The AAP Asthma Guideline for Pediatric Primary Care

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Abstract

Introduction: The purpose of this quality improvement project was to implement the AAP Asthma Guideline in a primary care setting. This project aimed to improve the quality of asthma care and decrease ER/urgent care transfer for pediatric asthma exacerbation.

Method: This project used a pre-post chart review design by educating four primary care providers were educated on the use of the AAP Asthma Guideline to identify and treat the pediatric population between 2-17 years with asthma at a pediatric primary clinic.

Result: Provider compliance with the guideline was analyzed by two-tailed Wilcoxon Signed Rank Test and ER/Urgent care transfer rate due to asthma exacerbation was analyzed by Odds Ratio analysis. During the project, the providers' compliance rate with the AAP guideline significantly increased. The providers achieved patient-centered education by communicating with their caregivers through asthma action plan. Improving providers' documentation in the Electronic Medical Record facilitated collaborating and communicating among team members which are essential to gain successful outcomes in the delivery of health care. However, the assumption that the AAP asthma guideline implementation will lead to lower the ER/urgent care transfer for asthma exacerbation could not be objectively demonstrated in this project since only a small sample size in a short timeframe was examined.

Introduction

Asthma is a complex environmental and genetic illness that affects individuals across the globe. It is one of the most prevalent chronic illnesses affecting approximately 6 million children in the United States (Zahran et al., 2018). Acute asthma exacerbations are high in children and are one of the leading causes of frequent childhood hospitalizations. Approximately, 60% of children with asthma have one or more acute exacerbations annually, which cost the US government more than $6.1 million (Pardue et al., 2016). In 2016, more than 6.1 million children in the US were diagnosed with asthma, which accounted for 135,000 hospitalizations annually and 383,000 deaths as of 2015 (Sawick et al., 2016). Evidence-based assessment tools can guide healthcare providers in measuring the asthma severity, starting the treatment process, and setting up a functional partnership with the children and their caregivers to minimize asthma exacerbation and to establish asthma control.

Asthma exacerbation assessment helps healthcare providers determine the priorities for all patients with asthma depending on the severity level. After the assessment, healthcare providers shift their concern to the classification of asthma severity to start and monitor control over time and ensure that the treatment process can be changed (Ban et al., 2018). Carrying out simple assessments improves the management of asthmatic patients both in the Emergency Room (ER) and primary care setting. The management of mild, moderate, and acute severe asthma exacerbations in primary care needs an effective assessment tool for measuring the severity of asthma that makes it possible to offer efficient treatment.

Background

Asthma is one of the predominant chronic disorders that affects over 6.1 million children in the US and leads to high numbers of preventable mortality and morbidity (CDC, 2018). The issue of acute asthma exacerbation assessment was first recognized in 1991 when the National Asthma Education and Prevention Program (NAEPP) published the strategies for diagnosis and asthma management (National Institutes of Health [NIH], 1991). This classification was divided into mild, moderate, and severe groupings based on several symptoms such as the frequency of exacerbations and school attendance for children. The severity assessment also included the level of exercise tolerance and pulmonary function tests before the beginning of asthma treatment processes (Yawn et al., 2019). Most importantly, however, the domains of severity and control were measured in terms of future risks and impairment levels. In 1997, NAEPP introduced moderate-persistent, mild-intermittent, mild-persistent, and severe-persistent asthma based on peak expiratory flow, frequency of symptoms, and peak-flow variability within 24 hours (NIH, 1997). During this time, children less than five years were only assessed using the symptom data alone. National Asthma Education and Prevention Program initiated the first classification of severe asthma assessment although how the severity was measured and modified remained unclear for some time.

Today, many health practitioners use different strategies to assess asthma exacerbations among children. The exacerbations categorized as mild, moderate, severe, or very severe are based on symptoms, lung function, and physical examination parameters among other factors (NIH, 2007). Children suffering from severe asthma exacerbation exhibit signs like inspiratory and expiratory wheezing, cyanosis, and retractions of the chest wall (Asthma and Allergy Foundation of America, 2017). However, one sign is not enough indication of asthma severity,

but an combination of symptoms can provide more accurate and valid data bearing in mind the connection between pathophysiology of asthma medical features (Magpuri, Dixon, McCorkle, & Crowley, 2018). This fact has triggered the development of different assessment methods to quantify the severity of asthma exacerbations. Assessment of asthma control begins with the history of past asthmatic exacerbations and challenges placed on the patient's daily activities such as sporting activities, use of medications, devotion to therapy, and other factors that may complicate care.

Problem Statement

Use of evidence-based assessment tools is a strategy that can guide healthcare providers in measuring the level of asthma severity, starting the treatment process, and deciding the nature of pediatric patients with severe asthma exacerbation (O'connor et al., 2015). Many patients who experience asthma exacerbation seek help from primary care facilities (Price et al., 2017) and, therefore, utilizing evidence-based tools that guide healthcare providers is a necessity (Patel et al., 2019). This project will take place at a primary care clinic that frequently treats asthma exacerbations. The clinic does not currently enforce specific asthma guidelines for providers to use, instead allowing providers to choose methods they prefer. The use of evidence-based assessment tools enhances patient wellbeing, quality of treatment, and intensifies the movement of asthmatic patients in the primary care setting. This project explores the AAP Asthma Guideline as an evidence-based guideline tool to assess the severity of asthma exacerbations among children in the primary care setting and to develop an effective treatment plan.

Purpose Statement

Primary care providers recognize the need to offer high quality care to all patients. The purpose of this QI project is to educate primary care providers on the use of the AAP Asthma

Guideline to identify and treat the pediatric population between 2-17 years with asthma and evaluate if that improve the providers' compliance rate with the evidence-based asthma guideline and reduces the number of ER/urgent care visits due to asthma attacks with a period of six weeks.

Project Question

Among asthmatic patients between 2-17 years of age, does the use of the AAP Asthma Guideline by healthcare providers to identify and treat the population increase the providers' compliance with the guideline and reduce the number of ER/urgent care transfers due to asthma exacerbations within the next six weeks compared to patients treated by healthcare providers without the use of the AAP Asthma Guideline?

P=Population of patients: Healthcare providers in pediatric clinic.

I=Intervention: Use of the AAP Asthma Guideline to asthmatic patients between 2-17 years of age.

C=Comparison: The compliance rate with the AAP Asthma Guideline and the number of incidence of ER/urgent care transfers due to asthma exacerbations of patients treated by providers prior to the implementation of the use of the AAP Asthma Guideline.

O=Outcome: Increased the providers' compliance rate with the guideline and reduced ER/urgent care visits for asthma attacks.

T=Timeframe: Six weeks.

Project Objectives

In the timeframe of this DNP project, the project site will:

a) Educate providers regarding implementation of the AAP Asthma Guideline prior to implementation of the DNP project.
b) Implement the AAP Asthma Guideline to treat asthmatic patients between 2-17 years of age in the primary pediatric clinic.
c) Increase the providers' compliance with the using the guideline.
d) Reduce ED/urgent care transfers for asthma exacerbation within the next 6 weeks.

Search Terms

An electronic search using databases including CINAHL, PubMed, Medscape, TUN-Jay Sexter Library, Google Scholar, UpToDate, and other governmental regulatory agencies such as the NIH and CDC were used. Search terms included "asthma", "asthma exacerbation", "pediatric", "primary care", "asthma guideline", and "the AAP Asthma Guideline" were used. Inclusion criteria included literature published from 2014 to 2019, meta-analysis, systematic reviews, randomized control trials, and cohort studies. Studies published prior to 2014 were considered only if historically relevant. Exclusion criteria included studies not relevant to the primary care environment. There were 40 eligible articles identified through the search, and 30 were selected for appraisal and literature review.

Literature Review

This review of the literature was conducted to identify the following:

1. Significance and risk factors of asthma exacerbations.
2. Prevention and management of asthma exacerbations in children.
3. Asthma severity assessments in children with acute asthma exacerbation.

Impact and Significance

Asthma exacerbation rates among asthmatic children in the US increased from a rate of 48 percent among children 18 years old and under in 2014 to 54 percent in 2016 (CDC, 2016). In 2015, a multicenter study in the US showed that the rate of ER visits with first-listed diagnosis of asthma were most frequent among children aged one to four years (14.6 visits per 1,000 population) and five to nine years (12.3 visits per 1,000 population) (McDermott, Stocks, & Freeman, 2018). Among one year and older pediatric age groups, asthma was the second most common category of first-listed ER conditions in 2015 (McDermott, Stocks, & Freeman, 2018). These statistics suggest that the identification of asthma exacerbation and treatment of asthma are crucial in the primary care setting to prevent ER visits.

Risk Factors for Asthma Exacerbations.

Race, ethnicity, and socioeconomic status. In the United States, asthma exacerbations are more prevalent among children who are African American, Puerto Rican, or economically undeserved (Frieden, 2013). Non-Hispanic (NH) blacks and Hispanics have a high risk of ER visits for asthma attack, compared with NH whites (Mehta et al., 2013).

Viral Infections. 85% of asthma attack in children is derived from respiratory viral infections including human rhinovirus (HRV) (Saraya et al., 2014). However, other respiratory viruses including respiratory syncytial virus (RSV), parainfluenza, influenza, and others often cause repetitive wheezing and severe asthma exacerbations in young children (Stein et al., 1999). Deunasa et al. (2016) reported that HRV was most commonly detected (73%), followed by influenza A (27%) and RSV (7.7%) in 175 children age 2 to 15 years. Also, multi-infection with two or more viruses was identified in 15 % of the participants (Duenas et al., 2016).

Air Pollution. Trasande et al. (2005) reported severe asthma exacerbation in children is caused by traffic-related air pollution. Estimated nine million dollars spent on health care for pediatric asthma exacerbations at two districts in California, Riverside and Long Beach, in 2012 (Brandt et al., 2012).

Allergens and Indoor Pollutants. In the United States, compared to children living in suburban areas, those living in urban areas in the Northeast are commonly exposed to certain allergens such as dust mites, cockroach, and mouse. Sensitized children are prone to develop poor asthma control and severe asthma exacerbations by exposure to allergens either indoors or outdoors (Kanchongkittiphon et al., 2015).

Psychosocial Stress. Chronic psychosocial stress is a cause of severe asthma exacerbations (Rosenberg et al., 2014). The potential mechanism for the undesirable effects of stress related to severe asthma attack includes a lack of adherence with controller medications, lower therapeutic responses (Brehm et al., 2015).

Poor Adherence to Treatment. Poor adherence to controller medications was significantly related to severe asthma exacerbations in pediatric population (Engelkes et al., 2015).

Current Management for Asthma Exacerbation.

An exacerbation is identified as a worsening in symptoms characterized by a change from the patient's previous status; occasionally the patients with the worsening symptoms are diagnosed as asthma. Optimal management of asthma exacerbation is essential such as self-management with an asthma action plan and appropriate escalation of intervention in primary care (NAEPP, 2007).

All asthma treatment guidelines consider the prevention of asthma exacerbations as an essential part of asthma control. The recommendations are following the AAP Asthma Guideline (2013) that is from the National Asthma Education and Prevention Program's (NAEPP's) expert panel (2007), and the NAEPP is part of the National Heart, Lung, and Blood Institute (NHLBI). The AAP Asthma Guideline (2013) set classification and management of asthma based on age group. The classification of the guidelines is based on the level of the children's risk including occurrence of acute severe exacerbations within the last 12 months and impairment including daily symptoms within the last 4 weeks. Based on risk and impairment, asthma is classified into intermittent, mild persistent, moderate persistent, and severe persistent. Control should be assessed by evaluating similar assessments and is classified as well controlled, not well controlled, or very poorly controlled. Following the classification of asthma severity and level of control, the AAP Asthma Guideline (2013) state taking a stepwise approach to pharmacologic treatment, which indicates increasing medications until asthma is controlled and adjusting medications when possible to reduce side effects.

The principal goals for managing asthma exacerbations include correction of significant hypoxia, an immediate reversal of airflow obstruction, and reduction of future recurrence. Short-acting inhaled β-agonists (SABAs) are the base of the treatment of acute asthma exacerbations. Systemic glucocorticoids should be considered for deterioration in symptoms and/or lung function after the first treatment with inhaled beta-agonists (AAP, 2013). Ganaie et al. (2016) reported appropriate administration of oral glucocorticoids for severe asthma exacerbations is recommended as the most effective intervention for decreasing ER visits and hospitalizations for asthma attacks. Additionally, the AAP Asthma Guideline (2013) recommends ensuring adequate baseline controller therapy including inhaled corticosteroids (ICSs) might be indicated to reduce

the recurrence of asthma exacerbation. ICSs improve lung function, reduce the incidence of asthma-related hospitalizations, decrease ER visits, and restrict the need for oral corticosteroids (Chauhan et al., 2012). The AAP Asthma Guideline (2013) recommends the intervention with inhaled corticosteroid/long-acting β-agonists (ICS/LABAs) for uncontrolled asthma with ICSs and/or LTRAs (AAP, 2013). However, severe asthma exacerbations continue in spite of helpful controller medications. According to the AAP Asthma Guideline (2013), the subspecialist consultation is necessary if 1) 0 to 4 years and step 3 care or higher is required, 2) 5 years or older and step 4 care or higher is required, and 3) difficulty in achieving or maintaining asthma control.

The AAP Asthma Guideline update (2019) reported the two major goals in managing asthma in children. First, the asthma management is for reducing impairment including supporting a good quality of life, normal activities without limitation, and decreasing missed school days. Second, the management is for reducing risk including staying children off systemic corticosteroids, decreasing ER/hospitalization, and supporting healthy lung function to avoid airway remodeling that is connected to chronic inflammation.

Addressing the Problem with Current Evidence

Even though the evidence-based asthma guidelines exist, unfortunately, asthma is related to significant morbidity and the intolerable number of preventable deaths (Booker, 2014). Asthma related medical care and missed school continue to burden our communities, costing more than $80 billion each year (Nurmagambetov et al., 2018). Prevention of asthma exacerbations has been placed as a crucial component of establishing best possible asthma control. The treatment of asthma is based on an assessment of severity and asthma control. Asthma disproportionately affects minorities and socioeconomically disadvantaged children.

Black children have the highest asthma morbidity and mortality rates of any US group, with twice the ER visit/hospitalization rate and 9 times the mortality rate as white children. To bridge these gaps, it is important to practice guideline-based management with accurate assessment of asthma severity and control.

Poor adherence to controller medications for asthma leads to severe asthma exacerbations, including ER visits and hospitalizations (Williams et al., 2011). Poor adherence to controller medications might be caused by provider underdiagnosis or undertreatment of asthma, or patients' poor compliance with medications (Fischer et al., 2010). Poor adherence to ICSs accounts for approximately 60% of asthma-related hospitalizations (Williams et al., 2007).

Evidence gaps.

Despite of evidence-based treatments and guideline-based care, asthma remains a significant public health problem and significant disparities in care. To reduce overall asthma morbidity and its racial and ethnic disparities, it is essential to support efforts to prevent asthma, build a capacity for integrated primary care, improve the identification of at-risk children, and remove barriers to guideline-based care.

Theoretical Framework

The theoretical framework to guide this DNP project was created by Dr. Deming who recognized organizations should focus on constant improvement and collaborate as a team. The Plan-Do-Study-Act (PDSA) cycle is utilized to assess Quality Improvement (QI) ideas (Byrne, Gang, & Carr, 2015) by developing, testing, and implementing new ideas (Gilliam & Siriwardena, 2013). The PDSA cycle is comprised of four cyclical, repeating phases: Plan, Do, Study, and Act (see Appendix A).

Historical Development of the Theory

The PDSA cycles introduced by Edward Deming which includes the four stages used for testing and implementing (Deming, 1919). The PDSA cycle is a powerful tool for achieving improvements in quality and safety and has been commonly used by healthcare organizations to accelerate healthcare processes and desirable results. The practical concepts of PDSA cycles recommend examining the selecting changes on a small scale if they produce QI and expand the tests to larger samples (IHI, 2016). These rapid assessments allow healthcare organizations to modify the change easily following analysis to support desirable results that are recognized (Damschroder et al., 2009).

Applicability of Theory to Current Practice

The concepts of QI have been implemented in healthcare to minimize errors and variation in results (Christoff, 2018). PDSA Methodology is commonly utilized for QI and PDSA cycles provide a frame for iterative testing of the changes to achieve the quality of system. Approaching to QI in healthcare is supported by modification on care systems. PDSA cycles aim at the crux of change, the conversion of goals and plans into actions (Taylor, 2014)

Frisina et al (2019) performed QI-interventions to fulfil the Healthy People (HP) 2020′s influenza vaccination goal of 90% among people working in healthcare settings. The QI interventions were focused on staff education, increased accessibility to influenzas vaccines, and improving communication with staff during multiple PDSA cycles. The researchers described QI-interventions remarkably improved the overall vaccination rates from 70.2% (2011–14 influenza seasons) to 84.9% (2014–15 influenza season) in PDSA 1, and 91.1% (2015–16

influenza season) in PDSA cycle 2. This research reported that using PDSA could perform as a method to improve patient outcomes by QI-interventions.

Bansal et al (2016) also utilized PDSA cycles in their study on communication and cancer. Using the PDSA cycle, the researchers reported that educating in the communication of goal of chemotherapy and utilization of checkboxes in progress note template could achieve competency in communication of goal of therapy in cancer patients. Improved patient satisfaction rates were attained on obtaining adequate information and reason for which they were given chemotherapy, and readiness of oncologists to listen, answer questions, and explain things thoroughly to them.

Hendriksma (2017) performed a QI program based on PDSA cycles in the safety net clinic to improve the quality of care in volunteer healthcare professionals. The formalization of the QI program in the safety net clinic during this PDSA cycles provides a strong foundation from which to launch the next PDSA cycle focusing on greater volunteer involvement (Hendriksma, 2017).

Major Tenets

Plan. In the plan stage, a change designed for improvement is recognized. An organization planned to improve with a distinct and solid intention (IHI, 2016). The plan should be completed at a determined time for the specific population who will be affected (IHI, 2016). Complying with the plan is essential; so is distributing the people and resources required to achieve the plan (IHI, 2016). In 2001, the Institute of Medicine (IOM, 2001) published a second report, Crossing the Quality Chasm: A New Health System for the 21st Century, which indicates six comprehensive “Aims for Improvement” for health care. First, we should prevent patients

from injuries from the care for help (IOM, 2001). Second, we should coordinate care with evidence-based science to prevent redundant care and inappropriate care (IOM, 2001). Third, we should respect the individual and their choices as patient-centered service (IOM, 2001). Fourth, we need to avoid unnecessary waiting for patients and their caregivers (IOM, 2001). Fifth, it should be efficient (IOM, 2001). At last, we should eliminate racial and ethnic gaps in health outcomes (IOM, 2001). Once the aim is recognized, it is necessary to make projections about what will occur and why (IOM, 2001). Also, it is important to create a plan to assess the change including who, what, when, where, what information required to be obtained (IOM, 2001).

Do. In the do stage, tested the change is identified. Once a team has chosen a plan and goal, developed criterions to verify whether a change contributes to an improvement, the following step is to carry out a change in the real worksite (IHI, 2016). The PDSA cycle is a simple tool for evaluating a change by planning, carrying it out, discovering the results, and complying with what is learned (IHI, 2016). This is the scientific strategy that leads to taking practical action to deal with the issue (IHI, 2016). The purpose to test changes are to assess the improvement from the change, to evaluate whether the suggested change will succeed in the real situation, to examine which combinations of changes will have the favorable results on the significant measures of quality, to estimate costs, social effect, and side effects from a suggested change, and to reduce resistance from application (IHI, 2016).

Study. In the study stage, the success of the change is examined. Evaluating the analysis of the data concurrently could bring remarkable quality improvements (THA, 2019). Concurrent data enables a healthcare facility to recognize the chance to announce or adjust an issue in real-time (THA, 2019). After compared the data to the projections, the next step is to outline and review what was learned (IHI, 2016). This phase provides the researchers to decide if the

changes are required to achieve the outcome successfully (THA, 2019). The data could be reviewed by checklists, direct monitoring, or surveys (THA, 2019).

Act. In the act stage, adaptations are identified and introduced to the next steps to inform a new cycle. Depending upon what was discovered from the test, it is necessary to decide what adjustments should be considered (IHI, 2016). The process procedures might be modified to more acceptable steps or included more staff training or other strategies to increase the responsibility for the new plan (THA, 2019). At last, a modified plan for the future test will be prepared (IHI, 2016). As a result of the act phase, the PDSA cycle makes a new beginning until the result has been fulfilled (THA, 2019).

Theory Application to the DNP Plan

Many patients who experience asthma exacerbation seek help from primary care facilities (Price et al., 2017) and, therefore, utilizing evidence-based tools that guide healthcare providers is a necessity. Evidence-based assessment tools can guide healthcare providers in measuring the asthma severity, starting the treatment process, and setting up a functional partnership with the children and their caregivers to minimize asthma exacerbation and to establish asthma control. The PDSA model served a theoretical framework that guided the implementation and evaluation of the AAP Asthma Guideline in a pediatric primary clinic serving pediatric populations.

The PDSA model was utilized to implement this DNP Project at the host site. As part of the Plan phase of this PDSA cycle, the AAP Asthma Guideline was selected to collaborate with the pediatric clinic providers. The AAP Asthma Guideline establishes a standard process to assessment and management of pediatric patients with asthma exacerbation. During the Do phase, the procedure the AAP Asthma Guideline was educated to the providers in a pediatric

clinic. Throughout the Study phase, the documentation compliance data, as well as the outcomes from the chart review, were analyzed. Documentation compliance was compared for two six-week periods: before this PDSA cycle and after the implementation of this PDSA cycle. The hope is that analysis of the outcome will reveal a reduction of ER/urgent care transfer for asthma exacerbation during the six weeks since the AAP Asthma Guideline implementation. As part of the Act phase, the outcomes reported during this PDSA cycle were reviewed. And the recommendations will be made for future PDSA cycles within the pediatric clinic. The ultimate goal is that the AAP Asthma Guideline will be integrated into the structure and process of the pediatric clinic to ensure protocol sustainability beyond this PDSA cycle.

Project Design

Description of project design

This project consists of QI methods to reduce asthma exacerbation by introducing the AAP Asthma Guideline to asthmatic patients between 2-17 years of age in a pediatric primary care setting. Many pediatric patients who experience asthma exacerbation seek help from primary care facilities (Price et al., 2017) and, therefore, utilizing evidence-based tools in measuring the level of asthma severity to guide healthcare providers is a necessity (Patel et al., 2019). The project lead met with the healthcare providers (N=4) to review the AAP Asthma Guideline for asthmatic children at the pediatric clinic. The lead educated the providers to implement the tool to evaluate asthma for the target population during a 6-week period. Data collected during the 6-week period were analyzed using a chart review tool developed exclusively for this project. The tool will determine the provider's compliance using the AAP Asthma Guideline and the efficacy of the guideline via the percent reduction of ER/urgent care transfer.

Setting

The project setting was a pediatric primary care clinic located in Houston, Texas. The clinic provides well-child checkups, immunizations, lab workup, asthma treatment, and other health services for the pediatric population from newborn to twenty-two years of age. The clinic serves approximately 60 individuals per day. The population served includes approximately 90% African Americans and Hispanics and 10% Caucasians, Middle Eastern, and Asians. At the time of the project, the clinic was supported by 4 providers including 1 board certified pediatricians, and 3 nurse practitioners. The site administrator has approved the project and staffs have been informed. Approval (Appendix G) have been granted from the project's clinic site.

Population of Interest

The direct population of interest are the four providers who implemented the AAP Asthma Guideline. The inclusive criteria are pediatricians and nurse practitioners who currently work for the pediatric clinic and agree to participate in the QI project. There are no exclusion criteria. The provider's patients are an indirect population of interest considering that this project intends to evaluate the percent reduction in ED/urgent care transfers. The inclusive criteria are all the patients with asthma/exercise-induced bronchospasm/asthma exacerbation age 2 to 17 years old at the pediatric clinic during the six weeks period. There are no exclusion criteria based upon sex/gender or race/ethnicity.

Stakeholders

The stakeholders are with an interest in the practice site and the services being offered, which would include the patients, pediatricians, nurse practitioners, medical assistants and managerial staffs. Those identified as key project stakeholders are essentially involved in the

healthcare organization and would be significantly affected by changes to the system. Due to the large number of stakeholders, it was important to encourage effective communication. To promote effective communication and rapport, the goals and plans were shared with all stakeholders before project initiation. Additionally, the stakeholder feedback was requested. Feedback may be used to modify or adapt project implementation methods to achieve the project outcomes more efficiently.

Recruitment methods

Following project approval from the clinic's administrator, the project lead did email/call to recruit the clinic's providers at the project site about the project and answer for the concerns and questions during the week 1. The project lead hosted the AAP Asthma Guideline training for the clinic's providers to the project. A lunch was provided during the training as an incentive for attendance as compensation. All information collected from the providers were kept confidential. Each chart was designated a number and a codebook was generated to record data in Excel worksheets. The data saved on the laptop were password protected. In addition, data collected were stored in Research Electronic Data Capture (REDCap), a secure web-based application to assist data capture for this project. Every effort was made to protect the data collected while accounting for privacy and confidentiality issues (AHRQ, 2018).

Tools

Several tools were developed and/or utilized for this DNP Project. Tools include the AAP Asthma Guideline, a chart review tool, and educational materials. Each aspect of the tool development is described further below.

AAP Asthma Guideline. The guideline (Appendix B) is an evidence-based, pediatric asthma guideline that provide accurate assessment of asthma severity and control. The AAP Asthma Guideline is based on the National Asthma Education and Prevention Program's (NAEPP's) expert panel (2007), and the NAEPP is part of the National Heart, Lung, and Blood Institute (NHLBI). Multiple research reported that the benefits of decreased ED visit from the national asthma guideline-based care (NAEPP, 2007; Garro et al., 2011; Lovinsky et al., 2010; Sin et al., 2002; Blais et al., 2004; Ly et al., 2007; Ducharme et al., 2011; Rowe et al., 1999). The AAP Asthma Guideline includes how to assess pediatric patients with an acute asthma exacerbation by recognizing early signs and symptoms of worsening asthma (AAP, 2013). Also, the guideline includes optimal pharmacotherapy options with an asthma action plan (AAP, 2013). The treatment options include an inhaled short-acting beta2-agonist (SABA) bronchodilator, systemic oral corticosteroids (OCS), a daily inhaled corticosteroid (ICS), long-acting beta2-agonist (LABA), and montelukast.

Chart review tools. Chart review tools (Appendix C) were utilized to evaluate the providers' compliance using the AAP Asthma Guideline. The measures include: 1) performing assessment with spirometry only for patients older than 5 years, 2) providing optimal treatment options based on stepwise approach, 3) Inspecting medications, inhaler, and spacer and educating the administration skills and knowledge for self-management, 4) providing asthma action plan based on the asthma severity and level of asthma control. Also, the chart review tools were used to determine if the patients transferred to ER/urgent care during the six weeks period. The tools were reviewed by the project team and reviewed and approved at the project site by stakeholders.

PowerPoint and education materials. The project lead developed training materials for staff. The training materials covered the AAP Asthma Guideline (Appendix B), and chart review tools (Appendix C), and asthma action plan (Appendix E) with patient education (Appendix D). The PowerPoint (Appendix F) guided the training and encouraged participation and feedback from the providers. These tools were reviewed by the project team and reviewed and approved at the project site by stakeholders.

Data collection procedures

The clinic electronic medical record (EMR) databases were accessed with permission to extract charts including the ICD 10 codes for asthma. The specific ICD 10 codes related to asthma include J45.20, J45.21, J45.22, J45.30, J45.31, J45.32, J45.40, J45.41, J45.42, J45.50, J45.51, J45.52, J45.901, J45.902, J45.909, J45.990, J45.991, and J45.998 which are listed on the chart review tools (Appendix C). The project lead reviewed the selected charts to determine providers' compliance with the AAP Asthma Guideline and the number of patients transferred to ER/urgent care pre/post-implementation of the AAP Asthma Guideline. Data collected were stored in Research Electronic Data Capture (REDCap), a secure web-based application to assist data capture for this project.

Providers' compliance with the AAP Asthma Guideline. Each provider that attended training and agreed to implement the AAP Asthma Guideline for six weeks was tracked by the project lead. Chart review tools were utilized to evaluate the providers' compliance using the AAP Asthma Guideline. The total 100 charts were collected, 50 pre-implementation and 50 post-implementation of the guideline to look at the percent compliances per provider before and after.

ED/urgent care transfer. The project lead reviewed the provider's notes to determine if the patients transferred to ER/urgent care due to asthma exacerbation before/during/after the visit during the six weeks period. This allowed a comparison of the number of patients transferred to a higher level of care pre/post-implementation of the AAP Asthma Guideline.

Intervention/Project Timeline

The proposed timeline for the DNP project is as follows:

Week 1

Week/Date	Activity
Week 1 February 21- February 27, 2020	The project lead did email/call to recruit the clinic's providers at the project site about the project on February 21 and answer for the concerns and questions until February 26. The site administrator has approved the project. Approval (Appendix G) has already been granted from the project's clinic site. The educational training for the providers was performed by the project lead at 10 AM on February 26th. It covers the AAP Asthma Guideline, chart review tools, asthma action plan, and inhaler spacer factsheet by using PowerPoint presentation. A total of 4 providers including 1 pediatrician and 3 nurse practitioners including project lead agreed to participate in the project. The project lead collected the providers' email address and contact number to communicate and answer any questions during the project implementation.

Week 2-6

Week/Date	Activity
Week 2 February 28 – March 3, 2020	The project implementation phase continued at the practice site. The project lead communicated and received feedback with other providers by email or text message that the implementation is going well without any change. The project lead completed 40 percent of the pre-implementation chart review.
Week 3 March 4- March 10, 2020	
Week 4 March 11- March 17, 2020	The project implementation phase continued at the practice site. The project lead completed 100 percent of the pre-implementation chart review which is the total 50 charts.
Week 5 March 18- March 24, 2020	The project lead communicated and received feedback with other providers by email or text message that the implementation is going well without any change.
Week 6 March 25- March 31, 2020	The project implementation phase continued at the practice site. The project lead completed 100 percent of the post-implementation chart review which is the total 50 charts.

Week 7

Week/Date	Activity
Week 7 April 1- April 7, 2020	The project lead analyzed project findings based on the chart review. The evaluation results will be disseminated to stakeholders upon completion.

Ethics/Human Subjects Protection

The project lead submitted Institutional Review Boards (IRB) determination forms per TUN policy. It is expected that the project will likely fall under the category of TUN quality improvement project which would not require IRB review. IRB is not required by the project site. Asthma management and prevention incorporated into this project are standard clinical procedures and consistent with established AAP Asthma Guideline. There are no direct risks for participants in this project. One potential benefit is that the AAP Asthma Guideline provide appropriate, evidence-based treatment of pediatric asthma exacerbation that gives the providers a blueprint of asthma exacerbation assessment and treatment. Patient's may benefit by learning their asthmatic status and taking the necessary precautions to reduce asthma exacerbation. A lunch was provided during the training as an incentive for attendance. No ethical issues or conflicts of interest have been identified for this project.

The clinic electronic medical record (EMR) databases were entered with permission to extract charts including the ICD codes for asthma. Data collected were stored in Research Electronic Data Capture (REDCap), a secure web-based application to assist data capture for this project. This is to protect the privacy and confidentiality of the participants while being engaged in the project.

Plan for Analysis/Evaluation

This QI project used a pre-post chart review design to evaluate the effectiveness of the AAP Asthma Guideline aimed to improve the providers' compliance rate with the evidence-based asthma guideline and decrease ER/urgent care transfer for pediatric asthma exacerbation. The analysis plan is to assess: 1) percent compliance with the AAP Asthma Guideline per

provider, and 2) the number of patients transferred to ER/urgent care pre/post-implementation of the AAP Asthma Guideline.

To address the first aim of the analysis of the project, patient charts (N=100) were reviewed, 50 pre-implementation and 50 post-implementation of the AAP Asthma Guideline. The AAP Asthma Guideline includes the essential 4 items including assessment, optimal treatment plan, inspection and education, asthma action plan with follow up plan based on the stepwise approach to managing asthma. A pre-implementation chart review between February 27th, 2019, through March 31st, 2019 was conducted by the project lead. A pre- and post-implementation chart review evaluated each providers' charts including the ICD codes relating to asthma diagnosis by utilizing chart review tools. Each provider that attended training and agreed to implement the AAP Asthma Guideline for six weeks between February 21st, 2020, through March 31st, 2020, was tracked by the project lead. Following the data collection, the percent compliances with the AAP Asthma Guideline per provider were analyzed by Wilcoxon Signed Rank Test with 95% confidence intervals. The Wilcoxon test is the appropriate analysis to compare differences derived from the same population when the dependent variable is ordinal or continuous. It is used to assess differences from matched pair designs or repeated measures. The distribution of the differences between the two related groups would be symmetrical in shape.

To address the second aim of the project, the same charts were reviewed by the project lead to determine the number of ER/urgent care transfer pre/post-implementation of the AAP Asthma Guideline. Odds Ratio with a 95% confidence interval was utilized to determine the effects of the AAP Asthma Guideline interventions which may reduce ER/urgent care transfers for asthma exacerbation. The odds ratio is the appropriate analysis to quantify the relationship between an exposure and a result in a case-control study. The exposure would be the AAP

Asthma Guideline implementation and the result would be ER/urgent care transfer due to asthma exacerbation. It was used to assess that the AAP Asthma Guideline implementation might be a protective factor against the ER/urgent care transfer.

Analysis of Results

The implementation of the AAP Asthma Guideline for preventing asthma exacerbation increased the providers' compliance rate of the asthma guideline (Table 2). The providers' compliance rate on the AAP Asthma Guideline increased from an average of 58% during the pre-implementation period to 94% during the post-implementation period. The number of ER/urgent care transfers for asthma exacerbation was also tracked at the practice site during the six-week implementation of the AAP guideline, but insufficient data was found to conduct statistically significant analysis (Table 5).

During the six-week implementation, the clinical providers served 75 asthmatic patients of 1413 patients. The project lead extracted 50 asthmatic patients' charts between 2-17 years of age for each pre-implementation period and post-implementation period (Table 1). The pre-implementation phase was selected from Feb 27th, 2019 to Mar 31st, 2019. The pre-implementation period of the provider 2 and provider 4 are different than others since they did not practice at the project site during the timeline. The post-implementation phase was performed from Feb 28th, 2020 to Mar 31st, 2020.

A two-tailed Wilcoxon Signed Rank Test with 95% confidence intervals was performed. This test assumes dependent samples, assessing before and after observations, and independence of the paired observations. The data showed a significant difference between each providers' compliance rate on the AAP Asthma Guideline at pre-implementation and post-implementation

with p-value ($p < .05$) (Table 4). The results showed that the implementation of the AAP Asthma Guideline increased the providers' compliance with evidence-based asthma care to patients (Table 2).

For this study, the following are the 4 levels of compliance used: one item is 25%, two items are 50%, three items are 75%, and four items are 100%. The measures used are classifying asthma severity and level if asthma control, providing optimal treatment options based on the stepwise approach, inspecting medications, inhaler, and spacer and educating the administration skills and knowledge for self-management, and providing asthma action plan and follow up plan. This implies that if the participant is compliant with one item, it is a 25% compliance rate, two items is 50% compliance rate, three items is 75 % compliance rate, and all four items is 100% compliance rate. Each provider is categorized depending on the compliance rate, which is based on the number of transactions they process during the period. Also, details on how the researcher reached the percent compliances are included in Appendix C.

Odds Ratio with 95% confidence intervals was performed to examine ER/urgent care transfers for asthma exacerbation. The data failed to show statistically significant to the reduction of ER/urgent care transfers for asthma exacerbation during the six-week implementation period of the AAP guideline (Table 5).

Discussion of Findings

The AAP Asthma Guideline was implemented by four providers for six weeks to identify and treat asthmatic children between 2-17 years of age in the primary pediatric clinic. Before implementation of the DNP project, the educational meeting for the participants executed to cover the AAP Asthma Guideline (Appendix B), chart review tools (Appendix C), inhaler spacer

factsheet (Appendix D), and asthma action plan (Appendix E) by using PowerPoint presentation (Appendix F). The project lead evaluated providers' charts to assess the providers' compliance rate with the AAP Asthma Guideline and ER/urgent care transfer rate for asthma exacerbation to compare between pre- and post-implementation of the AAP guideline. During the project, providers' documentation improved significantly at the site regarding the description of asthma severity and the history of the level of asthma control (Table 3) for initial diagnosis and treatment to achieve asthma control which helped communication between providers about the patients.

Utilizing handouts, patient education regarding inhaler use, and spacer use (Appendix D) was provided for effective medication application. Without the proper technique, patients could not gain the benefit of the therapy or achieve control. Providing an asthma action plan (Appendix E) improved the evidence-based practice of assessing asthma severity level and control of asthma exacerbation. Patients learn self-management skills and maintain long-term care for quality asthma management with the asthma action plan. NAEPP (2007) reported asthma control focuses on both arenas, 1) reducing impairment of symptoms and functional limitations; 2) reducing the risk of future asthma exacerbations.

By implementing the AAP Asthma Guideline, the practitioners not only provided the evidence-based optimal asthma management for the patients but also introduced the skills and tools for the patients and their caregivers to continue with their self-care at home and school. During each visit, providers became more engaged and invested in practice changes because primary care health professionals are at the forefront of care to minimize asthma exacerbation.

Data analysis revealed that the adherence to the AAP resulted in a decrease of asthma-related ER/urgent care transfers at the project site. However, the assumption that the AAP

Asthma Guideline implementation will lead to lower the ER/urgent care transfer for asthma exacerbation could not be objectively demonstrated in this project (Table 5) since only a small sample size in a short timeframe was examined.

Significance/Implications for Nursing

This project is significant to the nursing profession because it addresses the care of asthma among children leading to high numbers of preventable mortality and morbidity. Among one year and older pediatric age groups, asthma was the second most common category of first-listed ER conditions in 2015 (McDermott, Stocks, & Freeman, 2018). The identification of asthma exacerbation and treatment of asthma are crucial in the primary care setting to prevent ER visits. In addition, nurses have key roles to play in improving health outcomes for their patients through education, implementing evidence-based practice, and communicating with others. Throughout the DNP project, providers performed their essential roles to the vulnerable population with asthma. First, the providers' compliance rate significantly increased the guideline-based management for the targeted patients with asthma (Table 4) who are at higher risk for ER visits. Second, providers achieved patient-centered education by communicating with their caregivers and school nurse through asthma action plan. Third, improving providers' documentation in the EMR facilitated collaborating and communicating among team members which are essential to gain successful outcomes in the delivery of health care.

The implications for future practice are to maintain the AAP Asthma Guideline to the project site. It is crucial to implement the evidence-based guideline for providing quality asthma care and reducing asthma exacerbation for the pediatric population. Uncontrolled asthma has major adverse effects on the quality of life, and overall healthcare costs (Holmes, 2017). Nurses in primary care settings play a crucial role to manage chronic disease by providing health

education (Holmes, 2017). As leaders, DNP nurses have the education and competency to play the roles of advocates, educators, and clinicians capable of implementing the evidence-based guideline that serves to improve healthcare outcomes.

Limitations

According to Olufowote (2017), examining limitations of a QI project demonstrates awareness of the problems being examined. Highlighting limitations is essential as it addresses specific issues in the QI project. In this project, the primary limitation is a short time frame as the project lead had six weeks period for the implementation of evidence-based guidelines for asthma care. Gamble et al. (2017) mention that sufficient time is needed for research to be completed in the desired manner as the results of the study depend on the interaction between the researchers and the respondents. During this QI project, there were several barriers in data recruitment and collection techniques such as short timeframe, language barrier, difficulty in measuring AAP Asthma Guideline, and small sample size. The language barrier of Spanish-speaking caregivers which was resolved by providing educational materials in English and Spanish. The comprehensive asthma care based on the AAP Asthma Guideline was challenging to measure, which was determined by creating chart review tools. During the data analysis, the small sample size in the project impacted the failure to verify the assumption that the AAP Asthma Guideline implementation led to a decrease in ER/urgent care transfer due to asthma exacerbation.

Dissemination

Dissemination of findings is an essential element of DNP projects. Marín-González et al. (2016) stated that dissemination of a QI project is necessary as it results in an increased awareness of the project as well as maximizes the impact that a QI project can have in enhancing

the healthcare outcomes of the clients that will benefit from it. In this case, the QI project will be prepared as a PowerPoint presentation and delivered to Touro University Nevada faculty through Zoom online meetings on June 24th, 2020. Correspondingly, the project will be prepared as a poster presentation and delivered to NCNP (National Conference of Nurse Practitioner) 2020 Fall Conference in Las Vegas, NV. The QI project will also be submitted to the DNP repository. Grey (2013) stated that DNP students should submit their final doctoral projects to the DNP repository to have the opportunity to share their final evidence-based projects with other DNP students and faculty. The DNP candidate also plans to present this QI project to stakeholders and providers in current healthcare organizations on 2020 Fall meeting.

Project Sustainability

According to Daneshpour (2015), project sustainability is critical as it allows projects to promote sustainable development goals that shape society. In this project, the implementation of evidence-based asthma guidelines for the pediatric population was essential to the reduction of asthma-related ER/Urgent care visits. The project site has adopted the protocol as part of their daily clinical practice, and it is integrated into the EMR as a simple, easy to use template for checking asthma diagnosis or status, and a template plan including patient education.

Sustainability is necessary for long term changes. Ideally, the project lead had to buy in from providers as their participation is crucial in planning, monitoring, and delivery of project delivery and support processes (Gemünden, 2016). A few supportive efforts encouraged providers to continue applying the guideline in the pediatric clinic, including the following: reminding providers of implementing the AAP Asthma Guideline by using the templates during every monthly meeting for the next 6 months and providing providers of the multiple copies of

the asthma action plan and inhaler spacer factsheet in English and Spanish to promote patients' education.

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Table 1

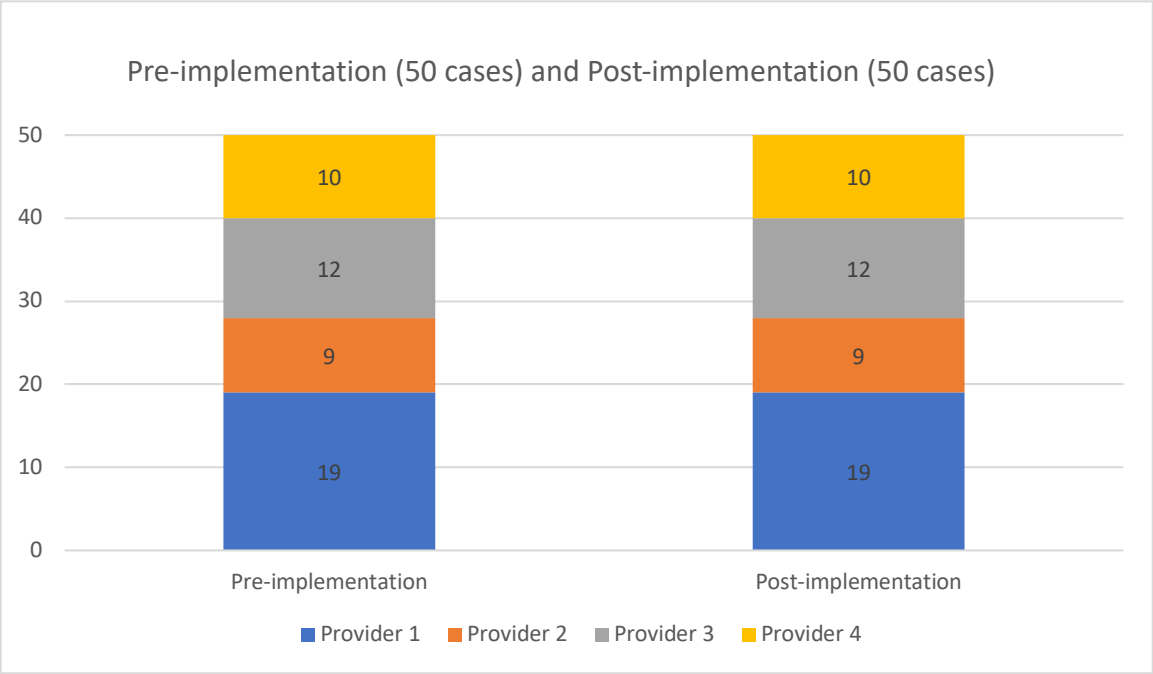

Pre-implementation (50 cases) and Post-implementation (50 cases)
50
40
30
20
10
0
10
12
9
19
10
12
9
19
Pre-implementation
Post-implementation
Provider 1
Provider 2
Provider 3
Provider 4

Table 2

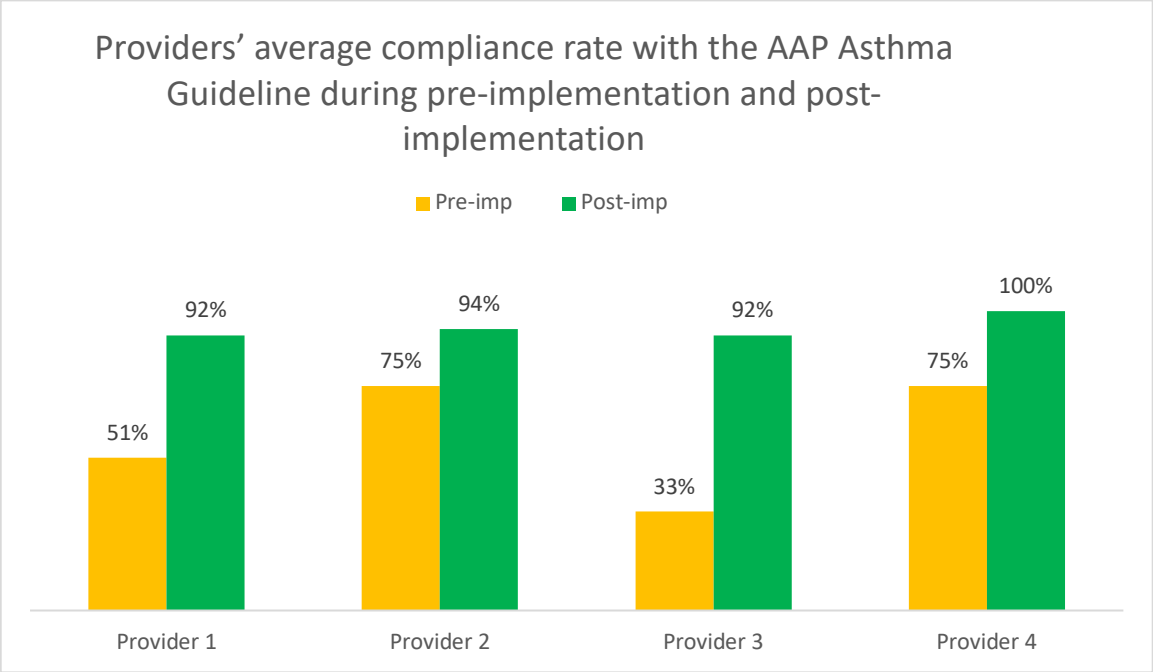
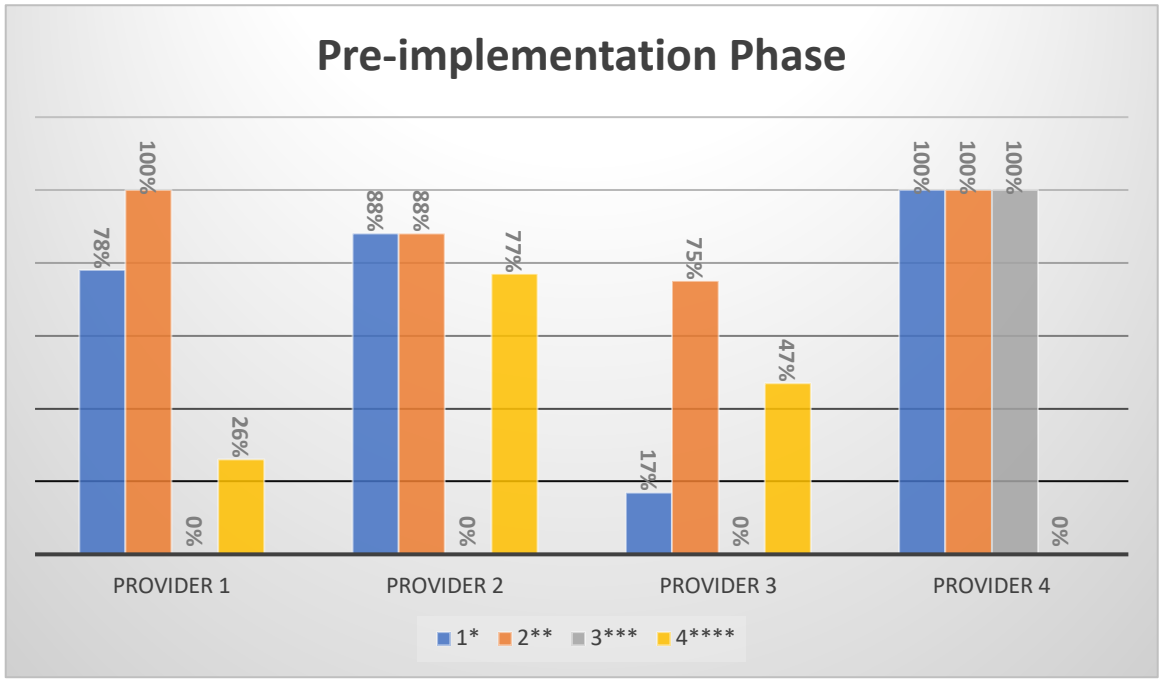
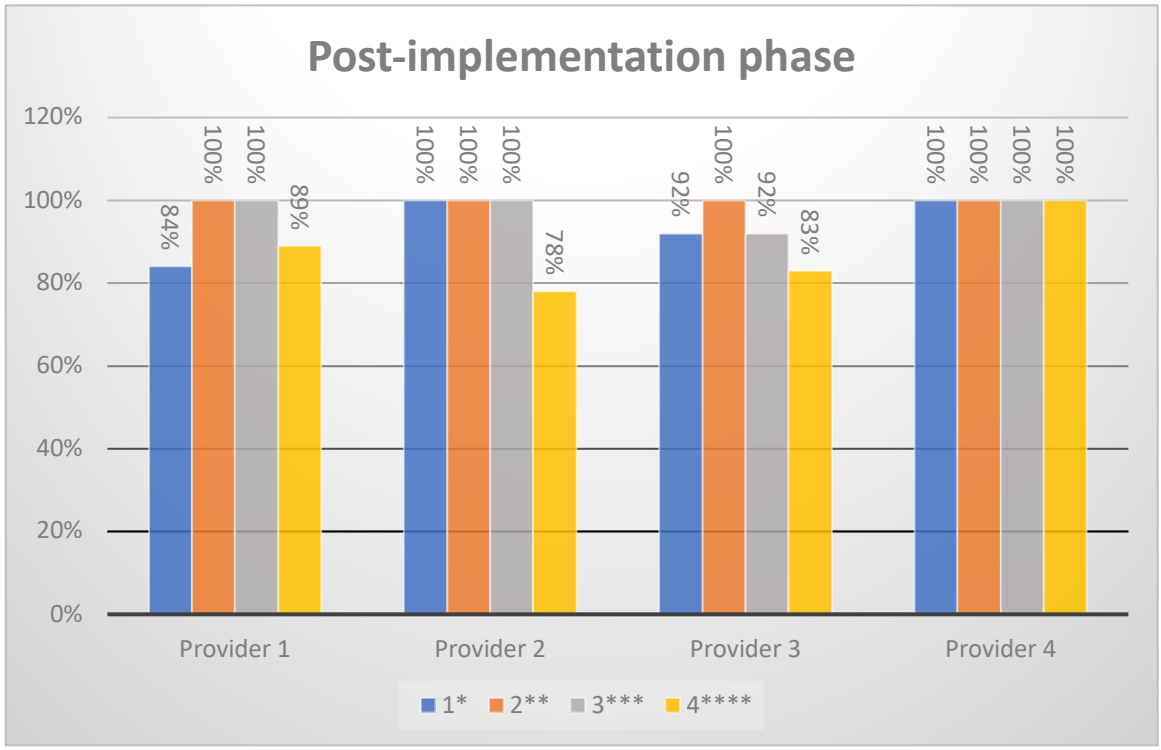

Providers' average compliance rate with the AAP Asthma Guideline during pre-implementation and post-implementation
Pre-imp
Post-imp
51%
92%
75%
94%
33%
92%
75%
100%
Provider 1
Provider 2
Provider 3
Provider 4

Table 3

Providers' average compliance rate with the four items of the AAP Asthma Guideline





1* is compliance rate with the classifying asthma severity and level of asthma control by using the AAP Asthma Guideline (Appendix B).

2** is compliance rate with the providing optimal treatment options based on the stepwise approach by using the AAP Asthma Guideline (Appendix B).

3*** is compliance rate with the inspecting medications, inhaler, and spacer and educating the administration skills and knowledge for self-management by using the Inhaler Spacer Factsheet (Appendix D).

4**** is compliance rate with the providing asthma action plan and follow up plan by using the Asthma Action Plan (Appendix E).

Table 4

Wilcoxon Signed Rank Test with 95% confidence intervals result				
Providers	A	B	C	D
W-Value	0	0	0	0
Mean Difference	-25	-72.73	-32.14	-25
Sum of pos. ranks	0	0	0	0
Sum of neg. ranks	171	66	28	55
Significance of the result ($p < .05$)	Yes	Yes	Yes	Yes

Table 5

Chart review results for ED/urgent care transfer			
	Transferred	Not transferred	Total
Pre-implementation	1	49	50
Post-implementation	1	49	50
Total	2	98	100
Odds Ratio with a 95% confidence interval result			
Odds ratio	0.4898		
95 % CI	0.0430 to 5.5818		
z statistic	0.575		
Significance level	P = 0.5653		

Appendix A

The Plan-Do-Study-Act Model

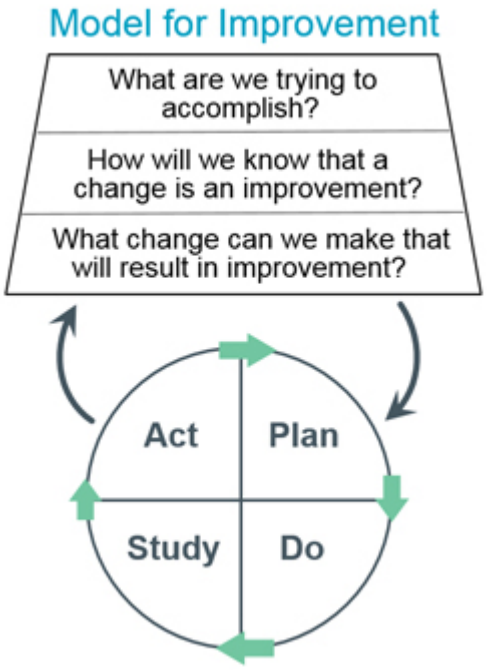


Figure A. The Plan-Do-Study-Act Model. Adapted from "Model for improvement: Plan-Do-Study-Act (PDSA) Cycles," by The Institute for Healthcare Improvement. Retrieved from http://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementTestingChanges.aspx.

Langley GL, Moen R, Nolan KM, Nolan TW, Norman CL, Provost LP. (2009). The Improvement Guide: A Practical Approach to Enhancing Organizational Performance (2nd edition). San Francisco: Jossey-Bass Publishers.

Appendix B

The AAP Asthma Guideline (2013)

https://www.aap.org/en-us/Documents/medicalhome_resources_keypointsforasthma.pdf

Key Points for Asthma Guideline Implementation

GOALS OF THERAPY

Reduce Impairment
- Prevent chronic and troublesome symptoms
- Minimize the need to use SABA for relief of asthma symptoms to ≤2 days/week
- Maintain (near) normal pulmonary function
- Maintain normal activity levels

Reduce Risk
- Prevent recurrent exacerbations
- Provide optimal pharmacotherapy with minimal or no adverse effects
- Minimize the need for ED visits or hospitalizations

Optimize Health and Function
- Provide initial and ongoing education to patient and family
- Educate patient and family to recognize and avoid triggers
- Partner with patient and family to identify treatment goals and achieve well-controlled asthma that allows patient to fully and safely participate in activities (eg, physical education, recess, sports, etc)
- Maintain patient's and family's satisfaction with asthma care

ASSESSMENT
- Classify asthma severity and level of asthma control
- Identify precipitating and exacerbating factors (ie, asthma triggers, including those in the home, school, and child care settings)
- Identify comorbid medical conditions that may adversely affect asthma management
- Periodically inspect medications, inhaler, and spacer to verify appropriate type
- Regularly assess the patient's and family's knowledge and skills for self-management, including medication administration and inhaler and spacer technique

VISIT FREQUENCY

If asthma is not well controlled: Visits at 2- to 6-week intervals are recommended
If asthma is well controlled: Visits at 3- to 6-month intervals are recommended to monitor how well asthma control is maintained and to adjust medications as necessary

PATIENT AND FAMILY EDUCATION

Incorporate the following into every clinical encounter:

Use a written asthma action plan to share when and how to:
- Take daily actions to control asthma
- Adjust medication in response to signs of worsening asthma

Knowledge
- Basic facts about asthma
- Role of medications

Skills
- Take medications correctly, use appropriate type of inhaler and spacer with proper technique
- Identify and avoid asthma triggers
- Self-monitor level of asthma control
- Recognize early signs and symptoms of worsening asthma
- Seek medical care as appropriate
- Communicate asthma information to school, child care center, and other caregivers

OBTAIN SUBSPECIALIST CONSULTATION IF:

(see Table 1 on the following page)
- 0-4 years and Step 3 care or higher is required (may consider consultation at Step 2)
- 5 years or older and Step 4 care or higher is required (may consider consultation at Step 3)
- Difficulty in achieving or maintaining asthma control

Information adapted from Texas Children's Health Plan's "Key Points for Asthma Guideline Implementation"

Acronyms
SABA = Short acting beta agonist
LABA = Long acting beta agonist
ICS = Inhaled corticosteroid
OCS = Oral corticosteroid
ED = emergency department

MEDICAL HOME CHAPTER CHAMPIONS
PROGRAM ON ASTHMA

Table 1: Stepwise approach to managing asthma

Steps	Preferred treatment
Step 1	SABA prn
Step 2	Low dose ICS
Step 3	0-4 years: Medium dose ICS + subspecialist referral ≥5 years: Low dose ICS + LABA or medium dose ICS
Step 4	Medium dose ICS + LABA or montelukast + subspecialist referral
Step 5	High dose ICS + LABA or montelukast + subspecialist referral
Step 6	High dose ICS + LABA or montelukast + OCS + subspecialist referral

Notes

- The stepwise approach is meant to assist—not replace—clinical decision making.
- Before step up, review adherence, inhaler technique, environmental control and comorbid conditions.
- If clear benefit is not observed within 4-6 weeks and/or technique and adherence is not satisfactory, consider adjusting therapy and/or alternative diagnoses.

Acronyms
SABA = Short acting beta agonist
LABA = Long acting beta agonist
ICS = Inhaled corticosteroid
OCS = Oral corticosteroid
ED = emergency department

Table 2: Classifying asthma severity and initiating therapy

Components of severity		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week	Daily	Throughout the day
	Nighttime awakenings	0 (≤4 years) ≤2x/month (≥5 years)	1-2x/month (≤4 years) 3-4x/month (≥5 years)	3-4x/month (≤4 years) >1x/week (≥5 years)	>1x/week (≤4 years) Often 7x/week (≥5 years)
	SABA use for symptoms	≤2 days/week	>2 days/week	Daily	Several times per day
	Limitation of normal activity	None	Minor	Some	Extreme
	Lung function *	FEV1>80% FEV1/FVC>85% (5-11 years) FEV1/FVC normal (≥12 years)	FEV1>80% FEV1/FVC>85% (5-11 years) FEV1/FVC normal (≥12 years)	FEV1>60% FEV1/FVC>75% (5-11 years) FEV1/FVC reduced by 5% (≥12 years)	FEV1<60% FEV1/FVC<75% (5-11 years) FEV1/FVC reduced >5% (≥12 years)
Risk	Exacerbations requiring OCS	0-1/year	≥2/6 months (0-4 years) ** ≥2/year (≥5 years)		
Recommended step for initiating therapy ***		Step 1	Step 2	Step 3	Step 3 (≤4 years) Step 3 or 4 (5-11 years) Step 4 or 5 (≥12 years)

Table 3: Assessing asthma control and adjusting therapy

Components of control		Well controlled	Not well controlled	Very poorly controlled
Impairment	Symptoms	≤2 days/week	>2 days/week or (if ≤11 years) multiple times ≤2 days/week	Throughout the day
	Nighttime awakenings	≤1x/month (if ≤12 years) ≤2x/month (if >12 years)	≥2x/month (if ≤12 years) 1-3x/week (if >12 years)	≥2x/week (if ≤12 years) ≥4x/week (if >12 years)
	Interference with normal activity	None	Some limitation	Extremely limited
	SABA use for symptoms	≤2 days/week	>2 days/week	Several times per day
	Lung function *	FEV1>80% FEV1/FVC>80%	FEV1 60-80% FEV1/FVC 75-80%	FEV1<60% FEV1/FVC<75%
Risk	Exacerbations requiring OCS	0-1x/year	2-3x/year (if 0-4 years) ≥2x/year (if ≥5 years)	≥3x/year (if 0-4 years) ≥2x/year (if ≥5 years)
	Reduction in lung growth	Requires long-term follow-up		
	Treatment related to adverse effects	Medication side effects do not correlate with specific levels of control, but should be considered in overall assessment of risk.		
Recommended action for treatment ****		Consider step down if well controlled for ≥3 months.	Step up 1 step. Re-evaluate in 2-6 weeks.	Consider short course oral corticosteroid. Step up 1-2 steps. Re-evaluate in 2 weeks.

* Some individuals with smaller lungs in relation to their height (such as a thin individual with narrow A-P diameter to their chest) may normally have FEV1<80% and/or FEV1/FVC<85%. Lung function measures should be correlated with clinical assessment of asthma severity.

** For 0-4 years, ≥4 wheezing episodes per year each lasting >1 day and risk factors for persistent asthma meets risk criteria for persistent asthma.

*** For initial therapy of moderate or severe persistent asthma that is poorly controlled, consider a short course of OCS.

**** Recommended guidelines

Appendix C

Chart Review Tools for 4 providers (1 pediatrician and 3 nurse practitioners)

Evaluation	**Measures**	**Number of charts**		
			Pre-implementation	Post-implementation
Patients between 2-17 years of age with the following ICD codes*				
Providers' compliance with the AAP Asthma Guideline	• Classifying asthma severity and level of asthma control** • Providing optimal treatment options based on the stepwise approach*** • Inspecting medications, inhaler, and spacer and educating the administration skills and knowledge for self-management****	The percent compliances	Pre-implementation	Post-implementation
		4 items (100%)		
		3 items (75%)		
		2 items (50%)		
		1 item (25%)		
		0 item (0%)		
		Total		

	• Providing asthma action plan and follow up plan****			
ED/urgent care transfer		Transferred	Not transferred	Total
	Pre-implementation			
	Post-implementation			
	Total			

* ICD codes include below:

1) J45.20 Mild intermittent asthma, uncomplicated. J45.21 Mild intermittent asthma, with (acute) exacerbation. J45.22 Mild intermittent asthma, with status asthmaticus. 2) J45.30 Mild persistent asthma, uncomplicated. J45.31 Mild persistent asthma, with (acute) exacerbation. J45.32 Mild persistent asthma, with status asthmaticus. 3) J45.40 Moderate persistent asthma, uncomplicated. J45.41 Moderate persistent asthma, with (acute) exacerbation. J45.42 Moderate persistent asthma, with status asthmaticus. 4) J45.50 Severe persistent asthma, uncomplicated. J45.51 Severe persistent asthma, with (acute) exacerbation. J45.52 Severe persistent asthma, with status asthmaticus. 5) J45.901 Other and unspecified asthma, with (acute) exacerbation. J45.902 Other and unspecified asthma, with status asthmaticus. J45.909 Other and unspecified asthma, uncomplicated. 6) J45.990 Exercise induced bronchospasm. J45.991 Cough variant asthma. J45.998 Other asthma.

** The 2019 AAP Asthma Guideline assessment includes 1) impairment including symptoms, nighttime awakenings, SABA use for symptoms, limitation of normal activity, and lung function(spirometry), 2) risk for exacerbations requiring oral corticosteroid.

*** Step 1 includes SABA prn. Step 2 includes low dose ICS. Step 3 includes medium dose ICS + subspecialist referral for age 0 to 4 years, low dose ICS + LABA or medium dose ICS for age 5 years and older. Step 4 includes medium dose ICS + LABA or montelukast + subspecialist referral. Step 5 includes high dose ICS + LABA or montelukast + subspecialist referral. Step 6 includes high dose ICS + LABA or montelukast + OCS + subspecialist referral.

****see Appendix E

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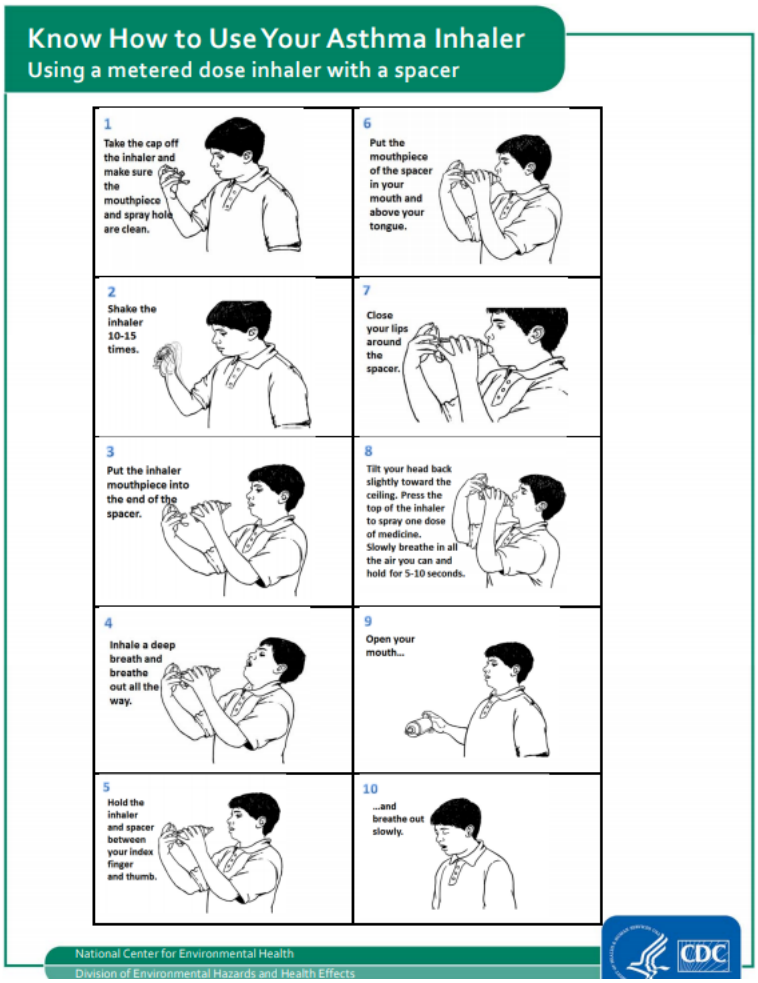
Appendix D

Inhaler Spacer Factsheet



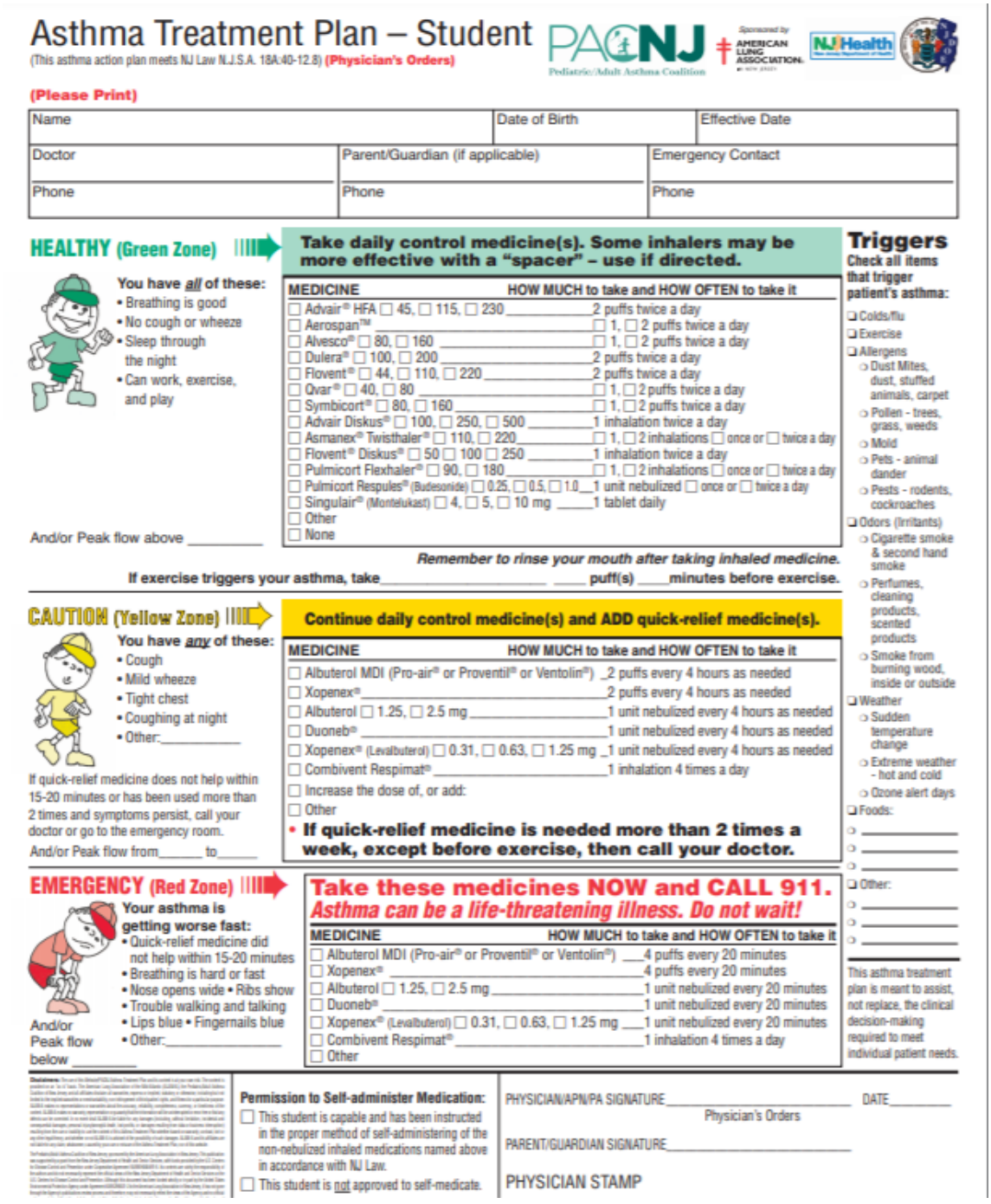
Medications, inhaler, and spacer, and administration skills

https://www.cdc.gov/asthma/inhaler_video/default.htm

Appendix E

Asthma Action Plan

http://www.pacnj.org/pdfs/atpfillablestudentengsp.pdf



Asthma Treatment Plan – Student

(This asthma action plan meets NJ Law N.J.S.A. 18A:40-12.8) **(Physician's Orders)**

PACNJ Pediatric/Adult Asthma Coalition — Sponsored by American Lung Association — NJ Health

(Please Print)

Name	Date of Birth	Effective Date
Doctor / Phone	Parent/Guardian (if applicable) / Phone	Emergency Contact / Phone

HEALTHY (Green Zone)

You have *all* of these:
- Breathing is good
- No cough or wheeze
- Sleep through the night
- Can work, exercise, and play

And/or Peak flow above _____

Take daily control medicine(s). Some inhalers may be more effective with a "spacer" – use if directed.

MEDICINE	HOW MUCH to take and HOW OFTEN to take it
☐ Advair® HFA ☐ 45, ☐ 115, ☐ 230	2 puffs twice a day
☐ Aerospan™	☐ 1, ☐ 2 puffs twice a day
☐ Alvesco® ☐ 80, ☐ 160	☐ 1, ☐ 2 puffs twice a day
☐ Dulera® ☐ 100, ☐ 200	2 puffs twice a day
☐ Flovent® ☐ 44, ☐ 110, ☐ 220	2 puffs twice a day
☐ Qvar® ☐ 40, ☐ 80	☐ 1, ☐ 2 puffs twice a day
☐ Symbicort® ☐ 80, ☐ 160	☐ 1, ☐ 2 puffs twice a day
☐ Advair Diskus® ☐ 100, ☐ 250, ☐ 500	1 inhalation twice a day
☐ Asmanex® Twisthaler® ☐ 110, ☐ 220	☐ 1, ☐ 2 inhalations ☐ once or ☐ twice a day
☐ Flovent® Diskus® ☐ 50 ☐ 100 ☐ 250	1 inhalation twice a day
☐ Pulmicort Flexhaler® ☐ 90, ☐ 180	☐ 1, ☐ 2 inhalations ☐ once or ☐ twice a day
☐ Pulmicort Respules® (Budesonide) ☐ 0.25, ☐ 0.5, ☐ 1.0	1 unit nebulized ☐ once or ☐ twice a day
☐ Singulair® (Montelukast) ☐ 4, ☐ 5, ☐ 10 mg	1 tablet daily
☐ Other	
☐ None	

Remember to rinse your mouth after taking inhaled medicine.

If exercise triggers your asthma, take_____ ____ puff(s) ____minutes before exercise.

CAUTION (Yellow Zone)

You have *any* of these:
- Cough
- Mild wheeze
- Tight chest
- Coughing at night
- Other:_____

If quick-relief medicine does not help within 15-20 minutes or has been used more than 2 times and symptoms persist, call your doctor or go to the emergency room.

And/or Peak flow from_____ to_____

Continue daily control medicine(s) and ADD quick-relief medicine(s).

MEDICINE	HOW MUCH to take and HOW OFTEN to take it
☐ Albuterol MDI (Pro-air® or Proventil® or Ventolin®)	2 puffs every 4 hours as needed
☐ Xopenex®	2 puffs every 4 hours as needed
☐ Albuterol ☐ 1.25, ☐ 2.5 mg	1 unit nebulized every 4 hours as needed
☐ Duoneb®	1 unit nebulized every 4 hours as needed
☐ Xopenex® (Levalbuterol) ☐ 0.31, ☐ 0.63, ☐ 1.25 mg	1 unit nebulized every 4 hours as needed
☐ Combivent Respimat®	1 inhalation 4 times a day
☐ Increase the dose of, or add:	
☐ Other	

- **If quick-relief medicine is needed more than 2 times a week, except before exercise, then call your doctor.**

EMERGENCY (Red Zone)

Your asthma is getting worse fast:
- Quick-relief medicine did not help within 15-20 minutes
- Breathing is hard or fast
- Nose opens wide • Ribs show
- Trouble walking and talking
- Lips blue • Fingernails blue
- Other:_____

And/or Peak flow below _____

Take these medicines NOW and CALL 911.

Asthma can be a life-threatening illness. Do not wait!

MEDICINE	HOW MUCH to take and HOW OFTEN to take it
☐ Albuterol MDI (Pro-air® or Proventil® or Ventolin®)	4 puffs every 20 minutes
☐ Xopenex®	4 puffs every 20 minutes
☐ Albuterol ☐ 1.25, ☐ 2.5 mg	1 unit nebulized every 20 minutes
☐ Duoneb®	1 unit nebulized every 20 minutes
☐ Xopenex® (Levalbuterol) ☐ 0.31, ☐ 0.63, ☐ 1.25 mg	1 unit nebulized every 20 minutes
☐ Combivent Respimat®	1 inhalation 4 times a day
☐ Other	

Triggers

Check all items that trigger patient's asthma:

- ☐ Colds/flu
- ☐ Exercise
- ☐ Allergens
  - Dust Mites, dust, stuffed animals, carpet
  - Pollen - trees, grass, weeds
  - Mold
  - Pets - animal dander
  - Pests - rodents, cockroaches
- ☐ Odors (Irritants)
  - Cigarette smoke & second hand smoke
  - Perfumes, cleaning products, scented products
  - Smoke from burning wood, inside or outside
- ☐ Weather
  - Sudden temperature change
  - Extreme weather - hot and cold
  - Ozone alert days
- ☐ Foods:
  - _____
  - _____
  - _____
- ☐ Other:
  - _____
  - _____
  - _____

This asthma treatment plan is meant to assist, not replace, the clinical decision-making required to meet individual patient needs.

Permission to Self-administer Medication:

☐ This student is capable and has been instructed in the proper method of self-administering of the non-nebulized inhaled medications named above in accordance with NJ Law.

☐ This student is not approved to self-medicate.

PHYSICIAN/APN/PA SIGNATURE_____ DATE_____

Physician's Orders

PARENT/GUARDIAN SIGNATURE_____

PHYSICIAN STAMP

Plan de Tratamiento del Asma - Para Estudiantes

(Este plan de acción para el asma cumple los requisitos de la ley de NJ N.J.S.A. 18A-40-12.8)

(Ordenes Medicas)

(en letra de imprenta)

The Pediatric/Adult Asthma Coalition of New Jersey — "Your Pathway to Asthma Control" — www.pacnj.org

Sponsored by AMERICAN LUNG ASSOCIATION. — NJ Health

Nombre	Fecha de nacimiento	Fecha de vigencia
Médico Teléfono	Padre, madre o tutor (si corresponde) Teléfono	Contacto de emergencia Teléfono

SALUDABLE (Verde Zona)

Usted presenta todo esto:

- La respiración es buena
- Ausencia de tos o silbido en su pecho
- Duerme toda la noche
- Puede trabajar, hacer ejercicio y jugar

Y/o flujo máximo mas de _____

Tome este medicamento(s) todos los días. Algunos inhaladores podrían ser mas eficaces si se usan con una cámara inhaladota – úsela como fue indicada.

MEDICAMENTO	CUÁNTO tomar y CUÁNDO tomarlo
☐ Advair® HFA ☐ 45, ☐ 115, ☐ 230	2 soplos dos veces al día
☐ Aerospan™	☐ 1 ☐ 2 soplos dos veces al día
☐ Alvesco® ☐ 80, ☐ 160	☐ 1 ☐ 2 soplos dos veces al día
☐ Dulera ☐ 100, ☐ 200	2 soplos dos veces al día
☐ Flovent® ☐ 44, ☐ 110, ☐ 220	2 soplos dos veces al día
☐ Qvar® ☐ 40, ☐ 80	☐ 1 ☐ 2 soplos dos veces al día
☐ Symbicort® ☐ 80, ☐ 160	☐ 1 ☐ 2 soplos dos veces al día
☐ Advair Diskus ☐ 100, ☐ 250, ☐ 500	1 inhalación dos veces al día
☐ Asmanex® Twisthaler® ☐ 110, ☐ 220	☐ 1 ☐ 2 inhalaciones ☐ una vez ☐ dos veces al día
☐ Flovent® Diskus® ☐ 50, ☐ 100, ☐ 250	1 inhalación dos veces al día
☐ Pulmicort Flexhaler® ☐ 90, ☐ 180	☐ 1 ☐ 2 inhalaciones ☐ una vez ☐ dos veces al día
☐ Pulmicort Respules® (Budesonide) ☐ 0.25, ☐ 0.5, ☐ 1.0	1 unidad nebulizada ☐ una vez ☐ dos veces al día
☐ Singulair (Montelukast) ☐ 4, ☐ 5, ☐ 10 mg	1 pastilla diaria
☐ Otro	
☐ Ninguno	

Recuerde enjuagarse la boca después de tomar medicamentos inhalados.

Si el ejercicio desencadena el asma, tome _____ ____ soplo(s) ____minutos antes de hacer ejercicio.

ADVERTENCIA (Amarillo Zona)

Usted tiene *alguno* de estos síntomas:

- Tos • Silbido leve
- Pecho apretado
- Tos nocturna
- Otro:_____

Y/o flujo máximo de_____ a_____

Llame a su doctor o vaya a la sala de emergencia si la medicina de alivio rápido no lo ayuda en 15 a 20 minutos, o ha usado la medicina mas de dos veces y los síntomas persisten.

Continúe tomando su(s) medicamento(s) de control diario y AGREGUE medicamento(s) de alivio rápida.

MEDICAMENTO	CUÁNTO tomar y CUÁNDO tomarlo
☐ Albuterol MDI (Pro-air® or Proventil® or Ventolin®)	2 soplos cada 4 horas según necesite
☐ Xopenex®	2 soplos cada 4 horas según necesite
☐ Albuterol ☐ 1.25, ☐ 2.5 mg	1 unidad nebulizada cada 4 horas según lo necesite
☐ Duoneb	1 unidad nebulizada cada 4 horas según lo necesite
☐ Xopenex® (Levalbuterol) ☐ 0.31, ☐ 0.63, ☐ 1.25 mg	1 unidad nebulizada cada 4 horas según lo necesite
☐ Combivent Respimat®	1 inhalación quatro veces al día
☐ Aumente la dosis o agregue:	
☐ Otro	

➡ **Llame a su medico si necesita la medicina de alivio rápido mas de dos veces por semana, excepto antes de hacer ejercicio.**

EMERGENCIA (Rojo Zona)

Su asma empeora rápidamente:

- El medicamento de alivio rápido no le ayudó en un lapso de 15 a 20 minutos
- La respiración es difícil o rápida
- Las aletas de la nariz se abren
- Se le ven las costillas
- Tiene problemas para caminar y para hablar
- Tiene los labios azules
- Tiene las uñas azules
- Otro:_____

Y/o un flujo máximo por debajo de_____

Tome estos medicamentos AHORA y LLAME al 911.

El asma puede ser una enfermedad potencialmente mortal. ¡No espere!

MEDICAMENTO	CUÁNTO tomar y CUÁNDO tomarlo
☐ Albuterol MDI (Pro-air® or Proventil® or Ventolin®)	4 soplos cada 20 minutos
☐ Xopenex®	4 soplos cada 20 minutos
☐ Albuterol ☐ 1.25, ☐ 2.5 mg	1 unidad nebulizada cada 4 horas según lo necesite
☐ Duoneb	1 unidad nebulizada cada 4 horas según lo necesite
☐ Xopenex® (Levalbuterol) ☐ 0.31, ☐ 0.63, ☐ 1.25 mg	1 unidad nebulizada cada 4 horas según lo necesite
☐ Combivent Respimat®	1 inhalación quatro veces al día
☐ Otro	

Disparadores

Marcar todos los factores que disparan el asma del paciente:

- ☐ Resfriados/ la influenza
- ☐ Ejercicios
- ☐ Alergias
  - ☐ Ácaros, polvo, peluches, alfombras
  - ☐ Polen – árboles, césped, monte
  - ☐ Moho
  - ☐ Mascotas – caspa de animales
  - ☐ Pestes – ratones, cucarachas
- ☐ Olores (irritantes)
  - ☐ Humo de cigarrillo y humo de segunda mano
  - ☐ Perfumes, productos de limpieza, productos perfumados
  - ☐ Humo de la Madera
- ☐ Clima
  - ☐ Cambios bruscos de temperatura
  - ☐ Temperaturas extremas - caliente o fría
  - ☐ Días de alerta ozono
- ☐ Alimentos:
  - ☐ _____
  - ☐ _____
  - ☐ _____
- ☐ Otros:
  - ☐ _____
  - ☐ _____
  - ☐ _____

Este plan de tratamiento para el asma ha sido diseñado para ayudar, no a reemplazar, la toma de decisiones clínicas requeridas para satisfacer las necesidades individuales de cada paciente.

SOLO PARA MENORES:

☐ Este estudiante es capaz y se le ha enseñado el método correcto, para que se administre a sí mismo los medicamentos inhalados no nebulizados nombrados arriba, según la Ley de NJ.

☐ Este estudiante no tiene la aprobación para automedicarse.

MÉDICO/APN/PA FIRMA_____ FECHA_____

(Ordenes Medicas)

PADRE, MADRE O TUTOR FIRMA_____

SELLO DEL MÉDICO

Save | Print | Print Only Selected Medicines

Appendix F

Presentation for the AAP Asthma Guideline implementation

Presentation for the AAP Asthma Guideline implementation.pptx

Appendix G

Permission Letter for Project

To,

Minjung Hong-DeCapio

Family Nurse Practitioner,

Touro University Nevada, Las Vegas, NV

February 10, 2020

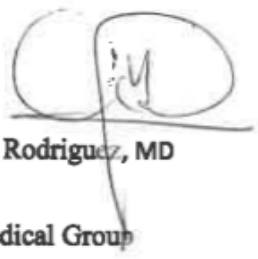
Subject: Permission for conducting project

Dear Ms. Hong-DeCapio,

I am pleased to inform that MD Medical Group permit you in respect of your project request for implementing the AAP asthma guideline in MD Kids Pediatrics. Your initiative is appreciable, and we are ready to support the project at my best.

We wish you all the best in your project.

Yours truly,



Ana Veronica Rodriguez, MD

CMO MD Medical Group