

Abstract

Problem: Improved patient asthma outcomes, operationally defined as decreased acute care visits, reduced missed days from school and work, and decreased nocturnal awakenings due to asthma symptoms, have been demonstrated through the use of a symptom based written asthma action plan (AAP) in reducing acute care visits (Gibson & Powell, 2004; Zemek, Bhogal, & Ducharme, 2008). However, despite the research and guideline recommendations that support the use of AAPs, these plans are routinely not used by providers. In fact, only 25 percent to 56 percent of all asthma patients receive an AAP (Rank, Volcheck, Li, Patel, & Lim, 2008). Thus, the purpose of the Capstone project was to improve provider compliance in an outpatient office in the use of a symptom based AAP.

Methods: The Capstone quality improvement (QI) project was conducted during a specific two month period (coinciding with the study period in the fall and winter of 2010) in a suburban outpatient allergy and asthma clinic in Glen Burnie, Maryland. The QI project involved an educational in-service on the use of an AAP and a system procedural change (placing a blank AAP on each patient's medical record at the time of visit). A retrospective medical record review was conducted from all eligible medical records of patients greater than six years of age diagnosed with asthma that were seen in the office during the two month study period following the educational in-service in order to assess the use and completeness of the AAP (N = 42). The rate of proportional change (percentages) in compliance in the use of an AAP after the educational in-service and system procedural change was analyzed and reported.

Results: A statistically significant improvement in provider compliance to the use and completion of a symptom based AAP was found at eight weeks following an educational in-service and system procedural change. A statistically significant change ($p < .001$) in provider

compliance was found as evidenced by a 79 percent (33/42) increase in the use and completion of a symptom based AAP following the intervention (education and system procedural change) as compared to less than 5 percent (2/42) rate of compliance prior to the intervention.

Discussion: The role of the Doctor of Nursing Practice (DNP) is to synthesize the evidence and implement the best evidence and recommended national guidelines. The QI project paralleled the role of the DNP in the implementation of evidence based research and guidelines in conducting an educational in-service and system procedural change to improve provider compliance in the completion and use of a symptom based AAP within an organization. The project demonstrated the effectiveness of an educational in-service in improving provider compliance in the use of and the completion of a symptom based AAP.

Improving Provider Compliance in the
Use of an Asthma Action Plan for
Patients with Asthma in an Outpatient Setting

Elaine Y. Bundy, MS, CRNP

University of Maryland School of Nursing

Dedication

To my dear husband, Mark, and my family, who gave me their understanding and loving support to be able to complete this project. To my Capstone Chair, Dr. Murphy, whose expertise and guidance was often sought after, and who always found time to help in whatever way was needed.

Acknowledgements

The author gratefully acknowledges the support and guidance of the following individuals:

Lyn Murphy, PhD, MBA, MS, RN (Committee Chair)

Bridgitte Gourley, DNP, CRNP (Committee)

Kathleen Buckley, PhD, RN, IBCLC (Committee)

Robin Newhouse, PhD, RN, NEA-BC

Margaret Watt, PhD-c, CRNP

Arnold Kirshenbaum, MD

Chase Nichols (Administrative Support)

Table of Contents

Abstract.....	1
Dedication.....	4
Acknowledgement.....	5
Table of Contents.....	6
Section One:	
Overview/Background.....	8
Problem: The Need for the Asthma Action Plan	10
Conceptual Framework.....	11
Purpose of the Project.....	11
Potential Significance and Anticipated Outcomes.....	13
Section Two:	
Review of the Literature.....	14
Evidence Based Practice Guidelines.....	15
Barriers to the Use of an Asthma Action Plan.....	16
The Influence of Patient Education on Asthma Outcomes.....	17
Evidence for Outpatient Clinic Asthma Education.....	18
Evidence for the Use of an Asthma Action Plan.....	20
Synthesis of Evidence and Recommendations for Practice.....	23
Section Three:	
Methods.....	26
Design.....	26
Setting and Sampling.....	27

Procedures.....	28
Variables and Measures.....	30
Data Collection.....	31
Data Analysis.....	32
Results.....	32
Section Four:	
Discussion.....	34
Strengths and Limitations of Data.....	34
Ethical Considerations.....	36
Section Five:	
Plans for Translation.....	37
Translation Plan Template.....	38
Implications for the Doctor of Nursing Practice.....	39
References.....	42
Timeline.....	49
Table 1.....	50
Table 2.....	51
Table 3.....	52
Appendices.....	53

Improving Provider Compliance in the Use of an Asthma Action Plan
For Patients with Asthma in an Outpatient Setting

Section One: Overview and Background

Asthma is the most prevalent chronic disease in childhood (World Health Organization [WHO], 2008) and has the distinction of being the only treatable chronic disease in the United States that is also increasing in morbidity and mortality (Lane, Newman, Edwards, & Blaisdell, 2006). The Agency for Health Care Research and Quality (AHRQ) reports that asthma affects 16 million adults and 6.1 million children and accounts for two million emergency department visits annually in the United States (USDHHS, 2007). Asthma is a chronic disease characterized by airway inflammation and intermittent or acute expiratory airway obstruction in response to various stimuli (Fitzgerald & Shahidi, 2010; Gibson & Powell, 2004). The inflammation of asthma with variable air way obstruction, which is usually reversible, can lead to recurrent episodes or exacerbations of wheezing, breathlessness, chest tightness, and cough (NAEPP, 2007). Many patients do not recognize the symptoms of an impending asthma exacerbation, such as chest tightness, nocturnal awakenings, cough, wheeze or decreased activity level. Most often, these symptoms occur gradually over several days and offer an opportunity for timely intervention with β agonists and corticosteroids which help to reduce airflow obstruction and the severity of an exacerbation.

Asthma poses a major public health burden in the United States and is associated with the disparities of race, socioeconomics, gender and age (Lane et al, 2006). The disparity in the morbidity and mortality rates of asthma are thought to occur as a result of a multitude of complex and interdependent influences of the individual, environment, society, health system

and the provider (Canino, McQuaid & Rand, 2009). African American children have twice the risk of asthma and increased morbidity when compared to white children among families with low income in the United States (Akinbami, Rhodes & Lara, 2008; Piper, Glover, Elder, Baek & Wilkinson, 2010). Both race and class factors may increase the asthma burden (Brown, Mayer, Zavestoski, Luebke, Mandelbaum & McCormick, 2003; Williams, Sternthal & Wright, 2009).

Some of the reasons identified to explain asthma disparities are differences in diagnosis behaviors, access to care, and quality of care. Researchers report that racial disparities contribute to poor asthma outcomes and were found to lead to unaddressed health care needs due a lack of access to care, lack of preventative care, and lack of quality health care (Piper et al., 2010). Additional reasons racial disparities exist in asthma patients may be as a direct result of the provider's who treat minority patients. For example, providers prescribe controller therapy (per the guidelines) less frequently for African American and Latino children than for non-Latino whites (Kruse, Deshpande & Vezina, 2007).

In light of the high prevalence of asthma, inconsistencies in standards of care, burden of asthma, and other socioeconomic factors, the Institute of Medicine (IOM, 2011) designated quality improvement in asthma as a priority area. Recognizing the inconsistencies and need for improvement in managing asthma, the National Heart, Blood and Lung Institute's National Asthma Education and Prevention Program (NAEPP, 2007) was developed as a national guideline for the diagnosis, treatment and management of asthma. The guidelines, developed through research and evidence based findings, emphasize the implementation of an individualized written AAP (See Appendix A) for all patients with asthma (Bhogal, Zemek, & Ducharme, 2006; Fitzgerald & Shahidi, 2010; NAEPP, 2007; Rank, Volcheck, Li, Patel, & Lim, 2008).

Problem: The Need for the Asthma Action Plan

Researchers from individual studies and meta analyses of data link improved asthma outcomes, as operationally defined as reduced hospitalizations, emergency department (ED) visits, and out patient visits for asthma exacerbations, fewer missed days from school and work and less nocturnal awakenings with the use of an AAP (Gibson & Powell, 2004; NAEPP, 2007; Teach, Crain, Quint, Hylan, & Joseph, 2006; Zemek, Bhogal, & Ducharme, 2008). The AAP is of paramount importance in asthma self management and is a fundamental part of the NAEPP 2007 guidelines. The AAP is a set of prescribed instructions which assist patients in the early recognition and provides directions as to what steps to take in the treatment of an exacerbation. AAPs help to guide patients with asthma in recognizing and determining what action to take based on their symptom severity and intervene to reduce the severity and duration of an impending exacerbation (Gibson & Powell, 2004). This is important because patients can intervene in a more timely fashion to prevent worsening of their asthma symptoms which leads to improved patient outcomes. Impaired symptom control, leading to asthma exacerbations, is a major contributor to poor outcomes in patients (NAEPP, 2007; Szeffler, 2009).

The promotion of self-management and control of asthma symptoms through education and use of an AAP have been shown to be effective in improving patient outcomes (Gibson & Powell, 2004). The AAP is a key component of asthma education, serving as a roadmap for patients regarding what medications they need to take to control their asthma, how to avoid triggers, and to better understand the signs and symptoms of an impending asthma exacerbation (Ellis, 2009). AAPs are particularly imperative for patients with frequent or severe asthma exacerbations (NAEPP, 2007). Therefore, the AAP is a vital component of overall asthma management and of patient self-management of asthma exacerbations (Gibson & Powell, 2004).

Conceptual Framework

The application of theory in nursing research offers a foundation or perspective that can guide nursing practice in improving asthma outcomes. The translation theory by Greenhalgh, Robert, MacFarlane, Bate and Kyriakidou (2004) provides a conceptual framework that can be used to implement research based findings into practice within an organization as part of a quality improvement project. According to Greenhalgh et al. (2004) effective translation of evidence into practice is dependent upon the following key determinants: diffusion, dissemination, implementation, and sustainability. Diffusion is a passive process of knowledge spread. Dissemination is an active process that includes planning and focus directed to targeted groups adopting the intervention. Active dissemination is more beneficial when implementing new strategies, such as an AAP. Successful implementation involves active planning efforts to embrace the innovation organizationally. Sustainability entails the innovation becoming such a routine process within the organization until it is obsolete. A conceptual model by Greenhalgh et al., (2004) was constructed from a synthesis of research findings to guide the diffusion, dissemination, and implementation of innovations in healthcare organizations. In operationalizing the translation innovation for the completion and use of an AAP, a template was used to help plan, develop, implement and disseminate the project's findings.

Purpose of the Project

Strategies that have been found to be effective in promoting behavioral change among health professionals include in-services, reminders or boosts, academic detailing and multifaceted interventions, such as audits and feedback (DiCenso, Guyatt, & Ciliska, 2005; O'Laughlen, Hollen, & Ting, 2009). In a study by Boom, Nelson, Laufman, Kohrt, & Kozinetz

(2007), academic detailing successfully improved provider immunization knowledge and behaviors following an educational intervention. Academic detailing differs from didactic and traditional continuing medical education by considering baseline knowledge, motivating factors for clinical practice and defining behavioral and educational outcomes. Several factors in academic detailing are thought to promote implementation of the desired behavior: credibility of the trainer, active participation in the presentation, and targeted follow-up. The use of authoritative and unbiased information references employed by trained “detailers” that tailor and address barriers also help to influence adoption of the desired practice (Boom, Nelson, Laufman, Kohrt, & Kozinetz, 2007). Provider education is one of the main quality improvement strategies employed in the Closing the Quality Gap series as reported by the IOM (2011).

Quality improvement (QI) is a process where individuals collaboratively work together to bring about improvements in outcomes (Newhouse, 2007). To address the problem of provider compliance in the use and completion of an AAP, a QI project was developed to address and improve provider compliance in the completion and use of an AAP. The QI project sought to determine if an educational intervention and procedural system change would improve provider compliance in the completion and use of an AAP. The null hypothesis was that there was no pre- educational intervention to post educational intervention changes in the use of an AAP, and the alternative hypothesis was that there were changes in the use of an AAP. Thus, the purpose of the Capstone project was to determine if an educational intervention and system procedural change (placing a blank AAP on all patient medical records at the time of their visit) would improve provider compliance in the use and completion of a symptom based AAP in an outpatient setting.

Significance and Anticipated Outcomes

The symptom based written AAP guides the patient as how to detect worsening symptoms and the steps to take in effective self-management (Rank et al, 2008). This is especially important in maintaining control and with asthma exacerbations in the use of inhaled (ICS) and oral (OCS) corticosteroids (Gibson & Powell, 2004). Effective asthma education on the use of an individualized AAP enables patients and caregivers to understand the importance of reducing trigger exposure, the signs and symptoms of asthma exacerbation and to be able to recognize when to step up or step down controller therapy (Ellis, 2009).

It is incumbent upon physicians and nurse practitioners to implement treatment and therapeutic measures such as asthma education and an AAP to manage patients effectively. Adhering to the guidelines and including the use of an AAP have been shown to ultimately reduce hospitalizations, emergency department (ED) visits, and out patient visits for asthma exacerbations (Gibson & Powell, 2004; NAEPP, 2007; Zemek, Bhogal, & Ducharme, 2008). The expected outcomes were improved provider compliance in the completion and use of an AAP, which in turn will provide patients with a guide for asthma self management and thereby lead to better patient outcomes.

Section Two: Literature Review

A review of the national guidelines and literature were examined to determine if an educational intervention and system procedural change would improve provider compliance in the completion of an AAP in an out-patient setting. The National guidelines and studies were reviewed regarding the influence of patient education geared toward improving asthma outcomes in both school based and outpatient settings, and the evidence for an AAP. An evidence based review was utilized to address the practice problem, focusing upon recent (2004-2010) published research, systematic reviews and clinical practice guidelines, using databases of Cochrane Database of Systematic Reviews, PubMed Medline and SUMsearch.

Initially, using the terms “asthma education” in PubMed, a total of 5,805 publications were found. A total of 103 publications were found in PubMed with the terms, “written asthma action plan”. Using SUMsearch with search terms of “asthma action plan” and “the focus of treatment for asthma”, 343 documents were found, including practice guidelines, systematic reviews, and original research. In PubMed, using the search term “asthma action plans” and published articles 2004-2010, forty-four articles were included in the title and abstract screen. A further advanced search in PubMed, under the search terms “asthma action plans” and “education and systematic reviews”, yielded five systematic review articles. A Cochrane Database of Systematic Reviews using search terms of “asthma education” resulted in twenty systematic reviews. Publications were then reviewed for type and strength of evidence (systematic review, randomized control trials, national guidelines) and published within the last seven years. All publication titles were reviewed out of a total of 278 found, and then narrowed to a review of 64 abstracts. From the abstract review, 29 articles were retrieved, and ultimately 12 primary publications were selected for the evidence review (See Appendix C).

Criteria for this evidence review were based upon the results of the types of studies, participant setting, intervention and outcomes involved in reducing asthma exacerbations. Inclusion criteria were the studies that addressed the problem with either education or AAP, or compared to no AAP with only education. All ages of study participants were included. Additionally, research studies were sought for evidence of effective nurse-led interventions in improving asthma outcomes through education and the use of AAPs. Studies that were excluded did not specifically address the practice problem, or were not applicable to asthma patients in an outpatient setting. The Johns Hopkins Evidence Based review and rating scale was used to evaluate the literature (See Appendix C, Newhouse, 2007).

Evidence Based Practice Guidelines

The National Asthma Education and Prevention Program (NAEPP) (2007) was developed to disseminate evidence based national guidelines in the diagnosis and management of asthma. The guidelines underscore the importance of patient education and primary care provider-patient partnership in improving patient asthma outcomes. The report also emphasizes control of asthma through adherence and assessment, medication technique, the use of an AAP, and review of patient concerns at every visit (Sarver & Murphy, 2009). The NAEPP states that all patients with asthma should have an AAP as the AAP guides the patient in detecting worsening symptoms and the steps to take in effective self-management. When the patient has an AAP, they are able to take steps that can prevent hospitalizations, emergency department (ED) visits, and out patient visits for asthma exacerbations (NAEPP, 2007).

Barriers to the Use of an AAP

Although evidence based practice (EBP) guidelines for asthma management are developed and updated, there continues to be a substantial variance between EBP guideline recommendations in the use of an AAP and actual practice amongst providers in the use of an AAP. Potential barriers to implementation of the educational program are the complexity and variability of asthma and the written asthma action plan, and the challenge of changing or altering a medical practice (DiCenso et al., 2005). Individual provider characteristics are often observed as barriers to the implementation of research based evidence. Some health care providers, for example, perceive evidence based findings and research as not applicable to their area of practice.

The complexity of asthma and the AAP may prove to be a barrier in adopting the educational intervention if it is perceived as difficult to understand or use. Reasons and barriers cited for provider noncompliance to the use of an AAP are provider lack of awareness and knowledge of the guideline or disagreement with the guideline, lack of time, lack of self-efficacy, lack of outcome expectancy, belief that the AAP will not be useful to patients and boredom with a customary practice (Cabana et al., 1999; Partridge, 2004; Roberts et al., 2009). Other potential barriers to provider adherence of the use of an AAP is that they may lack specific educational training and knowledge as to what self-management instructions need to be given to the patient in the completion of a individualized written AAP (Partridge, 2004). Rastogi, Shetty, Neugebauer, and Harijith (2006) suggest that provider non-adherence to the guidelines may contribute to health care disparities and higher hospitalization rates.

Despite the guideline recommendations, AAPs are not routinely used by providers and only 25 percent to 56 percent of patients receive an AAP (Rank et al., 2008). In a survey given

to 196 locations in family practice, internal medicine, pulmonologists, allergist offices and hospitals covering 24 states in the United States, Cooper et al. (2009) reported that only 63 offices provided an AAP to their patients with asthma. Also from the survey findings, Cooper et al. assert that only 32 percent of health care practitioners use the guideline recommended AAPs.

Some providers believe that AAP are not effectively or routinely used by their patients (Braganza & Sharif, 2010). However, contrary to this belief, Braganza and Sharif (2010) found that most parents post their children's AAPs for easy reference or retrieval from a safe place, such as on the kitchen refrigerator. Braganza and Sharif interviewed 428 subjects, reviewed 2192 charts, and reported that eighty percent of parents of patients with an AAP perceived that AAPs were extremely useful; most were pediatric patients were older and had persistent asthma. When the child was sick or medication needed to be given, 55 percent of the parents reported looking at the AAP for guidance.

The Influence of Patient Education on Asthma Outcomes

According to the NAEPP (2007), patient education is of paramount importance in asthma management and is a fundamental part of the national guidelines. As such, asthma education is one of the key components of asthma control and is essential for optimal asthma self-management. Effective asthma education enables patients and caregivers to understand the disease and the importance of when and how to take steps to reduce trigger exposure and to be able to recognize when to step up or step down controller therapy (Ellis, 2009; Sarver, 2009). Patient education empowers the patient to quickly respond to asthma exacerbations with prompt initiation of treatment thus reducing morbidity (Rank et al., 2008).

Velsor-Friedrich, Pigott, and Srof (2005) developed a nurse practitioner-based asthma intervention program (Open Airways) that studied and tested psychosocial and health outcomes of African American inner-city school children. Patients enrolled in The Open Airways program received asthma education, nurse practitioner visits, and an AAP. The quasi-experimental study found that students (N= 52) in the intervention group had scores that were significantly higher than the control group over time when comparing asthma knowledge, asthma self-efficacy, general self-care practices, and asthma self-care practices. The hypothesized objective of improvement in peak flow readings, school absences, asthma symptoms, rescue medication use, and urgent doctor visits, however was not supported. Limitations of this study were the small sample size leading to the internal validity of the study. Additionally, while emphasizing the role of education and adherence to the national guidelines, the study's authors did not address how the use of a written asthma action plan led to improvement in asthma outcomes. Thus no conclusions can be made regarding the specific use of an AAP. However, the significance of the study supports evidence that asthma education, in conjunction with the continuity provided by nurse practitioner care, can improve asthma knowledge, asthma self-efficacy and self-care outcomes for inner-city minority children with asthma (Velsor-Friedrich et al., 2005).

Evidence for Outpatient Clinic Asthma Education

The NAEPP guidelines (2007) emphasize that asthma care should occur through a primary care provider-patient partnership and evidence has shown that adherence to these guidelines in a primary care setting improves asthma outcomes (Newcomb, 2006). Despite the call for appropriate primary care management, the emergency department (ED) continues to be a main source of asthma care for large numbers of minority families living in an urban area. The

preponderance of ED visits for asthma can however, be prevented by timely and effective asthma management by clinicians and patients (Rand & Apter, 2008; Teach, Crain, Quint, Hylan & Joseph, 2006).

Asthma outcomes were improved in a study by Teach et al., (2006), in a high-morbidity pediatric population via follow up with education and intervention with an AAP. The study involved a convenience sample of 488 pediatric asthma patients who previously: had been diagnosed with asthma, had one or more unscheduled visits in the past 6 months or one or more hospitalizations in the past 12 months. The study design was a prospective, randomized clinical trial conducted through the emergency department at Children's National Medical Center in Washington, DC. The study intervention focused on asthma self-monitoring and management, environmental modification and trigger control, and linkages and referrals to primary care for ongoing care. Specifically, patients in the study received education on the basic physiology and chronicity of asthma, technical device teaching (metered-dose inhalers, spacer, diskus, compressor, nebulizer) self-monitoring (symptoms and peak flow measurement), and an AAP.

Asthma patients who received the intervention experienced a decrease in subsequent unscheduled healthcare utilization and improved compliance and quality of life (Teach et al., 2006). Although the sample size was large, limitations of the study are the single source and sole geographic location, and use of a convenience sample which may affect the generalizability of the results. Additionally, the study subjects were chosen based upon high prior rates of health care use for asthma, thus leaving out the effect from patients with less frequent emergency department utilization. The medical intervention was also provided by a single provider, which could also influence results due to a practitioner effect and lend bias to the results. The study, however, was conducted with a rigorous randomized design combining blinded interviews and

an intention-to-treat analysis which established that a single educational focused follow-up after emergency department discharge can improve asthma care and outcomes in a highly populated urban area for minority children with asthma. The patients in the study may therefore have the greatest need for help and also showed improvement as a result of the educational intervention.

Evidence for the use of AAP

In answer to the practice problem, the NAEPP guidelines (2007) call for the use of either a written AAP that is based upon either patient symptoms or peak expiratory flow (PEF) measurements. AAPs help the patient in early detection and treatment of their asthma symptoms. Gibson and Powell (2004) reported in a review which evaluated twenty-six randomized control trials that use of individualized AAPs improved asthma health outcomes in patients. The reviewers focused on AAPs which described when to increase treatment, how to increase the treatment, for how long, and when to seek medical help. The investigators' review concluded AAPs based either on personal best PEF, or that used 2- 4 action points corresponding to asthma symptoms, which also recommended both inhaled corticosteroids (ICS) and oral corticosteroids (OCS) for treatment of exacerbations, were equal in improving asthma outcomes. Limitations identified by the reviewers for this study were the small number of existing studies to compare, thus leaving open the possibility of a type II error. However, the review's overall findings strengthen the evidence of the need to provide an individualized AAP in improving patient asthma outcomes.

In a Cochrane systematic review, Toelle and Ram (2004) evaluated the question of whether a written AAP will influence patient adherence. Toelle and Ram (2004) reported that there were too few studies with sufficient evidence to conclude that AAPs consistently improve

asthma outcomes. Measures and outcomes evaluated were reported as medication adherence, hospitalization, emergency department visits, use of oral corticoid steroids, lung function, respiratory tract infections, and absence from school or work. A noted strength of the review was the inclusion of randomized controlled trials with a parallel study design. Weaknesses in the review were the age of the publications used with most dating back more than ten years, and the lack of statistical power and generalizability. However, lending validity to the review was the use of continuous variables in the individual results, which were pooled using fixed or random effects models with weighted mean differences or standardized mean differences and calculated 95% confidence intervals. The main review results concluded that there were insufficient sizes and numbers of trials with inconsistent results to effectively assess the advantage of an AAP.

In a systematic review of five randomized controlled trials (RCTs) evaluating AAPs, Zemek, Bhogal, and Ducharme (2008) found evidence that using a written symptom based AAP is more beneficial than peak-flow based plans in managing and improving patient asthma outcomes. Zemek et al., (2008) reported that school aged children, who follow an AAP, experience significantly less nocturnal wakening, improved symptom scores, fewer school absences, and reduced acute care visits. The authors concluded in the review that AAPs, designed upon symptom management versus peak flows in distinguishing decline, resulted in better asthma improvement in children. A major strength of the review is noted in the control and reduction of bias through the use of randomized or quasi-randomized controlled studies with solid methodological scores. Weaknesses in the review were the lack of statistical power and generalizability. This limitation was due to the few numbers of published studies evaluating the independent effect of an AAP to no AAP use. Additionally, the inherent absence of blinding and

inadequate measurement of compliance monitoring to use of medications and AAP were limitations identified in the studies reviewed.

Bhogal, Zemek and Ducharme (2006), in a more recent Cochrane Systematic review, searched literature for RCTs comparing a written action plan with no AAP, or comparing different types of AAPs for study inclusion. The review included three RCTs and one quasi-RCT (N = 355) to evaluate the independent effect of providing an AAP vs. no AAP. Bhogal and others, (2009) reported a lower risk of exacerbations requiring an acute care visit in the trials for children who used a symptom designed management written AAP (n= 5; RR 0.73; 95% CI 0.55 to 0.99). Reporting confidence intervals strengthen the review, as it helps to give more generalizability to the study effect and the differences in the intervention and control groups (DiCenso, Guyatt & Ciliska, 2005). Additional strengths of the review were inter-rater reliability, statistical data collection and quality assessment of allocation grading with detailed discussion of blinding methodology, analysis and reporting of results. The few number of RCTs limits the generalizability of findings and the true effect of the AAP. Blinding of the intervention was not done, although difficult in educational interventions, is another limitation found in the review. Meta-analysis was hindered by the inability to determine the effect of adherence to monitoring from inconsistent reporting in the studies reviewed. Finally, the review reported that none of the RCTs studies evaluated compared the effectiveness of an AAP to no AAP in children with asthma. The review suggests however, that there was sufficient evidence in the daily management of symptoms to prevent exacerbations, and recommended a symptom-based AAP, reported to be preferred by children.

Synthesis of Evidence and Recommendations for Practice

The evidence reviewed underscores the importance of asthma education in promoting self-management and the use of written action plans in effective asthma management. Study recommendations include individualized asthma education, asthma medication and use knowledge, mastery of the self-management regimen, and use of a written AAP in an outpatient or community setting (Bhagal et al, 2006; Gibson & Powell, 2004). Guidelines have been developed to standardize practice in the treatment of asthma, which call for the use of a written asthma action plan. An AAP should be implemented and is recommend for all patients, especially for those with moderate to severe persistent asthma, a history of severe exacerbations, or those patients with poorly controlled asthma (NAEPP, 2007). The goals of effective asthma treatment are to achieve and maintain control (Sarver & Murphy, 2008).

Reasons and barriers cited for non-adherence to guideline recommendations are lack of awareness, lack of knowledge and comfort with asthma terminology, disagreement with the guideline, lack of self-efficacy, lack of outcome expectancy, indolence to customary practice, as well as external barriers (Cabana et al., 1999). Many providers do not give patients with asthma a written asthma action plan and as a consequence, these patients may not be as able to control their own symptoms as needed (Roberts et al., 2008). Barriers to use of a written asthma action plan include: poor translation/dissemination of the guidelines, providers not having confidence in their ability to give patients appropriate directions, inadequate quantity of readily available preprinted action plans, lack of time, a perception that patients will lose or do not wish to control their own symptoms, or a belief that if a patient's symptoms worsen that it is too dangerous for the patient to self-manage (Partridge, 2004; Roberts et al., 2008).

While outcome improvement from the use of the AAP versus no use has not been consistently demonstrated (Toelle & Ram, 2004), two high quality systematic reviews suggest that AAPs improve patient outcomes (Bhogan et al, 2008; Zemek et al, 2008). Symptom-based written AAPs are superior to peak flow-based action plans in preventing acute care visits (Bhogan et al., 2008). Zemek, et al. (2008) found that school age children who receive an AAP, as compared to no AAP, experience significantly less nocturnal wakening, improved symptom scores, fewer school absences, and reduced acute care visits. Possible explanations for the superiority of the symptom based over the peak flow-based AAP include greater compliance (as evidenced by the continuity of use after the end of the trial), simpler application of the plan and only needing cooperation of one person with the symptom based and patients not understanding zone definitions with peak flow. Gibson and Powell's (2004) large systematic review helped to define the essential components of an AAP and concluded that AAPs improve asthma health outcomes.

Although the National Evidence based practice (NAEPP, 2007) guidelines for asthma management are routinely updated, a substantial disparity is evident between recommendations and actual practice amongst providers and patients in the care given to asthma patients (AHRQ, 2007). More studies are needed to determine which educational interventions are most effective in improving provider use of an AAP. Evidence from Meta analyses supports the use of an AAP as a vital component of asthma education (Bhogan et al., 2006). Another potential value and effect of an AAP for both children and adults is that it may help to attract them to a medical home. These patients may be more involved in seeking care and employing effective self management steps if they have an AAP. Larger studies, and more nurse led studies are needed to demonstrate how evidenced based asthma interventions and education can positively impact

asthma health outcomes in the out patient population. Studies which show the effectiveness of nurse practitioners in implementing guidelines in asthma management are also important in furthering evidenced based practice.

Section Three: Methods

Research has shown that the symptom based AAP is beneficial in improving asthma outcomes through the use of action points and treatment instruction. Meta-analyses of data from RCTs have shown that AAPs reduce emergency room visits, hospital admissions, and improve lung function (Gibson & Powell, 2004; NAEPP, 2007). Recognizing the evidence supporting the need for the use of the AAP and the gap between the evidence and practice, the next step was to implement a strategy that will improve provider compliance in the use of an AAP in the outpatient setting.

The goal of the project was to improve compliance in the documentation and use of a symptom based AAP in an outpatient setting by using an educational intervention for both the office medical assistant staff and providers. Following an educational in-service intervention in the use of an AAP and system change, the project aimed to increase placement and use of a completed AAP on all asthma patient medical records. An estimation of the change in provider compliance rate was analyzed and compared to the use of an AAP prior to, and after, the system change and educational intervention on the use of an AAP.

Design

A patient medical record review was conducted retrospectively from all eligible asthma patients (See Setting and Sample) at the completion of the project to determine current usage of a symptom based AAP. The McNemar test was used to test differences in proportions for dependent groups in a 2X2 within subjects design to measure changes in rates of provider compliance of the AAP.

The QI project involved the implementation of an educational in-service on the use of an AAP and a system procedural change (placing a blank AAP on each patient's medical record at the time of visit). Education was directed toward increasing provider and office staff understanding of the need for patient empowerment through self management in the control of their asthma symptoms through the use of an individualized symptom based AAP and how to complete an AAP. A measure of the change in provider compliance rate to the use of an AAP was analyzed before versus after an educational intervention provided by an advanced practice nurse. Specifically, the change in proportion rates over a two month time frame was evaluated to report the rates of provider compliance in the use of an AAP following a system change and educational in-service with reinforcements. Provider compliance was operationally defined as a 100 percent completed copy of an AAP on eligible medical records.

Setting and Sampling Approach

The QI project was conducted during a specific two month period (during the study period in the fall and winter of 2010 and 2011) in a suburban outpatient allergy and asthma clinic in Glen Burnie, Maryland. Inclusion criteria for eligible medical record review included all active or new patients (N = 42) diagnosed with asthma, age six and older, who received treatment in the office for their asthma during the two month study period. Eligible medical records during the study period were cross referenced from the patient schedule during the eight weeks of the study period and were also determined through any of the following criteria: (1) documented asthma diagnosis, (2) presence of airway reversibility of greater than 12 percent or (3) the use of inhaled corticosteroids in applicable patient medical records. Medical records with AAPs from those asthma patients seen by the nurse practitioner project investigator were

excluded from data collection in the study to reduce bias. During the project implementation phase, 162 patients were seen in the office from 12/8/2010 through 2/2/2011 (excluding dates that the Nurse Practitioner investigator treated patients). One hundred and sixty-two patient medical records were reviewed and of these, 42 medical records met the inclusion criteria eligibility.

Procedures

Following Institutional Review Board (IRB) review, this capstone QI project was conducted in two phases: development and implementation. In the development phase, through discussion, collaboration, staff interviews and individual meetings with medical director, office manager and staff, an evaluation was conducted to determine feasibility, knowledge base and learning needs on the use AAPs. Approval from the medical director was obtained for the use and completion of AAPs both for the patient and patient's medical record, and for the staff to make copies available of AAPs. Modifications to the AAP education and implementation were made based upon feedback received. Samples of appropriately completed AAP were developed as a reference for staff and also at project completion to compare eligible medical records when reviewing provider compliance. A medical record review tool (see appendix B) was developed to record data when performing medical record review.

In the implementation phase, an educational in-service was given to two health care providers, (one physician and one nurse practitioner), one office manager and two medical assistant staff on the application, steps, and intended use involved in the appropriate completion of an AAP. Components of the educational in-service included: (a) purpose of the project, (b) background and significance of using an AAP, (c) role and expectations that providers and office

staff play in the system procedure change (e.g., placing a blank asthma action plan in all eligible asthma patients medical record at the time of the office visit and photo copying once it is completed for medical record), (d) instructions on how to complete the AAP, and (e) what patient education needs to be done, be documented, and by whom. The educational intervention program included ongoing verbal and electronic reminders on the use of a written AAP.

After the initial in-service the first week in December, 2010, AAP implementation began immediately with education reinforcement within two weeks with weekly face to face boosts and electronic messaging (email or texting reminders). Electronic messaging or emails and face-to-face boosts entailed weekly reinforcement reminding to the providers and medical assistants about the use and completion of the APP. As part of the intervention directed toward a systems procedural change in practice, the office staff placed a blank AAP in the medical record of those patients being seeing for asthma or with asthma at the time of the patient visit.

The office staff was instructed on how to initiate and complete the top section of the AAP form by entering the patient name, provider, office phone number, and date. Any known asthma medications (i.e., inhaled corticosteroids and bronchodilators) that were currently prescribed for the patient were also to be listed by office staff or providers in the medication section in the green zone of the AAP. Using the symptom based AAP approach, the health care provider or trained office staff, entered patient information in the green zone: how much of the medication and when to take it, and then the yellow and red zone areas, indicating additional medications and how much medication, when to take them, and what other actions to take. Upon completion of the AAP, the health care providers reviewed the plan with the patient, explaining the different colored zones (green, yellow and red) with the respective corresponding symptoms, medications, and actions to take for each colored zone, and review what steps to take to avoid possible asthma

triggers. The office staff gave the original AAP to the patient and made two copies of the completed plan; one was placed in the patient's medical record and the other in a file for the nurse practitioner project investigator.

In order to facilitate the collection process, office staff placed a completed copy of the patient's AAP and a copy of the daily office patient schedule in a designated secure file for the nurse practitioner investigator to review and collect at the completion of the project at 8 weeks to evaluate provider compliance in the use of the AAP. Identification of eligible asthma patients was achieved through cross referencing with patient schedule with copies of the AAP left in a designated folder and also through retrospective medical record review to determine the level of implementation and areas for ongoing performance improvement in sustaining the process.

The available resources included a venue for an educational program to take place, experienced providers in treating asthma patients, an office manager and staff of medical assistants available to support the providers in patient education, and a downloadable written AAP from the National Institute of Health's NAEPP (2007) website (see Appendix A). The downloadable accessibility of the NAEPP guidelines and written AAPs were also a resource for the educational process.

Variables and Measures

The effectiveness of the educational intervention was measured through assessment of the outcome variable, provider compliance in the use of a completed AAP. The independent variable was the educational intervention given to the health care providers and office staff on the use of the AAP through an initial in-service, and then followed by face-to-face meetings, posted samples of AAPs, and electronic messaging (email or texting) reminders and the initial

placement of the blank AAP form in eligible medical records. The outcome, or dependent variable, provider compliance was operationally defined and measured through evaluation of the presence of an appropriately completed AAP on all eligible medical records during the study period.

The review tool (see Appendix B) assessed the dichotomous categorical variables of yes/no and to be defined as yes, an AAP has applicable data areas fully filled out as completed and present as a copy on all eligible medical records, and to be defined no, as it is not fully or partially completed; or yes an AAP is on the medical record, but not filled out, or no, an AAP is missing from the medical record. Continuous variables of patient age (in years) and nominal dichotomous variables of gender (male/female), asthma diagnosis and insurance type (Commercial, Medicare, Medical Assistance, Private pay), and yes or no to the presence of fully completed AAP was recorded on the medical record review tool for descriptive statistical reporting.

Data Collection

Patient demographic and provider compliance data was collected via a medical record review tool by the nurse practitioner investigator. Verification of provider use and patient receipt of the AAP was assessed by the presence of a fully completed copy of an AAP as defined by the green, yellow, and red zones with prescribed medication, dose, route and frequency, in all eligible medical records.

Data was collected on site via the data collection tool and compared utilizing a medical record review tool to collect data and assess provider compliance rate as measured by the presence of a completed AAP on an asthma patient's medical record. Age (in years), gender

(male/female), primary diagnosis of asthma and insurance type (Commercial, Medicare, and Medical Assistance) data was obtained for descriptive statistical reporting. Data was entered initially into an excel report and then at project completion, into SPSS version 18.

Data Analysis

Statistical analysis in SPSS was conducted using descriptive and frequency analyses of continuous, nominal and dichotomous data. The proportion of eligible medical records with and without fully completed AAPs was analyzed and examined for rate change. The rate of proportional change (percentages) in compliance in the use of an AAP after the educational in-service was analyzed and reported. The numerator was the number of eligible medical records with a completed AAP at any time during the study and the denominator was the total number of medical records that were eligible for a fully completed AAP any time during the study period. The proportion of patients with a fully completed APP on the medical record was compared before and after the educational intervention using the using the McNemar test. The McNemar test was used to test differences in proportions for dependent groups in a 2X2 within subjects design to measure changes in rates of provider compliance of the AAP.

Results

Forty two patients met inclusion criteria out of 162 medical records retrospectively reviewed during the project's eight week implementation period. Several young patients with asthma had an AAP on their medical record but were not counted in the retrospective review as they did not meet the eligibility criteria, for example because of the age restriction > 6 years of age. The majority of patients were female (64%), with asthma as their primary diagnosis (86%),

had commercial or private insurance (79%), and a mean age of 37 years (\pm SD 20.8; Range 6 to 70 years). The average number of visits per patient was 1.7 (SD 0.7). Of the 33 AAP on the eligible medical records, all sections (Green, Yellow and Red sections) of the AAP were 100% fully completed (Table 1). Two patients (<5%) had an AAP prior to the educational intervention and system change, whereas 33 patients (78.6 %) had an AAP following the educational intervention ($p < .001$) (Table 2). Results were reviewed and assessed for translation and evaluation of provider compliance to the procedural change. A statistically significant change ($p < .001$) in provider compliance was found as evidenced by a 79 percent (33/42) increase in the use and completion of a symptom based AAP following the intervention (education and system procedural change) as compared to less than 5 percent (2/42) rate of compliance prior to the intervention.

Section Four: Discussion

With an educational intervention and system procedural change focused on the national guideline recommendations in asthma management in the use of and completion of AAPs, the project was able to demonstrate that education with system changes increases provider compliance in the use of symptom based AAPs. There was a statistically significant ($p < .001$) improvement in provider compliance (as measured by change in percentage) in the use and completion of an AAP, pre and post the educational intervention and system procedure change. This project demonstrated an improved completion and use of the AAP at the out patient office. It is expected that the office will benefit from the structured use of the AAP as an increased use in the AAP will ultimately improve patient outcomes. The specific data collected in this quality improvement project will help the outpatient office demonstrate provider compliance in this important and useful tool. Another future quality improvement project is needed that targets the AAP and measures improvements in asthma outcomes, and patient satisfaction in patients with an AAP.

Strengths and Limitations of Data

According to the expert panel on nursing informatics competencies, experienced nurses need to use data and statistical analyses to evaluate practice and perform quality improvement activities (Staggers, Gassert, & Curran, 2001). A noted strength of this quality improvement project is the integration of evidenced based practice, national guidelines and systematic reviews to bring about change in provider practice. To enhance the reliability and validity of the review tool, categorical variables of yes/no were operationally defined as “yes”, copy of an AAP is present and completed with all applicable data areas fully filled out on the chart or “no”, it is not

completed fully or not on the chart. This strict operational definition helped to strengthen the validity in the determination of provider compliance change.

An outcome benefit of the project may be that in use of an AAP, providers are reminded of the standard care. For example, patients with asthma may have a controller medication such as an inhaled corticosteroid but did not have a rescue inhaler as recommended by the NAEPP guidelines. Thus the use of an AAP allows the provider and the patient a concrete way to manage the disease of asthma. Additionally, at the conclusion of the project, customized AAPs were developed and pre-printed with the office address.

A limitation in the project was having trained medical assistant office staff rather than a health care provider complete some of the AAPs prior to the provider reviewing the AAP with the patient. However, since the office staff utilized the provider's prescribed medications, there were few instances where changes needed to be made when the provider reviewed the AAP with the patient. Another limitation in the data collection process is the manual process of the medical record review. A manual medical record review is time intensive, less efficient than an automated data collection, and has the potential for error and bias especially if some medical records lack review. Bias can lead to an underestimate or overestimate of the underlying beneficial effect of the AAP (DiCenso et al., 2005). The process for identifying asthma patients involved first reviewing the daily office schedule and then pulling all patient charts for review using multiple referents for diagnosing asthma patients, (Asthma diagnosis on visit note, use of bronchodilators or inhaled corticosteroids, and airway reversibility). In posttest only designs, testing or sensitization effects may contribute to bias and be an internal validity threat as the mere act of doing the project may influence outcome (Polit & Beck, 2004). In addition, another validity threat consideration is that the findings from the project may not be generalizable across

populations to other asthma patients in out patient settings. To strengthen and further improve patient asthma outcomes, future study and analysis should be continued to determine if patients are managing and controlling their asthma well as a result of the use of an AAP. Another suggested improvement in future projects would be to incorporate a category on the medical record review tool to check for the presence of an AAP in subsequent patient visits if the patient did not have one at the first medical record review.

Ethical Considerations

It was anticipated that as a result of provider adoption in the use of an AAP, there was a potential benefit and minimal risk to patients in conducting this project. To ensure patient confidentiality protection, records for patients in this study at the outpatient asthma office complied with human subject protection and approval was obtained from the University of Maryland's Institutional Review Board (IRB). Exemption from the IRB was sought as data was abstracted from a retrospective medical record review and recoded by the investigator with a pseudo-identifier (no patient identifiers) and kept in secure files on a password protected computer. No research data was linked to individual patients. Identity of the providers or staff was also not collected or recorded. Following a request to the IRB, a full HIPAA privacy waiver was granted for medical record review for the study period.

Section Five: Plans for Translation

Translating research into sustainable and effective practice is hastened by the process of knowledge translation. Knowledge translation is a term used to describe the “dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve the health of” [patients]; simply stated closing the gap between knowing and doing (Canadian Institutes of Health Research, 2008). Effective knowledge translation ties continuing education, professional development and quality improvement processes, bridging the evidence-practice gap (Kent, Hutchinson, & Fineout-Overholt, 2009). Education and learning outreach have been shown to be effective when implementing change of practice in learners (DiCenso et al., 2005; Kent et al, 2009). Strategic in the process of the translation plan is taking on the role of knowledge broker to forge a link between the producers of evidence (the researchers) and the users (physicians and nurse practitioners).

In continuing medical education, learning is more likely to result in a change in practice if the input and learning needs of the participants are considered in designing an educational program (Grant, 2002). Individuals are more likely motivated to implement the learned behaviors if their personal interests have been considered and if there is reinforcement of the education. Additionally, ensuring the leadership support of the medical director, as well as other key staff, in the proposed asthma educational program is extremely beneficial in achieving successful assimilation of the program. Organizational support has been shown to be a crucial influence on individual provider adoption of newly learned innovations (DiCenso, Guyatt, & Ciliska, 2005; Greenhalgh, 2004).

Translation Template

In operationalizing the translation innovation (Greenhalgh et al., 2004) a template is used to help plan, develop, and implement dissemination of the evidenced based findings (See Table 3). While all of the concepts within the translation model are applicable in adopting the proposed intervention, the two primary concepts that were applied in the translation plan are (1) Adoption/Assimilation and (2) Implementation and Routinization. The antecedents to the conceptual component of Adoption/Assimilation are general psychological antecedents (tolerance ambiguity, intellectual ability, motivation, values, and learning style).

Greenhalgh et al.'s (2004) systematic review observes that there is paucity evidence concerning the implementation of interventions or translation strategies. The implementation process is not linear and is up against a variety of barriers (as were described earlier in the background section). In this QI project, implementation of the AAP began immediately after IRB receiving approval, assessment of system readiness, and the educational in-service on the use of an AAP in the outpatient clinic office. Initially (during the early stages of implementation), plans for long term routinization were flexible. Feedback and input were sought to align with system readiness and agreement from clinic management, and the identification of a clinic AAP champion (The office manager) who would ensure momentum and a procedure that included the routine use of the AAP. The QI project specified time frames for review of the findings, bench marks, evidence review, evaluation of provider compliance corresponding to appropriately complete written instructions in the green, red, and yellow zones on the AAP, and communication of findings to providers throughout the agency. Continuous improvement feed back included reassessment, review, on going discussion regarding which

patients met the eligibility criteria, electronic messaging and implementation adjustment measures based upon results, patient and staff input.

The American Association of Colleges of Nursing (AACN) specifies the Doctor of Nursing Practice's (DNPs) foundational competencies in *The Essentials of Doctoral Education for Advanced Nursing Practice* (AACN, 2006). In *Essential III: Clinical Scholarship & Analytical Methods for Evidence-Based Practice*, the DNP is required to develop competencies to be able to synthesize and translate evidence based findings into practice. Furthermore, when the DNP implements an intervention effectively, the selected scientific approach will lead to improved patient outcomes (Hathaway et al., 2006). Venues for dissemination of findings from this project include an oral presentation or poster presentation at the National Annual American Academy of Nurse Practitioners (AANP) conference geared toward education on AAP in asthma management, publication in the American Journal of Nurse Practitioners, and poster or oral presentation at the National Doctor of Nursing Practice Conference, or Canadian Association of Advanced Practice Nurses National Biennial Conference.

Implications for the Doctor of Nursing Practice

Although evidence based practice (EBP) guidelines for asthma management have been developed and routinely updated, there remains a substantial variance between evidence-based recommendations and actual practice amongst providers and the care given to asthma patients (USDHHS, 2007; O'Laughlen et al., 2009). The Doctor of Nursing Practice (DNP) as a healthcare provider has a crucial role in the provider-patient partnership in synthesizing and translating the evidence, and promoting education and compliance to the guidelines in facilitating asthma control in patients through increasing provider compliance in the use of an

AAP (Ellis, 2009; Gibson & Powell, 2004; Martin et al., 2009; Sarver & Murphy, 2009). In following and incorporating the NAEPP (2007) guidelines, this project addressed the need to align asthma education to providers regarding the use of a symptom based AAP in conjunction with the established guidelines for asthma control in reducing and preventing further asthma burden.

Quality of care as defined by the Institute of Medicine (2011) is the degree to which a health intervention for individuals and populations increases the probability of desired health outcomes that is congruent with current professional knowledge. As a knowledge broker, it is the role of the DNP nurse practitioner project investigator to synthesize the evidence and implement recommended national guidelines. The DNP cultivates well-tuned interpersonal, collaborative and communication skills to facilitate practice change (Kent et al, 2009) and increase provider compliance in the use of an AAP. Ruhe, Carter, Litaker and Stange, (2009) report that tailored interventions facilitate sustained improvement in quality health care delivery when the key stakeholder's motivation, external influences, and available resources are considered.

DNPs as leaders, strive to align the best from evidenced based research, guideline recommendations and practice to enhance quality and outcomes in patient health care (Newhouse, Dearholt, Poe, Pugh, & White, 2007; Porter-O'Grady & Malloch, 2010). Recognizing the need to improve health care delivery for asthma patients, the DNP embraces the need for change in provider practice and draws upon systems theory leadership skills in designing a quality improvement project. These skills include the use of evidence based practice, innovation, consideration of complex adaptive systems, adaptive and facilitative leadership, conflict management, communication, and collaboration (Porter-O'Grady & Malloch,

2010). DNPs as community health care leaders and as providers have an instrumental role in advocating for patients and communities (Bishop and Scudder, 2001).

While challenging the status quo, the DNP also is alert to reading the sign posts and finding a goodness of fit within the healthcare organization (Porter-O'Grady & Malloch, 2010). The DNP leader considers the complex dynamic processes, barriers, beliefs, forces and tensions to garner understanding and insights as to the potential actions needed to facilitate provider practice change (Lichtenstein, Uhl-Bien, Marion, Seers, Ortan & Schreiber, 2006). This type of incremental innovation could lead to a successful learning experience and education of the national guideline recommendations in the use of and application of AAPs (Carlisle & McMillan, 2006).

The QI project paralleled the role of the DNP in the implementation of an educational in-service and system procedural change to improve provider compliance in the completion and use of an AAP within an organization. The project demonstrated the effectiveness of an educational in-service in improving provider compliance in the use of and the completion of a symptom based AAP. DNPs are needed to improve and hasten the knowledge dissemination of recommended guidelines and evidence in the use of AAPs thereby improving asthma outcomes. Dissemination of this project's findings will help to further knowledge translation of the recommended guideline in the use of an AAP. Armed with the evidence from the guidelines, DNPs can effectively work with providers and asthma patients to ensure all patients with asthma have an AAP.

References

- Akinbami, L. J., Rhodes, J.C., & Lara, M. (2008). Racial and ethnic differences in asthma diagnosis among children who wheeze. *The Journal of Pediatrics, 115*, 1254-1260.
- American Association of Colleges of Nursing (AACN). (2006). The essentials of doctoral education for advanced nursing practice. Washington, D.C.: AACN. Available at: <http://www.aacn.nche.edu/DNP/pdf/Essentials.pdf>.
- Bhogal, S.K., Zemek, R.I., & Ducharme, F. (2006). Written action plans for asthma in children. *Cochrane Database of Systematic Reviews, 3*, Assession CD005306.
- Bishop, A., & Scudder, J. (2001). *Nursing Ethics, Holistic Caring Practice*. Sudbury, MA: Jones and Bartlett Publishers.
- Boom, J.A., Nelson, C.S., Laufman, L.E., Kohrt, A.E. & Kozinetz, C.A. (2007). Improvement in provider immunization knowledge and behaviors following a peer education intervention. *Clinical Pediatrics, 46*, 8, 706-717.
- Braganza, S.F. & Sharif, I. (2010). Use of Written Asthma Action Plans. *Journal of Asthma & Allergy Educators, 1*, 155-157.
- Brown, P., Mayer, B., Zavestoski, S., Luebke, T., Mandelbaum, J. & McCormick, S. (2003). The health politics of asthma: environmental justice and collective illness experience in the United States. *Social Science & Medicine, 57*, 453-464.
- Cabana, M. D., Strand, C.S., Powe, N., Wu, A., Wilson, M., Abboud, P., & Rubin, H.R. (1999). Why don't physicians follow clinical practice guidelines? *JAMA, 282*, 15, 1458-1465.

Canadian Institutes of Health Research. (2008). About knowledge translation. Retrieved from:

<http://www.cihr-irsc.gc.ca/e/29418.html>.

Canino, G., McQuaid, E.L. & Rand, (2009). Addressing asthma health disparities: A multilevel challenge. *Journal of Clinical Immunology*, 123,6, 1209-1217.

Carlisle, Y. & McMillan, E. (2006). Innovation in organizations from complex adaptive systems perspective. *Emergence: Complexity & Organization*. 8, 1, 2-9.

Cooper, C., Mills, N., Chabot, D., West, S., Holloway, C., Spyers-Duran, H., ... Prieto-Jereb, L. (2010). The use of a written asthma action plan in America today. *Journal of Asthma & Allergy*, 6, 92-93.

DiCenso, A., Guyatt, G., & Ciliska, D. (2005). *Evidence-Based Nursing: A Guide to Clinical Practice*. St. Louis: Elsevier Mosby.

Ellis, K.C. (2009). The differential diagnosis and management of asthma in the pre-school-aged child. *Journal of the American Academy of Nurse Practitioners*, 21, 9, 463-473.

Fitzgerald, J.M. & Shahidi, N. (2010). Achieving asthma control in patients with moderate disease. *The Journal of Allergy and Clinical Immunology*. 125, 2, 307-11.

Gibson, P.G. & Powell, H. (2004). Written action plans for asthma: an evidence-based review of the key components. *Thorax*, 59, 94-99.

Grant, J. (2002). Learning needs assessment: Assessing the need. *British Medical Journal*, 324, 156-159.

- Greenhalgh, T., Robert, G., MacFarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *Milbank Quarterly*, 82, 4, 581-629.
- Hathaway, D., Jacob, S., Stegbauer, C., Thompson, C. & Graff, C. (2006). The practice doctorate: Perspectives of early adopters. *Journal of Nursing Education*, 45(12) 487-496.
- Kent, B., Hutchinson, A.M. & Fineout-Overholt, E. (2009). Getting evidence into practice- Understanding knowledge translation to achieve practice change. *Worldviews on Evidence-Based Nursing*, 3, 183-185.
- Kruse, L.K., Deshpande, S., & Vezina, M. (2007). Disparities in asthma hospitalizations among children seen in the emergency department. *Journal of Asthma*, 44,833-837.
- Lane, W.G., Newman, D., Edwards, M. & Blaisdell, C. (2006). Disparities in the circumstances of asthma deaths in Maryland. *Journal of Asthma*, 43, 777-782.
- Lichtenstein, B.B., Uhl-Bien, M., Marion, R., Seers, A., Orton, J.D. & Schreiber, C. (2006). Complexity leadership theory: An interactive perspective on leading in complex adaptive systems. *Emergence: Complexity & Organization*, 8, 4, 2-12.
- Martin, M.A., Catrambone, C.D., Kee, R.A., Evans, A.T., Sharp, L.K., Lyttle, C., Rucker-Whitaker, C., et al. (2009). Improving asthma self-efficacy: Developing and testing a pilot community-based asthma intervention for African American adults. *Journal of Allergy & Clinical Immunology*, 123, 153-159.

- National Asthma Education and Prevention Program (NAEPP). (2007). *Expert Panel Report 3: Guidelines for the diagnosis and management of asthma*. (NIH Publication No. 07-4051). Bethesda, MD: National Heart, Lung, and Blood Institute.
- Newcomb, P. (2006). Results of an asthma disease management program in an urban pediatric community clinic. *Journal for Specialists in Pediatric Nursing*, 2, 178-188.
- Newhouse, R.P., Dearholt, S.L., Poe, S.S., Pugh, L.C., & White, K.M. (2007). *Johns Hopkins Nursing Evidence-Based Practice Model and Guidelines*. Indianapolis: Sigma Theta Tau International.
- Newhouse, R.P. (2007). Diffusing the confusion among evidence-based practice, quality improvement, and research. *Journal of Nursing Administration*, 37, 10, 432-435.
- O’Laughlen, M.C., Hollen, P., & Ting, S. (2009). An intervention to change clinician behavior: Conceptual framework for the multicolored simplified asthma guideline reminder (MSAGR). *American Academy of Nurse Practitioners*, 21, 417-422.
- Partridge, M.R. (2004). Written asthma action plans. *Thorax*, 59, 87-88.
- Piper, C.N., Glover, S., Elder, K., Baek, J.D. & Wilkinson, L. (2010). Disparities in access to care among asthmatic children in relation to race and socioeconomic status. *Journal of Child Health Care*, 14, 3, 271-279.
- Polit, D.F. & Beck, C.T. (2004). *Nursing Research*. Philadelphia: Lippincott Williams & Wilkins.

Porter-O'Grady, T. & Malloch, K. (2010). *Innovation Leadership Creating the Landscape of Health Care*. Sudbury, MA: Jones and Bartlett Publishers.

Rand, C.S. & Apter, A. J. (2008). Mind the widening gap: Have improvements in asthma care increased asthma disparities? *Journal of Allergy and Clinical Immunology*, 122, 319-321.

Rank, M.A., Volcheck, G.W., Li, J.T., Patel, A.M., & Lim, K.G. (2008). Formulating an effective and efficient written asthma action plan. *Mayo Clinic Proceedings*, 83, 11, 1263-1270.

Rastogi, D. Shetty, A., Neugebauer, R. & Harijith, A. (2006). National Heart, Lung, and Blood Institute guidelines and asthma management practices among inner-city pediatric primary care providers. *Chest*, 129, 619-623.

Roberts, N.J., Mohamed, Z., Wong, P., Johnson, M., Loh, L., & Partridge, M. R. (2008). The development and comprehensibility of a pictorial asthma action plan. *Patient Education and Counseling*, 74, 12-18.

Ruhe, M.C., Carter, C., Litaker, D. & Stange, K.C. (2009). A systematic approach to practice assessment and quality improvement intervention tailoring. *Quality Management In Health Care*, 18, 4, 268-277.

Sarver, N. & Murphy, K. (2008). Management of asthma: new approaches to establishing control. *Journal of the American Academy of Nurse Practitioners*, 21, 54-65.

- Staggers, N., Gassert, C.A., & Curran, C. (2001). Informatics competencies for nurses at four levels of practice. *Journal of Nursing Education, 40*, 7, 303-316.
- Szeffler, S. J. (2009). Advances in pediatric asthma in 2008: Where do we go from here? *The Journal of Allergy and Clinical Immunology, 123*, 1, 28-33.
- Teach, S.J., Crain, E.F., Quint, D.M, Hylan, M.L. & Joseph, J.G. (2006). Improved asthma outcomes in a high-morbidity pediatric population. *Archives of Pediatric and Adolescent Medicine, 160*, 535-541.
- The National Academy. Institute of Medicine. (2011). Crossing the quality chasm: The IOM health care quality initiative. Retrieved from:
<http://www.iom.edu/Global/News%20Announcements/Crossing-the-Quality-Chasm-The-IOM-Health-Care-Quality-Initiative.aspx>
- Toelle, B. & Ram, F.S. (2004). Written individualized management plans for asthma in children and adults. *The Cochrane Database of Systematic Reviews, 1*, Accession: CD002171.
- United States Department of Health and Human Services (USDHHS). (2007, January). *Agency for Health Care Research and Quality. Closing the quality gap: a critical analysis of quality improvement strategies: Volume 5- Asthma Care*. Retrieved from:
<http://www.ahrq.gov/clinic/tp/asthmgaptp.htm#Report>
- Velsor-Friedrich, B., Pigott, T. & Srof, B. (2005). A practitioner-based asthma intervention program with African American inner-city school children. *Journal of Pediatric Health Care, 19*, 163-171.

Williams, R.D., Sternthal, M., Wright, R.J. (2009). Social determinants: Taking the social context of asthma seriously. *Pediatrics*, 123, S174-S184.

World Health Organization. (2008). Facts about asthma. Retrieved from:

<http://www.who.int/mediacentre/factsheets/fs307/en/>

Wright, R.J. (2006). Health effects of socially toxic neighborhoods: the violence and urban asthma paradigm. *Clinical Chest Medicine*. 27, 413-421.

Zemek, R.L, Bhogal, S.K., & Ducharme, F.M. (2008). Systematic review of randomized controlled trials examining written action plans in children: What is the plan? *Archives of Pediatric Adolescent Medicine*, 162, 2, 157-163.

Timeline

The Capstone project was conducted over a four month period (16 weeks), including project planning and development.

1. Project planning and development: week 1-2
2. Training/Educational in-services (one or two in-services per week to capture all providers and office staff): week 2-4
3. Implementation: at week 4
4. Educational boosts to staff (face-to-face, emails/texts and/or sample AAPs) once per week at week 5 and 6.
5. Educational boosts to providers and staff at weeks 8 and 10
6. Project and data evaluation: week 12-16

Evaluation of provider adoption of the AAP was ongoing following implementation and assimilation and to ensure sustainability.

Table 1. *Characteristics of AAP Eligible Patients/Medical Records (N=42)*

Characteristic	Value
Age, mean \pm standard deviation, range	37 \pm 20.8, 6-70 years
Number of Visits, mean \pm standard deviation, range	1.71 \pm 0.7, 1-3
Sex, n (%)	
Female	27 (64)
Male	15 (36)
Diagnosis, n (%)	
Asthma	36 (86)
Asthma/COPD (combined)	6 (14)
Primary Insurance, n (%)	
Commercial/Private	33 (79)
Medicare	6 (14)
Medicaid	3 (7)
AAP % Fully Completed, n (%)	
No	9 (21)
Yes	33 (79)

Table 2. *A Comparison of Medical Records With and Without an AAP Before and After the Educational In-Service Intervention and System Change (N=42)*

Use of AAP	Before Educational Intervention/System Change	After Educational Intervention/System Change	<i>p</i> -value
No	40	9	
Yes	2	33	<.001

Table 3. Translation Plan Template

<p>Goal: To increase provider compliance in the use of an AAP in the out patient setting</p>		
<p>Approach (how to accomplish the goal):</p> <ul style="list-style-type: none"> • Involve and enlist support and commitment from top clinic management • Communicate and seek feedback and input from the learners (providers and office staff) via individual meetings • Develop Educational in-service for providers and office staff on the components of an AAP • Develop educational asthma program and sample AAPs for providers/office staff to give to patients • Provide an educational in-service to providers on the use of an AAP • Measure provider compliance through retrospective medical chart review; evaluate change in rate of compliance prior to and following system change and educational in-service 		
<p>Tactics/Action Items:</p>	<p>Responsibility (Timeframe):</p>	<p>Evaluation Plan:</p>
<p>Conduct planning (with participation of NPs & management) to develop office process changes and in-service.</p> <p>Establish a timeline</p> <p>Establish collaboration with providers to collaboratively develop educational program regarding the use of an AAP.</p> <p>Conduct training program.</p> <p>NP investigator assumes role as project manager (PM) serve as change agent.</p> <p>Learner assessment/feedback Implementation & Routinization</p>	<p>Responsibility: Project Manager</p> <p>Timeframe:</p> <ul style="list-style-type: none"> - Program and protocol planning and development: 1 month Implementation: 1 month - Ongoing reinforcement: month 2 - Program evaluation: month 3 - Ongoing after adoption and assimilation 	<p>Post test evaluation</p> <p>Treatment fidelity evaluation (compliance)</p> <p>Expected Outcome: Improved provider compliance in the use of a completed AAP.</p> <p>Identify quality improvement indicators for AAP that focus on different aspects of how the AAP is completed or not and what areas need to be further completed if any.</p>

Appendix A - NIH Asthma Action Plan

Asthma Action Plan

For: _____ Doctor: _____ Date: _____
 Doctor's Phone Number: _____ Hospital/Emergency Department Phone Number: _____

GREEN ZONE

Doing Well

- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

And, if a peak flow meter is used,

Peak flow: more than _____
 (80 percent or more of my best peak flow)

My best peak flow is: _____

Take these long-term control medicines each day (include an anti-inflammatory).

Medicine	How much to take	When to take it
_____	_____	_____
_____	_____	_____
_____	_____	_____

Before exercise _____ 2 or 4 puffs _____ 5 to 60 minutes before exercise

YELLOW ZONE

Asthma Is Getting Worse

- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

-Or-

Peak flow: _____ to _____
 (50 to 79 percent of my best peak flow)

- First** Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.
- _____ 2 or 4 puffs, every 20 minutes for up to 1 hour
 (short-acting beta₂-agonist) Nebulizer, once
- Second** If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:
 Continue monitoring to be sure you stay in the green zone.
- Or-
- If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:
 Take: _____ 2 or 4 puffs or Nebulizer
 (short-acting beta₂-agonist)
 Add: _____ mg per day For _____ (3–10) days
 (oral steroid)
 Call the doctor before/ within _____ hours after taking the oral steroid.

RED ZONE

Medical Alert!

- Very short of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in Yellow Zone

-Or-

Peak flow: less than _____
 (50 percent of my best peak flow)

- Take this medicine:
- _____ 4 or 6 puffs or Nebulizer
 (short-acting beta₂-agonist)
- _____ mg
 (oral steroid)
- Then call your doctor NOW. Go to the hospital or call an ambulance if:
- You are still in the red zone after 15 minutes AND
 - You have not reached your doctor.

DANGER SIGNS ■ Trouble walking and talking due to shortness of breath ■ Take 4 or 6 puffs of your quick-relief medicine AND
 ■ Lips or fingernails are blue ■ Go to the hospital or call for an ambulance _____ NOW!
 (phone)

See the reverse side for things you can do to avoid your asthma triggers.

#	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING
							Strength
					scores, fewer school absences, and reduced acute care visits. Concluded that action plans, based upon symptom management vs. peak flows for recognizing deterioration, were superior in managing asthma in children.	evaluating the independent effect of a written action plan to no action plan use. Also, the inherent absence of blinding and inadequate measurement of compliance monitoring to use of medications and action plan are limitations identified in the studies reviewed.	
3	Gibson, P.G. & Powell, H.	2004	Systematic Review of RCTs	26 RCTs	A review of 26 randomized controlled trials which evaluated asthma action plans in their effect on asthma outcomes. PEF and using 2-3 action points (symptoms) as to when to use ICS/OCS for treatment were both found to be equal in improving asthma outcomes.	There is potential for a Type II error due to a limited number of studies. However the authors state that they were careful to only include RCT studies and to report data when there were several studies contributing to the outcomes.	1 B
4	Toelle & Ram	2004	Systematic Review	7 RCTs	There is not enough evidence to deduce that written asthma action plans for children & adults unfailingly improve asthma outcomes. Main review results conclude that there are insufficient sizes & numbers of trials with inconsistent	Weaknesses in the review are the age of the publications used; most dating back more than ten years, and the lack of statistical power and generalizability.	1 B

#	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING
							Strength
					results to effectively evaluate the benefit of an asthma action plan.	Additionally, only one study was included with children and confidence intervals were not provided for individual studies.	
5	Rank et al	2008	Opinion	X N/A	A written asthma action plan is an effective means of helping patient to recognize worsening asthma symptoms. Recommendations are given as how to construct and formulate an individualized plan.	Generalizability of findings.	5 B
6	Martin et al	2009	Quasi-experimental study	42	A community based asthma intervention improved asthma self-efficacy and quality of life for low income African American adults. Self-efficacy and the use of written asthma action plan were more prevalent in the intervention group at 3 months.	Generalizability of findings due to small sample size; Pilot test	2 B
7	Gibson, P.G. & Powell, H.	2004	Systematic Review of RCTs	26 RCTs	A review of 26 randomized controlled trials which evaluated asthma action plans in their effect on asthma outcomes. PEF and using 2-3 action points (symptoms) as to when to use ICS/OCS for treatment were both found to be equal in improving asthma outcomes.	There is potential for a Type II error due to a limited number of studies. However the authors state that they were careful to only include RCT studies and to report data when there were several studies contributing to the outcomes.	1 A

#	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING
							Strength
8	National Heart and Lung Institute: National Education and Prevention Program. Expert Panel Report 3	2007	National Clinical Practice Guidelines	N/A	The guidelines provide an evidence-based review of recent and current asthma management options and recommend a stepwise approach for asthma control.	None	4 A
9	Ellis, K.C.	2009	Opinion/Review	N/A	Correct diagnosis of asthma is key to appropriate treatment in school aged children & patient self-management. Under control asthma has fewer exacerbations, night time awakenings, & better activity levels. Thorough discussion of consequences of undiagnosed asthma, differential diagnosis, PE, treatment, patient education & use of written asthma action plan.		5 A
10	Velsor-Friedrich, B., Pigott, T. & Srof, B.	2005	Quasi-experimental study: Pre and post test design	52	School based asthma program that is NP managed improves psychosocial outcomes for inner city minority children with asthma. There was no measurement of outcomes related to the use of a written asthma action plan.	Small sample size Limited generalizability; Intervention failed to demonstrate improvement in asthma symptoms, school absences, and peak flow readings	2 B
11	Teach, S., Crain, E., Quint, D., Hylan, M.	2006	Experimental: Prospective randomized clinical trial	488	Post ED f/u clinic for urban children with asthma w/intervention of a	Did not increase PCP contact for scheduled	I

#	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING
							Strength
	& Joseph, J.				written asthma action plan, asthma self-monitoring, management, environ. modifications & trigger control, linkages to PCP, decreased unscheduled care utilization, increased compliance & quality of life	asthma care; Convenience sample and geographics are a potential threat to external validity	A
12	Sarver, N. & Murphy, K.	2009	Opinion	N/A	Review of literature, NHBL/NAEPP asthma guidelines & patient education resources shows that patient oriented (comprehensive patient education, written asthma action plan, collaboration between the patient and provider) versus disease oriented management approach is needed to improve asthma compliance and control.	Review does not specifically address asthma disparities in minority populations	5 A

Elaine Bundy, DNP Student University of Maryland School of Nursing 01/06/2011			
Evidence Based Practice Question: Will an educational in-service on the use of an AAP improve provider compliance?			
Level of Evidential Strength	Number of Studies	Summary of Findings	Overall Quality
<u>LEVEL I</u> Experimental (randomized controlled trial – RCT) or meta analysis of RCTs	6	<ul style="list-style-type: none"> - Use of written asthma action plans is superior to no action plan with fewer exacerbations and acute care/ED visits in school aged children. - Written individualized asthma action plans with 2, 3 or 4 action points, improve symptom control. Treatment instruction on the plan needs to include ICS and OCS. No distinction made as to the type of action plan. - Symptom based written asthma action plans is more beneficial than peak flow-based action plans in preventing acute visits. - Insufficient number of RCTs exists to evaluate effectiveness of action plans. - Asthma education is found to reduce the mean number of hospitalizations and ED visits. - Post ED visit with a clinic follow up asthma intervention for urban children with asthma improved asthma outcomes. Asthma interventions consisted of education, environmental/trigger control, linkage with PCP. Intervention group had a decrease in ED/unscheduled care, increased compliance and quality of life. 	A
<u>LEVEL II</u> Quasi-experimental	2	<ul style="list-style-type: none"> - NP Supervision of asthma therapy & school based asthma programs improve asthma and psychological outcomes in inner city children with asthma. - A community based asthma intervention improved asthma self-efficacy & quality of life for low income African American adults with asthma. 	B
<u>LEVEL III</u> Non-experimental or qualitative			
<u>LEVEL IV</u> Opinion of nationally recognized experts based on research evidence.	1	- NHBLI/NAEPP guidelines (last updated 2007) provide evidence-based review of recent and current asthma management options and recommend a stepwise approach for asthma control. Focus is on achieving and maintaining control. The use of patient education and a written asthma action plan is recommended in the guidelines.	A
<u>LEVEL V</u> Opinion of nationally recognized experts based on non-research evidence.	3	Correct diagnosis of asthma is key to appropriate treatment in school aged children & patient self-management. Implementation of the asthma guidelines & use of patient educational resources (comprehensive patient education, written asthma action plan) are important in improving asthma outcomes.	A