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A Comparison Of An Individually Tailored And A Standardized Asthma Self-Management Education Program

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A COMPARISON OF AN INDIVIDUALLY TAILORED AND A STANDARDIZED ASTHMA SELF-MANAGEMENT EDUCATION PROGRAM

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Abstract

Asthma is one of the most prevalent chronic diseases in the United States (Centers for Disease Control [CDC], 2003). According to the CDC (2003), prevalence of asthma continues to rise in epidemic proportions and is very costly. While asthma cannot be prevented or cured, it can be controlled to improve quality of life. Self-management is key to controlling asthma (CDC, 2003; National Heart, Lung, and Blood Institute [NHLBI], 2002).

State of the science for asthma self-management establishes that health care costs decrease for self-management intervention groups (Lindberg et al, 2002; Thoonen et al, 2003). Education is essential to support asthma self-management, but state of the science does not indicate the type of education intervention or how intense an education intervention should be. Education literature supports meeting learner needs as an essential component for successful adult learning.

The purpose of this study is to examine and compare the effects of two asthma self-management programs on adult asthma control, the individually tailored and the standardized. It is a comparative, pretest-posttest design to examine and compare the effects of the standardized education (n = 44) and the individually tailored education (n = 44) on asthma control. The education curriculum for both groups is based on National Asthma Education Prevention Program guidelines. The individually tailored education utilizes an andragogical framework. The Asthma Control Test (ACT) and Peak Expiratory Flow (PEF) readings were utilized as pre and post-test measures (American Lung Association, 2002). An independent t-test, chi-square, and repeated measure general linear model technique were utilized to compare groups. There was a significant

difference in ACT scores between pre and post-test, regardless of asthma teaching methods, as indicated by multivariate tests of within subject effects ($F = 4.43$, $p = .038$). There was a statistically significant decrease in mean number episodes of shortness of breath ($F = 6.22$, $p = .015$) regardless of asthma teaching methods. The current study supports a standardized and an individually tailored education program as being effective in improving asthma control and decreasing episodes of shortness of breath and supports a growing need for nurses to become involved in adult asthma education.

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Chapter I: Introduction

In this chapter the background, the problem, the problem statement, and purpose regarding adult asthma self-management education are discussed. The rationale for studying the effects of adult asthma self-management education on asthma control is presented. The significant influence of asthma on individuals and on the healthcare system in the United States (U.S.) is emphasized. In addition, the research questions, associated assumptions, and theoretical definitions for the current study are presented.

Background

With the epidemic prevalence of asthma and related health care costs, a collaborative effort of federal agencies has been established to address the problem of asthma. While current guidelines regarding treatment of individuals with asthma are based on available research and expert opinion, they are limited. Expected outcomes or potential side-effects of medication treatment are not addressed. Cost implications of guideline recommendations are not considered. Cost and side-effects are two important factors to consider. Guidelines are also medical-care focused when increasing asthma morbidity and mortality calls for effective interventions extending beyond medical care into the realm of behavioral and lifestyle modification, educational services, housing, community services, and environmental reforms (Lara et al., 2002).

Review of the literature supports asthma self-management improves outcomes. Strategies to facilitate asthma self-management are identified. Written plans are as effective as regular physician visits (Gibson et al., 2003; Powell & Gibson, 2003). Peak expiratory flow (PEF) and symptom monitoring are equally effective (Powell & Gibson, 2003). Education is essential to support asthma self-management. Current evidence and

recommended guidelines for controlling asthma often are not being applied in health care practice (Centers for Disease Control and Prevention [CDC], 2003a). Future challenges lie in facilitating evidenced-based practice in caring for individuals with asthma. Avenues to implement asthma self-management education as a standard of practice need to be explored.

Problem

The U.S. faces many health challenges. In an effort to identify and address these challenges, state and national statistical data are tracked in the Healthy People 2010 Database (Department of Health and Human Services [DHHS], 2005). From these data, the following health concerns have been identified: a) 18.2 million Americans have diabetes; b) 64% of adults are overweight or obese; c) more than 31 million people have diagnosed asthma; d) 40% of all deaths yearly are due to heart disease or stroke; e) Cancer is the second leading cause of death (DHHS, 2005). While asthma mortality is not as high as heart disease, stroke, or cancer, it impacts more people and has a greater incidence and prevalence than diabetes, heart disease, stroke, or cancer.

Asthma is one of the most prevalent chronic diseases and can be life-threatening despite the existence of effective treatment because of a lack of effective management (CDC, 2003a; McAllister, 2004). Asthma results from a complex inflammatory process which causes airway obstruction (Janson, Hardie, Fahy, & Boushey, 2001; National Heart Lung Blood Institute, 1997, 2002). Prevalence of asthma continues to rise in epidemic proportions in every region of the country. Asthma crosses all demographic groups and is not age, race, or sex specific (Pew Environmental Health Commission, 2005). Asthma is a costly disease. In 1990, costs related to asthma care were estimated at

$6.2 billion. Costs rose to an expected $14.5 billion by the year 2000 (CDC, 2003a). While many studies focus on children, there are a rising number of adults with asthma who do not outgrow childhood asthma. Consequently, there is a growing need to be responsive to health care needs of adults with asthma.

Current evidence does not indicate the length or content of education interventions to support asthma self-management. There is a paucity of evidence to substantiate the amount of time, the setting, and the necessary content to be included in asthma self-management education to optimize asthma outcomes. There is a need to determine conditions necessary for individuals to maintain self-management across time and context. Much of the current evidence regarding asthma self-management education is focused on the child population. There is a lack of theory-based evidence regarding asthma education specifically in relation to adult populations. Incorporating theory is essential to supporting, guiding, and validating future research. While the need to further evaluate asthma self-management education programs is identified in the literature, asthma self-management education could be examined in many ways.

Incidence

The Pew Environmental Health Commission (2005) states that there is currently an $11 billion annual cost for asthma care. Globally, 300 million people of all ages and ethnicities suffer from asthma. The rate increases in Western Europe, Canada, the U.S. and urbanized areas (Masoli, Fabian, Holt, & Beasley, 2004). According to the CDC (2003a), the number of people with asthma increased by 75% from 1980 to 1994. In 2003, more than 15 million people in the U.S. were reported to be diagnosed with asthma. Today, more than 31 million are reported as being diagnosed with asthma

(DHHS, 2005). This increase has occurred despite improvements in medical treatment. Also, there is a disproportionate effect of severe asthma on the poor, minority, and inner city populations (CDC, 2003a). On a state level, Illinois has one of the nation's highest mortality rates related to asthma with 279 reported deaths in 1999 (Illinois Department of Public Health, 2002). Until a greater understanding of factors that cause asthma can be achieved, cost effective management approaches are available to decrease morbidity and mortality (Masoli et al., 2004).

Prevalence

From 1977 to present, the death rate from asthma has increased. Within the United States, there are greater than 5000 deaths reported annually from asthma, and the highest percentage of these are adults (PEW Environmental Health Commission, 2005). According to the CDC (2003a), 106 per 1000 adults have been diagnosed with asthma. This is 21.9 million adults (10.6%) compared to 8.9 million children (CDC, 2003a). According to the Illinois Department of Public Health (2002), nationally asthma is the number one work-related respiratory disease for adults. With the increase in prevalence among children and the aging population, it is evident that the number of adults impacted by asthma will continue to rise.

Due to the increasing prevalence of asthma globally, the National Heart, Lung, and Blood Institute (NHLBI) of the United States in 1992 established an international group consisting of 18 physicians and scientists to develop guidelines for the diagnosis and treatment of asthma. Eleven nationalities were represented in the group which prepared a report establishing an international consensus statement on the diagnosis and

treatment of asthma and identified areas of research to resolve uncertainties about asthma (NHLBI, 1992).

The International Consensus Report on Diagnosis and Treatment of Asthma was reviewed by 12 consultants representing eight countries (NHLBI, 1992). The document underpins current asthma management guidelines recommended by the NHLBI, DHHS, and CDC. While much has been learned about the management of adult asthma, best practices or evidenced-based practices need to be implemented into a standard public health practice to curtail rising morbidity and costs.

Problem Statement

Current research emphasizes the need for asthma education, self-management, and regular medical review. Evidenced-based guidelines are recommended, but not standardized into practice. All too often asthma care is crisis oriented, which is found to contribute to asthma morbidity and mortality (CDC, 2003b). With rising numbers of adults with asthma who do not outgrow childhood asthma, additional research is needed to determine the effectiveness of self-management interventions that implement National Asthma Education Prevention Program (NAEPP) guidelines and are responsive to the individual health needs of adults with asthma.

Purpose

The purpose of this current study is to examine and compare the effects of two asthma self-management programs on adult asthma control, the individually tailored asthma self-management education program and the standardized self-management education program. Both education methods are based on NAEPP Guidelines. One method is standardized and can be delivered to larger groups. The other is an individually

tailored method using an andragogical framework which can be delivered to individuals or small groups. Andragogy is the art and science of helping adults learn (Merriam, 2001) and establishes applicable generalizations for adult learners (Baumgartner, Lee, Birden, & Flowers, 2003; Merriam, 2001; St. Clair, 2002; Smith, 2002). The outcomes of asthma control that will be measured over a 4-week period include: limited activity days, shortness of breath, interrupted sleep due to asthma symptoms, use of rescue inhaler, PEF readings 80% or more of best PEF reading, health care visits, and perception of asthma control. These outcomes are evidenced-based and indicative of asthma control based on the pathogenesis of asthma (American Lung Association & GlaxoSmithKline, 2005; NHLBI, 1992, 1997, 2002).

Research Questions

What is worth knowing is influenced by ontological and epistemological perspectives. The ontological perspective of embracing one's uniqueness is fundamental to nursing care helped to format the research question. Literature supports that education is an integral part of asthma care. While self-management education is recommended, the ontological perspective that all adults with asthma should be taught self-management skills as the standard of care underpins the purpose of the study. Although the NAEPP Expert Panel guidelines are standards of care, they need to account for individual uniqueness and needs. The proposed design supports the question: what effects, if any, do different adult asthma self-management education programs have on asthma control? Outcome variables are: limited activity days, shortness of breath, interrupted sleep due to asthma symptoms, use of rescue inhaler, PEF readings 80% or more of best PEF reading, health care visits, and perception of asthma control. The current study will examine the

selected demographic variables of age, gender, marital status, ethnicity, socioeconomic status, previous asthma education, number of years diagnosed with asthma, and current asthma care regimen.

The study is designed to answer the following questions:

1. What are the effects of asthma educations in asthma control for adults with an individually tailored asthma self-management education program versus adults with a standardized asthma self-management education program as measured by scores on the Asthma Control Test (ACT)?

2. What are the effects of asthma educations for adults with an individually tailored asthma self-management education program versus adults with a standardized asthma self-management education program based on a) limited activity days at work, school, or at home; b) shortness of breath; c) asthma symptoms (wheezing, coughing, shortness of breath, chest tightness, or pain) and interrupted sleep; d) frequency of use of rescue inhalers or nebulizer medication (such as albuterol); e) PEF readings; f) number of hospitalizations, Emergency Department, or Health Care Provider visits related to asthma symptoms; and g) perceived asthma control?

3. Do selected demographic variables of age, gender, marital status, ethnicity, socioeconomic status, previous asthma education, the number of years diagnosed with asthma, and current asthma care regimen differ in asthma control for adults with an individually tailored asthma self-management education program versus adults with a standardized asthma self-management education program?

In summary, the prevalence and cost of asthma in the U.S., particularly in the adult population, is well established. There are evidenced-based guidelines to promote

optimal outcomes for individuals with asthma. It is established that asthma self-management improves outcomes and reduces morbidity and mortality. Asthma self-management depends on individual disease characteristics, personal attributes, lifestyle, and changes that occur with time. This makes asthma self-management unique to each individual. Therefore, it is important to study the effectiveness of educational interventions based on evidence-based guidelines to improve the health of asthma patients.

Significance

The significant contribution of this study is that it will contribute to the body of knowledge regarding the effects of two educational methods on asthma control. It will also contribute to theory-based knowledge specifically in regards to educating adults with asthma. Lastly, it will apply and lend support to implementation of NAEPP guidelines.

Associated Assumptions

The following are associated assumptions that underpin the current study:

1. Adults with asthma should be taught self-management skills as the standard of care.
2. Individuals in this study will come with varying levels of asthma self-management.
3. Guidelines for the education of persons with asthma are accurate.

Theoretical Definitions

The following definitions will be used in this study:

Asthma is theoretically defined as a chronic inflammatory disease of the airways characterized by episodes of wheezing, chest tightness, shortness of breath, and coughing (NHLBI, 1992, 2002; Thoonen et al., 2003).

Asthma signs and symptoms are theoretically defined as respiratory indications of airway inflammation such as wheezing, chest tightness, shortness of breath, coughing, pain, or events that occur as a result of airway inflammation such as interrupted sleep, limited activity days, increase use of rescue inhaler, a drop in PEF readings, increased health care visits and perceived asthma control related to asthma symptoms (NHLBI, 1997, 2002).

Triggers are theoretically defined as something that sets off airway inflammation (NHLBI, 2002).

Adult is theoretically defined as an individual 18 years of age or older (CDC, 2003a; NHLBI, 2002).

Education is theoretically defined as a planned program coordinated by individuals with varying roles and backgrounds for the purpose of encouraging individual growth and development, assisting individuals with problems and issues of adult life, preparing individuals for current and future work, assisting organizations in achieving desired results and adapting to change, and providing opportunities to examine community and societal issues, promote change and a civil society (Caffarella, 2002, p.10).

Self-management is theoretically defined as an individual who employs behaviors and decision-making skills based on current knowledge of the disease progression, symptomatology, and treatments available to monitor lung function, prevent triggers, and minimize symptoms and exacerbations in controlling their asthma (Shackelford, 2003).

Asthma control is theoretically defined as the ability to maintain activities of daily living with minimal symptoms (American Lung Association & GlaxoSmithKline, 2005).

In this chapter the background, the problem, the problem statement, and purpose regarding adult asthma self-management education have been discussed, and the research questions, associated assumptions, and theoretical definitions for the study presented. Chapter two will present the conceptual model and andragogical framework for the study, discuss and summarize review of the literature as it relates to adult asthma and the relationship of education and self-management to asthma control. Chapter three will present the methods, research questions, research design, and setting for the study. Power analysis, sample, and operational definitions will be reviewed along with data collection, data processing, data analysis, strengths and limitations of the study, and protection of human subjects. Chapter four reports the sample profile, psychometric properties, and results of the research questions. Chapter five will present conclusions and recommendations for the study in regards to implications for theory, nursing science and practice, and future studies.

Chapter II: Review of the Literature

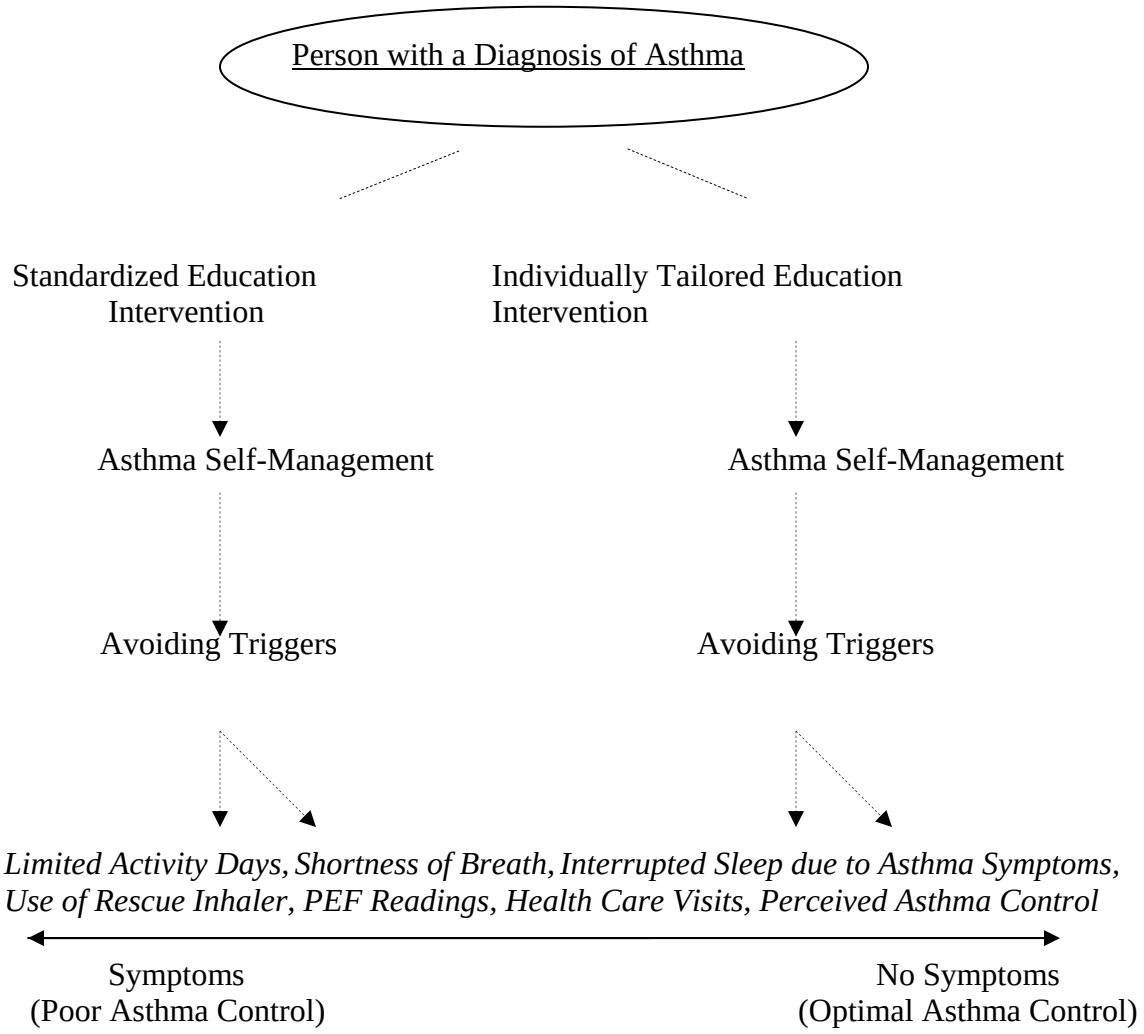
In this chapter, the conceptual model (see Figure 1) and the andragogical framework for the current study are presented. The person diagnosed with asthma and the standardized and individually tailored education interventions are described. Asthma self-management, asthma triggers, symptoms and control are discussed. Limited activity days, shortness of breath, asthma symptoms and interrupted sleep, use of rescue inhalers, peak expiratory flow (PEF) readings, health care visits, and perceived asthma control are identified as outcome measures for asthma control. The literature review is discussed along with a summary of the literature as it relates to the state of the science regarding adult asthma and the relationship of education and self-management to asthma control.

Conceptual Model

The Adult Asthma Self-Management Education and Asthma Control Model depicting the current research was created based on the researcher's review of the literature, empirical knowledge, and ontological perspective. Education literature does establish varied learner types, characteristics, and the benefits of matching teaching strategies to complement learner types (Brown, 2003; Endorf & McNeff, 1991). Adult learner education is viewed wholistically, more than a cognitive process (Merriam, 2001). According to Imel (1994), support for the learner is provided by a learning environment that meets the physiological and psychological needs of the learner. Such a learning environment is essential for successful partnerships between learners and educators. The application of the model in Figure 1 illustrates the relationship among variables in the

current study and the components of the conceptual model: person with asthma, education intervention, asthma self-management, triggers, symptoms, and asthma control.

Figure 1. Adult Asthma Self-Management Education and Asthma Control Model.



Person with a Diagnosis of Asthma

The person diagnosed with asthma is the starting point of the model. According to McAllister (2004), there is no simple diagnostic test for asthma. Consequently, asthma is diagnosed by an individual's history of airflow obstruction. According to the National Heart Lung and Blood Institute (NHLBI) (1997), a diagnosis of asthma can be

determined with the presence of episodic symptoms of airflow obstruction, airflow obstruction is partially reversible, and alternative diagnoses have been ruled out.

Standardized Education Intervention

Asthma self-management education is a key component of the model. The standardized education intervention utilizes a curriculum created by the Asthma and Allergy Foundation of America Expert Panel. It reflects the National Asthma Education Prevention Program's (NAEPP) Expert Panel Report II: *Guidelines for the Diagnosis and Management of Asthma* (NHLBI, 2002). These Guidelines recommend educating individuals with asthma on the definition of asthma, symptoms, triggers, the importance of self-management for asthma control, how to self-manage, proper use of medications, and use of PEF readings to monitor asthma control. It is a scripted program designed to deliver to small or large groups. The curriculum consists of three asthma education series: (a) The ABCs of Asthma, (b) Getting the Most From Your Medications, and (c) The Tools of Asthma Management. (See Appendix A)

In the model, the standardized education intervention leads to some symptom and asthma control. This is based on empirical evidence that these curricular topics are necessary to facilitate and support asthma self-management (CDC, 2003b; NHBLI, 2002). The state of the science also supports that asthma symptom control improves with asthma self-management education and self-management (Bailey et al., 1999; Cote et al., 1997; Gibson et al., 2003; Lindberg, Ahlner, Ekstrom, Jonsson, & Moller, 2002; Morice & Wrench, 2001; Powell & Gibson, 2003; Thoonen et al., 2003).

Individually Tailored Education Intervention

The model seeks to determine if there is a difference in asthma control for individuals who receive a standardized education versus individuals who receive an individually tailored education program. In the model, the individually tailored education intervention utilizes the same curriculum as the standardized intervention. The individually tailored education intervention differs in that it implements andragogical principles as a framework for delivery of the curriculum. Andragogy implies that educational practices need to be adult appropriate to facilitate learning. Andragogy addresses the uniqueness of the individual and is utilized as a framework for the individually tailored education intervention of the current study.

The following concepts are important for the application of the andragogical framework:

Concept of learner. The ABC's of Asthma content addresses the need to be self-directed and take responsibility in that it is an asthma self-management education program. The focus is to take charge of one's asthma rather than letting it take charge of you. Volunteering to participate in the program takes some individual motivation as well.

Role of Learner's Experience. Adults enter into the educational activity with life experiences. These experiences are unique to individuals based on roles.

1. Time should be given at the beginning of the education program for each individual to share something unique about themselves and their lived experience with asthma.
2. Individualized learning plans should be addressed in light of individual learning goals.

Readiness to Learn. The andragogical framework assumes adults are ready to learn when they experience the need to know more. Adult asthma research identifies gaps

between asthma morbidity and mortality and recommended standards of care. Asthma self-management is key to closing the gap. This establishes a need in terms of individual competencies.

Orientation to Learning. Because adults are motivated to learn after they experience a need, they seek education. A primary assumption is that the learning experience is organized around life situations. The individually tailored program addresses the areas that individuals need to know to facilitate self-management of their disease process based on their learning needs.

Motivation. The andragogical framework assumes that adults are primarily internally motivated. Quality of life is an internal motivator and desired outcome of asthma self-management education. Asthma self-management education also builds self-confidence in managing one's asthma. Self-confidence is also an internal motivator.

Concept of Educator. The educator role in the individually tailored program is that of a facilitator. The educator should design and manage the education activities that facilitate learning. The educator is also a content resource. There is an assumption that many resources other than the educator are available to the learners. The educator knows resources to link learners to as needed.

The individually tailored aspects of the model are empirically supported. The fact that asthma crosses all demographic groups makes it a culturally diverse, non-age, race, or sex specific phenomenon (CDC, 2003a; PEW Environmental Health Commission, 2005). Because asthma is a complex disease which can have episodes of exacerbation, self-management is necessary to optimize asthma control (Schaffer, 1991). The difficulty of managing asthma is the variability of the disease (McAllister, 2004). Symptoms can

vary from time to time and remit for periods of time. This variability impacts the management and outcome of asthma and renders support for individually tailored education. Application of andragogical principles allows for the education intervention to be tailored based on individual needs and learning goals.

Asthma Self Management

The person diagnosed with asthma is in need of asthma self-management education to manage his or her disease condition. In the Adult Asthma Self-Management Education and Asthma Control Model, the person diagnosed with asthma may gain asthma control if he or she receives a formal asthma self-management education intervention. This need for asthma self-management is established within the literature (CDC, 2003b; NHLBI, 2002; PEW Environmental Health Commission, 2005). In addition, the education supporting asthma self-management needs to accommodate for such uniqueness in order to be effective (Endorf & McNeff, 1991; Imel, 1994; Merriam, 2001; Wlodkowski, 1988).

Support for the placement of the education interventions preceding asthma self-management was established by expert panels who reviewed evidence based practices for asthma self-management and recommend education as an essential component for self-management (CDC, 2003b; NHLBI, 2002; Pew Environmental Health Commission, 2005). Systematic reviews of randomized clinical trials looking at the effect of education on asthma self-management found that education facilitated asthma self-management (Gibson, 2003; Gibson et al., 2003). Based on this expert panel's recommendations, educational interventions are essential to facilitating asthma self-management.

Asthma Triggers

Triggers are asthma symptom precipitators and are important in the model. While triggers vary from person to person, asthma symptoms are usually related to exposure of triggers (McAllister, 2004). An important aspect of asthma management is educating individuals to identify triggers that precipitate their asthma (McAllister, 2004). Asthma symptoms occur in response to triggers (McAllister, 2004). An exaggerated bronchoconstrictor response to a variety of triggers is an important feature of asthma (NHLBI, 1997). Narrowing of the airways easily and too much is a major but not unique feature of asthma (NHLBI, 1997). This airway hyperresponsiveness leads to symptoms of wheezing and shortness of breath (NHLBI, 1997). The hyperresponsiveness is related to inflammation (NHLBI, 1997).

Asthma Symptoms and Control

Asthma control is measurable by determining the frequency of asthma symptoms. Good asthma control would find an absence or reduction in symptoms while poor asthma control would find frequent symptoms. According to the NHLBI (1997), asthma is a variable disease. Asthma varies among individuals and in its progression. Asthma symptoms can vary within an individual's experience over time. Also, the course of asthma may vary within an individual at different ages. According to the NHLBI (1997), inflammation is a persistent component of asthma. A universal feature of asthma is airway inflammation; therefore, asthma therapy focuses on controlling airway inflammation (NHLBI, 2002).

According to the NHLBI (1997), key indicators of asthma are cough (worsening at night), recurrent wheeze, recurrent difficulty in breathing, and chest tightness. In

susceptible individuals, inflammation causes episodes of wheezing, shortness of breath, chest tightness, and cough particularly at night and early morning (NHLBI, 1997; Schaffer, 1991). The symptoms utilized in the model to measure asthma control are based on review of the literature. These symptoms include limited activity, shortness of breath, interrupted sleep, increased use of rescue inhaler, decreased PEF readings, and number health care visits related to asthma symptoms.

Limited Activity Days. The goals of asthma therapy are to maintain normal activity levels and prevent respiratory symptoms of coughing, shortness of breath, wheezing, chest tightness, or pain. According to the NHLBI (1997), it is crucial to determine how asthma control affects quality of life. The Expert Panel recommends that reduction in limited activity levels, absences from school or work, or inability to participate in activities due to asthma symptoms are key areas of quality of life to be assessed (NHLBI, 1997).

Shortness of Breath. The goals of asthma therapy are to maintain normal activity levels and prevent symptoms of coughing and shortness of breath during the night and early morning (NHLBI, 1997). Inflammation of the airway due to factors that trigger asthma can cause shortness of breath (NHLBI, 1992, 2002). Shortness of breath is one of the asthma symptoms used in the classification of asthma severity (NHLBI, 1992, 2002).

Asthma Symptoms and Interrupted Sleep. Nocturnal asthma symptoms are key indicators of unstable asthma (Fishwick, Souza, & Beasley, 1997). According to Thoonen and VanWeel (2002), waking at night due to asthma is a sensitive measure of deterioration. The NHLBI (1997, 2002), defines control of asthma as preventing

symptoms such as cough and shortness of breath at night, early morning, or after exertion.

Use of Rescue Inhaler. According to the Expert Panel, the purpose of asthma therapy is to control asthma, use the least amount of medication necessary, and minimize adverse effects of medications (NHLBI, 1997, p. 65). Control of asthma can be assessed by the use of rescue inhalers (NHLBI, 1997). A rescue inhaler is any medication used to provide quick relief of bronchoconstriction and acute asthma symptoms (NHLBI, 1997). With controlled asthma, the need for rescue inhalers is minimized. Thus, severity of asthma can be estimated by the increased need for such medications.

PEF Readings. Maintaining normal pulmonary function and activity levels is criteria for defining asthma control (NHLBI, 1997). Along with decreased symptoms, activity limitations, and night time interruptions, asthma control is also indicated by PEF values with less than 10 to 20 percent variability, or values consistently greater than 80 percent of an individual's personal best (NHLBI, 1997). PEF is useful for individual objective assessment and evaluation of individual response to therapy (Schaffer, 1991). Based on scientific literature, an important element of early treatment, is recognition of early indicators such as worsening PEF values (NHLBI, 1997).

Health Care Visits. The number of hospitalizations, health care provider and emergency department visits is an outcome measure of asthma control utilized in several studies (Abdulwadud, Abramson, Forbes, James, & Walters, 1999; Gibson et al., 2003; Klein, van der Palen, Uil, Zielhuis, Seydel, & van Herwaarden, 2001; Premaratne et al., 1999; Thoonen et al., 2003). Health care utilization and costs increase with asthma morbidity and mortality (Lindberg et al., 2002; Thoonen et al., 2003).

Perceived Asthma Control. The NAEPP Expert Panel Report (1997) recommends the assessment of the patient's perception of asthma control. The patient's perception of asthma control corresponds to one of the goals of asthma therapy for patient satisfaction with asthma care (NHLBI, 1997).

Strengths and Weaknesses of the Conceptual Model and Andragogical Framework

Review of the literature has established that asthma is one of the most prevalent chronic diseases in the United States (CDC, 2003a). While asthma cannot be prevented or cured, it can be controlled to improve quality of life. Self-management is key to controlling asthma (CDC, 2003a; NHLBI, 2002; PEW Environmental Health Commission, 2005). Education is essential to support asthma self-management, but state of the science does not indicate the type of education intervention or how intense an education intervention should be. One must rely on available theory and research to guide future direction.

Adult asthma self-management is largely unique to each person. Milnes and Callery (2003) state that asthma self-management depends on individual disease characteristics, personal attributes, lifestyle, and changes that occur with time. Individualization is key to adult asthma self-management (Milnes & Callery, 2003). Human nature is dynamic and life's meaning is influenced by the individual's lived experience (Lindeman, 1926). In order for an adult asthma education program to be effective, it must accommodate for individual needs and experience. Andragogy, which is the framework for the individually tailored program, addresses the adult learner's individuality and experience in its assumptions. The individually tailored program supports the individuality of the learner and values their lived experience. Through self-

direction it allows the learner to learn within her or his own tradition. According to the NHLBI (1992, 1997, 2002), the standardized program and curriculum support asthma self-management.

A primary debate is whether the andragogical assumptions underpinning the individually tailored program are exclusive to adult learners (Merriam, 2001). Critics point out that the andragogical assumptions do not address the influence of culture and society on the learner or the influence of social institutions on the learning situation (Merriam, 2001). While andragogy contributes to the understanding of adult learners, Merriam (2001) states that it does not expand or clarify the learning process. St. Clair (2002) states that andragogy is grounded in a Western male concept which overlooks gender. He also questions if assumptions are based on evidence and how varied their interpretation might be (St. Clair, 2002).

The exclusiveness of the andragogical assumptions to the adult learner does not impact the validity of the current study. The fact that the assumptions describe the adult learner is important and supported in the literature. In addressing the influence of culture and society on the learner, asthma care guidelines are recommending individual involvement in care through self-management and education, so cultural and societal influences should be more supportive of the learner. The lack of clarification on the learning process in regards to andragogy does not impact the current study due to the purpose of the study. Gender issues should be accounted for based on individualization of the education intervention that utilizes the andragogical framework. While limited experimental research has been done regarding andragogy, Roberson (2002) states that andragogy has been utilized in a wide variety of settings and educational situations.

Lastly, financial implications of the individually tailored education intervention verses the standardized education intervention need to be considered. While both interventions utilize the same curriculum, the number of participants in each intervention varies. The standardized education intervention can accommodate two to three times as many individuals in one session as the individually tailored education. This is a cost benefit in regards to professional hours needed to implement a standardized education program. In acute care arenas or physician offices where education is typically done in small groups, the individually tailored education would be more practical. Thus, in arenas where small group education is the norm there is no cost advantage for either education intervention.

Evidence Based Asthma Self-Management

The review of the literature examines current scientific evidence regarding adult asthma self-management education with additional support from adult education and learning literature. Studies utilizing an adult asthma self-management education program to improve participant outcomes in regards to asthma control were included in the review. The key words andragogy, adult, education, learning, and theory were utilized for the adult education and learning review. Literature retrieved was evaluated for relevance to adult asthma self-management education. A synopsis of the literature review regarding asthma self-management education, outcomes, andragogical principles to guide educational planning, evidenced based implications, and future research are presented.

Asthma Definition, Symptomatology, and Pathogenesis

Asthma is a chronic inflammatory disease of the airways characterized by episodes of wheezing, chest tightness, shortness of breath, and coughing (NHLBI, 1992,

2002). Inflammation is a primary component of asthma pathogenesis. Airway hyperresponsiveness can also occur in asthma. Airway hyperresponsiveness is a constriction of the airway due to various factors that trigger asthma (NHLBI, 1992). It can be present when individuals are symptomatic or asymptomatic. Therefore, the degree of hyperresponsiveness is not an indicator for the degree of treatment.

While causes of asthma symptoms vary, these episodes can be reversed with treatment (NHLBI, 2002). Consequently, medications to prevent or reverse the inflammatory response of asthma are recommended (NHLBI, 1992, 1997, 2002). According to the NHLBI (1992, 1997, 2002), most asthma exacerbations can be prevented with ongoing and comprehensive treatment. The goal of asthma treatment is to improve quality of life for those with asthma. This goal can be obtained by controlling symptoms, preventing exacerbations, attaining normal lung function, maintaining normal activity levels, and avoiding adverse asthma medication effects (NHLBI, 1992, 1997, 2002). Treatment recommendations are based on systematic review of the literature as well as an understanding of the pathogenesis of asthma.

Asthma Self-Management

The review of the literature for evidence based adult asthma self-management research studies were identified by using key words self-management and asthma. Adult asthma and research were specified in the scope of the search. The articles retrieved were reviewed for inclusion. Four criteria were utilized to determine inclusion for review:

1. Adult asthmatics were the specific population being investigated.
2. An asthma self-management intervention was being evaluated.
3. Comparison or control under scrutiny was evident.

4. The outcome was evidence based (Joanna Briggs Institute, n.d.).

Twenty-one studies met the inclusion criteria. Of these studies, a critical appraisal of the best available evidence was done. The strength of evidence was determined by using the following four criteria (Joanna Brigs Institute, n.d.):

Level I: Evidence obtained from a systematic review of all relevant randomized controlled trials.

Level II: Evidence obtained from at least one properly designed randomized controlled trial.

Level III, 1: Evidence obtained from well-designed controlled trials without randomization.

Level III, 2: Evidence obtained from well-designed cohort or case control analytic studies preferable from more than one center or research group.

Level III, 3: Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments.

Level IV: Opinion of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Using the above criteria, each study was assigned a level based on available evidence. The studies were then reviewed to determine what self-management interventions were researched, what impact the intervention had on health outcomes, the level of support for evidence based practice, what populations were studied and in what settings, and what type of study design was used. These findings are presented in Appendix B..

Because asthma is a growing health problem with multiple causes, effective intervention necessitates moving beyond medical care into the realm of behavioral and

lifestyle modification, educational services, housing, community services, and environmental reforms (Lara et al., 2002). Some factors attributed to increased morbidity and mortality associated with asthma are limited knowledge about asthma management on part of the individual (NHLBI, 1997). According to the Center for Disease Control (CDC) (2003), asthma care that is crisis oriented rather than health promoting is thought to contribute to asthma morbidity and mortality. While managing asthma is complex, effective asthma management should include: individual education, behavior changes, avoidance of triggers, medication regimens, and routine medical follow up (CDC, 2003b). At a minimum, competent asthma education should include self-management skills (CDC, 2003b).

Klein et al. (2001) define self-management as behaviors based on knowledge of asthma and its triggers, medication compliance and self-monitoring of the disease state, proper inhalant use, and use of PEF. According to Janson et al. (2001), while self-management is essential to the clinical management of asthma, patient education is the method for communicating self-management. Asthma requires constant self-management by the individual to maintain control of symptoms, prevent exacerbations, attain normal lung function, and maintain normal activity levels (Shegog et al., 2001). Lorig et al. (1999) state that while medical care has advanced, little has been done to enable patients to manage care, and in adults, self-management does lead to improved measures of morbidity and reduced health care utilization. Shegog et al. (2001) define asthma self-management as behaviors that persons with their family members perform to lessen the impact of chronic illness. Behavioral capability and self-efficacy are determinants of self-

management (Hanson, 1998). Partnerships of care between individuals and healthcare professionals are needed to facilitate asthma self-management (Lawrence, 1995).

Self-Management and Outcomes

In evaluating the effectiveness of asthma self-management education on various outcomes, significant improvement in the intervention groups were found in several randomized clinical trials (Abdulwadud et al., 1999; Barbanel, Eldridge, & Griffiths, 2003; Janson et al., 2003; Janson et al., 2001; Legorreta et al., 2000; Osman et al., 2002; Perneger et al., 2002). A review evaluating asthma education programs that used written self-management plans based on PEF self-monitoring verses symptom self-monitoring found PEF self-monitoring and symptom self-monitoring to be effective for asthma self-management (Powell & Gibson, 2003). Limiting the intensity of asthma self-management education decreased the effect. Gibson et al. (2003) reviewed the effectiveness of self-management used in conjunction with regular health practice review on outcomes. Education interventions without written plans were less effective. Another review looked at education (information only) on outcomes. Thoonen and colleagues (2003) investigated the safety of asthma self-management use compared to usual care. The self-management group showed significant difference in higher quality of life compared to usual care group.

Several studies utilize the Adult Asthma Self-Management Education and Asthma Control Model's proposed asthma symptoms as outcome measures in determining the effectiveness of asthma self-management education (Bailey et al., 1999; Lindberg et al., 2002; Morice & Wrench, 2001). Absenteeism and limited activity days were utilized as an outcome measure in determining the effectiveness of asthma self-management

education in several studies (Cote et al., 1997; Gibson et al., 2003; Powell & Gibson, 2003; Schermer et al., 2002). State of the science review also supports use of PEF meters to monitor the effectiveness of asthma self-management. PEF meters were used to monitor the effectiveness of asthma self-management in several studies (Cote et al., 1997; Gibson et al., 2003; Janson et al., 2003; Legoretta et al., 2000; Morice & Wrench, 2001; Powell & Gibson, 2003). Osman et al. (2002) utilized night disturbances from wheezing as an outcome measure to determine the effectiveness of asthma self-management education.

Asthma Self-Management Education

The Federal Liaison Group on Asthma (FLGA) was established to develop a federal plan for dealing with asthma. The group is responsible for making recommendations to Congress to improve coordination of federal government asthma activities. The FLGA has identified five goals in response to asthma (NHLBI, 2002). Two of these five goals relate to education: (a) discovering ways to maximize asthma control by increasing understanding about the cause of asthma and its exacerbations, and (b) overcoming barriers to use of NAEPP guidelines. The Pew Environmental Health Commission Report (2005) identified a need for public education to prevent and decrease the prevalence of asthma. According to the National Heart Lung and Blood Institute (1992) the aim of asthma education is to provide the individual with information and training to maximize asthma control.

Self-management education is an essential component of asthma care (Abdulwadud et al., 1999; Perneger et al., 2002). A goal of education is to strengthen the partnership between patients and health care providers in controlling asthma (Caplin & Creer, 2001,

p. 343). Janson et al. (2003) stated that education should be delivered in the context of medical care based on the assumption that basic information and skills lead to behavior that will improve asthma control (p.620). Morice and Wrench (2001) state that education needs to be aimed at changing behavior. Only one study identified a theoretical framework for the asthma self-management intervention. Abdulwadud and colleagues (1999) based their intervention on the Social Learning Theory. There were no other theoretical underpinnings identified in review of the literature.

The state of the science regarding asthma self-management education does not indicate the type of education intervention or how intense an education intervention should be (CDC, 2003b; NHLBI, 2002; Powell & Gibson, 2003). A state of the science review was done covering adult asthma self-management research literature. Studies were reviewed for inclusion based on criteria supporting a high level of evidence. Of the 21 studies reviewed, the primary purpose was to evaluate the effectiveness of asthma self-management (Abdulwadud et al., 1999; Barbanel et al., 2003; Berg, Dunbar-Jacob, & Sereika, 1997; Cote, Bowie, Robichaud, Parent, & Battisti, 2000; Janson et al., 2003, 2001; Legoretta et al., 2000; Morice & Wrench, 2001; Osman et al., 2002; Perneger et al., 2002; Premaratne et al., 1999).

Janson et al. (2003) and Bailey et al. (2003) utilized one education session with follow up as an intervention. The length of education session varied from 20-60 minutes as did follow up intervals. Three studies utilized three self-management education sessions (Abdulwadud et al., 1999; Klein et al., 2001; Perneger et al., 2002). These sessions were 75-90 minutes and were held consecutively over three weeks. Osman et al. (2002) and Morice and Wrench (2001) delivered two 30 minute sessions with follow up.

Couturard et al. (2002) utilized five individual sessions 30-60 minutes each. Berg et al. (1997) utilized six weekly sessions approximately two hours in length. Wilson et al. (1993) had group education, individual education and workbook education that lasted three to four months. The effectiveness of the interventions was determined by the outcome measures. Berg and colleagues (1997) utilized six weekly sessions approximately two hours each.

While the primary intervention utilized throughout the studies was self-management education, delivery of the intervention varied. Consequently, within scientific literature, there is a lack of asthma self-management education studies that refute the Adult Asthma Self-Management Education and Asthma Control Model. While the state of the science regarding asthma self-management education does not indicate the type of education intervention that is most effective for improving asthma control, adult education literature supports that individualized education facilitates adult learning (Endorf & McNeff, 1991; Imel, 1994; Merriam, 2001; Wlodkowski, 1988).

It is the recommendation of the NHLBI (2002) to include an action plan as part of asthma self-management education. The plan should define the regimen that meets patient's medical needs. The CDC (2003b) states that "patient-provider" partnerships develop effective asthma education, and the education needs to be tailored to individual needs relative to cultural or ethnic beliefs and practices (p. 7) At minimum, competent asthma education includes instruction on self-management and facilitates family support. Education may be provided to individuals or groups (CDC, 2003b).

Adult Education

According to Hiemstra (1987), adult education is viewed by many as an essential component in dealing with social problems. Within the United States, there is a growing awareness of the need for education if individuals are to deal with the intricacies of managing chronic illness. Education is a means for enhancing quality of life (Brockett, 1987). Education is a structured learning process by which behavior is modified (Langenback, 1988). For adults, this takes place in the form of adult education. Lindeman (1926) defines adult education as a means of improving society and individuals. Knowles (1980) defines adult education as the art and science of helping adults learn. Caffarella (2002) defines adult education as a planned program to facilitate change in individuals. For the purpose of this research, adult education will be defined as a means of helping adults learn.

Education comes in varied formats. Structured learning in universities is an example of a formal format while unstructured learning in a library would represent an informal format. Regarding adult education, programs are planned and coordinated by people with varying roles and backgrounds. Caffarella (2002, p. 10) states five purposes of adult education are to:

1. encourage individual growth and development
2. assist individuals with problems and issues of adult life
3. prepare individuals for current and future work
4. assist organization in achieving desired results and adapting to change
5. provide opportunities to examine community and societal issues, promote change and civil society.

Education fosters individual change related to knowledge and skill building (Caffarella, 2002). According to Tyler (1949), sequencing by moving from simple to complex and building on each education session are necessary for educational success. Continuity using repetition and reinforcement are also important (Tyler, 1949). The educational environment should be informal, supportive, and collaborative with mutual respect between the educator and learner (Langenbach, 1988). Educators need to determine the level of learner competence and needs to facilitate the learning process (Imel, 1994).

The role of the educator is to facilitate learning (Brockett, 1983a). Knowles (1980) views the adult learner progressing toward greater self-direction through the learning process. Thus, the educator must establish an effective relationship with the learner to facilitate the learning process (Brockett, 1983a). Brockett (1983a) addresses some interpersonal skills that facilitate an effective relationship: *attending* or being present with the learner, *responding* in an empathetic, respectful, and genuine manner to the learner, and *understanding* the learner's needs.

Adult Learners

Endorf and McNeff (1991, p. 20) identified "five types of adult learners: 1) confident, pragmatic, goal-oriented, 2) affective, 3) learner-in-transition, 4) integrated, and 5) risk takers." The learner types describe the learner's relationship to environment. A confident learner values learning from all persons and challenges him or herself. He or she is interactive and experiential (Endorf & McNeff, 1991). Affective learners are eager to learn, enjoy school, and view faculty as an expert resource Endorf & McNeff). According to Endorf and McNeff (1991) experience and learning must be connected for the transition learner. These learners view education seriously as a change process.

Integrated learners are self-directed and inspired by learning. They view learning as a personal responsibility and do not separate life and career (Endorf & McNeff, 1991). Risk takers learners take risks to accomplish educational goals and are willing to change and enjoy education (Endorf & McNeff, 1991). It is suggested that educators be aware of adult learner types to match teaching styles in order to meet learner needs.

In educating adults to self-manage their asthma, it is essential to do a learner needs assessment to make learning relevant and to relate topics to the learner's needs as much as possible. To encourage participation, removal of barriers, use of motivational strategies, and ongoing evaluation with self and learners is critical. Adult learning environments should be friendly and challenging (Brown, 2003; Cross, 1981; Imel, 1994; Merriam & Caffarella, 1999; Wlodkowski, 1988).

According to Wlodkowski (2003), the research on motivational teaching and learning indicates that individuals are curious, active, and initiate thought and behavior to make meaning. Thus, motivation is primary to all individuals. Individuals become motivated when what they are learning makes sense and is important (Wlodkowski, 2003). Wlodkowski's Motivational Framework for Culturally Responsive Teaching respects individuality while creating a common culture in the learning environment that is acceptable to all adult participants. The framework includes four motivational conditions that the educator and learner create: a) creating an environment where all participants feel respected and connected, b) making learning content relevant, c) making learning meaningful by including experiences, challenging learner perspectives and values, d) creating understanding that learners are capable of learning what is valued (Wlodkowski, 2003). These conditions are essential to motivate adult learners. Educators need to plan

and coordinate these conditions (Wlodkowski, 2003). According to Caffarella (2002), being clear about the purpose of the education is an important starting point. Wlodkowski (1999) states that understanding participants is important to learner motivation. In addition, adult education should include adult learning principles to promote motivation (Wlodkowski, 2003). Wlodkowski (2003) states that unless adults participate, they cannot learn. Without learning there is no change. Learner participation and use of the motivational conditions facilitate learning (Wlodkowski, 2003).

Research on adult education indicates that “hard-to-reach” individuals are more likely to participate in informal education programs (Brockett, 1983b). Research shows that adult learners are capable of and desire responsibility for their own learning (Hiemstra, 1994b). Traditional learning situations may hinder learner control or responsibility because content and process remain in control of the educator. The goal of education is to provide opportunities for the learner to become self-directed (Hiemstra, 1994b).

According to Imel (1994), adults are voluntary learners, and the learning process must meet a need for the learner to participate. What is important varies among adults. Learning is facilitated when adult learners take ownership, participate, and feel that learning relates to their need (Imel, 1994; Wlodkowski, 1988). Wlodkowski (1988), states that successful instruction meets the basic needs of the learner.

In educating adults to self-manage their asthma, many variables impact the learning process such as environment, culture, language, past experience, etc. Two primary variables that impact the learning process are learner characteristics and teaching strategies. Endorf and McNeff (1991) characterize adult learner types and provide

instructional techniques to complement these learner types. For example, a “confident” adult learner prefers participatory learning, so group discussions would be a suggested instructional technique (Endorf & McNeff, 1991). Brown (2003) states it is beneficial to match teaching strategies to learning styles. According to Merriam and Caffarella (1999), learning is cumulative. Nothing has meaning or is learned in isolation from prior experience. The adult learner is intrinsically motivated, voluntarily participates, and has experience; thus, learner centeredness is promoted for adult education (Kerka, 2002).

The learning process is more than a systematic acquisition and storage of knowledge. It deals with the nature of the learner, goals, social and physical milieu, and teaching learning techniques (Merriam, 2001). It can impact one’s life by integrating what has been learned. The context of learning can be impacted by culture, gender, and conceptions of knowledge and truth (Merriam, 2001). Adult learner education is viewed wholistically, much more than a cognitive process. The learner has experiences, emotions, and needs (Merriam, 2001). Support for the adult learner is provided by a learning environment that meets physiological and psychological needs. Such a learning environment is essential for successful partnerships between learners and educators (Imel, 1994).

Mezirow (1978) views learning as more than the acquisition of new knowledge. Learning involves a change of values and assumptions from which the learner operates. Brockett (1983a) states that educators need to move beyond formal education when working with “hard-to-reach” students. Hiemstra (1991) includes social, cultural, and psychological factors as part of the learning environment as they influence the growth and development of the adult learner. This may require giving some control to learners,

utilizing appropriate technology, being gender or race sensitive, having an updated curriculum

Adult Learning

While no one theory or model explains all that is known about adult learners, two key components of adult education are identified: andragogy and self-directed learning (SDL) (Merriam, 2001). Although numerous learning theories exist, the most popular theories will be discussed.

Behavioristic Learning Theory

Behavioristic learning theory focuses on how environment impacts behavior. Behaviorists define learning as a change in behavior as a result of experience or practice (Huitt, 2001; Huitt & Hummel, 2006; On Purpose Associates, 1998-2001a). There are three types of behavioristic learning theories: a) Contiguity – a behavior associated with a stimulus, b) Classical Conditioning – a stimulus that elicits an innate response, and c) Operant Conditioning – behavior connected to a stimulus that reinforces the behavior (Huitt, 2001; Huitt & Hummel, 2006). Pavlov, Thorndike, Watson, and Skinner are proponents of behavioristic learning theory. According to behaviorists, learning is produced by a stimulus (Ormrod, 1999). Learning is identified by behavior (Merriam, Caffarella, & Baumgartner, 2007; Snelbecker, 1974). Behaviorists use repetitive instruction, reinforcement, and external motivation in the educator role (Sil International, 1999). According to Merriam et al. (2007), the educator's role is to create an environment that elicits the desired behavior. The learner's personality and behavior is based on reinforcement since all behavior is learned and determined by reinforcement. The

environment is utilized to elicit the desired behavior and is the locus of control over learning (Merriam et al., 2007).

Cognitive Learning Theory

Cognitivists contend that individuals learn cognitive structures or understandings rather than behaviors (Merriam et al., 2007; Snelbecker, 1974). Thus, the focus is on the process of learning rather than the results of learning as in behaviorism. Vygotsky and Piaget are proponents of cognitive learning theory. According to Ormrod (1999), cognitivists do not see behavior as a part of learning. Cognitive learning theory focuses on the brain, how humans process and store information (Ormrod, 1999). It emphasizes intellectual processes such as thinking, language, and problem solving as part of the learning process (Snelbecker, 1974). According to Merriam et al. (2007), the educator role is to structure the content of the learning activity. They also contend the learner's memory and prior knowledge are important to learning. Learner perception, insight, and meaning are important to learning. Merriam et al. further state the locus of control over learning lies with the learner. Learning does not always produce visible changes, and can be facilitated by an instructor. Learning occurs from a change in mental status. Modes of learning are exploration, conditioning, and verbal instruction (Bigge & Shermis, 1999).

Social Learning Theory

Social learning theory combines cognitive with behavior modification (Hilgard & Bower, 1975). Bandura and Rotter are proponents of social learning theory. Social learning theory focuses on learning in a social context (Ormrod, 1999). It describes how social and personal competencies evolve out of social conditions where learning occurs (Hilgard & Bower, 1975; Merriam et al., 2007). Learning occurs by observing behavior

(Ormrod, 1999, Walker, 2006). According to Ormrod (1999), learning can take place without a change in behavior, and there is a cognitive role in learning. Consequences of behavior and cognition play a role in learning (Ormrod, 1999). Social learning theory is focused on the functions of individuals in their social relationships; therefore, the role of the educator consists of modeling, feedback, instruction, and guiding behavior (Bigge & Shermis, 1999; Merriam et al., 2007). The learner acquires knowledge by observing others and modeling behaviors. Environment is taken into consideration as well. Behavior is a function of the interaction of the learner with the environment (Merriam et al., 2007). The environment can influence the learner, and the learner can influence the environment. According to Merriam (2007), locus of control can be internal or external. Despite Behaviorists, Cognitivists, and Social learning theory some critics felt that the learner's ability to think, experience feelings, problem solve, and be self-directed was not addressed.

Humanistic Learning Theory

Humanistic learning theory emerged out of the need to study the individual as a whole (Snelbecker, 1974). Rogers, Maslow, and Knowles are proponents of humanistic learning theory. Humanists view the person as a whole in regards to personal growth and development throughout the lifespan. Thus, there is a focus on human needs and interest within learning (Huitt, 2001). Humanistic learning theory focuses on learning as a result of individuals engaging in creative activities (The Learning Curve, 2000). It allows for a sense of control, growth, and knowledge. Individuals are responsible for their life and actions (The Learning Curve, 2000). Humanistic theories are value-driven and emphasize an innate desire to learn (Atherton, 2005b). Learning is described from the learner's

perspective rather than the observer's. The learner's self-understanding to facilitate self-direction toward personal growth and development are fundamental concepts in humanistic theory (Merriamet al., 2007; Snelbecker, 1974). The educator role is to facilitate the development of the learner as a whole; therefore, they are a facilitator or guide (Merriamet al., 2007). The educator provides a climate in which the student can grow intellectually and affectively. This is done by communicating acceptance and understanding of the learner as a unique individual (Snelbecker, 1974; Merriamet al., 2007). According to Merriam et al. (2007), the primary role of the learner is to assume responsibility for their learning. Learning is focused on learner needs and self-development. It is an internal locus of control (Merriamet al., 2007).

Constructivist Learning Theory

Constructivists feel that knowledge is not an independent reality (it does not exist outside the learner's mind), but is an adaptive function where the learner must attain a picture of reality (Fosnot, 2005). Bruner is a proponent of constructivist learning theory. Constructivist learning theory focuses on the learner constructing knowledge and meaning by reflecting on experiences (On Purpose Associates, 1998-2001b). From a constructivist perspective, the educator's role is to provide the learner with opportunities and incentives to build knowledge so that cognitive development and understanding are the focus of learning (Fosnot, 2005). According to Merriam et al. (2007), constructivist educators serve as a catalyst, facilitator, and mentor. They encourage learners to critical reflection on experiences. Merriam et al. also state role-playing and problem-based learning are strategies utilized. The learning environment is trusting and open. Constructing meaning is learning (On Purpose Associates, 1998-2001). Learning is an

active process in which sensory input is used to construct meaning, and constructing meaning is a mental process. According to Hein (1991), learning is a social activity in that it is associated with one's connection to others. Learning does not take place in isolation. It is contextual (Hein, 1991). Thus, learning is dependent with life experience. It takes time, knowledge, and motivation to learn (Hein, 1991). The learner creates meaning dependent on previous and current knowledge (Merriamet al., 2007). The learner must engage socially and actively in problem-solving to create meaning. Learning is an internal locus of control. Atherton (2005a) distinguishes between two types of constructivism: a) cognitive which constructs meaning in regards to developmental stage and learning style, b) social which constructs meaning thru social encounters.

While earlier learning theory research focused on one of three different areas: a) behavior, b) cognitive, and c) individual experience, now there are many types of learning theories that expand beyond these areas (Snelbecker, 1974). There are overlaps as well as incompatibilities noted amongst the learning theories. While no one theory or model explains all that is known about adult learners, two key components of adult education are identified: andragogy and SDL (Merriam, 2001).

Andragogy

According to Lindeman (1926), the learner is of primary importance in the learning process. Andragogy is the art and science of helping adults learn (Knowles, 1980). Andragogy focuses on self-direction, the need to know, self-concept, life experiences, readiness and is problem centered (Merriam, 2001). Knowles (1980) refers to andragogy as a set of assumptions regarding the adult learner. He is known for introducing and popularizing andragogy in the United States. Critics of andragogy

question whether the assumptions are empirically based and how varied interpretation of the assumptions may be (Rachal, 2002). It is also questioned if andragogical assumptions are exclusive to adult learners (Knowles, 1980). St. Claire (2002) states that andragogy provides little insight into learning and argues that all adult learners may not be willing to engage in participatory and democratic teaching/learning experiences.

Andragogy is based on the five following assumptions:

1. The adult learner has an independent self-concept and has a need to be self-directed.
2. The adult learner brings a lived experience to the learning situation that is a valuable resource.
3. Adults learn more effectively when the information is relevant to their lives.
4. Adult learning is problem-centered, and adult learners like immediate application of knowledge.
5. For the adult, learning is internally motivated rather than externally. Thus, each person is unique and brings individual goals (Knowles, 1980).

These assumptions not only describe the adult learner, but also serve as a program-planning model for designing, implementing, and evaluating education experiences for adults (Baumgartneret al., 2003; Merriam, 2001; St. Clair, 2002; Smith, 2002). In review of the literature, andragogy is referred to as a theory (Cyr, 1999; Klapan, 2002; Weinstein, 2002; Zmeyov, 1988) and as a model or set of assumptions (Knowles, 1984; Mackeracher, 1998; Merriam, 2001; Rachal, 1994; Roberson, 2002; Tweedell, 2000). It assumes a readiness and motivation to learn.

The concepts of self-directed learning which are fundamental to andragogy have been successfully implemented in various countries among individuals with various

socioeconomic backgrounds (Roberson, 2002). Zmeyov (1998), in reviewing the origins, developments and trends of andragogy states that "it is the theory of adult learning that sets out the scientific fundamentals of the learner's and educator's activities in planning, realizing, and evaluating adult learning" (p.106). Andragogical principles of learning are needed in all areas of adult education (Zmeyov, 1988). Merriam (2001) states andragogy is the most learner-centered of all frameworks for adult education programming.

Roberson (2002) states that within the art and science of learning there is an interest in the individual learner. The educator encourages participatory activities based on the learner's unique situation and understanding. According to Mackeracher (1998), adults learn most effectively when teaching strategies are congruent with learner needs. Operating from an andragogical framework is important in adult asthma self-management education because the educator needs to know and understand the learner's lived experience and perspective on asthma to ensure value and meaning within the education process.

In regards to adult education literature, Rachal (1994) reviewed 18 studies comparing andragogy (adult learning theory) and pedagogy (learning theory more specific to children). While achievement and satisfaction were the most commonly examined variables, no significant differences were identified between methods (Rachal, 1994). This suggests that in determining different adult asthma self-management education models, the curricular framework may not matter. It should be noted that few experimental studies have been done in regards to adult education. Most of the research in the review was anecdotal or expository accounts of andragogy's effectiveness, so the

review was not conclusive (Rachal, 1994). Thus, advocacy for andragogy as a superior strategy for facilitating adult learning is not empirically based. Use of the andragogical framework for the current study could potentially contribute to the state of the science regarding effective adult asthma self-management education.

Self-Directed Learning

Mezirow (1981) states that facilitating a learner's self-direction is foundational to adult education. Knowles (1975) states that self-directed learning (SDL) assumes that individuals grow in capacity and need to be self-directed. Based on research there are three definitions for SDL: a) SDL as a goal, b) SDL as a process, c) SDL as a learner characteristic (Merriam & Caffarella, 1999). Kerka (1999) states that while SDL cannot be captured in a single definition, research and practice should acknowledge individual and collective goals for learning. Goals of SDL vary dependent on the philosophical orientation (Baumgartneret al., 2003). Several things are known about SDL: a) individuals can be empowered to take more responsibility for decisions associated with the learning situation, b) SDL is a continuum or characteristic that exists to varying degrees in every individual and learning situation, c) SDL does not mean learning takes place in isolation from others, d) SDL facilitates transfer of learning from one situation to another, e) the role of educator in SDL is to dialogue with learners, secure resources, evaluate outcomes, and promote critical thinking, and f) SDL can involve a variety of activities and resources (Hiemstra, 1994a).

Brockett and Hiemstra (1991) suggest that self-direction is a way of life and present strategies to facilitate self-direction. Providing information, serving as a resource, assisting learners to assess their needs and competencies, and providing feedback are

some suggested strategies to facilitate self-direction. Brockett (1985) found a positive relationship between self-directed learning readiness and life satisfaction. Taking responsibility for one's own learning is key to self-direction. While self-direction is a concept that has been embraced throughout history by educators and learners, individuals vary in their readiness for self-direction, and self-direction may not be the best way to learn for everyone (Brockett & Hiemstra, 1991). Tough (1979) establishes that self-planning is the most frequent approach adults initiate in learning activities. While self-direction is a more developed area in adult education, the extent to which it has been used to guide practice is questionable (Brockett & Hiemstra, 1991). An important point originating from self-directed learning research is that most learners, when given the chance, prefer to take responsibility for their own learning (Hiemstra, 1994b). Based on this point, there is an impetus to empower learners to take ownership of their learning. Many traditional teaching situations limit learner involvement. Control over content or process remain in the hands of the educator which creates barriers to self-direction (Hiemstra, 1994b). Hiemstra (1994b) states that allowing learners some control is as or more important than content being covered.

Brockett et al. (2001) found 1983-1991 to be the climactic years for self-directed learning research. In more recent reflections on the evolution of self-directed learning, Hiemstra (2003) states that self-directed approaches to teaching/learning run the risk of becoming outdated due to the increase in distance education, Internet growth, and expected movement away from traditional education settings. In a later interview, Hiemstra refers to the Internet as an opportunity for adult educators to facilitate self-directed learning (Donaghy, 2005). According to Gailbrath (2003), good mentoring is

significant to facilitating self-directed learning. He states self-directedness as the primary purpose and goal of mentoring. Mentoring goes beyond giving information and advice to developing and maintaining a relevant interpersonal relationship with the learner (Gailbrath, 2003). According to Donaghy (2005), the personal reflections of eight scholars all emphasized the importance of collaboration between the facilitator and the learner in self-directed learning.

In relation to self-directed learning, Guglielmino developed the Self-Directed Learning Readiness Scale (SDLRS) in 1978. The scale is now known as the Learning Preference Assessment (Guglielmino & Associates, 2005). The SDLRS assesses the extent to which individuals view themselves as self-directed. The instrument is a 5-point Likert scale which measures self-directed readiness. The instrument also measures love for learning, self-concept as an effective learner, tolerance with learning, creativity, view of life long learning, learning initiative, self-understanding, and responsibility for learning (Brockett, 1985, p. 215). The SDLRS is developed from an institutional school and book perspective (Brockett, 1983b). Brockett (1985), encountered a number of difficulties in administration of the SDLRS. He concluded that while the instrument is appropriate for certain segments of the adult population, it may be inappropriate for individuals with a low level of formal education. The SDLRS was revised based on Brockett's input (Guglielmino, Long, & McCune, 1989). Other empirical data is a meta-analysis of quantitative studies done on self-direction by McCune and colleagues (1989). McCune et al. (1989) identified variables associated with self-direction in learning. Positive self-concept, level of education, degree of self-directed learning, self-

development, autonomy, control of environment, and factors related to work longevity were variables identified.

To facilitate self-direction, learners should participate in assessment of personal needs, planning of learning activities, obtaining learning resources, and assessing personal progress towards learning goals (Brockett & Hiemstra, 1991; Mezirow, 1981). For such activities and roles to be successful, a partnership between the learner and educator is imperative (Brockett & Hiemstra, 1991). It should be noted that self-direction is not always the best way to learn. A situation may call for more dependent learning (Brockett & Hiemstra, 1991).

Grow (1991) addresses four stages of learner self-direction and proposes the Staged Self-Directed Learning Model to match the teacher's style and strategy to the learner's stage. The first stage includes dependent learners who have low self-direction. Learners in this stage require explicit directions and view the educator as an expert. The second stage consists of moderately self-directed learners. These learners are more confident, but lack knowledge of the subject at hand. They respond positively to personal interaction from the educator. Third stage learners have intermediate self-direction. They have skills and knowledge, and view education as participatory. Fourth stage learners are high in self-direction. They can set their own goals independently and utilize educators as a resource to pursue goals. Based on the model the teacher may help or hinder the learner from advancing through the stages of self-direction (Grow, 1991). Grow (1991) proposes the following assumptions: a) the goal of education is to develop self-directed, lifelong learners, b) teaching is situational and varies in regards to the learner, c) self-direction is situational and may not transfer from one learning situation to the next, d) self-direction

is valuable, and dependency can be limiting, e) self-direction can be learned and taught, f) theories do not have to be valid to be useful. Learners can vary in self-direction from dependent, interested, involved, to self-directed, and implications for teaching are to match the teaching style to the learner's stage of self-direction (Grow, 1991). Teaching excellence accomplishes two things: a) it complements the learner's stage of self-direction and b) empowers the learner to develop greater self-direction (Grow, 1991). According to Grow (1991), The Staged Self-Directed Learning Model applies andragogical assumptions through all levels of education and teaching styles. Progression of the learner through stages of self-direction is rarely linear and often repetitive.

Treatment Guidelines for Adults with Asthma

While asthma cannot be prevented or cured, it can be controlled to improve quality of life (CDC, 2003). Healthy People 2010 outlines specific national health objectives for asthma. As a result of these objectives over the past several years, a planned framework for responding to asthma has been developed through a collaborative effort of federal agencies dealing with asthma. Two primary documents have been developed to direct federal programs dealing with the asthma epidemic (DHHS, 2001). *Action Against Asthma* is a strategic plan for the Department of Health and Human Services (DHHS), and *Asthma and the Environment* is a strategy to protect children based on the Presidential task force for environmental health risks and safety risks to children (DHHS, 2001). Both of these strategic plans recommend use of the NAEPP Guidelines for Diagnosis and Management of Asthma (DHHS, 2001).

The NAEPP is the coordinating committee (NAEPP-CC) through the NHLBI required to identify all federal programs dealing with asthma, develop a federal plan for

responding to asthma, and submit recommendations to Congress for strengthening and improving coordination of federal asthma activities (DHHS, 2001). The Federal Liaison Group on Asthma (FLGA) is a subcommittee of the NAEPP-CC. The FLGA has representatives throughout the DHHS, the Department of Housing and Urban Development, the Environmental Protection Agency, and many others (DHHS, 2001). FLGA submits reports to the NAEPP-CC for review and concurrence.

The NAEPP-CC consists of representatives from 40 different professional societies, patient advocacy groups, and others with an interest outside the federal government (DHHS, 2001, NHLBI, 2002). NAEPP-CC guidelines were developed in line with national health objectives outlined in the DHHS report, Healthy People 2010 and the DHHS national health agenda (DHHS, 2001) (See Appendix C). NAEPP was established in March of 1989 to address the increasing problem of asthma in the United States (NHLBI, 2002). The goals of the NAEPP were to increase awareness of asthma as a serious chronic disease among the public, patients, and health professionals; ensure proper identification of asthma symptoms by the public, patients, and health professionals; and ensure effective control of asthma through patient/health professional partnerships, treatment, and education. To accomplish these goals, the NAEPP works with major medical associations, voluntary health organizations, and community programs to educate the public, patients, and health professionals.

The NAEPP has had a science-based committee of U.S. Asthma experts since 1994 to monitor scientific literature and advise NAEPP-CC when an update report is needed. Therefore, the NAEPP Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma (1997) is currently updated and incorporates the best available

scientific information on the care of patients with asthma (DHHS, 2001 p.7). The Expert Panel is a multidisciplinary group of clinicians and scientists with expertise in clinical asthma management (NHLBI, 1997, 2002). Panel members consist of individuals who served on the science-base committee, the previous Expert Panel, or are chosen based on nomination by NAEPP-CC (NHLBI, 1997). The report is the result of three years of analysis of scientific literature regarding the pathogenesis of asthma, effective approaches to asthma diagnosis, monitoring, pharmacological and environmental treatment, and patient education. It provides information on treatment of asthma using clinical and self-management strategies. If there is a paucity of evidence on which to base recommendations, the Panel labels recommendations "based on Expert panel opinion" (NHLBI, 1997). Final review, comments and approval of the NAEPP Report comes from the NAEPP-CC (NHLBI, 2002). For the current NAEPP Expert Panel Update, the science- based committee focused on critical asthma issues rather than updating all topics (NHLBI, 2002). Despite widespread circulation of NAEPP guidelines, the guidelines are not a standard practice of care universally (DHHS, 2001).

For the NAEPP Expert Panel Report (1997), the Science Base Committee along with members of the Global Initiative for Asthma examined all relevant asthma literature based on human subjects published in English between 1991 and mid 1995. The literature was obtained through Medline database searches with more than 5,000 abstracts reviewed (NHLBI, 1997). This study will utilize the NAEPP guidelines for the education curriculum (NHLBI, 2002)

Treatment and Outcomes of Adults with Asthma

A Cochrane Review by Gibson and colleagues (2001) found that education only did not improve health outcomes in adults with asthma despite perceived improvement of symptoms. Thus, a key component of asthma management guidelines is patient education and regular medical review (Gibson et al., 2001). Outcome measures from the review were the number of hospitalizations, doctor visits, emergency department visits, days lost from normal activity related to asthma exacerbations, and lung function (Gibson et al., 2001). In a review of asthma self-management education compared to usual care by Powell and Gibson (2003), education that included self-monitoring of symptoms or PEF, regular medical review or written action plans improved health outcomes in adults with asthma. Given these types of education, asthma self-management led to decreased hospitalizations, emergency department visits, unscheduled doctor visits, and improved quality of life (Powell and Gibson, 2003).

A Gibson and colleagues reviewed (2003) the effects of asthma self-management education along with regular health practitioner visits on health outcomes in adults with asthma. Self-management education programs using PEF or symptoms monitoring along with regular medical review and a written action plan improved health outcomes in adults with asthma. Education programs that enabled adults to adjust medication through a written action plan were the most effective form of self-management (Gibson et al., 2003). A decrease in health care services, nocturnal symptoms and work were noted as a result of education programs included in the review (Gibson et al., 2003). Toelle and Ram (2004) reviewed the effects of written asthma self-management plans on treatment

adherence and asthma outcomes. Findings were inconclusive due to small trial size and inconsistency of results (Toelle & Ram, 2004).

Gibson et al. (2003) identified four main components of asthma education: (a) information, (b) self-monitoring of peak flow or symptoms, (c) regular medical review and individualized written action plan, and (d) self-monitoring or regular review. Information without written action plans, self-monitoring, or regular review was found to have no significant effect on health outcomes for adults with asthma (Gibson et al., 2003). Review of the literature also establishes different modalities available for delivery of asthma self-management programs. A review by Powell and Gibson (2003) concluded that the mode of delivery and combination of components for self-management programs vary. Information delivery in this review was interactive or non-interactive. Self-monitoring was symptom or peak flow self-monitoring and sometimes diary recorded. Regular review or routine doctor visits were used, and asthma action plans were written or verbal (Powell & Gibson, 2003).

Sharpe et al. (2006) are currently reviewing the literature to determine if asthma education delivered in the Emergency Department improved health outcomes for adults with asthma, and to identify characteristics of asthma education programs that improved health outcomes for adults with asthma. Clark, Gotsch, & Rosenstoc (1993) reviewed research on patient education and asthma management. The need for asthma education is emphasized for patients, professionals, and the public to decrease asthma morbidity and mortality. Specifically a paucity of knowledge was noted regarding asthma education for adults (Clark et al., 1993).

Powell and Gibson (2003) state asthma education and self-management are recommendations of many asthma management guidelines. Gibson (1993) stated that guidelines are developed by expert opinion based on review of evidence-based literature. The International Consensus Report on the diagnosis and treatment of asthma recommends education and regular medical review as a key component of asthma management guidelines (NHLBI, 1992).

Monitoring Plans

The NAEPP states that self-monitoring is important to effective self-management whether peak flow monitoring, symptom monitoring, or a combination are used (NHLBI, 2002). Review of the literature supports that peak flow monitoring and symptom monitoring are equally effective when used to self-manage asthma (NHLBI, 2002; Powell & Gibson, 2003). Review of the literature also compares use of written action plans based on symptom monitoring with written action plans based on peak flow monitoring. Evidence neither supported nor refuted use of written plans with symptom or peak flow monitoring (NHLBI, 2002).

While NAEPP Guidelines recommend use of written action plans to educate individuals on asthma self-management, review of the literature on use of written plans for asthma self-management is inconclusive (Gibson et al., 2003; NHLBI, 2002). Regardless of format, any asthma self-management monitoring plan should address (a) control and prevention efforts to control exacerbations, (b) a treatment regimen regarding medications and prescribed adjustments with condition changes, (c) actions to take if medications are ineffective, and (d) emergency health care contacts (NHLBI, 2002). The

written plan is considered a tool to facilitate active partnership between the individual and health care professional, self-management education, and to support asthma control.

Diagnosis

According to the NHLBI (1992, 1997, 2002), the severity of asthma often is underestimated due to lack of objective assessment. The symptoms of asthma (wheezing, coughing, chest tightness, and shortness of breath) alone are not diagnostic. A patient history of recurrent exacerbations is significant particularly if nocturnal symptoms exist. Because asthma symptoms are episodic, physical examinations may be normal. The pattern and severity of airflow obstruction is important to determining treatment. Thus, objective measures of airflow obstruction are essential for diagnosis of asthma (NHLBI, 1992).

Although there is no direct measure of airway inflammation and obstruction with asthma, the degree of airway narrowing and variability can be assessed by PEF monitoring or forced expiratory volume in one second (FEV1) (NHLBI, 1992, 1997, 2002). Classification of asthma (mild, moderate, severe) is based on severity and pattern of airflow obstruction (See Appendix D). Classification levels of asthma are useful for determining the level of therapy necessary to control symptoms (NHLBI, 1992, 2002). The CDC (2003) and NAEPP Expert Panel Report II (NHLBI, 2002) recommends use of PEF monitoring for asthma self-management.

The NHLBI (1992, 1997, 2002) recommends spirometry for the initial assessment of asthma, and for periodic confirmation of PEF measurements. Vital capacity (VC) is the maximum amount of air inhaled and exhaled. Because many different airway diseases may decrease VC, it is important to determine if a decrease in VC is due to airway

restriction or obstruction. The most common instruments of forced expiratory flow are FEV1 and PEF (NHLBI, 1992, 1997, 2002). FEV1 is the maximum amount of air expired in 1 second after a full inspiration, and PEF is the maximum flow rate of forced expiration. While review of the literature supports FEV1 as the "gold standard" for assessing severity of airflow obstruction, it is costly and too cumbersome for individual asthma management. Preventing exacerbations is essential to asthma management; therefore, an instrument conducive to individual use and monitoring is crucial.

The PEF meter is an instrument used in several of the studies as a measure of lung function, symptomatology, and need for intervention. The meter is an objective standard of measure of lung function (Bheekie, Syce, & Weinberg, 2001). In trying to control asthma, lung function is difficult for individuals to assess accurately and objectively. PEF meter is an objective standard and is sensitive to physiological airway changes. PEF can detect airway obstruction before symptoms occur (Bheekie et al., 2001; Burkhart, Dunbar-Jacob, Fireman, & Rohay, 2002). With this assessment data, individuals are able to detect changes in their condition and make timely adjustments, minimizing symptoms and exacerbations.

The American Academy of Allergy, Asthma, and Immunology (AAAAI, n.d.) states the following guidelines for peak flow (PF) monitoring:

1. Green Zone – 80% or more of best PF, doing well.
2. Yellow Zone – 50-80% of best PF, asthma getting worse. Contact physician to adjust therapy.
3. Red Zone – 50% of best PF, Medical Alert! Need for acute intervention.

Personal best is the highest peak flow number an individual achieves over 2-3 weeks when asthma is under control (AAAAI, n.d.). It is recommended that treatment based on PEF monitoring be based on each individual's personal best (NHLBI, 1992, 1997, 2002). A decrease of 15% between two readings warrants self-management intervention to prevent symptoms (AAAAI, n.d.; Bheekie et al., 2001; Burkhart et al., 2002; CDC, 2003; Lahdensuo et al., 1996; Wilson et al., 1993; Wolf, Guevara, Grum, Clark, & Cates, 2003). Based on the literature, PEF show little fluctuation with effective asthma self-management. Early intervention with self-management returns PEF to personal best (AAAAI, n.d., & Wilson et al., 1993).

Research supports a positive linkage between asthma education and PEF. A systematic review comparing asthma education to routine care found that PEF was maintained in the green zone for those receiving asthma education while routine care subjects fluctuated between all three zones (Gibson et al., 2003). Lahdensuo et al. (1996) in a randomized clinical trial compared self-management patients given an asthma education intervention to traditional treatment patients. PEF was utilized as a guide for self-management. It was concluded that with asthma education, PEF stayed in the green zone while there was fluctuation between zones with traditional treatment (Lahdensuo et al., 1996). Forshee et al. (1998) found significant improvement ($p<.001$) in the attainment of personal best with PEF post asthma education intervention.

Lawrence (1995) conducted a retrospective study to see the effect of asthma education on PEF. A 100% improvement ($p<0.05$) was reported post education for patients receiving full education sessions. A 50% improvement ($p<0.05$) was reported post education for those receiving partial education sessions (Lawrence, 1995). PEF was

maintained in the green zone for patients receiving full education sessions. Wilson and colleagues (1993) utilized a randomized clinical trial to study the effects of asthma education on PEF. The education group differed significantly from the routine control group ($p<0.05$). PEF stayed in the green zone for the education group. The PEF for the control group fluctuated between all three zones (Wilson et al., 1993).

Costs and the need to educate regarding use of PEF can pose barriers to self-management. Also, comparison of PEF to the gold standard, Forced Expiratory Volume (FEV1) identified a lack of equivalence in some studies. The PEF meter demonstrated random errors and over and underestimation of lung function in comparison to FEV1 measures (Eid, Yandell, Howell, Eddy, & Sheikh, 2002; Myers, 2002; Sawyer et al., 1998; Sly, Cahill, Willet, & Burton, 1994). While PEF meters were homogenous and static in nature, there were other dynamic characteristics identified that impacted readings such as muscle mass, vigor, sex, age, time of day readings were taken, and the number of readings done (Enright, Sherrill, & Lebowitz, 1995; Hegewald, Crapo, & Jensen, 1994). The model of meter impacted accuracy and reliability as well (Jackson, 1995; Miles, Bright, Ayeres, Cayton, & Miller, 1995; Miller, Dickinson, & Hitchings, 1992). Thus, consideration to type of PEF meter, the time of day readings are done and the number of readings must be given to ensure reliability and validity of the instrument readings.

Medications to Manage Asthma

Medications to reverse or prevent airflow obstruction in individuals with asthma are a major component of asthma management. Selection of an individual pharmacological treatment should be based on the individual's asthma severity and current treatment. Because asthma is a chronic dynamic disease, the NHLBI (1992, 1997,

2002) recommends medication plans that accommodate for individual variability over time. Flexibility in individual medication plans to correlate with asthma severity requires education to avoid adverse medication effects.

Based on the pathogenesis of asthma, anti-inflammatory medications and bronchodilators are most commonly used. Anti-inflammatory agents have a preventive suppressive action that interrupts the inflammatory process of asthma, and bronchodilators relax bronchial smooth muscle to dilate the airways (NHLBI, 1992). Since asthma is a respiratory disease, inhalants are often used for maximum dose effect. Metered-dose inhalers (MDIs) and dry powder inhalers are commonly prescribed. Spacer devices can be utilized with inhalants to prevent medication deposits and irritation to the oral cavity (NHLBI, 1992, 1997, 2002). Education for use of various medications and spacer devices is necessary.

Avoidance of Triggers

In individuals with asthma, it is important to identify factors that trigger airway inflammation. This may vary amongst individuals, but is an important step in asthma management. Review of the literature supports that avoidance or control of triggers can reduce asthma symptoms and airway inflammation (NHLBI, 1992, 1997, 2002). Individuals need to be educated on factors that can trigger asthma, ways to avoid or control triggers, and how to identify specific triggers.

Outcomes

The following outcome measures were utilized in the identified studies: Quality of Life (QOL) (Abdulwadud et al., 1999; Cote et al., 2000; Gibson et al., 2003; Klein et al., 2001; Premaratne et al., 1999; Thoonen et al., 2003), Doctors visits,

hospitalization, absenteeism, ER visits (Bailey et al., 1999; Gibson et al., 2003; Mayo, Richmond, & Harris, 1990; Morice & Wrench, 2001; Osman et al., 2002; Powell & Gibson, 2003; Premaratne et al., 1999; Thoonen et al., 2003), Knowledge about asthma, correct inhaler use, PEF use (Abdulwadud et al., 1999; Cote et al., 2000; Morice & Wrench, 2001; Powell & Gibson, 2003; Thoonen et al., 2003; Wilson et al., 1993), Health care costs (Lindberg et al., 2002; Thoonen et al., 2003), Inflammation biological markers in sputum (Janson et al., 2001), Steroid inhaler use and compliance (Berg et al., 1997; Janson et al., 2003; Osman et al., 2002; Premaratne et al., 1999; Thoonen et al., 2003), and Asthma control (symptoms), health status, respiratory function (Bailey et al., 1999; Barbanel et al., 2003; Berg et al., 1997; Caplin & Creer, 2001; Couturard et al., 2002; Janson et al., 2003; Janson et al., 2001; Klein et al., 2001; Legoretta et al., 2000; Lindberg et al., 2002; Perneger et al., 2002; Thoonen et al., 2003; Wilson et al., 1993).

Type of Education Program and Outcomes

Lindberg et al. (2002) compared the effects of an asthma nurse practitioner (ANP) to medical self-management. While the ANP education care delivery was more effective and less costly than the medical, there were no significant differences in quality of life between groups. Bailey et al. (1999) conducted a randomized controlled trial to replicate an existing asthma self-management program to develop a less resource intensive program appropriate for nonacademic settings. All groups had a decrease in respiratory symptoms and care and an improvement in status.

None of the studies offered a description of the asthma self-management education programs used except for the length of the program, who delivered the program, and the program topics covered. The literature review offered insight about

things to consider when planning an asthma self-management education program such as the audience, setting, time, and content. While various types of adult education programs were utilized, no standardized asthma education program was found. While evidence neither supports nor refutes the benefits of PEF monitoring compared to symptom-based monitoring, the NHLBI (2002) currently recommends utilization of PEF monitoring with asthma self-management. Costs and the need to educate regarding use of PEF are barriers.

Settings

The studies encompassed a variety of research settings. Janson et al. (2003, 2001) conducted their research in a medical laboratory. Clinics were utilized in some studies (Abdulwadud et al., 1999; Couturaud et al., 2002; Klein et al., 2001; Lindberg et al., 2002; Mayo et al., 1990; Wilson et al., 1993). Communities were utilized as settings (Bailey et al., 1999; Barbanel et al., 2003; Berg et al., 1997; Legoretta et al., 2000). Some studies were hospital based (Cote et al. 2000; Morice & Wrench, 2001; Osman et al., 2002; Perneger et al., 2002). Physician's offices (general practice) were also utilized (Premaratne et al., 1999; Thoonen et al., 2003). The majority of the studies were conducted outside of the U.S. in Australia, the U.K., and the Netherlands (Abdulwadud et al., 1999; Barbanel et al., 2003; Gibson et al., 2003; Klein et al., 2001; Lindberg et al., 2002; Morice & Wrench, 2001; Osman et al., 2002; Powell & Gibson, 2003; Perneger et al., 2002; Premaratne et al., 1999; Thoonen et al., 2003).

Populations

Populations were multiethnic and demographics provided were primarily age, gender, and severity of asthma. All of the studies utilized participants who were age 16

and older except for three studies. Legoretta et al. (2000) utilized participants age five and older. Osman et al. (2002) utilized participants age 14 and older. Premaratne et al. (1999) utilized participants age 15 and older. While there was a fair representation of gender, the majority of participants were female (approximately 60% to 40% female over male). It is unknown if this is representative of populations utilized, the fact that women tend to participate more, or whether asthma impacts more women than men within the given population. All participants had moderate to severe asthma.

Evidenced Based Implications

Seventeen of the 21 studies reviewed were randomized clinical trials (RCTs) supporting a strong level of evidence (see appendix B). Validity and reliability of some of the instruments utilized were not addressed which may weaken the level of evidence (Abdulwadud et al., 1999; Cote et al., 2000; Couturard et al., 2002; Osman et al., 2002; Morice & Wrench, 2001; Wilson et al., 1993). Three of the studies lacked control which limits generalizability of the findings (Janson et al., 2001; Legorreta et al., 2000; Lindberg et al., 2002). One study was a descriptive study which offers information regarding group characteristics for self-management “continuers” and “relapsers” (Caplin & Creer, 2001). There was a fair representation of ethnic minorities and both genders. While a variety of settings were investigated, the primary focus of the studies was health promotion verses illness care. A health promotion focus is essential to decreasing asthma morbidity and mortality.

Knowledge improved adherence to corticosteroids (Abdulwadud et al., 1999; Gibson et al., 2001; Legorreta et al., 2000; Morice & Wrench, 2001; Perneger et al., 2002; Wilson et al., 1993). QOL did not differ significantly between groups in any of the

studies except for Thoonen and colleagues (2003). Health care costs decreased overall for self-management intervention groups (Lindberg et al., 2002; Mayo et al., 1990; Thoonen et al., 2003). Based on the supported findings, it is recommended that asthma self-management using a written action plan be offered as a management approach to decrease morbidity and mortality. Areas of further research are also recommended.

Adult Education Implications

Review of the adult education literature establishes that education is a structured learning process, and meeting learner needs is essential to adult learning (Endorf & McNeff, 1991; Imel, 1994; Merriam, 2001; Wlodkowski, 1988). Andragogy principles serve as a framework to individualize education (Baumgartner et al., 2003; Imel, 1994; Merriam, 2001; St. Clair, 2002; Smith, 2002). Andragogy has been applied in numerous settings and educational situations, yet experimental support is limited. Thus additional research is recommended.

Future Research

Further research needs to be done to establish support for the amount of time, the setting, and the necessary content to optimize outcomes. Further biological studies need to be done given the preliminary studies and small sample sizes (Janson et al., 2003, 2001). There is a paucity of qualitative studies to establish patient perspectives and experience. Abdulwadud et al. (1999) recommend self-management education to include behavioral change theory. There are few longitudinal studies to determine long term effectiveness and needs. Caplin and Creer (2001) suggest further research to determine coping and conditions necessary for patients to maintain self-management across time and context. According to the CDC (2003), there is disparity among populations

researched in regards to asthma self-management. More studies need to be done on lower socioeconomic minorities (CDC, 2003). Cost effectiveness of future programs will need to be determined. There is a lack of theory based research. Incorporating theory is essential to supporting, guiding, and validating future research.

Conclusion

Evidenced based practice regarding asthma is not being applied (CDC, 2003). Future challenges lie in facilitating evidenced based practice. According to the CDC (2003), while hospitalizations and death rates are leveling off, asthma health, QOL, and the economy remains impacted. The state of the science supports the use of asthma self-management as an effective approach to managing asthma morbidity and mortality.

Education is essential to supporting asthma self-management. While state of the science does not establish what type of education intervention is most effective, researched based guidelines are available to support content planning. Education literature offers insight as to setting, timing, and teaching strategies to promote learning and facilitate outcomes. It is critical for health care professionals to look at avenues to implement recommended guidelines in an effort to decrease asthma morbidity and mortality.

Andragogy is well established in adult education literature as a framework for educational planning. Use of andragogical principles as a framework for the individually tailored education intervention in the current study could add to the body of knowledge regarding andragogy and asthma self-management education. The current study offers an experimental approach to utilizing andragogy which is presently limited in the literature. The current study also applies a theoretical framework to asthma self-management

education which is limited in the literature as well. While review of the literature was focused on adults, much of asthma self-management education literature is focused on the child population. Given the prevalence of asthma in the adult population and the child population who will not outgrow asthma, there is a growing need to address asthma self-management in the adult population.

Chapter III: Methodology

In this chapter the methods, research questions, research design, and setting are presented. Power analysis, sample, and operational definitions are reviewed. The procedures for data collection, data processing, and data analysis are presented, along with the strengths and limitations of the current study, and protection of human subjects.

The purpose of the current study was to examine and compare the effects of two asthma self-management programs on adult asthma control, the individually tailored asthma self-management education program and the standardized self-management education program. Selected demographic data was examined regarding age, gender, socioeconomic status, ethnicity, marital status, the number of years for asthma diagnosis, current asthma care regimen, previous asthma education, and the number of yearly asthma related Health Care Provider and Emergency Department visits, and hospitalizations. Outcomes of asthma self-management include: limited activity days, shortness of breath, interrupted sleep due to asthma symptoms, use of rescue inhaler, peak expiratory flow (PEF) readings 80% or more of best PEF reading, health care visits, and perception of asthma control.

Research Questions

The study was designed to answer the following questions:

1. What are the effects of asthma educations in asthma control for adults with an individually tailored asthma self-management education program versus adults with a standardized asthma self-management education program as measured by scores on the Asthma Control Test (ACT)?

2. What are the effects of asthma educations in asthma control for adults with an individually tailored asthma self-management education program versus adults with a standardized asthma self-management education program based on a) limited activity days at work, school, or at home, b) shortness of breath, c) asthma symptoms (wheezing, coughing, shortness of breath, chest tightness, or pain) and interrupted sleep, d) frequency of use of rescue inhalers or nebulizer medication (such as albuterol), e) PEF readings, f) number of hospitalizations, Emergency Department or Health Care Provider visits related to asthma symptoms, and g) perceived asthma control?

3. Do selected demographic variables of age, gender, marital status, ethnicity, socioeconomic status, previous asthma education, the number of years diagnosed with asthma, and current asthma care regimen differ in asthma control for adults with an individually tailored asthma self-management education program versus adults with a standardized asthma self-management education program?

Research Design

The research design was a comparative, pretest-posttest design to examine and compare the effects of two self-management programs, the standardized asthma self-management education and the individually tailored asthma self-management education, on adult asthma control. The education curriculum for both groups was based on the National Asthma Education Prevention Program (NAEPP) Guidelines. The individually tailored education utilized an andragogical framework. The ACT and PEF reading were utilized as the pre and posttest (American Lung Association, 2002). T-test was utilized to compare groups.

Power Analysis

The independent variable for the current study was adult asthma self-management education. The dependent variable was self-management as measured by asthma control. Asthma control was measured by limited activity days, shortness of breath, interrupted sleep due to asthma symptoms, use of rescue inhaler, PEF readings 80% or more of best PEF reading, health care visits, and perception of asthma control. Standard means and deviations of dependent variable(s) in like studies were utilized for power analysis to determine sample size. In order to maintain a power of 80%, a sample size of 44 was utilized for both groups.

Sample

The study subjects were adults aged 18 or older, diagnosed with asthma with no other chronic respiratory conditions aside from allergies and sinusitis. Subjects were able to read and speak English. Eight-eight subjects agreed to participate in the study. A total of 88 subjects were randomly assigned into one of two education groups by consecutively assigning the numbers 1 (n = 44) and 2 (n = 44). After the groups were assigned, a number was drawn to determine which group would receive the standardized education intervention. Group 1 received the standardized education and group 2 received the individually tailored intervention based on an andragogical framework. Prior to the start of either education intervention, all participants completed the ACT and obtained a PEF reading.

Subjects were recruited from the Central Illinois Allergy and Respiratory Clinic in Springfield, Illinois. The clinic specializes in the care of individuals with allergies and respiratory conditions; therefore, serving a large concentrated number of individuals

diagnosed with asthma yearly. The sample is representative of the clinical population. Permission to use the site was obtained from Dr. David Wright. Classrooms were available at St. John's College and St. John's Hospital for the asthma self-management education sessions. Participants had the ability and desire to self-manage their asthma. This required being responsible for care, to make decisions regarding asthma management, and having cognitive ability to know about asthma signs, symptoms, and treatment (CDC, 2003). This was determined by the participant.

Recruitment flyers were available at the clinic for potential participants to contact the researcher (see Appendix E). In addition, Dr. David Wright distributed recruitment flyers to patients and obtain verbal consent to share patient's name and number with the researcher for study participation. Additional individuals were recruited by word of mouth, by the researcher, and individuals aware of the study. When a list of participant names and contact information was collected, the researcher telephoned potential participants to invite them to participate, obtained verbal informed consent, and scheduled education sessions.

Operational Definitions

The following definitions were used in this study:

Asthma as operationally defined as a medical diagnosis confirmed by a physician.

Adult was defined as an individual 18 years of age or older who is own legal guardian (CDC, 2003; NHLBI, 2002).

Asthma education was participation in a planned program addressing asthma disease progression, signs and symptoms, individual treatment plans, recognition of exacerbations, avoidance of triggers, and when to seek medical attention.

Asthma *self-management* was use of knowledge, skills, prescribed medications, action plan, and PEF to control asthma.

Asthma control was attainment of a score of 20 or above on the ACT (American Lung Association, 2002).

Limited activity days were times when asthma kept participants from getting as much done at work, school, or at home.

Shortness of breath was the feeling of not getting enough air.

Asthma symptoms were wheezing, coughing, shortness of breath, chest tightness, or pain.

Interrupted sleep was waking up at night or earlier than usual in the morning as a result of asthma symptoms of wheezing, coughing, shortness of breath, chest tightness, or pain.

Use of rescue inhaler was the number of times a rescue inhaler or nebulizer medication such as albuterol is taken.

PEF readings were the highest self-reported reading out of three consecutive readings taken in the evening.

Health care visits were any hospitalizations, Emergency Department or health care provider visits due to asthma symptoms.

Perceived asthma control was defined as an individual's view point of how their asthma is controlled as measured by the ACT.

Instrumentation

Two instruments were used for this study: the ACT and the PEF meter readings. The ACT and PEF meter readings were used to measure outcomes. Selected demographic

variables used to describe participants included: age, gender, marital status, ethnic background, socioeconomic status, previous asthma education, number of years diagnosed with asthma, and the total number of asthma related health care visits occurring during study participation. An evaluation form with open ended questions allowed participants to write comments about the asthma education program.

Evaluation Form

The evaluation form was developed by the investigator. It consisted of five questions. Participants were asked what barriers they encountered in managing their asthma; if they found the asthma self-management education program helpful; what was most helpful; what was least helpful about the asthma self-management education; and if there was anything that could be improved or added to the asthma self-management program to help them self-manage their asthma (see Appendix J).

Demographic Questionnaire

The investigator developed demographic questionnaire consists of ten questions. Five questions relate to gender, marital status, ethnic background, socioeconomic status, and previous asthma education. The remaining five questions relate to age, number of years diagnosed with asthma, description of previous asthma education, and total number of asthma related health care visits occurring during study participation (see Appendix F).

Asthma Control Test

ACT is an instrument developed by the American Lung Association and GlaxoSmithKline which is a research-based pharmaceutical company. ACT consists of five questions concerning asthma symptoms, control, and inhaler use. It is a self-administered survey written at a fifth-grade reading level. It is a Likert-type scale ranging

from one to five. The score for each question was added to determine the total score. The total score indicates the level of asthma control. The developer of the instrument indicates a score of 20 or above depicts adequate asthma control (see Appendix G). Lower scores indicate less control.

ACT is a validated instrument. According to Nathan and colleagues (2004), ACT was administered to 471 patients during development. Specialists' ratings of asthma control after spirometry were also collected. Stepwise regression methods were used to select items that showed greatest discriminant validity in relation to specialist's rating. Internal consistency reliability and discriminant validity tests were conducted for ACT scale scores. The performance of ACT was investigated using logistic regression methods. ACT internal consistency reliability was .84. As a screening tool, ACT has content validity with agreement between ACT and specialists' rating ranging from 71%-78% given cut points used (Nathan et al., 2004).

According to Schatz and colleagues (2004), ACT was administered to 248 patients ages 12-84 years at two office visits with asthma specialists. Specialists (blinded to ACT) rated asthma control after spirometry and forced expiratory volume in one second (FEV1) values were obtained. Changes in specialist ratings were computed and categorized into four levels. Changes in mean ACT scores were compared to specialist ratings using analysis of variance (ANOVA). ACT score showed good internal consistency (.85) among patients assessed by specialists as having no change in asthma control. ACT was responsive to changes in specialist ratings of asthma control and to clinically meaningful changes in FEV1. Research supports that ACT detects clinically meaningful changes in asthma control (Schatz et al., 2004).

Peak Expiratory Flow Monitoring

PEF is a simple, inexpensive, convenient, reproducible, and an objective measure of airway obstruction correlating well with FEV1 (NHLBI 1992, 1997, 2002). Variations in PEF reflect the severity of asthma. PEF monitoring can detect asymptomatic decrease of lung function. It allows individuals to manage their asthma by identifying the need to intervene before symptoms occur, monitoring response to asthma treatment, and providing an objective assessment for treatment.

The PEF meter is a simple to use instrument that measures how fast an individual can exhale after a maximum inhalation (American Thoracic Society, 2004). In using a PEF meter to monitor asthma, the PEF reading should remain within a specified range. The specified range is determined based on gender, age, and height. A peak flow reading falling below the specified range should occur before asthma symptoms appear allowing for management adjustments to prevent symptoms and exacerbations.

The PEF meter has strong face validity as it only measures expiratory flow. Literature is variable in regards to content validity of PEF meter readings, but in practice this instrument is useful. Review of the literature establishes a 90-95% interrater reliability of PEF meter readings (Enright et al., 1995; Jackson, 1995; Miles et al., 1995). NAEPP guidelines recommend PEF meters being accurate within ten liters per minute of each reading (Jackson, 1995). Based on the level of validity and lack of randomized clinical trial research, the reviewed literature is inconclusive to negate use of PEF to monitor lung function in asthma management as recommended in NAEPP guidelines (NHLBI, 1997, 2002). An Omron PEF meter which meets NAEPP guidelines was used for the current study and readings were taken in the evening.

Informed Consent

Approval of the current study was obtained from the University of Missouri at St. Louis Institutional Review Board (see Appendix H). Each participant was given an informed consent form which was approved by the Institutional Review Board. The informed consent describes the purpose of the study, participant rights, the costs and benefits of participating in the study, and how to contact the researcher for questions (see Appendix I).

Data Collection

Prior to the start of the education intervention, participants completed the demographic form, and the ACT. Each subject was given a PEF meter free of charge to reduce variability of results. Many of the subjects had there own PEF meter that they were instructed not to use to record PEF readings for this study. Each was given instructions on the use of the provided PEF meter. After instruction, a self obtained PEF reading was recorded. Four weeks after completion of the education intervention, participants completed the ACT and obtained a PEF reading. This was done via telephone and one per e-mail. Participants were given an ACT to take home to complete in four weeks and give responses to researcher via telephone.

Asthma Self-Management Education Intervention

The curriculum for both groups consisted of three educational series: a) The ABC's of Asthma: defining and describing asthma, control of asthma triggers, and distinguishing early warning signs of asthma episodes, b) Getting the Most From Your Medications: medications and treatment plans, and the role of partnerships with health

care providers, c) The Tools of Asthma Management: devices, techniques, and treatment plans, and encourages partnerships with health care providers.

The three educational series were developed by the Asthma and Allergy Foundation of America (AAFA). The program presentation and handouts reflect the NAEPP's Expert Panel Report II: *Guidelines for the Diagnosis and Management of Asthma Update on Selected Topics 2002*. The curriculum defines and describes asthma, as well as, helps adults control their asthma by identifying common asthma triggers and distinguishing early warning signs of asthma episodes. The program was presented on power point with handouts. All three education series were able to be delivered in one education session lasting 90 minutes.

Pilot of Education Interventions

A pilot was done as a precursor to the current study to test the standardized education intervention and the individually tailored education intervention using andragogical principles. While the same curriculum content was utilized for the standardized education intervention and the individually tailored education intervention, andragogical principles were utilized as a conceptual framework for the individually tailored education intervention to address individual needs. The standardized adult asthma self-management education program and the individually tailored adult asthma self-management program using the andragogical framework were delivered to two small groups.

It was found that while curriculum content was the same for both groups, the process for each group differed. The individually tailored education intervention using the andragogical principles was directed by individual learning needs and goals. The

standardized education intervention was content driven, yet al.lowed for questions, answers, and some sharing of asthma experiences. The feasibility of group size for the standardized and individually tailored education interventions was determined from review of the literature and the pilot study. The individually tailored education intervention requires group sizes of eight or less to facilitate application of andragogical principles. The andragogical principles emphasize that respect for the learner is paramount and that learning needs to be learner centered. The standardized education intervention can have up to 25 participants to allow for manageability of the education sessions.

Standardized Education Intervention

The education session for both groups was 90 minutes and allowed for questions and answers. The standardized intervention was delivered in groups. Group size varied from two to eight participants at a time. Group size was determined by participant's ability to attend each week. Education sessions were scheduled weekly based on participant's preference. The standardized education program was a scripted more formal delivery. The researcher's role in the standardized program was content expert. The researcher directed the education activities as recommended by developers of the scripted program. Participants were given time for questions and answers. The role of the learner was active listening and questioning. The meeting room was comfortable with available seating. Because the standardized program was content driven, focus was on facilitating the content. Thus, lighting, sound, and climate were conducive to facilitating the program.

Individually Tailored Education Intervention

The individually tailored education intervention was informal, semi-structured and applied andragogical principles as described in Chapter II. The individually tailored program was delivered in small groups of eight or less. Groups varied in size from one to six. Group size was determined by participant's ability to meet each week. Education sessions were scheduled based on participant's preference. The researcher's role in the individually tailored program was a facilitator of the learner. The researcher managed the education activities that facilitated learning. The researcher was also a content resource. There was an assumption that many resources other than the researcher were available to the learners. The researcher shared resources with learners as needed. The participants were asked to share their lived experience with asthma and to establish learning goals for the education activity. The role of the learner to be participatory was emphasized.

Seating arrangement was conducive to group sharing. The meeting room was a quiet, aesthetic conference room with comfortable, available seating. A climate of *mutual respect* was established by encouraging and utilizing activities that promote sharing of stories among participants. A noncompetitive atmosphere was promoted. A climate of *support* was promoted through a non-threatening, empathetic, nonjudgmental attitude conveyed by the educator that was accepting of participant situations and goals. This was done through verbal and nonverbal communications, active listening, being attentive and interested in learner's wellbeing. Group discussions were encouraged to support participants.

Enthusiasm was maintained by the educator and points of interest expanded on for the participants to create a climate of *pleasure.* Participants were asked to share points

of interest and establish learning goals. The education session was based on learning goals. A climate of *humanness* was maintained by treating participants with value and respect. Human comfort was provided for by the educator presenting a caring attitude, acceptance, respect, and a helping environment. Refreshments were provided. The room lighting and climate control were approved by participants prior to the start of the program.

Participants shared their lived experience with asthma and identified their learning needs to make them more engaged. The educator facilitated the education process to reinforce participation. Program dates were established based on participant's schedules. Participants chose her/his most desirable dates.

At the beginning of the first session, the educator briefly outlined curriculum content and importance to asthma self-management. Time was given at the beginning of each session to sharing of lived experience with asthma. Individual learning goals were established based on learning needs and available curriculum content. Based on individual learning needs the course of the education session was determined collaboratively by educator and participants. The educator facilitated the flow of the education session based on group input. Curriculum content was covered accordingly by educator with open discussion among the group.

Data Management and Analysis

All statistical analyses were conducted using the SPSS 13.0 statistical package. Descriptive statistics were used to characterize the sample. Regarding research question 1, the effects of two different adult asthma self-management education interventions on asthma control were examined using a General Linear Model (GLM) repeated measures

procedure to assess between-group and within-subject effects simultaneously. Regarding research question 2, the effects of two different adult asthma self-management education interventions on outcome variable, including a) limited activity days at work, school, or home related to asthma, b) shortness of breath, c) asthma symptoms, d) frequency of rescue inhaler use, e) perceived asthma control, and f) PEF readings were examined using a GLM repeated measures procedure to assess between-group and within-subject effects simultaneously. The difference in g) number of hospitalizations, Emergency Department, or Health Care Provider visits related to asthma symptoms between the standardized education group and the individually tailored education group were examined using an independent t-test. Regarding research question 3, how demographic variables age, gender, marital status, ethnicity, socioeconomic status, previous asthma education, the number of years diagnosed with asthma, and current asthma care regimen differ between groups, descriptive statistics were used to characterize the sample. An independent t-test was used to examine if the numerical demographic variables of previous asthma education, age, # of years diagnosed with asthma, and # of asthma related health care visits differ in asthma control for the individually tailored education group and the standardized education group. Chi-Square was used to examine if categorical demographic variables of gender, marital status, socioeconomic status, and ethnicity differ in asthma control for the individually tailored education group and the standardized education group.

Strengths

A major strength of the current study is that it addresses the effect of two different education interventions on asthma control with use of between-subject design in which randomly assigned subjects into one of the intervention to avoid carryover effects. State of the science does not establish what types of education are necessary for asthma control. Thus, the current study supports the development of new research and the advancement of science in the area of asthma control. This is in line with national recommendations (CDC, 2003; NHLBI, 2002; PEW Environmental Health Commission, 2005)

The study design is derived from a strong level of evidence. Randomization eliminates group assignment bias which decreases threats to validity by distribution randomly over conditions. This equates groups before treatment occurs. Use of research based NAEPP guidelines is a strength. The curriculum based on NAEPP guidelines and developed by experts is a strength. Use of andragogical framework adds theoretical and evidenced-based support to the individually tailored intervention. The quantitative design of the current study contributes to the present state of the science for andragogical theory which is largely qualitative. Having the researcher conduct both education interventions facilitates internal consistency. A pilot of both education interventions was done to assess for feasibility and smoother conduction of the current study. This adds to internal consistency of the study design.

Random assignment to groups supports external validity in regards to generalization of findings. Also, prior to design selection, lengthy consideration was

given to outcomes measures based on review of the literature and determining the state of the science for adult asthma self-management impacting asthma control. The outcomes selected for measure within the study design are reflective of the literature review. These outcomes selected are sufficient to evaluate the aim of the study. The aim of the study was based on the state of the science and implications for future research.

Limitations

While the study design strengthens internal validity, some threats or limitations still exist. History, events occurring between the beginning of the education intervention and the end that can produce outcomes in the absence of the education intervention, can be a threat to internal validity. This could be such things as participants reading supplemental information regarding asthma care, or an increase in physical activity or notable decrease in stress improving lung function. The repeated measure helps to decrease internal validity threats by helping with statistical analysis if reliability of measures is known.

Maturation is natural changes that can occur in the absence of the asthma self-management education intervention that can threaten internal validity. This could be growing experience with managing one's asthma or becoming wiser about asthma care. Maturation is considered a minimal threat due to the length of the study being only a four week period. Attrition is a threat to internal validity. Participants fail to complete outcome measures. Scheduling of the education sessions was done to accommodate participant's schedule to minimize attrition due to time constraints or conflicts. Also, education consisted of a single 90 minute session. The sample size was statistically calculated to compensate for attrition and maintain a power of .80. Enthusiasm of the

researcher, rapport with participants, and interest in obtaining information helped to encourage completion of the education session and post-tests.

Instrumentation can pose a threat to internal validity. In regards to PEF, muscle mass, vigor, gender, age, time of day readings are taken, and the number of readings done were identified as factors impacting PEF (Enright et al., 1995; Hansen et al., 2001). The model of the meter can impact accuracy and reliability (Jackson, 1995; Miles et al., 1995; Miller et al., 1992). According to Enright and colleagues (1995), girls and men, evening readings, and readings after two days of testing had the best reproducibility. To minimize threats to internal validity, participants were given the same PEF meter model that met NAEPP recommendations

The ACT is not sensitive in regards to instrument change, and is a validated instrument (Nathan et al., 2004; Schatz et al., 2004). Research supports that ACT detects clinically meaningful changes in asthma control (Schatz et al., 2004). Internal consistency reliability was .84 (Nathan et al., 2004; Schatz et al., 2004). The PEF and ACT were administered the same for pretest and posttest in each group. This allowed for instrumentation changes to be experienced equally over conditions within the limits of chance (Shadish, Cook, & Campbell, 2002).

Lastly, the generalization of a cause-effect relationship over different outcome measures is limited. The design compared the effects of two different methods of adult asthma self-management education. It does not answer the impact of the education intervention on participant behavior, the level of skill of PEF meter use with self-management, or participant compliance with asthma medication regimens.

Chapter IV: Findings

In this chapter, sample profile and psychometric properties are reported. Results for research questions one through three, analysis of participant's current asthma care regimen prior to education, the evaluation of adult asthma self-management education intervention, and secondary findings are presented.

Sample Profile

Descriptive statistics were used to characterize the sample (see Table 1 & 2). Responses to the demographic questionnaire for the standardized group was 100% (N=44) and the same for the individually tailored group 100% (N=44).

Table 1 *Categorical Demographics of the Sample in Individually Tailored Asthma Self-Management and Standardized Self-Management Programs*

Demographic Variables	Standardized (n = 44) f(%)	Individually Tailored (n = 44) f(%)
Gender		
Male	11(25%)	9(20.5%)
Female	33(75%)	35(79.5%)
Marital Status		
Single	20(45.5%)	13(29.5%)
Married	22(50%)	29(65.9%)
Widowed	2(4.5%)	2(4.5%)
Range Household Income		
$0 to $19,000	8(18.2%)	2(4.5%)
$20 to $39,000	3(6.8%)	7(15.9%)
$40 to $59,000	7(15.9%)	7(15.9%)
$60 to $79,000	11(25%)	7(15.9%)
$80 to $99,000	15(34.1%)	17(38.6%)
> $99,000		3(6.8%)
Ethnicity		
American Indian	1(2.3%)	1(2.3%)
Black	1(2.3%)	2(4.5%)
Asian/Pacific/Islander	0(0%)	1(2.3%)
White	36(81.8%)	36(81.8%)
Other	4(9.1%)	3(6.8%)
Previous Asthma Education		
Yes	19(43.2%)	24(54.5%)
No	25(56.8%)	20(45.5%)

Table 2. *Continuous Demographics of the Sample in Individually Tailored Asthma Self-Management and Standardized Self-Management Programs*

Characteristics of subjects in between-group interventions

	Standardized (n = 44)		Individually- Tailored (n = 44)	
Demographic Variable	Mean	SD	Mean	SD
Age	42.60	17.24	47.23	12.79
Asthma Health Visits	2.23	3.61	2.79	5.84
Years Diagnosed with Asthma	24.27	17.19	18.76	13.53

The majority of participants in both groups was female, White ethnicity, and married. Income ranges varied with no significant difference between groups.

Psychometric Properties of Measures

According to Nathan et al. (2004), Asthma Control Test (ACT) internal consistency reliability was .84. As a screening tool, ACT has content validity with agreement between ACT and specialists' rating ranging from 71%-78% given cut points used (Nathan et al., 2004). According to Schatz and colleagues (2004), changes in mean ACT scores were compared to specialist ratings using analysis of variance (ANOVA). ACT scores showed good internal consistency (.85) among patients assessed by specialists as having no change in asthma control. ACT was responsive to changes in specialist ratings of asthma control and to clinically meaningful changes in forced expiratory volume in one second (FEV1). Research supports that ACT detects clinically meaningful changes in asthma control (Schatz et al., 2004).

The peak expiratory flow (PEF) meter has strong face validity as it only measures expiratory flow. Literature is inconsistent in regards to content validity of PEF meter readings, but in practice this instrument is useful. Review of the literature establishes a 90-95% interrater reliability of PEF meter readings (Enright et al., 1995; Jackson, 1995; Miles et al., 1995). National Asthma Education Prevention Program (NAEPP) guidelines recommend PEF meters being accurate within ten liters per minute of each reading (Jackson, 1995). An Omron PEF meter was selected and used for the current study because it met the required NAEPP guidelines.

Results

Table 3 presents the descriptive statistics of outcome variables, including asthma control test, limited activity days, episodes of asthma symptoms, rescue inhaler use, perceived asthma control, and PEF readings.

Table 3. *Descriptive Statistics of outcome variables for the standardized and Individually Tailored education programs in GLM Analysis*

Outcome Variables	Between-Groups		Within-Subjects			
	Standardized	Individually Tailored	Pre-test		Post-test	
	M Difference	M Difference	M	SD	M	SD
ACT Scores	.50	1.24	19.20	4.40	20.06	426
limited activity days at work, school, or home related to asthma	.16	.23	4.14	.96	4.34	.95
shortness of breath	.36	.25	3.29	1.22	3.60	1.29
asthma symptoms	.00	.14	4.18	1.22	4.25	1.22
frequency of rescue inhaler use, and	.02	.27	3.77	1.28	3.89	1.29
Perceived asthma control	.00	.32	3.80	.84	3.96	.81
PEF readings	10.90	8.69	374.80	101.34	383.09	1.04
					1.04	

Research question 1. What are the effects of educations in asthma control for adults with an individually tailored asthma self-management education program versus adults with a standardized asthma self-management education program as measured by scores on the Asthma Control Test? A General Linear Model (GLM) repeated measures procedure to assess between–group and within-subject effects on Asthma Control Test (ACT) scores for the standardized education group and the individually tailored education group was utilized. There was no significant mean difference in ACT scores between the standardized education group and the individually tailored group ($F = .85$, p

= .36) (Table 4). There was a significant difference in the ACT scores between pre- and post-test regardless of asthma teaching methods as indicated by multivariate tests of within subject effects (F = 4.43, p = .038) (Table 4).

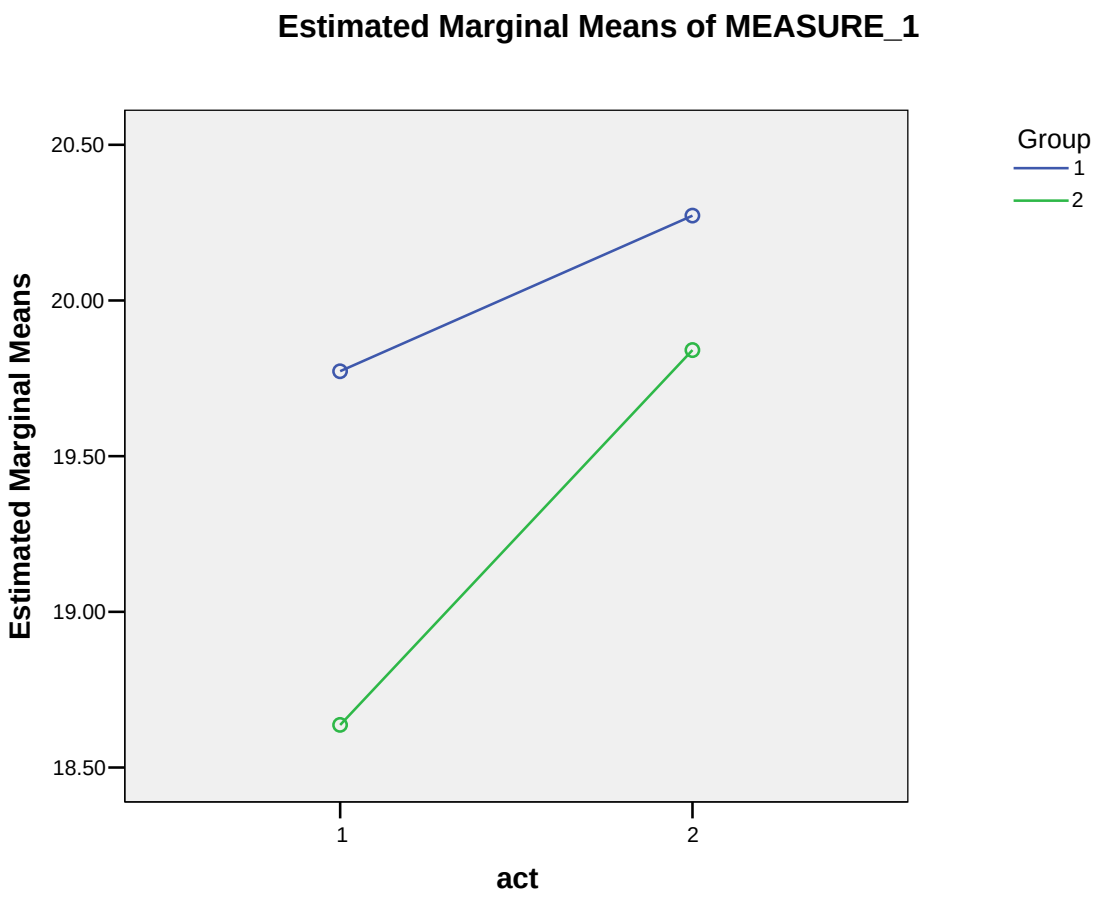
Table 4. *Outcome Variables for Standardized and Individually Tailored Education Programs in GLM Analysis*

	Between-Group Effects Standardized vs Individually Tailored			Within-Subject Effects Pre-test vs Post-test		
	F	df	P -value	F	df	P-value
ACT Scores	.85	1	.359	4.43	1	.038 *
limited activity days at work, school, or home related to asthma	.11	1	.740	3.55	1	.063
shortness of breath	.21	1	.645	6.22	1	.015 *
asthma symptoms	.23	1	.631	.233	1	.631
frequency of rescue inhaler use, and	1.6	1	.206	1.16	1	.204
Perceived asthma control	3.58	1	.062	3.58	1	.062
PEF readings	.03	1	.87	2.11	1	.15

**statistical significance was $\leq$ .05*

The individually tailored group scores increased more than the standardized group increased (Figure 2).

Figure 2



Group 1 = the standardized group, Group 2 = the individually tailored group, act1 = the act pretest, act2 = the act posttest.

Research question 2. What are the effects of asthma educations in asthma control for adults with an individually tailored asthma self-management education program versus adults with a standardized asthma self-management education program based on a) limited activity days at work, school, or at home, b) shortness of breath, c) asthma

symptoms (wheezing, coughing, shortness of breath, chest tightness, or pain) and interrupted sleep, d) frequency of use of rescue inhalers or nebulizer medication (such as albuterol), e) perceived asthma control, f) PEF readings, and g) number of hospitalizations, Emergency Department or Health Care Provider visits related to asthma symptoms? GLM repeated measures procedure to assess between-group and within-subject effects on variables, including limited activity days, shortness of breath, asthma symptoms, frequency of rescue inhaler use, and perceived asthma control, and PEF readings was utilized. No significant differences were found for limited activity days at work, school, or at home; shortness of breath; asthma symptoms and interrupted sleep; frequency of use of rescue inhalers or nebulizer medication; perceived asthma control; and PEF readings (Table 4). There was a statistically significant decrease in mean number of episodes of shortness of breath ($F = 6.22$, $p = .015$) regardless of teaching methods; decreased from 3.30 (SD = 1.22) for pre-test to 3.60 (SD 1.29) for post-test. It is important to note that an increase in scores of shortness of breath reflects a decrease in shortness of breath. The eta squared statistic for number of episodes of shortness of breath (.013) indicated a small effect size. The eta squared statistic for ACT (.038) indicated a small effect size.

Research question 3. Do selected demographic variables of age, gender, marital status, ethnicity, socioeconomic status, previous asthma education, the number of years diagnosed with asthma, and current asthma care regimen differ in asthma control for adults with an individually tailored asthma self-management education program versus adults with a standardized asthma self-management education program? The independent t-test was used to examine if the numerical demographic variables of

previous asthma education, age, number of years diagnosed with asthma, and number of asthma related health care visits differ in asthma control for the individually tailored education group and the standardized education group. There was a significant difference in mean scores for age of both groups. The mean age for the individually tailored education group was 47, and the standardized education group was 42. The average age was higher (M = 47.23, SD = 12.79) in the individually tailored education group compared to the standardized education group (M = 42.59). The groups were randomly assigned, so distribution of the population between the two education methods was equalized. Therefore, significance is not by chance. No significant difference in mean scores was found for previous asthma education, number of years diagnosed with asthma, and number of asthma related health care visits of both groups. Chi-Square was used to examine if categorical demographic variables of gender, marital status, socioeconomic status, and ethnicity differ in asthma control for the individually tailored education group and the standardized education group. There was no significant difference in gender, marital status, socioeconomic status, and ethnicity between groups one and two.

Current Asthma Care Regime. Participants were asked to describe previous asthma education received and who delivered it. For the standard education group, only 20 of the participants reported receiving previous asthma education. The majority of the participants, 16 total, reported receiving education from physicians. Three reported receiving education from their insurance company. Two participants were nurses and received education from their college curriculum. Two reported pamphlets as a source of education. Single reports of education sources were a nurse, school district, hospital,

American Lung Association, Asthma Coalition, and video. Of those reporting the type of content covered, two reported peak flow and inhaler use; one reported what to do based on peak flow; one reported receiving education on asthma and allergies; and one reported avoiding triggers for prevention, and treating symptoms.

Twenty four (55%) of the individually tailored group had received previous education. Of the 44, the majority, 16, reported receiving education from physicians. This included primary care physicians, pulmonary specialists, an allergist, and a pediatrician. Five participants worked in the health care field and received education from their college curriculum. Three were educated by nurses, one, a nurse practitioner, one, in a doctor's office, and one was a spouse of the participant. Other reported sources of education were the American Lung Association, Asthma Camp for children, "Huff and Puff" program for children, the school district updates for working with children with asthma, and literature. Some participants reported more than one source for receiving education. Of those reporting the type of content covered in the education, two reported receiving information regarding triggers and how to control asthma; two received an overview of asthma and how allergies impact; one, their asthma treatment; and one received education on not smoking, taking medications, and the importance of taking care of oneself.

In response to current asthma care regimen, the majority of participants listed medications prescribed. Some participants reported allergy shots, nebulizers when needed, and prevention methods such as avoiding triggers as part of their care regimen. It is important to report that medications prescribed were within national guidelines, but the way participants utilized medications did not always comply with national guidelines.

During education sessions, some individuals reported using their long acting bronchodilators as needed rather than on a regular basis to optimize asthma control. The individually tailored group reported additional modalities in their asthma care regimen, which included use of peak flow, getting necessary vaccines, proper use of medications, rest, exercise, and regular doctor visits.

Evaluation of Education Intervention. Participants were asked what barriers they encountered in managing their asthma. In the standardized group, nine participants reported encountering no barriers to managing asthma, six, avoiding triggers as a barrier, and, two, sports and exercise as a barrier. Single participants reported getting diagnosed, differentiating between allergy and asthma signs and symptoms, allergies, when to take medications, losing inhaler, insurance denying medications, doctors, acute attacks, lack of information, care when symptoms aren't classic, doctors changing medications, knowing when to go to the doctor, hospitalizations, and convenience as barriers to asthma management. For the individually tailored group, six reported reactions to medications and knowing medication to be a barrier in managing asthma, three, no barriers, two, the inability to avoid triggers, two, smoking, and two, lack of motivation to exercise. Single reported barriers were knowing when to call the physician, public lack of knowledge, physician education, going to the doctor with difficulty breathing and finding your lungs are clear, knowledge, not following up with physician, using a C-PAP machine.

When asked what was most helpful from the asthma self-management education session, 11 in the standardized group reported how to take medication, seven peak flow meters, five general knowledge and knowing and controlling triggers, and two, application discussion. Single reports consisted of review, levels of asthma, symptoms

and treatment, don't outgrow asthma, and go to the doctor to get re-evaluated. From the individually tailored group, 10 participants reported, medication updates, four, air chambers, three, talking with others about asthma, three, knowledge, two, triggers, and treatment plans. Prevention, epidemic of asthma, cleaning bedding, being more aware of symptoms, the power point and lecture were all reported one time as being most helpful.

In identifying the least helpful about asthma self-management education, 15 participants in the standardized group reported nothing as being least helpful, three participants, review of medicines was the least helpful, two redundancy of things they knew already, and one, length of the program. In the individually tailored group, 15 participants reported nothing was least helpful. Single participants reported information on severe asthma, peak flow, medications, and sharing with others as being least helpful.

Subjects were asked suggestions for improving the education program. Fifteen standardized participants reported there was nothing to improve. Single participants reported subject participation, new studies, rules of two, more about drugs and reactions, keeping inhaler with you at all times, allowing for questions and answers, and allowing family members to attend would be helpful. Twelve individualized participants reported there was nothing to improve. Single participants reported presenting information on films and inhalation technique would be helpful.

Overall, both educations groups had a significant improvement in Act score on post-tests with the individually tailored group showing more of an increase. Both groups showed a significant improvement with PEF, number of asthma related health care visits, and shortness of breath on post-test. Males improved significantly compared to females

on the post-test PEF. Primary sources of previous education were physicians. Current asthma care regimens followed national guidelines.

CHAPTER V: Conclusion and Recommendations

In this chapter, the summary of the problem and purpose are presented, along with discussing results for the research questions. The implications for theory, nursing science and nursing practice, and implications for future studies are presented. In closing conclusions drawn from this research are outlined.

Summary of the Problem

Asthma impacts more people and has a greater incidence and prevalence than diabetes, heart disease, stroke, or cancer. Because of a lack of effective management asthma is one of the most prevalent chronic diseases and can be life-threatening despite the existence of effective treatment (CDC, 2003a; McAllister, 2004). Prevalence of asthma continues to rise in epidemic proportions in every region of the country. Asthma crosses all demographic groups, and is not age, race, or sex specific (Pew Environmental Health Commission, 2005). Asthma is a costly disease. In 1990, costs related to asthma care were estimated at $6.2 billion. The Pew Environmental Health Commission (2005) stated that current asthma care was $11 billion annually. While many studies focus on children, there are a rising number of adults with asthma who do not outgrow childhood asthma. This investigation responded to the growing need to be responsive to health care needs of adults with asthma.

Current evidence does not indicate the length or content of education interventions to support asthma self-management. There is a paucity of evidence to substantiate the amount of time, the setting, and the necessary content to be included in asthma self-management education to optimize asthma outcomes. There is a need to

determine conditions necessary for individuals to maintain self-management across time and context. Much of the current evidence regarding asthma self-management education is focused on the child population. This study focused on adults and sought to gain insights into adult asthma education. There is a lack of theory-based evidenced regarding asthma education specifically in relation to adult populations. Incorporating theory is essential to supporting, guiding, and validating future research. This investigation incorporated an andragogical framework. The need to further evaluate asthma self-management education programs is identified in the literature. This investigation responded to this need and examined asthma self-management education.

Summary of the Purpose

The purpose of this study was to examine and compare the effects of two asthma self-management programs on adult asthma control, the individually tailored asthma self-management education program and the standardized self-management education program. Both education methods are based on National Asthma Education Prevention Program (NAEPP) Guidelines. One method is standardized and can be delivered to larger groups. The other is an individually tailored method using an andragogical framework which can be delivered to individuals or small groups. Andragogy is the art and science of helping adults learn (Knowles, 1980) and establishes applicable generalizations for adult learners (Baumgartner, Birden, & Flowers, 2003; Merriam, 2001; St. Clair, 2002; Smith, 2002). The outcomes of asthma control that were measured over a 4-week period included: limited activity days, shortness of breath, interrupted sleep due to asthma symptoms, use of rescue inhaler, peak expiratory flow (PEF) readings, health care visits, and perception of asthma control. These outcomes are

evidenced-based and indicative of asthma control based on the pathogenesis of asthma (American Lung Association & GlaxoSmithKline, 2005; NHLBI, 1992, 1997, 2002).

Discussion of Results

Research question 1. The difference in asthma control as measured by Asthma Control Test (ACT) showed a significant difference in ACT scores between pre- and post-test, regardless of asthma teaching methods ($F = 4.43$, $p = .038$). Although the individually tailored group scores increased more than the standardized group increased, there was no significant difference between methods. In the review of evidence-based studies, a variety of instruments are used to measure outcomes, and outcomes varied as well (see Appendix B). Only one evidence based study reported a significant improvement in asthma control. In the Legoretta et al. (2000) study, a significant improvement in asthma control (+10.9%) was reported using the Health Survey for Asthma Patients.

Research question 2. The difference in asthma control based on a) limited activity days at work, school, or at home, b) shortness of breath, c) asthma symptoms (wheezing, coughing, shortness of breath, chest tightness, or pain) and interrupted sleep, d) frequency of use of rescue inhalers or nebulizer medication (such as albuterol), e) PEF readings, f) number of hospitalizations, Emergency Department or Health Care Provider visits related to asthma symptoms, and g) perceived asthma control showed no significant difference except for shortness of breath (Table 4). There was a statistically significant decrease in mean number of episodes of shortness of breath ($F = 6.22$, $p = .015$) regardless of teaching methods; decreased from 3.30 (SD = 1.22) for pre-test to 3.60 (SD 1.29) for post-test. According to the National Heart Lung and Blood Institute (NHLBI)

(1997), key indicators of asthma are cough (worsening at night), recurrent wheeze, recurrent difficulty in breathing, and chest tightness. In susceptible individuals, inflammation causes episodes of wheezing, shortness of breath, chest tightness, and cough particularly at night and early morning (NHLBI, 1997; Schaffer, 1991). The symptoms utilized in the model to measure asthma control are based on review of the literature. These symptoms include limited activity, shortness of breath, interrupted sleep, increased use of rescue inhaler, decreased PEF readings, and number of health care visits related to asthma symptoms.

The goals of asthma therapy are to maintain normal activity levels and prevent symptoms of coughing and shortness of breath during the night and early morning (NHLBI, 1997). Inflammation of the airway due to factors that trigger asthma can cause shortness of breath (NHLBI, 1992, 2002). Shortness of breath is one of the key asthma symptoms used in the classification of asthma severity (NHLBI, 1992, 2002). Only one evidence-based study reported a significant improvement regarding breathing. The Barbanel et al. (2003) study measured breathlessness as part of an asthma symptom scale in which each symptom was given equal weighting. There was a significant improvement ($p < 0.001$) in the asthma symptom scale with the asthma education intervention group (Barbanel et al., 2003).

The current study found no significant improvement in the number of health care visits related to asthma. This finding is consistent with the Gibson et al. (2001) review which found that education alone does not significantly decrease use of health services. The Premaratne et al. (1999) study also reported no decrease in use of hospital health care services. One evidenced base study by Cote et al. (2001) reported a significant decrease

in the number of unscheduled medical visits for a structured education group over a limited education group. This, however, is consistent with the Powell and Gibson (2003) review that a written plan and self-monitoring are both effective for asthma self-management, but limiting the intensity of the education in regards to content and length decreases the effect. The Gibson et al. (2003) review reported written action plans and self-monitoring combined with regular medical review decrease absenteeism from work, use of health services, and nocturnal symptoms. The current study found no significant decrease in interrupted sleep due to asthma symptoms.

Research question 3. The difference in demographic variables in asthma control for both groups showed a significant difference in age between groups (Group 1 M = 42.5, Group 2 M = 47.2). Mean age for the standardized group (Group 1) was 42.5 and the individually tailored group (Group 2) was 47.2. Participants' age ranged from 18 to 76. The mean age for both groups was consistent with current studies. In studies reviewed, none reported a significant difference in age between groups although it is uncertain whether this analysis was done (Barbanel et al., 2003; Berg et al., 1997; Caplin & Creer, 2001; Cote et al., 2001; Courturard et al., 2002; Klein et al., 2001; Legoretta et al.; 2000, Lindberg et al.; 2002, Mayo et al., 1990; Morice & Wrench, 2001; Osman et al., 2002; Thoonen et al., 2003). It is important to note that participant age ranges varied amongst the studies. In the Thoonen et al. (2003) study, mean age was 39. In the Osman et al. (2002) study, the mean age was 29; however, ages ranged from 14-60. In the Legoretta et al. (2000) study, mean age was 36.7 with a standard deviation of 18.9; however, ages ranged from 5-65. In the Cote et al. (2001) study, mean age was 34. In the Berg et al. (1997) study, mean age was 50. In the Couturard et al. (2002) study, mean

age was 38. In the Caplin & Creer (2001) study, mean age was 51. In the Klein et al. (2001) study, mean age was 44; however, ages ranged from 18-65. In the Lindberg et al. (2002) study, mean age was 54; however, ages ranged from 7-93. In the Barbanel (2003) study, mean age was 46; however, ages ranged from 18-65. In the Morice and Wrench (2001) study, mean age was 36.1; however, ages ranged from 16-72. In the Mayo et al. (1990) study, mean age was 42.6.

Demographic Questionnaire Responses. Of the 88 participants, 68 were female (77%). The Standardized (Group one) had 33 females (75%), and the Individually Tailored (Group two) had 35 females (79.5%). This is consistent with current studies. In the Thoonen et al. (2003) study, of 193 participants, 65% were female. In the Legoretta et al. (2000) study, of 1,679 participants, 64.7% were female. In the Berg et al. (1997) study, of 55 participants, 66% were female. In the Couturaud et al. (2002) study, of 72 participants, 68% were female. In the Janson et al. (2001) study, of 12 participants, 58% were female. In the Perneger et al. (2002) study, of 131 participants, 60.5% were female. In the Caplin and Creer (2001) study, of 76 participants, 62% were female. In the Klein et al. (2001) study, of 245 participants, 55% were female. In the Barbanel et al. (2001) study, of 25 participants, 54% were female. In the Bailey et al. (1999) study, of 236 participants, 54% were female. In the Morice and Wrench (2001) study, of 80 participants, 66% were female. In the Mayo et al. (1990) study, of 104 participants, 61% were female. Cote et al. (2001) was the only study reviewed with the majority of 126 participants being male (52%).

In the current study, the majority of the participants were White ethnicity (81.8% for the standardized group and 83.7% for the individually tailored group). This is

reflective of the population and is consistent with current literature. In the Bailey et al. (1999) study, the majority of participants were Caucasian which was reflective of adult patients treated at the University of Alabama in Birmingham Pulmonary Medicine Clinic. In the Berg et al. (1997) study, the majority of participants were Caucasian.

In this investigation, the primary reported source of previous education was physician. Nurses were the second most reported source of education. Other reported sources in order of frequency were self, hospitals, insurance companies, American Lung Association, asthma programs for children, school district updates for working with children with asthma, and literature. The type of previous education varied and was not entirely indicative of national guidelines. Also, individuals may be relying on education geared toward children rather than adults. Fifty percent of the total participants reported not receiving education which identifies an area of need. Only one study inquired about previous asthma education. In the Perneger et al. (2002) study, 29% of 131 participants received previous asthma education. In the Thoonen et al. (2003) study, participants were asked if they had a need for information both pre and post-test. There was a significant decrease ($p = .001$) in the number of participants needing information after the education intervention (Thoonen et al., 2003).

Implications for Theory

Based on this investigation, both the standardized and individually tailored education programs were effective in improving asthma control as measured by the ACT. This finding implies that both types of asthma education are effective in improving asthma control. Both the standardized and individually tailored education programs were effective in decreasing the number of times participants experienced shortness of breath.

The individually tailored education group experienced more of a decrease in shortness of breath over the standardized group. This finding suggests that although both types of education are effective in decreasing asthma symptoms of shortness of breath the finding that the individually tailored group experienced a greater decrease in shortness of breath lends support to the use of an andragogical framework for adult asthma education.

While the need for asthma self-management education is established within the literature, there is a paucity of evidence regarding the type of asthma education intervention that is most effective. Andragogy, which is the framework for the individually tailored program, addresses the adult learner's individuality and experience in its assumptions. The individually tailored program supports the individuality of the learner and values their lived experience. Through self-direction it allows the learner to learn within her/his own tradition. According to the NHLBI (1992, 1997, 2002), the standardized program and curriculum support asthma self-management. The current investigation contributes to the body of evidence supporting both types of education as effective means of improving asthma control.

With regard to the adult education literature, Rachal (1994) reviewed 18 studies comparing andragogy (adult learning theory) and pedagogy (learning theory more specific to children). While achievement and satisfaction were the most commonly examined variables no significant differences were identified between methods (Rachal, 1994). This suggests that in determining different adult asthma self-management education models, the curricular framework may not matter. This is consistent with the current investigation and lends support to the thought that curricular framework may not matter. It should be noted that few experimental studies have been done related to adult

education. Most of the research in the review was anecdotal or expository accounts of andragogy's effectiveness, so the review was not conclusive (Rachal, 1994). Although not conclusive, the current study contributes to the quantitative body of scientific evidence supporting use of an andragogical framework in adult education.

Participants in the individually tailored group were able to share their lived experience and establish learning goals in regards to asthma self-management. Participants in the individually tailored education group were more engaged in the education session through sharing and asking questions than the standardized group. The individually tailored group participants were more motivated to participate in the learning process than the standardized group. Study participants were able to apply knowledge from education sessions directly to self-managing their asthma. The fact that the individually tailored group had less episodes of shortness of breath from pretest to posttest than the standardized group although not statistically significant may indicate enhanced learning within the group.

Implications for Nursing Science and Practice

Participants with previous asthma education reported a variety of content not always entirely indicative of national guidelines in describing their previous asthma education. The implication for nurses is to determine ways to more effectively implement national asthma education guidelines. The finding that 50% of participants in this investigation received no previous education suggests that nurses must take an active role in assessing educational needs of adults with asthma and then providing asthma education following national education guidelines. This study was responsive to the education needs of adult participants with 100% of participants in both education groups

reporting the asthma education was helpful. The majority of subjects in this investigation reported that their physicians were the primary source of asthma education. This identifies a significant implication for nurses to become actively involved in adult asthma education. Nurses need to collaborate with physicians to determine ways to meet educational needs of adults with asthma. Hospitals and physician offices were the primary reported arenas for education. Education is usually done one-on-one or in small groups in the physician offices and hospitals. This investigation found that both larger and smaller groups of adults could receive asthma education using the national guidelines. In a cost conscious health care arena, the implication for nurses is that they may effectively teach both small and larger groups of adult asthma patients. This makes both education methods practical with regard to cost. The implication for nurses is to determine avenues for delivering education, for example, in churches, colleges, work place where groups of adults with asthma could receive asthma education in a cost effective way. Current practice arenas identified as a source of asthma education were the lung association, insurance companies, and schools. These are areas of current practice for nurses which would make for easy access for asthma education implementation.

Recommendations for Future Research

Further research needs to be done to establish the amount of time, the setting, and if the national asthma educational guidelines are being implemented in education programs to optimize outcomes for adults with asthma. This study took place over a four week period. Factors that support or facilitate long-term maintenance of asthma self-management and asthma control need to be determined. Abdulwadud et al. (1999)

recommend self-management education to include behavioral change theory. There are few longitudinal studies to determine long term effectiveness and needs. Caplin and Creer (2001) suggest further research to determine coping and conditions necessary for patients to maintain self-management across time and context. Review of the literature identifies a need for further biological studies to be done given the preliminary studies and small sample sizes (Janson et al., 2001, 2003). There is a paucity of qualitative studies to establish patient perspectives and experience, thus, there is a need to conduct studies that determine the experiences of adults with asthma and their ability to manage their care. According to the CDC (2003), there is disparity among populations researched in regards to asthma self-management. More studies need to be done on lower socioeconomic groups and minorities (CDC, 2003). Effective recruitment measures for lower socioeconomic groups and minorities needs to be determined. Incentives for participation and recruitment through local churches could be possible means utilized. In a cost conscious health care system with multiple demands for health care dollars, studies that measure the cost effectiveness of asthma education programs are important. Surprisingly, there is a lack of asthma education theory based research. Incorporating theory is essential to supporting, guiding, and validating future educational research.

Conclusion

Evidenced based practice related to asthma is not being applied (CDC, 2003). Future challenges lie in facilitating evidenced based practice. According to the Center for Disease Control (CDC) (2003), while asthma related hospitalizations and death rates are leveling off, asthma health, quality of life, and the economy remains impacted. The state

of the science supports the use of asthma self-management as an effective approach to managing asthma morbidity and mortality.

Education is essential to supporting asthma self-management. While state of the science does not establish what type of education intervention is most effective, researched-based guidelines are available to support content planning. Education literature offers insight as to setting, timing, and teaching strategies to promote learning and facilitate outcomes for adults with asthma. Andragogy is well established in adult education literature as a framework for educational planning. The current study supports a standardized education program and an individually tailored program as being effective in improving asthma control and decreasing episodes of shortness of breath. This study contributes to the quantitative body of evidence supporting an andragogical framework for adult asthma education. Because physicians were the primary source of asthma education for participants and a large number of participants had no asthma education, this investigation supports a growing need for nurses to become involved in adult asthma education. Because nurses have a primary role in asthma education, it is critical for nurses along with health care professionals to look for avenues to implement recommended national education guidelines in an effort to decrease asthma morbidity and mortality. Nurses must be responsive to the growing need to address asthma self-management in the adult population.

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Appendix A

The ABCs of Asthma

1. Take Charge of Your Asthma

2. The Asthma Management Plan
   - Know and avoid triggers
   - Understand purpose of medication
   - Use inhalers correctly
   - Monitor lung function
   - Record it and report it

3. Everyone's Asthma is Different

4. Asthma Is Always With You

5. Normal Breathing

6. Narrowing/Inflamed Airway

7. Peak Flow Meters

8. What Causes Asthma?

9. Asthma Prevalence by Age, 1980-2001

10. Asthma's Impact on the U.S. Population—In 2002, asthma accounted for:
    - 4,261 deaths
    - 484,000 hospitalizations
    - 1.9 million emergency department visits
    - 13.9 million outpatient visits

11. Costs of Asthma
    - Total Costs: $10,748,300,000
    - Direct Medical Expenditures: $6,107,600,000
    - Indirect Costs: $4,640,600,000

12. Asthma Death Rates

13. Ages 1 to 44

14. Asthma Death Rates

15. Ages 45 to 85+

16. Asthma Is Not
    - Bronchitis
    - Emphysema

17. Asthma Myths
    - It's all in your head.
    - You'll outgrow it.
    - You shouldn't exercise.

18. Asthma Cannot be Cured—But Asthma Can Be Controlled

19. Warning Signs of an Asthma Episode
    - Drop in peak flow reading
    - Constant cough, especially at night
    - Difficulty breathing
    - Tight chest

20. Warning Signs of an Asthma Episode
    - Breathing faster than normal
    - Getting out of breath easily
    - Tiredness
    - Restlessness

21. Classification of Asthma
    - Mild intermittent
    - Mild persistent
    - Moderate persistent
    - Severe persistent

22. Mild Intermittent Asthma
    - Symptoms ≤2 times a week
    - Nighttime symptoms ≤2 times a month
    - Good school/work attendance
    - Peak flow score ≥80% of personal best score
    - Peak flow scores vary <20%

23. Mild Persistent Asthma
    - Symptoms >2 times a week, but not daily
    - Nighttime symptoms >2 times a month
    - Good school/work attendance
    - Peak flow score is ≥80% of personal best score
    - Peak flow scores vary 20 to 30%

24. Moderate Persistent Asthma
    - Daily Symptoms
    - Nighttime symptoms >1 time a week
    - School/work attendance affected
    - Peak flow score is 60 to 80% of personal best score
    - Peak flow scores vary 30%

25. Severe Persistent Asthma
    - Continuous symptoms
    - Frequent nighttime symptoms
    - Restricted physical activity
    - Poor school/work attendance
    - Peak flow score <60% of personal best score
    - Peak flow scores vary >30%

26. Is Your Asthma
    - Mild intermittent?
    - Mild persistent?
    - Moderate persistent?
    - Severe persistent?

27. Your Asthma Checkup
    - Signs and symptoms
    - Peak flow scores
    - Quality of life
    - Asthma episodes
    - Required emergency care
    - Medications and side effects
    - Inhaler technique
    - Your asthma management plan

28. Asthma Triggers
    - Viral respiratory infections
    - Rhinitis and sinusitis
    - Inhaled allergens
    - Tobacco smoke
    - Pollutants and fumes
    - Workplace exposures
    - Weather
    - Expressing strong emotions
    - Exercise
    - Foods
    - Sulfites
    - Medications

- Gastroesophageal reflux

29. Controlling Your Asthma Triggers
    - Viral respiratory infections and colds
    - Rhinitis and sinusitis
    - Pollens
    - Indoor and outdoor molds
    - Dust mites

30. Controlling Your Asthma Triggers: Dust Mites
    - Encase mattress and box spring in allergy-proof covers
    - Encase pillow or wash weekly
    - Avoid lying on upholstered furniture
    - Wash bedcovers and stuffed toys weekly in very hot water

31. Controlling Your Asthma Triggers
    - Animal allergens

32. Controlling Your Asthma Triggers: Animal Allergens
    - Find another home for pet
    - Keep pet out of bedroom at all times
    - Avoid visiting places where pets live or take medication before visiting
    - Use power vacuum with special filter

33. Controlling Your Asthma Triggers
    - Cockroach allergens
    - Thank You for Not Smoking
    - Strong odors and sprays
    - Outdoor air pollutants and irritants
    - Weather

34. Controlling Your Asthma Triggers**:** Exercise
    - Create plan that permits exercise
    - Take asthma medication before exercising
    - Warm up/cool down

35. Take Charge of Your Asthma

Getting the Most From Your Medications

1. Take Charge of Your Asthma

2. The Asthma Management Plan
    - Know and avoid triggers
    - Understand purpose of medication

- Use medications correctly
- Monitor lung function
- Record it and report it

3. Everyone's Asthma is Different

4. The ABCs of Asthma

5. Narrowing/Inflamed Airway

6. Asthma Triggers
   - Know them
   - Avoid them

7. Getting the Most From Your Asthma Medications
   - Goals of asthma treatment
   - Four levels of asthma severity and treatment
   - Medication descriptions
   - Setting up an asthma management plan

8. Inhaled Medication Types

9. Medications are Prescribed with Your Asthma in Mind

10. Asthma Treatment Goals
    - No chronic symptoms
    - Normal or near normal lung function
    - Normal activity levels including exercise and sports
    - No acute episodes or hospitalizations
    - No or few medication side effects
    - Confidence and satisfaction with care

11. Four Levels of Asthma Care
    - Two approaches to gaining control of asthma: Start with high-dose therapy and step down, or gradually step up therapy

12. Step 1: Mild Intermittent Asthma

13. Quick Relief Medicines: Use
    - As needed, but not daily
    - For fast relief of episode
    - Some can prevent exercise-triggered episodes

14. Quick Relief Medicines: What to Expect
    - Act in 5 to 15 minutes

15. Quick Relief Medicine: Side Effects
    - Rapid heart beat
    - Tremors
    - Anxiety
    - Nausea

16. Four Levels of Asthma Care
    - Two approaches to gaining control of asthma:
    - 1—Start with high-dose therapy and step down, or
    - 2—Gradually step up therapy

17. Step 2: Mild Persistent Asthma

18. Long-Term Control Medicines
    - Corticosteroids
    - Cromolyn sodium, nedocromil
    - Leukotriene modifiers
    - Long-acting beta agonists
    - Sustained-release theophylline
    - Combination therapy
    - Inhaled corticosteroids

19. Inhaled Corticosteroids: Use
    - May need spacer/holding chamber
    - Rinse and spit

20. Inhaled Corticosteroids: What to Expect
    - No rapid relief
    - Reduce and prevent airway inflammation

21. Inhaled Corticosteroids: Side Effects
    - Oral yeast infection
    - Cough
    - Growth and bone mass effects—rare

22. Cromolyn Sodium or Nedocromil

23. Cromolyn Sodium or Nedocromil: Use
    - As a daily preventive medication
    - Take quick relief medicine first

24. Cromolyn Sodium or Nedocromil: Side Effects
    - Rare
    - Mild headaches

- Nausea
- Dry Cough

25. Leukotriene Modifiers

26. Leukotriene Modifiers: Use
    - Dosage varies
    - During symptom-free periods
    - No quick relief

27. Four Levels of Asthma Care
    - Two approaches to gaining control of asthma:
    - 1—Start with high-dose therapy and step down, or
    - 2—Gradually step up therapy

28. Step 3: Moderate Persistent Asthma

29. Long-Acting Beta$_2$-Agonists: Use
    - Last 12 to 18 hours
    - Nocturnal asthma
    - Work in 20 to 30 minutes
    - No quick relief

30. Long-Acting Beta$_2$-Agonists: Side Effects
    - Rapid heartbeat
    - Tremors
    - Anxiety
    - Nausea

31. Theophyllines
    - Theo-24Theo-Dur
    - Theolair SR
    - Uni-Dur
    - Uniphyl

32. Some Theophyllines are Time-Released

33. Theophyllines: Use
    - Long-term control—tablet or capsule
    - Swallow whole
    - Take with food
    - Quick relief—syrup or liquid

34. Theophyllines: Side Effects
    - Nausea

- Stomach pain
- Anxiety
- Headaches
- Altered by other medications and by viral infections

35. Combined Therapy

36. 4 Levels of Asthma Care
    - Two approaches to gaining control of asthma:
    - 1—Start with high-dose therapy and step down, or
    - 2—Gradually step up therapy

37. Level 4: Severe Persistent Asthma

38. Oral Corticosteroids: Use
    - For severe persistent asthma
    - More powerful
    - Limited dosing period for severe episodes

39. Oral Corticosteroids: Side Effects
    - Weight gain
    - Changes in mood
    - High blood pressure
    - Brittle bones
    - Cataracts
    - Reduced growth rate

40. Anti-IgE Therapy
    - New treatment
    - Moderate or severe allergic asthma
    - Stops allergic response
    - Requires injections

41. 4 Levels of Asthma Care
    - Two approaches to gaining control of asthma:
    - 1—Start with high-dose therapy and step down, or
    - 2—Gradually step up therapy

42. Which Asthma Management Plan is Right for You?
    - Age
    - Severity and pattern of asthma
    - Daily routine
    - Ability to buy medicine

43. Asthma Management Plan

- Name and strength of medication
- Purpose
- Dosage
- Frequency

44. Asthma Management Plan
    - Expected results
    - When to change
    - Missed dosage
    - Guidelines for children
    - Safety information

45. You Are the Key to Controlling Your Asthma

46. Successful Asthma Management

47. Take Charge of Your Asthma

The Tools of Asthma Management

1. Take Charge of Your Asthma

2. The Asthma Management Plan
    - Know and avoid triggers
    - Understand purpose of medication
    - Use inhalers correctly
    - Monitor lung function daily
    - Record it and report it

3. Everyone's Asthma is Different

4. Previous Series
    - The ABCs of Asthma
    - Getting the Most From Your Medications

5. Asthma Management Tools
    - Inhalers
    - Spacers/holding chambers
    - Nebulizers
    - Peak Flow meters
    - Asthma diaries

6. Inhalers: Four Types

7. Press-and-Breathe Inhalers: <u>Quick Relievers</u>

8. Press-and-Breathe Inhalers: Long-Term Control

9. Correct Press-and-Breathe Inhaler Technique

10. Correct Technique: Open Mouth

11. Correct Technique: Closed Mouth

12. Correct Press-and-Breathe Inhaler Technique

13. Press-and-Breathe Inhalers: Common Mistakes Inhaler Canister Pressed
    - Before breathing in
    - After breathing in
    - Breathing in stops too soon
    - Breathing in through the nose

14. Incorrect Use: Common Signs
    - Spray hits back of throat
    - Extra puffs
    - Frequent refills of asthma reliever (more than one per month)

15. Incorrect Use Makes asthma treatment less effective

16. Press-and-Breathe Inhalers: Overcoming Problems
    - Training with health care professional
    - Use a spacer
    - Use a breath-actuated metered-dose inhaler

17. Spacers

18. Press-and-Breathe Inhaler with Built-In Spacer
    - Allows time to inhale
    - Available only with long-term control medication

19. Breath-Actuated Metered-Dose Inhaler
    - Easy to use
    - No need for spacer
    - Available only with quick relief medication

20. Dry Powder Inhalers
    - Breath-actuated
    - Inhalation force needed
    - Some have built-in counter

21. Correct Inhaler Technique
    - Read and understand medication instructions
    - Demonstrate technique to your health care professional
    - Take time to use inhaler correctly
    - Consider using a spacer or breath-actuated metered-dose inhaler

22. Count. Don't float.

23. Nebulizers

24. Typical Nebulizer

25. Peak Flow Meters
    - Where to find
    - What to look for
    - Cost
    - Usage by children
    - Alert you to upcoming episode
    - Signal need to adjust medications
    - Help avoid over- and under-medicating

26. Emergency Situations
    - Peak flow score in red zone
    - Severe breathlessness
    - Severe chest tightness
    - Severe cough and wheezing
    - Unable to speak in full sentences
    - Peak flow stays in red zone after use of quick relief medications
    - Written emergency action plan

27. Your Asthma Management Plan
    - Identify and avoid triggers
    - Know your medications
    - Understand instructions
    - Use correct inhaler technique
    - Monitor lung function
    - Record it
    - Report it
    - Emergency action steps

28. Take Charge of Your Asthma
    (Asthma and Allergy Foundation of America Expert Panel)

Appendix B

Appraisal of "Best Available Evidence" for Adult Asthma Self-Management Studies

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Powell & Gibson (2003)	The purpose of the review was to evaluate asthma education programs that optimize asthma control through use of inhaled corticosteroids, used written self-management plans based on PEF self-monitoring vs. symptom self-monitoring, and compared different options for optimal self-management education delivery.	Participants were 16 years of age and older. All had asthma diagnosed by a physician or objective criteria.	This was a systematic review of all relevant RCTs (15 total). (I)	Two independent reviewers assessed study eligibility, quality, and intervention.	Disagreement was resolved by consensus. Original authors were contacted for confirmation as necessary.	Asthma self-management that allowed for medication adjustment using a written plan was as effective as adjustments done by a physician. PEF self-monitoring and symptom self-monitoring were both effective for asthma self-management. Limiting the intensity of the education decreases the effect.

*Level of evidence was rated according to Joanna Briggs Institute (2001) criteria.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Gibson et al. (2003)	The purpose of the review was to determine the effects of asthma self-management coupled with regular health practitioner review on health outcomes (p. 1).	The participants were 16 years of age and older. All were diagnosed with asthma by a physician or objective criteria.	This was a systematic review of all relevant RCTs (36 total). (I)	Two independent reviewers determined study eligibility, quality, and intervention type.	The Cochrane system was used to determine study quality. Disagreement was resolved by consensus. Weighted mean difference and standard mean deviation with 95% confidence were calculated for continuous outcomes. Relative risk with a 95% CI was calculated for dichotomous outcomes (p. 4).	Adult asthma self-management improves health outcomes. Written action plans, self-monitoring, and regular medical review decreased use of health care services, loss of work, and those bothered by nocturnal asthma (p. 10). Those interventions without written plans were less effective.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Gibson et al. (2001)	The purpose of the review was to determine the effects of adult asthma education (consisting of information only) on health outcomes.	Types of participants were 16 years of age or older. All had asthma diagnosed by a physician or objective criteria.	Systematic review of all relevant RCTs (12 total). (I) Treatment allocation was randomized in all studies. In all of the trials, education was delivered by a person (or group of people) other than their physician. Information may have consisted of asthma pathophysiology, triggers, or medication action and side effects.	Two independent reviewers for study inclusion. Two independent reviewers to determine educational content used. Two independent reviewers assessed – methodological quality of the trials based on Cochrane system.	Percentage of agreement between reviewers for inclusion of studies was 91.6% and 91% for education content. Disagreements were resolved by discussion. Weighted mean differences & 95% confidence intervals were used to analyze continuous variables: Odds ratio and 95% confidence interval were used for dichotomous variables.	"Information only" asthma education does not significantly decrease hospitalizations, doctor visits, or medication use. The education did decrease ER visits in high-risk adults.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Abdulwadud et al. (1999)	The authors hypothesized that knowledge score would increase after 6 months in the intervention group and remain the same in the control group.	125 adults with asthma as a primary diagnosis were recruited from an Australian hospital asthma and allergy clinic. Ages were 16 on up. 39%/41% of the intervention group/control group were males. All had moderate to severe asthma.	This was a RCT. Participants were randomly assigned to the intervention or control group. The intervention group received three 90-minute education sessions over 3 weeks. Questionnaires were completed at baseline and at 6 months for both groups. In addition, the intervention group completed the questionnaires after the intervention. (II)	4 Questionnaires: Asthma General Knowledge Questionnaire, Asthma Quality of Life Questionnaire, Hypothetical Asthma Attack Scenarios, and Asthma Attitudes & Beliefs Questionnaire were used.	Validity and reliability for questionnaires were not addressed. (AQOLQ validity and reliability is reported in other studies.) Attrition and sample size impact validity of the study.	Asthma knowledge improved significantly within the intervention group. The control group improved on knowledge, QOL, and self-management after 6 months. The difference in mean change in knowledge scores between groups at 6 months was not significant (p. 493).

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Bailey et al. (1999)	The purpose of the study was to replicate the efficacy evaluation of an existing asthma self-management program and to develop a less resource intensive program that is appropriate for nonacademic health care settings. (p. 2422).	236 were randomized for 2 years and 221 completed the 2 year follow-up. All had moderate to severe asthma, the majority were female and Caucasian (which was reflective of the area).	This was a RCT comparing 3 interventions: the replicated program, the condensed version, and usual care. Participants were randomly assigned to a group. Outcome measures were done at 6, 12, 18, and 24 months. (II)	Monthly Support Group Meetings Focus Groups Workbook Telephone calls	Sample size based on statistical power calculations. Attrition rate was 7%. Data was collected by staff not involved with the intervention.	All 3 groups had decreased respiratory illness and health care services. Functional status improved for all groups.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Barbanel et al. (2003)	The purpose was to determine the effectiveness of an asthma self-management program delivered by community pharmacists.	This was a London, inner city ethnically mixed population. The sample consisted of 25 adults identified by the community pharmacist, ages 18-65, using inhaled corticosteroids.	The study was a RCT. Participants were randomized into an intervention and a control group. (II)	North England Asthma Symptom Scale. The scale was designed for ambulatory care use and has been used in other studies. Internal reliability Cronbach's alpha .93.	Baseline scores were similar for both groups. Validated instrument. One participant moved away. Small sample size.	Improvement in intervention group's mean score was significant.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Janson et al. (2003)	The purpose was to determine the effects of an educational self-management intervention on adherence to inhaled corticosteroid therapy, airway inflammation markers, and clinical control.	65 adults with mild to moderate asthma ages 18 to 55 years.	Prospective randomized controlled trial. (II)	Electronic Peak Flow Meter, Medication Monitors, Diary, Saline Induced Sputum samples. Asthma-related quality of life questionnaire. 11-item Perceived Control of Asthma questionnaire. Open-ended question. (Investigators and participants were blinded to group assignment.)	Yes, based on previous studies. Yes, based on previous studies. Subjectively support validation of meter and monitor readings. Yes, based on previous studies. Yes, based on previous studies. High internal consistency (Cronbach's a=0.74) and construct validity. Valid	The educational self-management intervention significantly improved adherence with inhaled corticosteroids and perceived asthma control. Sputum eosinophils were significantly reduced. Indexes for asthma control were improved. Improvement in outcomes were independent of improvement in adherence.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Klein et al. (2001)	The purpose of the study was to determine the effects of adult self-treatment in addition to asthma self-management on pulmonary function, QOL, and asthma symptoms.	The sample was selected from a Pulmonary outpatient clinic database of a teaching hospital located in the Netherlands. There were 245 participants. Ages ranged from 18-65. There were 111 males and 134 females with well-controlled moderate to severe asthma. All used inhaled corticosteroids.	This was a prospective randomized controlled trial with 2 interventions: self-treatment/ self-management and self-management. Follow-up was done at 4, 8, 12, 18, & 24 months. (II)	Self-recorded diary of asthma symptoms, spirometry, general questionnaire, asthma quality of life questionnaire (AQLQ), medical charts review for outpatient consults and hospitalizations.	Single blinded. Validity and reliability not addressed except that AQLQ was used in other studies. Groups were comparable. In 1st year 6 patients were lost to follow-up & one died. 2nd year, 174 continued with follow-up. Dropouts were significantly younger than remaining group.	Both groups showed improvement in QOL ($p<0.001$). No significant differences were found between groups in any pulmonary function variables. Activity limitations and exposure to environmental stimuli showed significant improvement for both groups.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Osman et al. (2002)	The purpose of the study was to evaluate if an asthma self-management program received during hospitalization would decrease readmissions.	There were 280 participants. All were between ages 14 to 60 and hospitalized for acute asthma.	This was a RCT with group 1 receiving a 40-60 minute education intervention with a written plan and group 2 receiving standard care. (II)	Postal questionnaires sent after 4 weeks. Hospital records.	Groups were similar at baseline. A respiratory nurse delivered educational program. An independent Assessor blinded to patient assignment collected medical records data after 12 months.	An increase of oral and inhaled steroids at discharge and follow-up appointments noted. Having a previous admission was a significant covariate of readmission (p. 872). Group 1 had fewer symptoms than group 2 & was less likely to be admitted. Group 1 was more satisfied. Those having their 1st admission had a greater intervention effect.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Perneger et al. (2002).	The purpose of the study was to assess the effectiveness of an adult asthma education program.	There were 131 participants out of a possible 253 from the Geneva University Hospitals in Switzerland. All were adults and had asthma for more than 10 years and were hospitalized prior to enrollment. The majority were female.	This was a RCT. Subjects were randomly assigned to immediate education or a wait list group. (II)	Health survey and QOL questionnaire were used.	Both groups were similar. The education program was theory based and delivered by trained physicians. The instruments were validated French translations.	The 2 groups differed on 4 variables. The immediate education group was more likely to develop confidence in their treatment, to improve knowledge of correct inhaler technique, and improve knowledge of PEF readings. The control group improved more on AQOLQ.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Premaratne et al. (1999)	The purpose was to determine the effectiveness of an asthma education service in improving treatments and quality of life for asthmatic individuals.	Ages 15-50 years. 12,238 individuals were surveyed in 1993. 1,621 of those included had asthma. 10,783 individuals were surveyed in 1996. 1,616 of those included had asthma.	Community based randomized controlled trial. (II)	Two cross sectional surveys. One at baseline in 1993 and one resurvey in 1996. Asthma quality of life questionnaire.	Described elsewhere (unable to reference). Validated and known to be sensitive to change.	No difference in quality of life post intervention. No evidence that the education intervention impacted asthma care. No changes in the use of emergency department or inpatient services.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Thoonen et al. (2003)	The purpose of the study was to determine if asthma self-management was a safe strategy to use in general practice.	Nineteen general practices were randomly assigned to a self-management group or a usual care group. The practices were recruited from the city of Eindhoven and from an academic research network.	RCT with a 2-year follow-up. There were 4 individually tailored training visits of 30, 30 and two 10-minute sessions. (II)	A modified Borg Scale was used to measure dyspnea scores. AQLQ Amount of medication use and the # of GP diagnosed exacerbations were used to measure secondary outcomes.	Power calculation was used for trial size on AQLQ. A 20% dropout rate was calculated which was sufficient. Two outliers attributed to workplace irritant exposure were excluded from final calculations. Instrument validity and reliability established in other studies.	Asthma specific QOL for the self-management group showed significant difference in observed change of QOL compared to control group. The number of self-management participants needing more oral steroids was significantly higher than the control group.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design Level of Evidence	Instrument/ Data Collection	Validity and Reliability	Main Findings
Berg et al. (1997)	The purpose of the study was to evaluate the impact of a nurse administered adult asthma self-management program on inhaled medication compliance, asthma symptoms, and airway obstruction. There were 2 hypotheses: !) subjects in the education program would increase compliance with inhaled meds, decrease the frequency of asthma symptoms, increase the % of symptom free days, and decrease airway obstruction. 2) subjects receiving the education program would increase self-efficacy & increase self-management behaviors.	55 subjects age 18 or older from a rural community participated. Subjects were predominantly female, White, & married. All were relatively well educated.	This was a randomized controlled experimental study design with 2 groups: usual care and self-management intervention group. The treatment consisted of 6 weekly education sessions. The self-management education was scripted and delivered by RN's. (II)	Instruments consisted of Meter dose inhaler chronology, journal of daily asthma concerns, PEF used to evaluate airway obstruction, asthma self-management assessment tool (ASMAT), & self-efficacy for asthma management scale (SEAMS). Pre & post treatment assessment measures were done for 1 week.	Only 1 subject withdrew, but data was included in analysis. Power level was .80 & moderate effect size .5. No significant difference between groups at baseline. Skills for inhaler use were assessed & reinforced @ baseline. MDI chronology reliability was .95. PEF meter reliability was .98. SEAMS was.82 reliability. ASMAT was .78 reliability. Instrument validity was not addressed.	Subjects receiving self-management program increased compliance with inhaled meds. No significant difference between groups in regards to symptoms, PEF, self-efficacy, or self-management.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design Level of Evidence	Instrument/ Data Collection	Validity and Reliability	Main Findings
Couturaud et al. (2002)	The purpose of the study was to assess the effect of an educational program in asthma patients.	72 patients with moderate to severe asthma enrolled in a multicenter study. More women than men participated.	This was a one year randomized group trial using an education group and a traditional treatment group as a control. Education consisted of five individual sessions developed by four nurses. Education sessions were 30-60 minutes. There was a 12 month follow-up. (II)	PEF, FEV1, Diary Card to record symptom assessment, Asthma Quality of Life Questionnaire, Compliance Questionnaire, Asthma Knowledge Questionnaire, and Self-Management Ability Questionnaire were instrument used.	54 completed the study. There was a 2 week run-in period to ensure good asthma control. Sample size calculations were based on previous data on asthma morbidity with 80% statistical power. Validity and reliability of instruments were not addressed.	Both groups showed high % of symptom free days. Compliance and knowledge was significantly higher for the education group @ 1 year.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design Level of Evidence	Instrument/ Data Collection	Validity and Reliability	Main Findings
Cote et al. (2001)	The purpose of the study was to determine if the decrease in emergency visits as a result of asthma education is related to the use of action plan alone or other education components.	126 patients age 18 and older consulting for acute asthma exacerbation from two university hospitals in Sainte-Foy and in Quebec City participated.	Randomized control trial with one assigned control group (usual care) and two randomized groups: limited education (LE) and structured education (SE) (II)	PEF, (French) Knowledge Questionnaire, and Quality of Life (QOL) Questionnaire were instruments utilized.	98 patients completed the study. There was no difference between groups at baseline. Reliability and validity of instruments were not addressed.	The structured education group showed significant improvement in knowledge, willingness to adjust meds, QOL scores, & PEF. The # of unscheduled medical visits decreased for SE group. Structured education improved outcomes significantly more than the limited education or control group.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design Level of Evidence	Instrument/ Data Collection	Validity and Reliability	Main Findings
Mayo et al. (1990)	The purpose of the study was to determine the effect of an outpatient program on readmissions for asthma exacerbations among adults with asthma.	104 adults age 18 and older with a history of multiple hospitalizations for asthma attacks participated. A New York City Hospital Clinic was utilized.	This was a randomized patient selection with crossover design. There was a 32 month follow-up. Patients were randomly assigned to an intensive outpatient treatment clinic or routine outpatient care. 19 patients from routine care group crossed over to intensive treatment group. Education occurred between the patient and the health care provider. Initial visits were @ least 1 hour. The frequency of the visits were determined by the patient and the frequency of symptoms. Subsequent visits lasted ½ -1 hour.	Admission records were used to measure readmission rates and hospital days used. Patients used written log books of PEF values to monitor symptoms. (II)	All medical treatment was done by the same physician. The physician was excluded from decision regarding hospital admission of patients.	Compared to usual care group the intensive outpatient clinic group had a threefold decrease in readmissions and twofold decrease in number of hospital days used. A similar reduction was found in patients who crossed over to the intensive treatment group.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Morice & Wrench (2001)	The purpose was to determine if an asthma nurse education program intervention could increase knowledge, self-management, and influence the number of emergency visits and hospitalizations.	80 individuals ages 16-72 years. (53 women)	Randomized Controlled Trial (II)	Series of questionnaires based upon the British thoracic Society guidelines. Follow-up postal questionnaire. GP contacts.	Not referenced (Statistical analysis was expressed as the percentage of individual's responses. Fisher's exact test was utilized for group comparisons.) Response rate 74%	The education intervention increased knowledge and enabled individuals to self-manage. There was no difference in the number of Emergency visits, but a marked increase in hospital readmissions for the intervention group.
Janson et al. (2001)	The purpose was to determine if sputum analysis could document the effectiveness of a nurse education intervention and whether inflammation biological markers in sputum correlate with improved pulmonary function and	12 non-smoking individuals ages 23 to 51 years. (5 men) (7 women) 4 were ethnic minorities (2 African American and 2 Hispanic)	Prospective uncontrolled open trial (III.3)	Peak Flow, Spirometry Inducted sputum sample Diary	Yes, based on previous studies. Yes, based on previous studies. Can support validation of peak flow. (Subjective)	A marked decrease in symptoms and inflammation biological markers occurred post education intervention. Findings are not definitive.

	symptoms.					
Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Legorreta et al. (2000)	The purpose of the study was to determine the effectiveness of a small group education class and asthma control kit on functional status, knowledge of self-management, and compliance with recommended treatment.	The sample was recruited from an HMO population. 1,679 subjects agreed to participate, but only 1,043 responded to follow-up survey. Participants were moderate to severe asthmatics ranging in age from 5-65.	This was a prospective nonequivalent control group design. Group 1 consisted of 614 participants who received an Asthma Control Kit (educational materials) and a self-management education class. Group 2 consisted of 385 asthmatics who did not receive the kit. Both groups responded to baseline and follow-up assessment. (III.1)	Health Survey for Asthma Patients. This was a validated adult & child version survey used in other studies.	Low response rate. Lack of experimental controls. Propensity scores used to eliminate bias from nonequivalent control group as unadjusted comparisons of outcomes would not be valid.	Group 1 had significant improvement in steroid inhaler and peak flow meter use, knowledge of strategies to use for asthma attacks, and feeling of asthma control. Specialty care, hospitalization, and absenteeism due to asthma significantly declined for group 1.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Lindberg et al. (2002)	The purpose was to compare the effects of an asthma nurse practice (ANP) to medical self-management in regards to patient outcomes.	(One asthma nurse practice (ANP) compared to seven non-ANP health care centers.) For retrospective patient records, 20 asthma patients age 18 years or older from each center participated. ANP non-ANP N=20 n=132 (8 dropouts due to no medical documents confirming asthma diagnosis.) For prospective patient questionnaire, ANP ages 7 to 53 years, n=186. non-ANP ages 8 to 93 years, n=161.	Randomized retrospective and prospective (III.2)	Structured investigation form used to examine patient records (retrospective) Patient questionnaire.	One experienced asthma nurse examined all records validity based on form used in previous study for same purpose. Yes, based on previous studies (Questions taken from 2 validated patient questionnaires – 1 asthma specific and 1 generic instrument)	Response frequency for ANP center was 82% and 53% for non-ANP center. ANP asthma care delivery was more effective and less costly than the non-ANP (traditional) care. There were no significant differences in the quality of life between the ANP group and the non-ANP group.

Investigators	Purpose/Questions/ Hypothesis	Population/ Sample Characteristics	Design/Level of Evidence	Instrument/Data Collection	Validity and Reliability	Main Findings
Caplin & Creer (2001)	The purpose of the study was to analyze long-term experiences and outcomes of patients using asthma self-management skills (p. 344). A secondary aim was to develop a questionnaire that could be completed by subjects or a skilled interviewer.	Subjects were recruited from 76 adult asthmatics who had completed a self-management (SM) program. 53 agreed to participate. Mean age was 51 years. 62% were females.	This was a descriptive study in which participants were categorized into 2 groups (continuers and relapsers). (IV)	Patient records from original study. Structured phone interview. Survey.	Participant asthma was stabilized prior to self-management program in original study. The survey was based on review of relapse & self-management literature. Behavioral & medical asthma experts reviewed & developed the survey. Administration of the survey was done by someone not involved in the original study to avoid social desirability.	Both groups reported barriers to self-management occurring during environmental/or lifestyle changes, and negative emotional experiences. Continuers had significantly more program satisfaction and self-efficacy. Relapsers reported significantly more lapses related to treatment changes. Three reasons for not using SM were identified.

Appendix C

Healthy People 2010: Specific Asthma Objectives

- Reduce asthma deaths
- Reduce asthma hospitalizations
- Reduce asthma emergency department visits
- Reduce activity limitations related to asthma
- Reduce the number of asthma related school and work days missed
- Increase the number of persons receiving formal asthma patient education including community and self-help resource information for asthma management
- Increase the number of persons who receive appropriate asthma care according to NAEPP Guidelines
- Establish a surveillance system in at least 15 states for tracking asthma death, illness, disability, impact of occupational and environmental factors on asthma, access to medical care, and asthma management

(DHHS, 2001, p. 4)

Appendix D

Classification of Asthma Severity

Classification	**Symptoms**	**Nighttime Symptoms**	**Lung Function**
Mild Intermittent	• Symptoms <2 times a week • Asymptomatic and normal PEF between exacerbations • Exacerbations brief	<2 times a month	• FEV1 or PEF >80% predicted • PEF variability <20%
Mild Persistent	• Symptoms >2 times a week but <1 time a week • Exacerbations may affect activity	>2 times a month	• FEV1 or PEF >80% predicted • PEF variability 20-30%
Moderate Persistent	• Daily symptoms • Daily use of inhaled short-acting beta2-agonist • Exacerbations affect activity • Exacerbations >2 times a week; may last days	>1 time a week	• FEV1 or PEF >60% to <80% predicted • PEF variability >30%
Severe Persistent	• Continual symptoms • Limited physical activity • Frequent exacerbations	Severe	• FEV1 or PEF <60% predicted • PEF variability >30%

(NHLBI, 1997, p. 20)

Appendix E

Recruitment Flyer

Asthma Study

Who: You are invited to participate in a study to compare asthma control for adults with individually tailored asthma self-management education program versus adults with a standardized self-management education program. Participants must be age 18 or older and have a diagnosis of asthma with no other respiratory conditions aside from allergies and sinusitis. If you are interested in participating please write your name and telephone number below and return to Dr. David Wright.

Name: _____
Telephone Number: _____

By: Presented by Judy Shackelford doctoral student at University of Missouri-St. Louis and Assistant Professor at St. John's College, Department of Nursing Springfield, Illinois.

When: You will be contacted by phone regarding research participation, or you may call Judy Shackelford at (217) 544-6464 extension 45444 or (217) 498-9030. These free education sessions will be scheduled at participant's convenience.

Where: Education sessions will be held at St. John's College.

Appendix F

Demographic Questionnaire for Adult Asthma Self-Management Education Study

Please complete the questionnaire. This information is strictly confidential. Data is anonymous and will be used solely for the purpose of the described study.

Please circle one answer for questions 1-5:

1. What is your gender? Male Female
2. What is your marital status? Single Married Widowed Separated
3. What is your household income range? $0 to $19K $20 to $39K $40 to $59K $60 to $79K $80 to $99K
4. What is your ethnic origin? American Indian Black, Asian, Pacific Islander, Hispanic, White, Other
5. Have you had previous asthma education? Yes No

Please fill in the blank for questions 6 - 10:

6. If you answered yes to question #5, please give a brief description of the asthma education you received and who delivered it.

_____

_____

_____

7. What is your age? _____
8. How many years have you been diagnosed with asthma? _____
9. Briefly describe your current asthma care regimen. _____

_____

_____

_____

_____

_____

10. How many asthma related health care provider visits have you had this year since January, 2006? (This includes office and emergency department visits and hospitalizations.) _____

Appendix G

ACT Instrument

Asthma Control Test™

The test below can help people with asthma, 12 years of age and older, assess their asthma control.

Please check **ONE** answer for each of the five questions below. Be sure to review your results with your healthcare professional.

1. In the past four weeks, how much of the time did your asthma keep you from getting as much done at work or at home?

- ☐ none of the time
- ☐ a little of the time
- ☐ some of the time
- ☐ most of the time
- ☐ all of the time

2. During the past four weeks, how often have you had shortness of breath?

- ☐ not at all
- ☐ once or twice a week
- ☐ 3 to 6 times a week
- ☐ once a day
- ☐ more than once a day

3. During the past four weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night, or earlier than usual in the morning?

- ☐ not at all
- ☐ once or twice
- ☐ once a week
- ☐ 2 to 3 nights a week
- ☐ 4 or more nights a week

4. During the past four weeks, how often have used your rescue inhaler or nebulizer medication (such as albuterol)?

- ☐ not at all
- ☐ once a week or less
- ☐ a few times a week
- ☐ 1 or 2 times per day
- ☐ 3 or more times per day

5. How would you rate your asthma control during the past four weeks?

- ☐ completely controlled
- ☐ well controlled
- ☐ somewhat controlled
- ☐ poorly controlled
- ☐ not controlled at all

OFFICE OF RESEARCH ADMINISTRATION

Interdepartmental Correspondence

The UM-St. Louis Human Subjects Committee reviewed the following protocol:

Name: Judy Shackelford

Title: A comparison of individually tailored and a standardized asthma self-management education program

This proposal was approved by the Human Subjects Committee for a period of one year starting from the date listed below. The Human Subjects Committee must be notified in writing prior to major changes in the approved protocol. Examples of major changes are the addition of research sites or research instruments.

An annual report must be filed with the committee. This report should indicate the starting date of the project and the number of subjects since the start of project, or since last annual report.

Any consent or assent forms must be signed in duplicate and a copy provided to the subject. The principal investigator is required to retain the other copy of the signed consent form for at least three years following the completion of the research activity and the forms must be available for inspection if there is an official review of the UM-St. Louis human subjects research proceedings by the U.S. Department of Health and Human Services Office for Protection from Research Risks.

This action is officially recorded in the minutes of the committee.

Protocol Number	Date	Signature - Chair
061024S	11/16/06	

Appendix I

Department of Nursing

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Informed Consent for Participation in Research Activities

A COMPARISON OF AN INDIVIDUALLY TAILORED AND A STANDARDIZED ASTHMA SELF-MANAGEMENT EDUCATION PROGRAM

Participant _____ HSC Approval Number _____

Principal Investigator __Judy A. Shackelford_____ PI's Phone Number _(217) 498-9030_____

You are invited to participate in a research study about the effect of two different methods of asthma self-management education on asthma control. You will be randomly assigned to either an asthma self-management education group or an individually tailored education group. The education curriculum for both groups is based on National Asthma Education Prevention Program guidelines. The individually tailored education utilizes adult learning principles. Judy Shackelford a Doctoral Candidate at the University of Missouri-St. Louis and an Assistant Professor at St. John's College will administer both methods of asthma self-management education. You have been asked to participate in the research because you are age 18 or older, have a diagnosis of asthma, and may be eligible to participate. We ask that you read this form and ask any questions you may have before agreeing to be in the research. Your participation in this research is voluntary. Your decision whether to participate will not affect your current or future relations with the Central Illinois Allergy and Respiratory Clinic. If you decide to participate, you are free to withdraw at any time without affecting that relationship.

The purpose of this study is to examine the effect of two different methods of asthma self-management education on asthma control. If you agree to participate in this research, prior to the first education session you will be asked to complete a demographic questionnaire about your age, gender, marital status, ethnicity, socioeconomic status, previous asthma education, the number of years diagnosed with asthma, and current asthma care regimen. You will then take the Asthma Control Test questionnaire that will ask if you have: (a) had limited activity days at work, school, or at home, (b) had shortness of breath, (c) had any asthma symptoms (wheezing, coughing, shortness of breath, chest tightness, or pain) and interrupted sleep, (d) frequency of use of rescue inhalers or nebulizer medication (such as albuterol), (e) the number of hospitalizations,

emergency department, or health care provider visits related to asthma symptoms, and (f) your perceived asthma control. You will also be asked to obtain a Peak Expiratory Flow Reading prior to the education sessions and self-report the results. You will be assigned to one of two education groups by consecutively assigning the numbers 1 and 2. You will then participate either in the standardized education program where your role is active listening and questioning or in the individually tailored education intervention where your role will be active participation by sharing lived experiences with asthma, identifying your learning needs, and establishing learning goals. The education sessions for both groups will be 90 minutes. The sessions will be held one time weekly for three consecutive weeks. Education sessions will be scheduled at your convenience and held at St. John's College or St. John's Hospital. Four weeks after completion of the education intervention, you will be asked to complete the Asthma Control Test questionnaire and self-report your Peak Expiratory Flow Readings. Approximately 100 subjects may be involved in this research..

There are no risks or discomforts associated with this research. The benefit of participating in the research is acquisition of asthma self-management knowledge.

The only people who will know that you are a research subject are members of the research team. No information about you, or provided by you during the research, will be disclosed to others without your written permission, except:

- if necessary to protect your rights or welfare (for example, if you need emergency care or when the University of Missouri-St Louis Institutional Review Board monitors the research or consent process); or
- if required by law.

When the results of the research are published or discussed in conferences, no information will be included that would reveal your identity. Any information that is obtained in connection with this study, and that can be identified with you, will remain confidential and will be disclosed only with your permission or as required by law.

To maintain confidentiality, handling of information will be done by the researcher. Your name will be on the instruments until the second set of instruments are complete. The instruments will then receive a code number and your name will be removed**.** During the study, data files will be stored in a secure file cabinet accessible only to the researcher. After completion of the study, all the data will be transferred to a CD-ROM, and the contents stored in a locked file cabinet by the researcher for six years after the completion of the study, as required by the University of Missouri System. After that time, the CD-ROM and all related hard copies will be destroyed as required by the University of Missouri System.

If you suffer any asthma symptoms in the presence of the investigator that need care, the investigator will assist you in seeking services at the Central Illinois Allergy and Respiratory Clinic or with your primary care provider. You or your third party payer, if any, will be responsible for payment of treatment.

There are no participation costs other than your own transportation to and from education sessions. You will not be paid, but you will receive a free Peak Expiratory Flow Meter and free education sessions.

You can choose whether to be in this study. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You also may refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. If you decide to end your participation in the study, please complete the withdrawal letter found at http://www.umsl.edu/services/ora/IRB.html, or you may request that the Investigator send you a copy of the letter.

The researcher conducting this study is Judy Shackelford. You may ask any questions you have now. If you have questions later, you may contact the researcher at (217) 498-9030 or (217) 544-6464 ext. 45444. If you have any questions about your rights as a research subject, you may call the Chairperson of the Institutional Review Board at (314) 516-5897.

Remember: Your participation in this research is voluntary. Your decision whether to participate will not affect your current or future relations with the Central Illinois Allergy and Respiratory Clinic. If you decide to participate, you are free to withdraw at any time without affecting that relationship.

You will be given a copy of this form for your information and to keep for your records.

I have read the above statement and have been able to express my concerns, to which the investigator has responded satisfactorily. I believe I understand the purpose of the study, as well as the potential benefits and risks that are involved. I authorize the use of my PHI and give my permission to participate in the research described above.

_____ _____

Participant's Signature Date Participant's Printed Name

_____

Researcher's Signature

Appendix J

Evaluation for Adult Asthma Self-Management Education Study

Please respond to the following questions. This information is strictly confidential. Do not write your name on this evaluation form. Data will be anonymous and will be used for the purpose of evaluating the adult asthma education program and determining barriers you may have encountered an managing your asthma. This evaluation will help improve future education offerings

1. What barriers have you encountered in managing your asthma?

_____

_____

_____

2. Did you find this asthma self-management education program helpful? Yes No

3. What was most helpful about asthma self-management education?

_____

4. What was the least helpful about asthma self-management education?

_____

5. Is there anything that could be improved or added to the asthma self-management program to help you self-manage your asthma?