THE IMPACT OF LIVE WEBINAR ASTHMA EDUCATION FOR CAREGIVERS OF ASTHMATIC CHILDREN 0-4 YEARS OF AGE

A Scholarly Project submitted to the Faculty of the Graduate School of Arts and Sciences of Georgetown University in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice

By

Joy Sawicki, M.S.N.

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Asthma is the most common chronic condition in children in the United States with an estimated 6.2 million children affected. The National Asthma Education and Prevention Program recommends self-management education for asthmatic children and their families in conjunction with ambulatory care services to improve management and outcomes of children with asthma. Despite the need, barriers to attend and participate in asthma self-management education often exist. Rosswurm and Larrabee’s evidence-based practice change model was utilized to develop a project aimed to improve access to asthma education through the use of a live-webinar. The project used a convenience sample of 30 self-selected caregivers with preschool asthmatic children from a pediatric pulmonology practice. The project aimed to evaluate a live-webinar asthma education intervention on asthma control, use of live-webinar format, and impact on emergency room visits and hospitalization. The Test for Respiratory and Asthma Control in Kids (TRACK) was the validated instrument used in the study. Statistical significance was achieved for asthma control ($p = .010$) in the participants who completed all three data points ($n=21$). Participants (>84%) found the live-webinar simple to use, convenient, and the information useful. Emergency visits and hospitalization rates were not impacted. Asthma education is a key component to achieve asthma control, and an awareness of the barriers that exist with an effort to overcome those barriers are possible through the use of live-webinar education.
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Chapter 1
Introduction

Asthma is a complex disorder of the respiratory system characterized by variable and recurring symptoms, airflow obstruction, bronchial hyper-responsiveness, and underlying inflammation (Expert Panel Report 3 [EPR-3]). Common signs and symptoms of asthma include coughing, which is often worse at night or early in the morning, wheezing (a whistling sound), chest tightness, and shortness of breath. Asthma is the most common chronic condition in children in the United States. The Centers for Disease Control and Prevention (CDC) estimates that 6.2 million children in the United States under the age of 18 years have been diagnosed with asthma (CDC, 2015). The CDC (2015) estimates 935,000 children 0-4 years of age have asthma, and these numbers could be higher since the CDC recommends an increased regard for frequent or severe recurrent wheezing in infancy be considered as part of the spectrum of asthma.

The comprehension of childhood asthma, including its pathophysiology and effective therapies have improved substantially over the past two decades, but improvements in management of childhood asthma, reduction in healthcare utilization and disease prevalence has been inconsistent (Archibald et al., 2015). The National Asthma Education and Prevention Program (NAEPP, 2007) stated the ultimate goal of both expert care and patient self-management is to reduce the impact of asthma on related morbidity, functional ability, and quality of life. The EPR-3 (2007) recommends self-management education for asthmatic children and their families in conjunction with ambulatory care services. It is acknowledged that self-management education for children be directed towards parents and caregivers.

The purpose of this chapter is to introduce the problem and burden of childhood asthma, especially in children 0-4 years of age, and the role their caregivers have managing the disease
on a daily basis. The importance of asthma education using the guidelines from The National Asthma Education and Prevention Program (NAEPP) are explored. The Population, Intervention, Comparison, Outcome, Time (PICOT) question and definition of terms is introduced. An organizational needs assessment for the project site is noted. The conceptual framework of the Rosswurm and Larrabee evidence-based practice model for practice change is used to support this scholarly project and is introduced and defined.

**Statement of the Problem**

Asthma is a common, chronic, non-communicable disease that affects as many as 334 million people of all ages worldwide. It is a substantial burden to people, often causing a reduced quality of life, both physical, psychological, and social. (Global Asthma Report, 2014). Asthma is a significant public health problem due to the economic burden from school and work absenteeism, high cost of care to manage the disease, and inconsistent access of care for the asthmatic patient. The financial burden of asthma in the United States is estimated by the CDC (2015) to have an average yearly cost for a child in the United States with asthma at $1,039 in 2009 with a total United States cost of approximately $56 billion a year. Asthma is a particularly serious financial burden in poorer countries that are least able to afford the costs of care (Global Asthma Report, 2014).

The chronic airway inflammatory response and structural changes that are characteristic of asthma can develop in the preschool years, and appropriate asthma treatment will reduce morbidity and mortality (EPR-3, 2007). In children 0-4 years of age, asthma is also associated with a high disease burden and is one of the top chronic conditions causing disability-adjusted life years (DALYs) (Nunes et al., 2017). The disability-adjusted life year (DALY) is a measure
of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death. (Nunes et al., 2017).

Asthma in young, pre-school children is often difficult to diagnose because many young children with a low risk of being asthmatic cough and wheeze with viral upper respiratory infections. The Asthma Predictive Index (API) is a guide used to determine which small children will likely develop asthma. In 2000, the API was developed using data from 1,246 children in the Tucson Children’s Respiratory Study birth cohort. Children younger than three years of age who have had four or more significant wheezing episodes in the past year are 80% more likely to have persistent asthma after five years if they have either one major decisive factor (a parent with asthma, diagnosis of eczema, positive skin or blood tests to environmental allergens), or two minor decisive factors (food allergies, greater than 4% blood eosinophils, wheezing apart from colds) (Castro-Rodriguez, 2011).

Asthma education is necessary for asthma symptom self-management and early education about asthma and self-management or caregiver management skills is an important component of care (EPR-3, 2007). Benefits of education include a knowledge base about asthma, better symptom control, fewer exacerbations, and confidence that symptoms when controlled will not constrain normal activities (Jones, 2008). Failure to educate patients about self-management results in a poor understanding of the disease process, triggers and control measures which in turn increases mortality and morbidity associated with asthma (Cleveland, 2013). Teaching caregivers all about asthma in a single clinic visit is not feasible. Additional education time is necessary to teach caregivers of children with asthma how to care for and manage the chronic condition. Despite the need for education, barriers to participation in the education classes often exist. Attending educational classes and traveling to those sessions is a challenge for busy family
schedules. Lack of adequate clinic time for sufficient education compounded by the challenges of families to attend additional classes’ results in caregivers lacking essential knowledge and skills to care for their children’s asthma. This gap in knowledge may be a potential origin for poor asthma outcomes. Alternate formats for educational sessions may improve the attendance and education of caregivers with asthmatic children.

Significance of the Problem

Young children with asthma require additional care since asthma requires the family to reorganize their life to accommodate management of the disease. The outcome of childhood asthma depends not only on treatment, but also on the way a child’s asthma is managed by the caregiver. Caregiver knowledge about the child’s asthma is linked to self-management skills and could influence the understanding of asthma etiology, impact their capability to engage in decision making and impact quality of life of both child and family (Gandhi et al., 2013). Normal daily activities such as school, work, family activities, and sleep are often impacted when a child has asthma. The elimination or avoidance of known triggers may impose further limitations on children and their family’s lifestyle.

The National Best Practice Guidelines for Managing Asthma (NAEPP, 2007) outline four vital components of effective asthma self-management for all patients with asthma. The components are: 1) use of objective measures of lung function to assess disease severity and control; 2) comprehensive pharmacologic therapy to reverse and prevent airway inflammation and constriction characteristic of asthma, and to manage asthma exacerbations; 3) patient education that fosters a partnership among the patient, his or her family, and clinicians; 4) environmental control measures to avoid or eliminate factors (asthma triggers) that contribute to
asthma onset and severity. The focus of this scholarly project relates most closely with the NAEPP (2007) vital component number three.

**Barriers to Asthma Education**

Archibald et al. (2015) stated the majority of childhood asthma management is provided by families outside of hospital settings, so optimizing a child’s caregiver’s capacity to manage asthma day-to-day is essential. Asthma education generally focuses on effective use of medications, devices, treatment plans, management of emergencies, modification of indoor environments and communicating with family, school, and healthcare providers. The EPR-3 (2007) recommends self-management education for asthmatic children and their families in conjunction with ambulatory care for asthma. Self-management education for children 0-4 years of age is directed towards caregivers. The focus at every office visit should include expectations of the visit, asthma control, patient goals and treatment, medications and quality of life (EPR-3, 2007). However, time constraints and distractions during office visits negate the provision of quality education in this setting. Educational sessions outside the confines of the office visit are vital. Cost efficient educational sessions that meet today’s busy family demands and utilize current internet technology may better facilitate self-management for young children with asthma.

**Settings for Asthma Education**

Numerous reviews have assessed the efficacy of asthma educational interventions provided in clinical settings, clinics or provider’s offices (Clark et al, 2007; Henderos, Janson & Hedlin, 2009). Clark et al (2007) reported improvement in a range of measures, including reduced days of restricted activity due to asthma symptoms, improved airflow, decreased emergency visits, decreased days absent from school, reduced asthma symptoms and improved
quality of life of the child. Henderos et al. (2009) reported improved outcomes of decreased steroid use and fewer urgent health-care visits following asthma education by strengthening the ability of parents to treat their children at home.

Asthma education has been instituted successfully in a number of different settings which complements the education received at clinic visits. Despite that there are various ways to provide asthma education, each format has its limitations. First, the provision of asthma education in the school setting is important because it has the potential to reach large numbers of school-aged children. A comprehensive school-based asthma program can improve symptom control and reduce acute-care utilization (Jones, 2008). Clark et al., (2007) stated assessments of school-based asthma programs have been numerous and many focus on particular problems for low-income minority students with an emphasis on the indoor environment and reduction of allergens. Although these school-based asthma education programs have been successful, their focus is on the students and do not meet the needs of very young children who are not yet in school or able to understand or act on the information.

Second, hospital stays related to asthma exacerbations are a time when education can occur. Hospitalization is a teachable moment at a time when the family and child are highly motivated, however emergency department and hospital education programs have had mixed results (Jones, 2008). One study that included an out-patient follow-up visit along with inpatient asthma education revealed decreased readmission rates (Jones, 2008). Although families may be ready for education during hospitalization, such times are often high-stress and can reduce the capacity to learn. Marcus (2014) stated barriers to information retention may include anxiety, denial, memory deficits, pain, stress, or unfamiliarity with healthcare team. Marcus (2014) stated patient and family education should exist throughout the continuum of care where healthcare
providers teach the patient and family about disease management, medications, post-discharge management, and advice on when and how to seek medical attention. Patient education is not effective if the patient or caregiver fails to comprehend the information provided.

Third, the use of smart phone applications and computer games are a means to provide education. Such applications have shown some benefit for educating people about self-management of asthma. Clark et al. (2007) reported that studies of many free-standing computer programs designed for children and parents for use at home correlated with positive outcomes including fewer hospitalizations, better symptom scores and improved understanding of asthma management. However, a limitation of many computer applications for educational purposes is their asynchronous nature and lack of concurrent interaction with a healthcare provider.

Despite various ways to offer asthma education, limitations exist with most of these. Today’s families are busier than ever and have many constraints on their time. Difficulty with access, inconvenient time, extensive travel, and associated costs to attend in-person asthma education pose significant barriers for some busy caregivers of children with asthma. Live webinar formats are used across many disciplines for education (healthcare, businesses, students, etc.), and is often a preferred method for Millennials.

The Millennial Generation includes people born between 1980 and 2000 and currently make up 31% of the United States (U.S.) adult population and about 34% of the U.S. workforce (Livingston, 2017). Millennial women accounted for about eight-in-ten (82%) U.S. births in 2015 (Livingston, 2017). Millennials have grown up using computers, are technologically savvy, and include Internet services in every part of their lives (Johanson, 2017). Patients in this generation find web-based services efficient and prefer to communicate through email, chat or video (Johanson, 2017). This preference for web-based communication can be used
advantageously for education as well. A large majority of caregivers with preschool children are likely millennials, and those caregivers who have asthmatic children may prefer web-based asthma education.

The utility of an alternative convenient educational format such as on-line live webinars may be useful for caregivers of young children with asthma. Currently there is limited availability of patient education in this format for caregivers with preschool asthmatic children. A time efficient, cost effective asthma education program that includes participation and active learning may be useful to improve access to education for the necessary asthma self-management skills as outlined in the EPR-3 (2007). Utilizing current means of webinar technology to improve access to asthma education may facilitate caregivers’ ability to obtain the knowledge and skills needed for self-management of asthma and ultimately gain confidence over their child’s asthma control.

**Research Question**

The PICOT format is a helpful approach for identifying and formulating clinical questions. (P) – Population or disease of interest (I) – Intervention or range of interventions of interest. (C) – Comparison is sometimes used and identifies a reference group to compare with the intervention. Many study designs refer to this as the control group. (O) – Outcome represents what result will be measured to examine the effectiveness of the intervention. (T) – Time describes the duration for the data collection (Melnyk & Fineout-Overholt, 2015).

The PI(C)OT question for this Doctor of Nursing Practice (DNP) scholarly project is: *Among caregivers of asthmatic children 0-4 years of age (P) how does a live webinar asthma education class (I) affect control (O) one- and three-months following education (T)?* Brief
definitions of each element of PI(C)OT are discussed here for clarity. More detailed definitions are provided in the Definition of Terms section later in this chapter.

The population of interest in this DNP scholarly project is twofold; the children and the caregivers. First, the children will be those with asthma 0-4 years of age with a history of four or more episodes of wheezing, shortness of breath (SOB), or cough lasting more than 24 hours. The diagnosis of asthma needs to be confirmed by a pulmonary specialist and not be associated with comorbid conditions of the child that can affect pulmonary function (cystic fibrosis, cardiac disease, gastroesophageal reflux disease). The second component of the population are the caregivers, who are usually the parents. Adult caregivers of children between 0-4 years must be 18-years-old or older and able to read and speak English. Caregivers need to live with the child seven days a week and be the person primarily responsible for the child’s asthma care.

The intervention in this DNP scholarly project is a single live webinar asthma education class for caregivers of children 0-4 years of age and offered at varied times of the day, varied days of the week, over the course of several weeks for caregiver convenience. The live webinar mirrors the successful in-person class traditionally used at the project site. The effect of the study site’s in-person asthma education program on emergency visits and hospitalizations was previously evaluated over a seven-year period from 1993-2000. During the study period, pediatric asthma emergency room visits decreased from > 15% to 2.2% of the total pediatric emergency visits in the institution, and hospital admissions decreased from 21% to 15.5% with pediatric patients under direct care of the pulmonary subspecialty group, <1% and 4.5% respectively (Breitwieser, Sawicki, & Atlas, 2003).

The outcome element in this project is pediatric asthma control. Well-controlled asthma is defined by the EPR-3 guidelines (2007) as: Asthma symptoms twice a week or less; Rescue
bronchodilator use twice a week or less; No nighttime or early morning awakening; No limitations on exercise, work, or school; Well-controlled asthma by patient and provider assessment; Normal or personal best PEF or FEV1. These elements of asthma control are both clinical and physiologic.

The timeframe for this DNP project is up to three months after the live webinar class. Following the webinar caregivers will be assessed at one and three months to evaluate control of their child’s asthma using the Test for Respiratory and Asthma Control in Kids (TRACK) tool (Murphy et al., 2009). Additional questions about their experience with a live webinar format and their child’s rate of hospitalizations and emergency room visits will also be explored.

Evidence-Based Practice Model of Implementation

Evidence-based practice (EBP) is a problem-solving approach to clinical care that incorporates the conscientious use of current best evidence from well-designed studies, a clinician’s expertise, and patient values and preferences (Melnyk & Fineout-Overholt, 2015). EBP is a process, and several models to guide this process have evolved since the inception of EBP in 1972. The Rosswurm and Larrabee model is the EBP model used to frame this DNP project (Rosswurm & Larrabee, 1999). Reasons for the choice of this model for this project is that their model guides practitioners through the entire process of changing to EBP beginning with the assessment of the need for change and ending with the integration of an EBP protocol (Rosswurm & Larrabee, 1999).

The model has six phases to guide the healthcare provider through a systematic process that uses change theory, clinical expertise, and quantitative and qualitative data for evidence-based practice change. The six phases are: 1. Assess the need for change, 2. Link problem interventions and outcomes, 3. Synthesize best evidence, 4. Design practice change,
5. Implement and evaluate change in practice, 6. Integrate and maintain change in practice (Rosswurm & Larrabee, 1999). To provide context for the scholarly project in relation to the phases of the EBP framework, each is outlined here.

**Phase 1: Assess the Need for Change**

In-person asthma classes have been the usual practice at the project site for many years, and their effectiveness validated. However, the problem of declining attendance at in-person asthma education classes was identified and current practice was evaluated for change. Ways to improve access for caregivers of asthmatic children to attend asthma education was identified as a need for change.

**Phase 2: Link Problem Interventions and Outcomes**

Potential interventions and activities were identified to increase access to asthma education. Web-based learning was identified as a novel method that may affect outcomes positively. Outcomes to evaluate were identified and selected.

**Phase 3: Synthesize Best Evidence**

The literature related to asthma education pertaining to children and webinars was searched using professional databases. The evidence was then weighed and critiqued before the best evidence was synthesized. The Strength of Recommendation Taxonomy (SORT) leveling system was used to examine all literature based upon its quality, quantity and consistency (Ebell et al., 2004). Feasibility, benefits, cost and risk was then assessed.

**Phase 4: Design Practice Change**

The proposed practice change to asthma education through a live webinar format was identified. The decision was made to provide the live webinar content and flow in a way that would mirror the current in-class educational format. Resources necessary to accomplish the
practice change were also identified. Outcomes were defined, and the implementation plan process started.

**Phase 5: Implement and Evaluate Change in Practice**

Implementation began with training staff about the live asthma education webinar through a combined strategy of education, role modeling, and other similar activities. Staff and caregiver feedback were evaluated and their suggestions were considered prior to implementation and practice change.

**Phase 6: Integrate and Maintain Change in Practice**

Intervention outcomes were assessed, and certain aspects were adjusted. Evaluation included quantitative feedback of data from questionnaires, as well as qualitative feedback and anecdotal stories of success. The live webinar model was overall well received and continues to be used for caregiver asthma education.

**Organizational Needs Assessment**

Gathering and analyzing information about the culture of an organization can provide an accurate and thorough picture of the environment that can then be used to guide goals, develop plans and allocate resources. Performing a needs assessment helps to determine a focus and direction for projects and activities. This section examines the culture of the study site located in the northeast United States using the Schein Levels of Culture Theory (Schein, 2010).

**Project Setting**

This DNP project took place in a hospital-based pediatric pulmonology group with six physicians, two nurse practitioners, three registered nurses and support staff which provide outpatient and inpatient care to children ages 0-21 years of age. Diagnoses include, but are not limited to: asthma, cystic fibrosis (CF), premature lung disease, chronic respiratory failure,
oxygen and/or ventilator dependence. The site is a busy northeastern U.S. suburban pediatric pulmonary practice within a larger hospital organization and is part of a children’s hospital with other pediatric subspecialties. The three levels of Schein’s theory (artifacts, espoused values and basic assumptions) are addressed from the perspective of a DNP leader. Specific aspects observed and discussed about the culture include behavior norms, socialization of members, rites and rituals within the system, the physical design and its impact on the culture, and how the culture relates to a larger system. The population of the town and surrounding area of the project site is mostly upper-middle class, largely white, English speaking, employed and has a high-school education or greater (United States Census Bureau, 2017).

**Schein Framework**

Schein’s Levels of Culture Theory (2010) contains three levels of cultural analysis to guide the user with how to understand the culture of an organization. These levels range from the very tangible overt manifestations that you can see and feel to the deeply embedded, unconscious, basic assumptions that Schein defines as the essence of culture (Schein, 2010). The three levels include artifacts, espoused values, and basic assumptions.

Artifacts are at the surface and include all the phenomena that you would see, hear, and feel when you encounter a new group with an unfamiliar culture (Schein, 2010). The pulmonology practice has approximately 4,530 active patients, the majority of whom have asthma. Approximately 175 patients with asthma are seen each week, for about 9,200 outpatient visits per year. The practice is made up of one main office and four satellite offices. The pulmonology group is also a Cystic Fibrosis Foundation accredited care center, and a certified pediatric sleep center.
The second level of Schein’s culture theory is espoused beliefs and values. The values of the individuals working in the organization play an important role in deciding the organization culture. The thought process and attitude of employees have deep impact on the culture of any particular organization (Schein, 2010). These beliefs and values are initially started by the founding leader and then assimilated to the group (Schein, 2010). It is the founders of the pediatric pulmonology practice who created the culture and rules for behavior. Within the practice there exists high expectations about how patients are managed, scheduled, and treated. The expectations of the pediatric pulmonology group for a high level of care translates to the importance of partnering with and educating the patients and families about their disease and proper disease management.

The third level of Schein’s Level of Culture Theory (2010) is basic assumptions. This level includes the assumed values of the employees which cannot be measured but make a difference to the culture of the organization (Schein, 2010). The inner aspects of human nature come under this third level of organization culture. The organization follows certain practices and rules which are not discussed often but are understood on their own. Each employee at the pediatric pulmonology practice offers valuable insight and brings his or her own ideas and understanding of how to achieve our ultimate goal of excellent patient care. This is evidenced as it relates to this DNP project by a persistent drive by providers and staff to encourage attendance at asthma education classes.

**Traditional Asthma Education**

Traditional asthma education to teach self-management skills at the pulmonology group has been provided for caregivers/parents and patients as a one-hour class outside of their regular clinic visits, provided in-person in the office and at no cost. Attendance at the educational classes
are strongly recommended for all caregivers of asthmatic patients. The classes are taught by registered nurses (RN) or advanced practice nurses (APN) who are Nationally Certified Asthma Educators (AE-C). Families are informed of these classes at their clinic visits or hospitalization and given written and verbal information about how to register for the weekly class. General content information covered during the in-person class includes the pathophysiology of asthma, triggers, and medications.

In-person traditional class attendance at this project site has been declining over the past few years. Parents cite various reasons for inability to attend class that include: travel time, cost of fuel and parking, cost of childcare, conflicting obligations such as work, after school activities, and not valuing the class as important. What was once a thriving in-person asthma education program has dwindled, therefore, an alternative form of asthma education is needed.

Definition of Terms

The following definitions are provided to ensure uniformity and understanding of these terms throughout the DNP project. Conceptual and operational definitions (when appropriate) are articulated for clarity and context of the DNP scholarly project.

Caregiver: The Free Medical Dictionary (caregiver, n.d.) defines a caregiver as lay individual who assumes responsibility for the physical and emotional needs of another who is incapable of self-care. The Free Medical Dictionary (parent, n.d.) defines a parent as one that begets or brings forth offspring and/or a person who brings up and cares for another. A parent is often the caregiver for a child with asthma, but a caregiver is not always a parent. For this project, the caregiver was further defined as having to live with the asthmatic child, be responsible for his or her primary care, and be at least 18-years-old. The caregiver was the child’s proxy for asthma education and self-management since very young children (< 4 years)
are not able to comprehend the educational materials or assume the role to self-manage.
Throughout this DNP project the term caregiver was used to mean either a parent or relative or non-relative who has the primary responsibility of taking care of the child with asthma.

**Asthmatic child:** This project’s intent was to evaluate caregivers of young asthmatic children between 0 and 4 years of age. The diagnosis of asthma was operationalized through the written notation of *asthma* or *Reactive Airways Disease* (RAD) by a pulmonary specialist in the electronic medical record. The Asthma Predictive Index (API) may have been used to diagnose the child who had four or more significant wheezing episodes in the past year.

**Live webinar:** The independent variable in the project was the participation in a live webinar asthma education session. A webinar is defined by the Free Medical Dictionary (webinar, n.d.) as an interactive lecture, meeting, presentation, or educational forum broadcast from one location to people using networked computers at remote locations. This element of PICOT was operationalized through a one-hour long live web-based webinar format. The live webinar mirrored the existing live on-site asthma education class. This webinar included a PowerPoint presentation which covered information recommended by the current EPR-3 guidelines (2007). At the end of the webinar time was allotted for questions and answers. The webinar was taught by a nationally certified asthma educator who is a nurse practitioner. Content included in the webinar was evidence-based. Webinar use for education of caregivers provided interactive education about asthma self-management skills such as trigger identification, medication and spacer use. Within the paper the term live webinar, webinar and online educational session may be used to mean the independent variable of the project. These terms will be used interchangeably.
Control: The dependent variable in this scholarly project was asthma self-management or asthma control. Self-Management is defined by the Free Medical Dictionary (self-management, n.d.) as the taking of responsibility for one's own behavior and well-being. Taking responsibility for asthma self-management is a primary goal of asthma care and education. Subjective measures are primarily used for children 0-4 years of age, as this population is usually unable to participate in the maneuvers required for objective measures of peak expiratory flow rate (PEFR), spirometry, and exhaled nitric oxide. Subjective measures for this project were defined similarly to the EPR-3 criteria which include the number and severity of wheezing exacerbations, nocturnal flare-ups, exercise-induced symptoms, amount of short-acting β-agonist used, and number of symptom-free days, (EPR-3, 2007). For the purposes of this DNP project, outcomes focused on number of hospital admissions, number of emergency room visits, and asthma control in three months following education. Control was operationalized through the use of the validated and established TRACK tool (Murphy et al., 2009).

Conclusion

In this chapter the problem of childhood asthma was examined with a focus on children 0-4 years of age, and the important role caregivers have managing the disease on a daily basis. Asthma education guidelines from The National Asthma Education and Prevention Program as well as the EPR–3 were explored. Asthma education and self-management skills are an integral part of everyday care for parents and caregivers living with children with asthma. Access to live in-person asthma education classes may be a challenge for some families. Sources and quality of education may vary as well as access to education. An evidence-based live webinar education program may reduce barriers to asthma education.
This chapter articulated an organizational needs assessment related to the project. The PICOT clinical question was introduced, and its elements discussed. Rosswurm and Larrabee’s evidence-based practice model was introduced as the framework for the project. Finally, key definitions were presented for clarity of terms.
Chapter 2

Review of the Literature

Asthma is the most common chronic condition in children in the United States. Educating caregivers of children with asthma has been shown to improved self-management skills, and improve outcomes such as decreased hospitalizations, decreased emergency room visits, and decreased use of oral corticosteroids. Chapter 2 will present a review of the available literature regarding asthma education and use of webinars in the pediatric population for the development of this project. A methodological analysis and synthesis of related quality literature was utilized to identify the best evidence related to this topic. Attention was given to literature devoted to educating caregivers of children with asthma about self-management skills. Also, in this chapter, the literature appraisal system is introduced. The final section of the chapter provides solid rationale for the implementation of this DNP scholarly project.

Introduction to Search Criteria

A systematic rigorous literature search of The Cumulative Index to Nursing and Allied Health Literature (CINAHL) plus with full text, PubMed and Google Scholar was performed in July 2017. The initial search was conducted using elements from this project’s PICOT question; asthma, self-care, patient education, and child. The search terms were combined with the Boolean phrase “AND”. PubMed changed the term “self-management” to “self-care”. Since the controlled vocabulary was noted as “self-care”, this term was subsequently used in the CINAHL and Google Scholar search. Attempts to include the terms “webinar”, “tele-medicine”, “tele-health”, “internet”, and “computer” with the other search terms resulted in zero or few non-applicable results. Hand-searching of the reference lists of retained literature was also conducted to identify other relevant literature. The searches within all databases was limited to English
language articles published during 2012-2017 but was then expanded to 2007-2017 when few relevant studies were located. The dates of the search were also expanded to include The Expert Panel Report 3 (EPR-3) 2007 guidelines.

Inclusion criteria for this review were: research studies that focused on childhood asthma, parent and caregiver asthma education and web-based education. Papers were excluded if the primary focus was adults, the diagnosis was not asthma, or there were co-morbidities such as cystic fibrosis, premature lung disease or gastroesophageal reflux. Literature written in non-English languages were also excluded. Key search terms and the use of appropriate Boolean operators were used to narrow the search to the most relevant articles. Each article was assessed using the inclusion and exclusion criteria to obtain the relevant articles. Literature retained for appraisal was relevant to all elements of the clinical question.

The search of CINAHL Plus with full text resulted in retrieval of 75 papers, of which two were retained (Findley et al., 2010; Henderos, et al., 2009). The search of PubMed resulted in retrieval of 103 papers, of which seven were retained (Cabana et al., 2008; Coffman, Cabana, Halpin, & Yelin, 2008; Davis, Gordon, & Burns, 2011; McCarty & Rogers, 2012; Peterson-Sweeney et al., 2007; Shomaker & DeVeau-Rosen, 2016; Wiecha et al., 2015). The search within Google Scholar resulted in retrieval and inclusion of three papers (Brown & Odenthal, 2014; Sterling & Linville, 2015; Turkeli, Yilmaz, & Yuksel, 2016). Hand-searching reference lists of retained literature resulted in five additional papers (Chan et al., 2007; Christakis et al., 2012; Jones, 2008; Meischke, Lozano, Zhou, Garrison, & Christakis, 2011; Yilmaz, Turkeli, Sahin, &Yuksel, 2014). Duplicate papers were excluded. A final sample of 17 full text articles were retained for this literature synthesis. The retained articles included two comprehensive literature reviews, one qualitative descriptive study, four cohort studies, one meta-analysis, two
randomized control studies, one program evaluation, two non-experimental descriptive studies, one case series descriptive study, two prospective randomized pilot studies, and one cross-sectional survey.

In addition to empirical research literature, key guidelines were located and included in this appraisal. First, the National Asthma Education and Prevention Program (NAEPP) Guidelines (2007) for the diagnosis and management of asthma were obtained. These guidelines are important to this topic because they reflect the latest scientific advances in asthma drawn from rigorous systematic review of the published medical literature and describes accepted best-practice approaches for making clinical decisions about asthma care (EPR-3, 2007). Next, the Asthma Predictive Index (API) from Castro-Rodriguez (2011) was obtained since early identification and intervention of infants and young children who will go on to develop asthma can be treated appropriately from the beginning of the disease. Subsequent searches for supporting literature were ongoing and included when relevant to further support important aspects of the project.

Critique and Synthesis of Previous Evidence

The effect of asthma education programs on different outcome variables was appraised and critiqued using the Strength of Recommendation Taxonomy (SORT) appraisal tool (Ebell et al., 2004). The SORT tool evaluates quality, quantity and consistency of evidence. The SORT tool emphasizes patient-oriented outcomes and rates individual studies as “1” for good quality with patient-oriented evidence, “2” for studies with limited-quality patient-oriented evidence or “3” for articles with other evidence such as consensus guidelines, disease-oriented evidence, usual practice and opinion. All primary studies are first leveled using the number system; 1 or 2 or 3.
The body of evidence is then rated in a second phase of SORT. The body of evidence is graded as an A, B or C to determine strength of evidence as a whole and aid in translation of research into practice (Ebell et al., 2004). Strength-of-Recommendation Grade “A” shows consistent, good-quality patient-oriented evidence; grade “B” has inconsistent or limited-quality patient-oriented evidence and grade “C” is consensus, disease-oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention or screening (Ebell et al., 2004).

**Asthma Education**

The National Asthma Education and Prevention Program (NAEPP, 2007) guidelines stress patient participation in symptom monitoring and asthma control. The NAEPP (2007) recommends asthma education for asthma self-management skills. Asthma education components recommended by the NAEPP (2007) are basic facts about asthma, the role of medications, skills needed to monitor symptoms and administer medications, environmental control measures and daily self-management and measures to adjust for changes in patient conditions. In a comprehensive literature review by Jones (2008), components of asthma education and the importance of patient self-management education were examined. Jones (2008) stated the evidence is strong for a collaborative relationship between patient and provider and asthma self-management education is essential component of disease management. SORT level 3 is appropriate for this literature review (Ebell et al., 2004).

McCarty and Rogers (2012) reviewed an in-patient asthma education program with an emphasis on the use of an Asthma Action Plan (AAP). The AAP is a written, individualized plan recommended by the NAEPP as a component of asthma self-management education. The inpatient asthma program showed improvement of caregiver comprehension of their children’s
medication use and administration technique with the provision of AAP’s. The authors’ recommended formal research be conducted to evaluate the correlation between asthma self-management education using AAP’s and the effect on asthma control. Ebell et al., (2004) quality of evidence level 2 is appropriate for this limited-quality patient-oriented program evaluation.

**Barriers to Asthma Education for Caregivers of Young Children**

**Access:** Various factors impact access to quality asthma education for caregivers of young children with asthma. Literature substantiates such barriers. Three main access barriers are addressed here: (1) access and cost; (2) availability of asthma education programming; and (3) time constraints. First, ease of access and associated costs to attend in-person asthma education may pose a barrier for some busy caregivers of children with asthma. Increased access to pediatric asthma education in the community was described by Sterling and Linville, (2015) in a qualitative descriptive study that analyzed existing data about case management from the Head-off Environmental Asthma in Louisiana (HEAL) program following the disaster of hurricane Katrina. There was a group of 151 children aged 4-12 years and their families who were included in this asthma education and management program. Results of home visits that focused on environmental control to eliminate asthma triggers proved positive in this particular situation. According to the SORT appraisal by Ebell et al. (2004) this constitutes level 3 evidence. It is a qualitative case series descriptive study.

Second, programs about asthma may not be readily available for caregivers. Findley et al., (2010) identified a lack of available asthma management programs for parents of preschool children. Findley et al., (2010) used parent surveys, sign-in sheets, and feedback forms in this descriptive study that examined an asthma education program for parents and early childhood center staff from Washington Heights and Harlem, New York. The children in the study were 2-
5 years of age from 31 non-parochial early childhood centers. Results revealed improved asthma control, decreased asthma related-absences, increased parent participation, and daycare and primary care providers were more effectively linked to asthma care for partnership. According to the SORT appraisal by Ebell et al., (2004) this constitutes level 2. Limited-quality patient-oriented evidence.

Davis, Gordon and Burns (2011) reviewed the available literature looking for evidence to guide practice about educational interventions for young children with asthma from low-income families. The authors were interested in the effect asthma management had on school readiness and academic achievement. A limited number of studies were found about educational interventions for children, and only one study was aimed at preschool children. The authors suggested further preschool aged studies are needed to determine specific interventions that may be useful to minimize detrimental effects of uncontrolled asthma on school readiness and achievement. This disease-oriented literature review is considered a SORT level 3 by Ebell et al., (2004).

Third, finding adequate time for asthma education is a barrier to both the provider and caregiver. Patient visit time is limited at clinic visits, usually between 15-30 minutes; thus, it is difficult to effectively educate caregivers about asthma. Cabana, Chaffin, Jarlsberg, Thyne, and Clark, (2008) conducted a cross-sectional survey of 896 parents with children 2-12 years of age that assessed education received in primary care offices. They found primary care pediatricians do not routinely provide asthma self-management education and tools, often due to time constraints. Ebell et al., (2004) SORT appraisal for this study is level 2, limited-quality patient-oriented evidence.
Shomaker and DeVeau-Rosen (2016) used a brief self-management worksheet in a non-experimental design descriptive study for hospitalized and out-patient children 12-18 years of age and caregivers of children 1-11 years of age. Time during each clinic appointment is at a premium; therefore, the development of an educational worksheet was tailored with the intent to save time. The length of the worksheet was hypothesized to be feasible enough to introduce into a routine care setting. Demographics, worksheet duration, topic selection, themes of self-management goals and barriers, and answers to Likert scale questions were quantified and reported descriptively. The brief worksheet for tracking behavior goals and self-management was found to capture patient-centered preferences for behavior change and facilitate goal-setting and self-management education in routine clinical care. This non-experimental study is considered a SORT level 3 (Ebell et al., 2004).

**Attitudes and Beliefs:** Strained attitudes and beliefs about asthma education may act as a barrier to quality education and, thus, quality asthma control. Peterson-Sweeney et al., (2007) used a non-experimental design descriptive questionnaire directed towards asthma self-management goals and targeted education. The authors stated illness representation is often a construct of an individual’s prior condition history and perceptions vary about asthma control and management despite asthma education received (Peterson-Sweeney et al., 2007). The study population was community based from six upstate New York pediatric clinics and included children 5-12 years of age with a diagnosis of asthma. The authors reported a positive impact on parent’s attitudes and beliefs about asthma management, a clearer understanding of asthma management, and a stronger partnership with their healthcare provider following asthma education. According to the SORT appraisal by Ebell et al., (2004) this constitutes level 2 limited-quality patient-oriented evidence.
Outcomes of In-Person Asthma Education

Turkeli, Yilmaz, and Yuksel, (2016) evaluated children between two and a half and 13 years of age in a cohort study to evaluate one aspect of asthma education completed during an office appointment and proper use of a metered dose inhaler (MDI) with spacer. Results demonstrated statistically significant improvement with spacer technique and asthma symptom scores after education about the specific steps of device use. This limited-quality patient-oriented cohort study is considered a SORT level 2 (Ebell et al., 2004).

Coffman, Cabana, Halpin, and Yelin, (2008) examined 37 studies in a meta-analysis that compared the effects of in-person pediatric asthma education on hospitalizations, emergency department (ED) visits and urgent provider visits for asthma. Coffman et al., (2008) indicated results suggest the implementation of pediatric asthma education was associated with reductions in mean number of hospitalizations and less odds of having ED visits for asthma-related symptoms. However, participating in asthma education did not affect the odds of hospitalization or mean number of urgent provider visits. Additional research is needed to evaluate benefits of asthma education based on age and severity of symptoms, important components, and cost/benefit of education. This meta-analysis is good-quality, with patient-oriented evidence and qualifies as SORT level 1 (Ebell et al., 2004).

Henderos, Janson, and Hedlin, (2009) evaluated a six-year follow-up of a randomized controlled study. The study involved 60 preschool children with asthma whose parents were educated about asthma self-management early in the diagnosis. The parents received in-person information and support about asthma through a series of four group discussions over six months. Findings indicated that straightforward and timely support for parents of children with asthma can have a positive impact on parents’ ability to self-manage asthma at home. This
limited-quality patient-oriented randomized controlled study is considered a SORT level 2 (Ebell et al., 2004).

Yilmaz, Turkeli, Sahin, and Yuksel (2014) evaluated the predictive value of the Test for Respiratory and Asthma Control in Kids (TRACK) for clinical parameters and investigated the validity and reliability of the Turkish version of TRACK. In a cohort study of 100 asthmatic children 4-years-old and younger TRACK was completed by the caregiver of the child and a pediatric allergist completed an asthma severity scale. The children were evaluated using the same parameters and TRACK one month later. Results demonstrated statistically significant TRACK scores as valid and reliable and were able to integrate the translated Turkish version of TRACK into practice. This limited-quality patient-oriented cohort study is considered a SORT level 2 (Yilmaz et al., 2014).

**Online Webinar Asthma Education**

Online live webinars are used across many disciplines to provide patient education about disease such as cardiac and diabetes (Archibald et al., 2015), however, there is less availability of patient disease-related education in webinar format specific to caregivers of children with asthma. Five studies were located and appraised that addressed the use of internet/web-based education for children with asthma and their caregivers. The studies lacked focus in the 0 to 4-year-old age group but instead often included older children and adults.

Brown and Odenthal (2014) studied the use of web-based asthma education in a rural population in a prospective cohort pilot study with 20 people aged 7-77 years. Asthma education via face-to-face real-time telemedicine with a Certified Asthma Educator (AE-C) was provided. Pre-bronchodilator spirometry and a survey (Asthma Control Test-ACT) was performed by pharmacy staff. Patients met monthly for the first three months and then every three months for a
total of one year. The authors found patients had improved objective and subjective control of their asthma over one year after education. Ebell et al., (2004) SORT level 2 is appropriate for this cohort pilot study of limited-quality patient-oriented evidence.

Chan et al., (2007) compared two groups of patients 6-17 years of age with internet-based home monitoring and in-person monitoring. A total of 120 patients with persistent asthma were randomly assigned to either the office-based or the recorded virtual education group. Results revealed the virtual patients had higher metered dose inhaler (MDI) and chamber technique scores, and greater adherence to asthma symptom diary entries than those who received office-based education. Ebell et al., (2004) SORT level 2 is appropriate for this prospective randomized trial of internet-based home asthma monitoring with limited-quality patient-oriented evidence.

Wiecha, et al., (2015) developed Boston Breathes (BB), a multidimensional asthma website for inner-city minority children aged 9-17 years and their healthcare providers. Patient and provider use of the website with asthma education delivered by streaming pre-recorded videos and providing peak flow meter instruction was compared with usual in-office care. Providers found BB to be a useful component of symptom monitoring and patient care in this prospective randomized pilot trial of 58 participants. Asthmatic children benefited from decreased wheezing episodes and reduced night-time waking. Parents benefited from increased amount of night-time sleep. Ebell et al., (2004) SORT level 2 is appropriate for this small prospective randomized pilot trial.

Meischke, Lozano, Zhou, Garrison and Christakis (2011) studied 283 parents and children with asthma to determine characteristics of parents who engaged (logged on) more often in an internet-based health survey compared with those who engaged (logged on) less often in the internet health survey. This was a sub-analysis of participants in a randomized controlled trial.
who tested the effectiveness of a pre-recorded web-based intervention to improve asthma control among 2-10-year olds. The authors found that younger parents were more likely to engage frequently on the internet-based health survey than older parents, yet the majority of participants reported a positive attitude toward the internet. The authors reported a need to find ways to increase engagement in web-based interventions for parents of children with asthma. This limited-quality patient-oriented evidence is considered SORT level 2 (Ebell et al., 2004).

Christakis, Garrison, Lozano, Meischke, Zhou and Zimmerman (2012) used an interactive website grounded in social cognitive theory to test for the effect of asynchronous asthma education on adherence to controller medications in this randomized controlled trial. The authors created a web-based intervention called My Child’s Asthma which utilized social cognitive theory as its theoretical framework. Christakis et al., (2012) stated social cognitive theory postulates that behavior is a function of dynamic and reciprocal relationship between personal, behavior and environmental influences. Parents (N = 603) were randomized to an asthma treatment arm (the My Child’s Asthma program) or an active control arm (the media reduction intervention). The study’s internet site prompted parents to assess their child’s asthma monthly regarding asthma severity, home care practices, functional status and parental beliefs related to daily medication use. Parents then received feedback on controller use and adherence strategies. Results at six months showed patients in the intervention group had higher adherence to daily controller medication than those in the control group. There was no significant difference between the groups at twelve months. This good-quality patient-oriented randomized controlled trial is a SORT level 1 (Ebell et al., 2004).
Overall State of the Evidence

This section of the paper provides a summary and synthesis of available literature related to the scholarly project. Each piece of literature was appraised. There are two level 1 articles, ten level 2 articles, and four level 3 articles. Quality, quantity, and consistency of literature was assessed. The Strength of Recommendation according to Ebell et al., (2004) based on the body of evidence from the preceding literature search is graded a B. There is inconsistent and limited quality patient-oriented evidence without clear recommendations in the literature.

Rationale for Project

The Centers for Disease Control and Prevention (CDC), (2015) estimates 935,000 children 0-4 years of age have asthma. Not all wheeze and cough is caused by asthma and wheezing during the first 3 years of life is often related to viral respiratory infections. Early childhood asthma, however, is frequently underdiagnosed or labeled instead with other terms such as chronic bronchitis, wheezy bronchitis, reactive airways disease, recurrent pneumonia, gastroesophageal reflux, and recurrent upper respiratory tract infections (Castro-Rodriguez, 2011). It is challenging to distinguish between these respiratory conditions during infancy and early childhood. Subsequently, children with asthma may not receive adequate therapy and their caregivers may not receive the necessary self-management skills through education.

The National Asthma Education and Prevention Program (NAEPP) suggests studying children in the 0-4-year age group, as well as children 5-11 years old and 12 years and older (NAEPP, 2007). There is limited data available about asthma in children 4 years of age and younger since the diagnosis has been challenging. When children less than 4 years of age are included in studies, they are usually not separated from older children. Therefore, it becomes difficult to tease out the best evidence specific to the very young children with asthma and those
who provide their care. There is a need for more information about asthma and very young children who rely on care by others. Section 3, Component 2: Education for a Partnership in Asthma Care (NAEPP, 2007) states asthma self-management education is essential to provide patients with the skills necessary to control asthma and improve outcomes. Young children cannot self-manage their asthma but instead receive care through a proxy.

Despite the literature that confirms asthma education is important to improve patient outcomes, barriers to receiving this education exist. Today’s busy families experience numerous and various barriers to quality asthma education. Families cite time constraints related to school, work, and family obligations as obstacles that limit their ability to attend in-person asthma education. Office visit time is limited, travel to in-person classes is time consuming, and the timing of classes may not fit busy work-life schedules. Inadequate caregiver asthma education, however, may impact children’s asthma control.

Thus, a time efficient, cost effective asthma education class that includes participation and active learning strategies is needed to improve access to education for the necessary asthma self-management skills as outlined in the EPR-3 (2007). Utilizing current live webinar technology to improve access to asthma education may promote caregivers’ ability to obtain the skills needed for self-management of asthma and ultimately gain confidence over their child’s asthma control. Therefore, a live webinar asthma education class is needed to provide asthma education for caregivers of young children.
Conclusion

This chapter outlined the body of literature related to asthma education for caregivers and their children. First, the rigorous and systematic search strategy was discussed to obtain literature relevant to the PICOT question. The SORT leveling and grading system was introduced. Each individual study was assessed using the SORT system and then the body of literature was further assessed using the SORT strength of recommendation grading system. The final overall body of evidence was given a grade of “B”.

Literature was appraised and synthesized. The articles included in this paper relate to information and knowledge about asthma in children 0-4 years of age, education available to parents and caregivers of young children with asthma, barriers to education experienced by caregivers, and literature about the use of online education and other educational modalities for childhood asthma, and asthma self-management.

Asthma education and self-management skills are an integral part of everyday care for parents and caregivers living with children with asthma. Access to asthma education classes may be a challenge for some families, yet this education is elemental to effective self-management skills. Through the use of current asthma education information and alternative teaching methods such as webinar classes to deliver asthma education, caregivers can gain the knowledge they need for asthma self-management with ease.
Chapter 3

Methods

The literature review chapter provided justification for the importance of educating caregivers of young asthmatic children about the disease and self-management. This chapter details the implementation plan for a study using a live webinar asthma education class for caregivers of 0-4-year-old asthmatic children and its effects on asthma control, participants’ perception of webinar-based learning, and effect on emergency visits and hospitalizations. Chapter 3 articulates the research design, population information, and protection of human subjects’ sections. Further, the live webinar intervention is detailed, and the measurement tools are described. A specific data collection section is articulated. The chapter concludes with a plan for data analysis for the project.

Design and Implementation Plan

The study used a one-group prospective cohort design with repeated measures to test the effectiveness of a live webinar educational intervention for caregivers of 0-4-year-old asthmatic children. The prospective cohort design allowed for the group of caregivers to be followed over time (Sipes, 2016). This group of individuals was similar since they have 0-4-year-old asthmatic children, but they differed by demographic characteristics and could be compared as such. Participants were accrued over time since the single webinar asthma class for this study was offered sixteen times. Participants completed the research measurement tools three times, beginning at the time of the asthma webinar class, one-month following the asthma webinar class, and three-months following the asthma webinar class. Research participants were recruited using a convenience sample in the pediatric pulmonology clinic. All participants received the single live asthma webinar intervention.
Research Questions

The primary PICOT research question to be answered through this project was: Among caregivers of asthmatic children 0-4 years of age, how does a live webinar asthma education class affect control one- and three-months following education? Additionally, there were three secondary aims for the project. Research questions that relate to the secondary aims were as follows: (1) does live webinar asthma education impact the need for emergency visits; (2) does live webinar asthma education impact the need for hospitalization; and (3) how satisfied are the caregivers of asthmatic children 0-4-years-old with the live webinar asthma education format?

Project Resources

The project site fully endorsed the project and agreed to assist as needed. The project was unfunded, with the DNP student researcher (Principal Investigator [PI]) absorbing all costs. Salaries were not taken into consideration since asthma education is a component of usual care.

The use of an existing quiet conference room at the study site, printing simple flyers and the use of existing computers kept project costs to a minimum. The facility information technology (IT) department worked closely and at length with the PI to set up Skype for Business© and enable the associated applications for smart-phones and computer tablets. Several staff members at the project site and an offsite DNP student willingly assisted with testing the Skype for Business© program on their computers and the application on their mobile devices.

Three certified asthma educator colleagues reviewed the webinar presentation and tested the webinar format to ensure function of the platform. A statistician was consulted to review data methods and was contracted to conduct data analysis for the project.
Population: Setting and Sample

The setting for the project was a pediatric pulmonology practice in the northeastern portion of the United States. The practice is part of a children’s hospital and consists of a main office and four satellite office locations, all serviced by the same providers and staff. Participants were recruited from all offices. All staff and providers were informed of the project and were able to recruit for participation.

A convenience sampling framework was used for the study (Melnyk & Fineout-Overholt, 2015). The convenience method of sampling was appropriate for this study because the children and their caregivers are patients of the practice and because of the usual care requirement of asthma education for all caregivers who have asthmatic children. The eligible participants consisted of adult caregivers with asthmatic children 0-4 years-old who visited the pediatric pulmonology clinic for a new or follow-up visit between April 2018 and May 2018 and agreed to take part in the study.

Inclusion and Exclusion Criteria

There was no plan for any monetary incentive to be offered to participants. Participants were motivated to attend the asthma education webinar as it being necessary information to take care of their young children while participating in a novel way to improve their understanding of asthma care and management. The ease of use and ability to access the live webinar on their computer or mobile device was promoted. Classes were offered twice a day in the morning and early evening, twice a week, for four weeks to allow for additional flexibility and ease of attendance.

Inclusion: Adult caregiver of an asthmatic child between 0-4 years of age; Child had a history of four or more episodes of wheezing, shortness of breath (SOB), or cough lasting more
than 24 hours; Diagnosis of asthma or Reactive Airways Disease (RAD) documented in the patient chart; Child lived with caregiver; Caregiver was in charge of child’s care; Caregiver was able to read and speak English; Caregiver was 18 years old or older; Caregiver had access to a computer (or mobile device) and stable internet connectivity. Exclusion: Caregivers of children with comorbid conditions that can affect pulmonary function including cystic fibrosis, cardiac disease, and gastroesophageal reflux disease.

Power Analysis

Prior to the research study implementation, a power analysis was calculated to determine the necessary sample size. Studies that have too few participants may be underpowered, and studies with too many participants may be overpowered. Determining the correct sample size minimizes the risk of findings based on chance (Melnyk & Fineout-Overholt, 2015). McCrum-Gardner (2010) stated power measures the ability of a test to reject the null hypothesis when it should be rejected and avoid Type II errors. Type II errors occur when an intervention worked but was accepted as not working (Melnyk & Fineout-Overholt, 2015). The minimum accepted power level is 80%. The significance level is the cutoff safeguard used to avoid accidentally rejecting the null hypothesis when in fact it is true (McCrum-Gardner, 2010). Alpha for this study was set at .05. A power analysis for this study conducted using G*Power for repeated measures analysis of variance (RM-ANOVA) with three measurements, power of .80, alpha level of .05, medium effect size (f=.25), resulted in a required sample size of 28.

Measurement Tools

Immediately prior to the asthma education webinar participants were provided with a secure link via anonymous enabled Survey Monkey© to access and respond to the first three surveys (consent, demographics and Test for Respiratory and Asthma Control in Kids
The participants were able to view the consent document and indicated their consent by clicking “next” and entering the survey. Participants were asked to complete 14 general demographic questions, and five questions related to asthma control using the TRACK questionnaire. This pre-intervention survey was designated T1. T1 was expected to take approximately ten minutes to complete. Follow-up questionnaires were completed two additional times. One month following the class, participants were reminded via email that the second set of questionnaires were due then sent a second email containing a secure link for Survey Monkey© to complete another TRACK questionnaire and four questions related to use of the webinar education (T2). During T2, there was also space for participants to provide additional comments about the live webinar. Three months following the class, participants were reminded via email that the third and final set of questionnaires were due then sent a second email containing a secure link for Survey Monkey© to complete the final TRACK questionnaire and four questions about emergency room visits and hospitalizations (T3).

**Demographic Questionnaire**

The demographic questionnaire was page # 2 in the T1 survey and was designed by the PI of the study. There were 14 demographic questions that addressed characteristics of the parents, the child, and the home environment. Examples of parent-related items are: age, gender and marital status. Examples of child-related items are: age and gender. Examples of environmental exposures include attending daycare, smoking in the home, and having pets with fur/feathers. See Appendix A for the full demographic questionnaire.

**Test for Respiratory and Asthma Control in Kids (TRACK)**

The primary outcome measure in this study was asthma control operationalized by the Test for Respiratory and Asthma Control in Kids (TRACK) questionnaire. The tool used to
assess asthma control was the TRACK questionnaire. The TRACK questionnaire was completed at T1, T2 and T3. This established and validated scale is a five-question questionnaire used exclusively for children younger than five-years-old with symptoms of asthma (Murphy et al., 2009). TRACK addresses impairment and risk of asthma control on a 5-point Likert-type scale. Answer options range from 0 points (> 4 times/week) to 20 points (not at all). Each item is scored from 0-20, in 5-point increments, for a total score range between 0-100. Higher scores represent better asthma control and a score of less than 80 suggests asthma may not be well-controlled (Murphy et al., 2009). In a second longitudinal study, researchers identified changes in TRACK scores of 10 or more points to represent clinically meaningful changes in respiratory control and asthma management should be re-evaluated (Zeiger et al., 2011).

TRACK was developed and validated by Murphy et al., (2009) from an original pool of 33-items about asthma risk and impairment. During two phases of their study (development and validation), items were administered to 486 caregivers of children less than 5-years-old with respiratory symptoms. Most caregivers were less than 45 years of age, female and Caucasian. Most children were aged 3 to 5-years-old with asthma. The content of the questionnaire reflected the NAEPP EPR-3 (2007) guidelines and the final five questions retained for TRACK are consistent with the EPR-3 asthma management guidelines for control (Murphy et al., 2009). Discriminate validity and construct validity were statistically significant with a p value <.001 for both development and validation samples. Reliability in the development sample had a Cronbach α of .75 and in the validation, sample had a Cronbach α of .71 (Murphy et al, 2009). Both Cronbach α scores are greater than the minimum accepted threshold for reliability of .70 (McCrum-Gardner, 2010). The researchers examined sensitivity and specificity for screening accuracy. A cutoff score of less than 80 was identified as the best balance between patients with
controlled and uncontrolled symptoms of asthma (Murphy et al., 2009). The TRACK tool was used with permission of the instrument developer. See Appendix B for the TRACK tool.

**Webinar Questionnaire**

The webinar questionnaire was completed only during the T2 survey and was designed by the PI of the study. There were four questions to address characteristics of the webinar and one write-in area for additional caregiver comments about the webinar platform and content. See Appendix C for the full webinar questionnaire.

**Emergency Visits and Hospitalizations Questionnaire**

The emergency visits and hospitalizations questionnaire was completed only during the T3 survey and was designed by the PI of the study. There were four questions to address emergency visits and hospitalizations in the past 6-months compared to the same 6-months in the prior year. See Appendix D for the full emergency visits and hospitalizations questionnaire.

**Live Webinar Asthma Education Intervention**

**Content of Webinar**

The educational intervention for this project was a single 1-hour live webinar asthma education class. The information contained in the webinar was offered using computer presentation package software. The live webinar presentation was the same presentation previously created by the PI and used during in-person asthma education classes for caregivers of children with asthma. All webinar classes were taught by the same person (PI) who is a nurse practitioner and a nationally certified asthma educator. All classes were taught by the PI to ensure consistency of conditions. Sipes (2016) stated consistency and a standardized method of a project is essential so that important elements are not overlooked. The webinar included a
PowerPoint presentation which covered information recommended by the current EPR-3 guidelines (2007) and time was allotted for questions and answers.

The content of the webinar adhered to the National Best Practice Guidelines for Managing Asthma (NAEPP, 2007) four vital components of effective asthma management. The third vital component of asthma education was the focus of the webinar. Basic facts about asthma included in the webinar are as follows:

- The role of airway inflammation and what happens to the airways during an asthma attack.
- Long-term control medications to prevent symptoms.
- Quick-relief medications to provide prompt relief of symptoms.
- Patient skills to take medications correctly (inhaler technique, use of spacer devices, and nebulizer).
- Identifying triggers and avoiding environmental exposures that worsen the patient’s asthma including triggers of allergens, irritants, and infection control.
- Self-monitoring to recognize early signs and symptoms of worsening asthma.
- A written asthma action plan to control asthma symptoms and adjust medication in response to signs of worsening asthma.
- When to seek medical care.

**Offerings of Webinar**

Days and times for class offerings were planned with caregiver convenience and flexibility in mind. Historically caregivers have preferred morning and early evening classes. The barriers identified by caregivers to in-person attendance related to busy schedules, travel time, cost of travel and time off work. Based on this historical knowledge and identified barriers, the
live webinar for the project period was offered twice a day, two days per week, for four weeks for a total of sixteen webinars. Caregivers participating in the study were asked to attend a single asthma education webinar on a day and time of their choosing.

**Platform of Webinar**

The webinar intervention was delivered at a scheduled time via encrypted Skype for Business© using a secure hospital server with Health Insurance Portability and Accountability Act (HIPAA) compliant firewalls in place. This format allowed for screen sharing of the presentation slides, live narration by the PI, and visualization of the presenter to allow for demonstration of spacer with mask and metered dose inhaler (MDI) technique. The webinar concluded with ten minutes for questions and answers by the participants. There was a chat box feature available during the presentation if participants wished to type in anonymous comments or questions. The link to the pre-intervention (T1) survey was placed in the chat box for easy access by participants. The Skype for Business© platform was tested with a select group of peers to ensure viability of screen sharing, audio and visual capabilities. The platform was also tested to confirm accessibility on laptop, smart phone, and computer tablets for participant convenience.

**Data Collection Procedures**

**Recruitment and Webinar Scheduling**

Recruitment for the study was conducted over an 8-week period from April to May 2018. Participants were identified by providers, nurses and medical assistants in the pediatric pulmonology center clinic from daily schedules. Potential participants were given a flyer by the provider, nurse or medical assistant. The flyer explained the webinar asthma education session, asked for voluntary participation in the study if they met inclusion criteria, and provided
information about registering for the webinar. All providers (except the PI), nurses or medical assistants across the four offices informed caregivers about the live webinar class and study. Interested participants called or emailed the PI to register for a live webinar convenient to their schedule. The Skype for Business© live webinar link used to log into the class was emailed to participants the day before the class. Participants were notified that the link was for their use only and was not to be shared with anyone. Participants in attendance were able to be identified only by the PI. Participants were asked to provide the last four numbers of their primary phone number at the top of each survey (T1, T2, & T3) for data matching purposes only. Office staff was audited Monday, Wednesday and Friday of each study week to assess their adherence with promotion of classes.

**Webinar Class and T1 Data Collection**

Caregivers (subjects) of asthmatic children 0-4 years of age were identified by the pediatric pulmonology staff and asked to participate in the research study to evaluate a live webinar asthma education class and the effect it has on their child’s asthma control. Participants signed onto their own computer or mobile device and participated in a single, live 1-hour asthma education webinar through encrypted Skype for Business©. Participants were asked to download Skype for Business© onto their computer or install the free application on a mobile device. This task was simple and took only minutes to complete. It was not necessary to create an account in Skype for Business© to participate in the live webinar.

Prior to the live webinar participants were provided a link in the chat box of the live session. The link directed participants to the anonymous enabled Survey Monkey© in a separate window of their browser where they viewed and confirmed consent, provided the last four numbers of their primary phone number, completed the demographic questionnaire and
completed the TRACK questionnaire (T1). It took approximately ten minutes to complete the T1 survey. Participants were then able to return to the Skype for Business© window and the webinar began. There were TWO additional times when survey questionnaires were completed; 1-month and 3-months following the webinar class. In the event a participant was a “no-show” to the webinar they registered to attend, a follow-up email was sent with available dates and times to re-register if they desired. Figure 1 provides an illustration of pre-data collection pieces of the project, recruitment, and data collection at T1.

**Figure 1: Planning and Implementation Phases**

**T2 and T3 Data Collection**

Study participants were contacted 1-month following the educational intervention and asked to complete a second TRACK, and four questions with space for additional write-in comments about the webinar experience. This survey (T2) was deployed via Survey Monkey©.
Study participants were contacted again at 3-months following the educational intervention and asked to complete a third and final TRACK survey and four questions related to emergency room visits and hospitalizations. This survey (T3) was deployed via Survey Monkey©. Completion time for the T2 and T3 surveys was estimated at approximately 2-minutes.

Electronic reminders were sent by the PI to all study participants the week follow-up surveys were due, and the PI sent a second electronic reminder with the Survey Monkey© link two days prior to the survey due date. The PI sent one additional reminder to all study participant non-responders on the last day of the week their survey completion was due. Reminders were used and are an accepted means to reduce attrition when completing online surveys (Sipes, 2016).

Partial participation was allowed in the study. Drop-outs who completed only the original T1 survey were included in the study as such and reported as a percentage. Drop-outs who completed the original T1 survey and then completed either the T2 or T3 surveys were also included in the study and were reported as such as percentages. Figure 2 provides an illustration of tracking surveys.

**Figure 2: Collection of Surveys T2 and T3**

**Human Subject Review**

The protection of human subjects is paramount in any research study (Melnyk & Overholt, 2015). Plans to protect all participants were maintained throughout the project in
accordance with the Institutional Review Board (IRB) at Georgetown University and the study site. The DNP project was granted approval with an expedited review at Georgetown University, and approved by the study site IRB with a status of exempt. Intentional decisions to protect participants were done during the design of the project. Providers and staff members at the study site recruited participants. The PI did not recruit participants and was not an assigned provider for any participant’s child.

Skype for Business© is both patient information and information-technology compliant through Office 365 at the project site. Healthcare Information Portability and Accountability Act (HIPAA) was passed by the Federal Government in 1996 and was created to protect the information of patients. In addition to HIPAA, the Health Information Technology for Economic and Clinical Health Act (HITECH) was signed into law in 2009 to promote the adoption and meaningful use of health information technology (Microsoft, 2017). HIPAA/HITECH mandates that any transmission of patient information over a computer network must be done so in a secure and auditable manner (Microsoft, 2017).

All caregivers were given the option to attend the webinar even if they did not wish to participate in the study. Only those who agreed to participate were asked to consent and complete the surveys. All potential participants were informed of the purpose of the research and participants were informed that participation in the study was voluntary and they had the right to refuse or leave the study without any changes in the provision of care for their child. Research ethics require participants be informed they may leave a research study at any time. When withdrawing from the study, the participant should let the research team know that he/she wishes to withdraw. A participant may provide the research team with the reason(s) for leaving the study but is not required to provide their reason (Sipes, 2016).
There were very few risks associated with participation in the study. It was possible, but unlikely, that this study could cause emotional distress if the topic of asthma was uncomfortable for the participant. In order to reduce this risk, time to ask questions and address any concerns was allotted during the live webinar. If a participant identified concern for their child, such as severe uncontrolled asthma, the investigator was prepared to consult with the collaborating physician and refer the caregiver for additional specialist evaluation as recommended by the EPR-3 (2007) guidelines.

**Data Management and Protection**

Skype for Business© is secure and was used only to deliver the presentation content. No data were collected through Skype for Business©. The PI was responsible for obtaining a participant’s email address and for scheduling the webinar class. The email addresses were kept confidential on a password-protected computer and the participants were blinded to each other during the webinar. No internet provider (IP) address was collected from any participant.

Data were collected through Survey Monkey© and only accessible by the PI. Survey Monkey© uses Secure Sockets Layer (SSL) Encryption, a protocol developed for transmitting private documents or information via the internet. SSL creates a secure connection between the client and a server, encrypting sensitive information being transmitted through the web page. SSL encryption was automatically enabled for all surveys in Survey Monkey©. The anonymous setting on Survey Monkey© was used to ensure no identifiable data were collected.

Due to the nature and design of the study, anonymity was not possible. It was imperative that participants be accurately matched from pre-education survey (T1), to 1-month survey (T2) and 3-month survey (T3). All data was strictly confidential and participant email addresses and unique ID numbers for matching were available only to the PI.
Data were kept on a password-protected home computer only accessible by the PI. No hardcopy data were collected. No data were collected from any patient chart. All data was self-reported by the caregiver of the asthmatic child in the Survey Monkey© electronic format. Only aggregate data were reported for the purposes of dissemination. The research data will be securely stored for a minimum of three years on the PI’s password-protected home computer. After three years, all files related to the study will be deleted from the computer and the trash bin in the computer will be purged.

Data Analysis

Data were analyzed using Repeated Measure Analysis of Variance (RM-ANOVA) for the primary research question of: Among caregivers of asthmatic children 0-4 years of age, how does a live webinar asthma education class affect control one- and three-months following education? RM-ANOVA was used for normally distributed interval-level data and RM-ANOVA testing measured the respondents before and at two time points after the educational intervention. RM-ANOVA measures responses by the same participants at multiple points in time as well as the variation present among the groups (Melnyk & Overholt, 2015). In order to include those participants who only had two data points, paired samples t-tests were also used.

Chi-square test was the nonparametric method used for nominal (categorical) data to test the difference in proportions in two or more independent groups (Sylvia & Terhaar, 2014). Descriptive analysis was utilized for the demographic data with close-ended quantitative measures using Statistical Package for the Social Sciences (SPSS) software, version 25. The mean, standard deviation, and the frequency of the variables were reported for the sample and categorized into five domains of the scale identified by the TRACK tool developers.
Content thematic analysis was completed on the qualitative data from the open-ended question. Consistent themes reported by participants regarding their responses to the open-ended question “Any additional comments about the webinar format or the information given that you think would be helpful for us to know” were identified and reviewed by the PI and statistician. Themes identified are displayed in a table in chapter 4.

The two secondary aims for the project included satisfaction with the live webinar asthma education format and its impact on emergency room visits and hospitalizations. Responses to these questions were analyzed using descriptive statistics. Descriptive statistics summarized the data with the purpose of describing what occurred in the sample (Sylvia & Terhaar, 2014). Frequency distributions were used to describe the number of answer selections and include the percentage of respondent answers. Sylvia and Terhaar (2014) stated frequency distributions and descriptive statistics are helpful for assessing data quality.

**Conclusion**

This chapter outlined the methods related to a study using live webinar asthma education for caregivers and their 0-4-year-old asthmatic children. First, the design and implementation plan of a one-group prospective cohort study using repeated measures to test the effectiveness of a live webinar was discussed. The primary research question was presented using the PICOT format: Among caregivers of asthmatic children 0-4 years of age, how does a live webinar asthma education class affect control one- and three-months following education? Two secondary research aims were then articulated.

Project resources including necessary technology were described before detailing the population sample and setting for the live asthma education webinar. Inclusion and exclusion criteria was detailed, and necessary sample size was addressed. Measurement tools including a
demographics tool, TRACK questionnaire, webinar use questions, emergency room visits and hospitalization questions and how they were deployed were explained in detail. The live webinar asthma education intervention was explained in detail, including the content and format of the webinar as well as frequency of class offerings. Data collection procedures were then described and included recruitment, webinar scheduling procedures, data collection time points and how data was managed and protected. The protection of participants was detailed in a section about human subject review. The next section of the paper, Chapter 4, will report the results of the project.
Chapter 4

Analysis of Results

In this chapter, results from the project data collection and analysis are presented. The purpose is to report the data using statistical methods to understand the impact of the asthma webinar intervention. Traditionally a \( p \) value of .05 or less is considered a statistically significant result in healthcare research (Melnyk & Fineout-Overholt, 2015). This significance level means there is less than a 5% chance that the null hypothesis is rejected when it is true. The alpha of .05 has been used in this analysis as the threshold of statistical significance. The project and data collection began in April of 2018 and ended with the final collection of T3 surveys in August, 2018.

Participants

A total of 30 eligible caregivers enrolled in the study, attended the asthma education webinar, and completed the online surveys. As mentioned in chapter 3, a \textit{a priori} power analysis for this study resulted in a required sample size of 28. Of these enrolled participants, 30 completed surveys during at least one data collection point, and 21 (70\%) had all three data collection point surveys completed. Five participants (16.7\%) submitted two of the surveys and four (13.3\%) submitted data only one time. Respondents who completed all data points and respondents who only completed some data points were included in the results as partial participation was allowed.

The sample of respondents (N=30) who completed the T1 demographics questionnaire in addition to the first TRACK tool, was statistically similar, on most variables, to the final sample size of respondents who completed the demographic questionnaire plus all three TRACK tool
surveys (n=21). The caregiver sample was comprised of a highly educated group with at least a 4-year college degree (90%), almost all female, and predominantly white and married. The caregivers average age was about 35 years old for all respondents (N=30). The children of the caregivers with full data (n=21) were predominantly male as were the children of all respondents (N=30). The child’s average age was 2.4 years. More than 85% of the children attend daycare or preschool. Nearly half of the caregivers reported having a pet in the home with fur or feathers and none of the respondents reported smokers in the home. Although 76.2% of the respondents who completed all three data points reported reading about childhood asthma on their own, only 9.5% reported attending a prior education class about childhood asthma. All participants and those with full data differed statistically on two demographic characteristics. Participants who believe their child has asthma was 76.2% and participants not sure if their child has asthma was 19%. Table 1 summarizes the demographic sample characteristics.
Table 1

Demographics

<table>
<thead>
<tr>
<th></th>
<th>All Respondents (N =30)</th>
<th>With Full Data (n = 21)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td><strong>Caregiver Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>3.3</td>
<td>0</td>
</tr>
<tr>
<td>Female</td>
<td>28</td>
<td>93.3</td>
<td>20</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>3.3</td>
<td>1</td>
</tr>
<tr>
<td><strong>Child Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>20</td>
<td>66.7</td>
<td>15</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>33.3</td>
<td>6</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>23</td>
<td>76.7</td>
<td>15</td>
</tr>
<tr>
<td>African-American/Black</td>
<td>3</td>
<td>10.0</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>10.0</td>
<td>3</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>3.3</td>
<td>1</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>3</td>
<td>10.0</td>
<td>1</td>
</tr>
<tr>
<td>Married</td>
<td>26</td>
<td>86.7</td>
<td>20</td>
</tr>
<tr>
<td>Widowed</td>
<td>1</td>
<td>3.3</td>
<td>0</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or equivalent</td>
<td>1</td>
<td>3.3</td>
<td>1</td>
</tr>
<tr>
<td>Some College</td>
<td>2</td>
<td>6.7</td>
<td>1</td>
</tr>
<tr>
<td>4 Year College Degree</td>
<td>15</td>
<td>50.0</td>
<td>10</td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>9</td>
<td>28.1</td>
<td>7</td>
</tr>
<tr>
<td>Doctoral or Professional Degree</td>
<td>3</td>
<td>10.0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Believes Child has Asthma</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>59.4</td>
<td>16</td>
<td>76.2</td>
</tr>
<tr>
<td><strong>Not Sure if Child has</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>10</td>
<td>33.3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Has Other Children with</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>4</td>
<td>12.5</td>
<td>2</td>
</tr>
<tr>
<td><strong>Attended Prior Education on</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>3</td>
<td>10.0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Read about Childhood</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma on Own</td>
<td>21</td>
<td>70.0</td>
<td>16</td>
</tr>
<tr>
<td><strong>Child Attends Daycare or</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool</td>
<td>26</td>
<td>86.7</td>
<td>18</td>
</tr>
<tr>
<td><strong>Pets in the Home</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>46.7</td>
<td>10</td>
<td>47.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregiver Age (in years)</td>
<td>34.8</td>
<td>7.7</td>
<td>35.9</td>
<td>5.1</td>
</tr>
<tr>
<td>Child Age (in years)</td>
<td>2.4</td>
<td>1.2</td>
<td>2.3</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Note:  p value based on chi square for categorical variables and independent samples t -test for continuous variables, comparing respondents with full data to those without full data.

* Two variables for which the groups were different are “Believes Child has Asthma” and “Not Sure if Child has Asthma” p < .05.
Asthma Control

The primary aim of the project was to evaluate whether a single live webinar asthma education class for caregivers of preschool children effects asthma control at one and three-months following education. The five-question TRACK tool which was developed exclusively for children younger than 5-years-old and validated using a sample of 486 children was utilized (Murphy et al., 2009). Scores on the TRACK range between 0-100. Higher scores represent better control and a score of less than 80 suggests asthma may not be well controlled. Zeiger et al., (2011) identified changes in TRACK scores of 10 or more points to represent clinically meaningful changes in asthma control.

Repeated Measures ANOVA indicated a significant increase of TRACK scores over time, \( F(2, 40) = 5.128, p = .010 \), partial eta squared = .204 (large effect size). In order to include those who only had two data points paired sample t-tests were run on respondents who completed T1 and T2, and those who completed T1 and T3. There was not a statistical change in the respondents who completed T1 (pre-education webinar) and T2, (one-month post education webinar). TRACK score Mean Time 1 = 60.2, SD = 2.1, to Mean Time 2 = 69.4, SD = 24.8, N = 25, \( t(24) = 1.948, p = .63 \). However, those who completed T1 (pre-education) and T3 (3-months post education) had a mean TRACK score at T1 = 59.5, SD = 21.7 to Mean Time 3 = 79.3, SD = 15.9, N = 22, \( t(21) = 3.286, p = .004 \) indicating a significant change from T1 to T3 for the 22 people with both of those time points. Table 2 summarizes the TRACK score over time.
Table 2

**TRACK Score over time (n = 21)**

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>59.3</td>
<td>22.2</td>
<td>60.0</td>
<td>15</td>
<td>90</td>
</tr>
<tr>
<td>Time 2</td>
<td>68.6</td>
<td>25.5</td>
<td>70.0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Time 3</td>
<td>79.1</td>
<td>19.3</td>
<td>80.0</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: Higher TRACK scores indicate better control of asthma; scores of 80 or higher indicate good control.

## Webinar Format

The first secondary aim of the project was to evaluate how satisfied the caregivers of these young children were with the live webinar asthma education format. The information presented in the asthma education class webinar was identical to that presented in the traditional in-person asthma education classes used at the pediatric pulmonology practice. More than 84% of the respondents (n = 25) reported the live asthma webinar was simple to use, convenient, contained helpful information and they would recommend the webinar to family and friends. Additional write-in comments were also positive and included the following:

“I wish I had taken the webinar earlier in our asthma journey. The availability of more time options was extremely helpful for my being able to be able to participate.”

“I think it would be helpful to also have a video of the class to watch on your own time.”

“Very helpful” was also reported and several comments simply stated, “Thank You.” One participant had technical challenges with her computer but was ultimately satisfied with the information received in the webinar. Not all participants included a write–in comment. Table 3 summarizes the webinar ratings.
Table 3

Ratings of Webinar (n = 25)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree n (%)</th>
<th>Agree n (%)</th>
<th>Disagree n (%)</th>
<th>Strongly Disagree n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The live webinar technology was simple to use</td>
<td>16 (64.0)</td>
<td>5 (20.0)</td>
<td>2 (8.0)</td>
<td>2 (8.0)</td>
</tr>
<tr>
<td>The live asthma webinar was convenient</td>
<td>12 (48.0)</td>
<td>9 (36.0)</td>
<td>2 (8.0)</td>
<td>2 (8.0)</td>
</tr>
<tr>
<td>The live asthma webinar information was helpful</td>
<td>11 (44.0)</td>
<td>10 (40.0)</td>
<td>2 (8.0)</td>
<td>2 (8.0)</td>
</tr>
<tr>
<td>I would recommend the live asthma webinar to family and friends</td>
<td>13 (52.0)</td>
<td>9 (36.0)</td>
<td>1 (4.0)</td>
<td>2 (8.0)</td>
</tr>
</tbody>
</table>

Emergency Room Visits and Hospitalizations

The second secondary aim of the project was to evaluate and compare the incidence of emergency room visits and hospitalizations. Participants were asked how many times their child with asthma had been to an emergency room or hospitalized in the past six months and in the same six months of the prior year. The children of the caregivers who completed all three points of data collection (n=21) had minimal hospital or emergency room visits ranging from zero to two visits during the previous 6-months in the study year and during the same 6-months in the prior year. More than 60% of caregivers reported zero emergency room visits and more than 70% reported zero hospitalizations for their asthmatic children during the current and prior year.

Conclusion

In this chapter, results from the project data collection and analysis were presented. The purpose was to report the data using statistical methods to understand the impact of the asthma webinar intervention. Data results for participant demographics, asthma control, webinar format evaluation and emergency visits and hospitalizations were presented and detailed.
Chapter 5
Discussion of Findings

In this chapter findings related to the research questions about asthma education for caregivers of preschool children and the impact on asthma control, participants’ perception of webinar-based learning, and the effect on emergency visits and hospitalizations are summarized. General conclusions based on the findings of the study presented are described. The strengths and limitations of this project are considered and implications and recommendations for nursing practice using webinar asthma education are presented. This chapter concludes with recommendations for future research.

Participant Characteristics

It was not surprising that the participants who are the caregivers of preschool children in the study were primarily female, white, highly educated, with an average age of 35 years. These demographics are representative of the population in the area of the study site (United States Census Bureau, 2017). The population was also similar to that of the TRACK tool developed and validated by Murphy et al. (2009). Most of the caregivers in the Murphy et al. (2009) study were less than 45 years of age, female and white, and most of the asthmatic children were aged three to five years old. The age of the participants in this study and the Murphy et al. (2009) study demonstrates they are typically Millennials. The Millennial Generation includes people born between 1980 and 2000 (Livingston, 2017). The use of a live webinar for asthma education is compatible with this technologically savvy generation who finds web-based services efficient and prefers communication through email, chat or video (Johanson, 2017).
Males were the primary gender of the asthmatic children in the group (71.4 %) in the project, with an average age of 2.3 years. This demographic characteristic is consistent with literature related to childhood asthma. Hubaida and Newcomb (2017) explain a gender disparity associated with disease severity is well-established in childhood asthma and changes with age. As children, boys have an increased prevalence of asthma compared to girls (11.9% vs. 7.5%, respectively) and boys are also twice as likely as girls to be hospitalized for an asthma exacerbation (Hubaida & Newcomb, 2017).

**Asthma Control**

As anticipated, scores on the Test for Respiratory and Asthma Control in Kids (TRACK) improved over time. The scores nearly reached the benchmark of 80 (indicating good asthma control) with a mean score three-months post webinar education (T3) of 79.1, and a median score of 80. Zeiger et al. (2011) stated changes in TRACK scores of 10 or more points represent clinically meaningful changes in asthma control. Findings from this study reveal median score between T1 and T2 and T2 and T3 each increased 10 points.

Although the benchmark was not reached between T1 and T2 for asthma control, the 10-point increase was representative of a positive change. Adjustment of treatment plans following education takes time, therefore changes may not be seen as quickly as one month. Henderos et al. (2009) in a six-year follow-up after asthma education for caregivers of preschool children stated successful symptom management requires an alliance with their healthcare providers, reinforcement of information and practice with the skills learned.

It is acknowledged that higher TRACK scores may have been influenced by the time of year as viral illnesses are at their lowest in the northeastern U.S. from late spring through summer. Viral illnesses are a common trigger for cough, wheeze and dyspnea in young children.
(Castro-Rodriguez, 2011). The Centers for Disease Control (CDC) (2015) identify October to May as viral season with onset ranges from mid-September to mid-November, season peaks from late December to mid-February, and season offset ranges from mid-April to mid-May in all 10 United States regions, except Florida.

Attendance at daycare increases exposure to viral illnesses and daycare has been known to be a major risk factor for respiratory tract infections (RTIs) in children for over 30 years (Schuez-Havupalo, Toivonen, Karppinen, Kaljonen & Peltola, 2017). Schuez-Havupalo et al., (2017) stated RTIs in this age group constitute an important health problem and young children are particularly vulnerable to daycare-related effects of respiratory virus infections and an increased lifetime risk of asthma. A considerable proportion of children in this study, more than 85%, attend daycare. Despite this large number of daycare attendees, TRACK scores indicated considerable asthma control in these children. Controlled asthma may allow these children to better tolerate the RTIs.

Webinar

Webinars are a popular method of teaching across many disciplines. Webinars provide convenience for both the presenter and attendees, is cost-effective, and allows for easy interaction in real time (Brown & Odenthal, 2014). Caregivers who participated in the study were able to access the asthma webinar from either a computer or a mobile device quickly and at no cost. The technology performed well overall with minimal disruptions. The researcher found Skype for Business© was simple to access and provided a strong platform for screen sharing of the educational material presented. Participants were able to access the webinar with minimal instructions on how to install the free Skype for Business© application on their computer or mobile device. Several participants experienced internet connectivity issues on their end that
resolved before the start of the webinar. Some of these issues were related to the level of internet access available at their place of business and was resolved by using their personal device. When providing webinar education, it may be helpful to have had participants check accessibility from their workplace prior to class if this is where they plan to view the webinar.

The webinar educational class was offered on numerous days and times, including times during the day and evening for a total of 16 webinars. The researcher had secure remote access to the webinar which provided convenience and flexibility for times offered. Previous information from the study site identified that multiple time options for education are needed to accommodate peoples varied and complex schedules. Participants were generally not willing to rearrange their schedules to attend the asthma education webinar, but rather looked for a webinar offering that was convenient for them. Some of the reluctance to accommodate for a class time may also be related to their beliefs about the severity of their child’s asthma or if the child truly has asthma. Despite intentional decisions about providing numerous offerings on varied days and times, participants still requested other options for attending the webinar. An important lesson learned is that people have very varied schedules in their everyday lives, therefore, flexibility with webinar offerings is paramount to decrease barriers.

The information contained in the live asthma webinar was identical to the traditional in-person class information. Participants were able to visualize the presentation, the presenter and were able to ask questions verbally or through the chat box. The chat box was viewed as an asset by the researcher and participants who were able to post anonymous questions during the webinar and have them answered throughout the course of the class or at the end.

Comments about the webinar information and use of the web-based platform were all-around positive. Participant comments expressed satisfaction with ease of use, flexible
scheduling and contents of the webinar. Participants found the information helpful and 88% stated they would recommend the live asthma webinar to family and friends. This satisfaction with web-based learning along with improved knowledge is consistent with findings in the literature. Reznik and Ozuah (2004) reported educational videoconferencing was a convenient and effective means to provide asthma education to immigrant families in New York City, and those who participated had significant gains in asthma knowledge at post-test. Chan et al. (2007) found in their study comparing internet-based asthma education with office-based care that both were effective, however, the internet educated group had a better understanding of inhaler use. Wiecha et al. (2015) reported in their study of a web-based asthma self-management system that there was significant improvement in asthma control and caregivers expressed satisfaction with the use web-based learning. Johanson (2017) reminds us that integrating technology into patient teaching will allow us to provide better interventions specific to the needs of the Millennial Generation.

Overall, the live webinar asthma education format implemented in this DNP scholarly project was not inferior to the traditional in-person class already in existence. It is possible that live webinar education may be a preferred method to teaching and learning by both presenter and participants.

**Emergency Room Visits and Hospitalizations**

Previous research at the study site indicated a significant decrease in emergency room visits and hospitalizations following asthma education. Emergency room visits in that study declined to less than 1% for children under direct care of the subspecialty pediatric pulmonology group and the hospital admission rate for pediatric asthma declined to 4.5% for all pediatric asthma admissions through the emergency room (Breitwieser, Sawicki & Atlas, 2003). This low
rate of emergency room visits and hospitalizations continues within the practice. Further, it is important to understand that children who are under the care of providers in this pulmonary specialty office historically have few emergency visits and hospitalizations. Of the 21 participants in the current study, 4.8% reported two or less emergency visits or hospitalizations in the prior year. Although TRACK scores were significant for asthma control in this current study, it cannot be concluded that the asthma education webinar influenced emergency room visits or hospitalizations.

Several factors may have influenced the accuracy of recall by caregivers about the prior year’s emergency care and hospitalizations. This recall bias needs to be taken into consideration, as does compliance and adherence with individualized treatment plans. Cleveland (2013) explains noncompliance is related to increased emergency care and results from a number of factors that include financial and cultural barriers along with misconception about the disease and the importance of treatment when asthma symptoms flare up.

**Limitations**

There are several limitations of this study which warrant mention. First, the study was conducted within a single area of practice where a convenience sample was utilized (Melnyk & Fineout-Overholt, 2016). The participants self-selected their participation which creates a sampling bias. Sipes (2016) stated that when using methods other than random selection there is a greater risk of introducing bias, however, the use of pre/post-measurement in the same group over time can remove the bias. Second, the population’s racial and ethnic make-up was consistent with the surrounding area of the study site and was homogeneous, which may limit generalizability to the overall population. The relatively high socioeconomic and educational status of the study population may influence the extent to which live asthma webinar education
could be used with a less advantaged population. Third, the study was limited to an English-speaking population, although the asthma webinar information could be easily translated into other languages.

A fourth limitation was related to question five on the TRACK tool which asks about the use of oral corticosteroids and how often in the past 12 months oral corticosteroids were needed. One respondent replied to this question that his or her child required the use of oral steroids more than four times a week for the past 12 months. It is unlikely that a young child in this study had such severe asthma that they required almost daily oral steroids. Although the difference between inhaled and oral medications was reviewed during the webinar, some confusion may have existed among caregiver participants between inhaled corticosteroids that were inhaled through the mouth and oral corticosteroids that were swallowed. In spite of these limitations, this study has important implications for an impact on pediatric asthma management.

**Implications for Practice**

Novel and convenient ways to provide healthcare education to patients and their families are needed in today’s busy lives. An interactive asthma education webinar is an effective and feasible alternative format for patient and family education. Our population is well connected to technology, therefore web-based education is not only convenient and practical, but also easy to incorporate into everyday practice. Telehealth is a tool that uses internet technology, such as live webinars, to remotely provide health services. Webinar education is an arm of Telehealth that allows for live, interactive communication between healthcare professionals and patients. The federal Health Resources and Services Administration defines telehealth as “the use of electronic information and telecommunications technologies to support and promote long-distance clinical healthcare, patient and professional health-related education, public health, and health
administration.” (Hayward & Heaton, 2014). It encompasses health-related services, including patient education, provider consultation and training, and remote care and home monitoring.

As we look for more effective and efficient healthcare systems, clearly web-based educational information and the use of telehealth is here to stay. The adoption and expansion of telehealth presents policy questions for government leaders. State policy typically determines what constitutes telehealth; the types of technologies, services and providers that are eligible for reimbursement; where telehealth is covered and how; and other guidelines (Hayward & Heaton, 2014).

**Recommendations for Nursing Practice**

Asthma is a chronic condition that requires comprehensive patient and caregiver education. Three important recommendations for practice are discussed. First, providing a format that allows for ease of access to this education will promote class attendance. Including live webinar asthma education into practice is a convenient and alternative form of patient education that can facilitate asthma control. It is unclear if offering a pre-recorded version without live attendance has benefit since viewing the educational information is left to the discretion of the patient or caregiver and information may go un-accessed. The advantage of live webinar education use is to afford an opportunity to ask questions, clarify any misconceptions that may exist, and verify attendance. Recording the live webinar for later viewing should be considered as a way to augment the live session.

Second, when to offer the webinar is a question best left to individual practices and the population served. Multiple offerings at different times of the day and evening may be necessary to meet patient and caregiver needs. Times should be flexible and take into consideration the needs of the family. Caregivers require a time that allows them to focus and concentrate on the
information in an undisturbed manner. Lunchtime may be suitable to attend an educational webinar for some people, yet others may find an evening webinar after the children are in bed to be their best learning time.

Finally, web-based education is a convenient and effective means of providing patients with valuable information related to their health and disease management. Prior to incorporating web-based programs into practice, however, it is important to also understand the internet accessibilities and demographics of the patient population within a particular setting to determine if in-person or live webinar can be utilized since stable internet access is required.

**Future Research**

The focus of this research project was on preschool aged asthmatic children and their caregivers. Additional asthma research with preschool age asthmatic children is needed to strengthen the knowledge base in this under researched population. Asthma carries a heavy disease burden and the ways in which asthma control impacts the quality of life for families with young children is an area to further explore. An additional area for future research is that of the impact of live webinar educational offerings on other health conditions. The model used for live webinar asthma education has potential to be modified to accommodate other disease entities and be transformed into other languages.

**Conclusion**

This chapter outlined the participant demographics related to caregivers and their children. First, the demographics of the caregivers were primarily female, white, highly educated and had an average age of 35 years which is typical for the study site surrounding area. The children were primarily male with an average age of 2.3 years.
Improvement of asthma control was identified and conceptualized using the Test for Respiratory and Asthma Control in Kids (TRACK) which indicated statistically significant improvement in scores over time. Reasons for these improved scores were explored and include improved caregiver knowledge about asthma management in their preschool children along with daycare exposure and the influence of the time of year and decrease viral illness prevalence.

Webinar use and participant satisfaction about the platform was explored. Convenience and flexibility of webinar offerings were reviewed along with participant comments. Literature pertaining to the experience of web-based education was reviewed and included. This was followed with comments about hospitalizations and emergency visits.

Limitations of the study, and implications and recommendations for nursing practice were explored. The chapter concluded with proposed future research to strengthen the knowledge base of web-based education for patients and their families, and in particular those with preschool asthmatic children. Although the literature identifies barriers to education do exist, findings from this study support that live webinar asthma education is one way to overcome these barriers and positively impact asthma control in young asthmatic children.
Appendix A
Demographic Questionnaire

If TWO caregivers are present at the webinar, please choose ONE to provide information

1. What is your age? ________ Prefer not to answer________________

2. What is your gender? Male___ Female ____ Prefer not to answer________________

3. What is the age of your child with asthma? __________ Prefer not to answer__________

4. What is the gender of your child with asthma? Male ____ Female____ Prefer not to answer__________

5. What is your race or ethnicity? White____ African-American/Black ____ Hispanic/Latino ___ Asian ____ Native American ___ Mixed ____ Other ______ Prefer not to answer____________

6. What is your current marital status?
   Single_____ Married______Separated______ Divorced______ Widowed______ Prefer not to answer____________

7. How many years of schooling have you completed?
   Grammar School_____ High School or equivalent_____
   Vocational/Technical School _____ Some College_____
   College Graduate (4 year) _____Master’s Degree____
   Doctoral Degree _____ Professional Degree (MD, JD, etc.) _____ Prefer not to answer________

8. Do you believe your child has asthma? Yes___ No____ I’m not sure____ Prefer not to answer________

9. Do you have other children with asthma? Yes____ No____ I’m not sure____ Prefer not to answer________

10. Have you attended an asthma education class prior to this class? Yes_____No________ Prefer not to answer________

11. Have you read information about childhood asthma on your own?
    Yes____ No______ Prefer not to answer__________

12. Does your child attend daycare or preschool? Yes ___ No _____ Prefer not to answer____________

13. Does anyone in the household smoke? Yes____ No_______ Prefer not to answer____________

14. Do you have any pets with fur or feathers in your home? Yes_____ No _____ Prefer not to answer____________
Appendix B

Test for Respiratory and Asthma Control in Kids (TRACK)

Test for Respiratory and Asthma Control in Kids (TRACK)

Box 19: The test for respiratory and asthma control in kids “track” for kids <5 years of age

<table>
<thead>
<tr>
<th>Test questions</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>During the past 4 weeks, how often was your child bothered by breathing problems (such as wheezing, coughing, or shortness of breath)?</td>
<td></td>
</tr>
<tr>
<td>Not at all □ 20</td>
<td>Once or twice □ 15</td>
</tr>
<tr>
<td>During the past 4 weeks, how often did your child’s breathing problems (wheezing, coughing, and shortness of breath) wake him/her at night?</td>
<td></td>
</tr>
<tr>
<td>Not at all □ 20</td>
<td>Once or twice □ 15</td>
</tr>
<tr>
<td>During the past 4 weeks, to what extent did your child’s breathing problems, such as wheezing, coughing, or shortness of breath, interfere with his/her ability to play, go to school, or engage in usual activities that a child should be doing at his/her age?</td>
<td></td>
</tr>
<tr>
<td>Not at all □ 20</td>
<td>Once or twice □ 15</td>
</tr>
<tr>
<td>During the past 3 months, how often did you need to treat your child’s breathing problems (wheezing, coughing, or shortness of breath) with quick-relief medications?</td>
<td></td>
</tr>
<tr>
<td>Not at all □ 20</td>
<td>Once or twice □ 15</td>
</tr>
<tr>
<td>In the past 12 months, how often did your child need to take oral corticosteroids for breathing problems not controlled by other medications?</td>
<td></td>
</tr>
<tr>
<td>Not at all □ 20</td>
<td>Once or twice □ 15</td>
</tr>
</tbody>
</table>

Total:

Adapted from reference 243

Used with Permission from AstraZeneca.
### Appendix C

**Webinar Questions**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The live webinar technology was simple to use.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The live asthma webinar was convenient.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The live asthma webinar information was helpful.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I would recommend the live asthma webinar to family or friends.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any additional comments about the webinar format or the information given that you think would be helpful for us to know, please type it here. Thank you so much.
Appendix D

Emergency Visits and Hospitalizations Questionnaire

1. In the past 6 months how many times has your child been to an emergency room for asthma symptoms? ______________

2. In the past 6 months how many times has your child been hospitalized for asthma symptoms? ______________

3. During these SAME 6 months from LAST YEAR how many times did your child go to an emergency room for asthma symptoms? ______________

4. During these SAME 6 months from LAST YEAR how many times was your child hospitalized for asthma symptoms? ______________
References


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