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Easy Breathing for Elementary School Children with Asthma at Dayton Public Schools

Jeanine M. Bochenek
Wright State University - Main Campus, jeanine.bochenek@wright.edu

EASY BREATHING FOR ELEMENTARY SCHOOL CHILDREN WITH ASTHMA AT DAYTON PUBLIC SCHOOLS

A scholarly project submitted in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice

By

JEANINE M. BOCHENEK
BSN, Wright State University-Miami Valley College of Nursing & Health, 1992
MS, Wright State University-Miami Valley College of Nursing & Health, 2005

WRIGHT STATE UNIVERSITY

GRADUATE SCHOOL

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I HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER MY SUPERVISION BY Jeanine M. Bochenek ENTITLED Easy Breathing for Elementary School Children with Asthma at Dayton Public Schools BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF Doctor of Nursing Practice.

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Tracy L. Brewer, DNP, RNC-OB, CLC
Doctoral Project Chair

_____

Deborah Ulrich, PhD, RN, ANEF
Interim Dean, College of Nursing and Health

Committee on Final Examination

_____

Tracy L. Brewer, DNP, RNC-OB, CLC
Wright State University

_____

Susan K. Rice, PhD, CPNP-PC, CNS
University of Toledo

_____

Virginia Noe, BSN, MEd, NCSN, RN
Dayton Public Schools

_____

Sara J. Paton, PhD, CPH
Wright State University

ABSTRACT

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Approximately 8.4% or 6.4 million children are diagnosed with asthma in the United States. Asthma is a chronic and life threatening disease that cannot be cured but only managed. Asthma is also one of the most expensive conditions to manage, requiring direct health care services if not adequately controlled. Asthma symptoms and exacerbations are also the number one reason for school absences among children. The PICOT question that guided the review of the literature to answer the clinical question was: In children with asthma, how does a school-based self-management asthma education program compared to standard management affect school absences and unscheduled asthma health care visits over a 12-month period? The purpose of this evidenced-based practice project was to provide asthma education at school for children with asthma to improve asthma self-management skills and decrease asthma symptoms that lead to emergency room visits, hospital admissions, and school absences. Students enrolled in grades two through five identified with either parent reported or physician diagnosed asthma were asked by the school nurse to participate in the Open Airways for Schools asthma education program held at school once per week for five weeks taught by trained student nurses. Parents signed a consent form for the child to participate in the Open Airway for Schools program and were asked to complete a questionnaire about

their child's asthma. Childhood Asthma Control Tests (cACT) were administered to students and parents at the start of the program and then 4 weeks after the program. Students with rescue inhalers at school completed a Rescue Inhaler Skills Checklist (RISC) before the inhaler lesson in the Open Airways for Schools program and 4 weeks after the program was finished. School nurses and student nurses followed up with and encouraged students, parents, and outside health care providers to provide rescue inhalers and asthma action plans. An ANOVA was conducted on the cACT pre and post summary mean scores revealed no significant difference, $F(1, 36)=1.34$, $p = 0.26$; however, an ANOVA performed on the RISC pre and post summary mean scores revealed a significant difference, $F(1, 27)=7.88$, $p = 0.009$. Pre and post cACT summary mean scores at the individual school level suggested improvement among three of the seven schools; while, four of the seven schools noted improvement between the pre and post RISC summary mean scores. An ANCOVA further analyzed the covariates of grade, school, sex, ethnicity and number of sessions attended for cACT and RISC scores; significance was found in the difference of the cACT scores, $F(1, 31)=4.910$, $p = 0.034$; but the RISC scores found no difference, $F(1, 22)=.0007$, $p = 0.933$ with all covariates; at the individual school level significance was found, $F(1, 26)=6.82$, $p=0.016$. School absenteeism increased during the intervention, and emergency department visits and hospital admissions were insignificant. Limited time frame for tracking outcome data related to absences, emergency department visits, and hospital admissions, low return

rates on Childhood Asthma Control Tests and rescue inhalers were limiting factors of this project. Nevertheless, self-management asthma education programs have the potential to improve asthma symptoms that impact everyday life. Properly controlled asthma is associated with less asthma symptoms, emergency department visits, and hospital admissions which have the potential to decrease overall economic expenditures for health care expenses, missed school for students and missed work for parents.

Keywords: *Asthma, school-aged children, school nurses, Open Airways, healthcare utilization.*

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I would like to acknowledge some special people who have each added to my professional growth and development in some way along this DNP journey. I feel so lucky and blessed that our paths have crossed. Each have inspired me in their own way to continue the pursuit to improve asthma outcomes in children through the role of the school nurse. Thank you so much to Dr. Tracy Brewer from Wright State University; Virginia Noe, Lisa Montgomery, and Lisa Stangle from Dayton Public Schools; Jessica Saunders and Belinda Huffman from Dayton Children's Hospital. Also, to Dr. Sara Paton who taught me about Pivot Tables.

DEDICATION

To my wonderful husband Bob, your sacrifices, support and unconditional love during my pursuit to reach this professional and personal dream of completing the Doctor of Nursing Practice degree. To my children, Ben, Emily, and Maggie, you are all very special people who have your whole life in front of you. Continue to go for your dreams and be open to all the possibilities that your life has to offer. To my mother Carole, your support and example of being a strong woman have helped me all along this journey in so many ways. To my father, Emile James who was cheering me on and watching over me. Finally, to my sisters Laura and Katie, thank you for your phone calls filled with words of encouragement, and timely distractions that allowed me to keep pushing forward.

I. INTRODUCTION

Prevalence of Problem

Approximately 300 million people worldwide (Global Initiative for Asthma [GINA], 2006) and 26 million people within the United States (Bloom, Cohen, & Freeman, 2012; Schiller, Lucas, Ward, & Peregoy, 2012) are burdened with asthma, which is a life threatening and chronic condition. Within the United States, 8.4% or approximately 6.4 million children (Centers for Disease Control [CDC], 2017) are diagnosed with asthma. In Ohio, approximately 252,944 children have asthma with a lifetime asthma prevalence of 13.6% and current prevalence of 9.4%, leaving Ohio children at a slightly higher asthma prevalence in comparison to 38 other states (Behavioral Risk Factor Surveillance System [BRFSS], 2008). Data supplied by the Greater Dayton Area Hospital Association for the years 2012-2013 indicate children under the age of 18 have 92-131 per 1,000 asthma-related emergency department visits, 25-32 per 1,000 asthma-related inpatient hospital stays, and 113-164 per 1,000 total asthma-related hospital visits (Dayton Children's Hospital [DCH], 2014).

Sixty percent of children with an asthma exacerbation miss at least 4 days of school, which collectively accounts for 10.5 million school days missed (CDC, 2011). Asthma is reported to be the number one reason for school absences and (Boyd et al., 2009; Cicutto, Gleason, & Szefler, 2014) costs $3,300 per person for missed work and/or school days, medical expenses, and even premature death (Barnett & Nurmagambetov,

2011; CDC, 2011; Cicutto et al., 2014). Nearly 20% of children diagnosed with asthma seek treatment in an emergent care setting with the majority being from minority groups of either black or Hispanic descent (CDC, 2013a).

Significance of Problem

Asthma is a chronic disease, which can be managed but not cured (National Institute of Health-National Heart, Lung, Blood Institute [NIHNHLBI], 2013). Consequently, asthma is one of the most expensive conditions to manage, requiring individuals to seek immediate direct health care services at an emergency room or urgent care if not under control (Bahadori et al., 2009). Asthma morbidity continues to rise worldwide (GINA, 2006), within the United States and Ohio (CDC, 2013b) placing greater stressors and economic burdens on individuals, families, health care systems, local and government resources (GINA, 2006). Therefore, self-management asthma education is essential for lessening the high burden load associated with this chronic disease.

Indicators of poorly controlled asthma are school absenteeism, and unscheduled health care visits (CDC, 2013b) all of which have the potential to decrease school performance (Cicutto et al., 2014), decrease parent work attendance, and increase health care costs which can lead to long term economic consequences or disadvantages. Unfortunately, students with asthma have the potential to experience less optimal academic outcomes than their peers without asthma (Cicutto et al., 2014; Meng, Babey, & Wolstein, 2012) due to missed learning opportunities and not being in an optimal ready to learn state.

The Director of Health Services at Dayton Public Schools (DPS) who is also a nationally certified school nurse (V. Noe, personal communication, October 7, 2015), indicated that asthma related symptoms were the number one reason for emergency medical services being contacted during the school day. Asthma has been identified as a growing problem within Montgomery County, Ohio (Public Health-Dayton and Montgomery County [PHDMC], 2014). In a Community Assessment conducted by the PHDMC (2014), a call to action for correct management of asthma was emphasized which includes the following: regular asthma management by a health care provider, an up to date asthma action plan, recognition and avoidance of asthma triggers, and compliance in taking asthma medications as prescribed.

Purpose and Goals

The Doctor of Nursing Practice Student who will be referred to as the Evidenced Based Practice Project-Academic Liaison (EBPP-AL) initially proposed to Virginia Noe, the Director of Health Services at DPS to implement an evidence based practice change in an urban elementary school within the school district where students identified with asthma would be invited to participate in a comprehensive self-management asthma education program during school hours to improve indicators of poorly controlled asthma such as school absences and unscheduled health care visits. The district had a very similar pilot program underway in five of its seventeen elementary schools and planned to roll out the pilot to all of the elementary schools in the 2016-2017 school year. The Director of Health Services, the lead asthma pilot school nurse, the lead technology school nurse, and the EBPP-AL decided collaboratively that the EBPP-AL would help in the implementation and evaluation of the comprehensive self-management asthma

education program in the district. Regular meetings with the School Health Director, the lead asthma pilot school nurse, the lead technology school nurse and the EBPP-AL during the first half of 2016 were held whereby gaps and flaws from the pilot program were identified. Based on these results, the team planned changes that would assist in the transition of the new practice change of providing a comprehensive self-management asthma education program to all seventeen elementary schools starting in the fall of 2016. At this time, it was decided that the EBPP-AL would focus mainly on the management, data collection, and evaluation in seven of the seventeen schools. Project evaluation is very valuable in determining the outcomes achieved from interventions, however is often overlooked due to the time and cost involved (CDC, 2011).

The purpose of this project was to implement a comprehensive self-management asthma education program in seven elementary schools within the DPS District and evaluate the effectiveness of the program. The education curriculum chosen was the Open Airways for Schools program. The goal of this project was for elementary students with asthma in grades 2 through 5 to receive self-management asthma education in school leading to improved asthma control, proper rescue inhaler skills, decreased absenteeism, emergency department visits and hospitalization admissions from asthma symptoms.

Melnyk and Fineout-Overholt (2015) discuss the importance of evaluating outcomes related to applied interventions in evidence based practice change and examine if significant “so what” factors (Melnyk & Fineout-Overholt, 2015) are achieved. Examples of significant “so what” factors or outcomes that relate to this evidence based practice project are quite significant and include reduced school absences, emergency

department visits, and hospital admissions. Secondary to these important "so what" outcomes related to effective asthma self-management are increased time in school and school learning opportunities; improved rescue inhaler skill, improved overall asthma control, less time off work for parents attending to sick children with asthma, and decreased overall health costs related to proper asthma management. Evidenced based practice projects should create outcomes that provide significant return on investment (Melnyk and Fineout-Overholt, 2015).

The landmark report *Crossing the Quality of Chasm* (The Institute of Medicine [IOM], 2001) urged for rapid changes in tackling health problems in the United States. The National Asthma Control Program [NACP] developed in 1999 was funded by the CDC in response to millions of people across the United States suffering from the burden of uncontrolled asthma (United States Department of Health & Human Services [USDHHS], 2010). In relation to the NACP, health care providers were charged with creating positive patient outcomes related to respiratory health that prevent, detect, treat, and provide better asthma self-management education, (USDHHS, 2010). However these charges were aimed primarily to occur within traditional care settings (IOM, 2001) rather than within the community. Since children and adolescents spend at least six hours daily in school settings, school nurses need included with this charge as children across the United States have acute and chronic health conditions that need managed regardless of where they are (National Association of School Nurses [NASN], 2012). Children with a multitude of health conditions have flooded the schools over the last 40 years due to federal inclusion laws requiring all students be educated among their peers regardless of a

disability or medical condition (Individuals with Disabilities Educational Act [IDEA], 2004, Rehabilitation Act [Section 504]).

For positive student well-being and health, Healthy School Communities Information [HSCI] (2011) support a partnership between health and education. Children and adolescents attend school for at least 6 hours per day, however, school nurses face many barriers in receiving medication orders for rescue inhalers, clarification for medication orders related to the rescue inhaler, and often not given critical asthma action plans, rescue inhalers, spacers for inhalers, and information about the severity of the child's asthma from the child's primary care provider or parents. A collaborative relationship needs fostered among primary care providers, students, parents, and school nurses to maximize asthma management and continuity of care so the child with asthma can benefit academically from being at school and experience lifelong positive health outcomes (HSCI, 2011) from well managed asthma.

Research suggests that comprehensive self-management asthma education programs in the schools have shown promising results. Asthma education programs are student friendly and can be implemented in the school setting where students spend almost as many waking hours compared to their home (Cicutto et al., 2014). Asthma indicators such as improved school attendance and decreased hospitalization or primary care provider use for acute asthma episodes have been linked to these kinds of asthma education programs (Ahmed & Grimes, 2011, Boyd et al., 2009; Cicutto et al., 2014).

As previously mentioned, prior to the collaboration between the DPS District and the EBBP-AL, the district selected Open Airways for Schools as the self-management asthma education program to be implemented as part of their pilot project to improve

asthma outcomes among its students. The Open Airways for Schools program is endorsed by the American Lung Association, the Center for Disease Control, and the National Association of School Nurses (American Lung Association, 2016). In order to guide an exhaustive search of the literature regarding asthma education programs, a PICOT question was designed by the EBBP-AL and strategically used to effectively guide the search.

PICOT Question

The spirit of clinical inquiry is the first step in evidence based practice as clinical problems are identified with the realization that other interventions could achieve equal or more optimal outcomes for patients (Melnyk & Fineout-Overholt, 2015) which might be more cost effective, provide less side effects, less pain, or be less interruptive to the patients sleep patterns. A PICOT question allowed the EBBP-AL to efficiently and effectively discover the best available literature (Melnyk & Fineout-Overholt, 2015) that provided relevant answers to the clinical question. In developing the PICOT question, the "P" represents the patient, aggregate or the condition, the "I" represents the intervention or condition, "C" represents the comparison intervention or comparison condition, "O" represents the outcomes, and "T" represents the specified time table (Melnyk & Fineout-Overholt, 2015). The PICOT question developed to guide the literature search for the clinical inquiry is as follows: "*In children with asthma, how does a school-based comprehensive self-management asthma education program compared to standard management affect school absences and unscheduled asthma health care visits over a 12-month period?"*

"School-based self-management asthma education" is defined as any formal asthma curriculum offered during the school day to students. "Standard management" is defined as school staff working with parents to receive rescue inhalers, spacers for rescue inhalers, rescue inhaler orders, asthma action plans, and information regarding the severity of the child's asthma. A guiding framework was used throughout the evidence based practice project. The next section will discuss the process for selection of the framework and how the framework was utilized throughout the project development.

Guiding Framework

Several models, frameworks, and theories were reviewed and considered to guide the proposed evidenced based practice project. Initially, the Evidence-Based Advancing Research and Clinical Practice Through Close Collaboration (ARCC) Model (Melnyk & Fineout-Overholt, 2015) guided the initial part of this project such as the review of the literature, organizational readiness assessment, stakeholder identification, administration support, and barrier and facilitator identification (Melnyk & Fineout-Overholt, 2015). The ARCC model includes essential rapid critical appraisal tools, which the EBPP-AL utilized to quickly appraise and synthesize the body of evidence found in the literature review (Melnyk & Fineout-Overholt, 2015). Influencing others about practice change and the delivery of evidence based care relies heavily on cognitive behavior and change theories (Melnyk & Fineout-Overholt, 2015). However, the ARCC model structure did not fit the project as well since clinicians are required at the point of care and mentors are supposed to be present assisting and supporting the clinicians along the way in the process of evidence based practice and encouraging them to ask the relevant clinical questions (Melnyk & Fineout-Overholt, 2015). As the evidence based practice project

evolved, it became apparent to the EBBP-AL that the ARCC model was a forced fit and the clinicians or school nurses did not need to become evidence based practice mentors (Melnyk & Fineout-Overholt, 2015). Rather the school nurses needed to have buy in and implement an already decided upon evidenced based intervention that evolved from the pilot program initiated in the district and from the recommendations of the EBBP-AL.

The EBBP-AL selected the Model for Evidenced-Based Practice Change by Larrabee (2009), which closely modeled the original Model for Change to Evidence Based Practice (Rosswurm & Larrabee, 1999) and Model for Evidence-Based Practice Change (Larrabee, 2004) as the guiding model for the remainder of the evidence based practice project. Larrabee's (2009) model is composed of the following six steps: assess the need for change in practice, locate the best evidence; critically analyze the evidence; design practice change; implement and evaluate change in practice; and integrate and maintain change in practice. The ease of use in the Model for Evidence-Based Practice Change is a strength as ongoing quality improvement strategies can be conducted along the way if chosen rather than being set in stone (Larrabee, 2009). The Model for Evidence-Based Practice Change was adapted to fit the entire proposed evidence-based project as shown in Figure 1 from start to finish (Larrabee, 2009). The flexibility of this model allows changes to be made if problems are identified and then recommendations to be formulated based on the best evidence which allow for best practice to be implemented for maximum outcomes and return on investment.

Overall Evidence Based Practice Project Aim Statement

In response to the growing population of children with asthma seen in the emergency department, admitted to the hospital or absent from school, the EBBP-AL

implemented a self-management asthma education program in seven of the elementary schools within DPS and evaluated the outcomes. Providing self-management asthma education to children in schools was the catalyst to help improve their overall asthma. The EBPP-AL originally proposed: by January 2017, 25% of students in grades two through five enrolled in the seven schools participating in the self-management asthma

Open Airways for Schools as a Model for Evidence-Based Practice Change

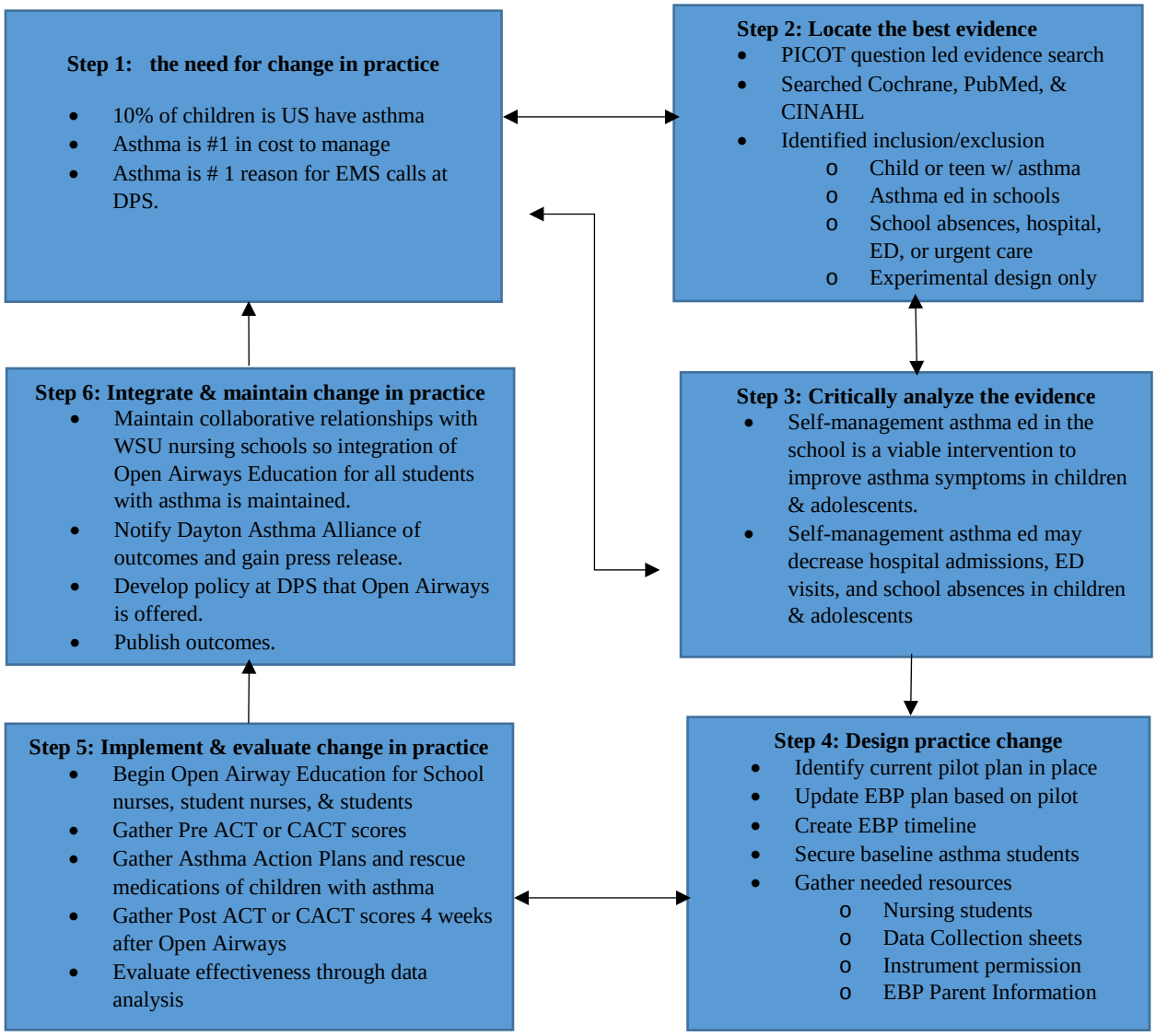

Figure 1. Adapted from Larrabee's (2009) model of evidenced-based practice change.

education program (Open Airways for Schools) will have improved their scores on the Childhood Asthma Control Test (cACT) to 20 or greater. The cACT is a self-administered asthma control tool for children aged 4-11 years that will be later discussed for assessing asthma control (Alzahrani, Y. & Becker, E., 2016). The next section outlines the literature review. The specific keywords in the PICOT question allowed for a focused search and retrieval of the relevant literature.

II. EVIDENCE

Search for Evidence/ Evidence Retrieval

A review of the literature was conducted and the search revealed external evidence via Cochrane, PubMed, and CINAHL databases. These databases were selected as it was suspected they would contain evidence relevant to providing answers for the PICOT question. The EBPP-AL was careful to be inclusive of not only the everyday language expressed in the PICOT question, but also used synonymous terms (Melnyk & Fineout-Overholt, 2015). The Cochrane database was searched looking in the Title, Abstract, and Keywords lines for the following keyword combinations: child* OR children OR pediatric* OR paediatric* AND asthma OR asthma exacerbation* AND education OR interventions AND emergency room OR absen* OR emergency dept* OR health care. The query in Cochrane, which had no dates set as limiters, resulted in 32 hits from a total of 8751 with articles dated through the years of 2001-2014. The PubMed database was searched for the following text in all fields: children AND asthma AND school based education AND absen* or hospitalization*. The search in PubMed resulted in a total of 117 records published between the years of 1979-2015, using the PubMed database, and limiters of years 2002-2015 within title the following words were used for the search: asthma AND education AND children AND school. The subsequent search in PubMed resulted in 6 initial hits. The CINAHL database was searched using the

following keywords: child* OR paediatric* OR pediatric* OR student AND asthma AND program OR case manage* plan AND attend * OR absence OR hospitalization OR emerg* care OR unscheduled. The search in CINAHL had no date limits set and resulted in 101 records that were published between the years of 1990-2014.

Of 251 records revealed in the initial search of the literature, a preliminary review was conducted narrowing the relevant records to 27 by discarding articles that did not relate to the PICOT question, were not intervention recipients of the child/adolescent age group, or lacked asthma education being used as an intervention. Articles included had asthma education interventions conducted in the school setting. Articles labeled as systematic reviews had asthma education interventions at school, in the community, home or health care provider office. In terms of the outcomes or dependent variables, the articles needed at least one of the following to be considered: attendance or absence at school, hospitalization or emergency room visits, or unscheduled office visits. Of the 27 records, seven were found to be duplicative leaving 20 to be reviewed closely for the strength of evidence, dependent and independent variables, and study design to be considered a keeper article. The amount of evidence validating asthma education lends to promising outcomes of decreased absences and hospitalizations. Due to the quantity of evidence on this topic, the author was selective and chose higher level studies consisting of systematic reviews and randomized control trials. (See Appendix A).

After reviewing the individual research articles retrieved in the literature review, articles included for the rapid critical appraisal required the population to be children or adolescents with asthma or asthma like symptoms. Asthma education occurring in the school setting was included as an independent variable or an intervention. Dependent

variables needed to include at least one of the following: school absences or healthcare utilization of hospitals, urgent care use, or unscheduled office visits for asthma complaints (See Appendix B).

Studies excluded revealed asthma education given to health care provider or school personnel and not the student or family. Single research studies found in a systematic review were excluded as they were already being evaluated. Since there was a plethora of research articles based on the topic of inquiry, studies that did not exhibit experimental design were not included.

Appraisal & Synthesis of Evidence

Eight articles met the inclusion criteria and were summarized into separate tables listing independent and dependent variables relative to the PICOT question, the study design and an article summary. See Tables 1-8. Let Evidence Guide Every New Decision [LEGEND] toolkit developed by Cincinnati Children's Hospital Medical Center was the critical appraisal tool used to evaluate the evidence (Cincinnati Children's Hospital Medical Center [CCHMC], 2012). (See Appendix C for the LEGEND toolkit for examples of Evaluating the Evidence Algorithm, Evidence Appraisal of a Single Study Intervention Systematic Review/Meta-Analysis, Table of Evidence Levels, Grading the Body of Evidence, and Judging the Strength of Evidence). The LEGEND toolkit is very user friendly and allows the user to move seamlessly from one step to the next of the critical appraisal and synthesis process without having to transition between several tools to assign leveling and quality ratings (CCHMC, 2012). Using LEGEND, each individual research study was reviewed and a study design determined (CCHMC,

Table 1

Review of Literature Abstraction Tables -Article #1 – Ahmad (2011)

Article Citation #1	Conc. Framework & Purpose	Design/Method	Sample/Setting	Major Variables (& Definitions)	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Ahmad, E. & Grimes, D. (2011). The effects of self-management education for school–age children on asthma morbidity: A systematic review. *The Journal of School Nursing, 27* (282). DOI: 10.1177/1059840511403003.	Theoretical Basis: Health Promotion Model Purpose: Examine impact of school-based AEP on school attendance, ED visits, and hospitalizations post 1 year old in 5-18yr olds.	Study: SROL-Descriptive (most RCTs) Inclusion: education to children with asthma to increase knowledge & improve self-care related to asthma. Evidence & quality=4b Follow up: varies 1 month- 1 yr post	E=SBAEP (Open Airways; Roaring Adventures of Puff (RAP); Puff City; Kickn' Asthma curriculum; Triple A program) C=usual care N=18-900 students (9 studies, mostly RCTs) Setting=Schools in United States, China, Australia, & Canada Attrition: not noted	IV1= SBSMAEP DV1=UHCV1 DV2=UHCV2 DV3=Ab SBSMAEP=teaching & reinforcement of inhaler technique; expand & improve working knowledge of asthma; reinforcement & training on following written action and/or maintenance therapies, teaching on monitoring lung fx Ab = school days missed related to asthma UHCV1= any unscheduled EDV related to asthma. UHCV2= any hospitalization related to asthma.	Asthma screening surveys, Phone Interviews health diary UHCV1-seen in Emergency Room UHCV2-hospitalized Ab – missed days of schools	Tools/questionnaire= Pre-intervention survey; varying times of post-intervention surveys (1-12 months)	DV1=unclear if less (ED) DV2=unclear if less (hospital) DV3=all had decrease in days of school missed; 6 out of 9 were SS.	Strengths: Reduced days of school missed SS. Decreased hospitalization Limitations: studies were homogenous, however collectively they had varying: age groups, age of onset, & severity. Schools did not measure why absent. Difficulty to track hospital or ED admissions. Memory recall needed w/ some students. Risk/harm: none Feasibility: These studies could be replicated

Key:SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; CCT=Controlled Clinical Trial; Independent Variable=IV; Dependent Variable=DV; C=Control; E=Experimental; SBSMAEP =School Based Self-Management Asthma Education Program; BAM=Basic Asthma Management; SMAEP=Self-Management Asthma Education Program; Ab=School Absences; UHCV=Unscheduled Healthcare Visit for Asthma; EDV=Emergency Department Visits; PCP=Primary Care Provider.

Table 2

Review of Literature Abstraction Tables - Article #2 – Boyd (2009)

Article Citation #2	**Conc. Framework & Purpose**	**Design/Method**	**Sample/Setting**	**Major Variables (& Definitions)**	**Measurement**	**Data Analysis**	**Findings**	**Appraisal: Worth to Practice**
Boyd, M., Lasserson, T., McKean, M., Gibson, P., Ducharme, F., & Haby, M. (2009). Interventions for educating children who are at risk of asthma-related emergency department attendance. *Cochrane Database of Systematic Reviews*. Issue 2. Art. No.: CD001290. DOI: 10.1002/14651858.CD001290.pub2.	Theoretical Basis: none Purpose: Systematic review of the literature examining if asthma education leads to improved health outcomes in children who have gone to the emergency room for asthma	Study: SROL (38 RCTs) Inclusion: RCTs or Quasi-RCTs studies of children seen the ER for asthma within the previous 12 months; asthma education was an intervention; 0-18 years of age Excluded: No RCTs; not recruited post ER; Primary intervention was environmental remediation & not asthma education Evidence & quality= 1b Follow up: 12 weeks to 2 yr	E= AEP post ER visit targeting children, parents, or both. C=Usual care, waiting list, or lower intensity education N= 7843 children Setting: hospital in 7 studies; community center in 3 studies; home in 10 studies; school in 1 study; outpatient clinic in 6 studies; hospital/clinic/home in 8 studies; hospital/outpatient clinical in 1 study, home/community center in 1 study, and 1 undetermined. Attrition: noted low	IV1= AEP DV1=UHCV1 DV2=UHCV2 DV3=UHCV3 DV4=Ab AEP= Asthma education targeting children, parents, or both post ER visit (comprehensive, information only, or education with environmental) UHCV1= any unscheduled EDV related to asthma. UHCV2= any hospitalization related to asthma. UHCV3=any unscheduled office visit related to asthma Ab = school or daycare missed related to asthma	UHCV1 UHCV2 UHCV3 Ab	Looking at 2 weeks to 2 years post AEP intervention	UHCV1= SS decrease UHCV2= SS decrease; reduction in risk UHCV3=reduction in risk Ab=inconclusive	Strengths: Various AEP used, and SS results shown in ER and hospital visits. Limitations: Data incomplete & heterogeneous; Many outcomes not reported, Educational interventions varied. Risk/harm: none Feasibility: AEP can be conducted in a variety of settings to children and parents that improve asthma outcomes.

Key:SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; CCT=Controlled Clinical Trial; Independent Variable=IV; Dependent Variable=DV; C=Control; E=Experimental; SBSMAEP =School Based Self-Management Asthma Education Program; BAM=Basic Asthma Management; SMAEP= Self-Management Asthma Education Program; Ab=School Absences; UHCV=Unscheduled Healthcare Visit for Asthma; EDV=Emergency Department Visits; PCP=Primary Care Provider; AEP=Asthma Educ. Program.

Table 3

Review of Literature Abstraction Tables - Article #3 – Cicutto (2013)

Article Citation #3	**Conc. Framework & Purpose**	**Design/Method**	**Sample/Setting**	**Major Variables (& Definitions)**	**Measurement**	**Data Analysis**	**Findings**	**Appraisal: Worth to Practice**
Cicutto, L., To, T., & Murphy, S. (2013). A Randomized Controlled Trial of a Public Health Nurse-Delivered Asthma Program to Elementary Schools. *Journal of School Health*, *83*(12), 876-884. doi:10.1111/josh.12106	Theoretical Basis: None Purpose: Evaluate the outcomes (health service use, quality of life, school absenteeism, parental & child days of interruption, inhaler technique and asthma friendliness of school) of a school-based multifaceted asthma program that targeted students with asthma and the broader school community. -91% assessors blinded entire time data collection; 9% data collectors unblinded.	Study: RCT-cluster Invited principals of schools in 5 health districts in province of Ontario Canada w/ poor air quality Inclusion: -participation desire ->10 students w/ asthma -return 3-4 wks Evidence & quality=2a Follow up: baseline, 7-9weeks, 1 year post; every three months	320 schools eligible surveys, 180 randomly selected. Asthma student identification survey completed by parents. 170 schools with largest number of asthma cases used. Those 170 Schools Randomized into E=85 Schools; C=85 Schools Inclusion: -parent report of HCP asthma dx -use asthma meds -asthma sx ≥ 3/yr - grades 1-5 -English speaking -no other health (Cystic Fibrosis). N=1316 students with asthma Attrition: yes 11%- students moved, or not wanting to give up lunch for intervention.	IV1= SBSMAEP DV1=Ab DV2=UHCV SBSMAEP (E-group) asthma education conducted at school & includes knowledge acquisition & self-management. BAM (C-group) scheduled routine care for office visits with PCP Ab school days missed related to asthma UHCV any visit unscheduled to an office, clinic, urgent care, or ED related to asthma.	Ab *Ab (any kind)* *Ab (>20d)* UHCV *Urgent care* *Walk-in* *Unscheduled* *ED*	-Baseline, 7-9wks, 1 year -Data Collection every 3 months for data recall on UHCV (urgent care, walk in, unscheduled, ED) ; Ab (any kind of asthma, >20 days due to asthma) Juniper's Pediatric Asthma QOL questionnaire Other measurements: %; mean, stand deviation, p values, absolute & relative risk reductions, intention to tx priori sample size	Ab *Ab (any kind)* 50.1% vs 60.3%; p<.01 *Ab (>20d)* 1.4% vs 4.5%; p<.01 UHCV @ 1 yr *Urgent care* 41.3% vs 51.4%; p<.0001 *Walk-in* 18.4% vs 21.6%; p=NS *Unscheduled* 24.1% vs 31.2%; p<.0001 *ED* 2.8% vs 8.2%; p<.02 E Group is statistically significant in Ab, QOL, & UHCV (Urgent care, Unscheduled, & ED)	Strengths: RCT by groups, 91% of assessors blinded, adequate power of sample size, attrition rate not abnormal; baseline demographics of C & E groups similar. Limitations: schools in poor air quality areas making less generalizable; 9% assessors unblinded, longer f/u to measure outcome retention; are parent recalls a Risk/harm: none Feasibility: Financial & time barriers may be problematic for some schools. Need Partnership w/ HCP & school. SBSMAEP

Key:SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; CCT=Controlled Clinical Trial; Independent Variable=IV; Dependent Variable=DV; C=Control; E=Experimental; SBSMAEP =School Based Self-Management Asthma Education Program; BAM=Basic Asthma Management; SMAEP= Self-Management Asthma Education Program; Ab=School Absences; QOL=Quality of Life; UHCV=Unscheduled Healthcare Visit for Asthma; EDV=Emergency Department Visits; PCP=Primary Care Provider.

Table 4

Review of Literature Abstraction Tables - Article #4 – Wolf (2002)

Article Citation #4	Conceptual Framework & Purpose	Design/Method	Sample/ Setting	Major Variables Studied (& Definitions)	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Wolf, F., Guevara, J., Grum, C., Clark, N., & Cates, C. (2002). Educational interventions for asthma in children. *Cochrane Database of Systematic Reviews* Issue 4. Art. No.:CD000326. DOI: 10.1002/14651858.CD000326.	Theoretical Basis: None Purpose: Determine the efficacy of SMAEP on physiological function, morbidity & functional status, self-perception, and health care utilization in children and adolescents with asthma. Determine characteristics of SMAEP and trials that are associated with improvements in health outcomes in children and adolescents with asthma.	Study-SROL (32 studies: 26 RCTs & 6 CCTs) Inclusion: RCT or CCT, children ages 2-18 years, SMAEDP; pulmonary function tests outcomes, morbidity, functional status, or health care utilization. Exclusion: other Pulmonary diagnoses, lack control population, non-standard education intervention, no outcomes of interest. Evidence & quality=1b	N= 3,706 patients with asthma between the ages of 2-18 yr Setting: school Attrition: Unknown	IV=SBSMAEP DV1=Ab DV2=UHCV SBSMAEP education intervention targeted to children or adolescents (or parents) to teach one or more self-management strategies related to prevention, attack management, or social skills using instructional or combination educational strategies either individual or in group sessions. Ab school days missed related to asthma UHCV emergency department visits or hospitalizations related to asthma.	Ab *Absences* UHCV *ED* *Hospital*	Mean (SD), CI, SMD, overall effect size, p values	N=18 studies and 1649 patients Ab=(SMD -0.14, 95% CI, -0.23 to -0.04 when pooled with fixed effect or random effects model. *Small but significant reduction in absences* N=18 studies and 1899 patients UHCV= (SMD -0.21, 95% CI -0.33 to -0.09) *Significant reduction in ER visits*	Strengths: SMAEP contributes to less ED visits & absences; improvement in asthma symptoms and control. Limitations: Allocation concealment was unclear in many studies; higher quality RCT studies showed better effects of SMAEP compared to lower quality pooled studies; missing information on outcomes left it difficult to gain adequate effect size, not all interventions were in the school. Risk/harm: none Feasibility: Financial & time barriers may be problematic for some schools. Partnership between HCP and Schools needs established. The findings were not as significant, they do support SMAEP to be implemented for patient benefit.

Key:SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; CCT=Controlled Clinical Trial; Independent Variable=IV; Dependent Variable=DV; C=Control; E=Experimental; SBSMAEP =School Based Self-Management Asthma Education Program; BAM=Basic Asthma Management; SMAEP= Self-Management Asthma Education Program; Ab=School Absences; UHCV=Unscheduled Healthcare Visit for Asthma; EDV=Emergency Department Visits; PCP=Primary Care Provider.

Table 5

Review of Literature Abstraction Tables - Article #5 – Bruzzese (2011)

Article Citation #5	Conc. Framework & Purpose	Design/Method	Sample/Setting	Major Variables (& Definitions)	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Bruzzese, J., Sheares, B., Vincent, E., Du, Y., Sadeghi, H., Levison, M., Mellins, R., & Evans, D. (2011). Effects of a school-based intervention for urban adolescents with asthma: A controlled trial. *American Journal of Respiratory Critical Care Medicine* *183*(8):998-1006. doi:10.1164/rccm.201003-0429OC. Epub 2010 Dec 7	Theoretical Basis: none Purpose: To test the efficacy of Asthma Self-Management for Adolescents (ASMA), a school-based intervention for adolescents and medical providers.	Study: RCT Inclusion: 9th & 10th graders; moderate to severe persistent asthma, taking prescribed asthma meds in last 12 months. Parent consent/student assent obtained Evidence & quality= 2b Interviews every 2 months by trained staff Follow up: baseline, 6 months,12 months	N = 345 AA or Latino -15 year olds (9 & 10th graders) -moderate to severe asthma -used asthma meds in last 12 months. -5 schools over 4 years (12 cohorts) -75% student eligible for free & reduced lunch Setting: School Randomized to E or C E=SBSMAEP (175 students assigned; 139 completed 12 mos f/u) C=Waitlist (170 students assigned; 142 completed 12 mos f/u) Attrition: retention after 1 year was 81%	IV1= SBSMAEP DV1=Ab DV2=UHCV SBSMAEP- School Based Asthma Self-Management for Adolescents (ASMA), a school-based intervention using groups and individual education Ab school days missed related to asthma UHCV Urgent care, emergency department or unscheduled health visits related to asthma	Ab-decreased UHCV-decreased; SS	Tools/questionnaire: student case detection survey; International Survey of Asthma and Allergies in Childhood (ISAAC) questionnaire 320 students needed to detect treatment effect.	Ab-decreased in self reported recall UHCV-decreased; SS	Strengths:. Randomized; adequate sample to see effect of intervention. Completed at school. Targeted at adolescents. Limitations: self reported absences for asthma conflict with school records; resources needed outside of the school Risk/harm: none Feasibility: need collaboration and support to provide intervention with school nurse and health teacher. May need to seek outside help via university students to provide education.

Key:SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; CCT=Controlled Clinical Trial; Independent Variable=IV; Dependent Variable=DV; C=Control; E=Experimental; SBSMAEP =School Based Self-Management Asthma Education Program ; BAM=Basic Asthma Management; SMAEP= Self-Management Asthma Education Program; Ab=School Absences; UHCV=Unscheduled Healthcare Visit for Asthma; EDV=Emergency Department Visits; PCP=Primary Care Provider

Table 6

Review of Literature Abstraction Tables - Article #6 – Coffman (2009)

Article Citation #6	**Conc. Framework & Purpose**	**Design/Method**	**Sample/Setting**	**Major Variables (& Definitions)**	**Measurement**	**Data Analysis**	**Findings**	**Appraisal: Worth to Practice**
Coffman, J., Cabana, M., & Yelin, E. (2009). Do school-based asthma education programs improve self-management and health outcomes? *Pediatrics. 124*(2):729-42. doi:10.1542/peds. 2008-2085.	Theoretical Basis: Knowledge-attitudes-behavior framework Purpose: To conduct a SROL on school-based AEP.	Study: SROL (24 studies-RCTs, cluster RCT, CCT, OB) Inclusion: -English -School Asthma education -outcomes of interest -ages 4 to 17 -dx of asthma, symptoms of asthma, 1 or more urgent visits Evidence & quality= 1b Follow up: ranged from immediately after SBSMAEP to post 1 year	N=24 studies -9030 children -aged 4-17 year -Asthma diagnosis or symptoms, 1 urgent visit E=SBSMAEP C=usual care Setting: School Attrition: not mentioned	IV1= SBSMAEP DV1=Ab SBSMAEP – school based asthma education intervention to children and some parents (differed widely) Ab – days missed at school	Ab	Physiothrapy Evidence Database (PEDro) scale For external and internal validity used Jada scale Delphi list	Ab – about ½ of the studies revealed no changes.	Strengths: Higher self-management and knowledge; Limitations: School reported absences; Some did not have adequate statistical power; many students had mild asthma which could limit effects; usual care not defined; clustered schools may overestimate outcomes; asthma ed did not address barriers; asthma ed not equal; behavior change may need Risk/harm: none Feasibility: Need to rely on outside resources to implement. Collab w/ PCP w/ schools

Key:SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; CCT=Controlled Clinical Trial; Independent Variable=IV; Dependent Variable=DV; C=Control; E=Experimental; SBSMAEP =School Self-Management Asthma Education Program; BAM=Basic Asthma Management; SMAEP= Self-Management Asthma Education Program; Ab=School Absences; UHCV=Unscheduled Healthcare Visit for Asthma; EDV=Emergency Department Visits; PCP=Primary Care Provider.

Table 7

Review of Literature Abstraction Tables - Article #7 – Guevara (2003)

Article Citation #7	Conc. Framework & Purpose	Design/Method	Sample/Setting	Major Variables(& Definitions)	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Guevara, J., Wolf, F., Grum, C., & Clark, N. (2003). Effects of educational interventions for self-management of asthma in children and adolescents: systematic review and meta-analysis. *British Medical Journal. 326*(7402):1308-9.	Theoretical Basis: Purpose:Determine effectiveness of AEP for the self-management of asthma in children and adolescents.	Study: SROL (32 RCTs or CCTs) Inclusion: -Published RCTs or CCTs with AEP reported lung function, morbidity, self-perception, or utilization of health care services. -2-18 yrs old -asthma dx Exclusion: -under age 2 -other pulmonary dx -lack of a control -Nonstandard ed intervention -no outcomes of interest Evidence & quality= 1b	N= 32 studies -3706 participants E=Comprehensive self-management asthma education program C=usual Setting: Diverse	IV1= SBSMAEP DV1=Ab DV2=UHCV SBSMAEP –asthma education targeting child, parent, or both Ab=days of school missed UHCV =utilization of health care services for asthma in ER or hospitalizations	Ab UHCV	Tools/questionnaire Other measurements:	Ab-reduced UHCV -reduced	Strengths:. Asthma ed may improve outcomes. Limitations: lack of adequate method discussion; lack of direct comparison Risk/harm: none Feasibility :Outside resources needed to implement and provide the education.

Key:SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; CCT=Controlled Clinical Trial; Independent Variable=IV; Dependent Variable=DV; C=Control; E=Experimental; SBSMAEP =School Self-Management Asthma Education Program; BAM=Basic Asthma Management; SMAEP= Self-Management Asthma Education Program; Ab=School Absences; QOL=Quality of Life; UHCV=Unscheduled Healthcare Visit for Asthma; EDV=Emergency Department Visits; PCP=Primary Care Provider.

Table 8

Review of Literature Abstraction Tables - *Article #8 – Joseph (2013)*

Article Citation #8	Conc. Framework & Purpose	Design/Method	Sample/Setting	Major Variables(& Definitions)	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Joseph, C. L., Ownby, D. R., Havstad, S. L., Saltzgaber, J., Considine, S., Johnson, D., & Johnson, C. (2013). Evaluation of a Web-Based Asthma Management Intervention Program for Urban Teenagers: Reaching the Hard to Reach. *Journal of Adolescent Health, 52*(4), 419-426. doi:10.1016/j.jadohealth.2012.07.009	Theoretical Basis: Health Belief Model, Attribution Theory, motivational interviewing; behavioral therapy Purpose: To evaluate a web-based tailored AEP targeted to urban teens with characteristics that could be associated with lack of behavior change.	Study: RCT Inclusion: -teens with asthma dx and symptoms Evidence & quality= 2b Follow up: baseline, 6 mos, 12 month follow up	N=422 students -98% AA -mean age 15.6 yr E=204 students (Puff City 4 sessions-less than 180 days-30 minutes to complete each) C=218 (generic asthma websites (4 sessions-less than 180 days -30 minutes to complete each Setting: 6 Urban HS in Detroit Attrition: 88.4 % completed 4 modules, 90% completed 12 month f/u	IV1= SBSMAEP (Puff City) with referral coordinator DV1=Ab DV2=UHCV SBSMAEP –Puff city intervention with referral coordinator Ab – days of school missed UHCV –health care utilization.	Ab UHCV	Questionnaire : EPR3 adapted Classification of severity Random number generator to assign E or C groups Kaplan Meier method	Ab-decreased UHCV – no SS	Strengths:. Generalized for AA population who have increase in Asthma Limitations: EPR 3 did not measure spirometry or clinical observation; self-report; not inclusion of randomization in subgroups; recruitment low; generalized on to AA because Puff city designed for AA population. Risk/harm: none Feasibility: need for the Puff City in the right demographic area with computer resources during school day.

Key:SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; CCT=Controlled Clinical Trial; Independent Variable=IV; Dependent Variable=DV; C=Control; E=Experimental; SBSMAEP =School Based Self-Management Asthma Education Program; BAM=Basic Asthma Management; SMAEP= Self-Management Asthma Education Program; Ab=School Absences; QOL=Quality of Life; UHCV=Unscheduled Healthcare Visit for Asthma; EDV=Emergency Department Visits; PCP=Primary Care Provider

2012). The appropriate appraisal form was selected based on the study design and completed so that the respective level of evidence and quality rating could be assigned (CCHMC, 2012). Based on the clinical inquiry, the PICOT question was developed and guided the literature search, recommendations were made based on the evidence that helped to answer the clinical question (CCHMC, 2012). Each recommendation given was reviewed along with the corresponding body of evidence and the "Grading the Body of Evidence" form from the LEGEND toolkit was used to assign an overall grade of "high", "moderate", "low "or "grade not assignable" based on the body of evidence (CCHMC, 2012). Finally, an overall strength of the recommendation was assigned and considered seven dimensions: grade of the body of evidence, safety/harm, benefit to target population, burn on population to adhere to recommendation, cost-effectiveness to healthcare system, directness, and impact on morbidity, mortality, or quality of life (CCHMC, 2012). The user considered the aforementioned dimensions and those reflections that fall to the left of the scale which is considered a strong recommendation (CCHMC, 2012). Prior to implementing an evidence based practice project it is important to establish that interventions selected have the best possible chance of providing the proposed outcomes sought after.

Asthma education as an intervention for improving outcomes related to asthma such as improved attendance, decreased emergency room visits and decreased hospital admissions is well supported by findings in the literature (Boyd et al., 2009; Bruzzese et al., 2011; Cicutto & Murphy, 2013; Guevara, Wolf, Crum & Clark, 2003; Wolf, Guevara, Crum, Clark & Cates, 2002). Findings from the review of the literature revealed many variations of asthma education programs for children ranging from 2-18 years of age with

some just for children, and some for both children and parents. Despite various asthma education programs and targeted groups, the outcomes remain optimistic in favor of asthma education (Ahmed & Grimes, 2011; Boyd, et al., 2009; Bruzzese et al., 2011; Cicutto, et al., 2013; Guevara, et al., 2003; Joseph et al., 2013; Wolf et al., 2002). While every research study has limitations, the level of evidence and quality rating was overwhelmingly high with most studies being experimental in design at level of evidence and quality rating of 1b, 2a, or 2b (Boyd et al., 2009; Bruzzese et al., 2011; Cicutto et al., 2013; Coffman, Cabana, & Yelin, 2009; Guevara et al., 2003; & Joseph et al., 2013; CCHMC, 2012) as shown in Table 9. Asthma education as an intervention for decreasing both school absences and urgent use of health care systems is a plausible option (Ahmed & Grimes, 2011; Bruzzese et al., 2011; Cicutto et al., 2013; Guevara et al., 2003; & Wolf et al., 2002). Table 10 reveals recommendation statements with the individual evidence level and quality grade.

The LEGEND toolkit employs rubrics that allow users to grade the overall strength of a recommendation. Areas considered in grading the strength are as follows: safety/harm, benefit to the target population, burden on population to adhere to recommendation, cost-effectivnes to healthcare system, directness to which the evidence answers the clinical question, and impact on morbidity, mortality, or quality of life (CCHMC, 2012). Table 11 reveals the strength of the evidence for the specified recommendations as “high” grade (CCHMC, 2012) which justifies integration into the school setting for students with asthma.

While research is very important in guiding decisions as a health care provider and reciever of care, it is also important to consider the internal evidence given by experts

Table 9

Synthesis of the Literature for School-based Asthma Education as an Intervention

	Ahmad (2011) #1	**Boyd (2009) #2**	**Bruzzese (2011) #5**	**Cicutto (2013) #3**	**Coffman (2009) #6**	**Guevara (2003) #7**	**Joseph (2013) #8**	**Wolf (2002) #4**
Intvx	AEPc	AEPc AEPp	AEPc	AEPc	AEPc AEPp	AEPc AEPp	AEPc	AEPc AEPp
Ab	↓	NS	↓	↓	NS	↓	↓	↓
UHCV	↓	↓	↓	↓	NA	↓	---	↓
Sample Size	9 studies	7843 children	345 children	1316 children	9030 children	3706 children	422 children	3706 children
Population	5-18 yr asthma	Children asthma	15 yr asthma; AA	1-5 gr asthma	4-17 yr asthma	2-18 yr asthma	HS age asthma; AA	2-18 yr asthma
Study Design	SROL Descriptive	SROL (38 RCT)	RCT	RCT Cluster	SROL (24-RCT, Cluster RCT, CCT, OB)	SROL (35-RCT, CCT)	RCT	SROL (32-RCT, CCT)
Evidence Level & Quality Grade	4b	1b	2a	2a	1b	1b	2b	1b

Key: SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; CCT=Controlled Clinical Trial; Independent Variable=IV; Dependent Variable=DV; C=Control; E=Experimental; SBSMAEP =School Based Self-Management Asthma Education Program; BAM=Basic Asthma Management; SMAEP= Self-Management Asthma Education Program; Ab=School Absences; UHCV=Unscheduled Healthcare Visit for Asthma; EDV=Emergency Department Visits; PCP=Primary Care Provider; AEP=Asthma Educ. Program; HS=High School; AA=African American; NS=No Significance; NA=Not Applicable

Table 10

Recommendations & Corresponding Level of Evidence and Quality Grade

Recommendations	Reference in Support of Recommendation	Rationale	Evidence Level & Quality Grade
Statement 1 A self-management asthma education program for students with asthma to improve proper asthma management and school attendance.	Ahmad et al. (2011).	Findings suggest statistically significant reduced number of school absences reported post asthma education program.	4b
	Bruzzese et al (2011).	Findings suggest statistically significant reduction in unscheduled health care visits related to asthma as well and less school absences due to asthma symptoms.	2a
	Cicutto et al (2013).	Findings suggest statistically significant reduction in absences and unscheduled health care visits related to asthma.	2a
	Guevara et al (2003).	Findings suggest statistically significant reduction in absences and unscheduled health care visits related to asthma.	1b
	Joseph et al (2013).	Findings not statistically significant, which could be related to sample size, but suggest a reduction in school absences.	2b
	Wolf et al (2002).	Findings suggest less school absences and ED visits from asthma	1b
Statement 2 A self-management asthma education program for students with asthma to improve proper asthma management and decrease asthma related ER visits and hospital admissions.	Boyd et al (2009).	Findings suggest statistically significant reduction in ER visits and hospitalizations related to asthma.	1b
	Bruzzese et al (2011).	Findings suggest statistically significant unscheduled health care visits related to asthma as well and less school absences due to asthma symptoms.	2a
	Cicutto et al (2013).	Findings suggest statistically significant reduction in absences and unscheduled health care visits related to asthma.	2a
	Guevara et al (2003).	Findings suggest statistically significant reduction in absences and unscheduled health care visits related to asthma.	1b
	Wolf, et al (2002)	Findings suggest less school absences and ED visits related to asthma.	1b

Table 11

Strength of Recommendations

Recommendation	Strength of Evidence for Recommendation	References in Support of Recommendation
Statement 1 It is strongly recommended that school nurses provide a self-management asthma education program for students with asthma to improve proper asthma management and school attendance.	Based on the "high" grade of the body of evidence (CCHMC, 2012) supporting statement 1, implementation of a self-management asthma education program at school to children with asthma is recommended to decrease school absenteeism.	Ahmad et al. (2011). Bruzzese et al. (2011). Cicutto et al. (2013). Guevara et al (2003). Joseph et al (2013). Wolf et al (2002).
Statement 2 It is strongly recommended that school nurses provide a self-management asthma education for students with asthma to improve proper asthma management and decrease asthma related emergency room visits and hospital admissions.	Based on the "high" grade of the body of evidence (CCHMC, 2012) supporting statement 2, implementation of a self-management asthma education program at school to children with asthma is recommended to decrease asthma related emergency room visits and hospital admissions.	Boyd et al. (2009). Bruzzese et al. (2011). Cicutto et al. (2013). Guevara et al (2003). Joseph et al (2013). Wolf et al (2002).

in the field and consider practical clinical experience and feasibility when designing evidence based practice programs. Consideration should also be given to the patient and their families regarding their beliefs and abiltiy to carry out a reccommendation prior to implementation.

Internal Evidence/Clinical Expertise for Recommendations

Throughout the school year, it is common for a school nurse to make multiple parent/guardian contacts in an attempt to secure asthma management items that can be kept at school for the child such as rescue inhalers, spacers, and asthma action plans.

Despite these attempts, school nurses often find many of these students still lacking rescue inhalers, spacers, and important asthma action plans. Those students with rescue inhalers available to them at the school often lack the correct skill of administering their rescue inhaler and coordinating it with the use of the spacer. This finding is often revealed to the school nurse when the child visits the school clinic complaining of shortness of breath or other breathing difficulties during the school day. The school nurse frequently sees students that teachers send to the school clinic as a result of sitting out of physical education class from asthma symptoms, falling asleep in class as a result of nighttime coughing, or who have frequent attendance issues related to asthma symptoms. All of these findings are concerning and have the potential to adversely impact asthma exacerbations thus leading to school absences, emergency department visits or hospital admissions. In addition to managing the acute asthma episodes, school nurses seize these acute times to educate students at the point of care about asthma management. The timing of this education is not ideal; thus, the student does not reach the full benefit of a more planned and structured comprehensive self-management asthma education program, however every touch point is utilized to try and educate students to improve their health outcomes.

Patient Preferences & Values for Recommendations

Parents of children at a local pediatric hospital consistently report absences from their employers when their child is home or hospitalized due to asthma symptoms. Others report their child does not participate in physical activity as frequently because it triggers asthma symptoms. One parent reported their child had so many asthma related school absences that “home schooling” was being considered so the parent could go to

work and leave the child at home rather than be called by the school to pick them up. Parents frequently voiced concerns about the fear of losing their job if they take more time off work. Children are able to help manage their health care and it is important for them to start to become active participants in the process. A comprehensive self-management asthma education program at school is an ideal setting for children to continue to learn about how to manage their potentially life threatening chronic condition. Having asthma education in a group setting allows students with asthma to see they are not alone and share something in common with their peers. Coffman et al. (2009) conducted a review of the literature and examined if school based asthma education programs compared to provider delivered asthma education programs were more effective. Of the 25 studies reviewed by Coffman et al. (2009), those asthma education programs delivered in schools among student peers had improved knowledge, self-efficacy, and self-management behaviors related to asthma (Coffman et al., 2009).

Recommendations for Practice Change

Comprehensive self-management asthma education programs delivered in the school environment are an optimal place for children with asthma to learn. These kinds of programs such as Open Airways for Schools are tailored for students to receive training while at school where they spend many of their waking hours (Cicutto et al., 2014). Open Airways for Schools and similar comprehensive self-management asthma education programs have related outcomes that include improved school attendance (Ahmad & Grimes, 2011; Bruzzese et al., 2011; Cicutto et al., 2013; Guevara et al., 2003; Joseph et al., 2013; & Wolf et al., 2002) and decreased hospital or primary care provider use (Boyd et al, 2009; Bruzzese et al., 2011; Cicutto et al., 2013; Guevara et al., 2003;

Joseph et al., 2013; & Wolf et al., 2002) for acute asthma episodes. The strength of evidence for recommending a comprehensive self-management asthma education program within the school setting is high and justifies a change in practice. In addition to the Open Airways for Schools implementation, the educator demonstrated proper administration of a rescue inhaler with a spacer, followed by a student demonstration, followed by re-education if the student misses any steps in the process.

Asthma self-management programs previously reviewed had common themes of asthma knowledge acquisition, asthma self-management strategies, proper medication management, and self-care (Ahmed and Grimes, 2011; Boyd et al., 2009; Bruzzese et al., 2011; Cicutto et al., 2013; Guerva et al., 2003; Wolf et al., 2002). These topics threaded throughout other asthma self-management education programs were similar in terms of topics taught in the Open Airways for Schools program. The Open Airways for Schools program focuses on asthma basics, asthma self-management, asthma symptom recognition, how to use asthma medications properly, how to avoid asthma triggers, the importance of daily exercise, and positive school performance (American Lung Association [ALA], 2016).

Open Airways for Schools is recommended by the National Association of School Nurses and is endorsed by the Center for Disease Control (ALA, 2016.). Evans et al., (1987) suggests that students with asthma who took part in the Open Airways for Schools program may have increased asthma self-management skills, and increased self-efficacy. Further, less asthma symptom days were reported and asthma self-management actions were increased after the Open Airways for Schools program was completed (Evans et al., 1987).

III. IMPLEMENTATION

Project Setting/Population

While asthma affects all genders, ages, race/ethnicity and socioeconomic levels, certain groups are far more disadvantaged than others. Blacks receive an asthma diagnosis far more often at 22.4% compared to Caucasians at 13.3%, Hispanics at 13.4% and Asians at 7.9% (BRFSS, 2008; DCH, 2016). African American children have a 260 percent higher Emergency Room visit rate and a 250 percent higher hospitalization rate from asthma compared to Caucasian children (USDHHS, 2013). According to the Public Health Dayton and Montgomery County (PHDMC), those within the poverty income level were more likely to receive a diagnosis of asthma than those above the poverty income level (2014). Montgomery county ranked 70th out of 88 counties in Ohio for health outcomes; specific to children in Montgomery county compared to Ohio, 29% lived in poverty compared to 23% in Ohio, and 43% were eligible for free and reduced lunches at school compared to 38% (County Health Ranking & Roadmaps, 2015). Within the DPS District, the majority of children are black, 14% have a diagnosis of asthma, and are eligible to receive free and reduced lunch (BRFSS, 2008; DCH, 2016).

The setting chosen to implement this evidenced based practice project was within the Dayton Public School (DPS) District across seven of the seventeen urban elementary schools. It is important to note that all seventeen of the elementary schools participated and received the self-management asthma education; however, only seven schools were led and evaluated by the EBPP-AL.

Children in grades two through five identified by the school nurse with either "parent identified" asthma or "health care provider diagnosed" asthma were invited to participate during the school day in the self-management asthma education program titled Open Airways for Schools. Initially, the School Health Director projected about 10 children from each school or approximately 70 students total across the seven schools would participate based on the previous pilot year attendance at the other schools. See Appendix D for Agency Permission for Conducting Doctoral Project.

Implementation Plan

Prior to implementing the evidenced based practice project, many steps were taken to ensure it evolved as planned which included but was not limited to identifying stakeholders, team members, possible barriers and factors that facilitated the process leading to a successful practice change (Larrabee, 2009; Melnyk & Fineout-Overholt, 2015). Many of these steps occurred simultaneously and some steps required revisits during the planning and implementation stages just as The Model for Evidence-Based Practice Change (Larrabee, 2009) purports.

Stakeholders, Barriers and Facilitating Factors. Melnyk & Fineout-Overholt (2015) indicate it is essential to perform an organizational assessment and identify barriers than can be mitigated to increase the likelihood of a successful practice change. Larrabee (2009) also indicates communication with the stakeholders as essential and the need to provide assessments of the outcomes, costs, and the process throughout the project. This evidence based practice project included many stakeholders over a variety of agencies including schools, health care providers, insurance companies, and local universities. Table 12 identifies the facilitating factors and stakeholders involved in this

evidence based practice project that were supportive of implementing the comprehensive self-management asthma education program named Open Airways for Schools.

Table 13 reveals the barriers and stakeholders considered a potential impedance to implementing the comprehensive self-management asthma education program. Strategies to mitigate these barriers are included. It was important to include team members in the planning and implementation process as they may be able to identify gaps that could be considered.

Team members and roles. Team members were identified for the evidenced based practice project and roles were clearly defined. Table 14 depicts all the team members involved in implementing the comprehensive self-management asthma education program.

Outcomes measures

A number of outcomes were used to measure the success of the evidence based practice project. These outcomes were closely tied to the cACT scores, the Rescue Inhaler Skills Checklist (RISC) scores, Open Airways for Schools session attendance, school attendance, emergency department visits, and hospital admissions. Outcomes and measurements for evaluation are shown in Table 15.

Readiness for Change

The DPS District was selected as one of twelve school districts across the United States to participate in Cohort 3 of the American Academy of Pediatrics (AAP) Training, Education, Assistance, and Mentorship (TEAMS) Program. The AAP received funding

Table 12

Stakeholders for Implementing Open Airways in Schools

Anticipated Facilitators & Stakeholders	Aid in Project Implementation
Facilitators related to guardian/parent, child, and home environment:	
• Up to date knowledge, skills, and behaviors on asthma management. • Adherence to regularly scheduled and emergency asthma medication regime • Knowledge of and avoidance of asthma exacerbation triggers • Home is an asthma friendly environment. • Access to primary care provider and/or pulmonologist • Reliable transportation to access appointments and prescribed medications • Committed to having Asthma managed	• Conducting an assessment of the facilitators related to guardian/parent, child, and home environment will be beneficial in helping to meet families and children where they are at in asthma management. Those areas where deficits are noted can be further stressed in the educational process.
Facilitators related to school nurses, school unlicensed assistive personnel, school administration, teachers, bus drivers, other school employees, facility environment, local university:	
• Up to date knowledge and skills regarding asthma management.	• Conducting an assessment will be beneficial in understanding what areas need further education.
• Licensed School Nurses as program manager.	• Licensed SN can be a liaison between HCPs, school personnel, families, and university.
• Access to emergency asthma medication and adherence to prescribed usage.	• Emergency medication on hand integral to managing asthma exacerbation.
• Initiate or follow an Asthma Emergency Action Plan.	• Asthma EAP essential to managing asthma exacerbation.

Anticipated Facilitators & Stakeholders	Aid in Project Implementation
• Asthma friendly school environment policies in place.	• Essential to support those with asthma and prevent exacerbations.
• Open access for communication with primary care provider/pulmonologist if needed by school nurse.	• Essential to provide needed treatments and clarify medication/treatment orders.
• Open to further learning regarding Asthma management.	• Essential to helping children in schools.
• Use school time for a structured Asthma management education plan.	• School attendance is compulsory and allows access to children.
• Collaboration with outside agency (Wright State University College of Nursing) to provide consistent Asthma Management education.	• Student: SN ratio is not at the 1:750 level. Partnerships provide education for school students and learning/clinical opportunities for nursing students.
Facilitators related to outside health care providers:	
• Up to date knowledge and skills techniques, and medication management of health care providers (Physicians & NPs) regarding asthma management.	• Up to date knowledge and medication management of Asthma benefits students in the school with asthma.
• Initiate an Asthma Emergency Action Plan (EAP).	• Asthma EAP essential to managing asthma exacerbation.
• Open access for communication with school nurse if needed.	• Essential to provide needed treatments and clarify medication/treatment orders.
Facilitators related to health insurance:	
• Less expenditure for unscheduled office visits, urgent care, emergency room visits, and hospitalizations.	• Health care savings can incentivize community partnerships with schools.

Table 13

Barriers to Implementing Open Airways in Schools

Anticipated Barriers & Stakeholders	Plan to Mitigate or Overcome Barrier
Barriers related to guardian/parent, child, and home environment:	*Include all stakeholders early on in plan to help mitigate potential barriers and gain buy in for the practice change.*
• Lack of up to date knowledge, skills, and technique of guardian and child on Asthma management.	• Conducting assessment to find the gaps in knowledge, skills, and behaviors to meet the family where they are at.
• Lack of adherence to regularly scheduled and emergency asthma medication regime.	• Conducting assessment to find the gaps in knowledge of medication management and why.
• Lack of knowledge of and avoidance of asthma exacerbation triggers by guardian and child.	• Conducting assessment to find the gaps in knowledge of what triggers are and how to avoid.
• Lack of a home that is an asthma friendly environment.	• Conducting assessment to find the gaps in knowledge of what constitutes asthma friendly home and assess for need for resources to implement.
• Lack of child access to primary care provider and/or pulmonologist.	• Assess reasons for lack of HCP and find resources to assist.
• Lack of reliable transportation to access appointments and prescribed medications.	• Assess reasons for lack of transportation and find resources to assist with transportation.
• Unwilling or not committed to Asthma management.	

Anticipated Barriers & Stakeholders	Plan to Mitigate or Overcome Barrier
Facilitators related to school nurses, school unlicensed assistive personnel, school administration, teachers, bus drivers, other school employees, facility environment, local university:	*Include all stakeholders early on in plan to help mitigate potential barriers and gain buy in for the practice change*
• Lack up to date knowledge and skills regarding asthma management.	• Assess those willing to learn up to date asthma management information. Educate others consequences and outcomes of poor asthma management.
• Lack of access to emergency asthma medication and adherence to prescribed usage.	• Assess if parents are not providing medication for school use. Educate about consequences of no medication.
• Lack of an ability to initiate or receive an Asthma Emergency Action Plan.	• Assess if understand importance of EAP and how to make. Educate on outcomes of poor asthma management.
• Lack of an Asthma friendly school environment policy in place.	• Assess if understand importance of Asthma friendly school environment. Educate on topic and assist with school policy
• Lack of access for communication with primary care provider/pulmonologist if needed by school nurse.	• Assess the problem with the School Nurse. Give strategies for improvement. (Consent release forms, etc.)
• Lack of willingness for school nurses/school employees to learn further about Asthma management and support program.	• Educate on outcomes of poor asthma management and the liability to the school district if poor outcomes.
• Lack of administrative support to use school time for students with Asthma to participate in the Comprehensive self-management asthma education program.	• Educate on outcomes of poor asthma management and the liability to the school district if poor outcomes. Provide data on absences related to asthma.
• Lack of regular partnership with an outside agency (Wright State Nursing) to provide regular Asthma education.	• Educate on outcomes of poor asthma management and need to reach out to community resources.
• Lack of time allowance for program management.	• Educate on outcomes of poor asthma management and decreased absences as an outcome.

Anticipated Barriers & Stakeholders	Plan to Mitigate or Overcome Barrier
• Conflict with school institutional goals (educational vs. medical)	• Educate on outcomes of poor asthma management and decreased absences as an outcome and less opportunity for learning if not well or have asthma symptoms
Barriers related to outside health care providers:	*Include all stakeholders early on in plan to help mitigate potential barriers and gain buy in for the practice change*
• Lack of up to date knowledge, skills, techniques, and medication management of health care providers (Physicians & NPs) regarding asthma management.	• Assess if medical management being provided
• Lack of ability or resources to initiate an Asthma Emergency Action Plan.	• Assess if parents are not providing medication for school use. Educate about consequences of no medication
• Lack of willingness to openly communicate with a school nurse if needed.	• Establish relationships and assess what is needed to freely communicate regarding treatment needed.
Barriers related to health insurance:	*Include all stakeholders early on in plan to help mitigate potential barriers and gain buy in for the practice change*
• Possible expenditures for transportation for guardians to Asthma Management Education in School	• Educate on outcomes of poor asthma management and consequences and conversely on less health visits reacted to asthma if asthma education in schools.

Table 14

Open Airways for Schools Team

Team Member	**Role**	**Organizations**
Jeanie M. Bochenek; Evidenced Based Practice Project-Academic Liaison	-Create and lead evidence-based practice project -Train on eSchool -Create & manage use of data collection reports & tools -Train on Open Airways Program -Schedule Open Airways training for nursing students -Orient school nurses on role of nursing students for EBP project -Orient nursing faculty and students on role for EBP project -Ensure smooth transition of EBP change -Trouble shoot possible issues & problem solve -Collect & analyze data, disseminate results -Support Open Airways Team	WSU
Virginia Noe; Director; School Health	-Support Open Airways Team -Provide Administrative Support	DPS
Respiratory Therapist	Provide Open Airways training	DCH
Asst. Superintendent	-Provide Admin. Support for Open Airways	DPS
School Nurses	-Complete Open Airway Training. -Building contact person for parent and student. -Identify Asthma students -Give parent EBP project forms and consent -Provide contact with parent for PCP follow up on medications, and asthma action plans -Enter findings into eSchool database. -Emphasize PCP f/u with parents	DPS

Team Member	Role	Organizations
Building Principal	-Administrative Support –Support Open Airways team	DPS
Nursing Faculty	-Supervise nursing student in their role -Complete Open Airway Training -Assist student in completing role	WSU
Nursing Students	-Complete Open Airway Training -Obtain cACT and RISC scores -Provide Open Airway Education to identified asthma students -Provide contact with parent for PCP follow up on medications, orders, and asthma action plans -Collect findings on data collection sheets and give to school nurses for data entry into eSchool database or document in e-School	WSU
Students w/ asthma	Complete Open Airway Training.	DPS/Home
Parents	-Complete F/u with PCP, provide Asthma Action Plans, Medication orders, and medications to school	DPS/Home
Primary Care Provider	-Provide AAPs, and medication orders to parents for schools. -Communicate with school nurses.	Community Health Setting

from the CDC. Each school district was able to determine their project based upon a Health Services Needs Assessment. DPS compiled a team consisting of the state school nurse consultant for the Ohio Department of Health (ODH), Healthy Lifestyle's Supervisor, from Dayton Montgomery County Public Health (DMCPH), and the Medical Director and School Health Services Director from DPS District. In November 2014, the

Table 15

Outcomes & Measurements

Topic	Measure Type	Measure	Code	Variable	How/What to Measure
DEM1	Process	Grade	*DGRADE*	*#*	*Collect via eSchool database*
DEM2	Process	Gender	*DGEN*	*1=Female* *2=Male*	*Collect via eSchool database*
DEM3	Process	Ethnicity/Race	*DETH*	*1=Black* *2=White* *3=Other*	*Collect via eSchool database*
AEP1	Process	cACT-Pre	*cACT-Pre*	*1=20 or +* *2= 19 or <*	*Complete & collect via eSchool*
AEP2	Outcome	cACT-Post	*cACT-post*	*1=20 or +* *2= 19 or <*	*Complete & collect via eSchool*
AEP3	Process	Rescue Inhaler usage correctness-Pre	*AIU-pre*	*1=Yes* *2=No*	*Complete & collect via eSchool*
AEP4	Outcome	Rescue inhaler usage correctness-Post	*AIU-post*	*1=Yes* *2=No*	*Complete & collect via eSchool*
AEP5	Process	Asthma Action Plan at school	*AAP-pre*	*1=Yes* *2=No*	*Collect via eSchool database*
AEP6	Process	Parent Asthma Questionnaire	*PQ*	*1=Yes* *2=No*	*Collect via eSchool database*

Topic	Measure Type	Measure	Code	Variable	How/What to Measure
AEP7	Process	Rescue inhaler at school	*RI*	*1=Yes* *2=No*	*Collect via eSchool database*
AEP8	Process	Spacer at school	*SP*	*1=Yes* *2=No*	*Collect via eSchool database*
AEP9	Outcome	Rescue inhaler for acute asthma care	*RI-AC*	*#*	*Collect via eSchool database*
AEP10	Outcome	Rescue inhaler for preventive asthma care	*RI-PC*	*#*	*Collect via eSchool database*
AEP11	Outcome	School absences-pre	*Ab-pre*	*#*	*Collect via eSchool database*
AEP12	Outcome	School absences-post	*Ab-post*	*#*	*Collect via eSchool database*
AEP13	Outcomes	Asthma 9-11 calls-pre	*9-11-pre*	*1=Yes* *2=No*	*Collect via eSchool database*
AEP14	Outcomes	Asthma 9-11 calls-post	*9-11-post*	*1=Yes* *2=No*	*Collect via eSchool database*
AEP15	Outcome	Clinic visit for acute asthma care	*CVAA*	*#*	*Collect via eSchool database*
AEP16	Outcome	Clinic visit for preventive asthma care	*CVPV*	*#*	*Collect via eSchool database*
AEP 17	Outcome	Clinic visit for asthma teaching	*CVAT*	*#*	*Collect via eSchool database*

team identified that a comprehensive asthma management program was needed to meet the needs of children with asthma in DPS.

Other community stakeholders became involved in January 2015 to develop a plan to implement a comprehensive asthma self-management education program. In fall 2015, a pilot project was unveiled and included asthma education to five elementary schools in the district. A readiness for embracing practice change and moving forward with the evidence based practice project was evident from the DPS District and the community partners.

Support and readiness for change is evident from the organizations impacted by the problems associated with poor asthma management. In response to the increase level of care required for uncontrolled asthma via 9-11 calls, emergency department visits, or hospitalizations, other organizations in conjunction with the DPS District such as Dayton Children's Hospital (DCH), Care Source, Public Health-Dayton Montgomery County, Wright State University, and PBS-Think TV formed the Dayton Asthma Alliance (DAA) to collectively impact and improve the management and outcomes of children with asthma in the Dayton area. The DAA is an example of shared collaborative efforts to tackle an identified health issue and provide evidence based practice to support improved outcomes which is in line with the vision developed by the Institute of Medicine: Roundtable on Evidenced Based Medicine (IOM, 2009). The DAA was formed during fall 2015 which coincided with the launch of the pilot project at DPS, when the EBPP-AL approached DPS District about implementing the comprehensive self-management asthma education program and when the EBPP-AL joined newly formed DAA.

The present school-based educational intervention plus additional supporting interventions were implemented to all 17 of the elementary schools in fall 2016 with seven of these schools having the outcomes measured and evaluated by the EBPP-AL. A readiness for embracing practice change and moving forward with the evidence based practice project was evident from the school district and the community partners.

Methods

Many steps and planning occurred prior to Fall 2016 in order to implement and evaluate the evidence based practice project design to be a comprehensive asthma self-management program, which included Open Airways for Schools curriculum. During Spring and Summer 2016, the Director of Health Services with the DPS District, the lead asthma pilot nurse, the lead information technology nurse and the EBPP-AL convened regularly and updated the e-School database so all school nurses could document asthma care, asthma interventions, and asthma outcomes in the same way for all student asthma encounters across the district. The team also developed the Rescue Inhaler Skills Checklist (RISC). The RISC allowed school nurses to have consistency with measurement of the students' skill level with use of their rescue inhaler. The current DPS Parent Asthma Questionnaire was updated to reflect additional questions that would be helpful in caring for a child with asthma including who their primary care provider was. The Director of Health Services developed a PowerPoint teaching tool for the school nurses with e-School updates that explained the new codes and documentation process for students with asthma encounters. All team members reviewed this PowerPoint and gave feedback so that it was inclusive of the comprehensive asthma self- management program. In addition, the EBPP-AL developed several project documents including, a

PowerPoint teaching tool for the school nurses, student nurses and nursing faculty that gave the step-by-step process for the evidenced based practice project and each member's role. A further document created was an asthma code sheet for encounters, treatment and outcomes to be used by the school nurses as a quick reference sheet if needed so that all school nurses would be documenting the same way in eSchool. An explanation sheet for parents explaining the Open Airways for Schools program and an Open Airways for Schools parent consent form was created. Solicitation and approval for permission to use the cACT was obtained prior to the project implementation. A data collection-coding sheet was created from the outcomes found in Table 15, for use by the EBPP-AL for the purposes of collecting outcome data from the e-School database that could be transferred into a password protected Microsoft EXCEL spreadsheet.

All school nurses, nursing students, nursing faculty, the School Health Director and the EBPP-AL participated in an all-day Open Airways for Schools Train the Trainer program taught by a Respiratory Therapist at DCH. Prior to the training sessions, the EBPP-AL assembled all of the learning packets for the attendees and developed the Open Airway bags that were distributed to all of the schools so the materials were available for all of the asthma students.

The school nurses were briefed on the evidence based practice project, the new documentation changes in e-School, the need to talk to the principal to secure rooms and times for the asthma education sessions, and were given the data tracking sheet to record outcome data if they were not able to document immediately into e-School. The student nurses and nursing faculty from Wright State University (WSU) were also briefed on the evidence based practice project, what to document in e-School, and were given the option

to document on the data tacking sheet if they were not able to document immediately into e-School. Documentation in e-School was also dependent on the school nurses and their choice whether to delegate documentation to the student nurses. The student nurses started the Open Airways for Schools program one week after the Open Airways for Schools Train the Trainer program was completed. All school nurses, student nurses and nursing faculty were given the PowerPoints which allowed their roles and project information to be reference later if needed.

Once school started, the school nurses in the seven elementary schools identified students with asthma in grades 2-5 as either "parent identified" or "physician diagnosed" asthma by running a report in e-School which identified students already coded in e-School from the previous school year as having one of these categories of asthma. Students not yet identified with asthma, or who were new to the school district were then classified with asthma once the parent turned in the completed emergency medical information sheet which gives the parent the opportunity to list any medical conditions. The school nurse then updated the child's record in e-School for any of these additional students identified with asthma. All of the students in grades 2 through 5 with asthma were then invited by the school nurse to participate in the Open Airways for Schools program and an Evidence Based Practice Program packet was distributed for the parents to review. The Evidence Based Practice Program packet an Open Airways Explanation/Information Sheet, the Open Airways for Schools parent consent form, the cACT, the Parent Asthma Questionnaire, an Asthma Action Plan (that could be used), and a medication order form for the health care provider to complete if the child had a rescue inhaler to be used. In order for the invited child to participate in the Open

Airways for Schools program, the parent had to sign and return the Open Airways for School parent consent form. The other forms in the packet were also highly encouraged to complete and return, however they were not mandatory in order for the child to participate. All students who returned the Open Airways for School parent consent form were then coded in e-School by the school nurse as "ASPRO" for easy identification.

Some students and their parents completed and returned the cACT. The cACT scores were entered into the e-School database. Students bringing a rescue inhaler and medication order to the school clinic completed a RISC and either the school nurse or the student nurse scored them accordingly. Information collected from RISC occurred prior to the students' receiving the inhaler administration lesson in the Open Airways for Schools program. Both the school nurses and the student nurses were taught by the EBPP-AL how to score the RISC. Students with asthma attended their weekly Open Airways for Schools program sessions taught by WSU student nurses. The sessions took place over five weeks, with one session a week lasting approximately 40 minutes during the school day. In addition to teaching the students with asthma, some nursing students in conjunction with the school nurses followed up with the parents/guardians and primary care providers to assist the school nurse by contacting parents and reminding them to provide rescue inhalers with spacers, medication orders, asthma action plans, and parent asthma questionnaires. Depending on the school nurse, some nursing students were able to assist by documenting Open Airways attendance, new forms obtained, and any cACT or RISC scores in e-School. Again, other activities beyond the teaching the Open Airways for Schools program was very dependent of the school nurse and what they delegated to the student nurse.

Throughout the 5-week time period when the Open Airways for Schools program was taught, the EBPP-AL made weekly visits and sat in on some of the Open Airways for Schools sessions, checked in with each of the school nurses and the student nurses to answer any questions or provide support. The EBPP-AL provided additional incentives above the stickers that were made available by the American Lung Association to the students with asthma. These additional incentives purchased by the EBPP-AL included stickers, pencils, erasers, cartoon tattoos stickers, notepads, small stuffed toys, small goodie bags with a healthy treat and school supply, and certificates of completion. As a small token of appreciation for taking on the additional time required for the implementation of the evidence based practice projective, the EBPP-AL provided flowers upon the rollout, and chocolate midway to the school nurses. School nurses and the nursing students were also encouraged to incentivize the children for good behavior and compliance in returning forms which was left up to the individual school nurse and student nurses. Students were all presented with a certificate of completion on the last day of the Open Airways for Schools sessions. All parents were invited to attend a parent night where they received information about what their child learned in the Open Airway for Schools program and were offered additional resources by the Respiratory Therapist and the Community Health worker from DCH. Within four weeks after completion of the Open Airways for Schools program, the cACT and RISC scores were repeated by the EBPP-AL on any student who had previous scores reported in e-School prior to the program inception. Students who did not have a previous cACT or RISC score reported were not scored following program completion. Table 16 presents an overview of the intervention.

Table 16

Overview of Self-Management Asthma Education Intervention Open Airways for Schools

Intervention	**Population**	**Setting**	**Team Members**	**Stakeholders**	**Barriers**	**Facilitators**
Open Airways: for Schools self-management asthma education program weekly for 5 weeks -40 minute sessions.	Elementary age children grades 2-5 with parent report or physician diagnosed asthma (mainly black)	-Seven Elem Schools -Inner City (free & reduced lunch)	-EBPP-AL -School Nurses -School Admin -Teachers -PCP's -Nursing Students -Nursing Faculty -Students -Parents	-EBPP-AL -School Nurses -School Admin -Teachers -School Secretaries -HS Students -Parents -PCP's -Nursing Students -Nursing Faculty -EMS -Medicaid & Insurance Co. -Hospitals, ED, Urgent care, Primary Care Provider offices, Clinics -Ohio Association of School Nurses	-Time to implement -Time out of class -HIPAA & FERPA -Multiple care settings (School, Medical) -SN to student ratio -PCP support -Access to prescribed medications -Parent permission obtained -Obtaining contact with parent for f/u questions, AAP, and medications.	-Convenient location for students -Familiar setting -Nursing clinical site -Increased school & work attendance -Increased school performance -Less health care utilization -Reimbursement tied Affordable Care Act mandates -IOM charging EBP interventions by 2020

Instruments

The cACT is an instrument by Glasgow that assesses children ages 4-11 years old regarding their individual asthma symptoms over the past 4 weeks and how well controlled their asthma is (Liu, et al., 2007). The cACT instrument uses seven questions on a Likert scale that uses both words and pictures of a face that correspond with each other. The child answers the first four questions, and the parent/guardian answers the last three questions. This tool assesses the ability of the child to play, sleep, or complete certain activities without any asthma symptoms or the ability to sleep at night due to coughing. The score range is zero signifying poor asthma control to 27 indicating complete asthma control (Liu, et al., 2007). Those individuals with a score of 20 or greater are considered to have their asthma controlled; whereas, those with a score of 19 or less are identified as not controlled asthma (Alzahrani & Becker, 2016). Data were collected from the cACT at the beginning of the intervention and then four weeks after the intervention of the asthma education. See Appendix G for the cACT and permission to use the test. In order to measure the effect of the intervention, it is important to define the measurement outcomes as well as determine the validity and reliability of the tools or instruments used (Brewer & Alexandrov, 2015). The cACT was found to be reliable with good test-retest reliability demonstrating equivalency of patient asthma control from the cACT score when compared to that scored by a specialist (Chen, Wang, Jan, Liu, & Liu, 2008). Further, internal consistency noting reliability of the cACT was found to be good with a Cronbach score of 0.79 (Liu, et al. 2007). The validity of the cACT has been widely validated with several tools and low cACT scores correlate with patients classified with poorly controlled asthma (Liu, et al., 2007).

The asthma project team developed the RISC checklist (Appendix H). The RISC has no measures of reliability; however, the tool was developed by a panel of expert asthma professionals. The RISC check list has one initial item pertaining to the student's ability to "correctly prime and clean their inhaler and or spacer" and would receive either a "0" (if inaccurately completed) or a "1" (if accurately completed). The checklist was then further divided into three categories for the type of inhaler equipment a student might use which included, "rescue inhaler without spacer," "rescue inhaler with spacer and mask" and "rescue inhaler with spacer." Each category contained five items that were assessed and given a score of "0" (if inaccurately completed) or a "1" (if accurately completed) for a potential summed score ranging from 0 to 6. Students with rescue inhalers available at school completed the RISC, by demonstrating their ability to use their inhaler correctly. School nurses, student nurses, and the EBPP-AL were trained on how to use the RISC and each observed a student and rated their score according to a specified rubric. Inter-rater reliability between observers was not determined. Students missing steps on the RISC, had immediate remediation upon the completion of their demonstration of how to use the inhaler. The RISC score was summed by the EBPP-AL again 4 weeks after the completion of the Open Airway for School.

Other instruments used primarily to gather specific information about the child's asthma or how to manage their asthma was the Asthma Action Plan, which the child's health care provider is responsible for completing, and the Parent Asthma Questionnaire, which the parent completes. These were not required; however, it is helpful to have this information as it informs the school nurse about the severity of the child's asthma and the

established asthma management plan. The Parent Asthma Questionnaire and the Asthma Action Plan is shown in Appendix I & J.

Institutional Review Board

The evidenced based practice project described above was submitted to the Institutional Review Board at the DCH in Dayton Ohio where it was reviewed to ensure ethical concerns were considered and addressed accordingly. Evidenced based practice projects differ from research in that a project demonstrates the implementation of the best available evidence supporting best practice into the clinical setting (Melnyk & Fineout-Overholt, 2015). The IRB safeguards subjects participating in the evidenced based practice project to ensure their privacy and protect them from any potential physical or mental harm. This evidence based practice project was determined by the IRB at DCH to be a Quality Improvement Project. (See Appendix J).

Based on the recommendations of the IRB at DCH, an Evidence Based Practice package was given to all students invited to participate. This packet included the following: detailed information that outlined the evidence based practice project, EBPP-AL contact information for the parent/guardian, a parent consent form (See Appendix K) for the child to participate in the evidence based practice project, a Parent Asthma Questionnaire, the cACT, an Asthma Action Plan, and a prescription medication form. In order to participate, the consent form required a signature by the parent or guardian and returned to the school. Students participating in the program gave ascent by attending the sessions. No harm was expected from implementing the evidence based practice project.

Under the Family Educational Rights and Privacy Act (FERPA) (United States Department of Education, n.d.) student information was protected in regards to their

asthma condition and the outcomes they achieved in response to the asthma education.

Project Timeline

Table 17 illustrates the timeline used for the evidenced based practice project completed within the DPS District. Certain tasks such as attendance of the Open Airway for Schools Training sessions, asthma case identification and scheduling of meeting spaces occurred either before the new school year or at the very beginning of the school year due to workflow demands of the school nurse.

Economic Considerations

Implementing this evidenced based practice project, relied heavily on coordinating with the school nurses at DPS District and other community partners for personnel resources. WSU provided 15 undergraduate nursing students and 2 nursing faculty affiliated with the Public Health Nursing Course. DCH provided the Open Airway for Schools Training by the Respiratory Therapist and Community Health worker from DCH. DCH sponsored all items needed during the Open Airways for Schools train the trainer day which included the following: folders and copies of the Open Airways for Schools Curriculum, lunches, room space, and the actual training. The American Lung Association provided the Open Airways for Schools learning charts, over-sized story books, bags, and initial incentive stickers for the project implementation. As mentioned above, the EBPP-AL also purchased additional incentives that included stickers, pencils, erasers, cartoon tattoos, notepads, small stuffed toys, small goodie bags with a healthy treat and school supply, student certificates of completion, sunflowers and chocolate.

At the introduction of the evidence based practice project, food was provided on four separate occasions, which included a morning meeting for all of the school nurses in

Table 17

Evidence-Based Practice Timeline of Implementing Open Airways in the Schools

	July 2016	Aug 2016	Sept 2016	Oct 2016	Nov 2016	Dec 2016	Jan 2017	Feb 2017	Mar 2017	April 2017
Proposal defense										
IRB application & approval										
Schedule & Conduct Open Airways training for nursing students										
Case ID students with asthma										
Schedule Open Airways sessions										
Open Airway parent consent										
Asthma questionairre from parent										
Pre-cACT Score										
Pre-RISC Score										
Deliver Open Airways asthma education to K-8 students with asthma.										
Post-cACT Score										
Post-RISC Score										
Data collection										
Data analysis										
Final defense										

the district, and a small work group of school nurses updating the e-School documentation. The other two occasions were days when the student nurses assisting with the project implementation and their faculty held meetings so the student nurses could present their Open Airways for Schools experience with their peers. Additional costs related to this evidence based practice include the services of the consultation with a statistician, which was essential so the project outcomes could be accurately analyzed, and several token gifts of appreciation for those going beyond their normal job responsibilities in supporting the project's success.

It is important to note that in order for sustainability of this project, it will be essential to have the continuing partnership of Wright State University –College of Nursing and Health with the DPS District so the student nurses can continue providing the asthma education program in the school setting. In addition, the partnerships between DCH and the American Lung Association will also be necessary to assure the services of a content expert, a Respiratory Therapist, and the free contribution of teaching supplies/materials by the American Lung Association. Moving forward with this effort requires a detailed cost analysis that considers direct and indirect costs of the program (Melnyk & Feinstein, 2009; Stone, Curran, & Bakken, 2002) as well as the project outcomes related to the program. Table 18 & 19 display unmeasurable and measurable costs related to this project.

Table 18

Economic considerations for Open Airways for Schools

Direct & Indirect Costs	Return on Investment	Cost Figures
Open Airway Training School Staff -Time for planning the Open Airway Training for school nurses, school staff, and nursing students -Space for training -Time to educate the Open Airway Training for school nurses, school staff, and nursing students -Time allowance for school nurses and school staff to be educated. -Costs for paper and printing	-Decrease in number of asthma related deaths in schools with asthma identified students -Decrease in number of Emergency Medical Systems (EMS) activations in relation to asthma symptoms with asthma identified students -Decrease in number of unscheduled health care provider visits in relation to asthma symptoms (HCP offices, urgent care, emergency room) -Increase in scheduled asthma checkup visits (maintenance-every 90 days)	-Priceless; Unmeasurable -$ Monetary and time gain for the City of Dayton EMS. -$ Monetary gain for acute asthma visits -$ Monetary gain for DPS for student in seat.
Open Airway Training the Educators -Time for planning the Open Airway Training for nursing students -Space for training -Time to educate the Open Airway Training for nursing students -Costs for paper and printing	-Decrease in number of absent days in relation to asthma symptoms with asthma identified students -Decrease in number of asthma symptom days with asthma identified students -Decrease in number of asthma symptom days leading to inability to fully participate in physical education class with asthma identified students	-Gain in instructional and learning time for student -Gain in instructional, learning, and physical activity time for student -Gain in instructional, learning, and physical activity time for student. -$ Monetary gain for DPS for student in seat.
Open Airway Training the Students with Asthma -Time for planning Open Airway Training for students -Space for trainings -Time to educate students during school -Small incentives and certificates for students attending. -Costs for paper and printing	-Increase in number of asthma rescue medications at school (with health care provider and parent/guardian permission) with asthma identified students -Increase in asthma action plans received to school from primary care provider with asthma identified students - Increase communication and rapport with parent/guardian regarding child's asthma -Decrease in number of asthma related deaths in schools with asthma identified	

Table 19

Measureable Costs for Open Airways for Schools

Costs incurred	Specific Items	Actual Cost
Incentives & Products for Students	Stickers, pencils, erasers, cartoon tattoos stickers, notepads, small stuffed toys, small goodie bags with a healthy treat and school supply, student certificates of completion, additional Portfolio Folders x 50	$ 240
Incentives for Schools Nurses	Sunflowers, ribbon, and chocolate	$ 100
Food		
Evidence based practice roll-out for DPS	Fruit Tray and Assorted Pastry Tray	$ 50
Afternoon work meeting	Fruit Tray and Cheese/Cracker	$ 25
Student Nurse Presentation Day	Fruit and Cheese Tray	$ 40
Statistician		
Statistical Consultant	Data Analysis x 7 hours @ $79/hour	$ 553
Token Gifts of Appreciation		
Director of Health Services	Gift Card	$ 75
Asthma Lead Nurse	Gift Card	$ 20
Technology Lead Nurse	Gift Card	$ 20
Information Technology	Gift Card	$ 20
WSU Course Coordinator	Gift Card	$ 50
WSU Instructor	Gift Card	$ 15
Total		**$1,208**

IV. PROJECT EVALUATION

Throughout the implementation of this evidence based practice project, pre-project implementation data and post-project data were collected as recommended by Larrabee's (2009) Model for Evidence-Based Practice Change for continuous evaluation. Evaluating the outcomes prior to and following the implementation of the Open Airways program allowed the EBPP-AL the opportunity for assessing the processes, outcomes, and costs during the project implementation.

Data Collection

All outcome data collected was saved on a password protected Microsoft EXCEL spreadsheet and stored on an Apricorn Aegis Security Key. Once students in the evidence based practice project were identified and coded as "ASPRO" in the e-School database by the school nurse, the EBPP-AL was able to conduct a retrospective chart review of these specific students to gather initial baseline and project outcome data from the e-School database. Each student marked as "ASPRO" was then assigned a random number so their baseline and post-project outcome data would remain de-identified.

Student specific baseline data was retrieved via e-School by the EBPP-AL which included the child's school name, grade, gender, race, and 2015-2016 quarter 1 and quarter 2 school attendance records. Other specific data points retrieved from e-School were whether or not the student had the following asthma specific items on hand in the

school clinic: a rescue inhaler, spacer for the rescue inhaler, asthma action plan, parent asthma questionnaire, initial cACT and RISC scores. In addition, to student specific data, aggregate baseline data was collected from the previous school year by the EBPP-AL from e-School. Additional baseline data included: student point of care encounters documented by the school nurse that were classified as school clinic visits for acute asthma or preventative asthma, rescue inhaler usage for acute care or preventative care, and any respiratory related 9-11 calls for quarters 1 and 2 of the 2015-2016 school year.

After each of the Open Airways for Schools sessions were completed, student attendance for each session was recorded in e-School. Four weeks after the final Open Airways for Schools session was completed, the EBPP-AL followed up with all students having an initial cACT and/or RISC scores and conducted repeat scoring of the cACT and/or RISC. The cACT and RISC scores and Open Airways for Schools attendance results were recorded in e-School by the school nurse. In cases of when the school nurse was unable to document the results the EBPP-AL was responsible. Once all data was entered into e-School, the EBPP-AL ran an attendance report for the Open Airways for Schools program, the follow up cACT and RISC scores, and the 2016-2017 quarter 1 and quarter 2 school attendance. At this time, the EBPP-AL also collected aggregate data from e-School for the number of point of care encounters documented by the school nurse that were classified as school clinic visits for acute asthma or preventative asthma, rescue inhaler usage for acute care or preventative care, and any respiratory related 9-11 calls for quarters 1 and 2 of the 2016-2017 school year.

On February 7, 2017, the EBPP-AL and Principal Investigator of DCH QI Project #2016-052 and Principal Investigator of DCH QI project #2017-005 requested an

Addendum to Petition for Approval of a Quality Improvement Project with the DCH IRB to be added as co-investigators to each other's respective Quality Improvement Projects "Easy Breathing for Elementary School Children with Asthma at Dayton Public Schools" (DCH QI Project #2016-052) and "The Impact of Community Health Worker Interventions on Pediatric Asthma Control" (DCH QI Project #2017-005). This petition was granted approval by DCH IRB on February 8, 2017 and then again on February 15, 2017 (See Appendix M). The EBP-AL received aggregate de-identified data specifying DCH emergency room visits and hospital admissions up to 30 days before and up to 30 days after completion of the Open Airway for Schools sessions via retrospective chart review. This de-identified aggregate data was placed into the original de-identified password protected EXCEL spreadsheet.

Data Analysis

After the collection of all outcomes, data were placed in a de-identified database in an EXCEL spreadsheet and then exported to the Statistical Package for Social Sciences (SPSS version 23). The statistician was consulted and collaborated with the DNP student in the data analysis. Analysis of descriptive statistics were conducted on the available data and comparisons were analyzed from the baseline data and the post-program education data measuring for statistical or clinical significance.

Results

Demographics. As previously mentioned, the Director of School Health Services projected approximately 70 students or 10 students per school would participate, however, a higher response of 143 students participated in the program. See Figure 2 for the number of students participating in the Open Airways for Schools program by

specified school. Among the seven schools, student participation ranged from 10 to 38 students with School 2 having the majority of participants. The turnout of students participating was higher than projected. Figure 3 depicts the number of students participating in grades 2 through 5 with the majority being in the 3rd grade.

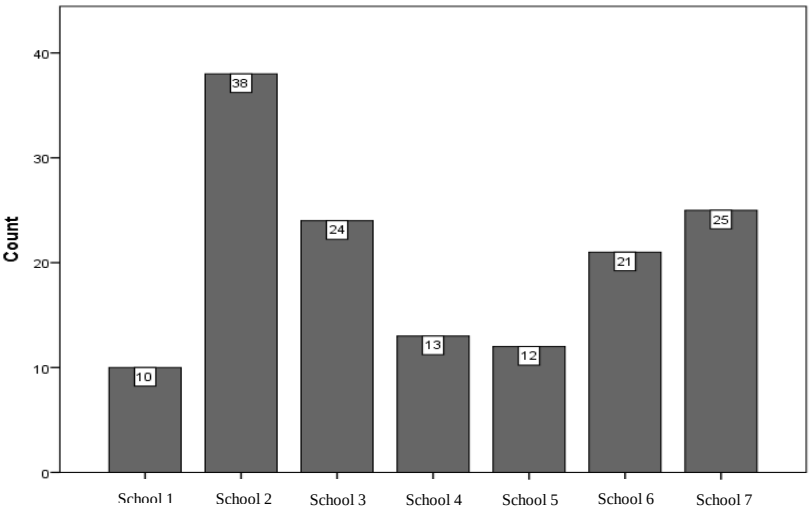

Figure 2: Student Participation by School in Open Airways for Schools

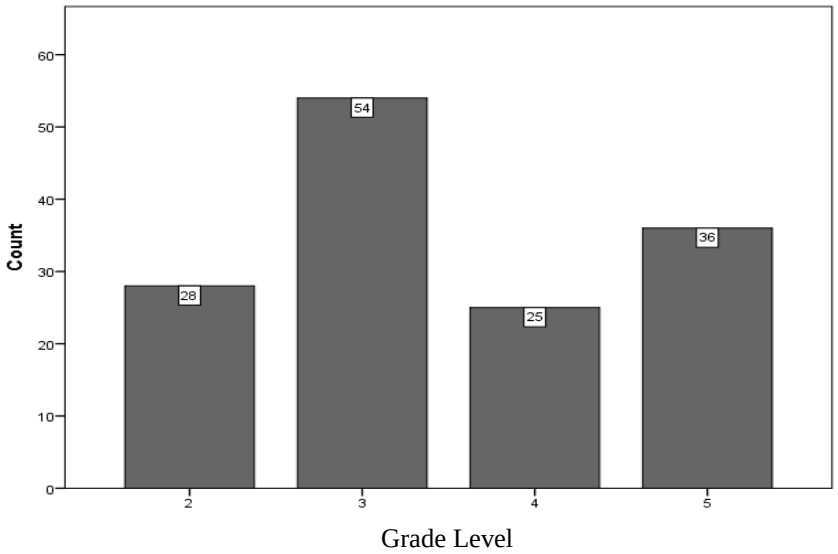

Figure 3: Student Participation by Grade Level

Figure 4 depicts the gender of students who participated in Open Airways for Schools program with greater than 55% being male.

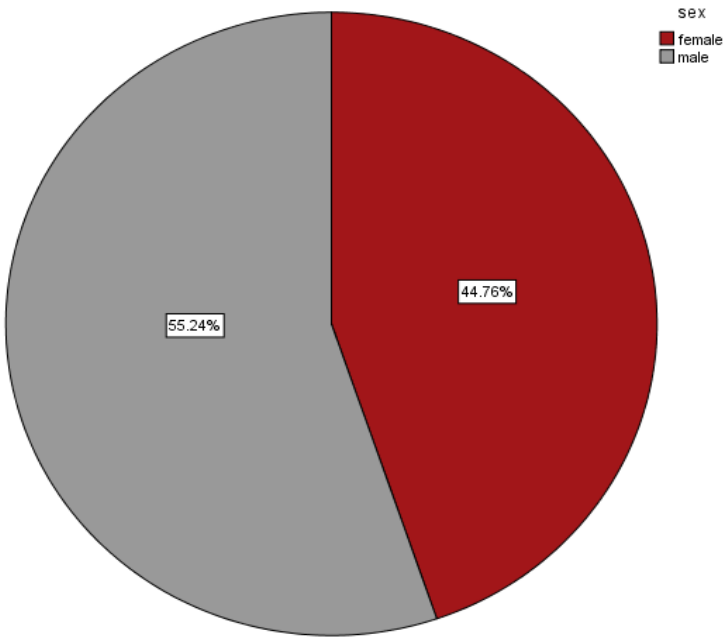

Figure 4: Student Participation by Gender

The majority of students participating in the Open Airways for Schools program were African American as shown in Figure 5.

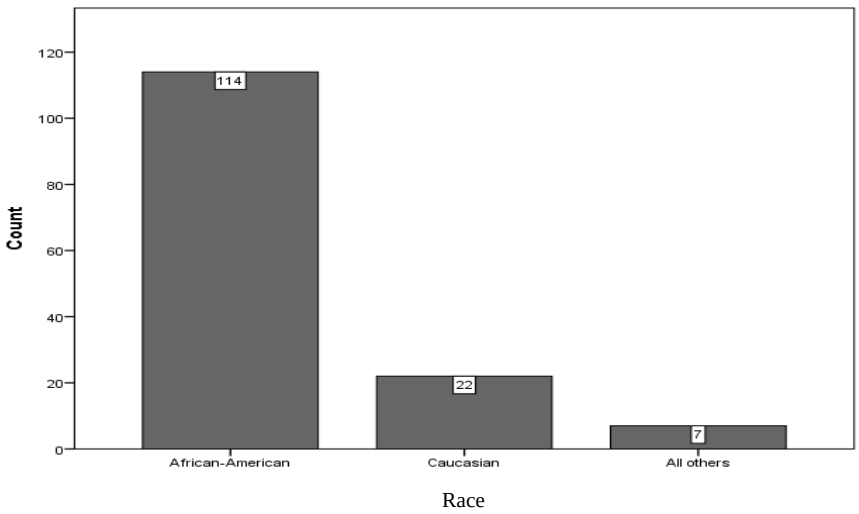

Figure 5: Student Participation by Race

Rescue Inhalers, Spacers, Asthma Action Plans, & Parent Asthma Questionnaires

The frequency of students with rescue inhalers, spacers, asthma action plans, and parent asthma questionnaires received by the school from the parent/guardian during the Open Airway for Schools program is shown in Table 20. Out of 143 students, this table highlights the frequency of crucial tools that assist the school nurse in managing the child's asthma prevention and acute exacerbations during the school day. For example, only six students had an asthma action plan on file, while no students had an available spacer. Both an asthma action plan and use of a spacer with a meter-dosed inhaler are recommended by the National Asthma Education and Prevention Program asthma diagnosis and management guidelines (USDHHS, 2007).

Table 20

Rescue Inhalers, Spacers, Asthma Action Plans, and Parent Asthma Questionnaires at School

Variable		**Frequency**
Rescue inhaler at school	Yes	30
	No	113
Spacer available with inhaler	Yes	0
	No	143
Asthma Action Plan	Yes	6
	No	137
Parent Asthma Questionnaire	Yes	37
	No	106

Childhood Asthma Control Tests & Rescue Inhaler Skills Checklist

Responses on the cACT are summed as an overall score with a range of zero (poorly controlled asthma) to 27 (asthma under control) (Alzahrani & Becker, 2016). Findings from summed scores on the cACT before the start of the Open Airways for Schools program and four weeks after completion of the program revealed that 51

students completed a pre-education program cACT score and 37 students completed a post-education program score. The pre-education mean summed score was 19.86 (*SD*=4.26) and the post-education mean summed score was 20.84 (*SD*=3.52), with the scores ranging from 13 to 29 and 13 to 27 respectively. An Analysis of Variance (ANOVA) was conducted on the 37 students who had both a pre and post education cACT score to determine differences among the means between the pre-program and post-program students. There was no significant difference between cACT scores, $F(1,36) = 1.34$, $p = 0.26$. Thirty-seven students out of 143 students completed both the pre-and post cACT scores for a response rate 26%. The measures of central tendency for cACT scores pre-and post the Open Airways for Schools program are noted in Table 21.

The RISC checklist is an overall summed score that has a range of 0 (poor performance) to 6 (accurate performance). The RISC scores were summed prior to the inhaler lesson in the Open Airways for Schools curriculum and then four weeks following the completion of the program. Thirty students had a pre-education program RISC score completed and 28 students completed a post-education program RISC score. Students who had a rescue inhaler available at the school were scored on the accuracy of their use and maintenance of the inhaler and a score was summed. Prior to the Open Airways for Schools program students had a mean score of 4.13 (*SD*=1.85) out of a possible score of 6, scores ranged from 0 to 6. After completion of the program the mean RISC score was 5.07 (*SD*=0.60) with scores ranging from 4 to 6. An ANOVA was conducted on the 28 students who had both a pre and post education RISC score to determine differences among the means between the pre-program and post-program students. There was a significant difference between RISC scores, $F(1,27) = 7.88$, $p =$

0.009. The measures of central tendency for RISC scores pre-and post the Open Airways for Schools program are noted in Table 21.

Table 21

Summary cACT and RISC Scores

	cACT score Pre	cACT score Post	RISC score Pre	RISC score Post
N	51	37	30	28
Missing	92	106	113	115
Mean	19.86	20.84	4.13	5.07
Median	20.0	21.0	5.0	5.0
SD	4.26	3.52	1.85	0.60
Minimum	13	13	0	4
Maximum	29	27	6	6

Taking a closer look by examining each individual school's cACT and RISC score, as shown in Table 22, there were differences noted in mean scores. Improvement in cACT scores were noted from pre-education to post-education at Schools 2, 6, and 7. While at Schools 1, 3 and 5, the mean summed cACT scores slightly fell. At School 1, prior to the education program their mean cACT score was 16.88 (*SD*=3.18) and a mean of 16.0 (*SD*=1.61) post education. At School 3, prior to the education program their mean cACT score was 22.6 (*SD*=5.09) and a mean of 22.29 (*SD*=3.04) post education. At School 5, the mean cACT score was 20.4 (*SD*=4.16), the mean score dropped to 20 (*SD*=4.24) post education.

RISC scores did not improve as projected at all of the schools from the pre to post education. Actually, the students at School 1 had a mean RISC score of 6 (*SD*=0.0) prior to the education on the four students scored, however the mean fell to 4.75 (*SD*=0.5) post-education and this was later determined to be due to rater error. An ANOVA was repeated removing School 1 on the remaining 24 students who had both a pre and post

education RISC score to determine differences among the means between the pre-program and post-program students. There was a significant difference between RISC scores, $F(1,23) = 14.57$, $p = 0.001$.

Table 22

School Specific CACT and RISC Scores

School		cACT score Pre	cACT score Post	RISC score Pre	RISC score Post
School 1	N	8	3	4	4
	Mean	16.88	16.0	6.0	4.75
	St dev	3.18	3.61	0.00	0.50
	Lowest	13	13	6	4
	Highest	21	20	6	5
School 2	N	2	2	5	4
	Mean	19.5	20.0	4.0	5.5
	St dev	3.54	4.24	1.23	0.58
	Lowest	17	17	2	5
	Highest	22	23	5	6
School 3	N	10	7	4	4
	Mean	22.6	22.29	5.75	4.75
	St dev	5.1	3.04	0.50	0.50
	Lowest	16	19	5	4
	Highest	27	27	6	5
School 4	N	0	0	2	1
	Mean			5.0	5.0
	St dev			0.00	
	Lowest			5	5
	Highest			5	5
School 5	N	5	4	4	4
	Mean	20.40	20.00	2.75	5.0
	St dev	4.16	4.24	2.06	0.82
	Lowest	16	15	1	4
	Highest	26	24	5	6
School 6	N	14	14	7	7
	Mean	19.3	21.43	3.57	5.29
	St dev	3.54	3.25	1.62	0.49
	Lowest	13	13	1	5
	Highest	24	26	5	6
School 7	N	12	7	4	4
	Mean	20.08	21.00	2.75	5.0
	St dev	5.11	3.22	2.63	0.82
	Lowest	13	17	0	4
	Highest	29	25	5	6

Results of the cACT and RISC scores were further analyzed by stratifying the covariates of school grade, individual school, sex, ethnicity and number of sessions attended in the Open Airways for Schools program. By performing an ANCOVA when adding the additional covariates there was a significant difference noted between pre and post education cACT scores $F(1,31) = 4.91$, $p = .034$. However, when performing an ANCOVA with the pre and post education RISC scores, there is no significant difference noted between the pre and post education RISC scores, $F(1, 22) = 0.007$, $p = .93$. However, there was a significant difference noted between pre and post education RISC scores between the individual schools, $F(1,26) = 6.82$, $p = .016$. Due to low effect size, these findings have no meaning to the overall results. Significance is found when the effect size is $r = .30$ or higher. Table 23 summarizes the pre and post comparison of cACT scores with covariates. Table 24 summarizes the pre and post comparison of the RISC scores with covariates.

Table 23

Pre and Post Comparison of cACT Scores with Covariates

Pre and Post with:	p-value	F	df	Effect size	Power
All covariates	.034	4.91	1,31	.137	.574
Grade	.184	1.84	1,35	.056	.260
School	.629	0.24	1,35	.008	.076
Sex	.316	1.04	1,35	.032	.167
Ethnicity	.678	0.18	1,35	.006	.069
Number of OAP sessions	.175	0.93	1,35	.059	.270

OAP-Open Airways for Schools program

Table 24

Pre and Post Comparison of RISC Scores with Covariates

Pre and Post with:	p-value	F	df	Effect size	Power
All covariates	.933	0.01	1,22	.001	.051
Grade	.123	2.58	1,26	.105	.336
School	.016	6.82	1,26	.237	.704
Sex	.827	0.05	1,26	.002	.055
Ethnicity	.764	0.09	1,26	.004	.060
Number of OAP sessions	.678	0.18	1,26	.008	.069

OAP-Open Airways for Schools program

The cACT score was collected prior to the Open Airways for Schools program and then four weeks following completion of the program. For the purpose of determining the need for medical intervention if the cACT score was 19 or less prior to the Open Airways for Schools program the student would be referred for medical intervention due to uncontrolled asthma symptomatology. Prior to the Open Airways for Schools program, 23 students or 16.1% had a cACT score of 19 or less indicating that their asthma was not under good control and a referral to their primary care provider was needed for assessment and management of their asthma symptomatology. Four weeks after completion of the Open Airways for Schools program, the number of students with a cACT score of 19 or less fell to 12 students or 8.4% who required referral to their primary care provider. There was no statistical difference in those children with controlled or uncontrolled asthma based on the pre and post cACT scores χ^2 (1, N = 87) = 1.22, p = .27. However, there was a 52% improvement in those 23 students prior to and following the education program suggesting clinical significance. Table 25 illustrates the

frequency of students prior to the education program with uncontrolled asthma compared to the same students following the Open Airways for Schools program.

In examining cACT Scores obtained by a small subset of students (*n*=37) prior to the Open Airway for Schools program and the same students again four weeks following the program a trend in cACT scores was noted. The scatterplot chart shown in figure 6

Table 25

Control versus not control of cAct Scores

	Pre-education		Post-education	
	Frequency	Percent	Frequency	Percent
cACT ≤ 19 Advise Medical Intervention	23	45.1	12	33
cACT ≥20 No Medical Intervention	28	54.9	24	67
Total	*n* = 51		*n* = 36	

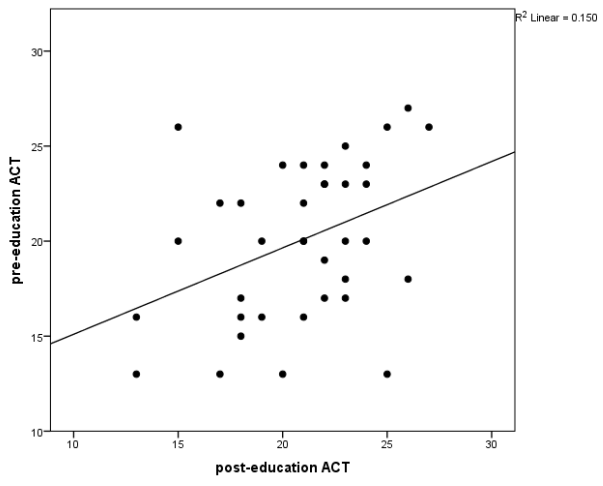

Figure 6. Scatter Plot of Pre and Post Childhood Asthma Control.

illustrates an upward linear line suggesting the positive relationship of those students who originally scored high on the cACT score (controlled asthma) tended to score high on the subsequent cACT score or continued to have well controlled asthma.

Documentation changes made to e-School database were conducted over the summer of 2016. Table 26 illustrates that during the year of 2015-2016 systematic retrieval of acute and preventative school clinic visits and rescue inhalers was not possible resulting in the inability to note any changes prior to the educational program. Since the upgrade to the e-School documentation system, findings related to acute versus preventative school clinic visits, acute versus preventative rescue inhaler usage and calls to 911 were able to be retrieved. As this data continues to be collected overtime the EBP-AL anticipates for those students who participated in the Open Airway for Schools program that preventative clinic visits and preventative rescue inhaler usage will increase with the added knowledge. Likewise, acute clinic visits and acute rescue inhaler use will decrease which may demonstrate a measure of controlled asthma and clinical significance to the Open Airway for Schools program.

Table 26

Acute Versus Preventative Clinic Visits Inhaler Usage, and 911 Calls

Variable	**2015-2016**	**2016-2017**
Acute School Clinic Visits	UTD	55
Preventative School Clinic Visits	UTD	60
Acute Rescue Inhaler Usage	UTD	45
Preventative Rescue Inhaler usage	UTD	20
911 Calls	UTD	0

UTD-Unable to determine

Open Airway Attendance

The Open Airway for Schools program had six lessons with session five and six completed on the same day that resulted in five sessions. Over the course of the program, 142 were enrolled, not counting the one student who was not enrolled into the program during the second quarter. The mean number of sessions that students attended was 4.15 (*SD*=1.06), with 49% of students attended all five sessions.

School Attendance

Student school attendance data from 2015-2016 quarters 1 and 2 was retrospectively collected and compared to attendance data from 2016-2017 quarters 1 and 2 as displayed in Tables 27 and 28. The mean percent of school days attended in quarter 1 of 2015-2016 was 96 (*SD*=5.39) with a range of 77 to 100 percent attendance compared to a mean percent of 94 (*SD*=10) in quarter 1 of 2016-2017 with a range of 90 to 100 percent attendance. When looking at quarter 2, in 2015-2016 the mean percent of school days attended was 95 (SD=6.43) with a range of 70 to 100 percent attendance. And for the second quarter of 2016-2017 the mean percent of school days attended was 95 (SD=8.0) with a range of 62.5 to 100 percent attendance. There are many confounding variables that could affect school attendance therefore, asthma as a single variable affecting school attendance cannot be determined.

Table 27

DPS Quarter 1 Attendance Percentages

	Q1 2015-16	**Q1 2016-17**
N	129	143
Missing	14	0
Mean	96.2088	93.9696
Median	37.730	97.620
Standard deviation	5.38681	9.95213
Minimum	77.27	90.00
Maximum	100	100

Table 28

DPS Quarter 2 Attendance Percentages

	Q2 2015-16	Q2 2016-17
N	131	142
Missing	12	0
Mean	94.9144	92.5086
Median	97.5	94.87
Standard deviation	6.43474	7.97841
Minimum	70.0	62.5
Maximum	100	100

Emergency Department Visits and Hospitalizations

Hospital data indicating asthma related encounters at Dayton Children's Hospital (DCH) from all patients who are served in several counties of southwestern Ohio and are displayed in Table 29. Findings show that DCH had less emergency room visits in Fall of 2015 (n=726) compared to Fall 2016 (n=878) for asthma related encounters. However, in Fall 2015 there were more hospital admissions (n=419) than compared to Fall 2016 (n=319) for asthma related encounters. Therefore, it is impossible to extrapolate the actual students from this project that may or may not be included in these data or the pediatric population as a whole, since some students may go to other hospitals or urgent care centers for their asthma needs.

Table 29

DCH Asthma Encounters

	Aug-Dec 2015	Aug-Dec 2016
Emergency Dept. Visits	726	878
Hospital Admissions	419	319

The final descriptive statistics obtained from a retrospective chart review were of emergency department (ED) visits and hospital admissions at DCH for the students

participating in the Open Airways for Schools program. The number of ED visits and hospitalizations were collected 30 days before the initiation of the Open Airways for Schools program. The number of ED visits and hospitalizations were also collected 30 days after the completion of the Open Airways for Schools program. In analyzing the frequency of these events three students had one visit to the ED and one student had two hospitalizations 30 days prior to the education program. Thirty days after completing the Open Airways for Schools program three students had one ED visit and two students were hospitalized once and one student was hospitalized twice. One hundred thirty-eight students and 141 students did not have and ED visits or hospital admissions 30 days prior to the program. Thirty days after the program Two hundred and139 students did not have either ED visits or hospital admissions up to 30 days after the program. Table 30 displays the occurrences of ED visits and hospital admissions up to 30 days prior to the education program and up to 30 days after completion of the program.

Table 30

DCH Emergency Department Visits or Hospital Admissions

Number of visits	**Emergency Dept. visits 30 days Pre**	**Hospital Admissions 30 days Pre**	**Emergency Dept. visits 30 days Post**	**Hospital Admissions 30 days Post**
0	138	141	139	139
1	3		3	2
2	1			1
3		1		

All N = 142

Evaluation of Outcomes

In summary, participant rates for both pre and post completion of the cACT score and RISC were low, 26% and 20% respectively. The cACT scores were not found to be

significantly different before or after the Open Airway for Schools program; however, the limited number of students did not give sufficient power to detect a difference if one was actually present. Though, once the covariates were added there was a significant difference, with the post education cACT scores being higher. Therefore, in those schools where there were increases noted in the cACT scores after the education program are clinically significant.

The purpose of the RISC score was to determine proper use and maintenance of the rescue inhaler with or without spacer. Although there were only 20% of the students that had a RISC score recorded both before and following the education program, there were significant differences noted after the education program with an overall one point improvement in the score after the education program.

The percentage of school absences actually increased after the Open Airway for Schools program in both the 1st and 2nd quarter of 2016-17 compared to the same quarters in 2015-16. There is no real understanding to these findings as there is no way to determine the nature of school absence or if there is any relationship to asthma related exacerbations or illnesses.

In conclusion, when analyzing the data related to 30 day pre and post program ED visits and hospital admissions the findings were insignificant. Nonetheless, there were a few students who were seen in the ED or hospitalized either 30 days prior to the Open Airway for Schools program and the 30 days after program completion. Yet, there are many variables that may influence access to these services and determining those variables are beyond the scope of this evidence-based practice project.

V. DISCUSSION

During fall 2016, the Open Airways for Schools asthma education program was offered to 143 children with asthma in grades 2 through 5 in seven schools across the DPS District. Baseline data was collected before the program and then 4 weeks after program completion so that the data could be compared and analyzed to see if the practice change made a difference. Student specific baseline data including the child's school name, grade, gender, race, 2015-2016 quarters 1 and 2 school attendance records and any items such as the following which might be in the school clinic: rescue inhalers, spacers for the rescue inhaler, asthma action plans, parent asthma questionnaires, and initial cACT scores. RISC scores were also completed on students with a rescue inhaler in the school clinic. Four weeks after the completion of the program, all data was then recorded in e-School database in the specific child's electronic health file. Four weeks after the completion of Open Airways for Schools, post cACT and RISC scores were collected on any student having initial scores. School attendance data was collected from fall 2016-2017 quarters 1 and 2 and recorded. In addition, student point of care encounters documented in e-School by the school nurse as school clinic visits for acute or preventative rescue inhaler usage, acute or preventative asthma school clinic visits, or any respiratory related 9-11 calls from fall 2016 quarters 1 and 2 was retrieved from the e-School data base. Baseline data was compared with the post program data so that inferences could be made.

Findings from this evidence based practice project were expected to demonstrate decrease school absences, ED visits, and hospital admissions related to asthma

symptoms, as well as improved cACT and RISC scores. The next section will discuss the findings from each of these outcomes.

Findings from Project Implementation

The purpose of this project was to implement a comprehensive self-management asthma education program that would improve the child's overall control of their asthma and their ability to properly use their rescue inhaler. Other outcomes projected were a decrease in school absenteeism, emergency department visits and hospital admissions all related to asthma exacerbations. The findings related to the outcomes collected within this evidence based practice change will be further discussed.

Demographics. The majority of the students or approximately 80% who participated in the Open Airways for Schools program were African American and just over 55% were male. According to the CDC (2017) about 13.4% of black children have asthma compared to only 7.4% of white children. Approximately 10% of boys under the age of 18 are found to have asthma compared to girls at 6.9% (CDC, 2017). Overall, within the DPS District, approximately 14% of children have asthma, while across the U.S. among blacks about 13.4% are found to have asthma whereas across all ethnicities about 8.4% of children have asthma (CDC. 2017).

Rescue Inhalers, Spacers, AAP's, & Parent Asthma Questionnaires. The lack of critical rescue inhalers, spacers and child specific asthma management information was alarming. Only 30 out of 143 students had rescue inhalers, 0 students had a spacer, and 6 students had asthma action plans located in the school health office. Children using asthma action plans are associated with better outcomes such as less ED visits and hospitalizations however asthma education also remains a critical factor in asthma

management (Khan, Maharai, Seerattan, & Babwah, 2014). School nurses can help to educate parents and stress the importance of having a completed asthma action plan and a rescue inhaler while a child is enrolled in school (Asthma Action Plans, 2014). In presenting to the DAA about the frequency of rescue inhalers, asthma action plans, and spacers found in this evidence based practice project, several pediatricians were shocked by the lack of compliance of having these items available at school. One physician reported how surprised she was to hear about the lack of inhalers and asthma action plans present at school as she stated she spends a lot of time writing prescriptions for rescue inhalers and completes many Asthma Action Plans.

cACT & RISC. The low return rate of the cACT at 26% played a factor in inadequate effect size which may have prevented a significant difference from being detected when the ANOVA was performed. However, 3 of the 7 schools showed an improvement in the overall mean summary scores from pre to post program, while 3 of the 7 schools showed a slight decrease in the overall mean summary score. Those students completing a cACT prior to the program and scoring 20 or above tended to remain at a higher score which reflects the student had controlled asthma prior to the program and was able to retain control 4 weeks after the program. Prior to the program, 16.1% of students scored 19 or less on the cACT while 4 weeks post completion students scoring 19 or less dropped to 8.4% which showed a 50% decline in students with asthma not in control.

RISC return rate was directly impacted by the number of students having a rescue inhaler present. Students could only complete a RISC if they had their own rescue inhaler at school. The RISC return rate was 20% thus impacting the effect size and

making it difficult to detect significant difference. An ANOVA was performed on the summed mean pre and post RISC scores and a significant difference was discovered. A closer look at the individual school revealed that RISC scores at School 1 and School 3 actually decreased by about one point after the education. However, individually at School 2, School 5, School 6, and School 7 the post-RISC scores improved greatly. An ANCOVA was performed with the additional covariates for pre and post education but revealed no significant difference. Once again, this could be related to the small effect size. Examining closely by school, the pre and post mean summary RISC scores were significant.

Findings from this evidence based practice project support similar findings in the literature that school based self-management education programs are found to improve asthma management skills which can lead to better controlled asthma (Ahmad et al., 2011; Boyd et al, 2009; Bruzzese et al., 2011; Cicutto et al, 2013; Guervra et al., 2003; Wolf et al., 2002). The EBPP-AL questioned why a low return rate of the cACT and RISC might occur and considers parental involvement, parental finances, or parental lack of asthma management knowledge to be possible factors. However, the school nurse-parent relationship, the student nurse-student relationship or school nurse-student relationship, and possibly the level of child responsibility all could impact return of materials to and from school Some students might not give the parent the paperwork to be completed or conversely, the student might forget to bring the paperwork back to school once completed. Improving the return rate on the cACT and RISC would improve the effect size and possibly show a difference if present.

This evidence based practice project focused on the child receiving the asthma

education as other studies suggested which had promising results in contributing to decreased school absences, ED visits, and hospital admissions (Ahmad et al, 2011; Bruzzese et al, 2011; Cicutto et al, 2013). While parental education was not used in this evidence based practice project, parental asthma education has been combined with the child asthma management education in several studies and also leads to decreased school absences, ED visits, and hospital admissions (Boyd et al, 2009; Guevara et al, 2003; Wolf et al, 2002).

Acute Versus Preventative Clinic, Inhaler, & 9-11 Calls. The increase in documentation in e-School is directly related to the e-School updates performed during summer 2016. This documentation update was performed so that all of the school nurses could document all asthma encounters of clinic visits, interventions and outcomes in a systematic way that can then be measured collectively. While data from the previous year was unable to be obtained systematically, the e-School documentation will capture the asthma encounters longitudinally which could not be completed easily previously.

Open Airways for Schools Attendance. Attendance of the Open Airways for Schools program was tracked. Almost half of all students were able participate in every session. There were a few occasions when a field trip was scheduled for the same day as the Open Airway program. Students appeared to enjoy coming to the sessions and they liked receiving the incentives. Overall, they participated and engaged, with a few behavioral issues. Some students came late to the sessions which could have impacted their learning.

School Attendance. School attendance from 2015-2016 school year to 2016-2017 school year was projected to improve as a result of the Open Airways for Schools

program as literature supports this outcome (Ahmad et al., 2011; Bruzzese et al., 2011; Cicutto et al., 2013; Guevra et al., 2003; Joseph, et al, 2013; Wolf et al., 2002). However, the findings from the project were opposite and actually absenteeism worsened. Many variables can play into school absenteeism. Influenza rates, air quality, pollen and mold counts were all investigated as possible causes that could explain the increased absenteeism during fall 2016. However, these aforementioned possible causes did not reveal elevated levels which could have triggered asthma in some children. School absences were only monitored for a short time after the actual intervention, therefore, it was difficult to establish a trend. Time was a limiting factor as well as a multitude of reasons for students being absent which are not asthma related.

Emergency Department & Hospital Admissions. Few students experienced ED visits or hospital admissions up to 30 days prior to and up to 30 days post Open Airways for Schools program. While this report does capture some of the students who were enrolled in the Open Airways for Schools program, most likely it does not capture all. Several other area hospitals, ED's, urgent cares, and primary care providers could also be visited for asthma exacerbations. Therefore, the ED visits and hospital admissions data in not significant as it is considered incomplete and may not include all of the students participating in the project.

Summary of Findings

This evidence based practice project was extremely complex and required several months of planning, coordinating, and collaborating within the DPS district and among multiple community partners such as the American Lung Association, DCH, and WSU-CONH. The body of knowledge gathered from this initial roll out of this evidence based

practice project is insightful and quality improvement principles will be applied so that outcomes from future roll outs will demonstrate continual performance improvement.

Due to many variable that were far beyond the control of the EBPP-AL, all of the projected outcomes were not achieved. However improved asthma outcomes related to asthma self-management skills were achieved as evidenced by clinical significance in cACT among 3 schools and overall statistical significance when an ANCOVA was run with all of the covariates combined, $F(1, 31)=4.910$, $p=0.034$. An ANOVA revealed a significant difference in pre and post summed mean RISC scores, $F(1, 2)=7.88$, $p=.009$. Further a significant difference was noted when pre and post summed mean RISC scores were analyzed by individual schools, $F(1, 26)=6.82$, $p=0.016$. Improved asthma management skills and asthma control can lead to decreased school absences, ED visits, and hospital admissions.

Lack of time to measure outcomes was a major limiting factor with this evidence based practice project. Further, lack of response rate in receiving cACT scores, rescue inhalers and thus RISC scores, asthma action plans, spacer, and parent asthma questionnaires was another limiting factor that needs to be improved.

Feedback about the project implementation and suggested recommendations was solicited from all of the school nurses, student nurses, and the nursing faculty. Incorporating these recommendations in addition to application of other quality improvement initiatives that focus on the processes of implementing the Open Airways for Schools program will be examined. Implementation of this project, revealed many valuable lessons and recommendations. The lessons learned and future recommendations are discussed below.

Lessons Learned & Future Recommendations

The school nurse in each building was responsible for coordinating meeting times and spaces in the building with principals and teachers. At some schools, the Open Airways for Schools sessions were held on the stage while lunch or a physical education class was being conducted. The setting described was not conducive to learning as many students were distracted from the other class activity and added volume. Students having their Open Airways for Schools sessions scheduled during lunchtime was also distracting since students ate during the sessions, and sometimes arrived late if they had to wait in the lunch line. There were also some instances when nursing students had to go from class to class to gather students for the session if the teacher forgot to send a student. This interruption of collecting students cut down on educational time of the Open Airways for Schools program.

In order to provide the best learning encounter for all students enrolled in future Open Airways for Schools programs, an official letter to building principals and teachers from the Superintendent, Director of Special Services, and Director of Health Services will need to be sent out. This letter will outline that students identified with asthma will be asked to participate in the Open Airways for Schools program and will need full cooperation with the school nurse so they can attend. This letter will spell out that the principal will need to support this effort by providing a dedicated room space conducive to learning (not the stage where gym or lunch are going on), provide a dedicated time free from interruptions (not during lunch), and enforce to the teachers the importance of the program and that students are expected to attend every session on time. Building principals will need to talk to those teachers whose students do not arrive on time or do

not attend the sessions regularly. Various schools had issues such as School 6 had the class on the stage and School 1 and School 4 had students who needed to be reminded to come to the class. The Open Airway sessions at School 1, School 2, School 3, School 4, School 5, and School 7 were held in either the library or a quiet room which contributed to the learning.

Nursing students were extremely positive about this health education opportunity which allowed them to work with a vulnerable population to improve overall asthma outcomes. However, behavior problems with about five school students over the seven schools were reported during some of the education sessions which interfered with other students being able to learn. While the nursing students were able to redirect some minor behaviors, they were not equipped to deal with students that refused to redirect.

To eliminate this problem, it is recommended to hold sessions in a library or a classroom whereby there is a trained school staff member or faculty present who can address students exhibiting patterns of poor behavior. Any students needing discipline beyond simple redirection should be handled by the school employee. The student needing discipline should be removed from the room by the school employee until they are ready to reenter the group without incident. This would allow the nursing students to focus on educating the entire group, rather than spending inefficient time with those school students demonstrating regular behavior issues. This recommendation would also allow the majority of the students to continue learning.

The first two months of the school year are extremely hectic times for school nurses as they are working on updating outstanding immunization files, compiling school health records, coordinating care for students with complex physical and mental health

needs; conducting mandatory vision and hearing screens, developing individualized health plans and emergency action plans for students with special needs, educating school employees on basic first aid and how to handle emergency situations. All of these aforementioned activities are conducted in conjunction with providing daily nursing assessment and interventions of those students coming to the school health clinic for acute needs.

As a way to resolve this overload the school nurses are faced with, the actual start of the Open Airways for Schools program will be delayed until mid-October, rather than the first week in September. This will allow the school nurse to attend to other urgent needs at the start of the school year. However, instead of sending paperwork about the Open Airways for Schools program later in the quarter, all permission forms and asthma paperwork will still be sent to the parents/guardians at the beginning of the school year. The delay in the start of the program will also allow for more parents to turn in rescue inhalers, spacers, asthma action plans and Parent Asthma Questionnaires.

The EBPP-AL visited each school nurse and each student nurse participating in the project on a weekly basis while each were at their respective schools. The EBPP-AL wanted to be proactive and available to diffuse any potential problems or confusion throughout the project roll-out and implementation. However, some confusion remained specifically related to documentation in the newly redesigned e-School documentation system. The school nurses did not receive any formal training on the updates except for minimal discussion and a Word document outlining the new updates, codes, and a few documentation scenarios. Documentation training of the student nurse participating in the project was left up to the specified school nurse. Therefore, this resulted in some

student nurses who lacked training in e-School by their assigned school nurse which could attribute to the school nurse themselves not feeling comfortable with the new documentation updates. Due to the initial lack of training of the school nurse, the student nurses were unable to document program outcomes into the e-School documentation system on behalf of the school nurse. Inability of the school nurses to document placed further burden on the school nurse to document outcomes in e-School which at School 3 and School 7 was problematic leaving the EBPP-AL to document the findings retrospectively. While this was not ideal in creating sustainability in the evidence based practice project, finding the lack of consistency and competency in documentation provided important insight that the current documentation was cumbersome and time consuming. This was especially problematic if the school nurse experienced high student volumes in the health clinic for that day.

Many recommendations regarding e-School documentation should be considered so that sustainability of the program can be secured. An in-person, hands-on e-School training session given by the lead technology school nurse is advised for next year that should be held for the school nurses and the student nurses. Any updates in the e-School documentation over the spring/summer will be incorporated into the training that will be provided prior to the program roll out. This will alleviate the problem of the school nurses having to be solely responsible for training the student nurses. The e-School documentation sheet will still be provided to the school nurses and student nurses as a reference to assist in e-School documentation. In relation to the unexpected finding by the EBPP-AL that the e-School program for documentation is cumbersome, it is recommended that procurement for an additional e-School template be secured so that

Open Airways for School outcomes can be documented in a streamlined and more feasible option. This will help in the sustainability and functionality of the program. To offset the cost for this upgrade within the e-School database, securing a grant or scholarship sought out under the auspices of chronic disease management of asthma is advised.

The roles of all involved in the evidence based practice project were included in a PowerPoint at the beginning of the school year prior to the role out. However, confusion remained which may have resulted in variations of the implementation process. The school nurses received their Open Airways for Schools training and role delineation about four weeks prior to the roll out, and the student nurses received their training one week prior to the roll out. Despite this training, confusion could have existed since the roles and implementation process was embedded in a lengthy presentation and the training was completed too far in advance.

As a recommendation to prevent role confusion and variations in the implementation process the EBP-AL recommends to design a simple week by week algorithm or timeline that clearly illustrates the role/task of the week. This algorithm can be kept close to the school nurses' computer for easy reference. To further support the school nurse and the student nurse understanding, a tip of the week can be sent out on Monday via email reminding everyone of their role/task to be completed for that week. By communicating this way, it will help to prevent the lead asthma school nurse from getting overloaded with multiple questions and it will be an avenue to keep all individuals involved in the asthma education program on the same page. Further, having one email

per week that is inclusive of the weekly information will be easier to reference rather than numerous emails.

Unexpectedly, there was a larger than anticipated volume of students in some schools that were enrolled in the program. The added number of student participants made it more difficult for the student nurses and school nurses to follow up with parents in regards to obtaining rescue inhalers, asthma action plans, spacers, cACT scores and parent asthma questionnaires since most of their time was spent in providing education or participating in other school nurse activities. Parent consent was required to participate in the Open Airways for Schools program due to IRB restriction. Due to the requirement of a consent form, the program was offered to students with asthma in grades 2 through 5 in order to gain at least 10 students from each school. However, there was a range of 10-38 students that participated at each of the seven project schools.

Next year, the DPS District nurses decided to offer the program to 4th graders only so the school nurses and student nurses can focus on a smaller cohort of students. The smaller cohort will allow more time to provide follow up with parents, and health care providers so that rescue inhalers, spacers, parent asthma questionnaires, and cACT scores can be obtained at a higher rate. The EBPP-AL recommends the program to start at grade 3 to allow more time for the school nurse to reinforce education in the remaining grade school years.

The Inhaler Skills Checklist was not checked for inter-rater reliability. All school nurses and student nurses were trained on the tool however there was concern at School 1 and School 3 that the pre-RISC scores were too high with the mean summed score being 6 and 5.75 at School 1 and School 3 respectively. Scores on the RISC can range from 0

to 6 with 6 meaning the student mastered the skill of inhaler usage. The highest score a student could receive was a 6 however, the first step can be broken down into 2 points because it includes showing the scorer how to clean the inhaler and prime the inhaler. The EBPP-AL questions if the scorer used the tool correctly. If 1 point was given for item 1, then two required activities were supposed to be met (priming and cleaning) however, some students were wrongly scored a 1 even if they did not complete both activities which should then be scored as a 0. Further, the school nurses and student nurses were instructed not to coach the students at all when scoring the child on the RISC, however it is suspected that coaching could have happened. The realization that inconsistent scoring could have occurred was noted by the EBPP-AL when completing all of the post RISC scores. In two schools, it was noted all but one of the students in the pre-inhaler RISC scoring received the highest score possible which was unusual since the students had not learned about inhalers yet in the Open Airway for School program.

In order to create inter-rater reliability, the EBPP-AL recommends to provide training again to the school and student nurses on the RISC tool, have them practice using the tool, and offer them feedback while observing them score each other. Further, splitting step 1 into 2 steps so that the highest score on this tool would be a "7" rather than a "6."

Due to the low return rates of cACT scores and rescue inhalers, not all students could participate in either data collection (i.e, cACT score and/or RISC score). Only students with their rescue inhalers at the school were allowed to participate in the RISC score observation due to infection control concerns. The placebo inhaler canister was

removed from the plastic actuator and then placed inside the child's own actuator so that the same mouthpiece would not be shared.

A different asthma control test could be examined other than the cACT. An asthma control test that does not require parent input would only allow the input of the child as to their asthma and remove the burden of trying to collect parental responses. However, elimination of scoring asthma control could be eliminated. However, parental engagement is essential for asthma management in children and their input is extremely valuable. The lack of parental engagement in this project was problematic since the child is reliant on their parent for certain aspects of their healthcare. An additional recommendation would be to allow only students with a rescue inhaler present in the school nurses office to participate in the Open Airway for Schools program. Parental incentives may be an option such as gift cards to grocery stores in order to improve parental assurance that their child's rescue inhaler, asthma action plan, spacer, cACT, and Parent Asthma Questionnaire is available to the school nurse. Perhaps an incentive would allow for greater numbers of students to participate in both the pre and post RISC scoring during the program. Adding additional student and parental engagement in the Open Airway for Schools program would benefit both the student and parent with added knowledge with correct inhaler use. While it is important to make recommendations based on the project findings so that continual improvements can be made, it is also essential to disseminate the lessons learned and findings from the project development through implementation and evaluation.

Dissemination of Findings

An important part of any evidence based practice change is to integrate and sustain the change into everyday practice. Larrabee (2009) points out the importance of disseminating the findings of the project to all key stakeholders. Further, it is also important to celebrate with those involved in the project and to embrace the change (Larrabee, 2004). Many times, key stakeholders of a project are only viewing a practice change from the periphery. Once key stakeholders and the community at large are aware of the impact on patient outcomes and health, will they become motivated to provide needed support and thus creating project sustainability.

Results from this evidence based practice project will be shared in multiple venues including locally with DPS school nurses, school board, and the superintendent as these outcomes and the further potential of this project need to showcase the school nurses' role in these coordination of care efforts. In March 2017, the findings of the DNP project were disseminated to the Dayton Asthma Alliance (DAA) who is in the process of rolling the Open Airways for Schools program to other local school districts. Via a podium presentation in April 2017, the project findings were presented at the WSU Student Research Symposium. Amongst a poster presentation, project findings will be shared with other school nurses at the National Association of School Nurses annual conference in June 2017 in San Diego, CA. Lastly, a podium presentation will be conducted at the Ohio State University Helene Fuld Evidence Based Practice Conference in Columbus, OH in October 2017. Further widespread dissemination via manuscript submissions to scholarly journals pertaining to school health, school nursing, public health, and pediatrics will be actively pursued for publication.

Conclusion

Asthma in children is the number one chronic illness and the leading reason for missed school days (CDC, 2011). Asthma continues to grow and adversely affect student learning outcomes from not being present in school or fully engaged and ready to learn. Asthma creates a huge financial strain on families and the government due to utilization of urgent health care services that are required to combat uncontrolled asthma exacerbations when they are not being adequately managed by the primary care provider. Implementing an asthma self-management education program in the school setting and utilizing available community resources such as nursing, medical, or health education students is a feasible option which is relatively inexpensive and yields valuable outcomes of controlled asthma, improved inhaler technique and the potential for improved school attendance, decreased emergency department visits, and decreased hospital admissions. Bringing an asthma self-management education program to students' in the school setting is pragmatic and patient centered. School is where the majority of children spend their day and where they are already present in a structured environment for learning.

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Appendix A

Search of the Literature

Date	Keyword(s), Subject headings, MeSH terms Used	Database Searched	Choice of Studies		
			Hits	Review	RCA
2/27/15	Searched in Title, Abstract, Keywords: Children AND asthma OR asthma* exacerbation* AND education OR interventions AND emergency room OR absen* OR emergency dept* OR health care (Years 2001-2014)	Cochrane Library	32	2	2
2/27/15	Child* OR paediatric* OR pediatric* OR student AND asthma AND program OR case manage* plan AND attend * OR absence OR hospitalization OR emerg* care (Years 1979-2015)	PubMed	117	15 *6 same in CINAHL*	15
2/27/15	Child* OR paediatric* OR pediatric* OR student AND asthma AND program OR case manage* plan AND attend * OR absence OR hospitalization OR emerg* care OR unscheduled (Years 1990-2014)	CINAHL	101	8 *6 same in PubMed*	2
3/04/15	Searched in Title: asthma AND education AND children AND school (Years 2002-2015)	PubMed	6	2	1

Appendix B

Studies Included and Excluded During Critical Appraisal

Title	Author (year) & Database	Include or Exclude	Included Rationale and/or Excluded Rationale
The effects of self-management education for school-age children on asthma morbidity: a systematic review.	Ahmad (2011)	Include	Aim: Examine impact of school-based AEP on school attendance, ED visits, and hospitalizations post 1 year old in 5-18yr olds. Study: SROL-Reviewed 9 studies, used Health Promotion Model as framework. Setting: Intervention occurred in schools Population: 5-18 year olds with asthma IV:SBAEP –1 or more: teaching & reinforcement of inhaler technique; instruction to expand & improve working knowledge of asthma; reinforcement & training on following written action and/or maintenance therapies, emphasis and teaching on monitoring lung function. DV: school attendance, ED visit, hospitalization Follow up: post 1 year Results: statistically significant decrease in school days missed. ER and hospital admission less but not as definitive. **Formal quality review of the studies included is unclear, so results should be used with caution.*
Partners in school asthma management: evaluation of a self-management program for	Bartholomew (2006) PubMed	Exclude	Aim: Evaluate the effects of asthma self-management, medical care, the school environment, symptoms, and functional status of children from implementation of a multilevel school-based AEP. Study: RCT; schools randomized, 515 students in treatment & 431 students in control Population: 60 elementary schools in urban district; students grades 1-4 Setting: Urban school setting IV: Child computer program; parent action & communication plan; physician letter, video & action plan; nurse training; school assessment, action committee/training of teachers.

children with asthma			DV: Outcomes: Child self-management, school grades, hospitalizations, ER visits, symptoms; child/parent Knowledge, self-efficacy & skills; physician clinical asthma management; nurse asthma management; school allergen & irritant management. Follow up: 3 years-503 students still available Results: Improved knowledge & asthma management for child in treatment group ** Excluded as intervention also included physician intervention with associated outcomes. Also, already included in SROL in Coffman,* (2009).
Interventions for educating children who are at risk of asthma-related emergency department attendance	Boyd (2009) Cochrane	Included	Aim. : Systematic review of the literature regarding if asthma education leads to improved health outcomes in children who have gone to the emergency room for asthma Study: 38 RCT's Population: children, parents or both who were in ER in last 12 months (7843 children total) IV: AEP post ER visit to children, parents, or both. DV:-**Primary outcome:** subsequent ER visits. **-Secondary outcomes** 1. Hospital admissions for asthma. 2. Duration of hospital admissions. 3. Unscheduled health care professional visits (GP/Paediatrician/Asthma Nurse). 4. Use of oral steroids. 5. Use of inhaler medications. 6. Symptom frequency and severity. 7. Lung function: FEV1, PEFR. 8. Quality of life, functional health status. 9. Days home sick (lost from school, childcare). 10. Cost. Results: Significantly reduced risk of subsequent ER visits, hospital admissions and less unscheduled doctor visits compared with the control.
Using school staff to establish a	Bruzzese (2006)	Exclude	Aim: Evaluate whether a preventive care network for children with asthma results in reduced asthma morbidity, fewer days of limited activity due to asthma, and improvements in students' attendance and caregivers' quality of life.

preventive network of care to improve elementary school students' control of asthma.	PubMed		Study: RCT Population:591 students grades K-5 and their parents in New York City Setting: School IV: Training Activities regarding the Physician Asthma Care Education program of the physician and school staff to them offer these associated preventive care activities. DV: reduced asthma morbidity, fewer days of limited activity due to asthma, and improvements in students' attendance and caregivers' quality of life. Follow up: 2 years Results: Low participation of the Primary care provider to attend PACE program, and of those attended only 10% returned asthma plans to schools; no changes in PCP of medications prescribed. Significantly fewer days per week that children activities were limited due to asthma in 6months, and fewer school absences in the previous 2 weeks due to asthma days. At 2 years post intervention, control students had significantly fewer hospitalizations in the previous 12 months. Hypothesis not supported. **Intervention was aimed at PCP, and school staff rather than AEP for children/adolescents.*
Effects of a school-based intervention for urban adolescents with asthma: A controlled trial.	Bruzzese (2011) PubMed	Include	Aim: To test the efficacy of Asthma Self-Management for Adolescents (ASMA), a school-based intervention for adolescents and medical providers. Study: RCT Population: 345 African American or Latino 15 year old reported with asthma with moderate to severe asthma & used medication for asthma in last 12 months. Setting: School IV: School-based AEP (treatment); waitlist (control) DV: Self-management; symptom frequency, quality of life; asthma medical management; school absences, days with activity limitation; urgent health care use. Follow up:12 months Results: Treatment group showed: improvement in self-management, use of controller meds and treatment plans, quality of life; reductions noted night wakening, activity restrictions, self-reported asthma school absences, acute care visits, ER visits and hospitalizations.

			**Since adolescents have previously been a hard population to reach, this intervention has been found as promising. Limitations: Minority only, self-report of case study of moderate to severe asthma, and self-reported attendance.*
Breaking the access barrier: evaluating an asthma center's efforts to provide education to children with asthma in schools.	Cicutto (2005) PubMed	Exclude	Aim: Provide children with asthma access to care and AEP in schools as an alternative to a formal asthma clinic. Study: Cluster-RCT Population: 256 students with asthma and ER visit within last year; grades 2-5 or 6-11 years old. Setting: Schools in Toronto, Canada IV: Intervention-Roaring Adventures of Puff (RAP) for 6 weeks. Control-Usual care DV: Number of ED visits and days absent from school. Follow up: baseline, 3, 6, 9, and 12 months Results: Statistically significant change in intervention group. p value for change in days of school missed was < 0.05. P value for ED visits was <0.01. **AEP effective in the school setting to decreasing missed days & other ED visits. However, already iin SROL in Ahmad, (2011) & Coffman (2009).*
A randomized controlled trial of a public health nurse-delivered asthma program to elementary schools	Cicutto (2013) CINAHL	Include	Aim: Implement elementary School-based AEP self-management program for children, while working to make asthma friendly schools, and evaluate the AEP with outcomes of health service use, quality of life, school absenteeism, parental and child days of interruption, inhaler technique and asthma friendliness of school;. Study: RCT; school random selection. 85 treatment, 85 control (170 total) Population: 170 schools grades 1-5 total 1316 children with asthma and their families (average 8 years of age). IV: AEP of Roaring Adventures of Mr. Puff (RAP) & School community received Creating Asthma Friendly Schools Resource Kit. Control was placed on waiting list and usual asthma care. DV: Health service use; school absenteeism, interrupted activity, quality of life; asthma friendly school. Follow up: preceding, 7-9weeks, 1 year post

			Results: Treatment group statistically significant improvements in inhaler technique, school attendance, less frequent ED visits and unscheduled health visits, improved quality of life, less interrupted times for children and parent. Asthma friendly improvements also noticed in schools. **AEP improves asthma related outcomes.*

Establishing school-centered asthma programs.	Cicutto (2014) PubMed	Exclude	Informational article that was a helpful tool in developing schools with asthma program.
Effects of a comprehensive school-based asthma program on symptoms, parent management, grades, and absenteeism.	Clark (2004) CINAHL & PubMed	Exclude	Aim: Assessed impact of a comprehensive school-based AEP on symptoms, grades, and school absences in children, and parents' asthma management practices. Study: RCT- 14 schools random assigned; 7 treatment with 416 children & 7 control with 419 children (wait listed). Population: 835 children with asthma grades 2-5 and parents. Setting: Elementary schools in low income neighborhoods in Detroit. IV: Open Airways AEP; Environmental detective for classmates; orientation to asthma and control for principals and counselors; briefings and building walk through for custodians regarding potential asthma triggers; school fairs for children and caretakers; written communication from PCP of child regarding asthma status to school. DV: Asthma symptoms at day or night; academic grades; school absences; Follow up: baseline and 2 years post intervention Results: Asthma symptoms: significant daytime symptom reduction for persistent & intermittent; significant nighttime reduction for persistent asthma, but intermittent had a significant increased which could indicted awareness. Grades: Science significantly greater in treatment group; Absences: school records do not report difference, but parental reports of treatment group validates this. **AEP helpful in managing asthma. However, already included in SROL in* Coffman, (2009).

Do school-based asthma education program improve self-management and health outcomes?	Coffman (2009) PubMed	Include	Aim: To conduct a SROL on school-based AEP. Study: SROL of 25 articles RCT Population: Children aged 4-17 years with asthma diagnosis or symptoms. Setting: IV: AEP to Usual care DV: Knowledge of Asthma; self-efficacy; self-management behaviors; quality of life; days of symptoms; night with symptoms; and school absences. Follow up: Results: AEP improves knowledge of asthma, self-efficacy, and self-management behaviors. QOL, school absences and symptoms in day or night time outcomes where conflicting. **Findings indicate the need for PCP support and partnership between schools and the need for innovative and creative partnerships, but may be difficult to sustain. AEP are not consistent across the board and often too brief less than 3 months. However, AEP is helpful.*
Identification and education of adolescents with asthma in an urban school district: results from a large-scale asthma intervention.	Davis (2008) PubMed	Exclude	Aim: To Case identification students with asthma and then offer them an AEP at school Study: Asthma Case Identification surveys (pencil/paper survey tool); Students rated into groups active asthma-basic or active asthma-high risk. Basic offered AEP, high risk offered more intensive off site services. Conducted for 4 academic years Population:Incoming 6^{th} graders Middle School students; 8,326 surveys returned, and 1,449 eligible to participate in AEP Setting:middle school with greater than 500 students IV: Case ID survey of Asthma, Kickin Asthma AEP DV: possible asthma, and active asthma; Follow up: 4 academic years offered to incoming 6^{th} graders Results: Reported fewer symptoms with day or night disturbance and less ED visits, but not included specifics in this paper **Results are promising with this program and case identification is important as a community health nurse to address all those with the asthma issue. Further, this program has preliminary good results. However since not RCT and exact results not included, then excluded. This is a good study to look at for implementation and to use as a guide.*

Outcomes for a comprehensive school-based asthma management program.	Gerald (2006) CINAHL & PubMed	Exclude	Aim: Evaluate effects of comprehensive school-based Asthma Management program in an inner-city, largely African-American school system. Study: RCT; Random by school; Divided into 3 cohorts, with each cohort receiving intervention each year. Treatment had immediate intervention and control had delayed interventions Population: African American, grades 1-4; 54 elementary schools, 736 children and 54 elementary schools. Setting: Urban Minority school system in Alabama IV: treatment: AEP for faculty & staff (Managing Asthma: A guide for schools); AEP for all students (Asthma awareness: A Curriculum of the Elementary School Classroom); AEP for students with asthma (Open Airways). Control: delayed OA program DV: School absences; Ed visits, hospitalizations, grades, QOL. Follow up: 1 years, program over 3 years Results: no significant findings between control and treatment groups for school absences, GPA, ED visits or hospitalizations. Knowledge increase noted in intervention and control. **very specific to AA population; Strain on having teachers to implement rather than staff with background of health services to implement. No differences noted in control or treatment group. Also, already included in SROL in Ahmad (2011) and Coffman (2009).*

Effects of educational interventions for self-management of asthma in children and adolescents: systematic review and meta-analysis.	Guevara (2003) PubMed	Include	Aim: To determine the effectiveness of AEP for the self-management of asthma in children and adolescents. Study: SROL-35 RCTs or CCTs on AEP Population: 2-18 year old with asthma (3706 participants) Setting: Diverse IV: AEP for self-management targeting child, parent or both DV: lung function, morbidity, self-perception of asthma control, utilization health care services Results: AEP associated with improved lung function, self-efficacy, reduced missed school days, and reduced number of restrict activity day and visits to ER. Peak flow meter interventions with individual's exhibiting severe asthma had a great effect on morbidity. **AEP should be part of everyday intervention for students with asthma.*
A web-based, tailored asthma management program for urban African-American high school students.	Joseph (2007) CINAHL & PubMed	Exclude	Aim: Develop and evaluate a multimedia, web-based tailored AEP management program to specifically target urban high school students. Study: RCT; Ex-314, Control 855/6 public high-schools Population: RCT/9th-11th grade students 15-19 year olds with a physician diagnosis of asthma or suspected asthma (98% AA, 49% Medicaid, mean age 15.2) Setting: Public High Schools in Detroit, MI IV: Intervention-Puff City (the web program) using computers at school. (4 sessions over 180 days-30 minutes to complete each). Control-generic asthma websites (4 sessions-180 days - 30minutes to complete each). DV: school days missed in the last 30 days and asthma-related ED visits and number of hospitalizations in last 3 months Follow up: survey at baseline and 12 months post intervention. Results: School absences and number of hospitalizations was significantly lower in the Exp. Group. ED visits were lower in the Exp. group but not significant. **Intervention was promising. Should be conducted also in a more diverse population. However, already included in SROL in Ahmad, (2011) and Coffman (2009).*

Evaluation of a web-based asthma management intervention program for urban teenagers: reaching the hard to reach.	Joseph (2013) CINAHL	Include	Aim: To evaluate a web-based tailored AEP targeted to urban teens with characteristics that could be associated with tack of behavior change. Study: RCT; questionnaire identified teens with asthma diagnosis and symptoms Population:422 students (98% AA, Mean age 15.6) (204 treatment; 218 control) Setting:6 Urban High schools in Detroit public schools IV: Intervention-Puff City tailoring to responses (the web program) using computers at school. Submodules on low perceived emotional support, low motivation, resistant to changed, rebelliousness. Referral coordinator. (4 sessions less than 180 days-30 minutes to complete each). Control-generic asthma websites (4 sessions-less than 180 days -30 minutes to complete each). DV: Functional status (symptom days, nights, school days missed, days of restricted activity, days had to change plans), Medical care use (ED visits, hospitalizations). Follow up: baseline, 6month, & 12 months post intervention Results: May not have seen as a great an impact due to control being more than "usual care". Benefit noted for treatment teens for symptom and restricted activity days. Rebellious teens reported fewer symptom days, symptoms nights, school absences and restricted activity days. Teens with low perceived emotion support with treatment students reported fewer symptoms days. **Despite results not being as overwhelmingly supportive, benefits still noted.*

The efficacy of asthma case management in an urban school district in reducing school absences and hospitalizations for asthma.	Levy (2006) CINAHL & PubMed	Exclude	Aim: Does SBNCMA improve school attendance & hospital utilization? Study: RCT; staff blinded to student's experimental condition; pre/post surveys via telephone to parents. Population: Students 6-10 years. Zip code where schools were selected had data to support high rates of asthma via Le Bonheur Children's Medicals Center data. Schools selected has data to support that High population via zip code of asthma incidence, AA > 97%, Free or reduced lunch > 85%. Setting: 14 Elementary schools in Memphis IV: Schools randomized to Intervention group=Case management (8 schools-115 students) Open Airways with weekly sessions or Control=Usual care (6 schools-128 students). DV: school attendance, ED visit, hospitalization, asthma knowledge & skills Follow up: 1 year Results: Statistical significance found for increase in school attendance, fewer ER visits and hospital days post school-based AEP. * *However, already included in SROL in Coffman (2009).*
Kickin' asthma: school-based asthma education in an urban community.	Magzamen (2008) CINAHL & PubMed	Exclude	Aim: Evaluate Kickin' Asthma, a school-based AEP designed by health educators and local students. Study: Pre-posttest design; case identification survey used to determine eligibility. Population: 990 students in middle & HS in Oakland CA with asthma from 15 middle Setting: 15 middle schools and 3 HS from Oakland, CA IV: Kickin Asthma AEP in small group 10-15 students for 4-50min sessions DV: Symptoms of daytime/nighttime, Severity of missed school or activity disruptions, health care utilization of clinical or hospital visits, and self-management of inhaler, peak flow and medication usage. Follow up: baseline & 3 months post Results: Significant drop in school absences (p values < 0.033, 0.0103, 0.438), for first two years of the study. Significant drops in ED visits and hospitalizations post intervention * *This is not a RCT, but does give promising results as to the efficacy of the AEP. Also, already included in SROL in Ahmad, (2011).*

The effects of a school-based intervention on the self-care and health of African-American inner-city children with asthma.	Velsor-Friedrich (2004) CINAHL	Exclude	Aim: Examine the effect of a school-based AEP intervention program on self-care abilities, self-care practices, and health outcomes of 8 to 13 year old minority children with asthma. Study: Quasi-experimental; pretest/posttest; convenience assigned to treatment or control Population:102 AA students aged 8 to 13 years with asthma (mean age 10.8 year) Setting: 8 inner city elementary school in major Midwestern city IV: Tx-Open Airways (6-45 minute sessions); Control- DV: self-care abilities, self-care practices, and health outcomes Follow up: baseline, 2 weeks, and 5 months post program completion Results: No significant decrease in number of days of school missed over time. Number of ED visits had a significant increase in the treatment group compared to the control group. However, children in the control were significantly older than those in treatment group. Also, despite the AEP literature being at the 3rd grade reading level, many children were reading at least one grade below their grade level. Since those in the treatment group actually had more ED visits, it is unclear if the treatment group had a higher severity level of asthma compared to the control group or if the interventions given in the AEP actually made the students more aware of when to seek treatment. Findings also suggest that reinforced education be frequently revisited to help students retain information. * *Already included in SROL in Ahmad (2011) and Coffman (2009).*

School-based asthma disease management.	Tinkelman (2004) PubMed	Exclude	Aim: To determine whether a comprehensive, school-based AEP in addition to a conventional disease management program, can reduce measures of asthma control, student absenteeism, and caregiver lost workdays. Study: Convenience Population:76 students entered, with 41 completing for 6 months (23-Texas, 18-Denver). 10 students completed full 12 months. Majority from lower socioeconomic level of Hispanic ethnicity. Setting:3 urban elementary and middle schools IV: AEP invites to parents + educational phone calls + asthma emergency number. AEP for students include peak flow meter, symptoms, medicine usage, recording in diary + month AEP + online AEP access. Support numbers given to parents DV: asthma control, student absenteeism, and caregiver lost workdays Follow up: baseline, 6 & 12 months Results: 2/3 reduction in missed school days and unscheduled doctor visits. Caregivers' perception of children's activity level increased by 11%. Daytime and nighttime frequency of symptoms dropped by 62% and 34%, respectively. After 12 months, remain same except reduction in frequency of symptoms attained statistical significance. **Favorable findings to apply.*
Educational interventions for asthma in children.	Wolf (2002) Cochrane & PubMed	Include	Aim: The purpose of this study was to systematically review the research literature on the efficacy of self-management educational interventions in modifying health outcomes for children with asthma. Study: 32 combined RCT & CCT's Population: 2-18 year olds with asthma & families (3706 individuals) IV: Asthma Ed Program of varying lengths at home, school, hospital, etc. given by CNS, nurse, or Physician versus usual care DV: Physiological function, Morbidity and functional status, Self-perception, health care utilization Results: Improvements in physiological measures of lung function, decreased asthma morbidity, improved self-perception, and reduced health care utilization

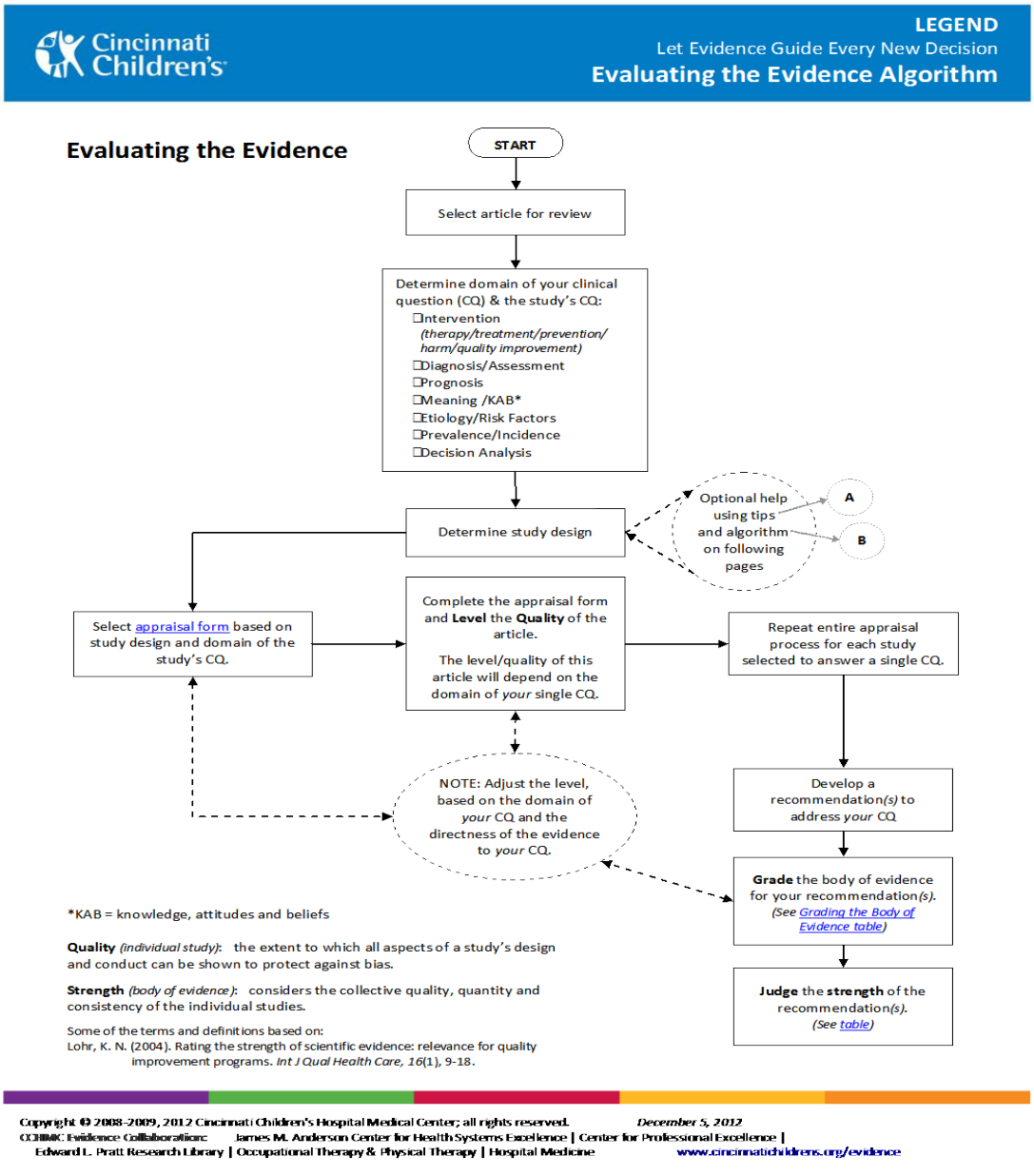
			**The intervention of Asthma Education in various settings for children can be generalizable to school aged children & adolescents with asthma and their families during the school day by school personnel in the school setting.*

Key: Asthma Education Programs=AEP; Independent Variable=IV; Dependent Variable=DV; SROL=Systematic Review of the Literature; RCT=Randomized Controlled Trial; QOL=Quality of Life

Appendix C

LEGEND Toolkit- http://www.cincinnatichildrens.org/service/j/anderson-center/evidence-based-care/legend/

Evaluating the Evidence Algorithm



Evidence Appraisal of a Single Study Intervention Systematic Review

Cincinnati Children's

LEGEND: Evidence Appraisal of a Single Study Intervention Systematic Review / Meta-Analysis

Project/Topic of your Clinical Question: _____

Reviewer: _____ **Today's Date:** _____ **Final Evidence Level:** _____

Article Title: _____

Year: _____ **First Author:** _____ **Journal:** _____

Do the study aim/purpose/objectives and inclusion/exclusion criteria assist in answering your clinical question? ☐ Yes ☐ No ☐ Unknown

☐ Study Aim/Purpose/Objectives:

☐ Inclusion Criteria:

☐ Exclusion Criteria:

When reading the bolded questions, consider the bulleted questions to help answer the main question.
If you are uncertain of your skills in evidence evaluation, please consult a local evidence expert for assistance:
CCHMC Evidence Experts: http://groups/ce/NewEBC/EBDMHelp.htm
Unfamiliar terms can be found in the LEGEND Glossary: http://groups/ce/NewEBC/EBCFiles/GLOSSARY-EBDM.pdf

VALIDITY: ARE THE RESULTS OF THE SYSTEMATIC REVIEW / META–ANALYSIS VALID OR CREDIBLE?

1. **Did the overview address a focused clinical question?** ☐ Yes ☐ No ☐ Unknown
   Comments:

2. **Was the search for relevant studies detailed and exhaustive?** ☐ Yes ☐ No ☐ Unknown
   - ☐ Was it *unlikely* that important, relevant studies were missed?

   Comments:

3. **Did the systematic review use RCTs?** ☐ Yes ☐ No ☐ Unknown
   - ☐ Were the criteria used to select articles for inclusion appropriate?
   - ☐ Was the assignment of patients to treatments randomized?

   Comments:

4. **Were the included studies appraised and assigned a high level of quality?** ☐ Yes ☐ No ☐ Unknown
   Comments:

5. **Were the methods consistent from study to study?** ☐ Yes ☐ No ☐ Unknown
   - ☐ Were populations among the included studies comparable and appropriate?
   - ☐ Were the outcomes, interventions, and exposures measured in the same way in the groups being compared?

   Comments:

 August 22, 2011

Table of Evidence Levels

Cincinnati Children's

LEGEND
Let Evidence Guide Every New Decision
Table of Evidence Levels

TABLE OF EVIDENCE LEVELS: ***Levels of Individual Studies by Domain, Study Design, & Quality***

DOMAIN OF CLINICAL QUESTION	TYPE OF STUDY / STUDY DESIGN																			
	Systematic Review Meta-Analysis	Meta-Synthesis	RCT [+]	CCT [+]	Psychometric Study	Qualitative Study	Cohort – Prospective	Cohort – Retrospective	Case – Control	Longitudinal *(Before/After, Time Series)*	Cross – Sectional	Descriptive Study Epidemiology Case Series	Quality Improvement *(PDSA)*	Mixed Methods Study	Decision Analysis Economic Analysis Computer Simulation	Guidelines	Case Reports N-of-1 Study	Bench Study	Published Expert Opinion	Local Consensus Published Abstracts
Intervention *Treatment, Therapy, Prevention, Harm, Quality Improvement*	1a[*] 1b[*]		2a 2b	3a 3b		4a 4b	3a 3b	4a 4b	4a 4b	4a 4b	4a 4b	4a 4b	4a 4b	2a/2b 3a/3b 4a/4b	5a 5b	5a 5b	5a 5b	5a 5b	5a 5b	5
Diagnosis / Assessment	1a 1b			2a 2b	2a 2b		3a 3b	4a 4b			4a 4b	4a 4b		2a/2b 3a/3b 4a/4b	5a 5b	5a 5b	5a 5b	5a 5b	5a 5b	5
Prognosis	1a 1b						2a 2b	3a 3b	4a 4b		4a 4b	4a 4b		2/3/4 a/b	5a 5b	5a 5b	5a 5b	5a 5b	5a 5b	5
Etiology / Risk Factors	1a 1b		2a 2b	3a 3b			3a 3b	4a 4b	4a 4b		4a 4b	4a 4b		2/3/4 a/b	5a 5b	5a 5b	5a 5b	5a 5b	5a 5b	5
Incidence	1a 1b						2a 2b	3a 3b				4a 4b				5a 5b	5a 5b	5a 5b	5a 5b	5
Prevalence	1a 1b								2a 2b		3a 3b	4a 4b				5a 5b	5a 5b	5a 5b	5a 5b	5
Meaning / KAB[+]		1a 1b				2a 2b								2/3/4 a/b		5a 5b	5a 5b	5a 5b	5a 5b	5

[*] *a = good quality study b = lesser quality study*

[+] *CCT = Controlled Clinical Trial KAB = Knowledge, Attitudes, and Beliefs RCT = Randomized Controlled Trial*

Shaded boxes indicate study design may not be appropriate or commonly used for the domain of the clinical question.

Development for this table is based on:
1. Phillips, et al: Oxford Centre for Evidence-based Medicine Levels of Evidence, 2001. Last accessed Nov 14, 2007 from http://www.cebm.net/index.aspx?o=1025.
2. Fineout-Overholt and Johnston: Teaching EBP: asking searchable, answerable clinical questions. *Worldviews Evid Based Nurs*, 2(3): 157-60, 2005.

Grading the Body of Evidence

Cincinnati Children's

LEGEND

Let Evidence Guide Every New Decision

Grading the Body of Evidence

Grade	Method			
High *Sufficient number of high quality studies with consistent* results*	***Step 1*** *(see worksheet to summarize the body of evidence)*	NUMBER OF STUDIES	QUALITY OF STUDIES*	CONSISTENCY OF RESULTS*
		1	1a	NA
		2+	1a or 2a	Yes
		5+	1a, 2a, or 3a	Yes
		5+	1a, 1b, 2a, or 2b	Yes
	Step 2 *(if the studies didn't fit neatly into a box in step 1)*	☐ multiple studies, unless large effect and very clinically important ☐ strong designs for answering the question addressed ☐ clinically important and consistent results with minor exceptions at most ☐ free of any significant doubts about validity *(generalizability, bias, design flaws)* ☐ adequate statistical power *(including studies showing no difference)*			
	Confirmation Step	Further research is unlikely to change our confidence in the answer to the clinical question.		
Moderate *A single well-done study or Multiple studies of lesser quality or with some uncertainty*	***Step 1*** *(see worksheet to summarize the body of evidence)*	NUMBER OF STUDIES	QUALITY OF STUDIES*	CONSISTENCY OF RESULTS*
		1	2a	NA
		3+	1, 2, 3; a or b	Yes
		5+	1, 2, 3, 4; a or b	Yes
	Step 2 *(if the studies didn't fit neatly into a box in step 1)*	*Either* ☐ multiple studies ☐ strong designs for answering the question addressed ☐ some uncertainty due to either ☐ validity threats *(generalizability, bias, design flaws or adequacy of statistical power)* or ☐ inconsistency *Or* ☐ multiple studies ☐ weaker designs for answering the question addressed ☐ consistent results with minor exceptions at most			
	Confirmation Step	Further research is likely to have an important impact on our confidence in the precision of the answer to the clinical question, and may even change the answer itself.		
Low *Studies with insufficient quality including case reports, case studies, general reviews, and local consensus*	***Step 1*** *(see worksheet to summarize the body of evidence)*	NUMBER OF STUDIES	QUALITY OF STUDIES*	CONSISTENCY OF RESULTS*
		1+	Insufficient quality to meet Moderate criteria above	Yes
		Local opinion or Published non-research articles	5	Yes
	Step 2 *(if the studies didn't fit neatly into a box in step 1)*	☐ health professional opinion is the only relevant published information ☐ local consensus is clear ☐ uncertainty due to either ☐ validity threats (generalizability, bias, design flaws or adequacy of statistical power) or ☐ inconsistency		
	Confirmation Step	There is published and/or local consensus, but little or no research, to answer the clinical question. Further research is very likely to have an important impact on the answer.		
Grade Not Assignable *Insufficient design or execution, too few studies, inconsistent results, and lack of consensus*	***Step 1***	NUMBER OF STUDIES	QUALITY OF STUDIES*	CONSISTENCY OF RESULTS*
		0+	Any evidence level	No
		Local opinion	5	No
	Step 2 *(if the studies didn't fit neatly into a box in step 1)*	☐ studies have not been done, or ☐ published studies are seriously flawed, and/or ☐ published studies give inconsistent results		
	Confirmation Step	There is insufficient evidence and lack of consensus to answer the clinical question.		

***Note: When there is both high and low quality evidence and the results are inconsistent:**

- ☐ Disregard lower quality evidence if the lower quality evidence is inconsistent with all higher quality evidence.
- ☐ Avoid disregarding lower quality evidence when inconsistency is at multiple quality levels, because bias could be introduced when determining which evidence to disregard.

Some of the concepts for this development are based on: Atkins et al: Grading quality of evidence and strength of recommendations. *BMJ*, 328(7454): 1490, 2004; Briss et al: Developing an evidence-based Guide to Community Preventive Services--methods. The Task Force on Community Preventive Services. *Am J Prev Med*, 18(1 Suppl): 35-43, 2000; & Greer et al: A practical approach to evidence grading. *It Comm J Qual Improv*, 26(12): 700-12, 2000.

 June 4, 2012

CCHMC Evidence Collaboration: James M. Anderson Center for Health Systems Excellence | Center for Professional Excellence | Edward L. Pratt Research Library | Occupational Therapy & Physical Therapy | Hospital Medicine www.cincinnatichildrens.org/evidence

Judging the Strength of the Recommendation

Cincinnati Children's

LEGEND

Let Evidence Guide Every New Decision

Judging the Strength of a Recommendation

Project Title: _____ Date: _____

In determining the strength of a recommendation, the development group makes a considered judgment.

The judgment is made explicit in a consensus process which considers critically appraised evidence, clinical experience, and other dimensions. The development group will consider what the relative weight each dimension listed below contributes when determining the strength of a recommendation.

Reflecting on your answers to the dimensions below and given that more answers to the left of the scales indicates support for a stronger recommendation, complete one of the sentences below to judge the strength of this recommendation.*

**(Note that for negative recommendations, the left/right logic may be reversed for one or more dimensions.)*

- ☐ It is strongly recommended that…
- ☐ It is recommended that…
- ☐ There is insufficient evidence and a lack of consensus to make a recommendation on…

Dimensions			
1. Grade of the Body of Evidence	☐ High grade evidence	☐ Moderate grade evidence	☐ Low grade evidence
2. Safety / Harm	☐ Has minimal adverse effects	☐ Has moderate adverse effects	☐ Has serious adverse effects
3. Benefit to target population *(e.g., health benefit to patient)*	☐ Has significant benefit	☐ Has moderate benefit	☐ Has minimal benefit
4. Burden on population to adhere to recommendation *(e.g., cost, hassle, discomfort, pain, motivation, ability to adhere, time)*	☐ Low burden of adherence	☐ Unable to determine burden of adherence	☐ High burden of adherence
5. Cost-effectiveness to healthcare system *(e.g., balance of cost/savings of resources, staff time, supplies based on published studies/onsite analysis)*	☐ Cost-effective to healthcare system	☐ Inconclusive economic effects	☐ Not cost-effective to healthcare system
6. Directness *(the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome])*	☐ Evidence directly relates to recommendation for this target population.	☐ There is some concern about the directness of evidence as it relates to the recommendation for this target population.	☐ Evidence only indirectly relates to recommendation for this target population.
7. Impact on morbidity, mortality, or quality of life	☐ High impact on morbidity, mortality, or quality of life	☐ Medium impact on morbidity, mortality, or quality of life	☐ Low impact on morbidity, mortality, or quality of life

Some of the concepts for this development based on:
Guyatt: Grading strength of recommendations and quality of evidence in clinical guidelines: report from an American College of Chest Physicians task force. *Chest*, 129(1): 174-81, 2006; **Harbour:** A new system for grading recommendations in evidence based guidelines. *BMJ*, 323(7308): 334-6, 2001; and **Steinberg:** Evidence based? Caveat emptor! *Health Aff (Millwood)*, 24(1): 80-92, 2005.

 June 11, 2012

CCHMC Evidence Collaboration: James M. Anderson Center for Health Systems Excellence | Center for Professional Excellence | Edward L. Pratt Research Library | Occupational Therapy & Physical Therapy | Hospital Medicine www.cincinnatichildrens.org/evidence

Appendix D

Wright State University-Miami Valley College of Nursing and Health

AGENCY PERMISSION FOR CONDUCTING DOCTORAL PROJECT

THE **Dayton Public School District** GRANTS TO **Jeanine M. Bochenek**, a student enrolled in the joint Doctor of Nursing Practice Program at Wright State University—University of Toledo, the privilege of using its facilities in order to conduct the following project:

Easy Breathing for Elementary School Children with Asthma at DPS

The conditions mutually agreed upon are as follows:

1 The agency (may) (may not) be identified in the final report.

2 The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.

3 The agency (wants) (does not want) a conference with the student when the report is completed.

4 Other:

_____	_____
Date	Signature of Agency Personnel/Title
_____	_____
Student Signature	Project Chair Signature

*Signatures on file with project lead

Appendix E

Dayton Asthma Alliance Team

Role	Agency
Evidenced Based Practice Project-Academic Liaison	Wright State University
Director; School Health Services	DPS
Director; Center for Child Health & Wellness	DCH
Health Consultant	DCH
Chief Nursing Officer	DCH
Respiratory Therapist	DCH
Healthy Lifestyle Supervisor	Public Health Depart Montgomery County
Assistant Superintendent	DPS
Chief; Office for Exceptional Children	DPS
Elementary School Nurses	DPS
Medical Director	DPS
Medical Director; Ohio Market	Care Source Management
Director; HEDIS Operations	Care Source Management
Director; Health Outcomes & Maternal Services	Care Source Management
Director; Performance Outcomes	Premiere Health
Director; Urban Health Services	Premiere Health
Executive Director	Community Health Centers of Greater Dayton
Community Health Faculty & Students	Wright State & Cedarville College

Appendix F

Dayton Asthma Alliance Model

Appendix G

Childhood Asthma Control Test & Permission to use Forms

Have your child complete these questions. to talk about your child's results.

1. How is your asthma today?

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, on average, how many days per month did your child have any daytime asthma symptoms?

5 Not at all | 4 1-3 days/mo | 3 4-10 days/mo | 2 11-18 days/mo | 1 19-24 days/mo | 0 Everyday

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

5 Not at all | 4 1-3 days/mo | 3 4-10 days/mo | 2 11-18 days/mo | 1 19-24 days/mo | 0 Everyday

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

5 Not at all | 4 1-3 days/mo | 3 4-10 days/mo | 2 11-18 days/mo | 1 19-24 days/mo | 0 Everyday

SCORE

TOTAL

Please turn this page over to see what your child's total score means.

Childhood Asthma Control Test Permission to Use

Permission to use Asthma Control Test and Childhood Asthma Control Test- Ref # OP053401

What is the name of the university or student to be listed as the Licensee?

Jeanine M. Bochenek – Doctoral Student at Wright State University

1. What is the address to be included on the license?

Jeanine Bochenek
2584 Lantz Road
Beavercreek, OH 45434

3. Name of the study/project:
EASY BREATHING FOR ELEMENTARY SCHOOL CHILDREN WITH ASTHMA AT DAYTON PUBLIC SCHOOLS

2. When do you plan to start reproducing the survey?
September 2, 2016

3. When do you plan to administer the last survey?
March 30, 2017

4. **How will the data be collected/captured?**
Data will be entered onto the school computer which the student attends and placed in their respective file. The computer is password protected.

6. How will the survey questions be administered?

Self-Reported Paper/Pencil	By Interviewer

7. How will the survey questions be administered?

Self-Reported Paper/Pencil	By Interviewer

8. Have you already collected survey data from this study?
No.

9. How many people are planned to be enrolled into your study?
We anticipate approximately 70 children.

10. How many times will each person take the survey during the study?
Students will take the Childhood Asthma Control Test or the Asthma Control Test (depending on their age) before the Open Airways Asthma Education (September 2016), and then at least 4 weeks after the Open Airways Asthma Education (January 2017).

11. What survey(s) are you interested in licensing?

a) For a list of our Generic, Disease Specific and Pediatric Health Surveys please click this link

Asthma Control Test™ and Childhood Asthma Control Test™

b) **What recall period are you interested in?**

Standard (4-week) Recall

12. What language(s) are you interested in licensing?

United States (English)

14. What is the Therapeutic Area/Condition that your population is being enrolled for?

Pulmonary/Respiratory Diseases/Asthma

15. What operating system is used on the computer that will be used for collecting survey data, scoring and reporting of the survey to be licensed?

Our software is not compatible with the MAC operating system. Please delete all choices that are not applicable below:

Windows 8 and 10, limited support available	Windows 7, recommended

Appendix H
DPS - Health Services
Rescue Inhaler/Spacer Skills Checklist

Student Name: _____Grade: ___Class Room: ____ DOB /Age:_____

Goal: The student will demonstrate proper use of the rescue inhaler/spacer without prompting.

Instructions:

1.The nurse enters the date of student observation in the appropriate date box.
2.The nurse enters a "Y" for each step completed or a "N" for each step missed or partially completed.
3.The nurse enters a score at the bottom giving one (1) point for "Y" & zero (0) points for "N."
4.The nurse signs appropriate signature box at the bottom of the page & comments as needed.

Skills Checklist of Steps	***Date***	***Date***	***Date***
1. Student describes correct priming of MDI and cleaning of equipment.			
Rescue Inhaler without Spacer			
1. REMOVE cap and SHAKE inhaler.			
2. BREATHE OUT fully before putting device to mouth.			
3. DEPRESS inhaler and BREATHE IN slowly for about five (5) seconds. *Position inside mouth with lips closed around mouthpiece, breathe in slowly while depressing inhaler to release one (1) puff. Administer only one (1) puff at a time.*			
4. HOLD breath and COUNT to ten (10) with lips kept closed.			
5. WAIT one (1) minute, then REPEAT steps 1 to 5 for additional puffs prescribed.			
Rescue Inhaler With Spacer & Mask (Medium Mask=1-6 years; Large Mask=>6 years)			
1. REMOVE cap and SHAKE inhaler.			
2. INSERT inhaler mouthpiece into the back piece of the spacer.			
3. APPLY mask to face and ensure that there is a good seal.			
4. DEPRESS inhaler at beginning of slow inhalation. Maintain seal with mask for 5-6 breaths after depressing inhaler. *Administer only one (1) puff at a time.*			
5. WAIT one (1) minute, then REPEAT steps 1-5 for additional puffs prescribed.			
Rescue Inhaler With Spacer (No Mask)			
1. REMOVE cap and SHAKE inhaler.			
2. INSERT inhaler mouthpiece into the back piece of the spacer.			
3. BREATHE OUT fully, then INSERT mouthpiece into mouth and close lips around it to ensure an effective seal. *The indicator only moves if the student has a good seal.*			
4. DEPRESS inhaler at the beginning of a slow, deep, single BREATH IN. Then HOLD breath and COUNT to ten (10) with lips kept closed. *Slow down inhalation if you hear the whistle sound. Administer only one (1) puff at a time.*			
5. WAIT one (1) minute, then REPEAT steps 1 to 5 for additional puffs prescribed.			
TOTAL SCORE (1 point for "Y", 0 point for "N." Total possible score is 6 points.)			
Comments: Nurse's Signature_____Date_____			

DAYTON PUBLIC SCHOOLS

Appendix I

PARENT ASTHMA QUESTIONNAIRE

So that we can better care for your child at school, please complete this questionnaire about your child's asthma and return to the school nurse. Thank you.

DATE: _____

STUDENT'S NAME: _____ DOB: _____ GRADE: _____

PARENT/GUARDIAN NAME: _____

PARENT/GUARDIAN PHONE NUMBERS: H: _____ C: _____ W:_____

PARENT E-MAIL ADDRESS: _____

DOCTOR/CLINIC: _____ PHONE: _____

PLEASE ANSWER THE FOLLOWING QUESTIONS REGARDING YOUR CHILD'S ASTHMA.

1. At what age was your child diagnosed with asthma?_____
2. What signs or symptoms indicate an asthma flare up? _____
3. List your child's asthma triggers: _____
4. Are your child's asthma symptoms worse in certain seasons? (Circle Response) Yes No
If so, which seasons? (Circle Response) Winter Spring Summer Fall All Seasons
5. Please list all asthma medications, including any inhalers that your child takes.
1) _____ 2) _____ 3) _____
6. Has your child been instructed to take a medication daily to control asthma?
(Circle Response) Yes No If yes, name of med: _____ Time used: _____
7. How many times in the *last month* has your child used a rescue inhaler for asthma symptoms? (Check one) 1 day a week or less __ 2 – 4 days per week __ 5-7 days per week ___
8. How many times in the last 2 years has your child been hospitalized due to asthma problems? ___
9. Does your child wake up coughing during the night? __ If so how many nights a month? __
9. Does your child use a chamber/spacer with his or her inhaler? (Circle Response) Yes No
10. Does your child have eczema? (Circle Response) Yes No
11. Allergies: list known allergies to medication, food, air-borne substances, or insect stings:
_____
12. When and where was your child's last medical visit for asthma? Date: _____
Doctor's office (Name) _____ Emergency/Urgent Care (Name) _____

Please complete the ASTHMA CONTROL TEST form on the back.

Appendix J

DCH QI Project- #2016-052

Dayton Children's Hospital IRB
One Children's Plaza
Dayton, Ohio 45404-1815
(937) 641-4218

August 3, 2016

Jeanine M. Bochenek, MS, RN, NCSN
Wright State University-College of Nursing & Health
118 University Hall
Dayton, OH 45435
Email: Jeanine.bochenek@wright.edu

RE: Your new project submission dated: 7/25/2016
IRB Non-Research, Quality Improvement Project Determination
Dayton Children's reference number **2016-052**: Easy Breathing for Elementary School Children with Asthma at Dayton Public Schools

Dear Ms. Bochenek:

This is in response to your request for IRB review of the above-listed project.

Items reviewed:

- Your Petition for IRB Determination: dated 7/25/2016
- Project Protocol
- Information Letter for Participation in a Quality Improvement Project: dated 7/29/2016
- Open Airways Parent Permission Letter
- Parent Asthma Questionnaire
- Childhood Asthma Control Test Survey (ages 4-11 years)
- Control Test Survey (ages 12-18 years)
- Dayton Public Schools – Health Services – Rescue Inhaler/Spacer Skills Checklist
- HIPAA De-Identification Certification Form, dated 7/25/2016

Upon IRB review it was determined that this qualifies as being a non-research, quality improvement project. Please see my attached QI determination check sheet.

No further action is required unless there is a change to the submitted project that may change the non-research determination. If there is such a change, the revision(s) must be submitted to the Dayton Children's IRB before implementation.

Please contact Bev Comer (937-641-4218; fax 937-641-3201; email: ComerB@childrensdayton.org) if you have any questions or require further information.

Sincerely,

[redacted]

William Spohn, MD, CIP
Chair, Institutional Review Board

Appendix K

Open Airway Parent Permission

Date _____

Dear Parent/Guardian of _____Home Room _____

I have exciting news to share with you. DPS is launching a Comprehensive Asthma Program at all of our elementary schools this year.

The American Lung Association in Ohio is offering "Open Airways for Schools," an asthma education and management program for children 8-11 years of age. This 6 session program will be taught by trained facilitators. Students may also be learning about asthma through interactive online programs. The overall goal of every program is to improve children's awareness and management of their asthma, keeping them healthier and decreasing their school absenteeism.

Your child has been selected to participate in these programs. The programs are free and will be held at our schools on Tuesdays, Wednesdays, or Thursday. If you do not want your child to participate, please contact the school nurse before September 4, 2016.

Thank you.

_____Phone: _____
School Nurse

Appendix L

Addendum to DCH IRB

Dayton Children's Hospital IRB
One Children's Plaza
Dayton, Ohio 45404-1815
(937) 641-4218

February 8, 2017

Jeanine M. Bochenek, MS, RN, NCSN
Wright State University-College of Nursing & Health
118 University Hall
Dayton, OH 45435
Email: Jeanine.bochenek@wright.edu

Ms. Stephanie Welsh
Master of Public Health Program
Department of Population & Public Health Sciences
Boonshoft School of Medicine
Wright State University
3123 Research Boulevard, Suite 200
Kettering, OH 45420
Email: Welsh.24@wright.edu

RE: Your Quality Improvement Projects Addendum to the Petition dated: 2/7/2017
Dayton Children's reference numbers:
1) **2016-052**: Easy Breathing for Elementary School Children with Asthma at Dayton Public Schools
2) **2017-005**: The Impact of Community Health Worker Interventions on Pediatric Asthma Control

Dear Ms. Bochenek and Ms. Welsh,

The IRB has reviewed your Addendum to the Petition and the 2/6/2017 justification letter related to the above-listed quality improvement projects.

The IRB acknowledges and concurs with your request for full collaboration between the two projects, including adding sub-investigators to each project as described in the Addendum.

Upon IRB review it was determined that these projects continue to qualify as being a non-research, quality improvement projects.

You may proceed with your projects as described. No further action is required unless there is a change to the submitted projects that may change the non-research determination. If there is such a change, the revision(s) must be submitted to the Dayton Children's IRB before implementation.

Please contact Bev Comer (937-641-4218; fax 937-641-3201; email: ComerB@childrensdayton.org) if you have any questions or require further information.

Sincerely,

[redacted]

William Spohn, MD, CIP
Chair, Institutional Review Board