Using a Nurse-led Educational Program to Reduce the Prevalence of Asthma Symptoms and Improve Asthma Management in Families of Children with Asthma in Urban Communities

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Abstract

Background: Asthma is a chronic, non-communicable lung disease that has become a significant public health issue in the United States, particularly among children and adolescents. Beyond its impact on health, asthma also represents a substantial economic burden on the healthcare system due to the costs of treatment and management. **Problem**: Children and adolescents in low-income communities are disproportionately affected by asthma, resulting in increased morbidity. Contributing factors to these disparities include inadequate housing, exposure to pollution, and environmental allergens. **Purpose**: This study aimed to test the impact of educational intervention in improving asthma symptom management and medication adherence among families of children with asthma. A nurse-led intervention was implemented to explore the effectiveness of educational strategies in enhancing asthma management in an urban community setting. **Method**: A quantitative and qualitative research approach was utilized. Data was collected before and after the educational intervention using the Pediatric/Adolescent Asthma Therapy Questionnaire and the Inhaler Device Assessment Tool. The data were analyzed using SPSS software to evaluate the impact of the intervention. **Results**: Data from 23 caregivers of children with asthma were analyzed. The results indicated that the nurse-led educational intervention significantly improved medication adherence and the correct use of inhaler devices, with caregivers demonstrating an average score increase of 2.23 points. However, no statistically significant improvements were observed in asthma control, attitudes and behaviors, self-efficacy, or patient-provider communication. Despite the lack of statistical significance in some areas, the study underscores the continued need for educational programs to foster better health outcomes for children with asthma.

Dedication

I dedicate this project to the memory of my beloved father, Mr. George A. Gilliam, who was always there to encourage my pursuit of academic excellence, and to my mother, Mrs. Arlene Gilliam, who keeps me grounded and has been a constant source of support.

To my beloved grandparents, Asbery, Carrie, Cornelious, and Rose, this is a heartfelt tribute to your legacy, unwavering hard work, and selfless sacrifices. Earning this DNP reflects your influence, your sacrifices, and an honor to your memory.

Uncle Kenny, you were the best uncle anyone could ever ask for. Thank you for being a steady presence in my life, always there with your unwavering support. Your love, laughter, and wisdom will stay with me forever. This is for your memory, with all the love and gratitude in the world.

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In memory of my father, I know you have been with me every step of the way. Daddy, your memory lives on in all I do, and I hope I have made you proud. Moreover, yes, I finally got that "cool hat."

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Chapter I Introduction

Background

Asthma is a chronic, non-communicable lung disease that affects adults and children globally (Dharmage et al., 2019). In the United States, asthma has become a significant public health concern due to the increased morbidity and mortality in severe cases (Dharmage et al., 2019). Asthma places an increased burden on the healthcare system, costing more than 80 billion dollars to treat each year (Patel & Teach, 2019). There is an increased cost of treating asthma, so it is important to note that there are approximately 6.2 million children in the United States who are affected by asthma (Norris & Gibson-Young, 2020). Youths residing in urban communities are disproportionately affected by asthma, having increased mortality and disease rates (Oland et al., 2017). In comparison to other ethnic groups, non-Hispanic black children had a death rate 7.6 times that of non-Hispanic white children and are 4.5 times more likely to be admitted to the hospital for asthma (Office of Minority Health, 2018a). Puerto Rican children in the United States are three times more likely to have asthma compared to non-Hispanic children and are 40% more likely to die from asthma (Office of Minority Health, 2018b).

Asthma is a chronic lung disease characterized by reduced airflow in the lungs (Sawicki & Haver, 2021). The reduction of airflow can be attributed to bronchoconstriction, airway inflammation, airway hyperresponsiveness, and an increase in thickened mucus secretions (Norris & Gibson-Young, 2020). Individuals with asthma may present with symptoms that include shortness of breath, wheezing, coughing, and chest tightness (Sawicki & Haver, 2021). The onset of these symptoms is commonly exacerbated because of exposure to triggers such as viral illness, allergies, environmental conditions, exercise, and medications (Sawicki & Haver,

2021). This chronic disease differs in degrees of severity and can be classified into three categories: mild, moderate, and severe (Norris & Gibson-Young, 2020).

Management of asthma in families of children with asthma is grounded in the identification of symptoms and the adequate use of medications. Treatment is often based on getting to a state without symptoms (Norris & Gibson-Young, 2020). Children and their caregivers should be able to identify and avoid individual triggers. Exposure to these triggers can harm health and worsen symptoms (Norris & Gibson-Young, 2020). To effectively manage asthma, children and their caregivers should be able to manage their symptoms using rescue and controller medications (Norris & Gibson-Young, 2020).

Children and adolescents who live in low-income urban communities are disproportionally affected by asthma, resulting in increased asthma morbidity (Grant & Wood, 2022). The increased incidence of asthma exacerbations and symptoms is attributed to a variety of factors. Children and adolescents who reside in urban communities are more susceptible to experiencing disparities in safe housing (Grant & Wood, 2022). Within these substandard housing conditions, children are more exposed to indoor allergens such as household pest allergens, endotoxins, and mold (Grant & Wood, 2022). In addition to indoor pollutants, children and adolescents in these communities have increased exposure to air pollution (NIH, 2023). According to the National Institutes of Health (2023), increased exposure to indoor and outdoor pollutants has been associated with a higher risk for attack-prone asthma. In addition to attack-prone asthma, exposure to ambient pollution has been associated with an increased incidence of disease, disability, and death later in life (Paciencia & Cavaleiro-Rufo, 2020).

Increased morbidity in children and adolescents with asthma is multifactorial and includes more than the exposure to environmental allergens. Families of children with asthma

have an increased prevalence of uncontrolled asthma, which has been associated with less access to care and poorer quality of healthcare (Oland, 2017). The disparities in quality care access negatively influence asthma control (Poowuttikul et al., 2019). The lack of accessibility to quality care burdens children and families residing in urban communities due to the lack of access to transportation and socioeconomic factors such as family income and education (Poowuttikul et al., 2019). Deficiencies in the coordination of medical care and socioeconomic factors inhibit the reinforcement of education on asthma symptoms and medication management (Poowuttikul et al., 2019). Enhancing access to asthma education for children and their parents or guardians is an effective preventative measure to control the prevalence of asthma in children (Liu et al., 2022).

Adequate education is an essential aspect of enhancing asthma management in children. Education ensures that families and children can recognize asthma symptoms and when to administer medications (Sawicki & Haver, 2021). Effective asthma management depends on medication adherence, proper inhaler technique, and trigger avoidance (Poowuttikul et al., 2019). However, it has been found that urban youths' lower medication adherence rates have been attributed to several factors (Margolis et al., 2020). The inconsistencies in medication adherence among low-income and racial minority children are attributed to the lack of access to specialty care, parental concerns about medications and their side effects, and difficulty in establishing family asthma management routines (Margolis et al., 2020). Examples of the lack of establishing an effective routine include refilling medications, having set medication times, and caregivers reminding children to take their asthma medications (Margolis et al., 2020).

Medication non-adherence in children with asthma has been closely associated with the parent’s perception of the disease (Abu-Shaheen et al., 2016). According to Abu-Shaheen et al.

(2016), medication adherence is a direct reflection of parents who may have misconceptions about the chronic disease and the underestimation of the severity of the illness. Additionally, parents who are concerned about medication side effects feel that the medication is not effective and that their child is receiving too much, or too little medication are less likely to comply with medication regimens (Poowuttikul et al., 2019). Other factors affecting medication adherence are problems with medication access, obtaining medications, and difficulty scheduling appointments (Poowuttikul et al., 2019).

Aims

This study aims to improve the self-management of asthma symptoms and medication adherence in families of children with asthma. The nurse-led intervention will examine the impact of education and the improvement of children's asthma in the urban community setting to prevent the worsening of asthma and decrease factors that may inhibit the children and their caregivers from adhering to their prescribed medication regimen. This study will provide education on identifying symptoms, managing symptoms, and self-administration and compliance with inhaled medication devices to address the deficiencies in asthma self-management.

Research Question

What is the relationship between a nurse-led asthma educational program and improved asthma management in families of children with asthma in urban communities?

Hypothesis

1. Families of children with asthma who participate in a nurse-led asthma educational program will report reduced asthma symptoms and improved asthma management.

Operational Definitions

Asthma educational program - a planned experience using teaching, counseling, and behavior modification techniques influencing patients' knowledge and health behavior. It involves an interactive process that assists patients in actively participating in their health care (Gibson et al., 2002, p.3). The asthma educational program will be based on the pre-established asthma education program by Children's Mercy Hospital. The Children's Mercy Hospital has created a program that uses the latest research to help families and patients manage asthma by learning how to recognize symptoms, trigger avoidance, and manage the onset of asthma (Children's Mercy, 2023).

Asthma management is the day-to-day control of chronic conditions by individuals throughout an illness (Grady & Gough, 2014). To achieve asthma control, families of children with asthma should be able to monitor and manage their disease daily. Asthma management can be operationally defined as managing asthma on a day-to-day basis with a focus on asthma knowledge, asthma control, identification of symptoms, and the use of medications (Skinner et al., 2004). Asthma management among pediatric asthma patients and their families can be measured by assessing these factors. The management of families of children with asthma can be measured using the Asthma Therapy Assessment Questionnaire (ATAQ). The ATAQ will measure potential issues in asthma symptom control, self-efficacy, communication with healthcare providers, patient behaviors and attitudes, and asthma-related healthcare utilization (Skinner et al., 2004).

Asthma symptoms – the changes in the airways that make it hard for air to flow easily through the airways and make breathing harder. Individuals can develop shortness of breath, cough, chest tightness or pain, wheezing, and a drop in peak flow meter readings (AAFA,

n.d.). The child's caregiver will report asthma symptoms using the Asthma Therapy Assessment Questionnaire (ATAQ). The ATAQ will assess the child's frequency by measuring how often the child has exhibited asthma symptoms such as difficulty breathing during exercise, night-time awakening, missed daily activities because of their asthma, and the number of times an inhaler was used for quick relief of asthma symptoms (Skinner et al., 2004).

Asthma medication management –patient-centered care to optimize safe, effective, and appropriate drug therapy to improve clinical outcomes (Cadel et al., 2021, p. 1312). For optimal disease management, individuals with asthma should consistently adhere to using anti-inflammatory controller medications (McQuaid, 2018). In addition to the appropriate use and adherence to medication regimens, asthma medication management also includes adequate inhaler technique. The Inhaler Device Assessment Tool will assess the inhaler technique and identify errors in usage.

Purpose

This study aimed to improve the health outcomes of families of children with asthma using education intervention. As asthma continues to be a public health concern among minority youths, it is vital to equip families and children with the necessary education to manage their asthma and increase medication adherence. This nurse-led instructional intervention based on the Children's Mercy Hospital will help establish a baseline of information that will assist in developing more programs that will target children with asthma in the community setting to prevent the worsening of asthma symptoms and adverse events.

Significance to Nursing and Healthcare

Implementing a nurse-led asthma educational program will contribute immensely to caring for families of children with asthma. Advanced practice nurses and other healthcare

professionals can use the knowledge gained from this study to develop more evidence-based interventions for promoting health and improving health outcomes. Creating new evidence-based interventions can be the catalyst for reducing the morbidity and mortality rates of minority children who are disproportionately affected by asthma. This program can also target the levels of prevention by addressing disparities and improving access to care and deficiencies in education.

DNP Project Essentials

The Essentials of Doctoral Education for Advanced Practice Nurses have been formulated to identify the curricular competencies and elements that are core to developing the nurse for the advanced practice role (AACN, 2006). Preparation of advanced practice nurses is entrenched in their education to enhance health outcomes, practice outcomes, or policy outcomes (AACN, 2006). The undertakings of this proposed project align with four of the DNP Essentials. The first competency identified is the first essential. *Essential I: Scientific Underpinnings for Practice* prepares the advanced practice nurse to integrate nursing science with knowledge from ethics, the biophysical, psychosocial, analytical, and organizational sciences (AACN, 2006). Implementing the actions and advanced strategies can enhance, alleviate, and improve health (AACN, 2006). The proposed goal of this DNP project is to utilize education to improve the lives and health of families of children with asthma. The DNP will also evaluate the effectiveness of implementing nurse-led educational intervention in the community setting as a new practice to improve asthma outcomes in children. The incorporation of the first essential into this project ensures that the DNP will contribute to the existing knowledge of the science of asthma to ensure that it will help guide nursing practice in finding new evidence-based approaches.

Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking will be included in this study. The second essential has been incorporated into the DNP preparation by ensuring that the advanced practice nurse can use their knowledge to improve patient and healthcare outcomes (AACN, 2006). Additionally, the second essential prepares the advanced practice nurse to eliminate health disparities and promote patient safety (AACN, 2006). Because children and adolescents who live in low-income urban communities are disproportionately affected by asthma, resulting in increased asthma morbidity, community-level interventions need to be incorporated to meet the needs of this population (Grant & Wood, 2022). The DNP will use this proposed project to effectively aim for quality improvement by further developing different approaches to care to meet the needs of these communities, address this disparity, and ensure that these populations have access to quality care and education. This project will also incorporate *Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice.* The third competency ensures that the DNP is prepared to translate research findings into practice (AACN, 2006). The implementation of this project will permit the DNP to improve the health outcomes of children who reside in urban communities. Through this research, the DNP is designing and implementing an asthma educational program to improve the practice and care of children with asthma.

The seventh essential will also be incorporated into this project. *Essential VII: Clinical Prevention for Improving Patient and Population Health Outcomes* prepares the DNP with leadership skills integrating evidence-based clinical prevention and population health services for individuals, aggregates, and populations (AACN, 2006). In the United States, 38.7% of children ages 18 and younger reported having one or more asthma attacks in the past year (AAFN, 2023). It has also been estimated that 50% of children with asthma have uncontrolled

asthma (AAFN, 2023). As a significant number of children with uncontrolled asthma, the DNP must be proactive in establishing interventions to improve asthma outcomes in children. Providing in-depth education about asthma will help the DNP provide children and their families from diverse communities with the necessary education on controlling their asthma symptoms and how to administer their meter-dosed inhalers to help manage their asthma appropriately.

Summary

Asthma is a chronic lung condition that affects millions of children in the United States. The prevalence of asthma in minority youths in the United States is disproportionally affected by asthma (Buchard & Borrell, 2021). The evaluation study aims to determine the effectiveness of nurse-led educational intervention programs in reducing asthma symptoms and medication adherence in families of children with asthma in urban communities.

Chapter II Literature Review

Conceptual Framework

Dorothea E. Orem's Self-Care Deficit Theory will be used to provide the conceptual framework for this study. Orem formulated the self-care theory to improve the quality of nursing care (Petiprin, 2023). Orem's Self-Care Deficit Theory derives from several basic assumptions (Hartweg, 1991). The premise of these assumptions are that people are distinct individuals, people should be self-reliant and responsible for their care as well as others in their family that need care, nursing is a form of action and interaction between two or more people, meeting the universal and developmental self-care requisites is an essential component of primary care prevention and health, a person's knowledge of potential health problems is needed to promote self-care behaviors and self-care behaviors are learned within a socio-cultural context (Petiprin, 2023). By formulating these assumptions, Orem developed a theory of three interrelated parts: self-care, self-care deficit, and nursing systems (Hartweg, 1991).

The first interrelated segment is the Theory of Self-Care. The Theory of Self-Care is the practice in which an individual initiates and performs on their behalf to maintain life, health, and wellness (Petriprin, 2023). Self-care is a learned behavior developed based on the response to individual needs (Hartweg, 1991). However, self-care can only be performed if the individual has time to develop or mature or if the developed ability is no longer attainable. The following interrelated segment is the Theory of Self-Care Deficit. The central idea of the Theory of Self-Care Deficit is that situations may arise that limit the individual's ability to meet their self-care (Hartweg, 1991). The limitations are significant because they include health conditions and internal and external factors (Hartweg, 1991). Individual internal self-care limitations can occur with age, and external self-care limitations can be a result of specific life experiences such as the

unexpected death of a family member (Hartweg, 1991). The last segment of this theory is the Theory of Nursing System. Through the Theory of Nursing System, Orem identifies a relationship between nursing actions and roles and the role of patient actions and roles (Hartweg, 1991). The central idea of this segment is that the nurse can determine the existing or potential deficit relationship between the abilities, and if necessary, the action involves an individual's health (Hartweg, 1991). If the deficit occurs, the nurse is responsible for developing a plan of care that identifies actions that should be done and by whom (Hartweg, 1991). The development of the nurse, patient, and caregiver's actions comprises the nursing systems (Hartweg, 1991).

Dorothea E. Orem's Self-Care Deficit Theory is applicable to this study because it is essential to the facilitation of skills that nurses can use to assist individuals in developing skills necessary to maintain their life, health, and well-being. As the three segments of this theory are further examined, it is evident that the nurse can be instrumental in improving asthma management and medication adherence in children and their families. Nurses are essential in assisting children and their families by providing teaching, guidance, support, and management of their asthma. This theory supports the hypothesis that promoting self-care through education will increase asthma management knowledge.

Asthma Prevalence Amongst Racial and Ethnic Minorities

According to Buchard and Borrell (2021), asthma is the most common chronic lung disease among children and is the most racially and ethnically diversified. In the United States, asthma disproportionately affects African American and Hispanic populations compared to other ethnic groups (Samedy-Bates et al., 2019)). In addition to ethnic and racial and ethnic disparities, African American and Hispanic children experience neighborhood socioeconomic disparities (Samedy-Bates et al., 2019).

Black and Hispanic children in the United States have a higher incidence of asthma and asthma-related morbidity compared with White children (Zanobetti et al., 2022). Black and Hispanic children have higher rates of asthma because they disproportionately reside in communities that have economic deprivation, increased poverty, and increased urbanicity (Zanobetti et al., 2022). Zanobetti et al. (2022) conducted a study to determine how neighborhood-level socioeconomic indicators explain the racial and ethnic disparities in childhood asthma. To obtain participants for this study, the researchers gathered birth cohorts of children born in the United States who were part of the Children's Respiratory and Environmental Workgroup consortium (Zanobetti et al., 2022). A hazard model was used to estimate the hazard ratios of asthma incidence, and logistic regression was used to assess ratios of early wheezing with the mother's educational attainment, parental asthma, smoking during pregnancy, child's race and ethnicity, sex, and region and decade of birth (Zanobetti et al., 2022).

Zanobetti et al. (2022) found that Black and Hispanic children were at an increased risk for asthma incidence compared to White children and had an onset of asthma occurring earlier in childhood. Increased incidence of asthma is also associated with a more significant proportion of low-income households, increased population density, and poverty (Zanobetti et al., 2022). Additionally, it was found that an increased risk of developing asthma among these ethnic groups was increased across neighborhoods regardless of income level (Zanobetti et al., 2022). This study is meaningful to this project because it sets the precedence for other studies to explore further and reduce asthma disparities.

The utilization of asthma-related emergency department use is found to be most significant among the Black and Latine populations due to a lack of resources (Kaufmann et al., 2022). An observational multistate study was conducted by (Kaufmann et al., 2022) to evaluate

the disparities by ethnicity, race, and language in pediatric acute asthma. Electronic health records and Medicaid claims data were used to determine the utilization of clinic use for acute asthma management compared to the use of emergency department and inpatient admissions for episodes of acute asthma care among non-Hispanic black, English-preferring Latine, Spanish-preferring Latine, and non-Hispanic White children (Kaufmann et al., 2022).

Through this study, it was found that non-Hispanic Black children were found to have lower community health center visits, which may have contributed to increased rates of asthma-related emergency department visits (Kaufmann et al., 2022). The increase in emergency department utilization amongst non-Hispanic black children was attributed to inadequate preventative visits for asthma management (Kaufmann et al., 2022). Additionally, this study found that Latine children relied more on community health center visitations (Kaufmann et al., 2022). There is an increased reliance on community health center visitations because of the acceptance of low-income and uninsured individuals (Kaufmann et al., 2022). The study found patterns in asthma-related healthcare use by race, ethnicity, and language (Kaufmann et al., 2022).

Nurse-led Educational Programs and Reduction of Asthma Symptoms and Exacerbations

Asthma is a chronic illness that has significantly affected approximately 10.6 million children in the United States (Oland et al., 2017). Though progress has been made in treating this chronic illness, there remains an increased prevalence of asthma and asthma exacerbations among pediatric patients (Islik et al., 2021). Deficiencies in recognizing triggers have been linked to the increased prevalence of asthma symptoms and exacerbations. Educational programs are effective as a preventative measure to enhance asthma knowledge and decrease exposure to asthma triggers (Baek et al., 2019). Educational programs are essential in controlling the

prevalence of asthma in children and should be adopted as part of standard asthma therapy in children (Liu et al., 2022).

A study by Baek et al. (2019) assessed the effectiveness of home-based asthma educational interventions. With the increased prevalence of asthma in low-income communities in the United States with a lack of access to care and health insurance, the researchers decided to examine the impact of a home-based education program on the health outcomes of Hispanic children with asthma (Baek et al., 2019). This quasi-experimental design was implemented to determine the effectiveness of asthma home-based education by comparing the changes in health outcomes between baseline and follow-up (Baek et al., 2019).

Through educational intervention, children and their families residing in low-income communities were taught how to effectively manage asthma by identifying common triggers, asthma signs and symptoms, asthma management, and the fundamental components of the asthma action plan (Baek et al., 2019). Families were also taught how to create a healthier home environment that will help reduce hazardous exposure in the household (Baek et al., 2019). Children and their families in the intervention group were provided 60–90-minute educational sessions, and the control group was only provided primary education related to asthma management (Baek et al., 2019). The interventional group that received the home-based education decreased the number and frequency of asthma attacks (Baek et al., 2019). The findings of this study are significant and can be used to support the need to implement nurse-led asthma educational programs in the community setting. Because asthma has a negative effect on children and their families, implementing this program can effectively provide an alternative approach to asthma education. This research is pertinent to this project because it demonstrates

the effectiveness of managing asthma by including the parents or caregiver in the education, providing them with the support needed to manage the child's asthma.

Asthma educational interventions in the community have supported managing children with asthma. A study by Ng et al. (2021) sought to determine the effectiveness of nurse-led web-based home asthma education programs for children and their families. According to Ng et al. (2021), asthma education is essential to asthma management. This research aimed to develop a web-based Home Asthma Education Program for local asthmatic children and their caregivers (Ng et al., 2021). This program minimizes unscheduled visits and hospital readmissions by enhancing the parent and child's knowledge, attitudes, and practices (Ng et al., 2021).

Ng et al. (2021) instituted a nursing protocol that provided a four-part 45-minute educational program through web-based modules that contained animated videos, inhaler administration videos, games, and discussion sessions (Ng et al., 2021). Pediatric patients and families in the control group received web-based education. The education of the control group had educational preparation that was done in the form of web-based intervention supplemented by in-person discussions. Conversely, the control group was only provided a pamphlet on asthma management and inhaler use (Ng et al., 2021). It was found that the education the interventional group received improved the knowledge of children and their parents (Ng et al., 2021). The web-based program also reduced the frequency of unscheduled visits and readmissions (Ng et al., 2021). The findings from this study are applicable because the implementation of a program such as this one can improve the long-term management of asthma in children. Like the previous study, including the parent/caregiver in the educational program effectively improved the clinical outcomes in children by further addressing any deficiencies that may be present in the home management of asthma. This study can also be used as a template for the proposed project to

help manage this chronic lung disease because of the inclusivity of parents within asthma education.

Agusala et al. (2018) conducted a prospective study to investigate further the effectiveness of an interactive asthma education intervention in pediatric patients aged 2-18 and their caregivers in rural areas. Agusala et al. (2018) hypothesized that including caregivers in asthma education will increase knowledge of asthma triggers, preventative methods, and confidence in medication management (Agusala et al., 2018). The study aimed to determine if providing asthma co-education will decrease the frequency of symptom exacerbations, missed school days, emergency department visits, and hospital admissions (Agusala et al., 2018).

The education intervention comprised four sections (Agusala et al., 2018). These sections included the introduction of the patient and caregiver, the education of the patient and caregiver, a demonstrational component for the patient, and a follow-up session for both the caregiver alone and the patient and caregiver together (Agusala et al., 2018). Through the educational component, the researchers aimed to teach the patient and the caregiver about asthma's pathophysiology, common asthma triggers, signs and symptoms of an asthma attack or exacerbation, the significance of asthma control, and an asthma action plan (Agusala et al., 2018). Additionally, the patient was taught the appropriate technique for administering a metered dose inhaler (Agusala et al., 2018). The educational intervention was evaluated by completing a telephone survey before and after. The study found that parents who underwent the education had a statistically significant increase in identifying triggers, the signs of severe asthma attacks, understanding the asthma action plan, feeling confident about managing asthma, and feeling that the asthma was under control (Agusala et al., 2018). Agusala et al. (2018) also concluded that

providing asthma education improves long-term outcomes and more effective disease management (Agusala et al., 2018).

Medication Management

Asthma management in pediatric patients highly depends on long-term management (Chen & Chen, 2021). The long-term management of asthma encompasses the control of clinical symptoms and the improvement of the inflammation of the airways (Chen & Chen, 2021). Chen and Chen (2021) implemented out-of-hospital nursing management measures regarding basic asthma knowledge and drug inhalation treatment methods for children with bronchial asthma. The implementation of the out-of-hospital nurse management provided health education regarding basic asthma knowledge, preventative measures, drug inhalation treatment, and exercise precautions (Chen & Chen, 2021).

The nurse-led asthma program included health lectures once a month as well as asthma handbooks (Chen & Chen, 2021). The distributed handbooks also covered the basic facts about asthma, the home environment, the management guidance for children with asthma, and asthma drugs and treatment methods (Chen & Chen, 2021). In addition to handbooks, the families were allowed access to online consultations and to ask asthma-related questions to medical personnel (Chen & Chen, 2021). By completing this study, Chen and Chen (2021) found that children and families who received the nurse-led education adhered to their treatment regimens and, as a result, had fewer acute asthma attacks and hospitalizations. This study also found that the control group significantly improved medication adherence rates of inhaled corticosteroid use (Chen & Chen, 2021).

Inhalation therapy is one of the most effective treatments for asthma (El Rifai & Rizk, 2019). The appropriate use of inhalers in children with asthma is needed to achieve optimum

asthma control (El Rifai & Rizk, 2019). El Rifai & Rizk (2019) aimed to evaluate the effect of educational intervention in improving inhaler technique among asthmatic children and their caregivers who reside in an urban area. The pre-post intervention was conducted with caregivers and children aged 2-12 (El Rifai & Rizk, 2019). The researcher initially observed and assessed the inhalation technique. After the initial assessment, the child and caregiver would receive the educational intervention. The intervention included demonstrating and explaining the correct steps for inhaler use with and without a spacer (El Rifai & Rizk, 2019). Patients who received inhaler education were shown to have more controlled asthma and asthma control. The study conducted by El Rifai and Rizk (2019) is essential to this proposed project because limited studies have assessed the impact of educational interventions on inhaler techniques to improve asthma control in children. Utilizing a program that focuses on inhalation therapy can be the cornerstone of improving asthma outcomes in pediatric patients.

Summary

This chapter finds that Dorothea Orem's Self-Care Deficit is helpful as a guide to educational programs to reduce asthma symptoms and medication adherence in families with children with asthma. As Orem's theory is analyzed, it is evident that the nurse can improve self-care behaviors to manage asthma through education. Upon completing a literature review, it has been found that limited studies focus on nurse-led interventions outside of the acute care setting. Therefore, additional studies are needed to examine nurse-led interventions outside the acute care and school setting to examine further their effectiveness in managing asthma. These studies could be instrumental in determining if the educational interventions will improve asthma outcomes and medication management to improve the health and well-being of families of children with asthma.

Chapter III Methods

Introduction

Improving the health outcomes of families of children with asthma in urban communities is imperative. As asthma is a prominent public health concern that disproportionately affects children in urban communities, it is essential to equip children and their caregivers with the tools to control their asthma symptoms and adhere to prescribed regimens. Facilitating educational programs in the community setting can enhance health-related behaviors and prevent the worsening of asthma and adverse events among children.

Research Design

This study used a quasi-experimental design. Data from one group were extracted using a pre-post method with no control group. Baseline data were compared before and after the nurse-led educational program on improving asthma management in families of children with asthma in urban communities. Inclusion and exclusion criteria were applied to identify participants and maintain external validity.

Individuals who agreed to participate in this study chose between virtual and in-person asthma education. The quality of the asthma educational experience was maintained for participants who opted for the virtual education option.

The educational intervention ensued once the principal investigator recruited participants in this study. Caregivers of children with asthma were given a ten-question demographic questionnaire. Seven questions were about the child, and three were about the caregiver. Once the demographic data had been established, the caregiver completed the baseline Pediatric/Adolescent Asthma Therapy Assessment Questionnaire. Through the completion of this questionnaire, the caregiver was asked questions about the acute symptoms over the past four

weeks or chronic symptoms over the past 12 months. Additionally, the researcher assessed the caregiver inhaler technique using the Inhaler Device Assessment Tool. The Inhaler Device Assessment Tool measured inhaler usage by scoring and identifying correct and incorrect steps of the inhaler technique.

After the pre-intervention assessment of the Pediatric/ Adolescent Asthma Therapy Questionnaire and the Inhaler Device Assessment Tool was completed, the nurse-led intervention started. The nurse-led education used an interactive approach and educational pamphlets to provide in-depth instruction on asthma pathology, signs and symptoms, medication management, and asthma action plans. The educational program consisted of one 45-minute session focused on these topics.

The nurse-led education was based on the asthma program created by Children's Mercy Hospital. Families of children with asthma were taught about four categories: primary asthma pathology, signs and symptoms, medication management, and asthma action plans.

Upon completion of the educational intervention, the caregivers had a latent period in which they were encouraged to take what they had learned to manage their child's acute asthma symptoms over four weeks. Once the four-week period concluded, the caregiver of the child completed the post-intervention assessment of the Pediatric/ Adolescent Asthma Therapy Questionnaire and the Inhaler Device Assessment Tool to determine if there is improved management of asthma and reduced asthma symptoms.

Setting

This study's participants were caregivers of children with asthma. These caregivers were recruited from urban communities in Essex County, New Jersey. The selection of an urban community in Essex County, New Jersey, is optimal because it is one of the counties with the

highest asthma inpatient hospitalizations and emergency department visit rates. The increased incidence of asthma in this county can be attributed to differences in access to adequate medical management, co-existing chronic diseases, and environmental or occupational asthma triggers (NJSHAD, 2022).

Sample

This study's sample consisted of caregivers of children diagnosed with asthma. Participants were recruited voluntarily. The analysis's inclusion criteria include a clinical diagnosis of asthma by a qualified physician, caregivers of children aged four to 17, willingness to participate in an educational program with consent, and the ability to follow questionnaire questions. The exclusion criteria were caregivers of children younger than four and older than 17 who could not read or write in English.

Recruitment

Flyers with QR codes that link to Qualtrics were posted in schools, camps, and after-school programs. Once the Qualtrics QR code was scanned, the caregiver was taken to a form that asked them several questions to determine if they have a child that has been diagnosed with asthma, their interest in participating in an educational program, the age of the child, the preference for a class type (group or individual), preferred day and time, and best way to contact. This form disclaimed that confidentiality is assured, and continuing with the survey provided passive consent.

Because the initial recruitment methods from schools, camps, and after-school programs yielded low participation, recruitment was to include the Facebook social media platform. The principal researcher shared the approved recruitment flyer with QR codes linking to the Qualtrics

survey on the investigator's Facebook page. There were no other changes to the recruitment strategy.

Methodology & Instrumentation

A quantitative methodology was used to collect data from the participants in this study using a demographic questionnaire, the Pediatric/ Adolescent Asthma Therapy Assessment Questionnaire, and the Inhaler Device Assessment Tool to determine the effectiveness of the nurse-led education. Nurse-led education used an interactive approach and educational pamphlets to provide in-depth instruction on asthma pathology, signs and symptoms, medication management, and asthma action plans. The educational program consisted of one 45-minute session. The session focused on asthma pathology, medication management, signs and symptoms, and asthma action plans.

Demographic Questionnaire

The researcher created a demographic questionnaire. The questionnaire consisted of 10 questions: 7 about the child and three about the caregiver (Appendix A).

The Pediatric/ Adolescent Asthma Therapy Assessment Questionnaire

The Pediatric/ Adolescent Asthma Therapy Assessment Questionnaire (Appendix B) is designed to assist the healthcare practitioner in identifying children at risk for developing adverse health outcomes (Skinner et al., 2004). The Pediatric/Adolescent Asthma Therapy Questionnaire (ATAQ) is an instrument that the healthcare practitioner can utilize to help identify deficiencies in care areas, including symptom control, behavior and attitude barriers, self-efficacy barriers, and communication gaps (Skinner et al., 2004). The ATAQ measures asthma control, attitude/behavior, self-efficacy, and patient-provider communication (Skinner et al.,

2004). Additionally, the ATAQ addresses issues related to asthma knowledge that may be used to identify poorly controlled asthma and individuals with suboptimal asthma management (Skinner et al., 2004).

The ATAQ is a seven-item parent-completed questionnaire to assess children aged 5-17 with asthma (Alzahrani & Becker, 2016). To assess asthma control, the parent is asked questions about acute symptoms over the past four weeks or chronic symptoms over the past 12 months (Yawn et al., 2016). Responses to the seven dimensions scored are dichotomized and scored 0 or 1 (Skinner et al., 2004). When summed, the scores of the questionnaire range from 0 to 7 (Skinner et al., 2004). A lower yielding score would indicate the child has no asthma control issues; however, a higher yielding score suggests that the child has an asthma control problem (Skinner et el. 2004). The reliability of the ATAQ in children and adolescents was found to have a Cronbach alpha of .75, which indicates sufficient internal consistency (Alzahrani & Becker, 2016).

Inhaler Device Assessment Tool

The Inhaler Device Assessment Tool (Appendix C) is a tool that is used to promote asthma control in children (Davies et al., 2006). Healthcare professionals can utilize the Inhaler Device Assessment Tool (IDTA) to assess inhaler technique, teach correct inhaler technique, and provide feedback on inhaler technique to children and their families (Davies et al., 2006). The Inhaler Device Assessment tool measures inhaler usage by scoring and identifying correct and incorrect steps of the inhaler technique (Davies et al., 2006). The IDAT lists five critical steps essential in adequately using several inhaler devices used in children (Davies et al., 2006). Through this assessment tool, the provider can score or identify the correct and incorrect steps to the inhaler technique (Davies et al., 2006). The five steps are each cut as a one or a zero (Davies

et al., 2006). “A score of one indicates no errors” were made, and “a score of zero indicates that at least one error was made” when performing the step (Davies et al., 2006). “A maximum score of five can be administered (Davies et al., 2006)”. Using the IDAT tool, the effectiveness of nurse-led education can be measured to ensure that the caregiver can administer the inhaler correctly for optimal drug delivery. For content validity, the IDAT tool was evaluated through clinician expert reviews (Davies et al., 2006). The reliability of the IDAT tool ranged from 0.55 to 0.94, with a mean of 0.82 (Davies et al., 2006).

Unstructured Qualitative Data

In addition to structured data collection using the ATAQ and IDAT tools, qualitative data was informally gathered during the educational intervention. This data came from participants' questions and statements as they engaged with the intervention process. These insights offered valuable context and depth, enhancing understanding of the participants’ perspectives throughout the educational intervention.

Nurse-Led Asthma Education

The educational component of this study was constructed based on the academic program that The Children's Mercy Hospital (Appendix D) has created

. The facilitation of the asthma educational program by the Children's Mercy Hospital provided information to children and their caregivers with the most current research, knowledge, and resources to help manage asthma (Children's Mercy, 2023). The comprehensive asthma educational program was created based on a framework of evidence-based guidelines.

The families of children with asthma had an education divided into four categories: primary asthma pathology, signs and symptoms, medication management, and asthma action plans. Integrating these four teaching topics provided a more comprehensive educational

approach to managing asthma outside the acute care setting. The first fundamental asthma pathology teaching component focused on understanding asthma (Children's Mercy, 2023). Families of children with asthma learned how air travels through the respiratory system and how different environmental triggers affect the airways of children with asthma (Children's Mercy, 2023).

Next, the family unit learned the different signs and symptoms of an asthma exacerbation and how the airways are affected. Individuals with asthma have more sensitive airways than those with normal airways. Therefore, the airways in affected individuals are more prone to swelling, inflammation, narrowing of the airways, and increased mucous production (Children's Mercy, 2023). Caregivers were encouraged to identify asthma symptoms, including coughing, wheezing, chest tightening, and fast breathing (Children's Mercy, 2023). As the signs and symptoms of asthma exacerbations are significant, the teaching incorporated education on exposure to triggers in the household. Families must become knowledgeable of triggers that may start the signs and symptoms of asthma. Triggers within the home that can trigger asthma symptoms include household and environmental exposure to mold, dust, weather, outdoor pollen, dust, smoke, strong smells, cockroaches, and animals (Children's Mercy, 2023). Additionally, caregivers were educated on the effects of colds or viruses, exercise, and emotions and how they may trigger signs and symptoms of asthma. Caregivers of children with asthma were encouraged to use an asthma booklet checklist to check their place of residence for these common triggers.

The third teaching category was focused on the medication management of asthma. The signs and symptoms of asthma can be improved with the appropriate use of asthma medications. Quick reliever medications are one of the primary medications used in asthma exacerbations. Quick reliever medications are fast-acting and work to improve symptoms within 10 to 20

minutes of use (Children's Mercy, 2023). These medications benefit the child with asthma because they last up to four hours and can be used to stop asthma signs and symptoms (Children's Mercy, 2023). Caregivers were encouraged to learn this information and circle which of the eleven quick reliever medications they use in their asthma booklet in the home setting. Controller medications are the next group of medications used to improve asthma symptoms. Unlike quick reliever medications, controller medications control the swelling and mucous in the airways. Controller medications work more slowly and can take a few weeks to work (Children's Mercy, 2023).

Caregivers were taught that controller medications do not stop the signs and symptoms of asthma but are used to prevent asthma exacerbations (Children's Mercy, 2023). Like the quick reliever medications, caregivers were encouraged to circle the controller medication listed in their asthma booklet. To administer quick relievers and control medications effectively, caregivers were taught how and when to prime inhalers for maximum benefit. Lastly, caregivers received education on the use of emergency medications. Emergency medications assist in regaining control of severe asthma symptoms (Children's Mercy, 2023). Emergency medications come in pills or liquids prescribed by a physician (Children's Mercy, 2023).

Quick relievers and controller medications can prevent asthma signs and symptoms (Children's Mercy, 2023). To adequately administer these medications, caregivers were taught how to use a spacer to help these medications. A spacer is a device that ensures that more inhaled medicine is delivered to the airways (Children's Mercy, 2023). Using spacers also ensures that inhaled medication does not end up in the mouth, throat, stomach, and lungs (Children's Mercy, 2023). Caregivers were encouraged to teach children ten or younger about administering asthma medications with a spacer and mask. For children ten or older, the caregivers were taught the six

steps in administering asthma medications with a spacer and mouthpiece (Children's Mercy, 2023). Additionally, caregivers were taught how to care for and cleanse spacers to remove particles that may have accumulated in the spacer and valves (Children's Mercy, 2023).

The last concept taught to the caregivers of children with asthma is the asthma action plan. The asthma action plan is a tool that families can use to help manage asthma signs and symptoms (Children's Mercy, 2023). The asthma action plan is divided into three zones: green, yellow, and red (Children's Mercy, 2023). Because asthma action plans are individualized, caregivers were encouraged to follow their physician's directions for each zone. The green, yellow, and red zones educate the caregiver on the actions to take if the child presents with asthma signs and symptoms (Children's Mercy, 2023). The green zone has been identified as where the child does not present with asthma signs or symptoms (Children's Mercy, 2023). Asthma signs start if the child is in the yellow zone (Children's Mercy, 2023). The child may present with cold symptoms such as a runny nose, sore or scratchy throat, abdominal pain, and fatigue (Children's Mercy, 2023). The asthma action plan for the yellow zone helps the caregiver evaluate asthma signs and symptoms to determine the course of action, such as administering quick reliever medications (Children's Mercy, 2023). Lastly, the red zone is when the child has difficulty breathing (Children's Mercy, 2023). If the child presents in the red zone, it is an emergency, and emergency medications should be administered (Children's Mercy, 2023). The caregiver was taught to seek emergency care if the child was in the red zone (Children's Mercy, 2023).

Protection of Human Subjects

Before teaching and distributing the Pediatric/Adolescent Asthma Therapy Questionnaire (ATAQ) and the Inhaler Device administered to the caregivers, the William Paterson University

Institutional Review Board (IRB) approved the proposal. Passive consent was obtained when the subject agreed to complete the survey. Participation in the study was voluntary, and all participant information collected remained confidential. The researcher ensured that the anonymity of the participants was maintained by safeguarding data, consent forms, and surveys on a password-protected computer to which the researcher had access. Refusal to participate in this study did not have any consequences for the participant.

Demographic information and data collected from the Pediatric/ Adolescent Asthma Therapy Questionnaire were administered using Qualtrics. Qualtrics, a HIPPA-compliant platform, safeguarded data and ensured participants' anonymity. The platform also ensured that surveys were protected with Transport Layer Security Encryption and password protection, to which only the researcher and committee members had access. The computer used for data analysis was configured to lock out after 10 minutes of inactivity to reduce the risk of unauthorized use of data.

Unique numbers were used to identify participants based on contact information. The original data did not include identifiable personal information. Paper data was stored securely and not accessed by anyone other than the primary investigator and committee members. Hard copies and paper documents, such as consent forms and the Inhaler Device Assessment Tool, were kept in a lock box that the primary investigator could access. Documents linking the participant’s contact information and assigned number were destroyed upon completion of the study.

Risk and Benefits of Participation

Participation in the asthma educational program can offer valuable insights into managing asthma to improve health outcomes. However, participation in this study has been associated

with minimal risks. Involvement in the asthma education program may have an emotional impact. The emotional impact can be related to feelings of being overwhelmed or unprepared in managing their child's asthma challenges. If the participant expressed these feelings, the researcher advised the participant that he/she does not need to continue with the program and offer emotional support. The researcher ensured that the caregiver had access to educational materials and resources for asthma education material and promoted communication with the primary care provider to foster further support.

Additionally, the program may require a substantial time commitment, including attending educational sessions and completing surveys. Committing to this program can interfere with daily routines or other obligations. The researcher ensured that each participant knew that participation was voluntary and offered in-person and virtual options to provide flexibility with education.

This study's perceived benefit is improving the health outcomes of families of children with asthma. Participants were provided valuable information about asthma triggers, symptoms, medication, and self-management techniques. By participating in such programs, caregivers can learn to better control their child's asthma, improving symptom control in children disproportionately affected in urban communities.

Participation in this asthma educational program can improve participants' understanding of asthma and its management, leading to increased health literacy. Additionally, participation gives caregivers access to additional resources and support in managing asthma.

Statistical Analysis

The statistical analysis for this study used SPSS software. Demographic data was analyzed using descriptive statistics, examining the frequencies of demographic values. A paired

sample t-test was used to determine whether significant differences existed between the pre-and post-intervention asthma scores of the Pediatric/Adolescent Asthma Therapy Assessment Questionnaire and the Inhaler Device Assessment Tool.

Intervention & Evaluation

The Pediatric/Adolescent Asthma Therapy Questionnaire (Appendix B) and the Inhaler Device Assessment Tool (Appendix C) were administered to the caregivers of a child with asthma in a pre-post-test format. The tools were issued, followed by education on asthma established by the Children's Mercy Hospital (Appendix D), in which the focus was on asthma management, symptom and trigger recognition, medication management, and the use of asthma action plans over three months. After the training, the surveys were administered to evaluate for statistically significant changes post-intervention.

Summary

This study used a quasi-experimental design to determine the effectiveness of implementing a nurse-led asthma educational program. To determine if there is a significant correlation between the educational program and improved asthma management in families with asthma, a demographic questionnaire, the Pediatric/ Adolescent Asthma Therapy Questionnaire, and the Inhaler Device Assessment Tool were used. The data collected from this study was analyzed with SPSS software.

Chapter IV Results

Introduction

Improving the health outcomes of families of children with asthma in urban communities is imperative. This study aimed to do so through an educational intervention. Because asthma is a public health concern among minority youths, a nurse-led instructional intervention based at the Children's Mercy Hospital was established. The program aimed to equip families with the necessary education to manage their asthma and increase medication adherence to prevent the worsening of asthma symptoms and adverse events.

This chapter presents the results of the data collected from the asthma educational program. The ATAQ and the IDAT were used to determine the effectiveness of the nurse-led education. A demographic survey was also administered to obtain background information on each participant. Qualitative data was also collected informally during the educational intervention based on questions and statements made by the participants throughout the process.

Data was collected and analyzed using the HIPAA-compliant Qualtrics platform and SPSS software. Descriptive statistics examined the child's demographic information, including asthma diagnosis, gender, age, race/ethnicity, grade level, insurance type, and asthma severity. Additionally, caregiver demographic data was analyzed, encompassing education level, relationship to the child, and employment status. A paired sample t-test was used to determine the statistical significance between pre-and post-intervention asthma scores of the ATAQ and IDAT.

Demographics

Sample

A total of 47 Qualtrics recruitment QR codes were scanned. Of the 47 participants who scanned the recruitment survey, 23 provided their contact information to receive the nurse-led education.

Asthma Diagnosis by Qualified Physician

All respondents (100%, n=23) who participated in this educational intervention had been diagnosed with asthma by a qualified physician .

Table 1

Gender

Most caregivers who participated in the educational intervention had a child who was male in gender (65%, n=16).

Gender

		Frequency	Valid Percent
Valid	Male	16	69.6
	Female	7	30.4
	Total	23	100.0

Childs Race/ Ethnicity

Most of the responses regarding the child's race/ethnicity were Black or African American (87%), and 3% were Hispanic or Latino.

Table 2

Child's Race/ Ethnicity

		Frequency	Valid Percent
Valid	Black/African American	20	87.0
	Hispanic/Latino	3	13.0
	Total	23	100.0

Child's Grade Level

The caregivers of children with asthma had one child who was not currently enrolled in school (4.3%, n= 1), fifteen were in elementary school (65.2%), three were in middle school (13%), and four children were in high school (17.4%).

Table 3

Child's Grade Level

		Frequency	Valid Percent
Valid	Elementary	15	65.2
	Middle	3	13.0
	High School	4	17.4
	Not enrolled	1	4.3
	Total	23	100.0

Child's Age in Years

The children of the caregivers who participated in the study ranged in age from 4 to 16 years, with a mean age of 8.87 years.

Table 4

Statistics

ChildAge

N	Valid	23
	Missing	0
Mean		8.87
Std. Deviation		3.622
Minimum		4
Maximum		16

Insurance Type

This study's caregivers reported that their child had Medicaid as a primary insurance (73.9%, n=17, and six children (26.1%) reported that their child had private insurance.

Table 5

Insurance Type

		Frequency	Valid Percent
Valid	Medicaid	17	73.9
	Private insurance	6	26.1
	Total	23	100.0

Asthma Severity

Five of the caregivers reported having a child with mild asthma (21.7%), 14 reported having a child with moderate asthma (60.9%), two reported having a child with intermittent asthma (8.7%), and two reported having a child with severe asthma (8.7%).

Table 6

Asthma Severity

		Frequency	Valid Percent
Valid	Mild	5	21.7
	Moderate	14	60.9
	Intermittent	2	8.7
	Severe	2	8.7
	Total	23	100.0

Characteristics of participants

Tables 8 and 9 depict the characteristics of the caregivers of children with asthma. The educational attainment of the caregivers was also analyzed. Many of the caregivers had a high school diploma (60.9%), six reported having an associate's degree (26.1%), and three reported having a bachelor's degree (13%).

Additionally, the caregivers' employment status was examined. Of the 18 caregivers, 18 worked full-time (78.3%), two worked part-time (8.7%), and three reported being unemployed (13%).

Table 7

Caregiver Education

		Frequency	Valid Percent
Valid	High School	14	60.9
	Associate's Degree	6	26.1
	Bachelor's Degree	3	13.0
	Total	23	100.0

Table 8

Caregiver Employment Status

		Frequency	Valid Percent
Valid	Full-time	18	78.3
	Part-time	2	8.7
	Unemployed	3	13.0
	Total	23	100.0

Variables of Interest

Inhaler Device Assessment Tool

This project's variable of interest included five critical steps for using a metered-dose inhaler. These steps include removing the cap, correctly priming the device, exhaling before administration, inhaling appropriate medication, and holding one's breath.

A paired sample t-test was performed to compare the pre- and post-nurse-led education and to assess the effectiveness of the education on the proper use and technique of the inhaler. An increase from the baseline IDAT and post-intervention IDAT scores of 2.227 was statistically significant, with $p<.001$.

Pediatric/ Adolescent Asthma Therapy Questionnaire

The project's additional variables included several dimensions of the parents' perception of their child's asthma. These dimensions include asthma control, attitudes and behaviors, self-efficacy, and patient-provider communication.

A paired sample t-test was conducted to compare caregivers' perceptions of these dimensions before and after the nurse-led intervention. The results indicated no statistically significant changes for the ATAQ, with a p-value of .216.

Paired Sample t-test IDAT and ATAQ

Table 10

Paired Samples Test

		Paired Differences			t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean			One-Sided p	Two-Sided p
Pair 1	PostIDAT - BaseIDAT	2.227	1.232	.263	8.481	21	<.001	<.001
Pair 2	PostATAQ - BaseATAQ	-.591	3.459	.738	-.801	21	.216	.432

Unstructured Qualitative Data

This study used an unstructured and informal methodology to collect data from the participants. Feedback was gathered during the education intervention, while attention was focused on the educational process, questions, and insights shared by participants throughout the intervention. The feedback and insights provided by participants offered valuable context and depth to the study outcomes. Five participants provided valuable feedback, which enriched the study's findings. Their input added substantial context and depth to the outcomes.

Several key themes emerged from the analysis of the qualitative data. These themes included a greater understanding of asthma and improved medication management. For instance, regarding the increased knowledge of asthma, Participant 23 shared, "My child has been diagnosed with asthma since he was six years old. I had no idea what was happening inside his

body or why he had so many asthma attacks.” (Participant 23, personal communication, December 17, 2024). Concerning medication management, Participant 7 commented, “My son is fifteen years old, and I never knew that the inhalers should be given in a specific order. Though he has had asthma for so long, no one has checked to see if we are using the medications correctly.” (Participant 7, personal communication, December 12, 2024)."

Summary

This chapter presented data collected from 23 caregivers of children with asthma who received nurse-led education based on a program created by Children’s Mercy Hospital. The demographic characteristics of the sample of participants and the variables of interest highlighted in the Inhaler Device Assessment Tool and the Pediatric/ Adolescent Asthma Therapy Questionnaire were presented. The results will be discussed further in the next chapter.

Chapter V Discussion

Introduction

Improving the health outcomes of families of children with asthma in urban communities is imperative. Asthma is a prominent public health concern and disproportionately affects children residing in urban communities; it is essential to equip children and their caregivers with the tools to control their asthma symptoms and adhere to prescribed regimens (Dharmage et al., 2019; Oland et al., 2017). Facilitating educational programs in the community setting can enhance health-related behaviors to prevent the worsening of asthma and adverse events among children. This chapter will analyze and discuss the relationship between this project's findings and the conclusions drawn from prior research. Additionally, this chapter will further interpret the results and explore the relationship to the research question, "What is the relationship between a nurse-led asthma educational program and improved asthma management in families of children with asthma in urban communities?" Lastly, this chapter will discuss limitations and the implications for healthcare and DNP practice.

Discussion

Nurses are in the optimal position to improve asthma self-management and medication adherence in families of children with asthma through education (Murray & O'Neil, 2018). Because asthma remains a public health concern for minority youths who reside in urban communities, this quality improvement study aimed to improve the health outcomes of these communities' families of children with asthma. This project sought to reduce asthma symptoms and management through intensive education on asthma knowledge, control, identification, and medication use.

A sample of 23 caregivers of children with asthma in Essex County, New Jersey, participated in a nurse-led asthma education program from November 2024 to December 2024. Data from one group were extracted using a pre-post method with no control group. Baseline data were compared before and after the nurse-led educational program on improving asthma management in families of children with asthma in urban communities. Caregivers completed a baseline Pediatric/Adolescent Asthma Therapy Assessment Questionnaire (ATAQ). Through the completion of this questionnaire, the caregiver was asked questions about the acute symptoms over the past four weeks or chronic symptoms over the past 12 months. Additionally, the researcher assessed the caregiver's inhaler technique using the Inhaler Device Assessment Tool (IDAT). The IDAT measured inhaler usage by scoring and identifying correct and incorrect steps of the inhaler technique.

This study demonstrated that a nurse-led educational intervention effectively enhanced compliance and inhaled medication devices' use. Before implementing nurse-led education, caregivers of children with asthma from diverse demographics had an average score of two on the IDAT. This indicates that among the five correct steps for inhaler use, participants accurately completed only two. The IDAT lists five critical steps essential in adequately using several inhaler devices used in children (Davies et al., 2006). Through this assessment tool, the provider can score or identify the correct and incorrect steps to the inhaler technique (Davies et al., 2006). The five steps are each cut as a one or a zero (Davies et al., 2006). "A score of one indicates no errors" were made, and "a score of zero indicates that at least one error was made" when performing the step (Davies et al., 2006). "A maximum score of five can be administered (Davies et al., 2006)".

Following one educational session and a four-week latent period, the post-intervention results showed improved performance in inhaler usage when comparing pre- and post-intervention results. The IDAT revealed an increase in caregivers' ability to perform the inhaler technique and ensure optimal drug delivery, with an increase in the mean score to 4.23. Caregivers who received the teaching became more knowledgeable and well-versed in inhaler use, achieving markedly higher scores after the intervention scores. A paired sample t-test showed a statistical significance with a one-sided p-value of <. 001.

Education delivered by knowledgeable individuals is crucial in achieving caregivers' desired inhaler technique and use (El Rifai & Rizk, 2019). In line with a study by El Rifai and Rizk (2019), caregivers trained by a qualified instructor showed a substantial improvement in proper inhalation techniques following a single interventional session. The educational program strengthened the child with asthma and their caregiver's ability to accurately demonstrate and explain inhaler use, with and without a spacer. Furthermore, a study by Ng et al. (2021) found that caregivers actively engaged in their child's asthma management and received nurse-led web-based education experienced reduced anxiety about inhaler use and reported improved knowledge of asthma control through better medication adherence.

The nurse-led educational program effectively improved the knowledge and use of the inhaler technique. However, although there were statically significant changes (p= < .001) in the caregiver's accurate use of inhalers with and without spacer use, there was no statistical significance seen with the nurse-led educational program and the results of the ATAQ which sought to measure asthma control, attitude/behavior, self-efficacy, and patient-provider communication (Skinner et al., 2004). With a one-sided p-value of .216, the lack of statistical significance can be linked to the timing of the program's implementation. The implementation of

this program occurred between November 2024 and December 2024. According to the CDC (2024), the fall and winter respiratory season lasts from October to April. Viral infections have been identified as one of the most common causes of asthma exacerbations in children (Lewis et al., 2019). Children in urban areas with asthma who acquire respiratory illness during the respiratory season have been noted to affect the airways, causing more significant airway obstruction and respiratory tract inflammation (Lewis et al., 2019). These changes in the airways due to viral illnesses may have resulted in more frequent exacerbations (Feddema & Claassen, 2020). As a result, implementing the nurse-led educational program during this time may not truly capture the improvement of asthma control. Educational programs that target communities with more substantial health disparities and increased morbidity and mortality rates are essential. Although statistical data did not reveal an increase in asthma control as displayed by the ATAQ results ($p = .216$), qualitative observations suggested that implementing a nurse-led program had a positive impact. Several key themes have emerged through educating caregivers of children with asthma, underscoring the substantial benefits of asthma management programs for these caregivers. These findings also highlight gaps in basic information, often resulting from the absence of introductory literature or a lack of urgency in conveying essential details.

An asthma education program significantly enhanced caregivers' understanding of asthma, empowering them to manage the condition more effectively. A study conducted by Agusala et al. (2018) found that offering an interactive asthma educational intervention led to caregivers feeling more educated about what triggers an asthma exacerbation, how to identify symptoms, and how to manage their child's asthma. Like Agusala et al. (2018), this study showed that caregivers reported feeling more confident in recognizing asthma symptoms, the pathology of asthma exacerbations, and triggers. As a result, caregivers were better equipped to

make informed decisions about their child's care, leading to improved asthma management at home. This increased understanding not only helped reduce anxiety but also fostered a stronger sense of control over the child's health, ultimately leading to better asthma outcomes. During the teaching sessions, the researcher encouraged participants to ask questions and provide feedback about the content presented. Participant inquiries and comments offered valuable insights into their perspectives.

"My child has been diagnosed with asthma since he was six years old. I had no idea about what was going on inside his body and why he had so many asthma attacks." (Participant 23, personal communication, 17, December 17, 2024)

"My child is often admitted due to asthma attacks. I am always so stressed out that I do not listen to the teachings being done. I am more receptive to your teaching because I can learn when he is not sick." (Participant 14, personal communication, December 12, 2024)

"I am a nurse and have a child with asthma. I do not remember any time that I have received such education about asthma from a healthcare provider." (Participant 5, personal communication, December 12, 2024)

Theme: Confidence in Medication Management

Asthma education programs greatly enhanced caregivers' confidence in managing their child's asthma medication. According to a study completed by Bosnic-Anricevich et al. (2023), poor inhaler technique hinders the effective management of asthma. Therefore, the assessment of the inhaler technique should be done frequently since it is a vital aspect of successful treatment (Bosnic-Anricevich et al., 2023). In this study, caregivers were provided clear instructions on

inhalers, and spacers helped caregivers better understand how to administer treatment effectively. The program also emphasized the importance of consistent medication adherence and explained the proper use of controller and quick reliever medications. This newfound confidence improved caregivers' ability to manage medications and strengthened their role as active participants in their child's asthma care. In addition to the increased understanding of asthma, participants also noted:

"My son is fifteen years old, and I never knew that the inhalers should be given in a specific order. Though he has had asthma for so long, no one has checked to see if we are using the medications correctly." (Participant 7, personal communication, December 12, 2024)

"I never understood why we needed to use a spacer to give medications. I did not realize that not using the spacer made the medications go to so many different places." (Participant 19, personal communication, December 12, 2024)

"I had no idea we should clean the spacers after use." (Participant 5, personal communication, December 12, 2024)

Limitations

While the nurse-led asthma education program revealed valuable insights, several limitations should be considered. The main limitation is the small sample size (n=23), which restricts the generalizability of the results to a broader population of caregivers in the community receiving asthma education. With limited participants in this study, the findings may not fully represent the diverse community of caregivers and children with asthma. The small sample size

can also lead to potential bias due to the overrepresentation of specific groups, which can affect the conclusions drawn from the gathered data.

Although caregivers of children with asthma initially expressed interest in participating, only a limited number provided contact information to receive the education. A limited number of caregivers provided their contact information to receive the educational materials or attend the sessions. The small number of participants may have been due to several factors, such as time commitments, perceived barriers to accessing education, or lack of awareness of the program's potential benefits. Furthermore, the participation in this project was voluntary. As a result, this may have led to selection bias in which individuals who were already actively managing their child's asthma were more likely to participate. Conversely, those needing education may not have understood the perceived benefits or did not have the time and, therefore, may not have chosen to participate. Understanding the reasons behind this limited participation could result in developing strategies to improve engagement and retention in future interventions, ensuring that there is more representation of caregivers who participate in the nurse-led asthma education program.

In addition to a smaller sample size, the study may have been subject to survey bias. The ATAQ Questionnaire relies on caregivers to recall their child’s asthma control and management over the past four weeks. Because this data collection method heavily relies on the self-reporting of asthma control and management, caregivers may struggle to accurately remember specific details about their child’s asthma symptoms, medication use, or management strategies over an extended time. This recall bias can lead to inaccuracies in the data, as participants may inadvertently omit important information or misrepresent the frequency or severity of asthma events. Caregivers who participated in this study may have felt obligated to provide responses

they believe align with the researcher's expectations. Caregivers may provide more positive information about their child's asthma control or management, even if their child did not have optimum management over four weeks, to appear more compliant with management strategies.

Lastly, a major limitation of the study is the lack of racial diversity among the participants. The caregivers involved in this study were primarily Black or African American, which limits the ability to generalize the findings to a broader, more diverse population. The uniformity of the caregiver sample may not fully represent caregivers' experiences and educational needs from other racial and ethnic backgrounds. Moreover, the lack of diversity could impact the program's effectiveness or the relevance of the educational content, as what works for one group may not be equally effective for another. A sample lacking ethnic and cultural diversity lacks inclusivity and fails to truly reflect the experiences of all caregivers of children with asthma.

Implications for Practice

Nurse-led asthma educational programs for caregivers of children with asthma are effective strategies for addressing the needs of families in urban communities disproportionately affected by asthma (Baek et al., 2019). These communities often experience increased morbidity and mortality due to the severity of asthma for several contributing factors. The existing literature on asthma education supports the idea that structured programs led by nurses and other healthcare professionals can play a vital role in reducing asthma symptoms and improving asthma management (Baek et al., 2019; Ng et al., 2021; Agusala et al., 2018). The results of this study further strengthen this evidence, offering additional insight into how such educational programs can contribute to better health outcomes for children with asthma by improving symptoms through adequate management.

This project could be a foundation for future initiatives to improve asthma care and education. To maximize its effectiveness, it is recommended that the program be offered in multiple languages to cater to the diverse linguistic needs of caregivers. Language barriers can be an obstacle to accessing healthcare education, and providing resources in various languages would ensure broader participation and a more inclusive approach (Pandey et al., 2021). Furthermore, creating a central "home base" that focuses on preventative health can be a place where caregivers can report or receive ongoing support that is easily accessible to encourage them to engage more actively and follow up on the program's recommendations. A program in a designated "home base" would ensure that caregivers receive consistent and accurate educational support information.

Implementing such a program is labor-intensive and requires more than one person to lead the educational efforts. Given the scope of responsibilities—recruiting participants, teaching, answering questions, and tracking follow-up progress—multiple staff members would be essential to ensure its success. Additionally, considering the time and effort involved, offering incentives for healthcare professionals participating in the program is important. These incentives would help maintain motivation and ensure their continued commitment to providing education and support.

Similarly, participants in the program should also be incentivized for their time and involvement. Compensation or rewards for caregivers who engage in the program could increase retention and encourage consistent participation. Another important consideration is the timing of the program's implementation. This study was conducted only during the winter months, which may have skewed the results due to the seasonal increase in respiratory ailments. Asthma is a chronic condition that requires year-round management, and ongoing education is crucial to

ensure that caregivers and children are adequately equipped to handle asthma symptoms throughout the year. Implementing the program year-round would provide the continuity needed to optimize asthma management and improve long-term outcomes.

DNP Essentials

The DNP Essentials of Doctoral Education for Advanced Practice Nurses are designed to prepare nurses for advanced practice roles and educational leadership, ultimately enhancing health outcomes, clinical practice, and health policy (AACN, 2006). Through this framework, the DNP student developed the skills to become an effective change agent, successfully implementing a nurse-led educational intervention to improve asthma outcomes for youth residing in urban communities.

Essential II: Organizational and Systems Leadership for Quality Improvement

The DNP Essentials were thoroughly embedded in this quality improvement project. DNP Essential II: *Organizational and Systems Leadership for Quality Improvement and Systems Thinking*. This essential emphasizes improving quality by addressing health disparities and promoting patient safety (AACN, 2006). The second essential was closely aligned with this DNP project in multiple ways. The project addresses the critical public health issue of childhood asthma by designing and implementing a nurse-led educational program within the community. The community-based approach enhances the DNP student's ability to improve individual care and overall community health outcomes. Moreover, the project deepened the DNP student's understanding of the role of education in reducing health disparities, particularly for children in urban areas, where asthma rates and health inequities are disproportionately high.

Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

Essential III: *Clinical Scholarship and Analytical Methods for Evidence-Based Practice* was integrated into this study. The DNP applied this essential in developing a nurse-led educational program for asthma grounded in evidence-based practice. By utilizing educational materials from Children's Mercy Hospital, the program aimed to address and meet the needs of caregivers of children with asthma. In addition to applying evidence-based practice, the DNP gained experience in promoting clinical scholarship. This scholarly approach to the project allowed the DNP to contribute new methods and insights on educating caregivers to enhance asthma management in children.

Essential VII: Clinical Prevention for Improving Patient and Population Health Outcomes

Essential VII: Clinical Prevention for Improving Patient and Population Health Outcomes was the final DNP Essential applied in this project. This essential emphasizes the critical role of advanced practice nurses in promoting health, preventing disease, and addressing the healthcare needs of diverse populations to improve overall health and reduce disparities (AACN, 2006). In this project, we implemented a nurse-led educational program to enhance asthma management among youth, explicitly targeting communities disproportionately affected by asthma. By focusing on education to reduce health disparities, this initiative directly aligns with the competencies outlined in Essential VII, which emphasizes the importance of addressing health inequities and promoting population health through preventive interventions.

Recommendations for Future Practice

This quality improvement project aimed to enhance asthma symptom management and medication adherence among families with children diagnosed with asthma. There is limited research on the effectiveness of nurse-led educational programs for caregivers in community settings. The findings of this project suggest that such programs can positively impact asthma

management for children in urban communities. However, one key limitation of the study was the small participant sample. To increase the generalizability of the findings, a larger sample size is needed to assess better whether a nurse-led program can effectively meet the needs of all caregivers of children with asthma. Another limitation was the lack of racial diversity in the sample. Including a more diverse population would provide valuable insights into the program's applicability across different groups. Future efforts should focus on implementing educational programs outside of acute care settings and physician's offices, as the need for ongoing asthma management and education extends beyond these environments.

Conclusion

This study examined the effect of a nurse-led asthma education program on enhancing health outcomes for children with asthma in urban communities, where the condition disproportionately impacts families. The research highlights the importance of improving asthma management through education on recognizing symptoms, proper inhaler techniques, and medication adherence. Results indicated that implementing an educational program enhanced caregivers' ability to use inhalers correctly. However, statistical significance was not reached in overall asthma control, with a value of $p = .432$, possibly because of the small sample size and the timing during the respiratory season. The program positively affected caregivers' knowledge and confidence in managing asthma, emphasizing learning outside the acute care setting. The study recommends future initiatives to address health disparities by providing programs that support multiple languages, establishing central support locations, involving various healthcare team members, and guaranteeing year-round education to encourage continuous asthma management and care.

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Appendices

Appendix A Consent Form

WILLIAM PATERSON UNIVERSITY
School of Nursing • University Hall, Room 345
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Project Title: Using a Nurse-led Educational Program to Reduce the Prevalence of Asthma Symptoms and Improve Asthma Management in Families of Children with Asthma in Urban Communities

Principal Investigator: Malika S. Gilliam, MSN (Ed.), RN

Faculty Sponsor: Dr. Jill Nocella, PhD, APRN-BC

Department: Nursing

Protocol Approval Date:

IRB Contact Phone Number: 973-720-2852

This community quality improvement initiative aims to improve the health outcomes of families with children with asthma in urban communities. I understand that my participation is voluntary. I may stop at any time and do not have to answer any question(s) if I choose not to respond.

The risks associated with participating in this study are minimal. However, involvement in the asthma education program may have an emotional impact, which can be related to managing my child's asthma. Participation in this program may require significant time commitment, including attending educational sessions and completing surveys. I have acknowledged these risks and accepted them. The benefits of my participation in this study are improving health outcomes through information about asthma triggers, symptoms, medication, and self-management, and I accept them.

I understand that any data collected in this study will be stored in a safe and secure location and destroyed when the research is completed, or the investigator no longer needs it.

I understand that I will be an anonymous participant in this study, and no one, including the investigators, will be able to identify me through my responses. I understand that my identity will not be revealed in any way through the way that data and findings are reported. I will not include my name in my responses to protect my identity.

I understand that by providing consent for this study, I am also permitting my responses to be included in datasets that may be used by the investigator of this study or other investigators for research related to the purpose of this study.

I confirm that I am at least 18 years old by providing consent for this study.

Consent:

___ Yes. I give my consent to participate in this quality improvement project.

___ No. I do not want to participate.

Appendix B Demographic Questionnaire

Demographic Survey

(***Please circle your answer choice***)

1. Has your child been diagnosed with asthma by a qualified physician?
    a. Yes
    b. No (if no, thank you for your participation.)
2. Gender of the child
    a. Male
    b. Female
    c. Other: _____
3. Child age in years: _____
4. Child's race/ethnicity
    a. American Indian or Alaskan Native
    b. Asian
    c. Black or African-American
    d. Hispanic or Latino
    e. Native Hawaiian or Other Pacific Islander
    f. White
5. Child's grade level
    a. Not enrolled in school
    b. Elementary
    c. Middle

    d. High school

6. Insurance type
    a. Medicaid
    b. Private insurance
    c. Other
7. Asthma severity
    a. Intermittent
    b. Mild
    c. Moderate
    d. Severe
8. Parent (guardian) highest level of education
    a. Less than a high school diploma
    b. High school diploma or equivalent (GED)
    c. Associate's Degree
    d. Bachelor's Degree
    e. Master's Degree
9. Caregiver relationship with the child
    a. Mother
    b. Father
    c. Stepparent
    d. Grandparent
    e. Aunt/ uncle
    f. Legal Guardian

g. Other

10. Parents employment status

a. Unemployed

b. Full-time

c. Part-time

d. Seasonal worker

Appendix C Pediatric/ Adolescent Asthma Therapy Assessment Questionnaire

Pediatric/Adolescent Asthma Therapy Assessment Questionnaire

Patient Name:_____

ID Number:_____

Physician Name:_____ Date:_____

Please have the parent or guardian complete this questionnaire.

INSTRUCTIONS: Check 1 answer to each question and enter point value (0 or 1) on line

	Control Issues	Other Issues

1. In the *past 4 weeks,* did your child:

a) Have wheezing or difficulty breathing when exercising?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____
b) Have wheezing during the day when **not** exercising?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____
c) Wake up at night with wheezing or difficulty breathing?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____
d) Miss days of school because of his/her asthma?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____
e) Miss any daily activities (such as playing, going to a friend's house, or any family activity) because of asthma?	☐ Yes (1)	☐ No (0)	☐ Unsure (1)	____

2. Does your child use an inhaler or a nebulizer for *quick relief* from asthma symptoms?* ☐ Yes ☐ No ☐ Unsure

(If Yes) In the **past 4 weeks**, what was the **greatest number of times** in 1 day your child used this inhaler/nebulizer?

0	☐ (0)	5 to 6	☐ (1)
1 to 2	☐ (0)	More than 6	☐ (1)
3 to 4	☐ (1)*	**Enter score** →	____

3. Has your child ever had a prescription for an asthma medicine that is NOT used for quick relief but is used to *control* his/her asthma? ☐ Yes ☐ No ☐ Unsure

(If Yes or Unsure) What best describes how your child takes this medicine now?

Takes it every day	☐ (0)	Only takes it when he/she has symptoms	☐ (1)
Takes it some days, but not other days	☐ (1)	Never takes it	☐ (1)
Used to take it, but now does not	☐ (1)	**Enter score**	____

4. Are you dissatisfied with any part of your child's *current* asthma treatment? ☐ Yes (1) ☐ No (0) ☐ Unsure (1) ____

5. Do you believe that:

a) Your child's asthma was well controlled in the **past 4 weeks**?	☐ Yes (0)	☐ No (1)	☐ Unsure (1)	____
b) Your child is able to take his/her asthma medicine(s) as directed?	☐ Yes (0)	☐ No (1)	☐ Unsure (1)	____
c) Your child's medicine(s) is useful for controlling his/her asthma?	☐ Yes (0)	☐ No (1)	☐ Unsure (1)	____

6. During this office visit, would you like the doctor to discuss:

a) Different types of drugs available to control asthma?	☐ (1)	
b) Your child's asthma treatment options?	☐ (1)	
c) How your child prefers to take his/her asthma medicine(s)?	☐ (1)	
d) Other issues?	☐ (1)	
	Enter score →	____

Add numbers in the light blue area and enter total SCORE here. **TOTAL** → ____

Add numbers in the dark blue area and enter total SCORE here. **TOTAL** → ____

If either SCORE is 1 or greater, discuss questionnaire with your doctor.

*This reflects a lower threshold to identify potential control problems than was used in the ATAQ validation studies. This modification was designed to encourage patients and providers to discuss how asthma medications are being used.

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Appendix D Inhaler Device Tool

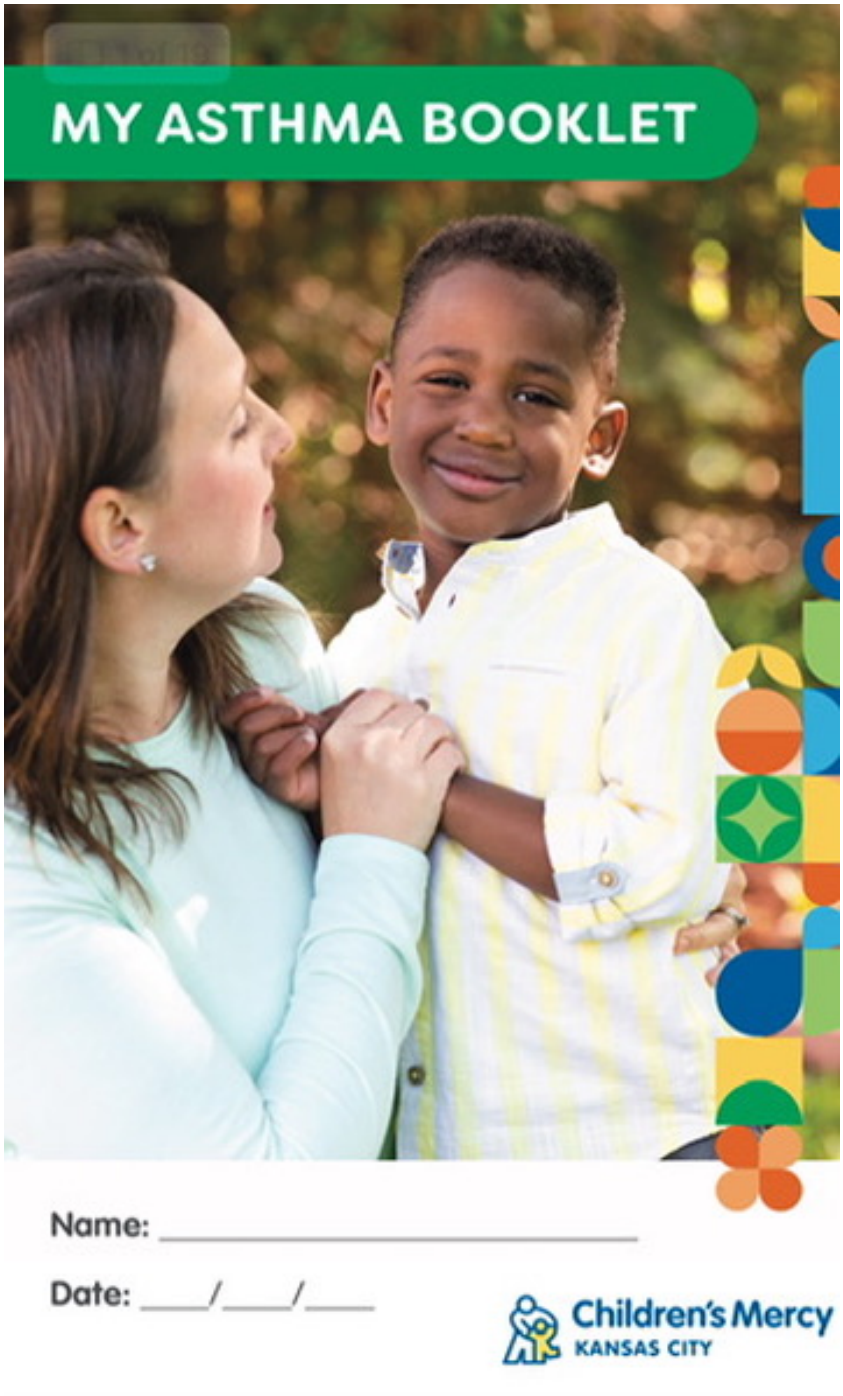
Inhaler Device Assessment Tool - Form A1: MDI

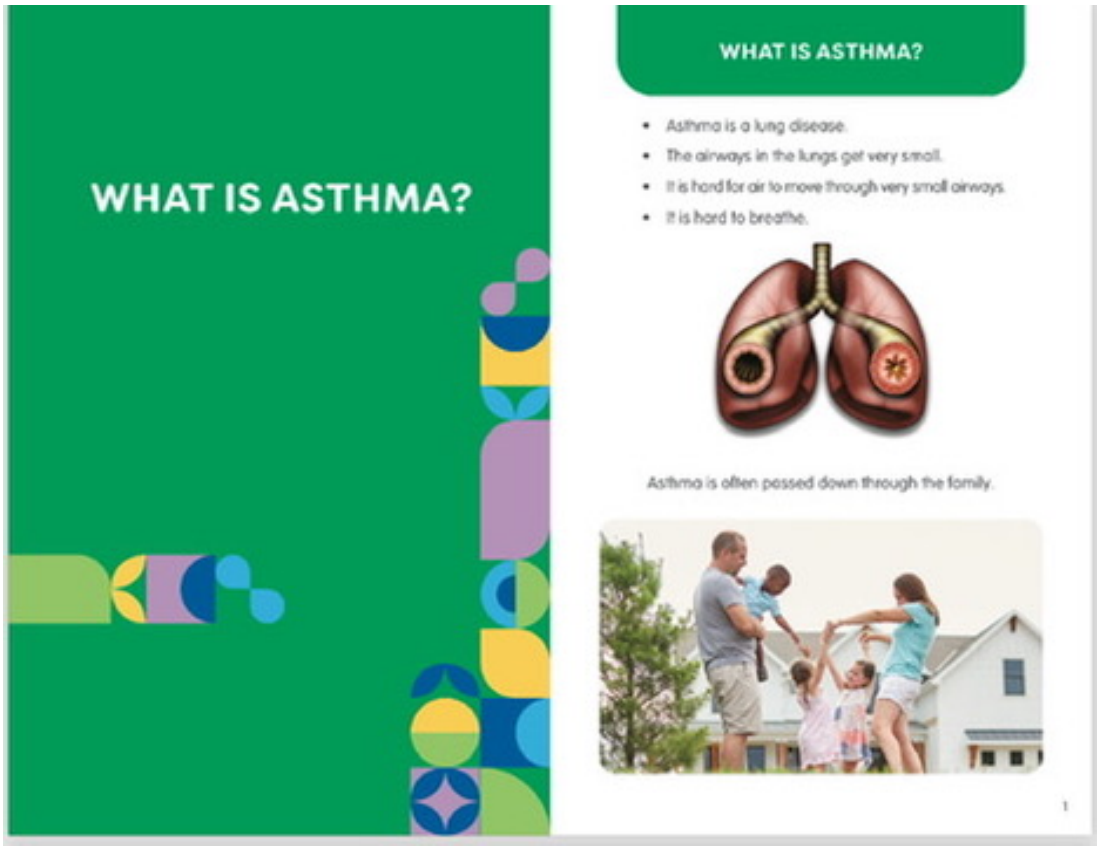
Type of inhalation device (**Check one**): ☐ MDI ☐ MDI plus spacer ☐ MDI plus spacer with mask

Instructions. Give one point for each step performed correctly (1=Yes, correct technique). Provide a reason for why a step was not done correctly for steps with a Score of 0.
When using this checklist as a teaching guide: For boxes with a score of 0, provide more teaching or coaching in these areas until a total score of 5 is obtained. Record the number of attempts until a satisfactory technique is obtained in the column "Coaching."

Sequence of Critical Steps & Criteria		Score Circle 1 or 0		Coaching
1 Removes cap.		1	0	
Score 1 if: ✓ MDI: Removes cap from the mouthpiece. ✓ MDI plus spacer: Removes cap(s), AND inserts canister into spacer correctly. ✓ MDI plus spacer with mask: Removes cap(s), inserts canister mouthpiece into spacer.	*Score 0 if:* ☐ Forget to remove cap(s). ☐ Metal canister of MDI not in plastic mouthpiece correctly ☐ Other:			
2 Correctly primes device.		1	0	
Score 1 if: ✓ MDI: Shakes the inhaler AND inhaler is upright ✓ MDI plus spacer with mask: Shakes and delivers only 1 spray in the chamber, after on face with a good seal.	*Score 0 if:* ☐ Forget to shake. ☐ Device held incorrectly (e.g., upside down). ☐ Other:			
3 Exhales.		1	0	
Score 1 if: ✓ Exhales completely or breathes out to the end of a normal breath before putting apparatus to mouth. ✓ MDI plus spacer: Hear a hissing sound. ✓ MDI plus spacer with mask: Good fit of mask (nose and mouth covered).	*Score 0 if:* ☐ Does not exhale fully. ☐ Other:			
4 Inhales appropriately for device.		1	0	
Score 1 if: ✓ MDI: Positioned 2-3 finger widths away from widely opened mouth. At the same time starts to breathe in slowly and depresses the inhaler to release 1 puff of medication. Continues breathing in slowly for about 5 seconds. Position with chin up. ✓ MDI plus spacer: Puts the mouthpiece of spacer in the mouth, lips closed tightly around it, presses the inhaler. Breathes in slowly and deeply through the mouth for about 5 seconds. ✓ MDI plus spacer with mask: Good seal over nose and mouth, press the inhaler, slow tidal breathing (that is, regular breathing in and out).	*Score 0 if:* ☐ Head not correctly positioned. ☐ Block spray with teeth or tongue. ☐ Blue or yellow Aerochamber: Hear a musical sound or whistling; breathing in too quickly. ☐ Does not synchronize breathing in with puff (MDI alone). ☐ Inhales through nose. ☐ Delivering 2 sprays at once in the chamber for 1 inhalation. ☐ Cough provoked by inhalation. ☐ Other:			
5 Holds breath.		1	0	
Score 1 if: ✓ Person holds breath to count of 10 seconds. ✓ Lips kept closed while holding breath. ✓ MDI plus spacer with mask: No breath hold (see tidal breathing above) ✓ Person waits 30-60 seconds before repeating process	*Score 0 if:* ☐ Holds breath for less than 10 seconds. ☐ MDI plus spacer with mask: Holds breath in and out less than 6 times per dose of medication. (child <6 years) ☐ Other:			
Date: _____ dd/mm/yyyy	**TOTAL SCORE**			

Appendix E Children's Mercy Hospital Education




WHAT IS ASTHMA?
WHAT IS ASTHMA?
Asthma is a lung disease.
The airways in the lungs get very small.
It is hard for air to move through very small airways.
It is hard to breathe.
Asthma is often passed down through the family.
1

ASTHMA SIGNS AND SYMPTOMS

Very small airways cause asthma signs and symptoms.

Check your asthma signs and symptoms

✓	Cough
✓	Wheeze
✓	Tight chest
✓	Fast breathing
✓	Other: _____

CONTROL YOUR ASTHMA SIGNS AND SYMPTOMS

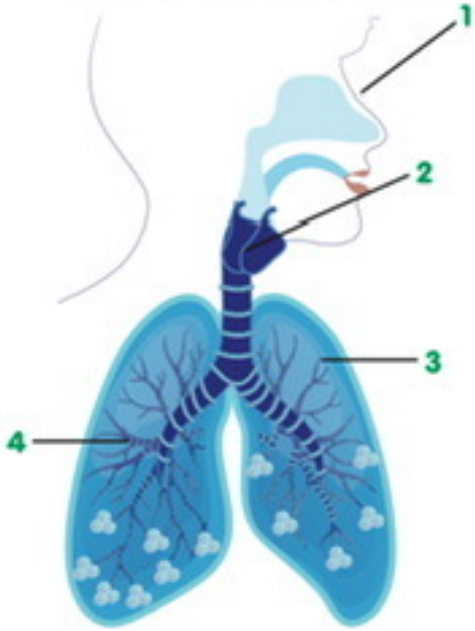
Asthma Goals

✓	**Able to play without asthma signs and symptoms.**
✓	**Asthma signs and symptoms during day** 2 or less times a week.
✓	**Asthma signs and symptoms at night** 2 or less times a month.
✓	**Coming to hospital or emergency department for asthma** 2 or less times a year.

✓ Check your asthma control often.

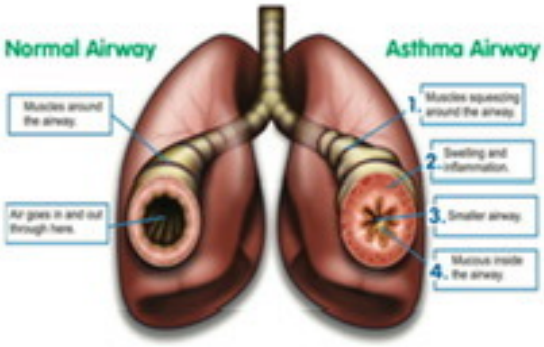
INSIDE LUNGS

1. We breathe through our nose and mouth.
2. The air goes into large airways.
3. Large airways branch into smaller airways.
4. Muscle bands wrap around the airways.



WHAT CAUSES ASTHMA SIGNS AND SYMPTOMS?

Asthma airways are sensitive or easily bothered.



What happens to the airway?		Asthma signs and symptoms
1. Muscle squeeze	CAUSES →	Cough
2. The inside swells		Wheeze
3. Airway gets small		Tight chest
4. Mucous fills the airway		Fast breathing

WHAT MAKES YOUR ASTHMA SIGNS AND SYMPTOMS BETTER?

Types of asthma medicines

1. **Quick reliever**
   Relaxes muscles around the airway.

2. **Controller**
   Controls swelling and mucous in your airways.

3. **Emergency medicine**
   Brings back control of serious symptoms.

QUICK RELIEVER MEDICINE

- Works **FAST** (10-20 minutes).
- Lasts for up to 4 hours.
- Used to **STOP** asthma signs and symptoms.

CIRCLE the quick reliever you use at home.

To prime your inhaler—see Priming Inhalers on page 28.

SP Use a spacer with this inhaler—see Spacer section starting on page 26.

Inhaler photos courtesy of Allergy & Asthma Network

CONTROLLER MEDICINE

- Works **SLOW**.
- May take a few weeks to work.
- **PREVENTS** asthma signs and symptoms.
- Rinse mouth after use.

CIRCLE the controller you use at home.


Flovent® HFA SP
(fluticasone)


Asmanex® SP
(mometasone)


QVar® RediHaler™
(beclomethasone)


Asmanex® Twisthaler®
(mometasone)


Dulera® SP
(mometasone and formoterol)


Budesonide


Montelukast


Pulmicort Flexhaler™
(budesonide)


Advair®
(fluticasone and salmeterol)


Alvesco® SP
(ciclesonide)


Symbicort® SP
(budesonide and formoterol)


Arnuity® Ellipta®
(fluticasone furoate)

To prime your inhaler—see Priming Inhalers on page 28.

SP Use a spacer with this inhaler—see Spacer section starting on page 26.

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CONTROLLER MEDICINE


Breo™ Ellipta™
(fluticasone - furoate and vilanterol)


Wixela® Inhub®
(fluticasone and salmeterol)


Spiriva®
(tiotropium)


AirDuo®
(fluticasone and salmeterol)
available in generic

Inhaler photos courtesy of Allergy & Asthma Network

EMERGENCY MEDICINE

Use to bring back control of serious symptoms.

Pill or liquid

- Prednisolone
- Orapred
- Prednisone

See page 21 for more details.

REDUCE YOUR EXPOSURE TO TRIGGERS IN THE HOME

- Don't bring food in bedroom.
- Keep pets out of bedroom.
- Caulk holes and cracks in walls and corners.
- Remove carpets and rugs from bedroom.
- Wipe dust off regularly with a damp cloth.
- Remove dust collecting items from bedroom.
- Use zipper-encased, allergy free bedding.
- Replace curtains with shades or blinds.
- Don't smoke inside the house.
- Keep windows closed during allergy season.
- Keep humidity under 50%.
- Use only HEPA vacuums and air purifiers.
- Use 'green' cleaning supplies or water and vinegar.
- Put away stuffed animals and toys in a box.

List developed by the **Asthma Literacy Project** for the **South Bronx Asthma Partnership**

REDUCE YOUR EXPOSURE TO TRIGGERS IN THE HOME

Triggers can start asthma signs and symptoms.

✓ Check Asthma Triggers

✓		**Cold or virus** • This is the most common asthma trigger. • Treat cough and wheeze during a cold with asthma medicines.
✓		**Exercise** • Warm up before exercise. • Cool down after exercise. • Use quick reliever before heavy exercise.
✓		**Weather** • Cold weather—Wear scarf over nose and mouth. • Hot weather—Use air conditioning.
✓		**Outdoor pollen** • Keep windows closed. • Stay indoors. • Wash clothes and hair after being outside.
✓		**Strong emotions** • Calm child down. • Use quick reliever as needed.

✓		**Mold** • Keep house dry. • Use exhaust fans. • Keep humidity less than 50%.
✓		**Dust** • Wash linens in hot water. • Vacuum with HEPA filter. • Change furnace filters. • Wipe dust with a damp cloth.
✓		**Smoke/Vape** • Try to quit. • Do not smoke/vape in the home or car. • Smoke/vape outside and wear a cover-up.
✓		**Strong smells** • Use fragrance-free cleaners. • Do not use strong smelling air fresheners or perfumes.
✓		**Cockroaches** • Keep home free of clutter. • Do not leave dishes in sink overnight. • Keep home dry. • Take trash out every night.
✓		**Animals** • Keep out of bedrooms and off furniture. • Bathe pets weekly.

WHAT IS AN ASTHMA ACTION PLAN?

An **Asthma Action Plan** is a tool to help manage asthma signs and symptoms at home.

Keep asthma action plan where you can find it:

- Hang up on refrigerator.
- Take a picture and keep in your phone.

ASTHMA ACTION PLAN ZONES

GREEN ZONE

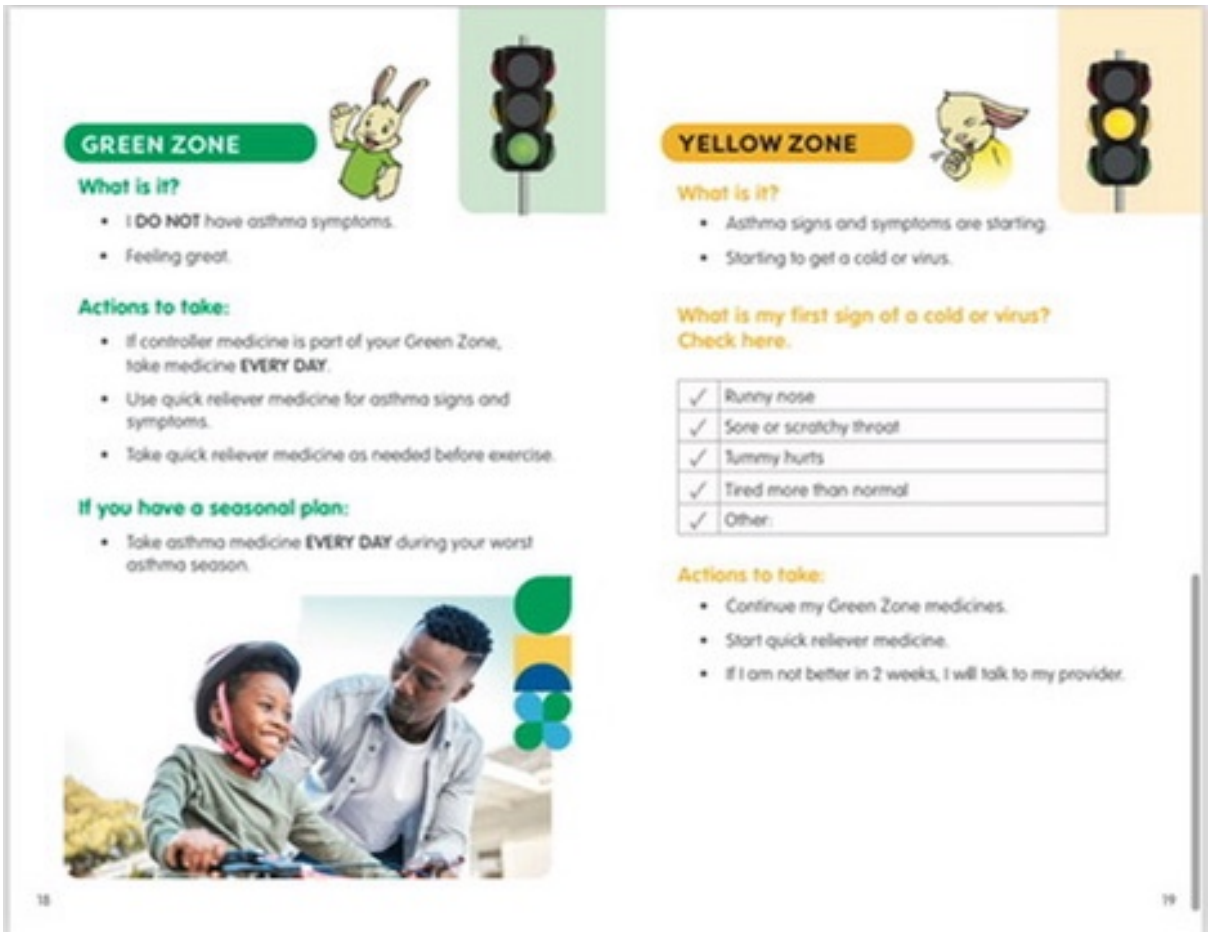
- I do not have asthma symptoms (cough, wheeze or problems breathing).
- I can play without symptoms.
- I can sleep without symptoms.

YELLOW ZONE

- Asthma symptoms getting worse.
- I have a cold.

RED ZONE

- Pulling in at the ribs or neck.
- Lips or fingernails are blue.
- Struggling to breathe.
- Concerned about your breathing.



GREEN ZONE

What is it?

- I **DO NOT** have asthma symptoms.
- Feeling great.

Actions to take:

- If controller medicine is part of your Green Zone, take medicine **EVERY DAY**.
- Use quick reliever medicine for asthma signs and symptoms.
- Take quick reliever medicine as needed before exercise.

If you have a seasonal plan:

- Take asthma medicine **EVERY DAY** during your worst asthma season.

YELLOW ZONE

What is it?

- Asthma signs and symptoms are starting.
- Starting to get a cold or virus.

What is my first sign of a cold or virus? Check here.

✓	Runny nose
✓	Sore or scratchy throat
✓	Tummy hurts
✓	Tired more than normal
✓	Other:

Actions to take:

- Continue my Green Zone medicines.
- Start quick reliever medicine.
- If I am not better in 2 weeks, I will talk to my provider.

YELLOW ZONE Continued

Evaluate your asthma signs and symptoms NOW.

Repeat quick reliever up to 3 times.

1. **GIVE QUICK RELIEVER**
   If quick reliever does NOT work fast (in 20 minutes)
2. **GIVE QUICK RELIEVER AGAIN**
   If quick reliever does NOT work fast (in 20 minutes)
3. **GIVE QUICK RELIEVER AGAIN**

NO SYMPTOMS	YES SYMPTOMS
YELLOW ZONE	RED ZONE

RED ZONE

What is it?

- I am finding it hard to breathe.

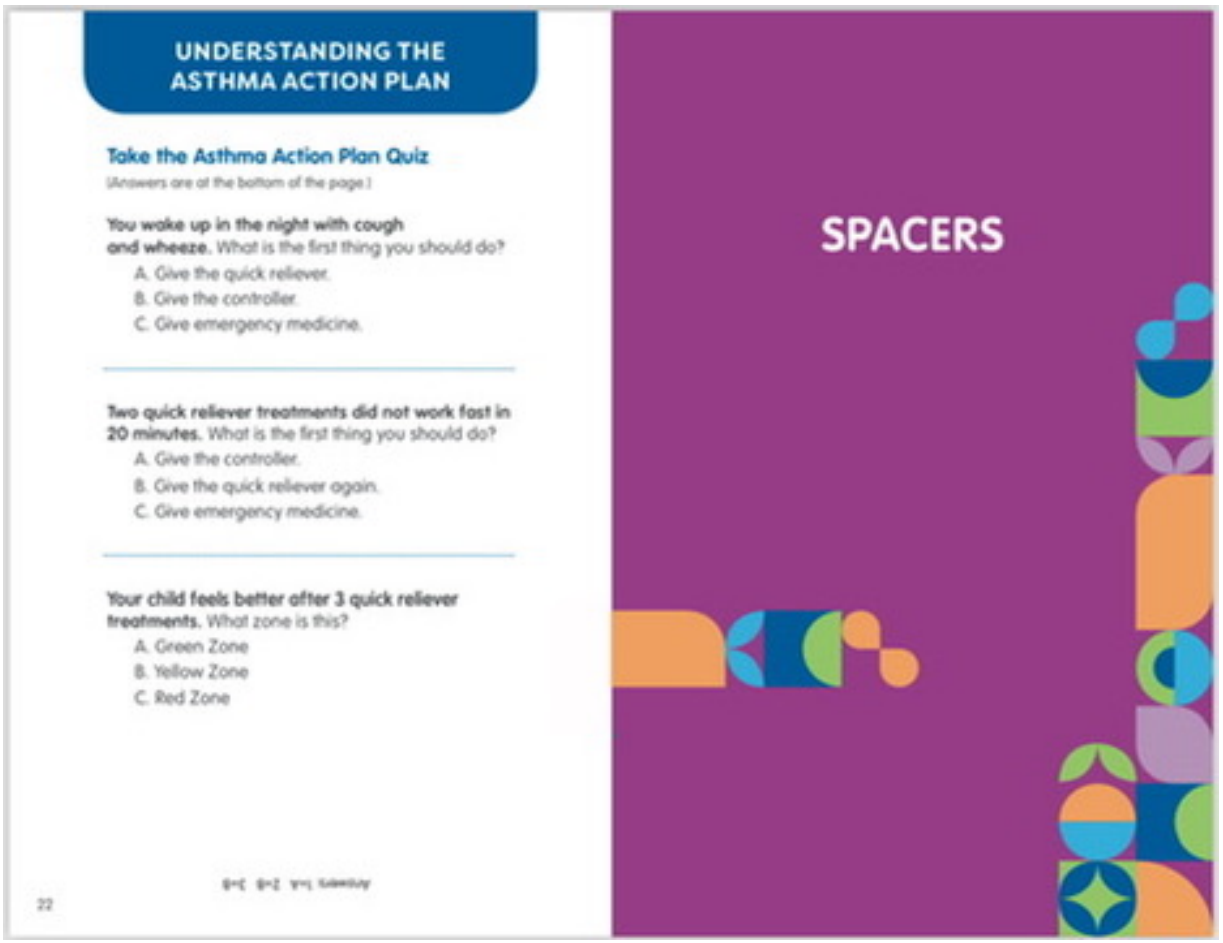
Action to take

- Take emergency medicine **NOW** if listed on my asthma action plan.

Next

Seek emergency care. A caregiver should:

- **Call your asthma provider or the Children's Mercy nurse triage line at (816) 234-3188.**
- **Go to the ER or call 911 if:**
  - Pulling in at the ribs or neck.
  - Lips or fingernails are blue.
  - Struggling to breathe.
  - Concerned about your breathing.



UNDERSTANDING THE ASTHMA ACTION PLAN

Take the Asthma Action Plan Quiz

(Answers are at the bottom of the page.)

You wake up in the night with cough and wheeze. What is the first thing you should do?

A. Give the quick reliever.
B. Give the controller.
C. Give emergency medicine.

Two quick reliever treatments did not work fast in 20 minutes. What is the first thing you should do?

A. Give the controller.
B. Give the quick reliever again.
C. Give emergency medicine.

Your child feels better after 3 quick reliever treatments. What zone is this?

A. Green Zone
B. Yellow Zone
C. Red Zone

Answers: 1=A 2=B 3=B

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SPACERS

Why use a spacer with an inhaler?

Inhaler alone

When an inhaler is used alone, medicine ends up in the mouth, throat, stomach and lungs.

Inhaler used with spacer device

When an inhaler is used with a spacer device, more medicine is delivered to the lungs.

- Always use a spacer with your inhaler.
- Children under the age of about 10 should use a mask with the spacer.

Scan this QR code for a video version of how to use a spacer.

"Comparative respiratory deposition of 99m Tc labeled particles of albuterol using a metered dose inhaler, a metered dose inhaler with Aerochamber® spacer and OptiChamber® spacer in healthy human volunteers using gamma scintigraphy," K. Behr, PhD, Scintipros, Inc., Indianapolis, IN and D. Doherty, MD, Dept. of Pulmonology, University of Kentucky Medical Center, Lexington, KY, 1997.

Images kindly provided by Respironics HealthScan, Inc.

Allies Against Asthma, Cap Center for Pediatric Research, 855 W. Brambleton Ave., Norfolk, VA 23510, (757) 668-6435

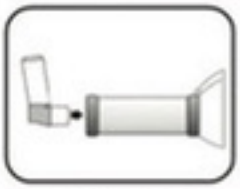
HOW TO GIVE ASTHMA MEDICINE WITH SPACER AND MASK

Spacer with mask

Use a spacer with the inhaler. More medicine will go into the lungs.

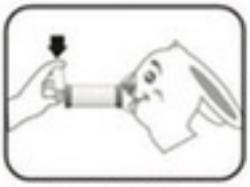
1. Sit with your child in your lap.

2. Shake the inhaler.



3. Remove cap from the inhaler. Place inhaler into spacer.

4. Seal the mask over the nose and mouth.



5. Push down on the inhaler. Release 1 puff into the spacer.

6. Hold mask on face for 5-10 breaths. Remove mask from face. Wait about 30 seconds. Repeat steps 1-6 for each puff.

HOW TO GIVE ASTHMA MEDICINE WITH SPACER AND MOUTHPIECE

Spacer with mouthpiece

Use a spacer with the inhaler. More medicine will go into the lungs.

1. Shake the inhaler. Remove the caps from the inhaler and spacer.

2. Place the inhaler into the back of the spacer.

3. Take a deep breath and let it all the way out.

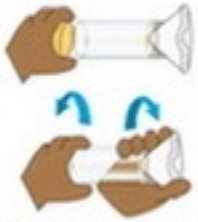
4. Seal lips around the mouthpiece. Push down on the inhaler to release 1 puff into the spacer.

5. Breathe in slowly through the mouth. Hold breath for 10 seconds. The whistle sound means the breath is too fast. Slow down.

6. Let out your breath. Wait about 30 seconds. Repeat steps 1-6 for more puffs.

CLEANING SPACER

Some spacers may be cleaned in the dishwasher. Please read cleaning instructions for your spacer.



1. Remove the back piece. Twist chamber to remove the front piece.

2. Soak all parts in warm water and liquid dish soap. Move gently. **DO NOT** scrub inside.

3. Rinse.

4. Air dry standing up. **DO NOT** rub dry.

5. Fit the front piece on the end of the chamber. Twist until locked.

6. Center the notch on the back piece with the line on the chamber. Press back piece firmly in place.

PRIMING INHALERS

Priming an inhaler means to spray it into the air before taking a dose. Follow the directions below to make sure you are getting the *right amount* of medicine with each puff.

Name	How to prime	
Ventolin® (albuterol)	First time: Spray 4 times in air.	If not used in 2 weeks or dropped, spray 4 times in air.
ProAir® (albuterol)	First time: Spray 3 times in air.	If not used in 2 weeks, spray 3 times in air.
Proventil® (albuterol)	First time: Spray 4 times in air.	If not used in 2 weeks or dropped, spray 4 times in air.
Xopenex® (levalbuterol)	First time: Spray 4 times in air.	If not used in 3 days, spray 4 times in air.
Flovent® (fluticasone)	First time: Spray 4 times in air.	If not used in 7 days or dropped, spray 4 times in air.
Asmanex® (mometasone)	First time: Spray 4 times in air.	If not used in 5 days, spray 4 times in air.
Symbicort® (budesonide and formoterol)	First time: Spray 2 times in air.	If not used in 7 days or dropped, spray 2 times in air.
Alvesco® (ciclesonide)	First time: Spray 3 times in air.	If not used in 10 days, spray 3 times in air.
Advair® (fluticasone and salmeterol)	First time: Spray 4 times in air.	If not used in 4 weeks or dropped, spray 4 times in air.
Dulera® (mometasone and formoterol)	First time: Spray 4 times in air.	If not used in 5 days, spray 4 times in air.

Check dose counter and expiration date on inhalers prior to giving medication.

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ASTHMA CONTROL

CHECK ASTHMA CONTROL OFTEN

✓	**Able to play without asthma signs and symptoms.**
✓	**Asthma signs and symptoms during day** 2 or less times a week.
✓	**Asthma signs and symptoms at night** 2 or less times a month.
✓	**Coming to hospital or emergency department for asthma** 2 or less times a year.

Contact your asthma provider if you do not check all of the boxes.

TRACK ASTHMA CONTROL AT HOME

Track symptoms every day using an Asthma Diary.

To print out an **Asthma Diary**, go to: **childrensmercy.org/asthma** and select **asthma control**.

Track symptoms once a month using an Asthma Control Test

To print out an **Asthma Control Test**, go to: **childrensmercy.org/asthma** and select **asthma control**.

ASTHMA HEALTH PROVIDERS

Partner with your health provider to assess asthma control.

Primary care provider

Provider:_____

Phone number: (_____) _____ - _____

Other asthma provider

Provider:_____

Phone number: (_____) _____ - _____

My next appointment is:

Date:_____

Time: _____

Location: _____

Always bring these items to your asthma visit:

- ☐ Medicines
- ☐ Diary
- ☐ Action Plan