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Evaluating the Use of the Asthma Action Plan and the Asthma Control Test by Providers in a Primary Care Office after Implementation into the Electronic Health Record

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Dedication

This scholarly project is dedicated to all people with asthma, to those still struggling with

control, to those whose asthma is well-controlled, as well as to those who have passed because of

they could not get the care they needed. And to my family who have been such great supporters

and cheerleaders though this process.

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Abstract

Asthma is a life-long chronic lung disease that inflames and narrows a person's airway. Asthma results in recurring periods of chest tightness, wheezing with inspiration and/or expiration, shortness of breath, nighttime or early morning coughing, and trouble sleeping as a result of coughing and wheezing. An asthma exacerbation occurs when asthma symptoms worsen enough to require medical intervention or self-administration of oral corticosteroids. Exacerbations can be graded in severity as mild, moderate, severe, and life threatening. An asthma action plan (AAP) is a written treatment plan developed collaboratively between the health care professional and the patient for self-management and maintenance of asthma symptoms. Despite the benefits of the AAPs, they are underused by primary care providers and are infrequently updated despite the variable nature of the disease. The Asthma Control Test (ACT) is a valid and reliable patient-based 5-item assessment tool to assess patient asthma control. The ACT is based on asthma management guidelines including asthma symptoms, use of rescue medications, and the impact that asthma has on daily functioning. The Childhood Asthma Control Test (C-ACT) is a 7-item patient-based assessment tool used to determine asthma control in children. This project aimed to increase the providers' use of these tools at a Midwestern state-supported University's nurse-managed academic Family Health Center (FHC). The project included (a) incorporating the ACT and the AAP into the FHC's electronic health record. (b) an in-service for all providers by an asthma expert to review the disease and the importance of patient self-monitoring with these tools, and (c) a record review comparing the use of these tools before and after the initiation of this project. The results of this project demonstrated the acceptability of these tools by the providers and an increased use in the electronic health record.

Executive Summary

According to the National Asthma Education and Prevention Program (NAEPP) 2007 guidelines, providers should use asthma action plans (AAPs) with all of their asthmatic patients. Providers should also utilize the asthma control test (ACT) to assist with assessment of asthma control. After a thorough organizational assessment of a Midwestern state-supported University's nurse-managed academic Family Health Center (FHC), it was noted that the providers do not consistently utilize these tools with their asthmatic patients.

The goal of this project was to make these tools easily accessible for the providers to use. This was done by incorporating these tools into the electronic health record (EHR), Athena. There was a pre-implementation provider interview as well as a pre-implementation chart review in order to assess provider perspective and use of these tools prior to implementation. After the tools were incorporated into the EHR, an asthma in-service was conducted by an asthma expert in order to educate providers about the importance of the use of these tools. The providers then had the green light to begin utilization of these tools with their asthmatic patients. After the implementation period, providers were then interviewed again to determine their perspectives about the ease of use of the tools and any barriers they encountered. A post-implementation chart review was conducted in order to determine the increase in use of these tools by the providers.

The charts of patients with asthma between the ages of 3 and 24 were reviewed. There were only 129 patients that fell into this category. There were only 30 active patients who had been seen by a provider at the FHC in the last 3 years. In the first three months of 2015, four (13.3%) of these 30 had AAPs in their charts and two (6.67%) had an ACT. In their initial interviews, only one provider (25%) used AAPs consistently and ACTs as able. At the end of the implementation period, chart reviews revealed that there was an increase of 100% in AAP

usage and an increase of 83% in ACT usage. Overall, the providers at the FHC believed that the two implemented tools were very useful and helpful to their practice of caring for the asthmatic patient populations. The use increased among the providers and they have stated that they will continue to utilize these tools in their practice.

Introduction and Background

Asthma is a common chronic lung disease that inflames and narrows a person's airways. Asthma results in recurring periods of chest tightness, wheezing with inspiration and/or expiration, shortness of breath, coughing, which usually occurs at night or early in the morning, and trouble sleeping as a result of coughing and wheezing (Friedman, 2010; Yates, 2013). Nocturnal awakening with coughing is such a common symptom of asthma that its absence often leads experienced providers to doubt an asthma diagnosis (McFadden & Gilbert, 1992). Asthma is currently the leading pediatric chronic illness in the United States (US) with a steady increase of the disease in children who are 6 years of age and under (Friedman, 2010).

There are many individuals, both young and old, who live and struggle daily with chronic diseases. According to the World Health Organization (WHO), "chronic diseases, such as heart disease, stroke, cancer, chronic respiratory diseases and diabetes, are by far the leading cause of mortality in the world, representing 60% of all deaths" (WHO, 2015, para.1). Out of the 35 million people who died from chronic disease in 2005, half were under 70 years of age and half were women (WHO, 2015). In the United States alone, an estimated 99 million people live with chronic illness and the annual cost of medical care for chronic diseases in 2003 was $1.67 trillion (Pierson, Schumann, & Berner, 2008; Rothman & Wagner, 2003).

Asthma is a life-long disease and should ideally be managed with the collaboration of the patient, primary care provider (PCP), an asthma educator, a pulmonologist/immunologist, and/or an allergist. Asthma exacerbation is defined as a worsening of asthma symptoms, which are severe enough to require intervention from a medical professional, or self-administration of oral corticosteroids. Exacerbations of asthma can be classified or graded in severity as mild, moderate, severe, and life threatening (Sears, 2008).

Asthma affects more children than it does adults. According to Akinbani and Moorman (2011), about 1 in 10 children (10%) and 1 in 12 adults (8%) suffer from asthma. Although it is a life-long disorder, with proper treatment and/or management of the disease, the patient can achieve a good quality of life (McFadden & Gilbert, 1992; Yates, 2013). It is a major cause of morbidity and mortality in the world and has been increasing in prevalence in the last 20 years especially in children (Khan, Maharaj, Seerattan, & Babwah, 2013; Sears, 2008; Sykes & Johnston, 2008). According to the Center for Disease Control and Prevention (CDC) and the National Center for Health Statistics Report on Asthma Prevalence, Healthcare Use and Mortality from 2005 to 2009, asthma prevalence in children in the US increased from 8.7% (1.77 million children) in 2001 to 9.6% (7.1 million children) in 2009 (Akinbami & Moorman, 2011; Friedman, 2010; Moorman et al., 2012; Yates, 2013). The prevalence of asthma in the general American population from 2005 to 2009 is 8.2% of the U.S. population, which is approximately 24.6 million people. Direct and indirect costs of asthma are estimated to amount to about $56 billion each year in the United States (CDC, 2013). The average yearly cost of care for a patient with asthma was $1,039 in 2009 (CDC, 2013). According to the CDC, asthma caused 10.5 million missed days of school and 14.2 million missed days of work in 2008 (CDC, 2013). In 2010, asthma accounted for approximately 3,404 deaths, 439,400 hospitalizations, 1.8 million emergency department (ED) visits, and 14.2 million PCP office visits (CDC, 2013). An estimated 750,954 adults and 254,583 children in Michigan had asthma in 2008 (CDC, n.d.). Prevalence is also greater in females, in children, in Non-Hispanic Black and Puerto Rican ethnicities, and in those who live below the poverty level (Yates, 2013).

The increased prevalence of asthma means that more primary care providers (PCPs) will encounter more patients with asthma. It is essential that each patient be properly assessed for asthma symptoms and how well this disease is being treated and maintained. Accurate

assessment and treatment by the PCP will enable the patient to maintain the best possible lung function and quality of life. It is also necessary for the PCP to include the patient in the treatment plan. Collaboration between the PCP and the patient assures a good understanding of the treatment plan and leads to better patient outcomes and quality of life.

Problem Statement

Providing the best evidence-based practice to manage asthma and the resulting improved asthma control and quality of life for patients is the goal for PCPs who care for asthmatic patients. In order to do that, providers need to remember to use the tools available to them and to ensure that the treatment plan is well understood and followed by the patient. An Asthma Action Plan (AAP) is a written treatment plan developed collaboratively between the health care professional and the patient for self-management and maintenance of asthma symptoms (Gillette et al., 2013; Khan, et al 2013; Tolomeo, 2013). Individualized AAPs have been shown to increase a patient's quality of life and serve as both an educational and step-by-step action tool for the patient (Booth, 2012; Gillette et al., 2013). Accurate and successful AAPs contain information for the patient regarding asthma triggers, and medication names, doses, and frequency of use. Additionally, the AAP teaches the patient how to recognize signs indicating worsening asthma. It also has information for the patient about what changes to make in treatment when asthma symptoms change. The AAP informs the patient about interventions to perform in the event of an exacerbation. These elements all improve the patient's quality of life and prevent hospitalizations (Booth, 2012; Gillette et al., 2013; Khan et al., 2013; Polisena et al., 2007; Tolomeo, 2013). According to the CDC (2013), 48.6% of children were more likely to report having an AAP compared with 27.4% of adults in the United States in 2010. The guiding question for this project was: How much will the use of the ACT and the AAP increase at the FHC after the implementation of these tools into the Athena electronic health record (EHR)?

Evidence-Based Initiative

Literature reviews are important as they serve to support the usefulness or success of a process or an intervention. This literature review was conducted to help support the feasibility of using the written AAP, the Asthma Control Test (ACT), and the Childhood-ACT (C-ACT) with asthmatic patients in primary care to improve management of asthma and therefore their quality of life. In order to achieve a comprehensive search for relevant research articles for the selected practice problem, several electronic databases were searched via the University's library of databases. These databases included CINAHL, ProQuest, and Medline Plus. The key terms used in the search included multiple combinations of the following: Asthma, Exacerbation of Asthma, Assessment of Asthma, Childhood Asthma Control Test, Asthma Control Test, Asthma Action Plan, Personalized Written Asthma Action Plan, Asthma and Primary Care, Treatment of Asthma, Electronic Health Record (EHR) Adoption, Attitudes to EHR innovations, and Provider Attitudes to EHR Innovation and Adoption to be included in this integrative literature review. In order for the articles to be used in this literature review, they had to meet the inclusion criteria.

The inclusion criteria for the articles included in this review were that they needed to be full text articles written in English, the interventions implemented needed to involve the use of a written AAP and the C-ACT or the ACT. The articles also had to have research into providers' attitudes to EHR innovation. The search criteria resulted in over 100 articles, however, only 27 of those articles met the inclusion criteria and could be used. The studies were chosen regardless of whether or not there was a significant improvement in asthma with the utilization of the AAP and the ACT. The articles used included cross-sectional analyses, meta-analyses, randomized control trials, validation studies, review articles, longitudinal studies, qualitative research articles, and systematic reviews.

Current Asthma Guidelines and Expected Outcomes

The National Asthma Education and Prevention Program (NAEPP, 2007) guidelines clearly outline assessment and management options for asthma. The goal of these guidelines is for providers to deliver quality care to patients with asthma. The goals of asthma control are reducing impairment and reducing risk (NAEPP, 2007). Reducing impairment involves reduction of the intensity and frequency of symptoms and functional impairment experienced by the patient. Reducing risk encompasses decreasing the likelihood of future asthma exacerbations, decreasing the progressive declines in lung function, and minimizing the medication side effects (NAEPP, 2007).

In order to properly assess a patient who is suspected to have asthma or one who does have asthma, the provider can refer to the NAEPP assessment guidelines. Monitoring of asthma symptoms is also outlined to ensure that patients' current treatment regimens are achieving good asthma control (NAEPP, 2007). According to the guidelines, at each visit, the provider is to assess asthma control, proper medication administration technique, written AAP, patient adherence, and patient concerns. The provider must obtain lung function measures by spirometry at least every one to two years. This may be done more frequently for asthma that is not well controlled (NAEPP, 2007). Medication therapy of inhaled corticosteroids must be used for long term asthma care. A short acting beta-agonist may also be prescribed to the patient for use during exacerbations (NAEPP, 2007). During follow-up visits, the provider, after assessing the patient, must determine whether or not it is appropriate to adjust therapy. Follow-up visits must be scheduled every two to six weeks while gaining asthma control, every one to six months to monitor control, and every three months if a step down in therapy is anticipated.

According to the NAEPP (2007), a written AAP must be developed in partnership with the patient and family. Both parties need to agree on treatment goals to ensure successful asthma

control. The provider must then teach patients how to use the AAP to take daily actions to control asthma, adjust medications in response to exacerbations, and seek medical care as appropriate (NAEPP, 2007). The provider must also encourage adherence to the AAP and review the plan at each visit. Praise and encouragement for adhering to plans may be given to ensure continued success. The NAEPP (2007) has posited that following their recommended asthma guidelines can result in improved asthma control and outcomes.

Written Asthma Action Plan (AAP)

In 1991, the NAEPP published the first Executive Summary for the Guidelines for the Diagnosis and Management of Asthma (Mangold & Salzman, 2005). It was in this initial report that written AAPs were first published. Providers and practices have since adapted the first AAP into different versions for their own use (Mangold & Salzman, 2005). A written AAP is a written treatment plan developed collaboratively between the health care professional and the patient for self-management and maintenance of asthma symptoms (Gillette et al., 2013; Khan et al., 2013; Tolomeo, 2013). Individualized written AAPs have been shown to increase a patient's quality of life and may serve as both an educational and step-by-step action tool for the patient (Booth, 2012; Gillette et al., 2013). Accurate and successful written AAPs must contain information for the patient regarding asthma triggers, and medication names, doses, and frequency of use. Additionally, the written AAP teaches the patient how to recognize signs indicating worsening asthma, what changes to make in treatment or medication when asthma symptoms change as well as interventions to use in the event of an exacerbation. These elements all improve the patient's quality of life and prevent hospitalizations (Booth, 2012; Gillette et al., 2013; Khan et al., 2013; Polisena et al., 2007; Tolomeo, 2013). See a sample of the AAP in Appendix A.

Booth (2012), in his article, seeks to emphasize the importance of written AAPs for asthmatics. The author states "there is strong evidence which suggests that personalized asthma action plans improve patient quality of life, reduce the risk of asthma exacerbations, and prevent hospital admissions for people with asthma" (Booth, 2012, p. 594). According the author, the key components of the personalized written AAPs are helping people with asthma to understand their condition and respond early enough to prevent potentially life threatening complications. The contents of the personalized written AAPs should contain certain essential information for the patient such as how to recognize worsening symptoms, medication details, and strategies to use in the event of an exacerbation. This also includes when to increase treatment, how to increase treatment, how long to increase the treatment for, and also when to seek medical help (Booth, 2012). With all this information available to the patient and/or caregivers, it is easier for the patient to maintain appropriate control of his/her asthma.

According to Tolomeo (2013), a written AAP is "a written (asthma) plan developed by both the health care provider and the patient" (p. 329). The patient then uses this written AAP to practice self-management of his/her asthma and its symptoms. Patient education is a vital component in the treatment and management of asthma. This essential element is endorsed by the National Heart, Lung, and Blood Institute's Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (NAEPP, 2007; Tolomeo, 2013). The main purpose of this self-management education is to reduce the morbidity and mortality associated with asthma and to improve the quality of life of asthmatic patients. Self-management education may include teaching both the patient and his/her family basic facts about the disease, what role medications play in the management of asthma and its symptoms, medication administrations skills (especially the use of spacers with inhalers), early recognition of symptoms, environmental control measures, as well as the provision of a written AAP that is reviewed regularly (Tolomeo,

2013). Tolomeo (2013) continues to state that various studies have demonstrated improvements in asthma outcomes such as fewer Emergency Department (ED) visits and hospitalizations, fewer exacerbations, and more self-management behaviors and more sick visits to PCPs related to asthma as well as follow up visits in conjunction with the proper use of written AAPs.

In a recent Cochrane review, Bhogal, Zemek, and Ducharme (2007) conducted a review to determine the independent effect of providing a personalized written AAP as compared to not providing one. The participants included 335 children and adolescents, aged 0 to 17. They also sought to determine the effect of the different AAPs: symptom-based versus peak flow monitoring AAPs. Four randomized controlled trials were included in this review. The researchers determined that the asthmatic patients preferred and used the symptoms-based written AAPs and had a lower incidence of exacerbations leading to acute care visits compared to those who did not have written AAPs (Bhogal et al., 2007). There were no significant group differences in the rate of exacerbation requiring oral steroids or admission, school absenteeism, lung function, symptom score, and quality of life. The evidence suggests that symptom-based AAPs are superior to peak flow AAPs for preventing acute care visits although there is insufficient data to conclude whether the observed advantage is as a result of greater adherence to monitoring symptoms, earlier identification of onset of exacerbations, higher threshold for presentation to acute care settings, or the specific treatment recommendations (Bhogal et al., 2007).

Khan et al. (2013) conducted a randomized controlled trial to determine the effectiveness of written AAPs in the management of children with partly controlled asthma. There were 45 children in the intervention group and 46 in the control group making a total of 91 study participants between the ages of 1 and 14 (Khan et al., 2013). The children in the intervention group received personalized written AAPs and asthma education while those in the control group

did not. The primary outcome measured was the number of ED visits, but the researchers also sought to determine the difference in the number of acute asthma attacks, missed school days, nighttime awakenings, and unscheduled asthma-related PCP visits (Khan et al., 2013). At the conclusion of the study, the authors determined that the intervention group had significantly improved asthma outcomes when compared to the control group. The intervention group had fewer ED visits (22 compared to 29, p=0.005), fewer acute asthma events (24 compared to 29, p=0.0064), fewer nighttime awakenings (19 compared to 25, p=0.48), fewer missed school days (5 compared to 13, p=0.23), and fewer unscheduled asthma related PCP visits (12 compared to 15, p=0.69) than those in the control group (Khan et al., 2013). The authors concluded their study with the suggestion that the provision of personalized written AAPs may play an important role in the management of asthma for children with partly controlled asthma (Khan et al., 2013).

Garg, Bidani, Rich, Hershey, and Hershey (2005) offered a different approach to personalized written AAPs by focusing on patients as far as their knowledge, perception of, and adherence to asthma guidelines is concerned. This is because patients' knowledge and perceptions about asthma management correlate with the quality of their asthma outcomes. The authors conducted a study to determine how much education and asthma care patients were receiving. Participants included 76 people with asthma aged 18 and older. The researchers interviewed patients and reviewed their medical records for the presence of pulmonary function tests, spirometry reports within the last year, peak flow meter prescriptions, peak flow measurements on their most current visit, self-assessment forms, asthma action plans, and prescriptions for an anti-inflammatory medication (Garg et al., 2005). All of the aforementioned tests, plans, and prescriptions have been recommended as guidelines for asthma management in a report by an expert panel (Garg et al., 2005). For the purpose of this review, only the results regarding the written AAP will be mentioned. Upon conclusion of the research, they discovered

that only six patients (7.9%) had knowledge of written AAPs. Four of the patients thought that the written AAPs were useful but only one patient (1.3%) who had received a written AAP still had it and was actively using it (Garg et al., 2005). None of the patients had an asthma action plan present in their charts (Garg et al., 2005).

In their research study, Polisena et al. (2007) sought to evaluate the economic benefits of asthma action plans for children by comparing the direct and indirect costs and health outcomes between children who received a written AAP and those who did not. The researchers used a stratified sampling plan to select 835 children with asthma from primary care practices, respiratory specialist offices, asthma clinics, and EDs. The stratified design allowed for the selection of children with varying severity of asthma. The children in the sample were aged between 1 and 18 and had been diagnosed with asthma or some other reactive airway disease and had to have a prescription for at least one asthma medication within the past year (Polisena et al., 2007). All participants were asked whether they had ever been given a personalized written AAP. The intervention group consisted of 217 participants who had been given a personalized written AAP and the control group consisted of 618 participants who had never been given a personalized written AAP (Polisena et al., 2007).

The direct and indirect costs, the number of nights with symptoms, and the number of asthma attacks were compared between the control and the intervention groups. After a year, the annual costs for the groups was calculated and it was noted that the intervention group actually incurred more cost than the control group- $6,948 per person versus $6,145 per person (Polisena et al., 2007). The increased cost incurred by the intervention group was as a result of respiratory specialist visits and increased asthma medication costs. The researchers believed this to be as a result of adhering to the personalized written AAPs, going to follow up and specialist appointments, as well as continuously renewing prescribed medications (Polisena et al., 2007).

Another article by Gibson and Powell (2004) was a study undertaken to determine the impact of the individual components of personalized written AAPs on asthma health outcomes. The authors identified completed individualized written AAPs as those that contained four main components: When to increase treatment, how to increase treatment, how long treatment should be increased, and when to seek medical help. These action plans also contained information about what medications to take routinely, which to increase and which to include in the event of an exacerbation (Gibson & Powell, 2004). The authors identified and examined 26 different randomized-controlled trials. These studies compared the use of written AAPs with usual care. Seventeen of the studies contained completed individualized written AAPs, four used incomplete written AAPs, compared to the authors list above, and five used non-specific AAPs (Gibson & Powell, 2004). All the patients in studies with completed personalized AAPs, achieved better control of their asthma and experienced overall better health outcomes than those patients in studies that had the incomplete personalized written AAPs. According to the authors, their analysis of all studies revealed that the provision of personalized written AAPs is beneficial for all asthmatic patients. The components they identified as being included in the complete personalized written AAPs were useful for the patient to identify times when increased treatment was needed.

Sheares et al. (2015) conducted a research study to assess the efficacy of a written AAP provided by a subspecialist provider as part of the usual asthma care during an office visit. There were 407 children and adult participants who were randomized to either receive a written AAP or no written instructions other than prescriptions. There were 204 participants in the intervention group and 203 in the control group. The primary outcomes assessed were asthma symptom frequency, emergency visits, or asthma quality of life from baseline to 12-month follow up (Sheares et al., 2015). Both the intervention and control groups showed similar and

significant reductions in asthma symptom frequency, nocturnal symptoms, beta-agonist use, and adult and pediatric caregivers' asthma quality of life scores. There was a marked reduction in ED visits for participants in the intervention group compared to the control group (Sheares et al., 2015). Overall, the authors concluded that using the written AAP, as a method of providing asthma management instructions to patients receiving subspecialty care for the first time, presents no added benefit beyond subspecialty based medical care and asthma education (Sheares et al., 2015).

As important as the written AAPs are, most PCPs do not always provide these to the patients and/or their caregivers. In a study by Steurer-Stey, Fletcherm Vetter, and Steurer (2006), the researchers endeavored to investigate providers' knowledge of the principles and implementation of self-management in the care of asthma. They developed a questionnaire to investigate whether the providers provided education and AAPs to their asthmatic patients, and if they did, what the components of this education were. In the sample of 352 general practitioners and 42 pulmonologists, 81% indicated that they offered education, however, only 21% of general practitioners and 52% of pulmonologists in the sample provided a written AAP (Steurer-Stey et al., 2006). Two-hundred sixty-four providers (75%) gave information about the mechanisms of illness and 272 (77%) provided instructions on how to use inhalers although only 212 (60%) checked inhaler technique (Steurer-Stey et al., 2006). The information above indicates the importance of educating patients about asthma and ensuring that they each have an individualized written AAP. It also indicates a need for improvement in utilizing AAPs with patients. This is indicated by the evidence that a small percent of general practitioners and only about half of pulmonologists currently utilize AAPs.

Gillette et al. (2013) conducted a cross-sectional analysis of transcripts of medical visits to determine how often providers discussed written AAPs with asthmatic children. Their study

included 296 asthmatic children and their caregivers to determine how often providers educated about asthma and developed written AAPs. These participants were recruited from 5 pediatric primary care practices where there was more than one provider. The researchers concluded that providers only discussed written AAPs during 21% of the medical visits, with one provider accounting for 37% of the visits in which written AAPs were discussed. Approximately 43% of the 31 providers did not discuss written AAPs with any of the families. There were six topics that the provider could educate the asthmatic children and/or their families on. These six topics included asthma as a chronic disease, environmental triggers, rescue medications, controller (also known as maintenance) medications, usage of peak flow meters, and spacers. Out of these six topics, providers on average discussed only two at a visit. Providers educated patients about asthma triggers during about 45.6% of the visits and about environmental control in 14.2% of visits. Education about control medications occurred the most, at 61% of visits (Gillette et al., 2013).

According to Gillette et al. (2013), written AAPs "have been shown to improve outcomes for children, including fewer acute asthma visits, less nighttime awakening, fewer missed school days, better asthma symptom scores, asthma related quality of life, fewer unscheduled office and ED visits, and even asthma related death" (p. 1165). In the study, the authors noted that the providers only discussed written AAPs with 1 in 5 families. They attributed this lack of discussion to the limited time that the PCPs have with patients and the many aspects of care to discuss. The authors concluded that written AAPs are an essential tool for patients and/or their caregivers to refer to so that they can remember the roles that the different medications play and when to adjust therapy as needed (Gillette et al., 2013).

The findings of most of the articles indicate increased asthma control with the use of personalized AAPs. Although one of the studies indicated no change in asthma control using an

AAP, the NAEPP (2007) guidelines recommend the use of this tool with asthmatic patients. Providers must endeavor to always provide this tool for the patients. AAPs must be completed in collaboration with the patient in order to ensure that they understand the instructions and are capable and willing to follow the instructions.

Asthma Control Test

The Asthma Control Test (ACT) is a valid and reliable patient-based 5-item assessment tool to assess asthma control (Melosini et al., 2012). This tool assesses the patient's asthma control based on underlying asthma management guidelines including asthma symptoms, use of rescue medications, and the impact that asthma has on his or her daily functioning (Nathan et al., 2004). The ACT is used to assess asthma control in patients aged 12 and older and can be used to identify patients with poorly controlled asthma (Deschildre et al., 2014; Liu et al., 2007; Melosini et al., 2013; Nathan et al., 2004). The Childhood Asthma Control Test (C-ACT) is a 7-item patient-based assessment tool used to determine asthma control in children aged 4 -11 (Deschildre et al., 2014; Liu et al., 2007; Nathan et al., 2004; Okelo et al., 2013). This tool is used to assess the patient's asthma symptoms over the past 4 weeks (Deschildre et al., 2014; Liu et al., 2007; Nathan et al., 2004; Okelo et al., 2013). Examples of both the C-ACT and the ACT can be found in Appendix B and C respectively.

Patients can be taught to use the Asthma Control Test (ACT) to measure their asthma control. PCPs can also use this to determine how well their patient's asthma symptoms are controlled. The ACT and the C-ACT are simple patient-based tools that take into consideration the patient's symptoms to determine how well their asthma is controlled. This can direct both the patient and the PCP to alter treatment as needed (Booth, 2012).

Nathan et al. (2004) sought to develop a simple tool that could be used to assess asthma control, especially considering the busy schedules of health care providers. They administered a

22-item survey to 471 asthmatic patients in asthma specialty offices, of which 407 completed the

survey. The participants ranged in age from 12 to 94. The researchers also took into

consideration the asthma specialists' rating of the patients' asthma control after spirometry was

conducted (Nathan et al., 2004). Stepwise regression methods were used to select the 5 items

that showed the greatest discriminant validity in relation to the asthma specialists' asthma control

rating (Nathan at al., 2004). These items sought to assess shortness of breath, the patients'

perception of asthma control, use of rescue medication, the impact of asthma on everyday

functioning, and nocturnal asthma symptoms (Nathan et al., 2004). Overall, the researchers

concluded that the agreement between the ACT scores and the asthma specialists' control rating

was between 71% and 78%, making the ACT a useful, brief patient-based tool for assessing

asthma control (Nathan et al., 2004).

　　　　Liu et al. (2007) sought to develop and validate the C-ACT for identifying children aged

4 to 11 whose asthma was unsuccessfully controlled. They were interested in this subject

because they felt that although there were tools for assessing the quality of life for patients

younger than 12, a validated tool for assessing asthma control was lacking. A cross-sectional,

non-randomized study of 343 children and their parents and/or caregivers was conducted to

identify appropriate child and caregiver asthma assessment questions (Liu et al., 2007). A 21-

item questionnaire was administered to the participants with 75% randomly assigned for

development and cross-sectional validation of the tool and 25% to a confirmatory sample.

Stepwise logistic regression was used to reduce the 21-item questionnaire to 7 items best able to

discriminate control as defined by the specialists' rating of asthma control (Liu et al., 2007). Of

the 7 items selected, 4 are child completed, assessing for current asthma symptoms and the other

3 items are geared towards the parents/caregiver and assess for asthma symptoms in the last four

weeks. The researchers concluded their study with the determination that the C-ACT is a

validated tool for assessing and identifying children with inadequately controlled asthma (Liu et al., 2007). The C-ACT can be a valuable tool for providers based on its validation, ease of use, input from the children and their parent/guardian, and its alignment with asthma guidelines (Liu et al., 2007).

According to Melosini et al. (2012), the ACT is a validated method for assessing the level of asthma control in individual patients. The Global Initiative for Asthma (GINA) guidelines recommend the use of this tool with all asthmatic patients. Melosini et al. (2012) investigated the correlation between ACT scores and the clinical asthma control in a group of 68 mild-to moderate asthmatic subjects with a mean age of 42. They compared the ACT scores with functional findings such as forced expiratory volume in the first second (FEV1) reversibility, bronchial hyperresponsiveness, or inflammatory markers. The patients were studied over a period of three months. Patients had to perform spirometry and be free from short-and-long acting inhaled bronchodilators 24 and 48 hours respectively before each visit to be included in the study. At enrollment in the study, spirometry was performed followed by a bronchodilator test 20 minutes after the inhalation of 400 mcg of salbutamol (Melosini et al., 2012).

After these tests, the patients were instructed to monitor their daytime and nighttime symptoms, use of their rescue medications, and morning and evening peak expiratory flow (PEF) and to record these findings on a report card (Melosini et al., 2012). They were to keep records at 4-week intervals. ACT scores were measured at each 4-week interval. After 4 weeks, they were to return for baseline spirometry and a sputum induction test to determine the presence of eosinophils indicating inflammation (Melosini et al., 2012). At the end of the 3-month study, it was determined that there was indeed a correlation between the ACT score and the symptom score, rescue medication use, and PEF variability indicating that the ACT can effectively describe the current level of asthma control (Melosini et al., 2012). The results of this study

indicate that the use of the ACT is essential in determining asthma control in patients with asthma in order to determine what course of treatment needs to be implemented, maintained, or adjusted for the asthmatic patient (Melosini et al., 2012). The ACT may be used in conjunction with other tests such as spirometry.

Jia et al. (2013) conducted a systematic review and meta-analysis of articles to compare the ability of the ACT and the ability of the asthma control questionnaire (ACQ) to assess asthma control. The authors reviewed 21 studies in which 11,141 subjects with asthma were assessed with the ACT and 12,483 were assessed with the ACQ (Jia et al., 2013). The ACQ is a tool that involves asking patients to recall their asthma experiences in the past week. It assesses 7 items including asking about nighttime awakenings, symptoms on waking, activity limitations, shortness of breath, wheezing, required use of inhaled short-acting rescue medications, and lung functioning before a bronchodilator (Jia et al., 2013). According to the studies reviewed, the authors determined that the ACT had good diagnostic accuracy for assessment of controlled and not well-controlled asthma and the ACQ had good accuracy for the assessment of not well-controlled asthma. The authors concluded that the ACT is preferable to the ACQ in clinical practice as it assesses both well and not-well controlled asthma (Jia et al., 2013).

Schatz et al. (2006) conducted a study to evaluate the reliability and validity of the ACT in a longitudinal study of patients with asthma who were new to the care of an asthma specialist. Three hundred thirteen participants, aged 12 and older were included in the study. In order for them to be eligible for study, they had to have not been to an asthma consultant in the past 5 years, had to have a provider's diagnosis of asthma without comorbidities, had to be literate in the English language, and had to be not currently participating in other clinical studies (Schatz et al., 2006). Participants had to complete the ACT at two specialist visits 4 to 12 weeks apart. At these visits, pulmonary function was measured and the asthma specialist rated the patient's

asthma control. The sensitivity of the ACT to changes in asthma control and pulmonary function was demonstrated with significant correlation (r= 0.44, P <0.001) between changes in the ACT score and the specialists' ratings (Schatz et al., 2006). At the conclusion of the study it was determined that the ACT is reliable, valid, and sensitive to changes in asthma over a period of time for patients new to an asthma specialist. The researchers then recommended the ACT be used in clinical practice to help providers identify patients with uncontrolled asthma and to facilitate their ability to monitor their patient's progress with asthma treatment (Schatz et al., 2006).

A study conducted by Ko et al. (2009) evaluated the correlation between the ACT with the treatment decisions made by asthma specialists and compared the ACT's performance with other conventional parameters including spirometry, PEF rate, exhaled nitric oxide (FeNO), and bronchial hyperresponsiveness. There were a total of 383 study participants who completed a 1-month diary on symptoms and PEF rate before the providers' assessment. Each participant then completed the ACT together with same-day spirometry and FeNO measurements (Ko et al., 2009). The asthma specialists were blinded to the results of the ACT but not the spirometry and PEF rates, assessed the patients' level of control according to the 2006 GINA guidelines, and made the appropriate treatment decisions (Ko et al., 2009). The researchers concluded that the ACT had the highest correlation (r=0.21, P <0.0001) for changing asthma treatment and therapy when compared to FeNO, spirometry, PEF rate, and bronchial hyperresponsiveness (Ko et al., 2009).

Deschildre et al. (2014) aimed to evaluate and compare asthma control in patients according to the 2006 GINA guidelines, the NAEPP guidelines, the C-ACT, and the providers' assessment. Demographic data, treatment, and the number of severe exacerbations in the last year were collected from 525 children aged 4 to 11 and their parents. The participants were

asked to complete the C-ACT and were assessed by their provider. According to the Liu et al. (2007), scores ≤ 19 on the C-ACT indicate a lack of asthma control over the last 4 weeks. In the study conducted by Deschildre et al. (2014), the providers were blinded to the C-ACT score. They assessed children using the GINA and NAEPP guidelines. They then performed physical assessments which indicated that 89% of the participants with a C-ACT score of > 21 were controlled and 85% of participants who scored <17 were not controlled. In conclusion, the authors determined that although the C-ACT is a helpful tool for screening and assessing asthma control, physical assessment, exacerbation, and lung function must be taken into account as suggested by the 2006 GINA guidelines when determining asthma control (Deschildre et al., 2014).

Adoption and Acceptance of EHR Innovations

Athena is the EHR system used by the providers at the FHC. Providers' perception about the innovations in Athena was considered. The providers' attitudes can affect the success of the proposed intervention (Adler, 2010). In order to ensure positive attitudes, the providers were well-prepared for the potential changes. Unsuccessful implementations and innovations are usually a result of poor communication, complexity, organization, technology, planning, and leadership (Morton & Wiedenbeck, 2010). When the aforementioned points were addressed, the providers displayed more positive attitudes to EHR implementation and innovations.

Mertz et al. (2015) conducted a study to determine providers' attitudes towards an innovation in their EHR. The researchers sent out an electronic survey to determine predisposing factors to acceptance of EHR-based tools 3 months prior to implementation. Nine hundred thirty out of 1166 participants responded to the survey (Mertz et al., 2015). Out of this number, 83.1% were providers and the remaining responses were received from ancillary staff.

The clinicians surveyed reported being highly amenable to the implementation of clinical tools. The clinicians' attitudes reflected higher expected improvements in patient care, quality, and outcomes (Mertz et al., 2015). The clinician characteristics that most strongly correlated with positive attitudes and acceptance included satisfaction with the EHR ($p < 0.001$), job satisfaction ($p < 0.001$), finding change to be exciting ($p < 0.001$), perception of having enough tools and training to get the work done ($p < 0.001$), and degree of perceived control over work ($p < 0.001$, Mertz et al., 2015). There were some characteristics that correlated with negative attitudes. These included feeling burned out ($p < 0.001$), feeling emotionally drained ($p < 0. 001$), and feeling that work is a strain ($p < 0.001$, Mertz et al., 2015).

Overall, there is likely to be some negative attitudes towards EHR innovations. With the right preparation, however, providers would be able to develop more positive attitudes to EHR innovations. Positive attitudes to changes in the EHR can lead to a successful adoption of quality improvement innovations.

It appears that the common theme with most of the studies was a positive outcome related to the use of personalized written AAPs and ACTs. PCPs, in collaboration with patients, ensured that they were properly educating patients and providing them with completed personalized written AAPs. This ensured that patients had the necessary knowledge at their fingertips to care for themselves should an exacerbation occur.

ACTs and C-ACTs are also good tools for the provider to use to determine a patients' asthma control. Providers must keep in mind though, that these assessment tools should not replace their physical assessments and lung function tests. They may be used as a guide to help determine management and treatment options. The evidence found in the articles indicates that the use of both the ACT and the written AAP result in positive asthma outcomes for patients.

Potential Intervention for Practice Problem

Despite the benefits of the written AAPs, they are underused by PCPs and are not always updated despite the variable nature of the disease (Booth, 2012; Gillette et al., 2013). Asthma education is essential in enabling the patient to understand the chronic nature of this disorder and empower the patient to understand the treatment regimen and the necessity to follow the individualized written AAP in order to have good asthma control (Booth, 2012; Gillette et al., 2013; Khan et al., 2013; Liu et al., 2007; Nathan et al., 2004; Tolomeo, 2013).

The NAEPP and GINA define goals of asthma control as minimal symptoms during the day and night, full physical activity including exertion, prevention of exacerbations, maintenance of near normal pulmonary function, decreased use of rescue inhalers, and minimal to no adverse effects from medication (Liu et al., 2007). It is therefore helpful that health care providers caring for patients with asthma have a reliable and valid tool to effectively assess asthma control in order to initiate or modify pharmacotherapy (Liu et al., 2007).

The importance of using these assessment tools to evaluate a patient's asthma control influenced this author to work to incorporate electronic versions of the written AAP, the C-ACT, and the ACT into the EHR at the FHC to increase the providers' use of these tools. The goal of incorporation of these tools was to make it easier for the PCP to assess a patient's current asthma control and adjust treatment as needed. It was implemented to allow for all patients to be assessed using reliable, validated tools thus leading to potentially better patient outcomes and quality of life.

Conceptual Models

A conceptual model is useful for investigating a practice problem, a phenomenon of interest, and guiding the implementation of a quality improvement project. Pender's Health Promotion Model (HPM) was used to guide the implementation of this project. The model

helped with the exploration of provider perspectives in order to facilitating patient self-care and monitoring through the use of the ACT and the AAP. The Theory of Organizational Change was used to assess the organization's readiness for change. This theory was also used to assess the organization throughout the implementation process.

Health Promotion Model

The HPM was first published by Nola Pender in 1990 and revised in 1996 (Pender, Murdaugh, & Parsons, 2011). The HPM is an "attempt to depict the multidimensional nature of persons interacting with their interpersonal and physical environments as they pursue health" (Pender et al., 2011, p. 44). The HPM was used with permission from Nola Pender, which can be found in Appendix D. The HPM was applied to patient-provider interactions at the FHC as actions to improve the health of asthmatic patients were pursued. The concepts of the HPM include patients' prior related behavior, personal factors, perceived benefits of action, perceived barriers to action, perceived self-efficacy, and activity-related affect. Additional concepts include interpersonal influences, situational influences, and commitment to a plan of action (Pender et al., 2011). There was the capacity for the providers to impact a few concepts of the HPM to help improve the health and asthma outcomes of their patients. The concepts of the HPM can be seen in Figure 1 below.

The first concept, prior related behavior, was proposed to have both direct and indirect effects on the likelihood of engaging in health-promoting behavior (Pender et al., 2011). The direct effect of past behavior on health-promoting behavior may be due to habit formation, which makes a person continue to engage in prior behaviors (Pender et al., 2011). Some of the providers at the FHC were used to just verbally educating their patients with asthma and this was identified as having the potential to affect the implementation process. When practitioners add a written plan for patients, new routines identified in the plan may assist patients to break habits

and adapt to different health-related behaviors. With continued practice and improved patient

outcomes, the providers may see the benefits of continuing to utilize the AAP and the ACT with

their patients with asthma.

Figure 1

Pender's Health Promotion Model

INDIVIDUAL CHARACTERISTICS AND EXPERIENCES

BEHAVIOR-SPECIFIC COGNITIONS AND AFFECT

BEHAVIORAL OUTCOME

PERCEIVED BENEFITS OF ACTION

PERCEIVED BARRIERS TO ACTION

IMMEDIATE COMPETING DEMANDS (low control) AND PREFERENCES (high control)

PRIOR RELATED BEHAVIOR

PERCEIVED SELF-EFFICACY

ACTIVITY-RELATED AFFECT

PERSONAL FACTORS Biological Psychological Socio-cultural

INTERPERSONAL INFLUENCES (Family, Peers, Providers); Norms, Support, Models

COMMITMENT TO A PLAN OF ACTION

HEALTH PROMOTING BEHAVIOR

SITUATIONAL INFLUENCES Options Demand Characteristics Aesthetics
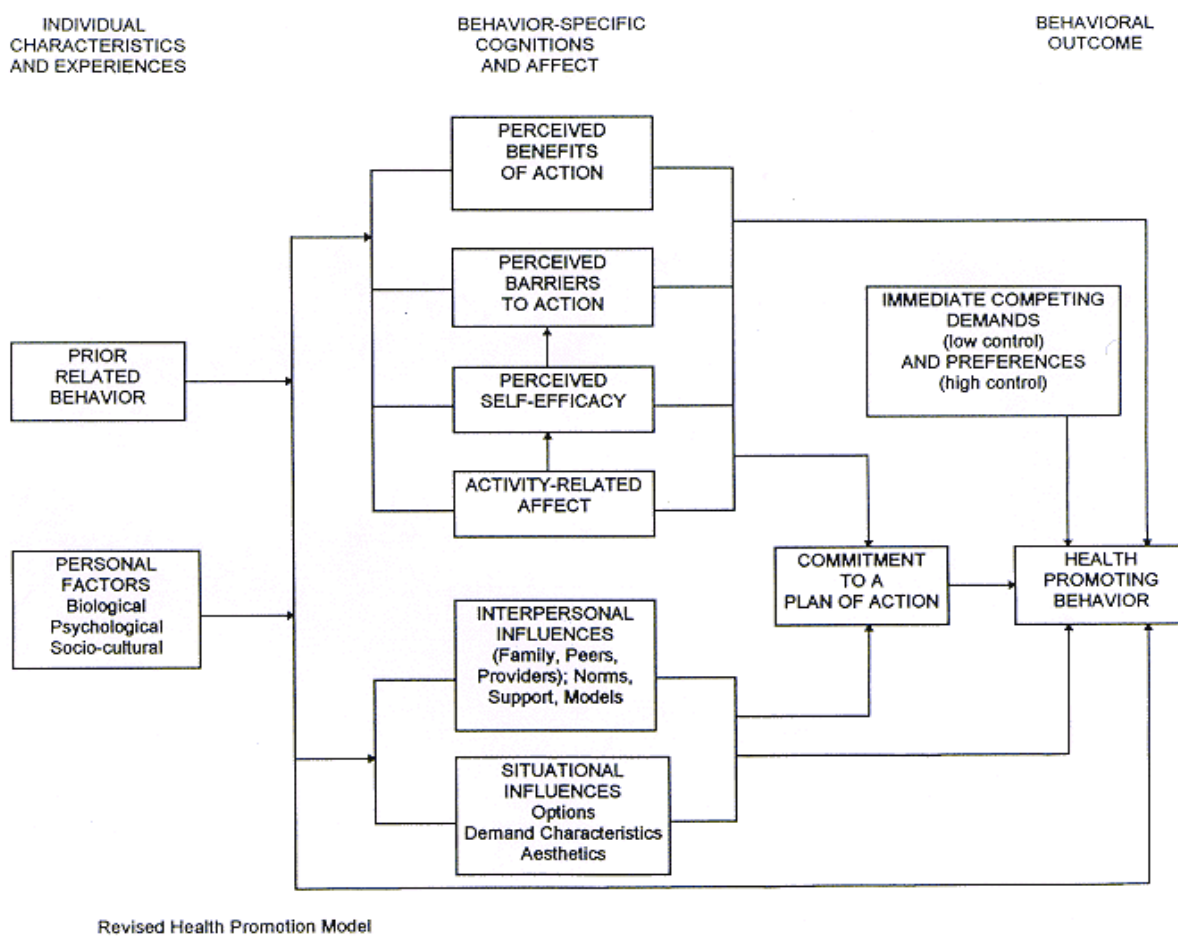
Revised Health Promotion Model

Figure 1. Pender's Health Promotion Model. Adapted from "Health Promotion in Nursing

Practice" (6th ed.), by N. Pender, C. Murdaugh, & M. A. Parsons (2011), p. 45. Copyright 2011

by Pearson Education Inc.

The second concept has to do with biologic, psychological, and sociocultural factors (Pender et al., 2011). Not all of these factors are associated with the patient-provider interaction at the FHC, however, self-motivation, a psychological factor of both participants was considered. Patient self-motivation that is facilitated by the provider through these tools is the goal of this type of intervention. Through the use of the AAP, the provider motivates patients to monitor their symptoms and initiate disease and health maintenance. With patients having the tools they need from the provider, they will most likely achieve improved patient health outcomes. This will also result in decreased ED visits, nocturnal awakenings, and exacerbations requiring hospitalization. In order for this project to continue successfully and be sustainable, the providers need to see the benefit of encouraging patient self-motivation for managing their health care. Without considering this, providers would not make conscious efforts to remember to complete both the ACTs and the AAPs for the patients' benefit. Patient improvement is a reward for both patients and providers under this health promotion concept.

The next concepts of perceived benefits and barriers can influence the patients' use of these tools and the providers' encouragement of the patients' use of these tools. Some of the benefits of utilizing the ACTs and the AAPs include accurate assessment of asthma over the past 4 weeks and improved asthma self-maintenance and outcomes. One barrier for this project is the lack of motivation of the patient to use these tools, especially the AAP. The providers can help the patients overcome this by their continued encouragement of the use of the AAP as well as ensuring that they have good understanding of how to use the tool. Not understanding how to properly use the AAP could cause the patient not to want to use the AAP. The availability and use of this tool will potentially reduce the need for acute hospital visits for asthma exacerbations.

Self-efficacy is "the judgment of personal capability to organize and carry out a particular course of action" (Pender et al., 2011, p. 47). The role of the AAP and ACT are to enhance

information and planning for the patient. Thus, providers can use these tools to increase the patients' sense of self-efficacy. Patient self-efficacy was very important to the success of this project. Providers attended an asthma in-service in order to ensure that they were confident in their ability to educate a patient with asthma. Educational needs for the providers ranged from pathophysiology of the disease, how to accurately read a spirometry report, how to complete ACTs, AAPs, and also what medications and dosages were most appropriate for patients. Providers, armed with refreshed knowledge about asthma, increase the patients' arousal in order to facilitate their use of the AAP and increase patients' self-efficacy.

Interpersonal and situational factors, such as support from providers and families, and availability of necessary tools, play an important part in ensuring the success and sustainability of this project (Pender et al., 2011). When patients feel that they are not being supported by their providers, they are more likely not to use their AAPs. When patients have the support of their providers and family, they are more likely to continue to perform the necessary actions and use the provided tools. Commitment to a plan of action is essential to ensure the success and sustainability of projects (Pender et al., 2011). If patients are committed to using the AAPs, not only are they ensuring that the project is successful, but they are also ensuring improved self-management and health outcomes.

Stage Theory of Organizational Change

Organizational change is "the extent, rate, and overall nature of activities, led by a change agent, to enhance the overall performance of the organization" (Wu, 2013, p. 3). Organizational theories provide a framework for adaptation of a chosen evidence-based intervention in order to enhance the performance and the productivity of the organization (Glanz, Rimer, & Viswanath, 2008; Wu, 2013). There are many organizational theories but the Stage Theory of

Organizational Change (Glanz et al., 2008; Lewin, 1951) can be used to assess the FHC providers' readiness for change (see Appendix E).

The Stage Theory of Organizational Change is one that is used to assess for readiness to change within an organization. This theory is based on the concept that before change occurs, the organization progresses through a series of steps or stages before that change occurs (Glanz et al., 2008; Lewin, 1951). In identifying the stage at which the organization is, strategies to promote change can be matched with each stage to ensure successful progression to the next stage. This theory can be used to explain how different organizations develop new goals, programs and ideas. Each stage requires a specific set of tactics that are dependent on the organization's stage of adopting, implementing, and sustaining new projects (Glanz et al., 2008; Lewin, 1951). In relation to the FHC, the stage at which the center and the providers were, determined activities that promoted, enhanced, and encouraged the proposed project.

As described by Kurt Lewin (1951), there are four stages in the Stage Theory of Organizational Change. The first stage involves defining the problem, also known as the Awareness Stage. In this stage the problems are recognized and analyzed, then solutions are sought and evaluated (Glanz et al., 2008; Lewin, 1951). Management and other personnel are involved at this stage in order to ensure awareness of the problem. At the FHC, the proposed problem was that the providers were not consistently using the ACTs and the AAPs. Although these forms were available in paper form, they were not readily accessible in the rooms for the providers to use. One of the Centers for Medicare and Medicaid Services (CMS) meaningful use objectives is the use of certified EHR technology to identify patient-specific education resources and provide them to the patient (CMS, 2010). The FHC was not meeting this requirement with asthmatic patients. In order to meet this requirement a solution needed to be implemented.

Another motivator for this project was that the author, a Doctor of Nursing Practice (DNP)

student, had identified the lack of use of these tools to be a problem.

The proposed solution to the problem was incorporating the ACT and the AAPs into the

EHR, Athena. The proposed problem and solution were discussed with the practice manager and

the providers. Interviewing the providers revealed that only one out of the four providers

consistently use AAPs and ACTs in paper form. This provider stated that she uses these forms

about 98% of the time. The other providers stated that they either did not know where the paper

forms were kept or they forgot to complete the forms during the patient's appointment. These

issues were identified as problematic as current evidence-based asthma guidelines by the

National Asthma Education and Prevention Program (NAEPP) recommend the use of these tools

in assessing and managing asthma (NAEPP, 2007). Various potential solutions were discussed

by this author, the practice manager, and the providers. A proposed solution of incorporating the

ACT and the AAP into the EHR was preferred as it could be easily added to patients' electronic

charts and paper forms were no longer likely to be misplaced.

The second stage involves initiating action, or the Adoption Stage. In this stage, policies

are formulated and resources for beginning the change are allocated. In this stage, decision-

makers and implementers are informed about the anticipated change (Glanz et al., 2008; Lewin,

1951). The FHC staff, and providers were informed about the change and what tools and

resources were required. This included conferring with staff to understand preferences about the

implementation, barriers, and processes. These preferences included feedback on ease of use and

educational needs for implementation. All providers expressed interest in participating with

these steps.

Third, the Implementing Change stage involves implementing the project, providing any

needed training, assisting with problem-solving, and observing the reactions to the change by

those involved (Glanz et al., 2008; Lewin, 1951). Training for the providers involved reiterating the importance of the project and tools as well as implementation of the ACTs and the AAPs into the EHR. The FHC did not have an asthma expert on staff who could present asthma education. An external asthma expert conducted an in-service on how to complete ACTs and AAPs, and proper asthma assessment and treatment.

The fourth and final stage involves Institutionalizing the Change. In this stage, the program becomes entrenched in the organization and a champion for the project is identified who will continue to ensure that the implemented project becomes integrated in daily functioning of the FHC (Glanz et al., 2008; Lewin, 1951). Data about the initial implementation informed this stage. This stage provided validation about the success of the project and its usefulness to the providers and patients at the FHC and identified a champion to sustain the change once the DNP student was no longer at the site.

Need and Feasibility Assessment of the Organization

The proposed project took place at the FHC. This facility is a nurse-managed academic health center located near downtown of a Midwestern city. There are four nurse practitioners (NPs) who provide various health services to the general public, staff, students, and faculty of the University. Services provided include primary care services such as well child and well adult visits, allergy and immunization services, travel clinics, Department of Transportation and participation physicals, student compliance visits, and same day sick visits. The FHC provides services for a total of approximately 440 patients per month. In addition to the NPs, there is a practice manger, office and referral coordinator, two registered nurses (RNs), front office staff, and a variety of students. The students come from different disciplines such as speech, physical, and occupational therapies, social work, and nursing.

Some of the patients seen at the FHC suffer from chronic illnesses such as asthma, hypertension, and diabetes. Therefore, a project geared towards the improvement of treatment options for asthmatics is feasible in this organization. There are strengths that can be found within the FHC. These strengths were beneficial, as they supported the success of the implementation of this project. One strength of the organization was the providers' willingness to incorporate the AAP and the ACT into their care for the patients with asthma. Their enthusiasm towards this change ensured the success and effectiveness of this project.

Another strength was the benefit of this program to the patients at little to no cost for the organization. The AAP and the ACT are available on the Internet at no cost and recommended for use with asthmatic patients. The organization therefore did not have to spend monetary resources purchasing these tools. The patients had a documented plan of care, which they took home with them to refer to during exacerbation of symptoms of asthma and for daily management of the disease. An additional strength to the project was that the AAPs and the ACTs were already incorporated into the EHR of the FHC as a result of collaboration between the DNP student and the EHR information technology (IT) personnel. The FHC uses Athena as their EHR and there is capacity for documents to be uploaded and used in individual charts.

The existence of the patient portal was also identified as another strength of the FHC. This patient portal allows the provider and the patient to communicate without barriers as needed. This portal is also a means for the provider to deliver educational materials to the patient. The AAP may be uploaded at the request of the patient. The portal is also an excellent source for sharing the AAP with the patient.

One weakness of the FHC was that there was no asthma expert on staff. That made it challenging for regular asthma in-services to be conducted. Having regular asthma in-services would involve bringing in an asthma expert from an outside organization.

Another weakness considered was the providers' possible reluctance to add another step or process into their already hectic schedules. This weakness was also anticipated for the registered nurses (RNs) who already had very busy schedules. Although this extra step has the potential to improve asthma outcomes for the patients, the providers need to spend time educating patients about how to use their AAPs, what medications they would need to use and why, and when they would need to come in to see their PCP versus when they would need to go to the Emergency Department (ED). When the providers educate their patients about medications, having a written plan of action provides the extra reference for the patient at a very stressful time when it may be easy to forget instructions. This will ensure accurate asthma self-management. RNs spend time rooming patients for the provider, taking vital signs, drawing blood, and performing vision and hearing screenings. The RNs also had patients scheduled for services like tuberculosis testing, allergy shots, immunizations, and titer screenings. They may have been reluctant to add into their schedules completing the ACT, which the RN can do, or ensuring that the patient receives a completed AAP.

Another weakness considered was the providers' ability to remember to consistently use the AAPs and the ACTs. As this was a new addition for the providers at the FHC, it took some time for them to get used to completing these tools. They needed to be constantly reminded to continue to use the AAPS and the ACTs for the benefit of their patients by the DNP student. The providers may not have liked the added pressure of being accountable for remembering to complete forms and doing the education when they had been doing things a little differently before, i.e. giving verbal instructions. Another weakness taken into account was the scanning of the AAP and the ACT back into the patients' charts. Providers could believe that the time spent scanning the completed forms into the patients' charts could be spent doing other tasks.

Another weakness anticipated was the time that the provider took to personalize the patient's AAP as well as educate the patient about his/her AAP and what to do in case of an exacerbation of symptoms. The provider also had to spend time asking questions in the ACT as well as calculating the scores to determine current asthma control. Although the benefits of both the AAPs and the ACTs far outweigh the disadvantages, the providers may have been reluctant to include these in their practice, as it would further impinge on the already limited time that they had with their patients.

The percentage of patients in the FHC who utilize the patient portal could be considered a weakness. Only 42% of patients currently use the readily available portal. This could impede the providers' ability to send the patients their completed AAPs.

The lack of on-site Information Technology (IT) consultants was considered a weakness. IT issues currently need to be handled via phone. This makes it quite difficult and time-consuming. The Athena IT consultants are stationed in Atlanta, Georgia. This makes it nearly impossible to have hands-on help when needed. The FHC staff members have to call Athena and be put in contact with an IT consultant in order for their IT issue to be addressed. The IT consultant then has to walk the FHC staff members through different steps in order to solve whatever problem they may have. There is quite a bit of time spent waiting for an IT consultant to pick up the phone. Depending on one's IT issue, the average time spent on the phone with Athena IT consultants is between 20 minutes and an hour and a half.

There were many opportunities at the FHC for the proposed project to be successful. One of these opportunities was the fact that the providers had a desire to ensure that all patients had and continue to have quality care. Given this, they supported efforts for patients with asthma to have a good quality of life and to manage their asthma symptoms on their own before they get bad enough to require emergency treatment. For this reason, the providers were willing to

incorporate the AAPs and the ACTs in the patient's well and episodic visits. In addition, the opportunity for improved patient outcomes was considered. Giving patients completed AAPs enabled them to manage their asthma as appropriate, thereby leading to better patient outcomes.

Another opportunity for success of this project was the availability of the AAPs and the ACT on the Internet. These documents could easily be imported into Athena for the providers' use. They could then be completed and printed out for the patient to keep a copy. For the FHC, an interactive version of the AAP was incorporated into Athena. This allowed for the providers to complete the forms from drop-down menus. These forms were then printed out and then scanned into the patient's chart to be used as a reference both for the patient and for other providers who may be caring for another provider's patient. There was also the opportunity for these completed forms to be placed into the patient's portals for easy patient access and reference.

This project also provided the opportunity for patients to be invested and well informed about their treatment plans. There are many times that patients leave appointments confused about what they are supposed to be doing as far as their treatment plans/plans of care are concerned. Having a written plan with them helps alleviate some of the confusion they may have. This intervention involved patients in their care because they had a plan about what to do in the case of asthma exacerbation, which in the long run can reduce the number of unnecessary ED visits.

One big threat to the project was the lack of effective communication between the clerical front-desk staff and the clinical staff of the FHC. There was often a delay in communication about changes in office and patient procedures. This ineffective communication had the potential to affect the success of the proposed project. It could have hindered the project because

of procedural inconsistency between providers and the front desk staff as far as ensuring that they are consistently giving the patient a copy of their AAPs.

Project Implementation

The need and feasibility of implementing the proposed project have been highlighted in the previous sections. This section details the implementation plan for this project in the described organization. The conceptual models were used to help develop this proposed implementation plan. This section also details the implementation process and highlights any deviations from the original project plan.

Purpose of Project with Objectives

The purpose of this project was to increase the usage of the AAP and the ACT by the providers at the FHC. AAPs are very important in the treatment of asthma as they enable patients to manage their disease at home without having to go into the ED unless absolutely necessary. Despite the importance of the AAPs and the variable nature of asthma, they are widely underused by PCPs (Booth, 2012; Gillette et al., 2013). The main objective of this project was to ensure that the PCPs at the FHC were consistently utilizing these tools to improve the quality of life of the asthmatic patient. The evaluation of outcomes was done by reviewing the quality measurement information in Athena to determine whether there was an increase in the number of patients receiving an AAP, as well as an increase in the number of providers utilizing the ACT to determine asthma control.

Type of Project

The project is considered to be a quality improvement (QI) and evaluation study. According to Wiseman and Kaprielian (2014), QI is a "formal approach to the analysis of performance and systematic efforts to improve it" (para. 1). The providers at the FHC were not performing according the National Heart, Blood, and Lung Institute (NHBLI) asthma treatment

guidelines which indicates that a personalized AAP must be completed and given to all patients with a diagnosis of asthma (NAEPP, 2007). The goal of this project was to ensure that the providers were caring for patients with asthma according to these guidelines as well as ensuring that patients with asthma had a treatment plan to refer to as needed. According to the Health Resources and Services Administration (HRSA), one of the principles of QI is that it focuses on the patient (Quality Improvement, 2011). In addition, the concepts behind QI methods identify that both resources and the activities carried out are addressed together to ensure or improve quality of care (Quality Improvement, 2011). During this project, the providers utilized the ACT and the AAP, which were readily available to them, to ensure that patients ultimately have a positive change in their health status. The project and its desired outcomes were designed to meet the principles of QI as explained by the HRSA. The effectiveness of the proposed project was continuously evaluated throughout the implementation process.

Setting and Needed Resources

The proposed project was implemented at the FHC. It should be noted that although the FHC already had all these resources in place, the extra time, space, and technology that the provider spent educating patients and/or their caregiver(s) about the disease and its management could have been used to provide services for an additional client. The resource that was needed most was time, once accessibility to the tools was provided through the EHR. Currently, the providers see asthmatic patients in 15-minute appointment blocks. This was insufficient time for the provider to conduct the ACT, perform a physical assessment, start or modify a personalized AAP, educate the patient about his/her disease, what to do to prevent exacerbations or, alternatively, what to do in the event of an exacerbation, and educate him or her about medications. These patients could have benefited greatly from 30-minute appointment blocks. This extended timeframe would allow the provider to spend time educating patients and ensuring

that they have a good understanding of their treatment plan. Another activity that also required

time commitment was scanning the completed documents into the patient's chart. While the

providers were able to complete the ACT electronically from a built-in template that also scored

the ACT to determine a patients' level of asthma control, the final tool could not be saved.

Rather, it had to be printed out and scanned back into the patients' chart. Other essential

resources for this project included the space to be used, the Internet, and computer access for the

providers, nurses, and front desk staff. There was however the potential for these visits to be

billed using higher current procedural terminology (CPT) codes.

Another resource needed was the multi-disciplinary team within the FHC. The success of

this project was dependent not only on the providers, but also the nurses and the front office

staff. The nurses ensured that the provider was ready for the appointment by supplying the ACT

for the provider. This also served as a reminder to the provider that those tasks needed to be

completed. Once finished with the appointment, the front desk staff scanned a copy of the

document into the patient's chart. These scanned documents served as a reference to the

provider or to other providers as to what the current treatment plan for the patient is. The

assistance of the Athena Information Technology (IT) department was also an essential resource

needed to ensure the success of this project. It was with their help that the AAP and the ACT

was incorporated into Athena for the providers to use.

Design for the Evidence-Based Initiative

The first step in the process was to determine how may providers were currently using

the ACT and the AAP with their asthmatic patients. This was done via a chart review and

provider interview. Athena has the capability to allow an authorized user to generate a report of

how many patients have been seen at the clinic with a diagnosis of asthma. It was from this list

that the pre and post chart reviews were conducted.

The second step in ensuring the success of this project was the incorporation of the AAP and the ACT into Athena. This involved working with the Athena IT department to incorporate the ACT as a screening tool that could be pulled up and completed by the provider. The ACT is an evidence-based tool and there were therefore no problems with adding it to the other screening tools the providers use. The AAP was incorporated under forms that the provider can electronically complete via drop-down menus and then print out. There were three version of the AAP that were incorporated. These AAPs were categorized according to the age of the patient; 0 to 4 years, 5 to 11 years, and 12 years and older. These tools were divided according to age as the dosing of the medications in the drop down menus are age-dependent dosages. The providers completed these forms based on symptomology of the disease, and not on peak flow meter readings. The completed forms were then scanned into the patients' chart after they were completed. It should be noted that although the AAP is available in different languages, only an English version was incorporated into Athena.

After these tools were incorporated into Athena, the implementation began. The AAP is an interactive form that the providers completed from a drop down menu. Unfortunately, at this time, Athena only has the capacity for these forms to be electronically completed, printed out, and then scanned back into patients' individual charts. The next step in the process was to educate the providers on how to properly use both tools. An external asthma expert agreed to assist with this process. The providers could then begin consistently using these tools with all asthmatic patients.

A month after the providers got the approval to use the ACT and the AAP, a chart review of asthmatic patients was conducted to determine and evaluate use of these tools. It was anticipated that there would be at least a 95% increase in the use of both tools. This should help determine the improvements in asthma management at the FHC.

Participants

The participants included all patients with asthma at the FHC aged between 3 and 24. Their parents and/or caregivers will also be involved. This is because the younger patients will most likely not be able to answer the symptom-related questions properly. They may also be unable to properly understand the asthma education and treatment plan. The number of patients was determined via a chart review and inclusion criteria. In order to be included in this project, patients had to be a current patient of the FHC, had to have had an asthma-related visit between January and March 2015, and had to be between the ages of 3 and 24. These criteria however, did not exclude other patients from being assessed using the ACT and being given the AAPs as part of their treatment plans. The majority of the patient population at the FHC is English-speaking. Those who did speak a different language could participate as long as they had an interpreter present who demonstrated clear understanding of the contents of the AAP.

Measurement

The outcomes of the project were assessed via a chart review. Each chart was reviewed for the utilization of the ACT and the AAP. A list of asthmatic patients who had been seen by their provider since the implementation of the tools was generated and reviewed for the use of both tools. It was anticipated that at least 95% of these patients would have an ACT score and a completed AAP in their charts. Copies of these tools can be viewed in Appendix A, B, and C respectively. This author was then able to determine the percentage increase in the use of these tools after their implementation using data from January through March 2016.

<div align="center">Steps for Implementation of the Project, Including Timeline</div>

Steps for the implementation of this project have already been defined in the design of the evidence-based initiative. Table 1 contains the timeline for the implementation and evaluation of this project.

Table 1

Timeline for Project Implementation

Phase	Milestones	Timeframe
I: Provider tool use assessment	Provider Interview Chart review	1-2 weeks
II: Incorporation of tools into EHR	Work with Athena IT personnel for ACT and AAP implementation in EHR (See examples of tools in Appendix A-C)	1 month
III: Implement	In-service for providers and staff Begin use of ACT and AAP	2-3 weeks
IV: Evaluation	Post-implementation chart review	1 week

Project Evaluation Plan

The main objective of this project was to increase the use of both the ACT and the AAP by providers at the FHC. This was evaluated on the actual increase in use of these tools. The doctoral student conducted a chart review of patients with asthma. This provided information on how many of the patients with asthma had had appointments with their PCPs and have updated ACTs and AAPs in their charts.

Another objective was to make these tools easily accessible to the providers. This was comprised of the successful incorporation of these tools into Athena. The doctoral student worked in collaboration with the IT personnel at Athena to integrate these tools effectively. These tools were applied to a test patient to ensure that they were live and ready to be utilized.

Finally, another goal of this project was to ensure that the providers understood and were able to complete the ACT and the AAP effectively. The in-service conducted by the external asthma expert ensured the success of this objective. The doctoral student also attended this in-

service in order to be available to the providers in case they needed extra assistance during the implementation process.

Ethics and Human Subjects Protection

This project was presented to the University's Human Research Review Committee (HRRC) to determine the possibility of any ethical concerns for patient participants. There were no anticipated risks to humans with the project as there was no actual patient contact by the doctoral student. No patient information was used on any final reports. The HRRC determined that the project was a quality improvement project and not research (See Appendix F). This enabled the initiation of the project at the FHC.

Budget and Time

There was very little financial burden for this project. There was no additional cost to the FHC for incorporating the ACT and the AAP into Athena. These tools are recommended by the NAEPP (2007) and are freely available for use on the Internet. Clinical staff already spent time educating the patient and charting. Completing these forms required extra time with the patient, however, this was time that could potentially be built into patient appointments. The front desk staff already spent time scanning forms into patient charts. Scanning the completed AAPs into the patients' charts therefore did not create any additional work for the clerical staff.

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Stakeholder Support and Sustainability

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It is necessary with the implementation of any project that the major stakeholders be identified in order to gain their support and ensure a successful project implementation. Key stakeholders would be interested in and benefit from the success of the intended project. The first key stakeholders were the patients who would be receiving the individualized AAPs. Their role as decision-maker in their health is important to them. They may be willing to follow the treatment plans given to them by their providers. Other stakeholders interested in the success of

this project are the parents, guardians, caregivers, and other family members of the asthmatic patients. In the cases of children who are too young to follow a treatment plan themselves, their caregivers are the ones who will be utilizing the AAPs.

Additionally, the staff of the FHC are stakeholders of this project. They will approve of and incorporate the project into the daily functioning of the FHC. They will utilize the ACT to assess their patient's asthma control. They will complete and educate patients about their new AAPs. Feedback from the providers as to what is working and what needs to be adjusted will ensure that changes are made as quickly and efficiently as possible in order to ensure the success and sustainability of the project.

Insurance carriers may be considered stakeholders as they would want decreased health care costs associated with asthma. The aim of this project is to ensure that providers are equipping patients with the necessary tools to maintain and properly care for their disease. With these tools, there is the potential to decrease health care costs as patients would hopefully not need to make frequent trips to the ED for asthma exacerbations. Employers and school authorities may be considered stakeholders as they would benefit from decreased sick days.

Finally, this author is also a key stakeholder in ensuring the success of this project. It has been predicted by this author that the patients will benefit from this project. It is therefore important that this project be successful. As a future Pediatric Nurse Practitioner/DNP, this author will be implementing these activities into future practice. Observing the success of this project will validate that AAPs do indeed assist patients' control and maintain their asthma status, thereby promoting a better quality of life.

The resources readily available to the center as well as its strengths and opportunities contributed to the success of the project. The project will ultimately positively affect the

patients. This makes success and sustainability of the project important not only to the patients but also to their health care providers.

Project Outcomes

Prior to starting the project, a provider interview was conducted to determine how many providers at the FHC were completing the ACT and the AAP with their patients. The providers were also interviewed to determine whether they were willing to begin using the aforementioned tools with their patients with asthma. The initial provider questionnaire can be found in Appendix G. The DNP student then applied to and received approval from the Institutional Review Board (IRB) to conduct a quality improvement project. The student then collaborated with the Athena IT personnel in order to incorporate the tools into the EHR. An asthma in-service was conducted by the asthma expert in order to educate the providers on the importance of using the ACT and the AAP for patients with asthma. A copy of the expert's in-service outline can be found in Appendix H. A chart review was conducted, looking at the use of the ACT and the AAP in patients with asthma from January 2015 to March 2015. Following incorporation of these two tools into Athena, data from charts of patients with asthma were collected to identify the use of these tools. A post-implementation chart review was done to determine the immediate uptake and use of these tools. The DNP student then compared the tools' use a year ago to the post in-service period, and the immediate pre- and post-implementation period. Identified patients were given an identification code and no names were included on the chart data collection form (see Appendix I). The names were not attached to the IDs as there was no intent to match use of the ACTs and AAPs with patients from 2015 to 2016. Providers were also given a code in order to examine changes in use by practitioners. However, no provider names were included in the final reports of this project. Inclusion criteria for chart

review participants were that they were a current patient at the FHC, had a positive diagnosis of asthma, were between the ages of 3 and 24, and were able to speak and understand English. In addition, in order to be included in this project and chart review, patients had to have been seen by a provider at the FHC with a diagnosis of asthma between January 2015 and March 2015. There was a post-implementation interview to assess the providers' perspectives about ease and convenience of use (see Appendix J).

Results

Chart Review of Asthmatic Patients

The pre-implementation chart review revealed that only 30 out of 129 (23%), of the asthmatic population at the FHC met the inclusion criteria for the project and were active patients of the FHC. These 30 had had asthma related appointments between January and March 2015. Of this number seen, only 6 had either of these tools in their charts; four (13.3%) had AAPs and two (6.67%) had an ACT in their charts in January, February, and March 2015.

Charts were reviewed after the implementation of the project and data from January 2016 to March 2016 for asthma-related visits among the 30 qualifying patients were collected. The data were collected from the last asthma-related appointment they had had between January and March 2016. The post-implementation chart review indicated that the number of patients with AAPs and ACTs in their charts had increased notably. Twelve of the 30 patients had not been seen at the FHC for asthma-related visits between January and March 2016 and were therefore excluded from the post-implementation data collection. Eighteen (100%) of the remaining 18 patients had been given new AAPs that were scanned into their charts. Fifteen (83.3%) of the 18 patients had completed ACTs in their charts. Out of the 18 that had new AAPs, three (16.7%) did not have completed ACTs in their charts. Overall, there was a marked increase in the use of these tools as evidenced by the rise in use of the AAP from 13.3% between January and March

2015 to 100% between January and March 2016. The use of the ACT increased from 6.67% between January and March 2015 to 83.33% between January and March 2016. Results are displayed in Table 2 and Figure 2 below.

Table 2

Active Asthmatic Patients (n = 30)

Timeframe	Number of patients seen	AAP	ACT
January – March 2015	30/30 (100%)	4 (13.33%)	2 (6.67%)
January – March 2016	18/30 (60%)	18 (100%)	15 (83.33%)

Figure 2

<u>*Increase in the Use of the AAP and the ACT by Providers From 2015 to 2016*</u>
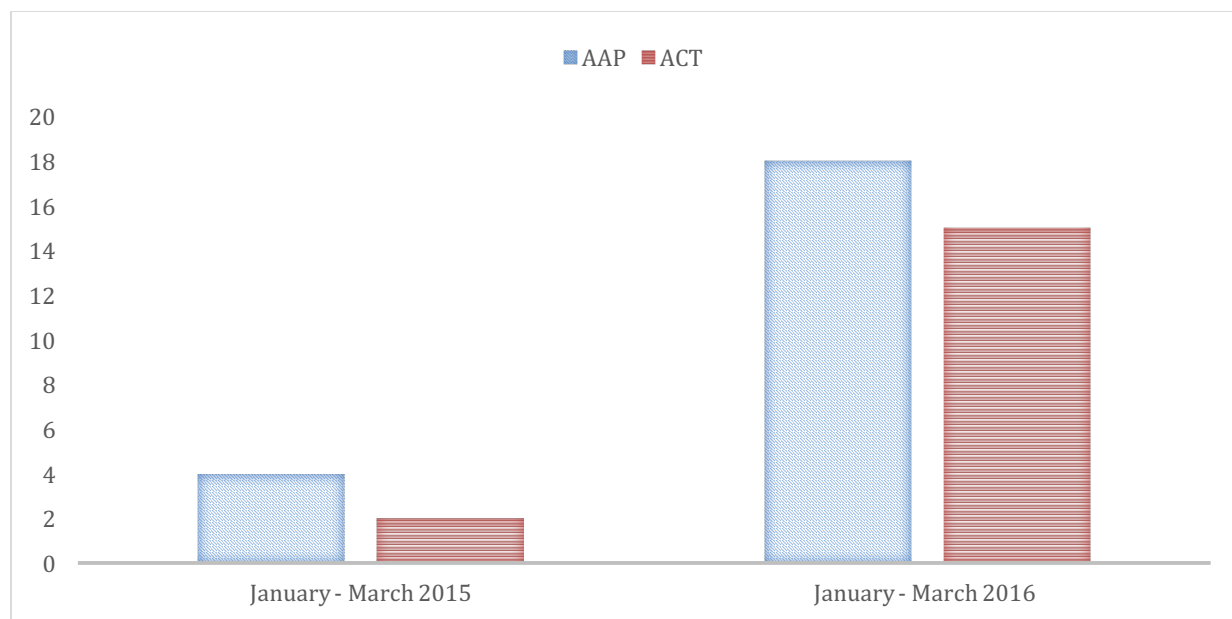
Figure 2. Increase in the use of the AAP and the ACT by providers from January to March 2015 compared to January to March 2016.

Provider Use of Tools

During the pre-implementation chart review, it was recognized that only one out of four providers was utilizing the AAP and/or ACTs with asthmatic patients in 2015. After the implementation of the tools, provider use increased from one provider to three providers in 2016. The fourth provider worked only one day a week. One provider was most consistent with the use of these tools. The three providers who had seen asthmatic patients between January and March 2016 all completed AAPs for their patients. Two of these providers however did not utilize the ACTs with their asthmatic patients. The provider who worked only once a week did not see any asthmatic patients during the implementation period. The breakdown of the provider use of these tools is indicated in Table 3 below.

Table 3

Provider Use of AAPs and ACTs in 2016 (n = 18)

Provider	Number of Patients	AAP n (%)	ACT n (%)
A	15	15 (100%)	15 (100%)
B	2	2 (100%)	0 (0%)
C	1	1 (100%)	0 (0%)

Provider Interviews

The initial provider interview (Appendix G) conducted indicated that only one of the four providers at the FHC was routinely using AAPs and ACTs in their assessment, education, and treatment of patients with asthma. They indicated that they were not utilizing any other educational forms with their asthmatic patients. All of the providers expressed willingness to

begin utilization of the AAP and the ACT if these tools were easily accessible in the EHR. The perceived benefits of the AAP and the ACTs were that assessment and education of patients with asthma would be made easier. The providers indicated that a perceived barrier to the use of these tools was the potential time consuming nature of these tools.

The post-implementation provider interview (in Appendix J) results revealed that the providers are now consistently utilizing the AAP and the ACTs that were incorporated into Athena. All the providers also thought that the in-service conducted by the asthma expert helped them understand asthma as a disease, asthma care and management. One of the benefits of utilizing the AAP was that they noticed that the patients often had more questions about self-management. They mentioned that the benefit of the ACT was that it gave them a baseline number and assessment of how the patient is doing subjectively. They mentioned that the ACTs are great tools for them to compare at each visit. One of the barriers mentioned by the providers is the fact that the AAP was somewhat confusing to use. They mentioned that instead of using the current one based on symptoms, they would like to utilize one that uses "The Rules of 2s." Although they stated that they would like that particular AAP, they stated that they like the implemented AAP because of the ease of use and the nice drop-down menus. The providers stated that they did not find any barriers with utilizing both tools with their asthmatic patients. They stated again that the forms were very easy to use, patients and/or their caregivers found the forms easy to understand and use, and that the forms were quick to complete and did not take up as much time as they initially thought. All of the providers stated that they would be willing to continue to utilize both the AAP and the ACTs.

Implications for Practice

This type of quality improvement project is best suited for a primary care practice office. There are resources readily available to ensure the success of this type of project. It is the

recommendation of the NAEPP (2007) expert guidelines for the diagnosis and treatment of asthma that all patients with asthma be properly assessed and given an AAP. This AAP will help patients and their families manage the disease and prevent and/or treat exacerbations. As the evaluation of this project has shown, AAPs may help reduce ED and acute care hospital visits. Having an AAP on hand also ensures that patients have the right resources to help them treat exacerbations. Health care providers in other practices can and are recommended to utilize these tools. According to the reviewed research, only about 21% of PCPs and specialists utilize AAPs with their patients (Gillette et al., 2013). The success of this project suggests that other providers will find that discussing and completing AAPs and ACTs during patient visits is feasible and must be integrated into all visits. In coding for these visits, the providers can utilize the CPT code for a more complicated visit (99214) as they are performing extra activities like patient education. This will increase reimbursement for the visit.

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Successes and Difficulties Encountered

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Project Strengths and Sustainability

One major success encountered was the providers' willingness to be a part of the project. They were willing to learn more about asthma as well as use the tools provided. Another success was the availability of the tools for use. The tools were quite simple to use and that made it a success. The interactive nature of the AAP was highly favored by the providers. The form was already pre-filled with most age-appropriate asthma medications and dosages. This made it fairly easy for the provider to select a medication for the patient and have it populate into the AAP.

The sustainability of this project has been assured not only by the increased use of these tools by the providers, but also by the presence of a champion to ensure continuity. The pediatric nurse practitioner at the FHC has become invested in the project and will continue to be

a champion for the use of these tools among her colleagues. Having a champion ensures that the other providers have an available resource should they have questions and concerns about the tools implemented. Sustainability will also be enhanced by the use of CPT codes for more complex visits. The increase in reimbursement will support the use of the increased time used during the appointment.

Limitations and Weaknesses

Future activities would include assessing continued use of these tools as well as improvement in self-management of asthma by patients. Another consideration would be to determine whether or not there is improved quality of life as a result of the implementation and use of these tools. Unfortunately, the aforementioned future considerations were beyond the scope of this immediate QI project.

A limitation to be considered was the limited time for implementation of the project. This project was implemented over the course of a month. Had the project been implemented over three or more months, there may have been even better results than what this project yielded. In the future, more time for the implementation of the project should be considered.

The ACTs and the AAP were only implemented in the English language. The patient population at the FHC is over 20% Hispanic. These patients may have benefitted from Spanish ACTs and AAP. In the future, implementing these tools in Spanish may be beneficial for the Spanish speaking and reading patient population at the FHC.

Another limitation and weakness of this project were the limitations on patient data collection criteria. There are currently 129 patients who are between the ages of 3 and 24 at the FHC. The final 30 patients who met the inclusion criteria had to have been seen at the FHC with an asthma diagnosis or follow-up between January 2015 and March 2015. They also had to be an active patient according to the EHR system. Some patients are marked inactive for various

reasons such as outstanding bills, not being seen in the office in the past three years, transferring of care to another entity, and death. The small sample size makes it difficult to apply the findings beyond the identified. A bigger sample size over a longer period of data collection should be considered in future projects.

Another limitation to be considered was the unavailability of the Athena IT personnel at the FHC. All correspondence had to be conducted via phone calls. This made it challenging at times to explain the exact needs of the project to the staff. Persistence with the IT personnel eventually ensured the incorporation and usability of the tools.

Relation to Other Evidence/Healthcare Trends

The outcome of the project had its desired effect of increasing the use of the ACT and the AAP by providers at the FHC. As evidence has shown, only 21% of general practitioners in the United States utilize AAPs with patients with asthma (Gillette et al, 2013). The use of these tools at the FHC has risen from 25% of providers to 75% of the providers. The NAEPP 2007 guidelines recommend the continued use of these tools among patients with asthma. According to the CDC (2013), 48.6% of children were more likely to report having been given an AAP compared with 27.4% of adults. These numbers demonstrate that the national average for asthmatic patients receiving AAPs is less than 50%. This is a wake-up call for healthcare providers in the United States to ensure that they are providing patients with asthma self-management tools in the form of AAPs. This will go a long way to increase asthma outcomes and quality of life in patients with asthma. The providers at the FHC are now providing AAPs and utilizing ACTs at a rate that is much higher than the estimated national average. The benefit of the ACT is that it is a measurement tool to assist the provider in assessment of asthma control (Liu et al., 2007). The provider can then use the information gathered from the ACT to

determine the best course of treatment for the patient (Liu et al., 2007). This tool can also be compared at subsequent visits to help a provider determine the need to modify current treatment.

Enactment of Doctor of Nursing Practice Essential Competencies

According to the American Association of Colleges of Nursing (AACN, 2006), the DNP scholarly project should reflect components of the eight essentials of doctoral education for advanced nursing practice. These essentials include Scientific Underpinnings for Practice, Organizational and Systems Leadership for Quality Improvement and Systems Thinking, Clinical Scholarship and Analytical Methods for Evidence-Based Practice, Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care. The additional essentials are Health Care Policy for Advocacy in Health Care, Interprofessional Collaboration for Improving Patient and Population Health Outcomes, Clinical Prevention and Population Health for Improving the Nation's Health, and Advanced Nursing Practice (AACN, 2006). For this project, the essentials enacted to a large extent include Organizational and Systems Leadership for Quality Improvement and Systems Thinking, Clinical Scholarship and Analytical Methods for Evidence-Based Practice, Information Technology and Patient Care Technology for the Improvement and Transformation of Health Care, and Advanced Nursing Practice. Other essentials employed include Interprofessional Collaboration for Improving Patient and Population Health Outcomes and Scientific Underpinnings for Practice.

Organizational and Systems Leadership for Quality Improvement and Systems Thinking

This essential was the foundation for the whole project. The doctoral student was able to perform an organizational assessment which indicated that most of the providers at the FHC were not assessing and educating patients with asthma according to the NAEPP 2007 asthma guidelines. This project was then born out of the need to develop, implement, and evaluate care

delivery approaches based on research findings that meet the needs of the pediatric and young-adult population with asthma (AACN, 2006). The project sought to improve the quality of care that patients with asthma received at the FHC. Provider interviews, and an in-service were used to communicate with the providers and other staff at the FHC about the need for and importance of the project. These communication methods were used initially to assess the process by which the providers assessed, educated, and provided management resources for their patients with asthma. These methods were also used post-implementation to determine the providers' perspectives regarding the ease of use, facilitators, and barriers of this project.

Information Technology and Interprofessional Collaboration

IT was an integral part of this project as the AAP and the ACTs were incorporated into the EHR. The Athena IT personnel played a huge role in getting these tools into the EHR for the providers to have easy access. Although the IT personnel were not on site, they were able to assist via phone. This collaboration demonstrated the essential of interprofessional collaboration. Another aspect where IT came into play was the ability of the providers to complete the AAP and the ACT forms electronically before printing them off and handing them to patients. The ability for the providers to send the AAP electronically through the patient portals also embodied the IT DNP essential. The collaboration between the providers and the clerical staff also exhibited the essential of inter and intra-professional collaboration. Once a copy of the AAP was completed, printed out, and handed to the patient, a copy was then scanned back into the patients' chart by the clerical staff. This whole process allowed the AAP to be easily accessible to the patients' provider and/or other providers within the practice. This in turn, ensures that the patients' asthma management plan is available and can be adjusted easily.

The Athena IT personnel also assisted incorporating the ACT which could be completed in the patients' chart under the "screenings" section. Results from the ACT were automatically

generated and categorized in the chart under the "results" section. Providers could then view the results of this screening tool in a patients' chart as needed.

Clinical Scholarship and Analytical Methods for Evidence-Based Practice

This essential was carried out via the critical appraisal of existing literature about care for asthmatic patients in order to implement best evidence-based practice tools. The relevant findings helped to design and direct quality improvement methodologies to promote safe, effective, timely, efficient, patient-centered care (AACN, 2006). These findings were used to develop asthma practice guidelines for the providers at the FHC in order to improve their practice with regards to patients with asthma.

Scientific Underpinnings for Practice

This essential embodies determining the nature and significance of health and describing the action and advanced strategies to enhance, alleviate, and restructure health and health care delivery phenomena as appropriate (AACN, 2006). For this project, the delivery of asthma management education and the method of assessment was enhanced and restructured in order to improve health care delivery and outcomes for patients with asthma. The essential also includes evaluating outcomes of the implemented project. This was also performed for this project. Evaluation of outcomes helped to determine the success and sustainability of the implemented tools.

Advanced Nursing Practice

The advanced nursing practice competency was enacted on a small scale. The project was meant to guide and support other nurses to achieve excellence in their nursing practice by ensuring that they use evidence-based clinical guidelines to provide care for patients with asthma. The project ensured that the providers demonstrated advanced levels of clinical judgment in delivering evidence-based care to improve asthmatic patients' outcomes (AACN,

2006). The providers worked in partnership with asthmatic patients and their families in order to facilitate optimal care and patient outcomes (AACN, 2006). The ACT ensured that the patient was properly assessed by the provider and the AAP guaranteed that the patients had the education and resources available to them to help maintain their asthma.

Plans for Dissemination of Outcomes

The outcomes of this project will be disseminated in an oral presentation at the University's Campus. This oral presentation will be presented to the doctoral student's committee, and any faculty, staff, student, and community member who wishes to attend. The outcomes of the project may also be presented to the staff of the FHC in the case that they request it. A poster presentation of this project was also presented to the members of the 2016 DNP cohort and invited faculty, staff and students. The outcomes of this project can potentially be disseminated to the Athena staff to demonstrate feasibility of the use of these tools.

Conclusion

The proposed project was aimed at increasing the providers' use of the ACT and the AAP. The consistent use of these tools will help ensure that patients and their families have the tools they need to manage their asthma. Evaluation of this project has helped to determine the success and viability of this program at the FHC. This will in turn ensure that patients with asthma at the FHC continue to be treated according to the NAEPP guidelines.

For this DNP student, one of the lessons learned was to ensure that there was a clear start date for implementation of the project. This helps to keep everyone involved in the implementation process on track and beginning the project at the same time. Another lesson learned was that it takes collaboration and coordination with other members of the team to get a project started and finished on time. Without the help of each member of the team, this project would not have been as successful. Another lesson learned was to be flexible in the planning of

the implementation project. This allows for necessary changes to be made to ensure the continuity and success of the project.

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Appendices

Appendix A: Asthma Action Plan

Email Form Developer   Reset Form

Grand Valley State University Family Health Center
Asthma Action Plan for Patients 5 – 11 Years
Additional instructions are available by holding your mouse pointer over each field.

Name:	John Doe		
Reg #:	0000	Date:	01/28/2016
DOB:	01/28/2009	Age:	7

GREEN ZONE
(Doing Well)

✓ Breathing is good (no coughing, wheezing, chest tightness, or shortness of breath during the day or night), *and*

✓ Able to do usual activities (work, play, and exercise), *and*

✓ Peak flow is more than 80% of your child's personal best (_____)

Personal Best: _____

Controller Medications
Take these medication(s) EVERY DAY.

Medication	Directions
Advair Diskus 100/50 mcg	*1 puff with chamber and mask once daily*

☐ If your child usually has symptoms with exercise, then give:
Albuterol HFA 90mcg   *2 puffs with chamber as needed, 15-30 minutes before exercise*

YELLOW ZONE
(Caution)

✓ Breathing problems (coughing, wheezing, chest tightness, shortness of breath, or waking up from sleep), *or*

✓ Can do some, but not all, usual activities, *or*

✓ Peak flow is between 60% to 80% of your child's personal best (_____ to _____)

Rescue Medications
Continue giving the controller medication(s) as prescribed.

Give: *Albuterol*   *2 puffs with chamber OR 1 nebulizer treatment; repeat after 20 minutes if needed*

Then: ◆ Wait **20 minutes** and see if the treatment(s) helped
   ◆ If your child is GETTING WORSE or is NOT IMPROVING after the treatment(s), go to the Red Zone
   ◆ If your child is BETTER, *schedule an appointment with PCP in the next couple days*

Then: If your child still has symptoms after 24 hours, CALL YOUR CHILD'S DOCTOR and if he/she agrees:
   ☐ Start: *Prednisolone (15mg/5mL): 10 mL by mouth once daily for 3 days*
   ☐ Other: _____

If rescue medication is needed more than **2 times a week**, call your child's doctor at ___ **616-988-8774** ___ .

RED ZONE
(Medical Alert)

✓ Breathing is hard and fast (nose opens wide, ribs show), *or*

✓ Rescue medications have not helped, *or*

✓ Cannot do usual activities (including trouble talking or walking), *or*

✓ Peak flow is less than 60% of your child's personal best (_____)

Emergency Treatment
Take these medication(s) and seek medical help NOW.

Take: *Albuterol*   *4 puffs with chamber and mask OR 2 nebulizer treatments (one after another)*

Then: ◆ Wait **15 minutes** and see if the treatment(s) helped
   ◆ If your child is GETTING WORSE or is NOT IMPROVING, **go to the hospital or call 9-1-1**
   ◆ If your child is BETTER, continue treatments every 4 to 6 hours and call your child's doctor – **say your child is having an asthma attack and needs to be seen TODAY**

Then: ☐ If your doctor agrees, start: *Prednisolone (15mg/5mL): 10 mL by mouth once daily for 3 days*
   ☐ Other: _____

Plan Developed in Partnership with Patient's Family by (Doctor's Name): _____ **Jane Smith** _____   Doctor Number: __ **1111** __
Signature: _____ **Jane Smith, DNP, CPNP-PC** _____   Date/Time: __ **01/28/2016** __

POD-0242	REV: 12/09 HIM: 12/09	Medical Records	Ⓜ University of Michigan Hospitals and Health Centers	Asthma Action Plan Patients 5 – 11 Years

Appendix B: Asthma Control Test

Patient Name: ___ Date: ___ Patient ID#: ___ Primary Care Provider: ___

Asthma Control Test™ is:

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

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

1. In the past **4 weeks**, how much of the time did your **asthma** keep you from getting as much done at work, school or at home?
| All of the time (1) | Most of the time (2) | Some of the time (3) | A little of the time (4) | None of the time (5) | SCORE ☐ |

2. During the past **4 weeks**, how often have you had shortness of breath?
| More than once a day (1) | Once a day (2) | 3 to 6 times a week (3) | Once or twice a week (4) | Not at all (5) | ☐ |

3. During the past **4 weeks**, how often did your **asthma** symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?
| 4 or more nights a week (1) | 2 or 3 nights a week (2) | Once a week (3) | Once or twice (4) | Not at all (5) | ☐ |

4. During the past **4 weeks**, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?
| 3 or more times per day (1) | 1 or 2 times per day (2) | 2 or 3 times per week (3) | Once a week or less (4) | Not at all (5) | ☐ |

5. How would you rate your **asthma** control during the **past 4 weeks**?
| Not controlled at all (1) | Poorly controlled (2) | Somewhat controlled (3) | Well controlled (4) | Completely controlled (5) | ☐ |

TOTAL ☐

If your score is 19 or less, your asthma may not be under control.
Be sure to talk with your doctor about your results.

Copyright 2002, by QualityMetric Incorporated.
Asthma Control Test is a trademark of QualityMetric Incorporated.
The Asthma Control Test is for people with asthma 12 years and older.

References: 1. US Department of Health and Human Services, National Institutes of Health, National Heart, Lung and Blood Institute. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (EPR-3 2007).* NIH Item No. 08-4051. http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm. Accessed September 10, 2007. **2.** Nathan RA et al. *J Allergy Clin Immunol.* 2004;113:59-65.

ASTHMA ACTION AMERICA®

Used with permission from Optum Insight Life Sciences, Inc. (Appendix K)

Appendix C: Childhood Asthma Control Test

Childhood Asthma Control Test for children 4 to 11 years.

How to take the Childhood Asthma Control Test

▶ **Step 1** Let your child respond to **the first four questions (1 to 4)**. If your child needs help reading or understanding the question, you may help, but let your child select the response. Complete the remaining **three questions (5 to 7)** on your own and without letting your child's response influence your answers. There are no right or wrong answers.

▶ **Step 2** Write the number of each answer in the score box provided.

▶ **Step 3** Add up each score box for the total.

▶ **Step 4** Take the test to the doctor to talk about your child's total score.

19 or less If your child's score is 19 or less, it may be a sign that your child's asthma is not controlled as well as it could be. No matter what the score, bring this test to your doctor to talk about your child's results.

Have your child complete these questions.

1. How is your asthma today?

				SCORE
0 Very bad	**1** Bad	**2** Good	**3** Very good	☐

2. How much of a problem is your asthma when you run, exercise or play sports?

0 It's a big problem, I can't do what I want to do.	**1** It's a problem and I don't like it.	**2** It's a little problem but it's okay.	**3** It's not a problem.	☐

3. Do you cough because of your asthma?

0 Yes, all of the time.	**1** Yes, most of the time.	**2** Yes, some of the time.	**3** No, none of the time.	☐

4. Do you wake up during the night because of your asthma?

0 Yes, all of the time.	**1** Yes, most of the time.	**2** Yes, some of the time.	**3** No, none of the time.	☐

Please complete the following questions on your own.

5. During the last 4 weeks, how many days did your child have any daytime asthma symptoms?

5 Not at all	**4** 1-3 days	**3** 4-10 days	**2** 11-18 days	**1** 19-24 days	**0** Everyday	☐

6. During the last 4 weeks, how many days did your child wheeze during the day because of asthma?

5 Not at all	**4** 1-3 days	**3** 4-10 days	**2** 11-18 days	**1** 19-24 days	**0** Everyday	☐

7. During the last 4 weeks, how many days did your child wake up during the night because of asthma?

5 Not at all	**4** 1-3 days	**3** 4-10 days	**2** 11-18 days	**1** 19-24 days	**0** Everyday	☐

TOTAL ☐

★

Appendix D: Permission for Health Promotion Model

From: Nola Pender <npender@umich.edu>
Date: Mon, Apr 4, 2016 at 6:15 PM
Subject: Re: Permission to Use the Health Promotion Model
To: Claudia Turkson-Ocran <turksonc@mail.gvsu.edu>

Claudia:
You have my permission to reprint the Health Promotion Model in your project giving proper credit to the source.
Nola Pender

Appendix E: Stage Theory of Organizational Change

Stage Theory of Organizational Change

Concept	Definition	Application
Stages of Change	Organizations pass through specific steps as thy change	Help organization move through all the stage; do not stop at just adoption
Problem definition (Awareness Stage)	Problems recognized and analyzed; solutions sought and evaluated	Involve management and other personal in awareness-raising activities
Initiation of Action (Adoption Stage)	Policy or directive formulated; resources for beginning change allocated	Provide process consultation to inform decision makers and implementers of what adoption involves.
Implementation of Change	Innovation implemented, reactions occur, and roles change	Provide training, technical assistance, and problem-solving aid.
Institutionalization of Change	Policy or program becomes entrenched in the organization; new goals and values are internalized	Identify high-level champion, work to overcome obstacles to institutionalization, and create structures for integration

Adapted from:

Glanz, K., Rimer, B., & Viswanath, K. (2008). Health behavior and health education: Theory,

   research, and practice (4th ed.). San Francisco, CA: Jose-Bass.

Used with permission from: (see Appendix L)

Appendix F: HRRC Approval

From: Christina Moord <no-reply@irbnet.org>
To: turksonc@mail.gvsu.edu

Please note that Grand Valley State University Human Research Review Committee has published the following Board Document on IRBNet:

Project Title: [875416-1] Evaluating the Use of the Written Asthma Action Plan and the Asthma Control Test for Providers in a Primary Care Office after Implementation into the Electronic Health Record.
Principal Investigator: Claudia Turkson-Ocran, BSN

Submission Type: New Project
Date Submitted: February 26, 2016

Document Type: Determination Letter
Document Description: Determination Letter
Publish Date: March 3, 2016

Should you have any questions you may contact Christina Moord at moordc@gvsu.edu.

Thank you,
The IRBNet Support Team

www.irbnet.org

Appendix G: Initial Provider Interview

<u>**Initial Provider Interview Questions**</u>

1. Are you currently using Asthma Action Plans with all of your asthmatic patients?

2. Are you currently using the Asthma Control Test and/or the Childhood Asthma Control Test with all of your asthmatic patients?

3. Are you currently using another educational form for your asthmatic patients?

4. Are you willing to start using an electronic, interactive Asthma Action Plan and Asthma Control Test if they are incorporated into Athena?

Appendix H: Asthma In-Service Outline

By: *Karen Meyerson, MSN, APRN, FNP-C, AE-C*

ASTHMA IN-SERVICE

Overview of Asthma

Diagnosis and Management of Asthma
Importance of Asthma Control Tests
Completing Asthma Control Tests

Spirometry

Importance of spirometry in Asthma Diagnosis
How to accurately interpret spirometry results

Asthma Action Plans

Importance of Asthma Action Plans
How to accurately complete Asthma Action Plans

Appendix I: Chart Review Document

Chart Review

Date:

Patient Code	Patient Age	Date	AAP in Chart?	ACT in Chart?	Provider Code

Appendix J: Post-Implementation Interview

<u>**Post-Implementation Provider Interview Questions**</u>

1. Are you currently using Asthma Action Plans for your asthmatic patients?

2. Are you currently using the Asthma Control Test and/or the Childhood Asthma Control Test for your asthmatic patients?

3. Was the in-service conducted by Karen Meyerson, MSN, APRN, NP-C, AE-C helpful?

4. What benefits have you found in utilizing the AAP in your contact with your asthmatic patient?"

5. What benefits have you found in utilizing the ACT in your contact with your asthmatic patient?"

6. What barriers have you found in utilizing the AAP in your contact with your asthmatic patient?"

7. What barriers have you found in utilizing the ACT in your contact with your asthmatic patient?"

8. Are you willing to continue using the Asthma Action Plan and Asthma Control Tests incorporated into Athena?

Appendix K: ACT Permission

OPTUM™   **LICENSE AGREEMENT - DETAILS**

Licensee:	Grand Valley State University	License Number:	QM034109
	Claudia Turkson-Ocran		
	7272 100th Street SE	Amendment to:	N/A
	Caledonia, MI, 49503		
		Study Term:	03/15/16 to 03/14/17
		Master License Term:	N/A

Approved Purpose
Evaluating the Use of the Asthma Action Plan and the Asthma Control Test by Providers in a Primary Care Office after Implementation into the Electronic

Study Name: Evaluating the Use of the Asthma A
Protocol:
Govt. ID:
Study Type: Thesis/Dissertation
Clients Reference:

Licensed Surveys (Modes) and Services:

Item	Description	Mode of Admin	Quantity	Fees
PROJ01	License Fee	Paper	1	
ES0010	ACT, Standard Recall	Paper	1	

Approved Languages:
United States (English)

IS0160	ACT Interview Script, Std	Interview Script	1	

Approved Languages:
United States (English)

ADM012	Patients Enrolled (*increments of 100)		100	
ADMINS	Administrations (100 x 2 admins)		200	
SS075	Scoring Software v4.5		1	
SS082	ACT: scoring credits v4.5		200	
EM037	Quick Start Guide: ACT		1	

Approved Languages:
United States (English)

EM009	Asthma Control Test User Guide		1	

Approved Languages:
United States (English)
****

OGSR Discounts Applied

OPTUM™

NON-COMMERCIAL LICENSE AGREEMENT
Office of Grants and Scholarly Research (OGSR)

License Number: QM034109

Licensee Name: Claudia Turkson-Ocran c/o Grand Valley State University

Licensee Address: 7272 100th Street SE, Caledonia 49316 US

Approved Purpose: Evaluating the Use of the Asthma Action Plan and the Asthma Control Test by Providers in a Primary Care Office after Implementation into the Electronic Health Record

Study Type: Non-commercial academic research and/or thesis – Unfunded Student

Data Collection Method: Paper

Therapeutic Area: Lungs and Breathing

Indication: Health & Wellness

Royalty Fee: None, because this License is granted in support of the non-commercial Approved Purpose

A. Effective Date: This Non-Commercial License Agreement (the "Agreement") from the Office of Scholarly Grants and Research (OGSR) is made by and between OptumInsight Life Sciences, Inc. (f/k/a QualityMetric Incorporated) ("Optum"), 24 Albion Road, Building 400, Lincoln, RI 02865 and Licensee. This Agreement is entered into as of the date of last signature below and is effective for the Study Term set forth on Appendix B.

B. Appendices: Capitalized terms used in this Agreement shall have the meanings assigned to them in Appendix A and Appendix B. The appendices attached hereto are incorporated into and made a part of this Agreement for all purposes.

C. Grant of License: Subject to the terms of this Agree   ment, Optum grants to Lice nsee a non-exclu sive, non-transferable, non-sublicensable worldwide license to use, solely for the Approved Purpose and during the Study Term, the Licensed Surveys, Software, SMS Scoring Solution, and all intellectual property rights related thereto ("Survey Materials"), in the authorized Data Collection Method, Modes of Administration, and Approved Languages indicated on Appendix B; and to administer the Licensed Surveys only up to the total number of Administrations (and to make up to such number of exact reproductions of the Licensed Surveys ne cessary to support such A dministrations) in any combination of the specific Licensed Surveys and Approved Languages, Data Collection Method, and Modes of Administration.

EXECUTED by the duly authorized representatives as set forth below.

OptumInsight Life Sciences, Inc.   **Claudia Turkson-Ocran c/o Grand Valley State University**

Signature: _____   Signature: _____

Name: **Martha Bayliss**   Name: Claudia Turkson-Ocran, BSN, RN

Title: **VP Operations**   Title: Evaluating the use of the AAP and ACT

Date: 14 April 2016   Date: 4.13.2016

Appendix L: Permission for Stage Theory of Organizational Change

From: Wiley Global Permission <permissions@wiley.com>
To: <turksonc@mail.gvsu.edu)

Dear Claudia,

Thank you for providing more information.

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