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THE IMPACT OF AN EDUCATIONAL PROGRAM ON ASTHMA SYMPTOMS AND KNOWLEDGE IN THE LATE ADOLESCENT

by

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Abstract

Despite advances in medical technology, statistical evidence indicates that asthma related morbidity and mortality rates continue to rise, especially in the late adolescent population. Current research literature suggests that patient education may be beneficial in obtaining and maintaining asthma control in the pediatric and adult populations. Currently, however, there is little research available regarding the impact of education in the late adolescent population. This study, therefore, sought to determine the impact of an educational program on asthma symptoms and knowledge among late adolescents. Becker's Health Belief Model was used as the theoretical framework. A quantitative, quasi-experimental design was utilized to test the two research null hypotheses. The first null hypothesis was there will be no difference in asthma symptoms of late adolescents before and after an asthma educational program. The second null hypothesis was there will be no difference in knowledge of asthma of the

late adolescent before and after an asthma educational program. Subjects included male and female adolescents between the ages of 18 and 25 years who had been referred by their primary care health provider as candidates for enrollment in the asthma education study and who met all study criteria. Data were obtained from participant questionnaires and lung function studies. Asthma symptoms were measured and assessed by utilization of the American College of Allergy, Asthma & Immunology Life Quality (LQ) Test and by objective peak flow measurements. Asthma knowledge was measured and assessed by utilization of the National Heart, Lung and Blood Institute questionnaire Check Your Asthma IQ. Baseline data were obtained prior to a 40- to 60-minute educational intervention; post intervention data were then obtained at 2 weeks following the intervention. Telephone follow-up data were obtained at approximately 6 to 8 weeks following the intervention. The data were collected at the student health center of a large university in Northeast Mississippi. Data were analyzed using descriptive statistics and the two-tailed *t* test.

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Chapter I

The Research Problem

Asthma is the most common chronic respiratory illness diagnosed and treated in the primary health care setting (Owen, 1994) and the most common chronic disease of childhood (National Institutes of Health [NIH], 1997). In 1991 statistics indicated that 10 million people in the United States had been diagnosed with asthma (NIH, 1991). In 1995 it was estimated that 14 to 15 million people in the United States had been diagnosed with asthma or reactive airway disease ("Asthma Mortality," 1996).

Despite improvements in pharmacological management options, asthma related morbidity and mortality rates have continued to rise for all age groups. Some of the most striking increases in morbidity and mortality rates, however, have occurred in the elderly, the adolescent, and the young adult populations, particularly young black males (American Medical Association [AMA], 1993; NIH, 1995, 1996). Between 1980 and 1991 annual mortality rates in the 15- to 24-year-old population increased from 2.5

per million people to 5.2 per million people ("Asthma Mortality," 1996).

Specific causative factors for the increase in asthma morbidity and mortality are largely unknown. Current explanations include patient mental health status, poor patient perception of the severity of asthma and subsequent delayed medical intervention, ecological and environmental pollution, pharmacological mismanagement, and the existence of co-morbid conditions (Alberts & Pico, 1996; Boulet, Leblanc & Turcotte, 1994; Fackelmann, 1994; Johnson, Apter, & ZuWallack, 1996; Joseph et al., 1996; NIH, 1991). Unanswered questions regarding recent increases in asthma morbidity and mortality emphasize the need for investigation into the effectiveness of educational interventions for the identified at-risk populations, including late adolescents.

Establishment of the Problem

Asthma can be defined as a chronic inflammatory disease process involving complex chemical and cellular interactions which ultimately result in airway inflammation, hyper-reactive airways prone to bronchospasm, and excessive mucus production (NIH, 1997). Characteristic symptoms include recurrent shortness of

breath, cough, chest tightness, wheezing, and respiratory distress (NIH, 1991, 1997).

Asthma is a chronic disease process for which there is no cure (NIH, 1995). As with any chronic disease, people with asthma typically move through a grief process which includes feelings of anger, helplessness and loss of control, depression, guilt, and eventually acceptance (National Jewish Center for Immunology and Respiratory Medicine [National Jewish], 1992, 1995). In the late adolescent population these feelings may be intensified by age specific developmental needs (or tasks) (NIH, 1997).

Erickson (1963) noted that during the transitional period between childhood and adulthood, late adolescents must master the developmental tasks of establishing their own identity, intimate relationships, emotional independence, and developing adult social and cognitive skills. According to the NIH (1997), adolescent development needs (or tasks) include the assumption of a positive self-image, self-confidence, a sense of personal responsibility, and effective problem-solving skills. Adolescents attempting to master these developmental needs or tasks under the handicap of a chronic disease such as

asthma face special challenges. These adolescents present special challenges to the health care provider as well.

While adolescent medical management has traditionally consisted of problem-oriented treatment, Guidelines for Adolescent Preventative Services (GAPS) emphasizes that effective treatment of the adolescent patient requires a focus on preventive programs and education (AMA, 1993). According to the American Academy of Family Physicians (1995), "patient education can be defined as the process of influencing patient behavior and producing the changes in knowledge, attitudes, and skills necessary to maintain or improve health" (p. 2021).

Conceptually, there is an inherent difference between education and instruction. Instruction implies direction; education implies imparting or receiving information in such a way as to change knowledge level and attitudes and to influence behavior. Effective asthma education requires effective communication utilizing a common language which ultimately results in ". . . development of both the patient's asthma-management skills and the confidence that he or she can control asthma" (NIH, 1991, pp. 460-461). The process of asthma education involves assisting patients in gaining an understanding of asthma

pathophysiology, acquiring the knowledge and ability to utilize asthma management skills, and supporting appropriate patient-initiated asthma-management decisions. Distributing information is one goal of an educational program, but simply providing information is not enough (NIH, 1991).

According to AMA (1993), adolescents are willing and able to become responsible for their health care if educated properly, provided with access to health care and offered guidance. NIH (1997) guidelines recommend that patient education and the establishment of a peak flow based asthma management plan be considered necessary in maintaining asthma control. NIH (1991) stresses that asthma education motivates patients, assists them in gaining the skills necessary to assume responsibility for control of asthma, and fosters development of a partnership between the patient, family, and clinician. Asthma education is, therefore, the process of imparting knowledge in order to empower the adolescent asthmatic patient with the skills necessary to assume responsibility for his or her disease process and outcome.

The most significant publication which influenced this study of the impact of asthma education in the late

adolescent population was the February 1997 issue of the NAEPP Expert Panel Report II: Guidelines for the Diagnosis and Management of Asthma. Although this latest report from the National Asthma Education Prevention Program (NAEPP) in conjunction with the National Heart, Lung, and Blood Institution (NHLBI) is not a research study itself, it was the product of extensive cooperative efforts from the world's leading experts in asthma care, management, and education.

In 1994 the NHLBI sponsored and established a Science Base Committee of U.S. asthma experts to review current scientific literature and determine the need, based on newly published literature, for an update of the NIH (1991) Guidelines for the Diagnosis and Management of Asthma. The NAEPP Science Base Committee reviewed, examined, and evaluated over 5,000 abstracts related to asthma in human subjects obtained through MEDLINE database searches from 1991 through 1995. The committee recommended that the 1991 guidelines be reviewed and updated. An Expert Panel was then assembled and made responsible for determining new guideline standards. The Expert Panel included expert health care professionals from multiple medical disciplines, U.S. Federal agencies, international

representatives from the Global Initiative for Asthma, members from the Science Base Committee, and members from the 1991 Expert Panel.

Applicable condensed recommendations include a strong emphasis on patient asthma education, appropriate use of the written patient-initiated asthma care plan (with or without a home peak flow monitoring device), open mouth technique or spacing devices for metered dose inhaler use (especially for corticosteroid inhaler use), and a stepwise approach to pharmacological medical management that advocated control of patient asthma symptoms with the least amount of medication possible. Compliance promoting factors noted in the adolescent population include an emphasis on adult level patient-health care provider communication.

While current research links asthma education with improved management and control of asthma, the majority of research investigations have been conducted in the hospital or specialty care setting utilizing adult and pediatric populations. The primary source from which patients obtain information, however, remains the primary health care clinician (Yoon, McKenzie, Bauman, & Miles, 1993). It is reasonable, therefore, that an educational

program designed for hospital use may not be applicable to the office or collegiate primary care setting (Fitzgerald, 1994). The length of time required for the educational program must be minimized to allow for adaptation to the busy family care or primary care facility. Furthermore, the principles and acquired knowledge found to be true for adult and pediatric populations may not be applicable to the late adolescent population (AMA, 1993).

It is, therefore, of utmost importance for the primary care clinician to establish a trust relationship and enter into a partnership with the late adolescent asthmatic patient in order to provide the knowledge base necessary for effective patient asthma management. The development of "a partnership between the [patient], the family, practitioners, nurses and other health care professionals" is both necessary and desirable in order to fulfill "a crucial part of these new [asthma management] guidelines" (Rachelefsky, 1995, p. 13).

In summary, education imparts knowledge. Knowledge is empowerment; it gives freedom, strength, and a measure of self-determination to the learner. These positive qualities are both necessary and desirable in assisting the late adolescent asthmatic to master developmental

tasks effectively. As the adolescents assume responsibility for their health and well-being, the perception of disease severity and the impact of individual intervention may influence personal application of illness prevention behaviors. Illness prevention behaviors directly affect disease outcome. This research was conducted to determine whether there was a difference in asthma symptoms and knowledge in the late adolescent population before and after an asthma educational program in the primary health care setting.

Significance to Nursing

Nurses and nurse practitioners (NPs) play an integral role in the development of and assimilation of positive health care habits by the adolescent asthmatic. Asthma is a chronic disease process requiring routine monitoring and health maintenance in order to maintain adequate control of asthma symptoms. Equipping asthmatic patients with the skills and knowledge necessary for effective patient asthma management requires time, patience, and effective communication skills on the part of the educator.

Nurses and nurse practitioners have historically focused on health maintenance measures, preventative health behaviors, and patient education. Nurses and NPs in

the collegiate health care setting typically have first contact with patients, providing an opportunity to investigate, educate, and influence current health behaviors, practices, and beliefs.

There is very little current research investigating office-based asthma education in the late adolescent population. Adolescents have unique needs, particularly college age, late adolescents. Late adolescents who are away from home for the first time and attempting to assume responsibility for self-care or health maintenance may be at increased risk for asthma mortality. Therefore, these adolescents present a challenge to health care professionals.

The data gathered from this study on the impact of an office-based, protocol guided asthma education program on asthma symptoms and knowledge in the late adolescent will add to the existing body of nursing knowledge regarding asthma education. The findings of this study may also be utilized in the development of similar nursing education programs and, through use of the Health Belief Model as a theoretical basis, for promotion of self-care behaviors within the patient-provider relationship. Additionally,

this study may serve as a foundation for further asthma education impact studies.

Theoretical Framework

The theoretical framework for this study was Becker's Health Belief Model. Becker (1974) sought to explain illness behavior and variations in preventative health actions within the population. Becker (1974) determined that illness behavior is affected by several factors: patient perception of personal health threat (including perceived susceptibility), personal belief in the benefits of preventative actions, and perceived barriers. As applied to the study of the impact of an educational program on asthma symptoms and knowledge in the late adolescent, the Health Belief Model suggests that these factors must be convincingly addressed in order to precipitate positive preventative health behaviors.

Patient perception of personal health threat and personal susceptibility will most likely be affected by the frequency and severity of asthma symptoms. In order to instill belief that health maintenance behaviors during non-symptomatic periods are necessary and will be beneficial in reducing perceived threat (i.e., potential

asthma exacerbation), a means of direct cause-and-effect visualization will be provided.

Becker (1974) notes that in order for information to be internalized and utilized, it must be interpreted as personally applicable, obtainable, and necessary. Becker (1974) also indicates that motivation to change and behavior outcomes are directly linked to patient perception of variables, specifically including patient perception of barriers. Perceived barriers in the late adolescent may include time involved in performing health maintenance behaviors, cost, and social implications (Irwin, Millstein, & Ellen, 1993). Within the Health Belief Model framework, then, anticipation of the patient criteria which must be satisfied in order to achieve goals of behavioral change indicate the need for a strong cue to action which meets these patient criteria. In this study, the educational program served as intervention with education as the cue to action and the motivation for change.

In summary, the Health Belief Model served as a solid foundation for this study. Based on Becker's (1974) Health Belief Model, an educational program specifically addressing the unique developmental needs of the late

adolescent may be beneficial in assisting the adolescent to achieve control of his or her asthma which, in turn, encourages task-oriented goal attainment and mastery of developmental stages.

Assumptions

For the purpose of this research, the following assumptions were made:

1. Asthma is a life-threatening condition.

2. Motivation to take action is based on individual perception of risk, perception of personal susceptibility, and perception of disease severity (Becker, 1974).

3. Late adolescents in the collegiate setting are capable of accepting responsibility for management of their disease process.

4. Late adolescents' perception of asthma symptoms is a measurable phenomenon.

Problem Statement

Asthma affects over 15 million people in the United States. Despite technological advances, morbidity and mortality rates have continued to rise, especially in the adolescent populations. Studies have linked adult and pediatric asthma education programs with improved asthma

control and decreased incidence of asthma related hospitalizations. There are, however, few studies which specifically examine the impact of asthma education in the late adolescent population. Adolescent populations have unique needs, unique behavioral motivations, and unique health beliefs. It is imperative, therefore, for nursing science to study the impact of asthma education in the late adolescent population and to investigate differences in asthma symptoms and knowledge before and after an asthma educational program in order to assist in developing a means of decreasing morbidity and mortality rates in the late adolescent.

Research Hypotheses

Two null hypotheses guided this study:

1. There will be no difference in the asthma symptoms of late adolescents before and after an asthma educational program.

2. There will be no difference in knowledge of asthma of the late adolescent before and after an asthma educational program.

Definition of Terms

For the purposes of this study, the following terms were defined:

Asthma symptoms: quality of life as evidenced by physical manifestations that include chest tightness, shortness of breath, cough, wheeze, nocturnal exacerbations and exercise induced exacerbations, the frequency of asthma inhaler use, patient perception of asthma triggers, anxieties, and emergency room visits or hospitalizations for asthma related illness. Operationally, asthma symptoms will be scores on the Life Quality Test and peak flow readings.

Late adolescents: adolescents actively involved in mastery of the developmental tasks of establishing their own identity, intimate relationships, emotional independence, and developing adult social and cognitive skills (Erickson, 1963). For the purposes of this study, late adolescents were male or female asthmatics between the ages of 18 and 25 who were students at a state university in the southern United States.

Asthma educational program: a 40- to 60-minute educational program conducted by the researcher and consisting of the following: (a) review of the asthmatic

disease process, pathophysiology, and pharmacological intervention (as ordered by the health care provider); (b) instruction and demonstration of correct metered dose inhaler technique utilizing an Ellipse Spacing device (NIH, 1991); (c) instruction in and demonstration of TruZone Home Peak Flow Meter use, including the establishment of an asthma management plan; and (d) Asthma Education Protocol.

Knowledge of asthma: participant knowledge of asthma as a common chronic disease affecting people of all ages which can be dangerous, can be controlled, has many triggers, and should not prevent asthmatics from exercising. Operationally, asthma knowledge was scores on the Asthma IQ test.

Summary

In this chapter the establishment of the problem, significance to nursing, assumptions, research hypotheses, and definitions of terms were presented. The theoretical framework which guided this study was Becker's (1974) Health Belief Model.

Asthma is a significant health problem, particularly in the late adolescent population. Within this population, there is, however, little research regarding the efficacy

of asthma education programs. Adolescents, especially collegiate-based adolescents, have unique developmental and educational learning needs. Therefore, the impact of an educational program on asthma symptoms in the late adolescent was investigated.

Chapter II

Review of the Literature

This chapter will provide a review of select research literature related to asthma treatment, education, and medical management from 1989 to February 1997. The conduction of a research literature search in preparation for this study revealed numerous publications regarding asthma and asthma management. At least 304 studies about asthma pathophysiology and pharmaceutical management were discovered, 112 studies about asthma triggers including allergic components, 29 studies regarding lung function measurement including peak flow monitoring, and 85 studies about general asthma management. Included in these were 27 studies specific to the adult and elderly populations and 39 studies specific to pediatrics.

Due to the large volume of research available, this literature review will detail only the most recent, select research that most closely addresses the focal issues of this study. Recent literature and research studies which influenced this current research include the 1997 NIH

report, two major studies involving efficacy of asthma educational programs, two studies investigating adolescent health care behavior, one study investigating adolescent perceptions and knowledge of asthma, and one pilot study (1989) investigating the impact of an asthma education program on knowledge and symptoms in the college age young adult.

While it has been well documented that patient education improves patient outcome and well-being in most chronic disease processes including asthma, it was discovered that the majority of research investigations were conducted in the hospital or specialty care setting utilizing adult or pediatric populations. The few studies which were conducted in the office setting utilized a series of educational programs consisting of a number of sessions, each lasting 2 or more hours per session. It may be significant to note that time constraints have been important factors influencing primary health care provider consideration of routine educational program use.

The first reference study (Yoon, McKenzie, Bauman, & Miles, 1993), conducted in Sydney, Australia, sought to investigate the impact of an asthma education program on adult asthmatics. Yoon et al. (1993) theorized that

patient asthma control could be optimized by improving patient knowledge and encouraging development of self-management skills, thereby reducing hospital readmission rates.

Yoon et al. (1993) recognized that there were no published reports available concerning the effects of an asthma educational program on adult asthmatics. The researchers also noted that previous pediatric studies had not investigated actual changes in airway function nor had they investigated the duration of the educational program necessary to achieve effective intervention.

Adult asthmatics were defined as patients 16 to 65 years of age who had a diagnosis of asthma confirmed by history and documented reversibility of airflow obstruction to within at least 15% of predicted values. Patients with irreversible airway obstruction or other significant influencing disease processes were excluded from the study.

The asthma education program was defined as a single educational session lasting 2.5 to 3 hours in which groups of five to eight adults learned asthma management skills. The educational program consisted of three sets of videotaped instructions, one individual training session,

and one lecture type session. Standardized written information was also provided. Mini-Wright peak flow meters were provided to all participants while metered-dose inhaler spacing devices were encouraged but not provided. Asthma management skills were defined as knowledge of asthma physiology and triggers, knowledge of appropriate asthma medications (use, actions, and side effects), knowledge of proper metered-dose inhaler technique with a spacing device, knowledge of use of a home peak flow meter and asthma management plan, and utilization of all of the above.

The study sample consisted of adult asthmatics admitted to a university hospital in Sydney, Australia, for asthma exacerbation between April 1987 and April 1989. Potential subjects were identified and recruited in the hospital by monitoring hospital admission records. After hospital discharge, patients were directed to attend an asthma educational program at an independent educational facility. Of the 185 eligible patients who originally agreed to participate in the study and completed the questionnaire in hospital, only 76 actually attended the asthma educational program. Of the 76 subjects who attended the program, 39 were randomly assigned into the

control group and 37 were randomly assigned into the intervention group.

A measurement of forced expiratory volume at one second (FEV1) and forced vital capacity (FVC) was obtained pre- and post-bronchodilator (beta-agonist metered-dose inhaler) on all subjects. All participants were instructed in the use of a home peak flow meter. The subjects assigned to the intervention group were then educated according to the established asthma educational program. The control group received no further education at this point.

Follow-up visits to the education center occurred at 5 months after intervention and 10 months after intervention. By the end of the study, final control group population had dropped to 28; the final intervention group population also had dropped to 28. Data collected at each follow-up consisted of a questionnaire, objective measurements of airway function, and submission of daily home peak flow values (pre- and post-beta agonist) as recorded by all subjects for one week prior to follow-up visits.

Yoon et al. (1993) found that subjects in the intervention group showed a significantly greater

improvement in asthma self-management skills ($p = < .001$) than the control group. Analysis showed a seven-fold difference between the intervention and control groups in hospital readmission rates, as well as a greater than twofold reduction in emergency room visits for the intervention group. There was no statistically significant difference in lung function values between groups ($p = < .05$).

According to Yoon et al. (1993), these results indicated that success in asthma education was dependent on altered behavior and asthma management skills rather than on improved asthma control. Yoon et al. (1993) summarized that study participants were able to achieve better asthma outcomes via improved knowledge of appropriate medical interventions during asthma exacerbations and improved pharmacological management skills. Yoon et al. (1993) noted that, in conjunction with conclusions drawn from previous studies, the family health care provider was instrumental in ensuring patient participation in asthma education and recommended that further research be undertaken in this area.

A more recent study by Lahdensuo et al. (1996) sought to investigate the impact of a clinician-guided, patient-

initiated asthma care plan on the adult asthmatic's overall asthma symptomatology and quality of life. Lahdensuo et al. (1996) theorized that a clinician-guided, patient-managed asthma care plan could significantly improve asthma control in the moderately severe asthmatic patient, thereby improving quality of life and reducing asthma related deaths.

Lahdensuo et al. (1996) noted that current literature correlates asthma death rates with asthma under-treatment, severity underestimation, and medication mismanagement. The researchers noted that while there were numerous studies recommending peak-flow based asthma management plans, conflicting reports existed regarding efficacy of self-management. Little information had been published regarding the effect of self-management on patient quality of life. Therefore, the researchers concluded that a study of patient self-management and the efficacy of that self-management was required.

Lahdensuo et al. (1996) defined asthmatics as adults with mild to moderately severe asthma. The researchers assumed that most severe asthmatic patients would already own home peak flow meters and be utilizing them in peak-

flow-guided self-management plans. This subgroup of patients was, therefore, eliminated from the study.

By definition, asthma diagnosis and severity ratings were based on the following criteria: variations (between morning and evening measurements) in patient-recorded peak flow readings and patient medication requirements. Adults were defined as being 18 years old or older. Quality of life was defined as patient perception of the incidence of asthma symptomatology (and the illness impact associated with asthma) as evaluated using portions of the St. George's respiratory questionnaire. A baseline Quality of Life assessment was performed at the beginning of the study period and with every scheduled evaluation period thereafter (i.e., every 4 months).

Patients in the intervention group were required to complete a daily symptom score log (using a scale of 0 to 3 for the preceding 24-hour period). Self-management was defined as the process of patient initiated medication adjustment according to daily expiratory peak flow measurements.

The intervention group was exposed to the educational program wherein participants received personalized information (from nurse education specialists) over a

2- to 2.5-hour period. Instructions included information regarding respiratory system anatomy, asthma pathophysiology, physiotherapeutic breathing and relaxation techniques, pharmacological intervention including medication use and effects, home peak flow monitoring techniques, and self-management techniques.

Intervention group patients were instructed to obtain morning peak flow values using a Mini-Wright Peak Flow Meter; patients were to measure three consecutive efforts. After recording the highest reading in a home diary, patients were instructed to adjust medications according to calculated percentages of each patient's personal best peak flow reading. These patients were instructed to keep asthma medications constant except under the following conditions:

1. If peak flows fell below 85% of the patient's best peak flow, patients were instructed to double the inhaled corticosteroid dose for 2 weeks. If peak flows did not return to within normal limits or if symptoms increased, patients were instructed to call their physician or nurse.

2. If peak flows fell below 70% of best peak flow, patients were instructed to begin oral prednisone (40 mg

per day for 7 days) and immediately call their physician or nurse.

Traditional treatment was defined as patient information regarding proper metered-dose inhaler technique and general asthma information given during routine office visits. Patients receiving traditional treatment did not receive a peak flow meter, nor any information regarding medication adjustments. Their office visit lasted approximately one hour.

The study sample consisted of adult asthma patients receiving regular care at one of three outpatient clinics in Finland. As part of the sample population randomization, 122 patients were selected by computer in a random block design and divided into a treatment group (n = 60) or a control group (n = 62). Variable group sizes helped reduce predictability, with patients entering the study in staggered intervals over a 12-month time. Follow-up visits for both groups were scheduled every 4 months for 12 months.

The participants randomly chosen for the intervention group were exposed to the education program and asked to return to the clinic in one month. At the one-month follow-up (termed the run-in period), the intervention

group members were evaluated regarding peak flow proficiency, compliance with study criteria, and asthma stability. At that point, patients were either selected for admission into the actual study or disqualified. Patients qualifying for entry into the study intervention group must have had at least two episodes of > 15% variation in peak flow values (within a single week) within one of the monitored 6-month time periods. Optimal peak flow, based on patient-recorded morning values, must have been 250 l/min or greater. (Note: The intervention patients' one-month follow-up then became baseline. Actual visit two at 5 months from recruitment became visit one for purposes of statistical analysis.) The actual sample consisted, therefore, of the 115 patients who met all criteria and completed the study: self-management ($n = 56$) and traditional treatment ($n = 59$).

Lahdensuo et al. (1996) found a significant ($p = .009$) increase in quality of life for the treatment group versus quality of life for the control group. Further analysis utilizing statistical survival curves (based on occurrences of asthma incidences in both groups) revealed a significant ($p < .001$) difference between the treatment

group and the control group with the self-management group having fewer asthma incidents.

According to Lahdensuo et al. (1996), these findings indicate that, although there were no differences in lung function of either group, patient asthma self-management significantly improved patient quality of life and decreased frequency of asthma related life incidences. The researchers also determined that, as antibiotics were prescribed significantly less often in the treatment group than in the control group ($p = .008$) the increase in inhaled corticosteroid dose at an 85% decrease in peak flow values served as an early intervention in viral respiratory infections.

Lahdensuo et al. (1996) concluded that patient self-management compliance was strongly related to the incidence and severity of patient asthma symptoms. The researchers noted that while there were reports supporting the theory that patient self-management based on symptom scores alone yielded results similar to those obtained from patients utilizing home peak flow meters, there were also several reports indicating that a large percentage of asthmatic patients were poor determiners of asthma symptom severity. The researchers, therefore, recommended asthma

patient education and patient self-management utilizing a peak flow based asthma management plan.

As previously noted, late adolescents, particularly those attending college and/or newly responsible for their own health care, have unique developmental, social, and emotional needs. It is, therefore, essential for primary health care providers to understand and address these needs so that a working trust relationship with their health care provider can be established. Consequently, two survey studies were conducted (one in New Zealand and one at the University of South Carolina) which specifically investigated adolescent asthma management and health behavior in order to gain understanding in these areas.

The first study was conducted in 1990 by Richards and Mauger in Auckland, New Zealand. Richards and Mauger (1990) sought to investigate asthma knowledge, self and clinician asthma management practices, asthma monitoring methods, quality of life, attitudes, and health maintenance behaviors in the college student. The authors observed that college students seemed to be haphazard in their management of the asthmatic condition.

Richards and Mauger (1990) theorized that by obtaining more information regarding student attitudes,

existing management behaviors, quality of life, and asthma knowledge, health care providers could better understand the perceptions of and behavior of college-age students. This information may then have illuminated unique student needs which could be addressed in order to improve student health care utilization and increase patient education, thereby increasing patient knowledge and asthma self-management skills.

The authors defined students as male and female persons enrolled in the University of Auckland during an unknown time period. Student ages ranged from less than 20 years to 57 years of age. Asthma was subjectively defined by the student completing the questionnaire.

Survey questions investigated areas of the impact of asthma on student activities, attitudes and emotional response to asthma, medical management, peak flow meter use, knowledge of asthma, information resource choices, reasons for visiting the health center, social habits, co-morbidities, demographics, and asthma literature reading habits. Questionnaire results were tabulated and scored according to the number of students responding with the same answer to each question.

The sample was a sample of convenience. All students attending the University of Auckland Health Service were asked to complete a one-time, 96-question survey regarding the above topics if the students indicated to the Health Service at admission that they were asthmatic (n = 95). According to Richards and Mauger (1990), review of the questionnaire results revealed a significant knowledge deficit among asthmatic students. Specific numerical significance was not provided.

In a summary of the survey results, the authors found that approximately two thirds of responders reported a knowledge deficit regarding asthma. Richards and Mauger (1990) reported that the questions students asked most often included requested information on asthma pathophysiology, triggers, medications, medication side effects, alternative treatments and medications, the impact of co-existing health conditions, the impact of lifestyle modifications, and non-medical management options.

According to Richards and Mauger (1990), despite the large number of students who indicated a knowledge deficit regarding asthma, less than one third actually asked the health care provider for information. The researchers

indicated that most students viewed physicians as medication providers rather than as a source of information. However, the authors also noted that students perceived the number one information resource to be the physician.

Accordingly, the researchers noted that written literature was chosen as the second best source of information. However, over 50% of the students had not read the university-provided literature on asthma. Sixty-four percent of responders reported that their asthma had not affected their ability to participate in activities, but over 33% indicated limitations with sports participation.

Researchers indicated significant student anxiety levels and knowledge deficits regarding medication side effects and use (percentages/statistical significance unknown). Questions regarding asthma maintenance and monitoring measures accordingly revealed that over 50% of student responders had never used a home peak flow meter and less than one third used a peak flow meter as a cue to action in directing medication regulation.

Over half (59%) of the respondents reported that they used routine asthma treatments on a continuous basis

(specific treatment is unknown), yet 33% still reported constant asthma. Twenty-five percent indicated that they only had a limited number of hours of respiratory freedom. According to the authors, approximately 33% of responders reported hospital admissions for asthma (time frame unknown) which, when compared to adult general practice, was a proportionately greater hospital admission rate (percent difference unknown).

Richard and Mauger (1990) surmised that similar discontinuity was likely to be more prevalent in the walk-in clinic than in established family practice environments. The authors further extrapolated from the frequency of health center attendance by asthmatic students that preventative health maintenance behaviors were of low value and may be correlated with what they felt to be student denial or inaccurate perceptions of asthma severity. These results raise some interesting questions regarding student perceptions of asthma severity, caregiver efforts to educate, self-motivation, and student response to asthma symptoms.

A more recent study by Jolicoeur, Boyer, Reeder, and Turner (1994) was performed to investigate health care resource utilization, asthma management practices, and

disease impact on college students with asthma or allergies. In this study, the authors sought to investigate the perceptions of college students regarding quality of life, preventative and crisis intervention health behavior, and student perceptions of available health care resources.

Jolicoeur et al. (1994) noted that there was very little research regarding the asthmatic college student between the ages of 18 and 25 years. Recognition of the inadequacies of information available for this unique group prompted a retrospective review of the perceptions and behavior of college-age students with asthma. Students with allergies were included in the study as well because of the close link between allergic manifestations and asthma flares.

Jolicoeur et al. (1994) defined college students as male or female students enrolled at the University of South Carolina and who received medical care for a diagnosis of asthma or allergies at the Thomson Student Health Center between August 1991 and December 1991. There were no age requirements noted in this review.

Quality of life was defined by the number of days of class missed per student, number of students attending

class while experiencing asthma or allergy symptoms, number of work days missed for those students who were employed during the study, extent of perceived interference with social and academic activities, ability to avoid triggers while at college, and health care utilization for the 1991 fall semester. Students were asked to self categorize as having a diagnosis of asthma only, allergies only, or asthma and allergies. Student perception of the severity of these symptoms as evaluated by a 7-point rating scale was also used to define quality of life. Severity ratings ranged from 1 (not severe at all) to 7 (meaning severe as it could get).

This study was conducted at the Thomson Student Health Center at The University of South Carolina. Prior to initiation of this survey, study candidates were identified by reviewing computerized medical records for students who received care at the Thomson Student Health Center during the specified time period for a diagnosis of asthma or allergies. Two hundred and seventy-five students were identified as qualifying for enrollment in the study. These students were mailed a 46-question survey which inquired into current asthma or allergy management behaviors, days missed from work or school, health care

resources utilized, and demographics. An informed consent form requesting permission to examine and use student medical records for the purposes of this study was included. The questionnaire cover served as a self-addressed, stamped envelope to facilitate survey return. Subsequent follow-up of unreturned surveys consisted of one letter mailed approximately 2 weeks following the original mailing.

Of the 275 students who had questionnaires and follow-up letters mailed to them, only 77 Students (28%) completed and returned the survey. The mean age of these participating students was calculated to be 24 years (SD = 4.38). Sixty-six percent were women; 34% were male. Only 27% reported living on campus.

Thirteen percent of the responders reported a diagnosis of "asthma only," yet investigation of medication usage revealed that 79% of all study participants admitted using medications for asthma. Eighty percent of the asthma only group participants reported beta-agonist use. Jolicoeur et al. (1994) indicated, however, that the asthma only group reported the ". . . least amount of activity interference" (p. 254). Surprisingly, no participants in this group reported

inhaled corticosteroid use. The median severity rating of asthma symptoms for these responders was reported as 3.

Fifty-six percent of the survey responders reported a diagnosis of allergy only while 84% of all survey participants admitted using medications for allergies. Of the 43 students in the allergy only group, 88% of the participants reported antihistamine use. The median severity rating of allergy symptoms was reported as 4. This participant group reported that their symptoms interfered with activities to a greater degree (median severity rating of 3.4) than either of the other two groups. (The median severity rating of interference with overall activities in the asthma only group was 2.7; the median severity rating of overall interference with activities in the "asthma and allergy" group was 3.0.)

Twenty-three percent of the responders reported a diagnosis of asthma and allergy with a median severity rating of 4.5 for their allergy symptoms and a median severity rating of 3 for their asthma symptoms. Of the 18 participants in this category, 72% reported beta-agonist use, 50% reported antihistamine use, 18% reported inhaled corticosteroid use, and 11% reported oral cortisone use.

Interestingly enough, 8% of the responders reported no asthma or allergy diagnosis.

Participants were also surveyed regarding asthma instruction or education. Twenty-five percent of the respondents reported having received instruction in asthma management or medication administration techniques. Ninety-five percent of those respondents indicated a physician provided instruction, 37% reportedly received instruction from a nurse, and 16% reportedly received instruction from a pharmacist.

TSHC-USC chart reviewed survey statistical correlation significance was impaired by 12 charts that were not reviewed. Jolicoeur et al. (1994) reported, however, that

> . . . of the 23 students reporting beta-agonist use in the survey, 15 students had beta-agonist use recorded in the medical chart. Of the 40 students reporting antihistamine use in the survey, 28 (70%) students had reported antihistamine use in the medical chart. (p. 255)

There were reported to be five emergency room (ER) visits and one overnight hospitalization. According to Jolicoeur et al. (1994), three of the ER visits were made by students in the asthma and allergy group, as was the overnight hospitalization participant. However, ". . . 40.3% of students did not seek medical treatment when

thought necessary; 65.5% claimed seeking medical treatment was inconvenient; 31.3% reported they could not afford medical treatment" (Jolicoeur et al., 1994, p. 255).

Given the above information, it was interesting to note that the TSHC-USC was reportedly the most utilized health care resource. Jolicoeur et al. (1994) indicated that there were 172 participant visits during the study period. The authors indicated that the mean number of visits per asthma and allergy group participant was calculated at 3.1, the mean number of visits per asthma only participant was calculated at 2.0, and the mean number of visits per allergy only participant was calculated at 2.0.

In summary, Jolicoeur et al. (1994) found that the majority of respondents had never received information or education regarding asthma or asthma management. It was surmised that student asthma and allergy education would have reduced unnecessary health center visits, assisted the students in making appropriate health management decisions, and reduced lost or missed days related to illness.

Another incidental finding was the lack of student knowledge related to available health care resources.

Jolicoeur et al. (1994) indicated that the Thomson Student Health Center offered discounted medications and free services to students, yet 40% of respondents reported inconvenience and lack of finances as reasons for not seeking medical care even when it was necessary. It was concluded that health center services should be more widely advertised to the student population in order to promote appropriate use.

Additionally, reported medication use in the survey was not consistent with medication use as recorded in the medical chart. Jolicoeur et al. summarized that this may have indicated a need for a more thorough medication review during office visits. Jolicoeur et al. (1994) concluded that further research is needed in order to develop an asthma/allergy education program designed for college students in order to improve overall quality of life, utilization of health care resources, provision of maximum asthma, and allergy therapy options and to increase academic performance and social productivity.

Perhaps the most significantly applicable study found during the review of research literature was a pilot study performed at Dartmouth College in 1989 by Tehan, Sloane, Walsh-Robart, and Chamberlain. In this study, the

authors examined the health behaviors of college-age young adults before and after an educational program designed to educate students regarding asthma. Tehan et al. (1989) theorized that asthma education would foster asthma self-management skills and promote effective, appropriate early intervention strategies. The authors (in 1989) stated that, although asthma morbidity and mortality among college-age adolescent and young adult populations had not been specifically investigated, the impact of this disease process within this age group would be quite significant.

This study was designed and initiated following the admission of a 20-year-old asthmatic Dartmouth College student to the intensive care unit for status asthmaticus. This student had a 16-year history of asthma and had been treated at the Health Service several times in the preceding year for emergency intervention of acute asthma exacerbations. Health care providers felt that this severe exacerbation and hospital admission could have been prevented with appropriate student self-care management. Upon further investigation, the authors found a high rate (66%) of emergency visits for acute asthma exacerbations, few preventative care visits, and marked inconsistency of medical management among health care providers.

Subsequently, the authors sought to investigate contributing factors associated with college-age adolescents and young adults regarding asthma knowledge deficits and misinformation, lack of preventative health maintenance behaviors, and frequency of emergency visits to health care facilities for acute asthma exacerbations. The researchers theorized, therefore, that a health education program focusing on preventative health maintenance behaviors and self-management would decrease student needs for emergency asthma interventions and promote better asthma control.

For purposes of this study, Tehan et al. (1989) defined young adults as male or female students attending Dartmouth College who had been treated for asthma symptoms at the Dartmouth College Student Health Service in the previous year or had indicated a history of asthma on the required college-entrance physical exam. There were no age limitations noted.

The researchers defined asthma self-management education as an asthma education program entitled "Breathe Free," which consisted of the following components:

1. A preprogram asthma history (including medications) and subsequent completion of the Asthma Knowledge Test and the Asthma Attitude Test.

2. Objective lung function measurements utilizing spirometric lung function studies and peak flow meter readings.

3. Four 2-hour class sessions featuring lecture style information regarding asthma, relaxation techniques, and "skills practice, role playing, and peer support discussions" (Tehan et al., 1989, p. 515).

These educational sessions were designed to improve student knowledge (and subsequently positively alter self-care behaviors) regarding asthma medical management, the psychosocial implications of chronic disease, student response options in the event of acute asthma exacerbations, and methods of behavior modification.

The Asthma Knowledge Test consisted of a 29-item questionnaire designed to assess knowledge of asthma pathophysiology and lung function, triggers of asthma and methods of early detection of asthma exacerbations, "self-management skills, decision-making, problem solving, and medications" (Tehan et al., 1989, p. 515). This 100-point scale test was scored according to the number of correct

answers with correct answers indicating a higher level of knowledge.

The Asthma Attitude Test assessed asthma characteristics, satisfaction, understanding, and self-perceptions of students with asthma utilizing a Likert-type scale. This 20-point scale test was scored according to perceived severity; lower scores indicated a more positive student attitude and better student coping skills.

The study sample consisted of male and female students attending Dartmouth College who had been treated for asthma symptoms at the Dartmouth College Student Health Service in the previous year or had indicated a history of asthma on the required college-entrance physical exam (n = 90). A description of the study and an invitation to participate was mailed to these 90 eligible students. Of the 90, 22 students (24%) agreed to participate, but only 11 (12%) completed the program. Sixty-four percent of the class (n = 7) were female and 36% (n = 4) were male.

One week preceding the program, participants enrolled in the study were interviewed in order to obtain an asthma history, medication profile, baseline lung function

studies (including spirogram and peak flow measurements), and completion of the Asthma Knowledge Test and the Asthma Attitude Test. Following the interview, students attended four 2-hour sessions as described previously. These sessions were scheduled during the academic semester.

Prior to each session, additional spirometric and peak flow readings were obtained. At the same time, students were asked to subjectively rate their respiratory status on a scale of 1 to 4 with 1 meaning "no breathing problems" and 4 meaning "severe breathing problems." Students were also given a peak flow meter to record twice daily peak flow measurements and an Asthma Diary to record correlating asthma symptoms. Additional information regarding maintenance medications and timing of medications, relaxation techniques employed, and perception of respiratory status was also recorded.

Following the fourth session, students were again asked to complete the Asthma Knowledge Test, the Asthma Attitude Test, and finally a course evaluation. Three months following the program, students were interviewed in the same fashion as the preliminary interview.

According to Tehan et al. (1989), multivariate analysis of variance in Asthma Knowledge indicated that

there was no significant change ($p = .62$) in asthma knowledge between the pretest and posttest obtained immediately after the program. Interestingly enough, however, differences in knowledge did reach significance between the pretest and the 3-month follow-up ($p = .03$) as well as between the posttest and the 3-month follow-up ($p = .03$). Total improvement over time was, therefore, statistically significant ($p = .036$). The authors indicated several possible causative factors including delayed program benefit, stimulation of student interest in asthma and asthma management which prompted self-initiated study and increased knowledge, or the "test effect."

Accordingly, MANOVA analysis of Asthma Attitude revealed no statistically significant change in student attitudes between the pretest and posttest obtained immediately after the program ($p = .10$). However, differences in attitude did reach significance between the pretest and the 3-month follow-up ($p < .0005$) as well as between the posttest and the 3-month follow-up ($p < .001$). Total improvement over time was, therefore, statistically significant ($p < .0005$). Tehan et al. (1989) surmised that these results may have been the secondary product of

improved asthma management skills and coping abilities. Improvement in student attitudes may have evolved from successful implementation of acquired skill and abilities which would only have been evident at the 3-month follow-up.

The authors indicated that the large number of external variables inherent in this study prohibited clear interpretation of results. Tehan et al. (1989) note, however, that overall student "attitudes, knowledge, and perceived control over the disease appeared to rise. . . " (p. 518). According to the researchers, a second limitation was noted to be the small number of student participants. Academic scheduling restraints, geographic and logistic difficulties, and lack of student interest were suggested contributing factors.

The authors noted that students indicated significant benefit from group discussion and peer review. Tehan et al. (1989) reported that the students "stated that the program helped them to share solutions, to problem solve with their peers as well as with clinicians, and develop self-care strategies with the assistance of peer support both inside and outside of the sessions" (p. 518). The authors concluded that the Breathe Free program or a

similar asthma educational program was beneficial in helping students develop a self-care program. No recommendations for further research were noted.

It has, therefore, been indicated that college-age students (late adolescents) seemed to have difficulty in areas of asthma self-management behaviors, health care utilization, and preventative health care for a variety of reasons. In a study by Irwin, Millstein, and Ellen (1993), the authors had investigated and sought to similarly identify factors associated with adolescent acceptance of responsibility and compliance in the form of appointment-keeping behavior. Irwin et al. (1993) observed that adolescents tend to have relatively low appointment-keeping rates. The researchers also found that little current research literature has been published specifically investigating health behaviors in the adolescent. Irwin et al. (1993) theorized that sociodemographic and Health Belief Model compliance predictors could be identified in the adolesent population, thereby improving effectiveness of medical care and decreasing clinician cost of missed appointments. Therefore, the researchers concluded that a study of

appointment-keeping behavior in the adolescent was required.

Irwin et al. (1993) defined adolescents as males or females between the ages of 12 and 21 years. As criteria for entry into the study, patients must have had no office visit for the 6 weeks preceding the study and must have scheduled a follow-up appointment for a time within the following 3 months. Participants were required to speak English; developmentally or psychologically handicapped individuals were eliminated from the study.

Appointment-keeping was defined by actual patient return to the clinic according to scheduled time. Patients who canceled and rescheduled appointments remained in the study. Patients who missed scheduled appointments without canceling or who missed rescheduled appointments were considered to have concluded their study participation.

Prior to initiation of this prospective observational study, approval was obtained by the Committee on Human Research. Patient consent was obtained; in cases where the patient was accompanied by a parent, parental consent was obtained as well. The sample population consisted of adolescent patients receiving primary care at a large midwestern university medical center.

At the beginning of the study, adolescents (N = 166) were asked to complete a brief questionnaire inquiring about demographic data, transportation, and general clinician visit circumstances. Following the clinician visit, patients were then randomly divided into two groups: those who were to be interviewed (n = 78) and those who were not interviewed (n = 88). Those patients who were interviewed were questioned regarding appointment-keeping motivational factors applicable to the Health Belief Model (i.e., perceived susceptibility, severity, benefit, and barriers).

Each outcome (except barriers) was measured on a 5- to 6-point Likert scale. Susceptibility was assessed as the likelihood that perceived consequences of noncompliance would occur. Severity was assessed as to the perceived degree of adverse consequences of noncompliance. Benefit was assessed as perceived advantage or positive outcome of compliance. Barriers were assessed as dichotomous (yes or no) perceived patient identification with researcher proposed scenarios.

Outcome measures were determined by clinical appointment-keeping logs and medical records. Approximately half (48%) of the adolescents failed to keep

their follow-up appointment. Irwin et al. (1993) found that social class had a significant effect on appointment keeping behaviors ($p = .027$); elevated social class correlated with improved appointment-keeping behaviors. No other demographic data variables were found to be significant.

Correlational analysis of the Health Belief Model outcome measures found only one significant indicator of compliance: patient perception of the number of negative consequences potentially associated with noncompliance ($p = .009$). Perceived consequential severity of noncompliance was not found to be statistically significant, but was noted to be mildly directionally associated.

Irwin et al. (1993) concluded that adolescent compliance was directly associated with degree of understanding that noncompliance would produce negative consequences. As applied to asthma education, this study indicates that detailed discussion of chronic, irreversible airway damage due to untreated and poorly managed airway inflammation would have a significant impact on compliance in the asymptomatic late adolescent.

In summary, the published reports by the NIH and these six select studies have strongly influenced this

current research. While the Yoon et al. (1993) study demonstrated the influence and importance of primary care education, it did not address feasible adaptation of program content to the office or primary care setting nor the unique needs of the college-age late adolescent or young adult. While the Lahdensuo et al. (1996) study demonstrated the effect of an office-based educational program on quality of life and asthma symptomatology, it also did not address the unique needs of the late adolescent population. The Irwin et al. (1993) study indicated that educational programs for adolescents (and young adults) must specifically address and stress the long-term consequences of uncontrolled asthma. The Richards and Mauger (1990) and the Jolicoeur et al. (1994) survey studies indicated that asthma and allergy related illnesses in combination with a marked knowledge deficit are significant health problems for the college age-late adolescent student. Review of the Breathe Free program (Tehan et al., 1989) revealed significant benefit in education and peer review, yet was not feasible for routine primary health care use (as evidenced by discontinuation of the program after completion of the study). The 1997 NIH Report strongly recommended patient

asthma education, peak flow monitoring, and the establishment of a positive, healthy patient-health care provider relationship fostering effective communication. These studies or reports influenced the study design, educational program content, and implementation of this study. Each of these studies reveal findings supportive of conducting the proposed study.

Chapter III

The Research Design and Method

The purpose of this study was to determine whether there was a difference in asthma symptoms or knowledge in the late adolescent population before and after an asthma educational program. Methods used to study the variables of interest are identified in this chapter. The research design, setting, population, and sample are described. The instruments used to measure asthma symptoms and knowledge, the procedures for data collection, and the methods of data analysis are also identified and discussed.

Design of the Study

The study design for this quantitative study was quasi-experimental. Quasi-experimental designs "involve the manipulation of an independent variable . . . [but] . . . lack at least one of the other two properties that characterize true experiments: randomization or a control group" (Polit & Hungler, 1995, p. 168). There was no control group utilized in this study.

Variables

The dependent variables identified in this study were patient perception of asthma symptoms, objective peak flow measurements and patient knowledge of asthma. The independent variable was the asthma education program. The controlled variables were educational level and age of the students. Intervening variables may have included honesty in answering the questions, understanding the questions, unintentional variations in educator presentation, and the environment in which the testing was performed. Extraneous variables identified included the amount of previous exposure to asthma information or education, asthma severity, manipulation of medications by the primary health care provider, and diverse cultural and demographic influences affecting self-care, learning, and health maintenance behaviors inherent in the university health care setting.

Setting, Population, and Sample

This study was conducted in the student health center of a large university in Northeast Mississippi. Enrollment for the fall semester of 1996 totaled 14,064 students. The university has a multi-cultural, multi-racial population including 651 international registered students, 3,194

out-of-state registered students, and 10,870 in-state registered students.

The study population consisted of late adolescent asthmatics from 18 to 25 years of age enrolled in the university. The study sample (N = 13) was drawn from among male and female late adolescents who, having been diagnosed with asthma (including asthmatic bronchitis, reactive airway disease, wheezing or wheezy bronchitis), or who use asthma medications (bronchodilators, inhaled anti-inflammatories, or oral medications for the same purpose), had not participated in an office-based educational program and did not have or did not use a peak flow based asthma management plan. All participants received care at the student health center for asthma during the spring semester of 1997.

Methods of Data Collection

Techniques/instrumentation. The instruments used to measure the variables of this study and to collect the data were the Life Quality Test (LQ Test) (see Appendix A), the TruZone Peak Flow Meter (PFM), and the Asthma IQ questionnaire (see Appendix B). The term quality of life will be used synomously with the term symptoms for the purposes of this study.

The LQ Test questionnaire provided by the American College of Allergy, Asthma, and Immunology consisted of 20 yes or no questions divided into six categories: activities, symptoms, triggers, hospital visits, medication problems, and anxieties. The LQ Test, designed to assess patient perception of asthma symptoms and severity, was scored according to the total number of yes or no answers. Scores were interpreted in the following manner: the greater the number of yes answers, the greater the need for asthma evaluation or the more indicative of poor asthma control. The absolute range of the LQ Test was 20 to 40.

Lung function, a second measure of symptoms, was obtained by the TruZone PFM and yielded peak forced expiratory volume at 1 second (FEV1). Three consecutive peak flow readings (huffs) were obtained at each data gathering. The highest of the three numerical measurements was then considered the best effort and recorded. Peak flows were interpreted in the following manner: the greater the flow value (compared to standard normal values according to height and age), the more open the airway of the participant or the more indicative of better asthma control.

Basic knowledge of asthma pathophysiology, disease process, and medications were assessed using the National Heart Lung and Blood Institute (1991) Asthma IQ Fact Sheet. The Asthma IQ Fact Sheet consisted of 12 true or false statements. Score was based on the number of correct answers and was interpreted as follows: 11-12 answers correct = Superior knowledge, 10-11 answers correct = Very good knowledge, and fewer than 10 correct answers indicated a need for asthma education.

Reliability as a clinical assessment tool has not been established for the Life Quality Test (LQ Test) and the Asthma IQ questionnaires. These questionnaires were, however, assessed for content validity by the American College of Allergy, Asthma, and Immunology (Life Quality Test, 1995), the National Heart, Lung, and Blood Institute, and the committee members governing this study.

Procedures

Permission to conduct the study was first obtained from the Mississippi University for Women Committee on Use of Human Subjects in Experimentation (see Appendix C). Permission to conduct the study was then obtained from the Mississippi State University Use of Human Subjects Internal Review Board (see Appendix D). Potential

participants meeting study participation criteria (as defined in sample description) were referred for enrollment in the study from one of the University health care providers. Participants were then contacted by telephone regarding potential participation in this study. Following verbal agreement to participate, an initial appointment was scheduled at the convenience of the student subject. At the initial visit, study subjects provided written informed consent prior to participation in the program (see Appendix E).

After informed consent was obtained, participants were asked to complete the baseline assessment questionnaires entitled Life Quality Test (LQ Test) and Asthma IQ questionnaire. Baseline peak flow measurements were then obtained using a TruZone Peak Flow Meter. Peak flow normal values were recorded as predicted by the Peak Expiratory Flow Rate Nomogram adapted from Nunn and Gregg (NIH, 1994) (see Appendix F). Participants subsequently attended the educational program (see Appendix G).

The educational program consisted of one-on-one instruction in a separate room away from normal activity. Educational content, presented on a verbal, visual, and tactile level, including the following: (a) asthma

pathophysiology including signs and symptom patterns which may indicate inadequate asthma control, (b) the asthmatic disease process, (c) a review of health provider prescribed pharmacological intervention including prescribed medication use, side effects, and implications; (d) expected outcome as defined by the NIH (1997) to include prevention of chronic and troublesome symptoms, maintenance of (near) normal peak flows, maintenance of normal physical activities, and prevention of recurrent acute exacerbations/hospitalizations/emergency room visits; (e) optimal pharmacotherapy with the fewest adverse effects; and (f) patient satisfaction with asthma care. Program content additionally included participant instruction in metered-dose inhaler use, home peak flow meter (HPFM) use, HPFM graphing techniques, peak flow measurements with the participant's TruZone peak flow meter and the development criteria and utilization of a written asthma management plan based on percentages of the participant's personal best.

Participants were provided with and instructed in the use of an Ellipse metered-dose inhaler spacing device. Participants were provided with and instructed in the use of a TruZone peak flow meter. All verbal instruction was

reinforced by the following: provision of written material, clinician demonstration and patient return-demonstration, including handouts entitled How to Use Your Home Peak Flow Meter (see Appendix H), How to Use Your Metered Dose Inhaler (see Appendix I), and the booklet titled Understanding Asthma published by the National Jewish Center for Immunology and Respiratory Medicine, which can be obtained from National Jewish Center for Immunology and Respiratory Medicine. During the educational session, participants were asked for verbal repetition of key educational components with subsequent clarification and knowledge reinforcement throughout the session as needed. The educational session lasted approximately 40 to 60 minutes. Demographic data were obtained from the participant's existing intake history.

Following completion of the educational program, a posttest zoning visit with the study educator was scheduled for approximately 2 to 3 weeks later. Appointment cards with the time and date of the appointment, the name and telephone number of the investigator, and the name and telephone number of the Health Center served as cues to action for each participant. In the event of missed appointments, one

attempt to reschedule the appointment was made. If two appointments were missed without rescheduling by the participant, the participant was withdrawn from the study.

At the posttest appointment, all participants were asked to complete a duplicate LQ Test and Asthma IQ questionnaire which were then considered the posttest scores. Peak flows were obtained using the TruZone PFM and were also considered posttest data. Metered-dose inhaler technique and peak flow meter technique also were assessed and corrected as needed. TruZone peak flow values for the previous 2 to 3 weeks as recorded by the participant were assessed for stability and variability. A tentative Asthma Management Plan (see Appendix J) was then developed according to Asthma Education Protocol guidelines. Zones were determined according to the participant's personal best home peak flow and calculated as follows: green = at least 90% of personal best, high yellow = 70 to 90% of personal best, low yellow = 50 to 70% of personal best, and red = less than 50% of personal best.

The Asthma Care Plan was then reviewed, approved or revised, and signed by the health care provider. Participant understanding of the plan was assessed verbally. Participants then received the original plan and

a copy was made a permanent part of the participant's regular patient chart. The second visit lasted approximately 20 to 30 minutes.

A telephone follow-up assessment of asthma symptoms and knowledge was made at approximately 6 to 8 weeks post-intervention. The telephone follow-up included verbal completion of the LQ Test questionnaire, verbal reports of personal peak flow value ranges for the previous week, and verbal completion of the Asthma IQ questionnaire.

Methods of Data Analysis

Prior to data analysis, the questionnaires were sorted. Incomplete questionnaires or data from participants who did not complete the study were discarded. All completed questionnaires ($N = 20$) were included in analysis in order to obtain a sample size which yielded maximum statistical power. Telephone follow-up data ($n = 8$) were analyzed and compared separately.

Study participant characteristics were identified using descriptive statistics. Data were organized by assigning code numbers from 1 to 10 to each participant's scores to ensure confidentiality. Analysis was accomplished utilizing a two-tailed t test to test the research hypotheses and to assess for significant change

in pretest, posttest, and telephone follow-up questionnaire results or peak flow readings which would indicate differences in asthma symptoms or knowledge.

Summary

In this chapter, the research study design was presented. The methods used to study the variables of interest, the study setting, population, and sample also were described. The instruments used to measure asthma symptoms and knowledge, the procedures for data collection and the methods of data analysis were identified and discussed.

Chapter IV

The Findings

The purpose of this study was to determine whether there was a difference in asthma symptoms or knowledge in the late adolescent population before and after an asthma educational program in the primary health care setting. The study design used to test the two research hypotheses was a quasi-experimental design. In this chapter a description of the sample, analysis of the data in relation to the two research hypotheses, and additional findings are revealed.

Description of the Sample

The sample of convenience was solicited from the student population enrolled in a Northeast Mississippi university and included students who sought medical treatment for asthma or asthma related conditions at the campus student health center during the spring semester of 1997. Thirty-one adolescent students between the ages of 18 and 25 years who had been diagnosed with asthma (including asthmatic bronchitis, reactive airway disease,

wheezing, or wheezy bronchitis), or who used asthma medications (bronchodilators, inhaled anti-inflammatories, or oral medications for the same purpose) constituted the target sample. None of these students had participated in an office-based educational program and did not have, or did not use, a peak flow based asthma management plan.

The students were referred to the study group by the primary care physician. Of those 31, 14 students (43%) agreed to participate and, therefore, comprised the study sample. Of the 14 students who enrolled in the study and participated in the asthma educational program, ultimately 10 (71%) completed the program. One student was excluded as not meeting study criteria and 3 students did not return for the post program scheduled appointment nor for the subsequent rescheduled appointment. Of the 10 students who completed the educational program, 2 were not included in the telephone follow-up due to the students' telephones being disconnected. Demographic characteristics of the sample are presented in Table 1.

Table 1

Sample Demographic Characteristics by Frequency and Percentage

Characteristic	f	%
Gender		
Male	4	31.0
Female	9	69.0
Ethnicity		
Caucasian	11	84.0
African American	1	8.0
Hispanic	1	8.0
Age (years)		
18-19	1	8.0
20-22	7	54.0
23-25	5	38.0
Medication use		
Use > 1 metered dose inhaler	9	69.0
Oral medication use	1	8.0
Steroid nasal spray use	6	46.0
Smoker at pretest	3	23.0
Living off campus	8	62.0

Results of Data Analysis

Two separate tools were used to gather data for this study in conjunction with peak flow measurements. One tool, the Life Quality Test, was used to measure quality of life which is synonymous with the term symptoms. The TruZone Peak Flow Meter was used to quantify lung function as a measure of peak expiratory flow volume at 1 second (FEV1) and contributed to the measurement of asthma symptoms. The second tool, the Asthma IQ Test, was used to measure knowledge.

The Life Quality Test questionnaire provided by the American College of Allergy, Asthma, and Immunology (ACAAI) consisted of 20 questions divided into six categories: Activities, Symptoms, Triggers, Hospital Visits, Medication Problems, and Anxieties. The TruZone Peak Flow Meter assessed lung function by measuring three consecutive FEV1 readings per session. Lung function was subsequently categorized as a measure of quality of life or asthma symptoms. The Asthma IQ Test was prepared by the National Heart, Lung, and Blood Institute and consisted of 12 questions designed to assess asthma knowledge.

All data were analyzed to determine if there were differences in symptoms and knowledge before and after the

asthma educational program. Each category of tests was analyzed individually, utilizing two-tailed t tests for statistical significance including frequencies and percentages.

Symptoms. The first research hypothesis for this study was the following: There will be no difference in the asthma symptoms of late adolescents before and after an asthma educational program. The Life Quality Test, designed to measure asthma symptoms, was scored according to the number of questions answered yes or no and had an absolute range of 20 to 40. Symptoms were also measured according to objective lung function (FEV1) readings obtained at baseline, the 2- to 3-week zoning visit, and by telephone follow-up at 6 to 8 weeks. Lung function was recorded as the best reading of three consecutive peak flows at each of the three data collections.

The total pretest mean symptom (quality of life) score for both males and females (n = 10) was 32.30 (absolute range = 20 to 40). The mean pretest score for males was 32.00. The mean pretest score for females was 32.43. By category, the total mean pretest symptom scores were as follows: Activities, 6.90; Symptoms, 7.00;

Triggers, 7.20; Hospital Visits, 2.30; Medication Problems, 4.50; and Anxieties, 4.40.

The total posttest mean symptom score was 29.30. The total mean posttest symptom score for males was 31.00. The total mean posttest symptom score for females was 28.57. By category, the total mean posttest symptom score for males and females were as follows: Activities, 5.30; Symptoms, 7.00; Triggers, 6.90; Hospital Visits, 2.20; Medication Problems, 3.80; and Anxieties, 4.10).

Total mean pretest peak flow (CPF) was 400. The total mean posttest peak flow was 491. Data analysis revealed a statistically significant increase in peak flows between pretest and posttest ($t = 3.366$, $p = .008$). Further data analysis revealed an overall decrease in asthma symptoms as measured by the LQ Test pretest and posttest, but this decrease was not statistically significant ($p = .154$).

While there was a statistically significant difference in the scores for peak flow readings, there was no statistical difference in scores on the LQ test. Therefore, because the combination of these two measures encompass symptoms, the null hypothesis was accepted. These findings are presented in Table 2.

Table 2

Comparison of Asthma Symptoms Pretest and Posttest as Measured by the LQ Test and Peak Flows Before and After the Asthma Educational Program

Symptoms	n	M	SD	t	p
Total Symptom Score					
Pretest	10	32.30	4.45	1.557	.154
Posttest	10	29.30	3.37		
Activities					
Pretest	10	6.90	.876	3.748	.005*
Posttest	10	5.30	.949		
Symptoms					
Pretest	10	7.00	1.333	.000	1.000
Posttest	10	7.20	.789		
Triggers					
Pretest	10	7.20	.789	.635	.541
Posttest	10	6.90			

(table continues)

Table 2 (continued)

	n	M	SD	t	p
Hospital Visits					
Pretest	10	2.30	.483	1.000	.343
Posttest	10	2.20	.422		
Medication Problems					
Pretest	10	4.50	1.179	1.561	.153
Posttest	10	3.80	.789		
Anxieties					
Pretest	10	4.40	1.174	.818	.434
Posttest	10	4.10	1.101		
Peak Flows					
Pretest	10	400	81.82	3.366	.008*
Posttest	10	491	112.20		

Knowledge. The second research hypothesis was the following: There will be no difference in knowledge of asthma of late adolescents before and after an asthma educational program. The Asthma IQ Test designed to measure asthma knowledge was scored according to the number of questions answered correctly. This questionnaire had an absolute range of 0 to 12. Of the 12 questions on

the Asthma IQ Test, the mean number of correct pretest answers was 11. Scoring was defined by the American College of Asthma and Immunology as the following: 11-12 questions correct equaled superior asthma knowledge, 10-11 questions correct equaled very good asthma knowledge, and less than 10 questions correct indicated a need to learn more about asthma.

Statistical analysis revealed that there was no statistically significant change in total mean asthma knowledge between pretest, posttest, or telephone follow-up. Analysis of total mean scores between pretest and posttest revealed a *t* score (-1.309) which was not significant ($p = .223$). Therefore, the second null hypothesis was accepted.

Participants scored between very good and superior scores on the pretest, posttest, and telephone follow-up questionnaires. No persons missed seven of the questions at any time. Sixty percent of the participants consistently missed question 5 which stated, "Asthma episodes usually occur suddenly without warning." There was, however, a statistically significant increase in asthma knowledge between pretest and posttest for question 5 ($p = .001$). Additionally, 30% of participants

consistently missed question 3 which stated, "The way that parents raise their children can cause asthma." There was no statistically significant difference between pretest-posttest for question 3. These data results are illustrated in Table 3.

Table 3

Percentages of Questions Answered Correctly at Pretest, Posttest, and Telephone Follow-up

Question	Pretest	Posttest	Telephone Follow-up	%[a]
1	100.0	100.0	100.0	0.0
2	90.0	100.0	100.0	10.0
3	60.0	70.0	70.0	10.0
4	90.0	100.0	90.0	10.0
5	10.0	50.0	40.0	40.0
6	100.0	100.0	100.0	0.0
7	90.0	100.0	100.0	10.0
8	100.0	100.0	100.0	0.0
9	100.0	80.0	100.0	20.0
10	100.0	100.0	100.0	0.0
11	100.0	100.0	100.0	0.0
12	100.0	100.0	100.0	0.0

[a]% = difference between pretest and posttest.

Additional Findings

A telephone follow-up was conducted approximately 6 to 8 weeks after the educational intervention. Asthma symptoms and knowledge were again evaluated utilizing verbal completion of the LQ Test, verbal reports of recent home peak flows, and verbal completion of the IQ test. Of the 10 students who completed the study, only 8 were available by telephone for follow-up.

The total telephone follow-up ($n = 8$) mean symptom score was 25.88. By category, the total mean telephone follow-up symptom scores were as follows: Activities, 4.75; Symptoms, 5.63; Triggers, 6.75; Hospital Visits, 2.00; Medication Problems, 3.38; and Anxieties, 3.38.

Data analysis revealed a statistically significant decrease in total symptom scores between the pretest and the telephone follow-up ($t = 4.055$, $p = .005$). Additionally, there was a significant decrease in total symptom scores between the posttest and the telephone follow-up ($t = 2.631$, $p = .034$). Four of the six categories achieved statistical significance either between pretest and telephone follow-up or between posttest and telephone follow-up. These categories were as follows: Activities pretest to telephone ($p = .000$),

Symptoms posttest to telephone (p = .004), Medication Problems pretest to telephone (p = .028), and Anxieties pretest to Telephone (p = .007). Two categories, Triggers and Hospital Visits, did not achieve statistically significant differences in any comparison. These data are illustrated in Table 4.

Table 4

Comparison of Asthma Symptoms Pretest, Posttest, and at Telephone Follow-Up as Measured by the LQ Test and Peak Flows Before and After the Asthma Educational Program

Symptoms	n	M	SD	t	p
Total Symptom Score					
Pretest	10	32.30	4.45		
				4.055	.005*
Telephone[a]	8	25.88	.991		
				2.631	.034*
Posttest	10	29.30	3.37		
Activities					
Pretest	10	6.90	.876		
				6.333	.000*
Telephone	8	4.75	.463		
				1.080	.316
Posttest	10	5.30	.949		

[a]Telephone follow-up.

(table continues)

Table 4 (continued)

Symptom	n	M	SD	t	p
Symptoms					
Pretest	10	7.00	1.333		
				2.201	.064
Telephone	8	5.63	1.069		
				4.245	.004*
Posttest	10	7.00	.943		
Triggers					
Pretest	10	7.20	.789		
				1.667	.140
Telephone	8	6.75	.707		
				.000	1.000
Posttest	10	6.90	1.287		
Hospital Visits					
Pretest	10	2.30	.483		
				1.528	.170
Telephone	8	2.00	.000		
				1.000	.351
Posttest	10	2.20	.422		
Medication Problems					
Pretest	10	4.50	1.179		
				2.758	.028*
Telephone	8	3.375	.518		
				1.426	.197
Posttest	10	3.80	.789		
Anxieties					
Pretest	10	4.40	1.174		
				3.813	.007*
Telephone	8	3.375	.518		
				1.528	.170
Posttest	10	4.10	1.101		

(table continues)

Symptom	n	M	SD	t	p
Peak Flows					
Pretest	10	400	81.82		
				-2.650	.033*
Telephone	8	480	154.82		
				-.488	.641
Posttest	10	491	112.20		

When data were examined by individual category, it was interesting to note that, while overall statistical significance was not achieved between pretest and posttest, significance was obtained in one of the six categories. This category was Activities ($p = .005$).

Mean peak flow readings at telephone follow-up were 480. There was a statistically significant increase in peak flows between pretest and telephone follow-up where $p = .033$. There was, however, no statistically significant difference in peak flow readings between posttest and telephone follow-up. These findings are also presented in Table 4.

There was no statistically significant change in total mean knowledge either between pretest and telephone follow-up or between posttest and telephone follow-up. Referring to Table 3, it is interesting to note that there

was a statistically significant increase (p = .001) in correct scores between pretest and posttest scores as well as between pretest and telephone follow-up (p = .002) for Question 5 which reads, "Asthma episodes usually occur suddenly without warning." This significant increase could be due to the knowledge gained during the asthma education program, the test effect, self-motivated learning, or personal experience gained between testing sessions.

Additionally, there was a significant decrease in overall knowledge scores between pretest and posttest (p = .015) which then increased by the same amount (p = .015) between posttest and telephone follow-up for Question 9. Possible explanations for this finding could include participant inattention or misunderstanding of the question posttest. Another possible explanation could be researcher influence at telephone follow-up.

In summary, data analysis revealed no statistical differences in asthma symptoms or knowledge between the pretest and posttest following the educational program. There was, however, a statistically significant decrease in asthma symptoms between the posttest and telephone follow-up as well as between the pretest and telephone follow-up. There were no statistically significant

differences in knowledge between any of the three testing periods. These findings are supportive of similar studies investigating changes in asthma symptomatology over time before and after an asthma educational program. These findings differ from similar studies investigating asthma knowledge before and after an asthma educational program.

Chapter V

The Outcomes

Despite advances in medical technology, statistical evidence indicates that asthma related morbidity and mortality rates continue to rise, especially in the adolescent population. Current research literature suggests that patient education may be beneficial in obtaining and maintaining asthma control in the pediatric and adult populations. Currently, however, there is little research available regarding the impact of education in the late adolescent population. This study, therefore, sought to determine the impact of an educational program on asthma symptoms and knowledge among late adolescents. Becker's (1974) Health Belief Model was used as the theoretical framework for this quasi-experimental study.

The sample consisted of male and female late adolescents between the ages of 18 and 25 years who attended a large university health center in Northeast Mississippi and had been referred by their primary care health provider as candidates for enrollment in the asthma

educational study. Data were obtained from participant questionnaires, lung function measurements, and telephone follow-up. Asthma symptoms were measured and assessed by utilization of the American College of Allergy, Asthma, and Immunology Life Quality (LQ) Test, and by objective peak flow measurements. Asthma knowledge was measured and assessed by utilization of the National Heart, Lung and Blood Institute questionnaire Check Your Asthma IQ. Data were analyzed using descriptive statistics and the two-tailed *t* test.

Summary of the Findings

The pretest sample consisted of 12 Caucasian students, one African American student, and one Hispanic student, ages 18 to 25 with a mean age of 22 years. The sample was composed of 29% males and 71% females. The posttest sample consisted of 10 students with a mean age of 21 years. Thirty percent were males and 70% were females. The telephone follow-up sample consisted of 8 students with a mean age of 21.75. The follow-up sample was composed of 12% males and 88% females.

Statistical analysis revealed no significant difference between the total mean pretest asthma symptom scores and the total mean posttest asthma symptom scores

as measured by the LQ Test. However, further analysis revealed a statistically significant decrease in asthma symptoms between the pretest and the telephone follow-up (t = 4.055, p = .005) with level of significance at p < .05 as well as between the posttest and the telephone follow-up (t = 2.631, p = .034) with level of significance at p < .05. Additionally, analysis revealed that one of the six categories of the LQ questionnaire did achieve pretest and posttest significance. This category was Activities (p = .005).

There was a slight decrease in Anxieties between pretest and posttest, but this did not achieve significance (.434). There was, however, a significant decrease in anxieties between pretest and telephone follow-up (t = 3.813, p = .007). There was also a very significant difference in symptom scores for the Activities category between pretest and telephone follow-up (t = 6.333, p = .000). Additionally, there was a significant decrease in reported medication problems pretest and follow-up (t = 2.758, p = .028).

There was a significant increase in lung function as measured by peak expiratory flow volumes between the pretest and posttest (t = 3.366, p = .008) as well as

between pretest and telephone follow-up (t = 2.650, p = .033). However, between posttest and telephone follow-up, there was a decrease in peak flows (t = -.488, p = .641) which did not correspond to the significant decrease in symptoms (t = 4.245, p = .004) between posttest and telephone follow-up. In conclusion, however, both null hypotheses one and two were accepted.

Limitations

Several limitations were identified for this research study. The sample consisted of a small number of students from one university in Mississippi which may limit generalization. The sample was a sample of convenience. There were timing constraints dictated by scholastic calendars on the part of the researcher and the participants which may have influenced this research study. For example, the 2-week interval between pretest and posttest did not allow sufficient time for the educational program to impact participant symptoms. Additionally, the posttest visits fell during examination week or spring break for the majority of the students. Study participants were chosen by primary health care providers within the college health environment, which

contributed to a weaker design than if random samples had been utilized. There was no control.

Discussion

The findings from this study are supported by the theoretical Health Belief Model in that health maintenance behaviors are dependent on degree of perceived susceptibility. One possible explanation for the findings of this study could be the 2-week interval between the educational intervention and the posttest questionnaire did not allow sufficient time for participants to detect any significant improvement. Another possible explanation could be that when the students' asthma improved (i.e., symptoms decreased), they were not as diligent regarding health maintenance behaviors and slight deterioration occurred as evidenced by decreased peak flows.

When considering interpretation of study results, it is necessary to note that during the posttest visit, medication technique was reviewed and an individual written asthma management plan (or Zoning) was developed, reviewed, and given to participants for implementation. The telephone follow-up was then scheduled for approximately 4 to 6 weeks after posttest or Zoning visit

which would have allowed time for the asthma management plan to have been implemented and tested.

Another possible intervening variable which may have had an impact on study results was that for a large number of participants, the posttest visit fell during examination week. The week prior to and during examination week is a naturally stressful period for most students. This time period is often characterized by late nights with little sleep, little attention to personal health needs which could result in less diligent adherence to preventative health measures, and increased overall stress levels. All of these factors, or a combination of factors, may have contributed to a general lack of improvement in asthma symptoms pretest to posttest or even a worsening in symptoms for subjects in this study.

For those participants whose scheduled posttest visit did not fall during examination week, the visit fell immediately after spring break. Again, spring break for college students is often a time where scant attention is given to preventative health care needs, there is probable exposure to irritants and allergens in the form of cigarette smoke, dust, and/or dust mites in hotel rooms, and late nights with little sleep. In both instances, the

time between the posttest visit and the telephone follow-up fell during regularly scheduled class days when the students were in their normal routine, normal environment, and their normal health maintenance schedules. These explanations would be consistent with the findings of Richards and Mauger (1990) who determined that health maintenance behaviors were of low value or low priority in the college age adolescent.

Interestingly, peak flow scores actually decreased between posttest and telephone follow-up ($p = .641$). Symptom scores, however, between posttest and telephone follow-up decreased significantly ($p = .004$). Because small decreases in peak flow readings serve as early warning indicators of worsening asthma (generally even before asthmatics notice an increase in symptoms), one possible explanation for these findings could be that compliance dropped after the students' symptoms initially improved which is supported by the findings of Irwin et al. (1993). Irwin et al. (1993) determined that adolescent compliance was directly associated with degree of understanding that noncompliance would produce negative consequences. This theory is also supported by Becker's (1974) Health Belief Model which indicates that patient

compliance is dependent on patient perception of the degree of disease severity.

In comparison to the current findings with other studies, it is important to note the time intervals between intervention and data collection. In the Lahdensuo et al. (1996), the Tehan et al. (1989), and the Yoon et al. (1993) studies, data collection was 4 months post intervention, 3 months post intervention, and 5 months post-intervention, respectively. In this study, posttest data were gathered at approximately 2 weeks post-intervention in order to allow time for a personal best peak flow to be determined. This shorter 2-week interval was utilized in order to provide participants with an asthma management plan as quickly as possible.

This current study reflects the findings of the Tehan et al. (1989) study in which attitude improvement was not apparent immediately following the educational program. According to Tehan et al. (1989), there was no statistically significant change in student attitudes between the pretest and posttest obtained immediately following the program. However, in the Tehan et al. sample, differences in attitude did reach significance between the pretest and the 3-month follow-up, as well as

between the posttest and the 3-month follow-up. Total improvement over time was, therefore, statistically significant. Tehan et al.'s finding alerted this researcher who identified a trend at 6- to 8-week intervals in which some statistically significant changes were noted.

The delayed benefits noted in this current study may have been the result of improved asthma management skills and coping abilities. Improvement in asthma symptoms may have evolved from successful implementation of knowledge and abilities which were seen at the 6- to 8-week telephone follow-up and might have been evident with a 3-month follow-up. Other possible explanations could include stimulation of student interest in asthma and asthma management which prompted self-initiated study or the "test effect." These possible explanations were reflected in the discussions of Tehan et al. (1989) who reported similar findings.

Lahdensuo et al. (1996) and Yoon et al. (1993) found that lung function significantly improved between pretest and posttest. Lahdensuo et al. (1996) found significance at the 5-month follow-up ($p = .008$) and Yoon et al. (1993) found significance at the 5-month follow-up ($p < .001$). In

the current study, when the telephone follow-up data were considered as posttest, findings were consistent with the findings of Lahdensuo et al. (1996) and Yoon et al. (1993) in that a significant (p = .021) improvement in asthma symptoms was achieved between pretest and telephone follow-up.

There were no statistically significant changes in asthma knowledge between mean total scores for any of the three data gatherings in this current study. In comparing findings from this current study to previously related studies, it is important to note that all participants scored between very good and excellent on the pretest, posttest, and telephone follow-up questionnaires. These findings differed from the Jolicoeur et al. (1994) study in which a significant increase in knowledge 3 months post-intervention was reported. While these data would be the result of a generally higher education level, the Jolicoeur et al. (1994) study was likewise conducted in a collegiate setting. Another potential explanation could be that these data findings are a reflection of the National Asthma Education Campaign which was more widely publicized between 1994 and 1997.

In this current study, of the 13 students with scheduled zoning appointments, 6 arrived on the appropriate day within one hour of the appointed time. Four students, however, did not show up for the scheduled appointment but called to reschedule anywhere from 1 hour to 2 days after the appointment. This occurred an average of two times per student. Three students did not show up for appointments, did not call after missing the appointments, did not return pre-visit reminder calls, and did not return the call with suggestions to reschedule at their convenience.

At 6 to 8 weeks post-intervention, attempts to reach the 10 students by telephone for the telephone follow-up required approximately two to five calls per students before contact was made. Only two students attempted to return follow-up calls by leaving messages at the student health center, and one student left a message at the investigator's home telephone number. Two students had their telephone disconnected and were not listed in the telephone directory. Of these two, one student did not provide an emergency contact number with the university. Attempts to contact the other student through the

available emergency contact number revealed a disconnected number.

This lack of follow through on the part of the student subjects was also encountered in studies performed by Irwin et al. (1993) and Richards and Mauger (1990). Irwin et al. (1993) noted that adolescents have difficulty in compliance and follow-up behaviors. Richards and Mauger (1990) surmised that health maintenance behaviors are of low value to the college-age adolescent. These findings are supportive of Becker's (1974) Health Belief Model which states that changes in health behavior are the result of perceived susceptibility, belief in treatment modalities, and the ability to overcome obstacles.

Conclusions

Based on the results of this study, the following conclusions were drawn. There was no statistically significant decrease in the asthma symptoms of college-age adolescents within a 2-week interval. However, there was a statistically significant decrease in asthma symptoms over time. It is unknown if these benefits are long lasting.

There was a statistically significant increase in objective lung function following the education program but again it is unknown if these benefits are long

lasting. There was no statistically significant increase in asthma knowledge following the education program. However, the level of asthma knowledge prior to the program was exceptionally high and did not decrease significantly following the program.

Late adolescent college students require repeated reinforcement in order to motivate long-term behavioral changes. Despite a certain degree of autonomy and developmental maturity, college-age adolescents continue to have difficulty with compliance and follow through behaviors. There were no statistical differences between specific age groups, genders, those living on or off campus, and smokers and nonsmokers.

Implications for Nursing

The following implications for nursing practice, research, and education are made as a result of this study.

Practice. Findings from this study have several implications for advanced nursing practice. The nurse practitioner (NP) could utilize the findings of this study to implement an asthma education program better designed to be efficient and efficacious in the adolescent and late adolescent asthma populations. The results of this study

suggested that asthma education could improve quality of life for asthmatics and assist them in gaining better control of their asthma as evidenced by a decrease in symptoms over time and improvement in peak flows. However, findings also indicated that late adolescents continue to have difficulty with compliance. These behavioral characteristics are significant factors which must be considered in planning the care and management of the late adolescent asthmatic.

Because asthma is a chronic disease process with a potentially fatal outcome, nurse practitioners must also devise new ways to provide organized, efficient, and effective programs for clients in order to achieve lasting, beneficial health maintenance habits in the late adolescent population. Of the wide range of health care professionals, nurse practitioners (NPs) and primary health care providers located in the campus-based student health center may ultimately have the most contact with college-age adolescents. The findings of this study suggest, however, that student behaviors may be affected by collegiate schedules, class activities, and calendar events. Nurse practitioners must, therefore, be acutely

cognizant of these factors and plan scheduled visits accordingly.

Theory. The findings of this study support the Health Belief Model and add to the existing body of knowledge regarding motivation and alterations in health maintenance behaviors. Study results suggested that positive health maintenance behaviors decreased following an improvement in acute asthma symptoms. Assuming that asthma symptomatology served as a cue to action, this finding is supportive of the Health Belief Model premise that behavioral changes are dependent upon patient perceptions of susceptibility and degree of severity. Immediately following the educational program, when asthma symptoms were greatest, motivation was high, perceived degree of severity was subsequently high, and degree of behavioral change was high. As the severity of the disease decreased, patient compliance and health maintenance behaviors decreased.

Research. The findings of this study contribute to the existing body of knowledge regarding asthma management, education, and prevention in the late adolescent population. Nurse practitioners in primary care can use the findings of this study to develop new and

better ways to interact with late adolescents. NPs must develop new ways to improve compliance, such as development of Peer Support Groups or Peer Education Groups.

Additionally, NPs can utilize the findings of this study to design and implement further studies regarding adolescent motivation, compliance, and adherence to health maintenance behaviors. Further research into adolescent compliance and motivation to change are needed. Achieving a better understanding of late adolescent behavioral characteristics is paramount to establishing more reliable health care behaviors.

Recommendations

Based on the findings of this study, the following recommendations are made for future nursing research. It is recommended that similar studies be repeated in other college health care settings in order to expand the empirical evidence of knowledge related to asthma education, investigate student perceptions of the severity and susceptibility to asthma, student cues to action and motivation to change, and compliance factors related to treatment regimes. It is further recommended that similar studies be expanded to include a larger student population

with a more diverse cultural and demographic sample. Additionally, it is recommended that a longitudinal study with a greater time interval between data gatherings be implemented to determine long-term benefits and compliance.

Additional recommendations include further use and testing of the LQ Test and the IQ questionnaire to establish reliability and validity as a research tool. Because collegiate schedules were critical influencing factors in this study, it is recommended that future studies be mindful of holidays, scholastic calendars, and examination periods when determining testing dates, follow-up periods, and appointments.

Asthma continues to be a serious, yet understudied, health problem in our late adolescent collegiate population. Further investigation and research are urgently needed in order to motivate and initiate behavioral changes in our adolescents, thereby decreasing morbidity and mortality.

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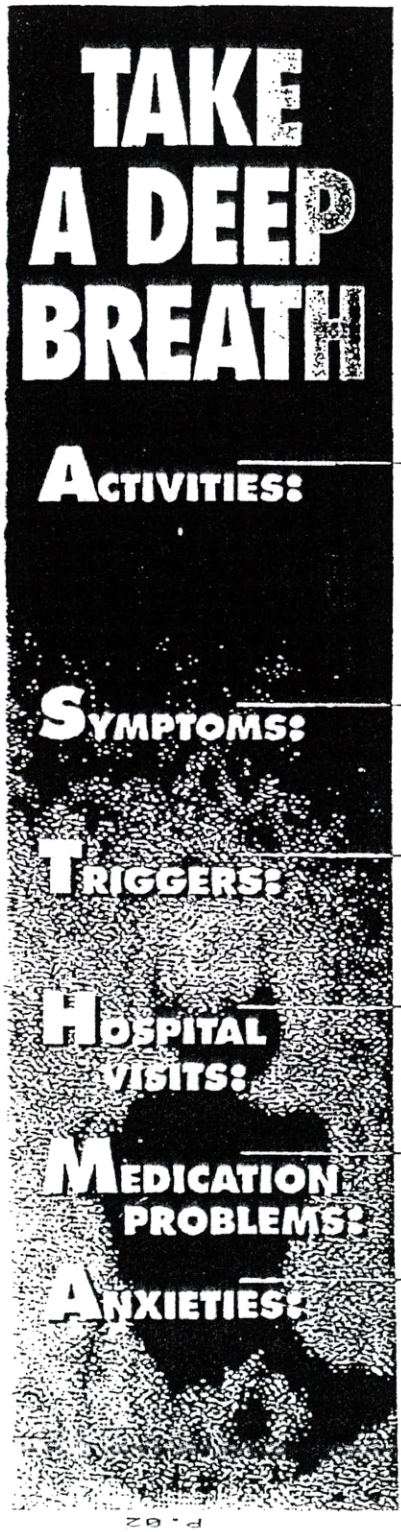
APPENDIX A

LQ LIFE QUALITY TEST



LQ LIFE QUALITY TEST

If you or your child has been told you have asthma, or even if you have occasional problems taking a good, deep breath, this simple test from the American College of Allergy, Asthma & Immunology (ACAAI) may help improve LIFE QUALITY (or "LQ"). Just pick up a pencil or pen and answer the 20 questions. Then turn over the page and decide whether a quick, free phone call could lead to a better LQ for you.

	Yes	No
ACTIVITIES:		
When I walk or do simple chores, I have trouble breathing or I cough	❑	❑
When I perform heavier work, such as walking up hills and stairs or doing chores that involve lifting, I have trouble breathing or I cough	❑	❑
Sometimes I avoid exercising or taking part in sports like jogging, swimming, tennis or aerobics because I have trouble breathing or I cough	❑	❑
I have been unable to sleep through the night without coughing attacks or shortness of breath	❑	❑
SYMPTOMS:		
Sometimes I can't catch a good, deep breath	❑	❑
Sometimes I make wheezing sounds in my chest	❑	❑
Sometimes my chest feels tight	❑	❑
Sometimes I cough a lot	❑	❑
TRIGGERS:		
Dust, pollen and pets make my asthma worse	❑	❑
My asthma gets worse in cold weather	❑	❑
My asthma gets worse when I'm around tobacco smoke, fumes or strong odors	❑	❑
When I catch a cold, it often goes into my chest	❑	❑
HOSPITAL VISITS:		
I made one or more emergency visits due to asthma or breathing problems in the last year	❑	❑
I had one or more overnight hospitalizations due to asthma or breathing problems in the last year	❑	❑
MEDICATION PROBLEMS:		
I feel like I use my asthma inhaler too often	❑	❑
Sometimes I don't like the way my asthma medicine(s) makes me feel	❑	❑
My asthma medicine doesn't control my asthma	❑	❑
ANXIETIES:		
My breathing problem or asthma controls my life more than I would like	❑	❑
I feel tension or stress because of my breathing problem or asthma	❑	❑
I worry that my breathing problem or asthma affects my health or may even shorten my life	❑	❑

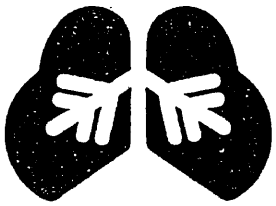
ACAAI American College of Allergy, Asthma & Immunology

APPENDIX B

ASTHMA I.Q.

Figure 5-7
National Asthma Education Program Fact Sheet

Check Your Asthma "I.Q."



National Asthma Education Program

Prepared by the National Heart, Lung, and Blood Institute

The following true-or-false statements test what you know about asthma. Be sure to read the correct answers and explanations on the back of this sheet.

	True	False
1. Asthma is a common disease among children and adults in the United States.	☐	☐
2. Asthma is an emotional or psychological illness.	☐	☐
3. The way that parents raise their children can cause asthma.	☐	☐
4. Asthma episodes may cause breathing problems, but these episodes are not really harmful or dangerous.	☐	☐
5. Asthma episodes usually occur suddenly without warning.	☐	☐
6. Many different things can bring on an asthma episode.	☐	☐
7. Asthma cannot be cured, but it can be controlled.	☐	☐
8. There are different types of medicine to control asthma.	☐	☐
9. People with asthma have no way to monitor how well their lungs are functioning.	☐	☐
10. Both children and adults can have asthma.	☐	☐
11. Tobacco smoke can make an asthma episode worse.	☐	☐
12. People with asthma should not exercise.	☐	☐

Your Score—How many answers did you get correct?

11-12 correct	=	Congratulations! You know a lot about asthma. Share this information with your family and friends.
10-11 correct	=	Very good.
Fewer than 10 correct	=	Go over the answers and try to learn more about asthma.

APPENDIX C

APPROVAL OF MISSISSIPPI UNIVERSITY FOR WOMEN'S COMMITTEE ON USE OF HUMAN SUBJECTS IN EXPERIMENTATION

MISSISSIPPI UNIVERSITY FOR WOMEN
Columbus, MS 39701

Office of the Vice President for Academic Affairs
Eudora Welty Hall
P.O. Box W-1603
(601) 329-7142

February 28, 1997

Ms. Jeanette Arnold Lawson
c/o Graduate Program in Nursing
Campus

Dear Ms. Lawson:

I am pleased to inform you that the members of the Committee on Human Subjects in Experimentation have approved your proposed research provided the following conditions are met.

There must be some control of raw data to assure confidentiality.

I wish you much success in your research.

Sincerely,

Susan Kupisch, Ph.D.
Vice President
for Academic Affairs

SK:wr

cc: Mr. Jim Davidson
Dr. Mary Pat Curtis
Dr. Rent

APPENDIX D

INSTITUTIONAL REVIEW BOARD APPROVAL OF MISSISSIPPI STATE UNIVERSITY

Mississippi State UNIVERSITY

John C. Longest Student Health Center
Box 9732
Mississippi State, MS 39762
(601) 325-2431 FAX (601) 325-8888

February 10, 1997

To Whom It May Concern:

Pending IRB approval, Mississippi State University will allow Jeanette Lawson to use the Longest Student Health Center as a research site. Her study will deal with the impact of an educational program on asthma symptoms in the late adolescent.

Robert K. Collins, M.D.
Director

INSTITUTIONAL REVIEW BOARD APPROVAL FORM
FOR THE PROTECTION OF HUMAN SUBJECTS IN RESEARCH
MISSISSIPPI STATE UNIVERSITY

STATEMENT OF BOARD: **IRB DOCKET #** 97-029

This is to certify that the research proposal entitled .The Impact of an Educational Program on Asthma Symptoms in the Late Adolescent

and submitted by: Name: Jeanette Arnold Lawson

Department: Longest Student Health Center

Name of Advisor: Dr. Linda Sullivan

to **Sponsored Programs Administration** for consideration has been reviewed by the Regulatory Compliance Officer or the IRB and approved with respect to the study of human subjects as appropriately protecting the rights and welfare of the individuals involved, employing appropriate methods of securing informed consent from these individuals and not involving undue risk in the light of potential benefits to be derived therefrom.

Administrative Approval Date: _____

_____(A) Contingent upon receipt of _____

_____

_____(B) All necessary documents were received.

Expedited Approval Date: _____

_____(A) Contingent upon receipt of _____

_____

_____(B) All necessary documents were received.

Full Board Approval Date: March 13, 1997

x (A) Contingent upon receipt of a signed IRB approval from Mississippi University for Women

_____(B) All necessary documents were received.

Robyn B. Remotigue — March 13, 1997

Robyn B. Remotigue, MSU Regulatory Compliance Officer **Date**

3/17/97

Institutional Review Board Member **Date**

(revised form 8/96)

APPENDIX E

LETTER OF INTRODUCTION AND INFORMED CONSENT

Letter of Introduction and Informed Consent

Dear Participant:

My name is Jeanette Lawson. I am a registered nurse working on a master's degree at Mississippi University for Women. I am conducting a research study concerning asthma, its effect on your day-to-day activities, and methods of controlling asthma. The findings of my study may benefit other asthmatics by finding better ways to educate asthma patients and help them to control their asthma symptoms.

If you agree to participate, your health care provider will recommend that you be enrolled in an asthma education program. Prior to the educational program, you will be asked to fill out a short questionnaire. The information you provide will be assigned a random participant number in order to ensure confidentiality.

The education program will last approximately 40 to 60 minutes and is free of charge. The program will include information about asthma, asthma medications, and a tool to help monitor asthma. At the end of the program, you will be asked to schedule one follow-up visit within a 2- to 3-week time period. During this follow-up visit, you will be asked to fill out a second questionnaire, your health care provider will evaluate your asthma, and you will be given a written asthma management plan. At the end of the study, you will receive a follow-up telephone call asking you to evaluate your asthma symptoms.

You may withdraw from the study at any time for any reason up to data analysis. Participation or nonparticipation in this study does not in any way affect your relationship with your health care provider. You will not be given any experimental medications, nor will your medications be any part of this study.

Your signature below indicates your willingness to participate in this study and your understanding of the terms of your agreement. Thank you in advance for your willingness to participate in this study.

Sincerely,

Jeanette A. Lawson, BSN, RN

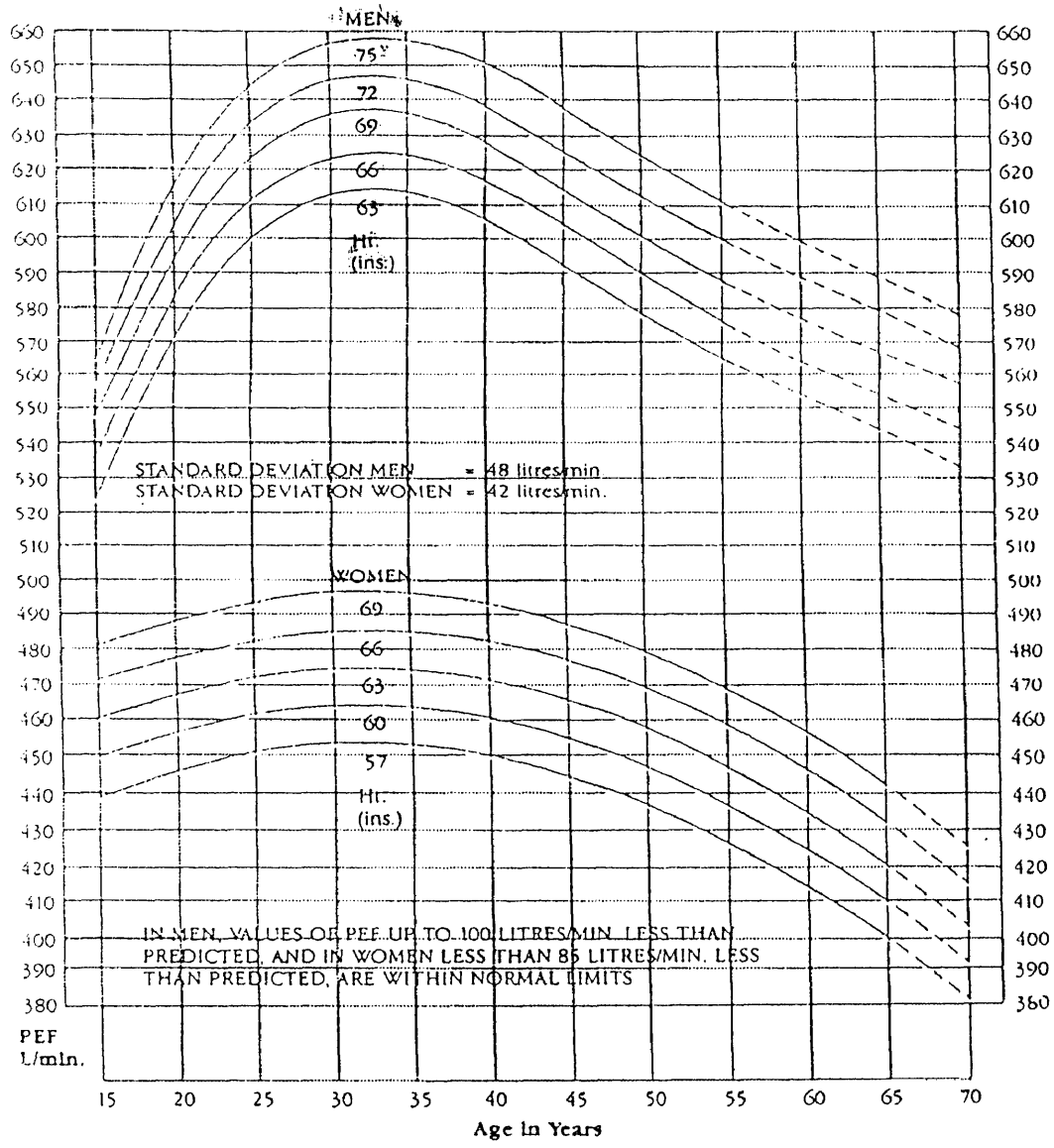
I, _____, agree to participate in this study. I understand the terms of my consent.

I, _____ (Parent/Guardian), agree to allow my son/daughter, _____ to participate in this study. I understand the terms of my consent.

APPENDIX F

PEAK EXPIRATORY FLOW RATE NOMOGRAM

Figure 3
Sample Peak Expiratory Flow Rate Nomogram



Adapted from: Nunn, AJ, Gregg, I, *Brit. Med. J.* 1989; 298:1068-70

APPENDIX G

ASTHMA EDUCATION PROTOCOL

ASTHMA EDUCATION PROTOCOL

Asthma is a chronic inflammatory disease process characterized by reversible airway obstruction and hypersensitivity of the airways. Asthma mortality and especially adolescent asthma mortality is on the rise. The National Heart, Lung and Blood Institute (NHLB) recommends establishing a written asthma management plan for each asthmatic that includes a stepwise management plan. As with any chronic disease, patients require education in self-management skills and effective crisis intervention.

Patient education is a crucial component of the comprehensive Asthma Management Plan. Patient education fosters development of a trust relationship between patient, clinician, and nurse. Education empowers the patient and helps maintain patient's perception of control.

Instructions must be clear and simple. Written instructions should accompany all verbal teaching and, when necessary, written medication instructions as prescribed by the clinician. Educators must be familiar with the information they are relaying and be prepared to answer questions.

Patients will be referred by a clinician. The clinician will indicate which medications he or she has prescribed and if a home peak flow meter is indicated. For inhaled corticosteroids, a spacing device should be used. The clinician preference will be indicated.

HOME PEAK FLOW METER/ASTHMA TALK

These educational segments are grouped together because patients who need a home peak flow meter will also need an asthma education talk.

All asthma patients should receive the Understanding Asthma booklet published by the National Jewish Center for Immunology and Respiratory Disease. Nurses should briefly point out patient information highlights while reviewing the booklet with the patient. The main highlights include the three components of the reactive airway (inflammation or swelling, bronchospasm, and excessive mucus production), common triggers of asthma, methods of monitoring asthma, and common medications. It is helpful to note which medications the clinician has prescribed and note them next to the appropriate action (e.g., bronchodilator or anti-inflammatory) in the patient's booklet. Nurses should point out resources for further reading and the LUNG-line number printed in the back of the booklet.

Peak Flows

A peak flow (**Peak Expiratory Flow Volume**) measures the maximum rate of air exhaled from the lungs in the first second. It is roughly equivalent to the FEV1 (forced expiratory volume in the 1st second) of spirometry and is a good indication in airflow obstruction of the large airways. It is not as accurate or as informative as a spirogram, but is an inexpensive, easy and timely way to monitor asthma.

To perform a peak flow reading, the patient should stand, inhale as fully as possible, seal the lips and teeth firmly around the mouthpiece (so no air leaks out) and exhale **forcefully.** Patients should utilize ("push with") their diaphragm and expend considerable effort/energy in order to obtain an accurate, meaningful reading.

Patients should perform three PF measurements:

1. Record each result on the peach peak flow chart located in the front of the chart.

2. Record the predicted "normal" values according to the National Heart, Lung, and Blood Institute guidelines in RED underneath the patient's readings.

3. Note "NL" beside it.

4. Record the patient's present age and height; update as needed for growing children (children's peak flows will change as they grow and will need to be updated periodically).

The mouthpieces are disposable, for one patient use only. Be sure to use a tissue or glove to remove used cardboard mouthpiece and place in the trash.

Be sure that the patient's tongue is UNDER the mouthpiece. If the patient's tongue is obstructing the air flow, there will be a characteristically "dull" sound accompanied by abnormally low readings.

Occasionally, patients will discover that if they first occlude the mouthpiece with their tongue, then suddenly remove it, they will have abnormally high readings. This is called "spitting" into the peak flow meter.

NEITHER OF THESE TECHNIQUES PRODUCE ACCURATE RESULTS.

The printed handout, **How to Use Your Peak Flow Meter,** should accompany each peak flow meter, as well as a graph for charting peak flows. Patients should be encouraged to copy the blank graph before use.

There are three main reasons for asthma monitoring via use of a home peak flow meter:

1. HPF monitoring gives the patient and the clinician a more effective level of communication. The patient can use specific, objective lung function measurements to help describe subjective, often vague, descriptions of patient symptoms. For example, a significantly higher level of communication is achieved when the patient says they have a "fever of 102," instead of "feverish and chilled."

2. HPF monitoring gives the patient objective data to make informed decisions about asthma management and medications. Home monitoring gives the patient control over his or her asthma by providing an individualized, action-specific asthma management plan based on objective measurements.

3. HPF monitoring serves as an early warning system by detecting changes in pulmonary function of 10% or less. Usually, clinicians cannot detect changes in airway status (and the patient does not begin to notice symptoms) until there is approximately a 20-25% decrease in lung function. The sooner asthma medications are adjusted in response to an asthma flare, the sooner the flare is reversed.

Patients should be instructed in **accurate** reading of peak flow measurements with **return patient demonstration required.** Peak flows are recorded in increments of 10. If the arrow appears to be between two numbers, instruct the patient to round up to the nearest 10th. The patient should perform home peak flows using the same respiratory effort and technique utilized in the office.

Remember: Peak flows are effort dependent. In order for the information obtained to be useful, effort must be **consistent and genuine.** Patients should take the highest of the three readings and graph that number. Review instructions with patient and point out written instructions on the bottom of the graph.

Do three blows, twice/day--morning and evening--**BEFORE** inhaled meds.
Take the highest reading; graph it.

Peak flows should be recorded for a minimum of 2 weeks. Patients should notify the clinician **BEFORE** the 2-week time period **if** peak flows **decrease, vary widely, or are extremely erratic.**

Patients should schedule the zoning appointment for 2 weeks from the start of the graphing period so that the clinician can create an asthma management plan. Place **Asthma Management Plan** sheet on the front of the chart along with a copy of the patient's most recent peak flows. After the clinician has completed the Management Plan, **signed it** and **dated it**, make a copy and place the copy in the front of the chart.

Instruct patients to bring their own peak flow meter with them for each office visit in order to avoid an in-office peak flow measurement charge.

MDI Demonstration

MDIs (metered dose inhalers) are incredible inventions that deliver a measured dose of medication to the target organ (the lungs) without systemic ingestion of the medication, thereby dramatically reducing medication side effects.

MDIs, however, have a design flaw: Using the original closed mouth technique, the medication comes out so fast, that approximately one half of the medication ends up sticking to the back of the throat. This results in half of the medicine being absorbed through the oral/pharyngeal mucosa; the more medication absorbed, the more potential there is for systemic medication side effects (cardiac with beta agonists and adrenal suppression with corticosteroids).

With the closed mouth technique, only about 2 to 8% of the medication actually gets into the lungs. A medication holding chamber of "spacer" decreases the amount uselessly stuck to the back of the throat to about 10 to 15% and increases the amount that gets to the lungs to about 15%.

In practical terms, this means that by utilizing an MDI spacer or the open mouth technique, the patient receives more benefit with fewer side effects. **It is important for patients to understand this and to use their spacers/proper technique regularly.**

There are several different types of spacing devices designed to be used with MDIs. MDIs are not wonderfully efficient to begin with, but if used incorrectly, they are even less so. NHLBI recommends a spacing device with every anti-inflammatory MDI. Not only does it **increase the effectiveness of the inhaler,** but it also **decreases the incidence of thrush.**

TECHNIQUE

All patients should **stand up** when using their MDI/spacer; this encourages full lung expansion. The object is to get as much medicine as possible to the tiny alveoli at the bottom of the lungs. This requires good posture and slow, deep breathing. (Note: Many of the spacers have a built-in timing device--if the patient breathes in too quickly, the spacer will whistle, indicating a need to slow inhalation rate!)

- Instruct the patient to **shake** the inhaler before **each** puff. This is necessary to mix the propellant and medication in the proper ratio to ensure an accurate dose of medication.
- Have the patient take a deep breath and exhale as fully as possible.
- Seal lips and teeth around the mouthpiece.
- Actuate the canister by pressing firmly.

- Inhale slowly and as deeply as possible through the mouth.
- When maximum inhalation has been achieved, hold that breath for 6 to 10 seconds.
- Wait 1 full minute and repeat entire process.

Patients using inhaled corticosteroids should **always** either **rinse-and-spit after use, or brush their teeth after use.** This (in addition to the use of a spacing device) reduces likelihood of thrush.

Demonstrate MDI technique (without actually touching your mouth to the mouthpiece, of course). **Disassemble** spacer and inhaler and have the **patient perform a return demonstration;** correct as needed. Written instructions should accompany each demonstration (HOW TO USE YOUR METERED-DOSE INHALER).

The **inspirease** is useful for children and the elderly; it enables the patient or caregiver to visualize the effectiveness of the patient's inspiration. The bag should collapse completely and stay collapsed as the patient holds his or her breath. If the bag will not stay collapsed, there may be a hole in it and the bag will need to be replaced.

The **aerochamber-with-a-mask** is a good alternative to a nebulizer for a young child or for someone who cannot coordinate inspiration and breath holding.

The **aerochamber** is usually the preferred spacing device for adults and children over the age of 7 or 8. You may have to experiment with the individual child to determine which spacer is best. Some 4-year-olds can use the inspirease, while some 10-year-olds (or even adults) cannot.

The **eclipse** and the **optihaler** are more compact and are free. They may be preferred by teenagers or athletes because the patient can store their MDI canister inside the spacer. However, only the Ventolin/Proventil and Beclovent/Vanceril MDIs will fit into the elipse adapter.

Ventolin rotocaps may be preferred for the patient with EIB (exercise induced bronchospasm) for PTE (prior to exercise) use; they are compact, fast, and easy to use. They are, however, dependent upon the patient's ability to inhale. They **are not suitable for patients who are in distress.**

Maxair autohalers are the only MDIs not suited for use with a spacing device. Azmacort MDIs come with a built-in spacer, but the extension devices do not have the recommended holding chamber capacity.

	Size	Age	Pro	Con
Aerochamber	Medium	4 years-Adult	Durable, clear barrel, inst. on side	Sl. bulky, $10
Elipse	Medium	6 years - Adult	Free, clear, store cann. inside	Flimsy, several remov. parts
Optihaler	Small	6 years - Adult	Free, clear, store cann. inside	Not recc. holding capacity
Rotocap	Small	4 years - Adult	Small, store cap. inside, QUICK	Not suitable for rescue use
Inspirease	Medium	3 years - Adult	View resp. effort, inexp.	Flimsy, bulky, bags tear
Aero, w/mask	Large	Infant - 4 years	Not depend. on ability to hold breath	Bulky, nose-piece tears

Current medical literature indicates that the open mouth technique (of MDI use) **performed accurately** is as effective as using a volumetric spacing device/holding chamber. It also points out that it is **difficult** to coordinate inspiration, MDI actuation, and stream of medication direction. Most of the time, open mouth technique is not used correctly, which dramatically reduces effectiveness.

If the patient or clinician prefers the open mouth technique, the inhaler should be held approximately 3-4 inches form the open mouth; head tilted back slightly to maximize opening of the airway. Patient should exhale fully, then actuate canister while beginning inspiration. Maintain open mouth and position while inhaling **slowly** and fully, then hold breath for 8 to 10 seconds.

Allergies play a significant role in triggering reactive airway inflammation and spasm.

Patients with pollen allergies will usually display seasonal allergic symptoms, especially during the spring and fall. Patients will notice cyclic "illnesses" with "sinus" symptoms of rhinorrhea, congestion, and PND (post nasal drip). A sore throat, chronic ear infections, and chronic, recurrent sinus infections (often accompanied by a cough) may also be indicators of an allergic condition.

Patients with allergies to dust, dust mites, animal danders, and mold will typically have symptoms all year long. Symptoms are frequently worse in the house, usually in the morning and on the weekend.

Some patients have a sensitivity to an environmental component at work; these patients will typically be well during the weekend, go to work Monday, and begin feeling ill. Symptoms worsen all week, resolve on the weekend and reoccur on Monday.

Vasomotor Rhinitis (VMR) and non-allergic rhinitis eosinophilia (NARES) have symptoms similar to allergic rhinitis (AR) but are not allergic responses. VMR is harder to control and is usually year round. Typical symptoms might be triggered by perfumes, strong odors, barometric weather pressure or temperature changes, air-conditioning, fabric dye odors, or spicy foods.

It is beneficial for the clinician to know the pattern of symptoms in order to diagnose and prescribe. You should know the medications available and their typical use in order to assist the patient in recalling current medications. Note them in the chart prior to the clinician's examination.

For patients who are sensitive to dust and dust mites, there is a handout provided by National Allergy Supply, Inc. Educators should review the main points included in the handout; be sure to point out that not all of the products for sale are recommended or necessary. Areas of significance to highlight:

- Pillow, mattress, and box spring covers. Note that covers should be zippered shut and left on. The newer mattress and pillow covers have a mite proof barrier on one side and cloth on the other; this eliminates uncomfortable sweating and crinkling that would have occurred with plain plastic. Covers may be wiped down, washed, or vacuumed with linen changes. The **box springs** can be covered with the less expensive plastic; remember, however, that the cheaper the plastic, the thinner it is and the easier it is to tear. . . tears can be patched using silver duct tape. It might be worth it to invest a little more in the pillow case . . .

- Suggested A/C filters: **Pleated** A/C filters, not the thin blue kind (pleated filters can be found at Lowe's, Wal-Mart, and Foodmax). Change every 6 weeks.

- High filtration vacuum cleaner bags: Needs to filter down to 1 micron or less (National Allergy Supply has a GREAT price, but you can also get these at Wal-Mart.)

- Wash linens in HOT water every 2 weeks (the patient will most likely have to turn up the hot water heater to 130 degrees to wash, then lower temperature again to avoid scalding--it takes 130 degrees to kill the mites.)

- The **ideal** environment requires wooden, linoleum or tile floors--anything except carpet. In **reality,** alternative flooring is expensive. Most of the time, students cannot modify an apartment . . . the next best thing is a tannic-acid based spray. It works well, BUT is unsuitable for white or very light colored carpets because it may discolor them and turn them brown. This spray (Allersearch Spray) must be used every 3 to 4 months; it is moderately priced. Give the patient all the options and let them decide what will work best for them. For specific precautions regarding the spray, have the patient contact the retailer.

- Vaporizers or humidifiers are not recommended for an allergic patient's room. Increased humidity levels cause an increase in dust mites. Dust mites feed on dead skin cells and love warmth and humidity. If a patient needs steam or mist treatments, have the patient go into the bathroom to administer treatment.

NASAL SPRAYS

If the clinician prescribes a cortisone nasal spray, these medications will need to be taken **regularly** during the applicable season in order for the patient to receive benefit. These medicines are not designed to work immediately. For the older anti-inflammatory nasal sprays (Beconase AQ® and Beconase aerosol®, Vancenase AQ® and Vancenase® pockethaler), it may take up to a week before any noticeable benefit. Flonase® (liquid), Vancenase DS® (liquid), Rinocort® (aerosol), and Nasacort® (aerosol) act much sooner; Flonase® reports patient benefits within 24 hours. The newer ones can also be tapered down to every other day in some cases, as the clinician orders.

Regardless of brand, cortisone nasal sprays need to be directed away from the nasal septum (**intra-nasally,** point more toward the eye). Occasionally, the force and nature of the spray can irritate the nasal septum and cause septal bleeding. If a patient on nasal sprays complains of mild nasal bleeding, inquire about and document spray technique.

Patient education is a crucial part of effective management of asthma and allergies. Nurses can serve as educators and patient advocates in assuring that the patient understands

- the disease process itself (brief pathophysiology) including
- intervention measures and management plans as prescribed by the clinician,
- the clinician's medication instructions,
- what their medications do,
- how they work,
- when to take them (as prescribed by the clinician),
- When **not** to take them (for prn medications as prescribed by clinician),
- and what signs and symptoms might alert the patient to changes in disease status that indicate a need for medical intervention.

APPENDIX H

HOW TO USE YOUR PEAK FLOW METER

Mississippi State UNIVERSITY

John C. Longest Student Health Center
Box 9732
Mississippi State, MS 39762
(601) 325-2431 FAX (601) 325-8888

How to Use Your Peak Flow Meter

Your peak flow meter is designed to help you better control your asthma by giving you an early warning when your airflow is becoming reduced. In order for your meter to help you in this way, it is critical that you use it properly. The following steps will help make you a peak flow expert.

1. Always STAND when you use your meter.
2. Make sure the mouthpiece is firmly attached to your meter.
3. Place the pointer to zero.
4. Take a deep breath.
5. Place your lips firmly around the mouthpiece with your tongue under the mouthpiece and out of the way.
6. Blow hard and fast into the meter. Remember, the meter only measures the first split-second of your breath out.
7. Read the results, and repeat two more times. If the use of the meter makes you cough or wheeze, stop.
8. Record your HIGHEST reading on you peak flow chart.

Remember, your peak flow meter is only as helpful as you make it. If your technique is poor, the meter cannot help you make good decisions about your asthma. If you have any problems or think that your meter is not working right, contact our office. Bring your peak flow meter and readings to each office visit, and call immediately if your asthma is not responding to your medications. Remember, early action to control your asthma means faster improvement with fewer medications.

Waldman-Wagner, C. Asthma Care and Patient Education: The Nurse's Role. Research Triangle Park, N.C.: Allen & Hanburys, 1991.

APPENDIX I

HOW TO USE YOUR METERED-DOSE INHALER

Mississippi State UNIVERSITY

John C. Longest Student Health Center
Box 9732
Mississippi State, MS 39762
(601) 325-2431 FAX (601) 325-8888

How to Use Your Metered-Dose Inhaler

Correct use of your inhaler is absolutely necessary to ensure that you are getting the full dose of your medication. Improper use can reduce your medication dose by more than one half; therefore, it is important that you follow these instructions EVERY TIME you use your inhaler.

Always use the spacing mechanism* your doctor has recommended. The use of the spacer makes a great deal of difference in the amount of medication you receive. The spacer slows and spreads the medication particles, making them easier to inhale.

1. **STAND** whenever possible to use your inhaler.
2. **SHAKE** the canister well before EACH spray.
3. Take a full breath, then exhale as much air as possible.
4. Place the spacer in your mouth with your tongue under the spacer and out of the way. Seal your lips firmly around the mouthpiece.
5. Press the canister to activate the spray.
6. IMMEDIATELY after spraying, inhale through your mouth **SLOWLY AND DEEPLY** (take a few seconds to inhale).
7. **HOLD** your breath for 6 to 10 seconds to allow the medication to settle and to have maximum benefit in the lungs.
8. If additional sprays are prescribed, wait 1 minute between sprays. This allows the first spray to being working, allowing the second spray to penetrate deeper into the airways. Also, some medications will not be ready to deliver a full dose for 1 minute after a spray; therefore, waiting gives the canister time to recharge.

If you feel your medication is not providing relief from your symptoms, **DO NOT** take more that the prescribed dose. Notify your doctor for consultation and instructions.

Each inhaler contains a specific number of doses. In many instances, the inhaler will continue to spray once the medication is gone; therefore, it is important to keep track of how many doses you use and anticipate the need for refills. If you are unsure of how much medication is left in your inhaler, remove the canister from the holder, and placed it in a container of water (do not do this with intal inhalers). A full canister will sink to the bottom on its side; a canister 3/4 full will stand upright at the bottom of the water; a canister 1/2 full will stand upright near the top of the water; and a canister 1/4 full will begin to tilt over on its side near the top. An empty canister will float on its side at the top of the water. Replace you inhaler when it is 1/4 full. This test should not be done with a cromolyn sodium inhaler-clogging results.

Waldman-Wagner, C. Asthma Care and Patient Education: The Nurse's Role. Research Triangle Park, N.C.: Allen & Hanburys, 1991.

* Spacing mechanisms include the Inspirease, Aerochamber, and Optihaler.

APPENDIX J

ASTHMA MANAGEMENT PLAN

Mississippi State University
Longest Student Health Center
MS State, MS 39762
(601) 325 - 2431

Dr. R. Collins Dr. J. Longest Dr. M. Mabry Dr. L. Watras Dr. S. Crowley M. Fitts, FNP

ASTHMA MANAGEMENT PLAN

Name:_____ **Date:**_____

Green Zone

This is where you should be every day. If your peak flows are _____ or above, you are within 90% of your best peak flow. Take these regular maintenance medications **every day**:

High Yellow Zone

This is an early warning zone. If your peak flows are between _____and _____, you are within 70% - 90% of your best peak flow. **Call if you keep dropping into this zone day after day!** Until your peak flows return to normal (Green Zone levels), make these changes in your medication routine:

Low Yellow Zone

This is a warning zone. If your peak flows are between _____ and_____, you are 50% - 70% of your best peak flow. **Call if your peak flows bounce in and out of this zone for two days in a row!** It is important to treat your asthma promptly by making these medication changes:

RED ZONE

This is an emergency. If your peak flows are below _____, you are blowing less than half of your best peak flow. Continue all of your asthma medications and call immediately if you drop into this zone.

***Note:** As children grow, their peak flow values will increase and they will need to be re-zoned periodically.