Parental perception concerning the use of peak flow meters in the child with asthma

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PARENTAL PERCEPTION CONCERNING THE USE OF PEAK FLOW METERS IN THE CHILD WITH ASTHMA

by

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ABSTRACT

Parental Perception Concerning the Use of Peak Flow Meters in the Child with Asthma

by

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A descriptive, correlational research design was used to identify parental perceptions concerning the use of peak flow meters (PFM) in their children. The sample consisted of 20 parents who were accessed through outpatient asthma allergy clinics. The questionnaire and semi-structured interview were utilized as tools and analyzed using inferential statistics and content analysis. The revised Health Promotion Model by Dr. Nola Pender provided the theoretical framework.

Content analysis provided a rich narrative as it described the perceived barriers and benefits of PFM use, prior related behavior for use or non-use of the PFM, and the nature of education that parents and children receive regarding the PFM. The barriers that decreased the use of the PFM included innovative asthma medication and increased asthma control. The benefits included guiding medication use and valuable for prediction. Statistical significance was found between severity of asthma and many variables, but there was no significance with the frequency of using the PFM.
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CHAPTER 1

INTRODUCTION

This descriptive correlational study investigated parents' knowledge and perception using the peak flow meter (PFM) to manage their child's asthma. Parents of children with asthma provided information about the usage patterns of the PFM, education they received concerning the PFM and what kind of support they received in using the PFM through the use of a questionnaire and semi-structured interview. This chapter contains the background of the problem, the problem and purpose of the study, and the significance of the study.

Background of the Problem

Asthma is a leading chronic health problem in the United States. The American Lung Association (2000) progress report in 2000 estimates that one third of the 17.7 million Americans with asthma are children under the age of 18. When asthma is not controlled, it affects all aspects of a child's development by disrupting daily activities, routines and social functioning. A key to controlling asthma is responding to the early symptoms of an exacerbation. Exacerbation is the current term used to describe adverse changes in the respiratory status, although attack has been used in the literature; the term attack will be used if cited by the author. However, as Ferguson (1998) points out, symptoms are not reliable predictors of an attack. Others have identified that the variations of
respiratory distress and the limited ability of individuals to recognize early physiologic signs (Boulet, Cournoyer, Deschesnes, Leblanc, & Nouwen; Fritz, Klein, & Overholser, 1990; Kendrick, Higg, Whitfield, & Lazlo, 1993; Legge, 1996; Male, Richter & Seddon, 2000; 1994; Rietveld, & Evernerd, 2000). Poor perceivers is a term to describe the inability of an individual to recognize the severity of the respiratory difficulty.

When an attack occurs, the bronchials become inflamed, with swelling and closing off of the air flow or peak expiratory flow (PEF). This PEF can be objectively measured by an inexpensive and easy-to-use piece of equipment known as a peak flow meter (PFM). Regular use of PFM can provide an objective measurement of early changes in respiratory status (Enright, Burchetti, Peters, Lebowitz, et al., 1997; Falliers, 1998; Gross & Ponte, 1998; Johnston, Pattemore, Sanderson, Smith et al., 1995; Kennedy, Chang, & Small, 1998; Rees & Price, 1995).

Although some literature supports the use of the PFM as noted above, other literature shows that patients do not use their PFM regularly, or at all, to provide the benefits of control that regular use can provide (Cote, Cartier, Malo, Rouleau, & Boulet, 1998; Verschelden, Cartier, L’Archeveque, Trudea, et al., 1996). The benefits of control for the patient and family include less disruption of daily activities and increased control over their chronic health problem. The use of the PFM also provides objective data that is beneficial to the health care clinician to guide and manage treatment.
Asthma rates have been increasing over the last two decades. The American Lung Association progress report for the year 2000 estimates that 17.7 million Americans are affected by asthma, with 5,438 deaths reported in 1998 (American Lung Association, 2000) and approximately 500,000 hospitalizations per year (CDC, 1999). Approximately 5.6 million children under the age of 18 have been diagnosed with asthma, with an approximation of 170,000 hospitalizations (one third number of total hospitalizations). Newacheck and Taylor (1992) found that asthma is the most common reason that school-age children miss school. McEwen, Johnson, Neatherlin, Willard, and Lawrence (1998) found that children with asthma miss more than twice the amount of school than children without asthma: 7.2 days/year versus 3.4 days. In addition to this national significance, Nevada is reported as having the highest overall asthma rate in the nation at 7.2% (CDC, 1998).

Use of the PFM has been well documented as an effective tool in managing asthma. The 1997 National Asthma Education and Prevention Program (NAEPP) guidelines recommend the use of a PFM during an acute exacerbation to determine severity of the exacerbation and guide the therapeutic decisions. Changes from the 1992 NAEPP guidelines to 1997 NAEPP guidelines include changing the use of a PFM reading from twice daily to once daily for baseline measurement and increase the frequency of use based on individual needs and clinical indication (NAEPP, 1997). The NAEPP guidelines also includes the use of PFM in the stepwise approach for managing asthma in adults and children over five years of age (NAEPP, 1997).
Problem and Purpose

Although the literature supports the use of the PFM, it also shows that the PFM is not being used by the patient. In a study by Cote et al. (1998), it was found that short-term compliance of the PFM by adults was only fair, with almost one third of the subjects not complying from the start, and 30% never or almost never using the PFM, and 7% fabricating the results. Compliance was monitored unbeknownst to the participants by an electronic memory, and the results were recorded at 1, 6, and 12 months. Compliance decreased from 63% at one month, to 50% at 6 months, and 33% at 12 months. Although the authors use the term peak expiratory flow monitoring, they describe using a portable device called the peak flow meter. The authors acknowledge that although “PEF monitoring can improve the outcome of some subgroups of asthmatics, the long term compliance of moderate to severe asthmatics with such monitoring has not been studied extensively” (Cote et al., 1998, p. 969). They conclude that although regular use of PEF can aid in the control of asthma, and because PFM use is of short duration, the PEF should be used on an individual basis.

Children as young as 5 years of age or older can learn to use the PFM correctly (NAEPP, 1997). Early intervention is a key to reduction of the effects of an asthma attack and return to a healthy state. The problem is that many children do not use their PFM on a regular basis to allow early identification of an exacerbation (Cote, et al., 1998; Verschelden et al., 1996). The literature supports the use of PFM, but acceptance and standard practice usage throughout the health care community is not evident. Grant (1999), and Flores, Lee, Baucher,
and Kastner, (2000) found variable use of PFM within the outpatient clinical setting. One study on the asthma care practices of the Chicago-area primary care physicians found that, although they were familiar with the NAEPP 1997 guidelines and the recommended use of the home monitoring of peak expiratory flow rate, only a minority of those surveyed supported this as part of the regular care for their patients with asthma (Grant, 1999). Although the NAEPP (1997) guidelines promote the use of the PFM, and there is great variability in the clinical practice patterns, this study examines the PFM use by the patient with asthma as perceived by parents.

The Third International Pediatric consensus Statement on the Management of Childhood Asthma (Warner, Naspitz, & Cropps, 1998) acknowledges that the daily management of asthma is handled by the patient, families, and school personnel. It further emphasizes the importance of tailoring co-management to the individual patient and family. Townsend, Feeny, Guyatt, Furlong, et al. (1991) also found that parental perception of a child's illness can influence the child's response to illness.

Additionally, a study by Deaves (1993) found that two thirds of the parents (n=32) found that it was very valuable to use the PFM and diary record. Parents also stated that both the diary and PFM were more helpful on prevention of attack than written information (Deaves, 1993). Therefore, the parents' positive perception and knowledge is essential in supporting their children within the realm of asthma, and specifically, in using a PFM.
Therefore, the purpose of this study was to investigate the parents' knowledge and perceptions using the PFM to manage their child's asthma. In this study, a school age child was defined as the age group of 6 to 12 years (Burns, Brady, Dunn, & Starr, 2000).

Significance

Health care professionals will be able to use the findings of this study to promote and support the use of PFM more efficaciously. Because of the objective information that the PFM can provide in empowering children with asthma and their families to take greater control over their health and wellness, it is imperative to explore this issue of PFM education, PFM support, and PFM follow-up. It is important for health care professionals to determine what information is needed to promote the use of PFM and how best to support children with asthma and their families in using an objective measurement tool. It is hoped that this study provides information to influence health care practitioners so that they can support patients and families in the use of the PFM as a tool for improved self-management of asthma.
CHAPTER 2

LITERATURE REVIEW

Introduction

This study specifically looked at parental knowledge and perceptions concerning the use of the peak flow meter (PFM) to manage asthma in the child. This literature review provides the basis for a greater understanding of the prevalence of asthma, both in the United States and Nevada, the severity of the disease process, and current practice recommendation for the use of PFM in providing an objective measurement for improved asthma management. The literature review includes asthma pathophysiology and prevalence, benefits of control, peak flow meters, and family involvement. The benefits of control includes age, perceptions of breathlessness, and education through self-management. Peak flow meters includes utilization, support, and variable use.

Literature Review

Asthma Pathophysiology and Prevalence

Asthma is a chronic disease of the respiratory tract. Asthma is characterized by airway obstruction and inflammation, often associated with hyper-responsiveness stimulated by various triggers. The bronchi and bronchioles in the lungs are narrowed by muscle contraction and mucosal swelling, and associated secretions. Asthma can be classified as extrinsic or
intrinsic, with the more common type, extrinsic, being associated with external triggers (McCance & Huether, 1998). Although these terms still exist, it is more accepted to define asthma by its severity classification as defined by the National Asthma Education and Prevention Program (NAEPP) of the National Health, Lung, and Blood Institute (NHLBI). The new terms, as used by the NAEPP guidelines (1997), are mild intermittent (the least troublesome) to the degrees of persistent asthma which include mild, moderate and severe persistent asthma. The degrees of asthma are defined by frequency of exacerbation, triggers, lifestyle limitations, and medications for rescue and maintenance. Heaman and Estes (1997) state "these pathologic changes are more pronounced in younger children because of a smaller airway diameter, increased soft tissue, and vascularity of mucous membranes lining the airways which increase the child's susceptibility to airflow obstruction" (p. 83).

Asthma prevalence in the United States is increasing. According to the Center for Disease Control, the number of asthma sufferers has nearly doubled in the past two decades (CDC, 1999). The CDC statistics cite 17.3 million asthma sufferers, including 4.8 million children. The progress report for the American Lung Association (2000) reports an increased estimate of 17.7 million Americans, with more than one third of this number being children under the age of 18 (5.6 million). The American Lung Association states that asthma deaths have increased by 109% between the years 1979 and 1998, with 5,438 deaths in 1998. Additionally, the number of hospitalizations has increased by 25% in that same time period. In addition, the CDC reports a disproportionate number of
asthmatics among poor inner-city dwellers (CDC, 1999). It is estimated that asthmatic sufferers experience over 100 million days of restricted activity each year (CDC, 1999).

Taylor and Newacheck (1992) are frequently cited in the literature (Horner, 1995; Yoos & McMullin, 1996) providing evidence to the burden of pediatric asthma. Although the data that Taylor and Newacheck provide is from 1988, they give a perspective for hardship within the pediatric population. In 1988, with 2.7 million children with asthma, Taylor and Newacheck report “7.3 million days restricted to bed, 10.1 million days missed from school, 12.9 million contacts with doctors, and 200,000 hospitalizations resulting in 1.9 million days of hospitalization” (Taylor & Newacheck, 1992, p. 659). Children experience special difficulties in dealing with the effects of asthma, because it affects all aspects of development by disrupting daily activities, routines, and social functioning when attacks of breathlessness occur. In the pediatric setting, this number of restricted days extends to the families. Family members also experience restrictions in caring for a family member with asthma, as evidenced by lost productivity and associated economic hardships (Taylor & Newacheck).

The CDC further highlights Nevada as having the highest asthma rate in the nation, at 7.2%, with an estimated prevalence of 125,700 persons affected (CDC, 1998). Other states, such as California and New York, have larger estimated numbers based on the state’s population.

There are many factors that may predispose an individual toward asthma. Some risk factors, as noted by McEwen, Johnson, Neatherlin, Willard, and
Lawrence (1998), may be considered unalterable, such as male gender, age, race, heredity, history of respiratory infections, low birth weight, and other allergic responses. Other factors, such as socioeconomic status and where they live, are difficult factors to change. Education can be considered a modifiable risk factors.

**Benefits of Control**

A child with asthma who has the disease symptoms controlled will experience improved quality of life. They have less disruption in daily activities, fewer emergency room visits and hospitalizations, and less disruption in school and social functions. The factors that influence control include age, breathlessness, and education through self-management.

*Age.* A child with asthma experiences different problems than an adult with asthma. These problems relate to disproportionate school absenteeism, as well as delays in treatment relating to developmental level.

Newacheck and Taylor (1992) found that asthma is the most common reason for absenteeism in the school-age child. McEwen et al. (1998) found that children with asthma miss over twice the amount of school as non-asthmatics: 7.2 days/year versus 3.4 days. Additionally, children with asthma have an increased morbidity at certain ages. According to Male, Richter, and Seddon (2000) a frightening risk factor associated with age is that preschoolers and teenagers are at the highest risk of death from asthma which is associated with a delay in seeking treatment.

*Perception of breathlessness.* Perception is the ability of a person with asthma to correctly assess their asthma status and be able to take corrective
measures to improve their respiratory comfort. Much of the literature concerning perception of breathlessness regards issues of inaccurate assessment of symptoms associated with degree of respiratory compromise and delay in treatment. Use of the PFM has been suggested to provide objective measurement for these patients with asthma.

Fritz et al. (1990) found that there was a wide variation in accuracy of perception. It was found that only one fifth of the study population could accurately perceive asthma symptoms, and one third was extremely inaccurate. In other words, the perception of asthma symptoms did not match the degree of respiratory compromise. The children with inaccurate reports were advised to use PFMs at home on a regular basis.

Male et al. (2000) found that those individuals with poor perception of asthma symptoms presented to the hospital with more significant hypoxia than those individuals who more accurately objectified their asthma symptoms. Also, those perceiving less breathlessness were possibly predisposed to life-threatening attack. Similarly, Lahdensuo et al. (1996) performed a 1-year, multi-centered trial and found that at least 40% of the patients with asthma do not react appropriately to symptoms, and an alarming 50% had symptoms for one week prior to hospitalization. Both studies support the timeliness of treatment for improved outcomes.

Kendrick, Higgs, Whitfield, and Laszlo (1993) also studied perception and the concept of people as poor discriminators of breathlessness. The authors conducted a study with 255 participants using a coded/electronic PFM and
analog scale that was used 4 times a day for a 2-week period. It was found that a large number of the patients with asthma recruited from the general practice were poor discriminators between high and low peak flows, revealing that symptoms did not correlate with perception. The authors discussed the possible limitations of the study and the confounding factors regarding the use of the analog scale; but, despite these limitations, they found that a conservative estimate of error of peak flow would still be as high as 45%. As a result, they state that dual use of self-assessment of asthma and the use of PFM is necessary for asthma management.

Rietveld and Everaerd (2000) made the distinction between airway obstruction and the associated dyspnea, and found that it is not an indication of the accuracy of symptoms. The authors prefer not to use the terms “good” and “poor” perceivers, but state that all patients with asthma are vulnerable to inaccurate perception of asthma symptoms. Blunted perception is a term that has also been used to describe this inaccuracy. The message is that subjects need to perceive airway obstruction in order to take precautions, and perception is not dependent on the degree of dyspnea they experience. Rietveld and Everaerd (2000) make the distinction that airway obstruction and dyspnea do not always correlate; therefore, the awareness of symptoms should instigate the use of a bronchodilator.

Guyatt, Juniper, Griffith, Feeny, and Ferrie (1997) studied the age of the person with asthma and their ability to provide accurate information. The adolescent (11 to 17 years old) can accurately provide information about their
asthma condition, and researchers reported that symptoms correlated moderately with change in peak flow. These researchers felt that this adolescent population could provide the clinicians with all the information necessary to determine asthma history, and that parental report may be misleading. However, children as young as 7 years of age can provide accurate information, along with complementary information by the parent, to guide the asthma management for the younger age group. Therefore, this study validates using parents to provide data concerning the younger children.

*Education through self-management.* Most of the literature concerning asthma education supports self-management to provide increased awareness of the disease process, and behavioral management in identifying and recording precipitating events and the medical treatment plan. The PFM is often included in the educational component as one self-management tool, but there are no studies concerning the use of the PFM alone. The PFM is generally included as part of an educational program.

Fillmore, Jones and Blankson (1997) found that with greater clarity in identifying problems in asthma management, there was a decrease in school absenteeism and an increase in life participation. Children with asthma, and their families, who are knowledgeable of the disease process are more prepared to deal with the exacerbations. People who are knowledgeable of how to manage the disease, how to track their peak flows, and when to anticipate changes to their health are more prepared for the challenges of managing the respiratory fluctuation in asthma control.
Lahdensuo, et al. (1996) compared self-management education and traditional treatment among 115 patients with mild to moderately severe asthma in a 1-year, multi-center trial. The self-management group was given information about asthma, lung anatomy and physiology, effects and purpose of asthma drugs, as well as information and instruction about PFM use. The self-management group was instructed in daily use of the PFM. Variations in the peak flow reading provided information for self-guided changes to anti-inflammatory medication or indicated a need for consultation with the health care provider. The traditional treatment group was given information on correct inhaler use and general information about the their disease, but did not use or have possession of a PFM. The results revealed that the self-management group had less unscheduled health care visits (P=0.06), less days off work due to asthma (P=0.03), less use of antibiotics (P=0.008), less use of the steroid prednisolone (P=0.01), and higher quality of life scores (P=0.0009). Hospital admission was rare for both groups (Lahdensuo, et al, 1996). The authors conclude that “guided self-management reduced by half or more the number of incidents caused by asthma when compared with traditional treatment” (p. 751).

Wilson et al. (1993) also highlighted the benefits of self-management education. Their study of 323 adult patients with moderate to severe asthma were randomized into one of four treatment conditions: “(1) group education, (2) individual education, (3) information control (workbook), and (4) usual control (no supplemental education)” (p. 566). The results found significant improvement in symptoms and adherence with an asthma education program of either group or
individual education as compared to a self-study workbook. Of interest, small teaching groups were found to be more beneficial than individual teaching sessions, as the group interaction promotes discussion about the patients' fears and concerns about asthma. Study results support the effectiveness of self-management educational programs for asthma and the potential value for other chronic health problems.

*Peak Flow Meter*

The PFM is an inexpensive portable device that can measure an individual's PEF. Peak expiratory flow is the measurement of the "maximal expiratory flow during a maximal forced expiration from the total lung capacity" (Sly, 1996, p. 277). Sly further clarifies that although, the term peak expiratory flow rate (PEFR) has been found in the literature, PEF is the only correct official term. "Flow, by definition, is the rate of change in volume" (Sly, 1996, p. 277). PEF will be used as the definitive term unless the author(s) cited use another term.

The measurement of PEF can give objective information as to the ability of the lungs to receive air. A numerical value can be placed on respiratory capacity. The value is dependent on age, gender, height and weight, respiratory effort, and lung capacity. Often in the health care setting, a computerized pulmonary function test or diagnostic spirometry is used to provide this information. As described in the Standardization of Spirometry 1994 Update (American Thoracic Society, 1995), diagnostic spirometry for office use provides specific monitoring of respiratory function including forced vital capacity, forced expiratory volume,
and PEF. The mini-peak flow meter is a hand-held portable device for home use. Although Sly (1996) acknowledges that mini-flow meters are capable of measuring PEF, he cautions that results must be brand-specific, with the patient using only one brand of mini-flow meter, as brands are not interchangeable. The intent in using the quantitative measurement is to get a baseline peak flow or personal best, and then, when there are respiratory changes or exacerbation of asthma, this quantitative information will assist in determining the level of obstruction or decreased airflow.

The PFM will be further reviewed according to utilization, support, and variable use patterns. The literature review of the PFM reveals lack of consensus for use and inherent value. The NAEPP (1997) guideline, which is the most current collective of information on asthma, states "more studies of daily long-term peak flow monitoring among patients with moderate and severe persistent asthma are urgently needed" (p. 31).

Utilization of PFM. According to the NAEPP (1997) guidelines, the PFM is a quantitative and reproducible tool to provide information on the existence and severity of airflow obstruction. The NAEPP guidelines stress that PFMs are designed as tools for monitoring, not diagnosis. The NAEPP guidelines highlight the use of peak flow monitoring for short-term monitoring, managing exacerbations, and daily long-term monitoring. The NAEPP guidelines do not recommend long-term daily peak flow monitoring for patients with mild intermittent or mild persistent asthma. The guidelines state that any patient may benefit with the use of peak flow monitoring for severe exacerbations. Dr.
Thomas Plaut, NAEPP guideline contributor, practicing Asthma Specialist, and author of many books for the consumer, states that although the PFM does not measure airflow in the small airways and will not reflect inflammation in those airways, serious asthma trouble is evidenced by obstruction in both small and large airways and will, therefore, be reflected in a reduced peak flow score (Plaut & Jones, 1999).

The NAEPP (1997) guidelines emphasized self-monitoring for the effective management of asthma whether this management includes peak flow monitoring, symptom monitoring, or a combination of approaches. In light of the difficulties of perception previously discussed, the objectivity of the PFM seems to offer a valuable tool for patients with asthma to quantify their respiratory activity and level of distress. The suggested use of the PFM is to obtain twice-daily measurements for at least 2 weeks or up to 2 months, to obtain baseline information, then taper the frequency of measurement readings, as needed, unless there is an exacerbation. Plaut suggests returning to daily peak flow readings if you: "have symptoms, are entering a threatening season (e.g. pollen) or environment (e.g., cat), are changing medicine or dose, have a doctor's appointment next week" (Plaut & Jones, 1999, p. 138).

The NAEPP (1997) guideline discusses the stoplight approach for monitoring asthma: the green zone is 80-100% of personal best, the yellow zone is 50-80%, and the red zone is less than 50% of personal best. Often, management plans are based on this objective measurement of the peak flow;
this information helps to determine necessary changes in medications, when to contact the health care practitioner, and when to seek emergency treatment.

It is emphasized that a single reading of peak flow is meaningless, and after obtaining a personal best, the PFM needs to be used to monitor trends. It is also important to use the same brand of PFM for each measurement; using a variety of tools does not provide consistent, objective information. Effective utilization of the PFM is limited by adherence, poor technique, and motivation.

The NAEPP (1997) guidelines describe that a review of the literature from 1980 to 1995 identifies seven intervention studies. These seven studies cast doubt as to the objectivity and measurement benefits of the PFM. However, according to the NAEPP (1997) guideline, “almost all the peak flow monitoring studies available had study design and execution problems (e.g., selection bias, unequal control and experimental groups, small sample sizes, high loss to follow-up)” (p.31). Plaut states that “all the peak flow studies referenced in the 1997 NHLBI (NAEPP) guidelines are flawed because the investigators didn’t properly determine the patient’s personal best” (personal communication, August 1, 2001). He further states that, in his practice, all of his patients use the PFM, with the exception of two patients with neck problems (personal communication, August 1, 2001).

One particular study that casts doubt on the use of PFMs had strong limitations. The Grampian Asthma Study of Integrated Care (GRASSIC), (1994) set out to evaluate asthma care by both the general practitioner and the asthma specialist. This study was published in two parts, separating out the overall
integrative care to specifically address the question of the effectiveness of routine self-monitoring of PFM. Of the 801 available patients, 232 were ineligible for randomization to the group of patients with regular asthma coverage versus the study group with PFM intervention, because they already possessed a PFM. This study "suggests that possessing a meter leads to some improvement in management for the more serious patient" (p. 566) and "those patients most likely to benefit from owning a PFM because their asthma was more severe or unstable were ineligible for our study because they already owned one" (p. 567). Despite these limitations, the conclusions of this study "reinforces the mounting evidence that self monitoring of peak flow meters does not improve morbidity" (p.567).

Sly, Cahill, Willet, and Burton (1994) questioned the accuracy of mini-peak flow meters, but found that the absolute values may not matter as much as the trends of peak expiratory flows that the PFMs are tracking. In a more recent study, Sly (1996) states that there are times when PEF monitoring may provide useful clinical information in the case of unstable asthma, when altering treatment plans, or to provide confidence to a patient when decreasing medications. Sly states that the PFM is still not suitable for diagnosing asthma or predicting exacerbations. Although Sly continues to be cautious in the use of PFM, he does not deny that clinical anecdotes on the monitoring of PEF can be helpful in managing asthma and specifically life-threatening exacerbation. He concludes that it is difficult to define the proper role for PEF monitoring in pediatric asthma. Despite these reservations and lack of scientific evidence, the
Australian Paediatric Respiratory Group has adopted some guidelines for use: consider using home monitoring of PEF on a short term basis of weeks or months (not years) for children more than 6 to 8 years old who have persistent symptoms (Sly, 1996). Persistent symptoms would indicate poor asthma control such as nocturnal awakenings, dyspnea, and increased use of rescue medication for asthma attacks.

Support of PFM. The literature provides many articles promoting the broad support of PFM, in general, or in specific populations. Pinzone, Carlson, Kotses, and Creer (1991) found that the peak expiratory flow reading (PEFR) was a consistent predictor of asthma episodes in children. McEwen et al., (1998) found improvement with the use of PEFR to decrease medications. Legge (1996) and Fritz et al. (1990) recommend use with poor perceivers. As previously stated by Male et al. (2000), poor perceivers have a decreased ability to identify or perceive breathlessness, and often present to the hospital with more significant hypoxia. Lacroix (1999) encourages use specifically for exercise-induced asthma in the adolescent patient. Kennedy, Chang, and Small (1998) and Rees and Price (1995) clarify that a simple, sporadic measurement is useless, and that consistent use will provide objective trends. Ferguson (1998) found the use of PFM helpful in assessing diurnal changes. Heaman and Estes (1997) caution that the PFM only measures the large airway and misses the mild symptoms of the small airways. Cote et al. (1998) have found that short-term compliance is good, but long-term management presents problems with compliance. Johnston, Pattemore, Sanderson, Smith, et al., (1995) found severe decrease in PFM...
readings with viral infections. Noble and Rochester (1998) advocate the use of PFM before asthma season for baseline and management information. Lastly, Guyatt et al. (1997) found that important information on airway caliber can be obtained through PFM.

Variable Use of PFM. A 1999 survey on the asthma care practices of the Chicago-area Primary Care Physicians by Grant (1999) found that, although they were familiar with the NAEPP (1997) guidelines and the recommended use of the home monitoring of PEFR, only a minority surveyed supported this as part of the regular care for their patients with asthma. Seventy-five percent of the physicians reported routine use of spirometry or peak flow measurements in the office, and especially in symptomatic patients. However, of these same physicians, when asked about their opinions on the use of peak flow monitoring for children greater than 5 years of age with moderate to severe persistent asthma, 58% found this often useful, 35% as somewhat useful, and 7% as rarely or never useful. This study does reveal disparity in the use of the NAEPP (1997) guidelines such as for PFM, written asthma treatment plans, and follow-up care for asymptomatic patients. The study cited possible limitations of the survey and the finding, but did not attempt to provide conclusions (Grant, 1999). The limitations of the study included lack of information about non-respondents, over-representation of women and U.S. graduates, findings being only reflective of the Chicago-area; possible reports of practice beliefs rather than actual practice patterns, and asthma care as a single point in time rather than on a continuum (Grant, 1999).
Flores, Lee, Baucher, and Kastner (2000) surveyed pediatricians on their attitudes, beliefs and practices regarding clinical practice guidelines and offered more conclusive thoughts on why practice guidelines are not used more often. Practice guidelines fail because they do not allow for clinical judgment, can potentially be used in litigation, and limit physician autonomy. Although this national survey reviewed many clinical practice guidelines, the NAEPP (1997) guidelines were cited frequently for familiarity. Even so, participants reported using 10 different clinical practice guidelines for asthma, revealing a lack of consensus. This was an unexpected finding given the wide dissemination of the NAEPP guidelines from both 1992 and 1997. The reasons for pediatricians' varied use of clinical practice guidelines are not clear. Given this information of inconsistent practice patterns, as with the previous literature review, the irregular use of PFM and guidance will also prevail.

Family Influence

Most of the literature concerning children with asthma and asthma management incorporates the family as an integral part of the team approach that includes the child with asthma, family members, and the health care team. Asthma education and self-management that involves both the child with asthma and the family, promotes increased understanding and improved management of the disease.

Klements (2001) proposed the use of peak flow monitoring as a health-promoting behavior for the patient with asthma and their families. In Pender's (1996) revised Health Promotion Model (HPM), she explored the HPM framework.
by highlighting the individual characteristics and experiences, as well as the perceived self-efficacy and barriers to the use of the PFM for promoting health. According to Pender, "approaches to enhancing self-care behaviors of children and adolescents must focus on both families and peer groups. This dual approach is critical, since values, attitudes, beliefs, and behavior of families and peers influence children's lifestyles" (p. 101).

Lloyd and Ali (1992) specifically addressed the question of home-based peak flow monitoring. The parents of 50 children with asthma were included. The parameters for inclusion in the study were that the child was over 5 years of age, the parents could write English, and the parents and child had previously attended the clinic. The questionnaire consisted of four questions: "(1) What is the best peak flow level that your child has ever blown? (2) What is your child's danger peak flow? (3) How useful do you find your peak flow meter (very useful, useful, not very useful, useless)? and (4) Now please write as much as you like about how the peak flow meter helps you look after your child's asthma" (1992, p. 1128). Forty-four of the 50 parents found the PFM to be helpful in assessing severity, and 42 parents recalled their child's danger peak flow. It is important to note that only 20% wrote about the usefulness for detection of impaired respiratory function when their child was well. The authors state that they are not convinced of the usefulness of monitoring in well children, but will continue to teach parents to recognize severe attacks.

Guyatt et al. (1997) were previously cited regarding the support of the child's perception. The family plays an important role for the health care provider
by providing valuable anecdotal information about the daily events and management, as well as verification of current routines and medications. This study validated the importance of the parents' impressions of the child's symptoms (ages 7 to 10 years), and stated that the parents provide independent and complementary information. This lends support to this study to survey parents of younger children.

Palmer (2001) explored the family caregivers' experiences with asthma in school-age children. The theory of the process of becoming a vigilant caregiver was generated by using semi-structured interviews with caregivers of 6 to 11-year-olds in this grounded theory approach. The parents cited many of the difficulties in integrating the child in the daily routine of school, but found that the most important strategy for the families was acquiring knowledge. Caregivers described the path for gaining information through persistence with clinicians, self-teaching, networking, and dissemination of information. The specific of knowledge acquisition did not identify PFM use, but could certainly lend towards a more unified approach to asthma management.

Horner (1995) advocates a family care approach with "a partnership between the family and clinician to work together for health outcomes" (p. 222). Horner also promotes psychoeducational therapy with a debriefing approach to the actual exacerbation. In the aftermath of the asthma exacerbation, the clinician and family can evaluate the management of the asthma episode along with the interpretation of the symptoms, thereby reinforcing the families' strength in handling the asthma exacerbation. Additionally, a study by Deaves (1993)
found that two thirds of the parents (n=32) found that it was very valuable to use the combination of the PFM and diary record. Parents also stated that both the diary and PFM are more helpful for prevention of exacerbation than written information (Deaves, 1993). Therefore, the parents are key in supporting their children in using a PFM.

Summary

Although some discrepancies in the support of the PFM exist, many studies have been cited to support the use of the PFM. Included is the support by the NAEPP guidelines, which is the gold standard for asthma care. The NAEPP guidelines, originally presented in 1992 and revised in 1997, sets practice guidelines for PFM use. It does state that PFMs are designed as a tool for monitoring and not diagnosis, as well as, primary use with patients with moderate and severe persistent asthma.

Despite this gold standard, discrepancies in practice patterns have been shown in reviewing studies with pediatricians in an urban area as well as a national review. Variability of practice patterns includes the use of the PFM, written asthma treatment plan, and follow-up care.

The literature explores the concept of PFM use and asthma education, but there is a lack of research on how the patients and families use the PFM to guide their management of asthma. It is also unclear as to the relationship of the severity of asthma with the use of the PFM, health care visits, and counseling of PFM. PFMs are often included in asthma education, but when PFMs are merged to this education content, information is diluted as to how the patient and families
perceive the benefits and barriers of PFM. Also, when PFMs are included in the asthma education, specific information is lost that would be helpful to health care professionals regarding the nature of the education. If such information about initial presentation of the PFM and regular monitoring is not isolated, it cannot be evaluated for its usefulness. In general, the literature has immersed the use of the PFM in asthma education, but it is necessary to highlight PFM education outside this realm to gather specific data for use. The literature does support the need for both patient and family involvement for the school age child. The literature also supports the parent’s involvement in guiding the child to improved asthma management with better health care practices.

In restating the purpose, it is important to assess what information the school-age child with asthma (6 to 12 year old) and their parents have received concerning the use of the PFM. A questionnaire and semi-structured interview will be utilized as the tool to assess this information. This data will provide insight into the usage patterns for PFM and provide information for health care professionals to support the use of this tool. Pender’s Revised Health Promotion Model (HPM) will be used as the theoretical framework to further explore the parent’s perception of health promotion in using the PFM.
CHAPTER 3

THEORETICAL FRAMEWORK

Introduction

This chapter presents the revised Health-Promotion Model (HPM) by Nola Pender (1996) as the theoretical framework. This model was used to explore the parents' knowledge and perceptions of using the peak flow meters (PFM) to manage their child's asthma. It also defines the definitions, assumptions, and research questions.

Framework

The revised HPM (Pender, 1996) is used to explore parental perceptions regarding the use of the PFM in their child with asthma. The revised HPM is often used for promoting lifestyle changes and health protection such as weight loss, dietary changes, and smoking cessation. In this study, asthma is a defined medical condition and, as defined by the literature review, would benefit from the self-promotion behaviors of the use of a PFM. The revised HPM model frames this study well, because of the interrelated factors and the fluidity to make changes in asthma management that can have a positive, health-protecting effect.

Pender (1996) describes the difference between health promotion and health protection. Health protection is the desire to avoid illness, or maintain
health states within the context of current illness. Health promotion is to seek greater health benefits and "actualize human potential" (Pender, 1996, p. 7). Pender also describes the multi-dimensional nature of health promotion that includes wellness for the individual, family, community, environment, and society. Family wellness is integral to this study. How the family environment encourages healthy or unhealthy behaviors will be addressed in exploring parental knowledge and perception, and the use of the PFM. The use of the revised HPM works well with this study because the goal of home management using a PFM is to enhance the quality of life. The PFM would be considered both a health-promoting and -protecting tool.

The assumptions of the revised HPM (Pender, 1996) emphasize the active role of the client in shaping healthy behaviors. Pender lists seven assumptions. This study will only reflect on the following four assumptions: individuals seek to regulate their behavior, individuals interact with their environment, health professionals are included in the interpersonal environment, and self-initiated change is essential to behavioral change. The revised HPM is considered a competence- or approach-oriented model and does not base healthy behavior on avoidance-oriented models. Because the revised HPM does not rely on fear and personal threat, its use across the life span may be valuable (Pender, 1996). The diagram of the theoretical framework is included (see Appendix V). The revised HPM adds three variables to the existing HPM: activity related affect, commitment to a plan of action, and immediate competing demands and preferences. The variables of the revised HPM are explored in the
following text. These variables will provide specific examples of how they relate in this study of parental knowledge and perception of PFM use for their child with asthma.

*Individual Characteristics and Experiences*

The individual characteristics and experiences that are discussed in the model are being expanded to include the family. One might think of Pender’s model to be used only for individuals, but in seeing how Klements (2001) incorporated Pender’s model for monitoring peak flow rates as a health-promoting behavior, it extends beyond the singular being. Therefore, the child is the individual with the altered health condition, but the parents’ perceptions and experiences will be explored in the context of their child’s asthma. Characteristics and experiences of this model include prior related behavior and personal factors.

The prior related behavior of the parent is considered in how the parent and child dealt with the child’s breathlessness prior to diagnosis of asthma, and with previous asthma attacks. Did the parent and child experience mild exacerbations or life threatening occurrences that necessitated emergency room visits and hospitalization? The severity of the previous experiences would have both a direct and indirect effect on the implementation of health-promoting behaviors. A direct effect on past behavior would include activities involving habit formation; whereas, indirect effect would involve perceptions of self-efficacy in performing activities (1996). In the example on the use of the PFM, the habit
becomes strengthened by repetitive use of the PFM, and the perception of self-efficacy indirectly strengthens this behavior.

The personal factors include biological, psychological, and sociocultural. Biologic factors for the parent would involve the parents' physical well-being to provide care to their child. The child's lung function, physical state, and developmental age would be considered here. Sociocultural aspects that would be significant are education and socioeconomic factors. Pender (1996) states that because many factors potentially may exist, only those relevant to explanation or prediction of a given behavior need be included. Many personal factors may influence and affect behaviors, but because some personal factors cannot be changed, they are not included in the health-behavior change interventions (Pender, 1996).

Behavior-Specific Cognitions and Affect

The behavior-specific cognitions and affect include perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences. These variables provide the core for intervention, because these variables can be affected by nursing interventions to promote change (Pender, 1996).

The perceived benefits of action would be for both the parent and child with unexpected disruption and early recognition of exacerbations. It is helpful to ask the parent and child how things would be different without asthma. This perceived benefit would be highly motivating, as evidenced by increased control or early recognition of respiratory changes. Although the revised HPM reiterates
that fears and threats do not have long-term motivation, "the motivational
importance of perceived benefits of action has been supported in the majority of
HPM studies in which it has been tested" (Pender, 1996, p. 69).

The perceived barriers to action would include lack of education of the
PFM, lack of perceived mastery of the PFM, lack of availability of the PFM, and
lack of desirable locations for use. The parent of the 6 to 12-year-old would be
well aware of these potential barriers and aid in the removal of these barriers. But
according to Pender (1996), "when readiness to act is low and barriers are high,
action is unlikely to occur" (p. 69).

Perceived self-efficacy, the concept attributed to Albert Bandura, is the
belief that an activity or pursuit can be performed (Bandura, 1986). The activity
and belief in this study is the belief by the parent that the child is able to perform
the PFM and the belief of the child that he/she can successfully perform the
PFM. A child of 5 years or older is the accepted lower limit for performing the
PFM maneuver (Klements, 2001). Pender cites a strong connection to the
activity-related affect and self-efficacy. "The more positive the affect, the greater
the perceptions of efficacy" (Pender, 1996, p.70).

Activity-related affects are the feeling surrounding the use of the PFM.
According to Pender (1996), affective responses have three components:
activity-related, self-related, and context-related. The child or parent may
respond more favorably if the teacher was accepting of intermittent use of the
PFM or the allowance to leave class to go to the school nurse. If the child was
hassled about needing to perform such activities or mistreated by classmates,
then the affect would be negative. This negative affect would also be a deterrent for the parent.

Interpersonal influences are a strong concept in using this framework. The support that the child and parents feel regarding the use of the PFM by the health care professionals is a significant concept relating to the revised HPM. Interpersonal influences include the expectations of significant others, social support, and modeling (Pender, 1996). These interpersonal influences would include families, friends, and health care professionals. The interpersonal influence is strongly connected to activity-related affect. Modeling, a sub-concept, "portrays the sequential components of a health behavior and is an important strategy for behavior change in social cognitive theory" (Pender, 1996, p. 71). Modeling may include practice and acquisition of a learned activity, and the connection of an asthma support network.

Situational influences seem closely related to activity-related affects. However, if activity-related affect is the subjective feeling of the behavior itself, the situational influences involve the environment. It is the environment surrounding an activity, and the reaction within this context, that aids or deters an activity.

**Behavioral Outcome**

The behavioral outcome is an interrelated, non-linear phenomenon that involves commitment to a plan of action for the ultimate goal of health-promoting behaviors. The health-promoting behavior is strongly affected by the immediate competing demands, as well as the interpersonal and situational influences. A
commitment to a plan of action implies the commitment to a plan and the strategies to carry out such a plan. Klements (2001) offers the example of the implied commitment to the nurse practitioner to monitor peak flows despite potential competing preferences. The parent would be strongly involved in guiding the younger school-age child to complete this task.

Immediate competing demands and preferences are activities that can take the person's attention away from the proposed health-promoting behavior. In the example of routine use of self-monitoring of PFM, the TV or a visit from a friend might be considered a competing preference. Competing preferences are different than barriers, because competing preferences are last-minute urges (Pender, 1996). A competing demand is different from a barrier because the demand must be performed “or untoward results are likely to occur” (Pender, 1996, p. 72). For example, the parent might allow the child to forego the daily peak flow reading so the child does not miss the bus. A questionable competing demand might be the overwhelming sense of breathlessness and the desire to take asthma medication before the recommended use of the PFM to ascertain medication use.

The goal of the revised HPM is “directed toward attaining positive health outcomes” (Pender, 1996, p. 73). Positive health outcomes would be seen with the reduction in exacerbation of asthma symptoms. The health promotion in this study is the use of the PFM. The goal of this study was to determine the parents’ perceptions and the knowledge on the use of the PFM with their child with
This study provided insights into the perceived benefits and barriers of using the PFM.

Definitions

1. Barriers—phrases to indicate negative connotation in content analysis that decrease use of PFM.

2. Benefits—phrases to indicate positive connotation in content analysis that increase the use of PFM.

3. Health Care Professional—includes physicians, specialists, nurse practitioners, physician assistant, registered nurses.

4. Home management of PFM—means outside the asthma specialty office.

5. Parent—guardian.

6. Peak expiratory flow (PEF)—the measurement of the “maximal expiratory flow during a maximal forced expiration from the total lung capacity” (Sly, 1996, p. 277).

7. Peak Flow Meter (PFM)—an inexpensive portable device that can measure an individuals’ peak expiratory flow. The measurement of the peak expiratory flow can give objective information to the ability of the lungs to receive air.

8. School Age Child—age 6-12

9. Prior related behaviors—the parent and child's past experience in dealing with the child's breathlessness, use of PFM, and acquisition of knowledge of the PFM.
Assumptions

1. Parent(s) answered the questionnaire and semi-structured questions honestly.
2. Parents understood the questions that are asked of them.
3. The health care provider in this study prescribed PFM to his/her patients.
4. The health care provider supported the use of the PFM.

Research Questions

1. What is the relationship between the severity of asthma and the frequency of use of the PFM?
2. What is the relationship between the severity of asthma and the frequency of health care visits?
3. What is the relationship between the severity of asthma and the frequency of counseling of the PFM?
4. What are the perceived barriers in the use of PFM?
5. What are the perceived benefits in the use of the PFM?
6. What are the prior related behaviors for use or non-use of the PFM?
7. What is the nature of education concerning use of the PFM that parents and children receive?

Conclusion

The use of Pender's model provides a useful guide for assessing the use of PFM for greater management of asthma surveillance. As previously stated, Pender acknowledges the importance of the family unit and the strong influence
on the child's lifestyle on health promotion. The literature supports the use of the PFM, but there is some disparity in the use of this tool. Nursing interventions to encourage behavior changes are integral to this model. One assumption of the revised HPM is that health professionals are included in the interpersonal environment. Health promotion is what distinguishes the nursing profession from other disciplines. Nursing professionals have an opportunity to help shape health beliefs and practices. The significance for nursing is to advance nursing theory within the context of health promotion.
CHAPTER 4

METHODS AND PROCEDURES

Introduction

The purpose of this study was to investigate parental knowledge and perception concerning the use of the peak flow meter (PFM), to manage their child's asthma. The research design, population and sample, measurement strategies, procedure for data collection, and statistical analysis are discussed in this chapter.

Design

A descriptive, correlational research design was used to describe, through the parent's perspective, why the child with asthma was using or not using the PFM. The use of the PFM as a tool to monitor asthma was cited in the literature, but it was more often in the context of asthma education and not as an objective tool. In describing the PFM as a distinct entity, it was believed that specific and clear data would emerge. This question of use or non-use was further explored by asking what information parents of children with asthma receive about the use of PFM, what they perceive are the barriers to and benefits of use of the PFM, and how they use the PFM in the management of their child's asthma. Information was also obtained, regarding the severity of asthma, that was
compared to: the frequency of use of the PFM, the number of health care visits, and the frequency of counseling on the PFM.

No reliable and valid instrument had been found in the literature concerning the use of PFM in children with asthma. Therefore, a semi-structured interview with the parent of the child with asthma was used to supplement the information obtained from the quantitative assessment of information obtained from the demographic questionnaire. Descriptive and inferential statistics were utilized to analyze the demographic information questions. The information obtained from the interview was analyzed using content analysis. Content analysis is a qualitative technique to classify words in a text into a few categories (Burns & Grove, 2001).

Population and Sample

The parents of children with asthma who were seen at asthma and allergy specialty offices provided the population for this sample. The sample came from asthma allergy clinics in the Intermountain region of the Western United States that was composed of 16 participants from a rural setting and 4 participants from an urban setting. Non-random, convenience sampling was used to identify individuals who fit the criteria and agreed to participate in this study. The criteria for inclusion was: (1) the child had experience using the PFM, (2) the child was between the ages of 6 and 12 years old, (3) the child had been seen at the asthma/allergy clinic at least once before, and (4) the parents of these children agreed to participate in this study.
Initially, the nurse researcher sat in the office waiting for potential participants that would fit the criteria. Many potential participants fit three of the four criteria, but the criteria requiring that the child had experience using the PFM (even once before) excluded them from the study. On monitoring potential subjects on any given day, five to seven participants were lost due to having never used the PFM. The office staff would then make telephone calls on the nurse researcher's behalf, but again, many children had never used the PFM. Although the specialist perceived that his patients used the PFM, many of his patients had never used the PFM.

Measurement Strategies

The information about the parental perception of PFM use was obtained by using both demographic questionnaire and semi-structured interview questions (see Appendix II). The demographic questionnaire had 15 questions. Questions 1-6 provided very specific factual information about the age, gender, race, grade in school, years of asthma, and type of insurance. Questions 7-11 described health care utilization. Questions 12-14 described actual practice patterns of the PFM, while question 15 asked, specifically, the frequency of PFM counseling in the clinic setting. Question 16 allowed the parent to list the medications being taken by the child. The parents were often unclear as to the severity classification and were, therefore, asked to describe the medications to promote accuracy. The researcher defined the level of asthma severity as adapted from the NAEPP (1997) guidelines. Research questions 1-3 were answered with the information obtained from the demographic questionnaire.
regarding severity of asthma as correlated with PFM utilization, health care visits, and counseling.

The second half of the data collection was obtained through a semi-structured telephone interview that occurred within one week of the clinic visit. The interview consisted of six questions that began with general questions and then asked very specific questions (see Appendix II). Interview question 1 asked about PFM use and elicited information about barriers and benefits of use to answer research questions 4 and 5. Interview question 2 asked about education of PFM and provided information about education and counseling to answer research question 6, regarding the prior related behaviors, and research question 7, about the nature of education. Questions 3 and 4 asked the parent to describe asthma control in the last month as well as how asthma has impacted the family and child; this addressed research question 6, regarding prior related behaviors. Interview question 5 provided information to answer research questions 4 and 5 that elicited information about the barriers and benefits when asking about the relationship between the child’s breathing and PFM readings, as well as assessing perception of breathing and asthma management in the context of PFM. Interview question 6 was very specific to assess utilization of the PFM and to correlate with severity of asthma, and addressed research question 1.

The semi-structured interview provided qualitative information about the parent’s perception concerning the use of the PFM in the management of the child’s asthma. This information was assimilated using content analysis. Content
analysis classifies the words in a text into categories “chosen because of theoretical importance” (Burns & Grove, 2001, p. 604).

The interview occurred within one week of obtaining the questionnaire and was conducted by telephone. Six interview questions were asked of each participant. Although the six questions went from broad questions to more specific questions, often the participants went back and forth to previous questions. This is acceptable in the partially structured or focused interview as long as all the topics get covered. The interviews were analyzed with one week after the interview.

This qualitative piece provided information about PFM use that has, thus far, been unavailable. It was desired in this study to gather information from a sizable data set to have the opportunity to get the most variety of responses in order to learn about parental perception and the use of PFM. The interview and questionnaire were purposefully used to gather a variety of responses and lay the groundwork for future study. It was hoped that the content analysis would provide well-defined categories for the future development of a PFM questionnaire.

**Setting and Procedure for Data Collection**

Asthma and allergy clinics were the settings for this study. The sample came from asthma allergy clinics located in the Intermountain region of the Western United States. The use of the clinic setting, and specifically an asthma allergy clinic, was chosen because these children currently seeks health care for asthma and are, therefore, an available population. The physician had given
consent for the researcher to be in the office (see Appendix IV). After the parents signed in at the desk, office personnel referred the clients to the researcher in a predetermined area of the room. Parents of 6- to 12-year-old patients, who had been seen at this clinic at least once before, were referred to the researcher. The office personnel stated, “We have a graduate nursing student here who is gathering information about young patients with asthma, and if you are willing to speak with her, that would be appreciated.” After receiving a verbal explanation of the study, as well as reading a written information sheet, parents were invited to participate. Parents read and signed the informed consent form before completing the questionnaire (see Appendix I). The nurse researcher and parent sat in the predetermined area of the room. The child was occasionally present with the parent, but the nurse researcher only interacted with the parent, because the study was concerned with parental perception. The parent completed the demographic questionnaire before seeing the physician, and the nurse researcher was on hand to answer questions. The semi-structured interview took place over the telephone at a time that was convenient for the parent, and occurred within one week of the office visit. The estimated time to complete the questionnaire, per person, was approximately 10 minutes. The telephone interview took approximately 15 minutes. If clarification on the telephone interview data was required, a second 5-minute telephone interview took place within 10 days of the data collection or not at all. As previously described, in addition to having the nurse researcher in the office, the office staff also made telephone calls to parents of children who fit the age criteria and were
seen at the asthma office. If the parents were willing to talk to the nurse researcher, they gave their permission to the office staff to give their telephone number to the nurse researcher. Because the rural offices were often hundreds of miles from the nurse researchers' home base, the preliminary criteria was reviewed with the parent participant over the telephone. If they fit the criteria, a questionnaire was mailed to them, with a self-addressed stamped envelope as well as a copy of the consent for their records. Upon receipt of the consent and questionnaire, the parent participant was then telephoned for the interview.

The determination of asthma severity was made as adapted from the National Asthma Education Program and Prevention Guidelines, (NAEPP), 1997. The leukotriene receptor antagonists, that were not standard therapy in 1997, have been added. According to the NAEPP Expert panel report for Guidelines for the Diagnosis and Management of Asthma: Update on Selected Topics 2002, (NAEPP, 2002) leukotriene receptor antagonists have been added as a daily medication option for control. The classification of asthma severity is determined by medication use as seen in Figure 1 (see Appendix VI).

Data Analysis

A descriptive, correlational research design guided the two-part data collection for this study. Both the questionnaire and semi-structured interview questions were used to gather information about parental perception. The demographic data obtained from this study was analyzed using SPSS to determine frequency and to conduct chi-square analysis. Also, both nominal and ordinal data was extrapolated from the questionnaire to provide the appropriate
unit of measurement for chi-square analysis, and was analyzed by SPSS. Non-parametric tests were used, because the distribution of the sample was not normally distributed.

The chi-square test was performed to determine the correlation between the level of asthma (mild, moderate, and severe persistent) and (1) the number of asthma related health care visits which includes hospitalization, emergency department visits, specialty clinic interaction, and school nurse visits, (2) frequency of use of the PFM, and (3) frequency of counseling on the use of the PFM.

"The chi-square is the most commonly reported nonparametric statistic. It can be used with one or more groups" (Munro, 2001, p. 98). "Chi-square is used when the data are nominal (categorical)" (Munro, 2001, p. 98). It was used to determine if the number of occurrences across categories was random. There are four assumptions of chi-square according to Munro (2001): (1) frequency data—using the asthma severity scale of mild, moderate, and severe persistent, (2) adequate sample size to satisfy chi-square analysis with 0 cells being less than 5, (3) measurement independent of each other—each severity classification is mutually exclusive of the others', and (4) theoretical basis—categorization of the variables is pre-established according to the NAEPP (1997) guidelines.

Responses to the semi-structured questions were analyzed using content analysis. Content analysis organizes words in a text into a few categories. According to Waltz, Strickland, and Lenz (1991), development of the categorical schemes can be either through a deductive or inductive approach. The inductive
approach was used in gathering themes on parental perception concerning the use of the PFM. This approach derives "categories from the data themselves by identifying clusters of similar data through a data-shuffling-and-sorting procedure" as previously recognized by earlier researchers (Waltz et al., 1991, p. 304). "In an inductive approach, the investigator moves from the concrete to the abstract in a process whereby categories (clustered data) are used as the basis for forming and developing concepts (Stern, 1980)" (Waltz et al., 1991, p. 304).

The interview provides important information to be analyzed. The interview is subject to pilot testing and varies in its formal structure. "Content experts, who may include nurse clinicians and researchers, scholars in other disciplines, and even advisory groups of patients, are able to evaluate the clarity of wording, appropriateness of the question to the content area, and the inclusiveness of the response alternatives" (Waltz et al., 1991, p 322). The thesis committee reviewed the content and direction for the interview questions in their capacity of content experts.

Waltz et al. (1991) also addresses the continuum of interviews ranging from "highly standardized (structured) to unstandardized (unstructured) interviews" (p. 312). The authors credit Wilson (1985) with clarifying the partially structured or focused interview and a completely unstructured interview. The focused interview generally begins with a rather loose agenda, for example, a list of topics to be covered. The interviewer may move from one topic area to another, but according to Wilson (1985), focused interviews "require that by the end of the interview all of the predetermined topics or questions have indeed

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been covered in some sequence, in some form with each interviewee" (Waltz et al., 1991, p. 315).

Each interview was analyzed separately, with each individual statement placed on a table and then grouped together according to content in order to develop themes. Often, the comments formed a group, and sometimes single comments were put aside until later, when the clusters were joined with the other participants. The coalesced clusters and single comments were placed on a large paper. Clusters then became themes, and the 20 interviews were coalesced into 17 themes.

To establish the trustworthiness of the data, two methods were used: credibility and confirmability. "Credibility is demonstrated when participants recognize the reported research findings as their own experiences" (Streubert & Carpenter, 1999, p. 330). Credibility is determined by reviewing the findings of the data with the participating parent to clarify what the researcher heard (Streubert & Carpenter, 1999). During the interview process, the nurse researcher would reiterate comments to make sure of what was said. “In order to increase reliability and validity, open-ended interview data should be transcribed and coded as soon as possible after the interview” (Waltz et al, 1991, p.325).

After analysis of the themes, two parents were called to verify the researchers analysis. The parents were asked “Does this describe your experience?” and “Does this match your description?” Both parents agreed with the themes that the nurse researcher had extracted to describe their comments and their intentions.
"Confirmability is considered a neutral criterion for measuring the
trustworthiness of qualitative research" (Streubert & Carpenter, 1999, p. 329).
The researcher and committee chair compared outcome information from
random semi-structured interviews to determine this confirmability. The nurse
researcher and the thesis committee chair independently analyzed two interviews
and described or produced the same categories and themes. In this way, the
researcher and committee chair were able to independently review data sets to
substantiate the data analysis process.

Each interview was looked at individually and categories emerged. It was
the goal of this research to explore the greatest variety of responses and then
place the responses in categories for data analysis. By allowing the information
to emerge, limitations were not placed on the data by having predefined
categories. If preset categories were developed for the information, it is thought
that valuable information would potentially be lost.

Table summaries were used to organize both the quantitative and
qualitative data.

Research Questions

1. What is the relationship between the severity of asthma and the frequency
   of using the PFM?

2. What is the relationship between the severity of asthma and the frequency
   of health care visits?
3. What is the relationship between the severity of asthma and the frequency of counseling concerning the PFM?

4. What are the perceived barriers in the use of PFM?

5. What are the perceived benefits in the use of the PFM?

6. What are the prior related behaviors for use or non-use of the PFM?

7. What is the nature of education concerning use of the PFM that parents and children receive?

Ethical Considerations

Human subject rights approval was obtained from the University of Nevada, Las Vegas Department of Nursing and the Institutional Review Board (IRB) (see Appendix III). Written consent was provided from the asthma allergy clinics to have access to their patient population. The specialty providers reviewed the questionnaire and semi-structured questions prior to use in their clinics. Participants in this study were given verbal information and a written informed consent form that explained the purpose of the study, and stated voluntary participation and confidentiality. Participants signed the consent form before completing the questionnaire tool. There were minimal risks and benefits by participating in this study, but the benefits to the practitioners of better caring for patients with asthma were included in the consent form. The minimal risks included feeling uncomfortable and answering questions. Parents were aware that information about PFM use was the information that the researcher was seeking. Parents of children with asthma provided the information, therefore no
issues regarding children needed to be addressed by the IRB. Confidentiality of data was addressed by assigning a code number for each participant. The coding began with the number 1. On a separate list, the numerical coding correlated with the participants' names and phone numbers. Participants' names do not appear on the data collection tool.
CHAPTER 5

RESULTS

Introduction

This chapter presents information that was gained about parental knowledge and perceptions concerning the use of peak flow meters (PFM) to manage their child's asthma. The quantitative data presented includes the demographics of the sample, asthma characteristics, health care utilization, and PFM data. This quantitative data answered research questions 1, 2, and 3. Research questions 4 through 7 were answered through analyzing responses to the semi-structured interview by using content analysis.

Results

Demographics of Sample

The characteristics of the sample population as shown in Tables 1-6 (see Appendix VI), were analyzed using descriptive statistics for the demographics. All 20 participants provided complete demographic information about their child with asthma. The children ranged in age from 6 to 12 years, with most of the children being in the younger or older group (see Table 1). Distribution of the sample according to gender had more males represented, with 70% of the sample males and 30% of the sample females (see Table 2). The sample ethnicity was 100%
Caucasian. Private health insurance provided coverage to 95% of the sample (n=19) with one child who was covered by Medicaid. The grade level was fairly well distributed through kindergarten to grade 7 (see Table 1).

Asthma Characteristics

The parents provided information concerning the asthma medication that the child takes on a daily and as-needed basis. For clarity and consistency of classification, the researcher determined the severity classification (see Table 2) based on the NAEPP (1997) guidelines as listed in Methods and Procedure, Chapter 4. Children with persistent asthma must take a routine daily medication. One participant was excluded because, although her child used the rescue inhaler routinely and on a daily basis throughout the school year, the parent chose to discontinue the prescribed daily medicine.

The children with mild and moderate persistent asthma were well represented, with 55% of the sample having mild asthma (n=11), and 40% of the sample having moderate asthma (n=8); only 5% of the sample had severe persistent asthma (n=1). One parent reported giving medications in the summer that would give the child classification of mild persistent asthma, but increased medications in the winter to a level that would classify her child as having moderate persistent asthma. Even so, for this study, she was included in the mild persistent group.

The majority of children have had asthma either 4-5 years (35%) or more than 5 years (40%), as shown in Table 2. School attendance revealed that absenteeism was not a major problem for the majority of the sample. The
question specified the number of days missed in the past school year for breathing problems, with 35% of the sample reporting no missed days, and 30% of the sample missing 1-2 days (see Table 5).

Health Care Utilization

Health care utilization was explored in questions 7, 8, 10, and 11 of the demographic questionnaire. Inpatient hospitalization and emergency department visits in the past year only affected a small number of children (see Table 3). Inpatient hospitalization related to breathing problems revealed that 90% of the sample had not been hospitalized. It is uncertain if this question was misread, because when asking people about control and recent problems, no parent described a recent inpatient hospital stay, as they all seemed to have been in the past. Even the parent of the child with newly diagnosed asthma, who was in the process of gaining symptom control, did not report either a hospitalization or emergency department visit. Emergency department visits revealed 85% of the sample had no visits, and 15% of the sample had 1-2 visits (see Table 3). Health care utilization also included visiting the school nurse, with 55% of the sample (n=11) not needing to visit the school nurse during the recent school year (see Table 4). The number of calls or visits to the asthma allergy office in the past year for breathing problems revealed this to be the major health care avenue, with 35% of the sample reporting 1-2 visits, 45% of the sample reporting 3-5 visits, and only 15% reporting no visits (see Table 4).
Peak Flow Meter Data

The PFM questions, 12, 13, 14, and 15 of the questionnaire, sought information about usage patterns and counseling. Usage of the PFM in the school nurse’s office revealed that 25% of the sample of the children (n=5) had used the PFM, and 75% of the sample (n=15) had never used a PFM in the school nurse’s office (see Table 5).

The PFM was not used prior to taking medication when experiencing shortness of breath in 70% of the sample (n=14), while 20% of the sample (n=4), did use the PFM prior to using medication with symptoms, and 10% of the sample (n=2) acknowledged sometime use (see Table 6). Although the parent was only given the choice of yes or no, two parents wrote in ‘sometimes’. Providing the option for ‘sometime use’ would have provided a response that more accurately depicted participants’ experience.

In establishing the actual usage pattern of the PFM, the parent was asked when the PFM was last used (see Table 6). The parent was given the choices of the last day, week, month, six months, or year. Again, some parents provided an additional choice of greater than one year. This was further described in the interview with the ‘greater than one year’ occasionally being as long three to five years. Only 25% of the sample had used the PFM within the last month, using the combined responses of day, week, and month. The majority of the sample had used the PFM within the last year (35%, n=7), with an equal number using the PFM within the past six months (20%, n=4) or greater than one year (20%, n=4).
When asked about the specifics of PFM counseling (see Table 6), the majority of the study participants revealed that they received counseling sometimes but not every visit (60%, n=12), while 25% of the sample (n=5) described counseling with the first visit, and only 15% of the sample (n=3) described counseling with every visit.

Research Questions

Question 1. What is the relationship between the severity of asthma and the frequency of using the PFM?

Analysis of the quantitative data was done with SPSS 10.0 software. The non-parametric chi-square test was used to analyze the data to determine if there was relationship between the variables of the severity of asthma and the frequency of PFM use. The level of significance was set at ≤ 0.05. This level of significance will predict with a 95% probability of accuracy (Burns & Grove, 2002).

The two nominal categories used were severity of asthma and frequency of PFM use. The categories had to be collapsed because of the small sample size and the need to satisfy the four assumptions of chi-square. The collapsed variable satisfies the assumption that sample size is adequate, with no cells having an expected frequency of less than 5, and there is a theoretical reason for the categories (Munro, 2001). The other assumptions are satisfied because both variables are nominal data and the categories are mutually exclusive (Munro, 2001).
The asthma severity classification provided data revealing that children with mild and moderate persistent asthma were well represented, with 55% mild (n=11), 40% moderate (n=8), and only 5% (n=1) with severe persistent asthma (see Table 2). Because the NAEPP (1997) guideline recommends PFM use for moderate and severe asthma, the moderate and severe category were then recoded and collapsed for this analysis.

The PFM use category had a potential for six choices (see Table 6). Originally, as the questionnaire was developed, it did not include a choice for greater than one year, but parents wrote in this response to more accurately reflect their usage patterns, thereby creating the sixth response choice. The analysis revealed that 25% had used the PFM within the last month: day (5%, n=1), week (10%, n=2), month (10%, n=2). The majority had used the PFM within the last year (35%, n=7), with an equal number using the PFM within the past six months (20%, n=4) or greater than one year (20%, n=4). Because recent use of the PFM was evident with use in the last day, week, or month, this category was collapsed to reflect recent usage patterns. Use within six months and a year were collapsed for the second variable, and greater than one year was the third variable, as it reveals minimal usage patterns.

A 2x3 chi-square table was created using the recoded variable of both severity and PFM use. The analysis of these recoded variables revealed that there was no statistical significance with $x^2=4.30$, df=2, $p=116$; therefore, no relationship was found between severity and frequency of PFM use.
Question 2. What is the relationship between the severity of asthma and the frequency of health care visits?

The severity of asthma was compared to four separate variables to answer this question. Frequency of health care visits included hospitalization, emergency department visits, school nurse visits, and asthma allergy calls/visits.

As described above, the severity of asthma category was recoded and the category was collapsed. The collapsed variable satisfies the assumption that sample size is adequate, with no cells having an expected frequency of less than 5, and there is a theoretical reason for the categories. Again, the level of significance was set at ≤ 0.05.

Hospitalization. A chi-square 2x2 table was used to compare both nominal categories of recoded severity of asthma and hospitalizations for breathing problems. The chi-square analysis revealed that there was a relationship with the recoded asthma severity and hospitalization with $x^2=9.80$, df=1, $p=.002$. This indicated that the more severe the asthma, the greater number of hospitalizations.

Emergency department visits. A chi-square 2x2 table was used to compare both nominal categories of recoded severity of asthma and emergency department visits related to breathing problems. The chi-square analysis revealed that there was a relationship with the recoded asthma severity and emergency department visits with $x^2=12.80$, df=1, $p=.000$. This indicated that the more severe the asthma, the greater the number of emergency department visits.
School nurse visits. A chi square 2x3 table was used to compare asthma severity and school nurse visits for breathing problems. Both of these nominal categories had to be recoded to satisfy the assumptions of chi-square analysis: categorical (nominal) data, adequate sample size with 0 cells with expected frequencies of less than 5, categories are mutually exclusive, and same theoretical reason for categories. As seen in Table 4, the school nurse visits had five choices. The majority of the sample had no visits to the school nurse with 55% (n=11). The five categories were collapsed into three: no visits, 1-2 visits, and 3 or more visits. It was felt that 1-2 visits represented low-level usage of school nurse visits, with 3 or more representing frequent use.

The chi-square analysis revealed that there was not a significant relationship between the recoded asthma severity and the recoded school nurse visits, with \( x^2 = 4.90, \text{df}=2, p=.086 \). This did not indicate that those children with more severe asthma visited the school nurse more.

Asthma allergy calls or visits. A chi-square 2x3 table was used to compare asthma severity and calls or visits to the asthma allergy clinic for breathing problems. Both of these nominal categories had to be recoded to satisfy the assumptions of chi-square analysis: categorical (nominal) data, adequate sample size with 0 cells with expected frequencies of less than 5, categories are mutually exclusive, and same theoretical reason for categories. The questionnaire provided five choices as seen in Table 4. Fifteen percent of the sample had never called or visited the asthma allergy office for breathing problems, with the majority of the sample either calling or visiting the asthma allergy office 1-2 times.
(35%) or 3-5 times (45%). The remaining 5% of the sample had called or visited the office 6-10 times. This was collapsed into: no visits, 1-2 visits, and 3 or more visits. Asthma allergy calls and visits with three or more visits represented fair utilization, as opposed to infrequent or no utilization.

The chi-square analysis revealed that there was not a significant relationship between the recoded asthma severity and the recoded asthma allergy calls or visits, with \( x^2 = 3.70, \text{df}=2, p=.157 \). This did not indicate that those children with more severe asthma called or visited the asthma allergy clinic more.

**Question 3. What is the relationship between the severity of asthma and the frequency of counseling concerning the PFM?**

It was necessary to review the data prior to chi-square analysis. The variable, severity of asthma, was nominal data and the variable, counseling of the PFM, was ordinal data. According to Munro (2001), if the data is categorical, it must be categorized before being used, and the new categories must represent the data and include sound rationale for the category. According to Morgan, Griego, & Gloeckner (2001), "You can use ordered data with a few categories (e.g., low, medium, and high) but chi-square and Cramer's V will treat the data as if they were nominal" (p. 90). The categories for frequency of counseling of the PFM are: with the first clinic visit, every visit, and sometimes but not every visit. This first assumption was met based on this information. The other three assumptions of chi-square are also satisfied: adequate sample size with 0 cells with expected frequencies of less than 5, categories are mutually exclusive, and same theoretical reason for categories. A 2x3 chi-square table, with the variables...
of recoded asthma severity and frequency of PFM counseling, revealed there was a significant relationship between the number of times health care professionals counseled on PFM and the severity of asthma. Therefore, the more severe the asthma, the more counseling that was provided, with $x^2 = 6.70$, df = 2, $p = 0.035$, as determined by a significance value set at ≤ 0.05.

**Question 4. What are the perceived barriers in the use of the PFM?**

There were four themes from the results of the content analysis that identified perceived barriers of use of the PFM. The themes that identified the perceived barriers of use of the PFM included: Values of the PFM, Innovative Medication, PFM Patterns of Use, and PFM Guidance and Support (see Table 7). These themes provided parental insight into why parents are not using the PFM or what prevents them from using the PFM; but, according to Pender (1996), “when readiness to act is low and barriers are high, action is unlikely to occur” (p. 69).

*Value of the PFM.* This theme provided insight into what the parents liked or disliked about the PFM. Some parents provided neutral responses about their perceptions of the PFM’s value. Some parents gave negative responses that included lack of availability and size. Parents also described the added responsibility of performing the task with comments like “Nuisance because added task to remember during trial period” and “Extra thing for me (mother) to do.” One parent stated that she did not like it at first, because she did not understand the concept; but later described its positive value.
Innovative Medication. This theme explored the perception of the parents' views about current asthma medication. Parents associated the newer asthma medications with control, and no longer see the need to use the PFM; therefore, improved medication could be considered a barrier to use. Comments include, “Don’t use (PFM) because singulair is doing well” and “But the medicine is so much better now that we don’t use it (PFM) for our younger son”.

PFM Patterns of Use. This theme provided insight into actual practice patterns. Parents provided information about how parents actually use the PFM. Some parents described regular and consistent use, while others only use the PFM for times of illness or with the initial diagnosis. A frequently cited reason for non-use or decreased use is healthy times. If families increased used with sickness, many people decreased use with healthy periods. Three parents give health as a reason to decrease use: “If sick or attack would use, but has been well”, “Not sick, it would be the same everyday”, “Not as frequently in summer, maybe every week”, and “Uses when sick; last used in the fall because she has been healthy”.

Three parents described difficulty with actually manipulating the PFM. Comments included, “Similar to taking test on computer, same concept but daughter needed practice” and “Tried to use within the past year (age 5½) but hard to coordinate.” Learning to use the PFM was a barrier to acquiring the skill necessary to monitor respiratory changes with the PFM, and the parents and children did not practice the use of the PFM to acquire this skill. Although the child attempted to use while 5½ years of age, no further attempt was made to
acquire this skill as she got older. For one parent, the barrier to learning was too
great, and the child never acquired the skill, “Not a valuable tool for me because
my son never got the hang of it, but I know other people who think it is great for
them.”

PFM Guidance and Support. This theme described the nature of
counseling parents received about the PFM, as well as the positive and negative
messages they received about the use of the PFM. Lack of follow-up on the PFM
may be seen as a subtle disregard for this tool, but when the physician verbalizes
that it is not necessary to use the PFM, this message may be seen as a barrier.
Six participants provided examples of lack of follow-up, or actual disregard for the
PFM as a useful tool. Examples of indifference included, “Physician said really
didn’t matter because of all medications will make him better and make the
difference” and “Doctor and them say don’t have to continue”.

Some parents were motivated to learn about the PFM and overcame the
lack of education piece. They received the PFM in the mail, or were told by
friends about the PFM, and initiated the process to learn about the PFM. They
went to the specialty office and requested information, the actual tool, or
requested further instruction to learn about the PFM.

Question 5. What are the perceived benefits in the use of the PFM?

The perceived benefits of action would be to both the parent and child in
the form of unexpected disruption and early recognition of exacerbations. This
perceived benefit would be highly motivating, as evidenced by increased control
or early recognition of respiratory changes. The perceived benefits emerged from
the themes: Value of the PFM, PFM Patterns of Use, and PFM Directs Medication Use (see Table 7).

Value of the PFM. In analyzing the Value of the PFM, eight parents gave comments as to why they liked the PFM. They valued the PFM for its predictive capabilities and convenience. Parents also used the PFM for validation or as an indicator to see how the child is breathing, which then helped to guide the parent in how to handle the changes in breathing with either medication or a call to the specialty office.

Positive comments were provided by eight parents. Two parents gave multiple reasons to support the value. “It is a tool—value to see how he is doing”, “Like to see how son is doing”, “Because we live very rural, using the PFM to follow progress was helpful”, “Very valuable for both mother and child—when to take rescue inhaler”, “Yes feel; can predict”, and “Before PFM, is sick and coughing didn’t always know what to do—(now) learned what to do to prevent suffering and increased medial bills; (before) if cough—take to MD to find out if it was upper respiratory and not lower respiratory”.

Other participants gave only one or two comments expressing their perception of value of the PFM. Comments included: “Found to be very helpful”, “Nice to get a feeling for how she is breathing”, “It is a validation”, “Probably like or neutral”, “Wonderful for someone not chronic”, “I love it—great measure as a home tool to take care of asthma—can self medicate”, “I think it is valuable because it reflects with change in breathing”, “Do like it because I think knowing
can predict when starting to get sick", and lastly, "I felt it was a good indicator to see how he was breathing".

_PFM Pattern of Use._ In addition to the six parents listed above that verbalized the value of the PFM, three additional parents have described the value of the PFM when describing their pattern of use. Reasons for use included prediction, providing objective numbers to the physician with increase use around the office visit, increases use with sickness or coughing, managing when away, restarting medication, and using to assess response with animal exposure.

Three parents described use when the child is not with them. They described using this tool to help manage their child’s asthma in their absence. "I taught the step mom”, “Helps guide when child away—when travel, call mom on phone and give PFM”, and “Going away without children in October and I can show the grandparents how to use”.

Three parents described using the PFM to predict the child’s breathing for either baseline or with real or potential changes. "At first used to predict—used on a daily basis and report number to MD” and "Uses to predict—has a stethoscope but can’t tell—I am not a nurse, so the PFM helps”. Similar use for predictive value to follow allergens, “If son had a cold or around animals, we check the PFM”.

Parents also described using the PFM to provide objective numbers to the physician in an acute situation or for monitoring overall respiratory health during routine office visits: “Call MD—more objective information with number and provide care”, “Before the office visit, will do more readings to give information”,

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and "To get baseline for physician probably to adjust medications". Interestingly enough, in the theme, PFM Pattern of Use, the usage patterns did not appear to reflect this strong sense of value. Only five participants state using weekly or every few weeks, but increase use if sick. Five participants used only with initial diagnosis, two have used in the last three years, and one stated use in the last five years.

*PFM Directs Medication Use.* This theme explored how the PFM provided direction to the parent, with objective parameters for when to administer medication. Six parents gave positive comments as to how the PFM can guide medication use. Parents were guided by the PFM to either give the medication, when to give extra doses of medication, or when to cut back on medication. Comments included, "I give extra doses of albuterol according to response as reflected on PFM", "Sometimes takes a few weeks to recover after an asthma attack and remove extra medication and don't overmedicate", "Depends on reading around 185 to start steroid; <185 call before starting", and "If <200—rescue inhaler; (200-250—one puff); >350—good, no extra".

The PFM also helped determine whether things could be managed at home with medication or to seek care. For example: "Yes, it guides medication use and if necessary take to see the specialist", "I can look at him for signs of coughing and labored breathing but the PFM guides what I should do—extra medication or go to the doctors", and "Save from taking excess medication and going to emergency room".

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Question 6. What are the prior related behaviors for use or non-use of the PFM?

The prior related behavior of the parent is considered in how the parent and child dealt with the child's breathlessness prior to diagnosis of asthma and with previous asthma exacerbations. A direct effect on past behavior would include activities involving habit formation, whereas indirect effect would involve perceptions of self-efficacy in performing activities (Pender, 1996). In the example, the use of the PFM, the habit becomes strengthened by repetitive use of the PFM, and the perception of self-efficacy indirectly strengthens this behavior. The activity and belief in this study is the belief by the parent that the child is capable to perform the PFM and the belief of the child that he/she can successfully perform the PFM. Other concepts from Pender's model include activity-related affects, which are the feelings surrounding the use of the PFM, as well as interpersonal and situational influences. The themes that provided information about prior related behaviors included: Connections Between PFM and Breathing, Child's View of the PFM, Family, and Mother's Intuition (see Table 7).

Connections Between PFM and Breathing. This theme had 13 parents who provided information. One parent did not feel that the PFM accurately reflected the child's breathing every time, while five parents did not feel that they used it long enough to find a relationship between changes in the child's breathing and a change in the numbers on the PFM. Seven parents felt that the PFM correlated with the child's breathing or changes in breathing.
The parents that felt the PFM reflected breathing stated “Noticed readings would be higher 20 minutes to one hour after medication”, “With sick episode (cold or breathing problem) would see numbers drop”, “If bad, she is less than 60; really good 100-110”, “Yes when his asthma acts up it is reflected on the PFM”, and “And yes it did correlate. He would drop in the numbers when having breathing difficulty”. Even so, one parent stated, “In red zone at the office but was not retracting at the time”.

*Child’s View of the PFM.* This theme gave examples of prior use of the PFM, and the child’s acceptance or neutral response to the PFM. There were no comments as to the child refusing to participate in using the PFM.

Examples of the child’s commitment to the PFM included one boy who “dug it out of the closet” and started using in the last month to measure with bagpipe use. The boy, who had recently started taking bagpipe lessons, wanted to measure if there was a connection between his PFM and a possible increase in endurance on the bagpipe. Another mother describes her two sons having “blowing contests” with the PFM. (Twelve year-old sibling has asthma but was not included in study). Other comments that described the child’s view included, “Child liked it, she thought it was a game”, “Child did ok with trial period”, “Child didn’t mind, just part of the necessary routine”, and “Child didn’t mind it.”

*Family.* The Family theme provided strong comments as to why the PFM is or is not currently used. Many parents cited previous experience with asthma with either extended family or within the immediate family unit. Two mothers had asthma, and use the PFM along with the children to monitor their breathing.
Two parents had older children with asthma. One mother cited that she used the PFM to guide her older child (now 20), to direct medication use and direct health care utilization, but her younger child has less asthma and responds better to the new medications. "We learned a lot about asthma with our older child and so we are better at managing, and our 12-year-old’s asthma is not as severe." This previous learning provided some comfort to the parents to manage their younger child’s asthma.

Another parent, who also has two children with asthma, described that her younger child has the more severe asthma. This parent commented that they were not as diligent with the older child (now 12 years old), but now they use the PFM for both children. These two brothers compete with each other and have blowing contests on a regular basis. When the two children are checking their peak flows, they compete to see who can get the higher number or the biggest jump in numbers with their three breaths (blows).

_Mothers Intuition._ In this theme, four mothers gave comments as to how they could just tell when their child was having a problem. These mothers described previous experience and observation to guide care as well as the child’s input. One mother did describe a combination of observation and use of the PFM to help guide care. Of note, four of the 20 participants are nurses (3 RN’s, and 1 LPN) but only one RN parent used intuition to guide.

Comments from parents illustrated how intuition and previous experience guided care. “Can tell when she has a spell and medication is doing well”, “Can tell when she has a spell and call the doctors office”, “More in tune—I can hear if
having problems”, “I just felt I knew what to do with breathing problems and
treated son”, and “Know when having problems and treat with meds.” The mother
who was a nurse stated, “Own assessment as good as tool and child verbalized
when having problems”, “When thought he was having problems, he was.” And
lastly, one mother used a combination of observation, previous experience, and
the PFM to guide care, “Would help to step up or down medication use and PFM
to guide—if lethargic or lips blue, is biggest indicator”, and “Also check lips or
fingertips.”

Question 7. What is the nature of education concerning use of the PFM that
parents and children receive?

The results of the content analysis provided one theme that answered the
question regarding the nature of education. The theme was PFM Guidance and
Support (see Table 7). This theme described counseling on the PFM by the
health care professionals as well as how and where the parents and children
learned to use the PFM. PFM Guidance and Support also addressed ongoing
support, or lack of support, as evidenced by questions and review of the PFM
technique.

The support that the child and parents feel regarding the use of the PFM
by the health care professionals is a significant concept relating to the revised
Health Belief Model. Interpersonal influences include the expectations of
significant others, social support, and modeling (Pender, 1996). These
interpersonal influences would include families, friends, and health care
professionals. The interpersonal influence is strongly connected to activity related
affect in which the feelings surrounding an activity are important; but modeling, a sub-concept of interpersonal influences, is an important strategy for behavior change (Pender, 1996). The modeling may include practice and acquisition of a learned activity with periodic review of PFM technique, and the interaction or involvement that one gets within an asthma support network.

**PFM Guidance and Support.** This theme had responses from all 20 parents. Thirteen parents learned from the specialist. Two of the thirteen initiated getting the information on the PFM after receiving it in the mail, or were influenced by a friend; "Learned at the clinic after receiving in the mail" and "As ked the asthma allergy doctor about the PFM—mentioned that friend had used it and then received one from asthma allergy doctor".

Five parents received their information from their family practice physician prior to being referred to the asthma allergy specialist. One parent sought out information on the PFM from the family practice physician after learning about and borrowing the PFM from a friend. The other two parents learned about the PFM from health care professionals unrelated to the family practice clinic or the asthma allergy clinics, such as during a hospitalization or from a family member who is a nurse practitioner. "Learned during hospitalization—initial diagnosis of reactive airway disease at about 4 years old", and "My sister is an FNP (Family Nurse Practitioner)—she sent me the first PFM."

Five parents described examples of PFM Guidance and Support when either request by the physician or clinic staff to provide records, or review technique. As previously described, this interpersonal influence is the expectation
of significant others, social support, and modeling (Pender, 1996), which influences the parents and children to use the PFM. Modeling is illustrated in this example: “We go to the PFM station at the office and see other patients doing the same thing.” One parent described how the asthma allergy staff provided guidance with her son’s self-discovery and unique mastery of the PFM. “Learning to flick tongue and make it go higher, then he thinks he won’t have to take his medication.”

In addition, when someone feels that it is a valuable or useful tool, they tell their friends about it. Family and friends encouraged the use of the PFM and this motivated the parents to get information about this tool. Four parents learned about the PFM from their family physician and were then referred to the specialist. Other examples of professional support included the school nurse, or when the child presented to the emergency department.

The nature of education can also have a negative impact on the use of the PFM. Six parents provided examples of lack of follow up, or actual disregard for the PFM as a useful tool. An example of indifference includes, “Physician said really didn’t matter because of all medications will make him better and make the difference.” Of note, one child had used the PFM for more than 1 year with regular usage when the parent was told, “Doctor and them say don’t have to continue.” Lack of follow up include responses like, “Doctor never requested follow up of PFM”, “They never ask about it here”, “After we got it from the doctor no one mentioned it again”, and “I thought it a great tool if going to use it but not promoted by specialist.”
General Asthma Themes

The interviews elicited significant and pertinent information that went beyond the seven research questions. Nine additional themes gave depth and understanding to having a child with asthma, and the influence that this health problem had on the lives of the child and family. The themes are Control, Triggers, Impact, Be Prepared, Past History, Guidance and Support Unrelated to the PFM, Spirometry, Child as Predictor, and Thwarted Efforts (see Table 8).

Control. This theme described recent health in relation to the child's asthma. When describing recent health, only one parent described her child as "struggling, but better than one month ago" and related a detailed account of the past month. This child was newly diagnosed and the parents were working to get this child's asthma under control. The other parents gave descriptions that ranged from great to not bad. Four parents described health as great or excellent, four parents described health as very good, seven described as good or well, and two parents described the asthma as under control or not bad. Comments that further described their health varied greatly in the parents' perception and acceptance. One mother described recent health as excellent but commented, "Last used rescue inhaler the other day—he uses it about every other day,", and "He has exercise induced asthma so he uses his inhaler frequently." Another described recent health as "Good—uses rescue inhaler about three times per week." Other comments that described recent health included, "Not impeded by his asthma", "Hasn't slowed down", "Has not limited
outdoor activities related to asthma”, and “Not much lately (impact)—swimming all summer.”

Medication use is a sub-theme to control, as it described how the parents used medications unrelated to the PFM, and how they used prophylactic medication to control asthma. Three participants described regular use of rescue inhalers before sports and physical education (P. E.) while one mother described prophylactic use of Claritin and the inhaler before visiting friends with dogs. Parents also described questionable medication use, “Not use rescue inhaler for travel—we take the Epi (epinephrine) pen with us and would use if necessary,” and “A nurse friend that we were visiting saw that my sons albuterol was not working and gave him (her daughter’s) Intal.” Lastly, one mother described her concern about long-term use of steroids, “Also first or second round of medication, given prednisone—but don’t want him on steroid for the rest of his life.”

**Triggers.** This theme had 15 parents providing comments. This theme included allergy components with seasonal, environmental, and animal causes as well as exercise-induced basis. Many comments overlapped while some parents can provide clear connection to triggers with comments: “Fall with allergies especially during soccer season”, “Asthma in the fall with hay cutting and football”, and “But it is asthma allergy season—(son) plays army and runs in the weeds.” Others attribute exacerbations to times of the year, “Uses rescue inhaler April and May, not June or July”, “Major flares in January”, “Problems
with cold weather activities”, “Hates when school starts”, and “Usually bad in December and January—hospitalized 4 years in a row during that time period.”

Impact. This theme had 13 parents giving comments. The impact ranged from periods of illness to routine accommodations. “Impact not on day to day, but when sick, things change”, and “Like with any sickness, like the flu, when your child has the flu you take extra care and it is similar to asthma”,

Other parents described changes to family life related to activities, travel, and ability to have family pets, “Family plans—don’t travel because sick or mountain bike—more moderate things”, “Occasionally restrict baseball, football, PE—one time he hid in the dugout from us”, and “Struggles with Christmas time—avoid travel. "Travel was also cited as an impact because of rural setting, “Big impact until stabilized on medications, because travel to major cities. Didn’t know about this local office a few years ago”.

The impact of not having animals was cited twice, “Impact is that the asthma is sports induced and we got rid of animal—we don’t have cats, dogs, or he can’t ride horses”, and “Outside of not having animals, not a big deal”.

Parents described maintaining normalcy if possible, “Let him be as normal as possible”, and “Don’t let asthma limit his activities.” When describing activities, communicating with the leaders or coaches has been beneficial. One mother described her own fears, “Big impact—child carried inhaler and I would worry that he wouldn’t have it or have a problem without me.” Lastly, one parent describes things getting easier, "Impact on activities—when younger—
regimented—now is maturing and bronchials are getting larger, so less problem” and “Moderate to severe but getting less problems.”

**Be Prepared.** This theme had 11 parents that described the need to be prepared. The comments were straightforward and dealt with the need to have medication, nebulizer, inhalers, and/or equipment when necessary. “Don't forget inhaler”, “We just have to have an inhaler wherever we go”, and “Never go anywhere without the inhaler—part of the disease.” One mother when asked about the impact of asthma stated, “Not really—need to take chamber and medications when we go on vacation; not a big problem but we need to be prepared.” And another mother didn’t carry the inhaler for local errands but did prepare for school and trips, “Have inhaler at school and take inhaler with us on trips—but I don't carry the inhaler with me on a regular basis if I go to the store.”

**Past History.** This theme provided some contrast to the current control. Ten participants gave comments about previous experiences. “Once at a baseball game, I though something was wrong and went to the boys restroom and I found him on the floor. He had gone in there and it was hot and he had an attack. He was about 10,” and “A few bad experiences last year the first week of school—he had problems and a classmate had to get help”. Other comments describe the early years of asthma, “When younger, we spent many nights up with him with breathing problems and coughing”, and “When 3-4 years, went to the emergency room 3-4 times—hard to determine cause and it was scary.”

**Guidance and Support Unrelated to the PFM.** This theme described both support and frustration with health care providers. Four participants felt they had
received strong asthma support and two participants complained of feeling frustrated about how their asthma was/is being handled. The four participants felt that their physician provided direction and support to be able to manage their child's asthma. "Dr. does such great teaching", "Encourages ownership of plan of care", and "Dr. empowers patient and family". One mother felt support regarding home restrictions was very helpful, "The specialist is supportive of no animals—it is hard to convince an 8 year old why he can't have a dog—so that support from the specialist is helpful."

Two mothers were frustrated over response to their child or the approach to their child’s asthma, "I'm frustrated over different approach between specialist and family practice", and "Not taken seriously at local hospital therefore went out of town. The doctors at the emergency room didn't take me seriously".

**Spirometry.** This theme provided comments from three parents about the use of spirometry and the impact on care. One parents likes that they use spirometry, "Love spriometry at office to follow." Another parent describes how spirometry impacts care, "Yes would use to direct care (PFM) but because work at Asthma Allergy office—plan of care is more objectified. Bring in for office spirometry to determine if needs to see MD—therefore used numbers of spirometry rather than PFM" and "In past with sick child-if sick-used spirometry to determine level of care necessary."

**Child as Predictor.** This theme gave two comments that lend toward the child alerting the parent of problems. "Occasionally yes, occasionally no—if
problem breathing—rely on her (child) not on meter”, and “Child is verbal child—child will say ‘feeling tight’—best predictor”.

**Thwarted Efforts.** Only one parent discussed thwarted efforts but was very detailed and therefore deemed to be significant. “With diagnosis about 3 years ago, we replaced the carpet and cleaned the air ducts to see if it would improve winter symptoms, but the next winter symptoms returned despite these attempts. Also our old dog died and waited to get a new one; with recurrent winter symptoms and no improvement, we got another dog.”

**Summary**

This chapter presents information that was gained about parental knowledge and perceptions concerning the use of PFMs to manage their child’s asthma. Both quantitative and qualitative data presented information about PFM use in children to answer the research questions. The quantitative data presented the demographics of the sample, asthma characteristics, health care utilization, and PFM data. The non-parametric chi-square test was used to analyze the data to determine if there was relationship between the variables. The level of significance was set at 0.05. Chi-square analysis did determine statistical significance between the severity of asthma and both emergency department visits and hospitalizations when analyzed separately; the relationship indicated that the more severe the asthma, the greater the number of these types of health care utilization. There was also significance between the severity of asthma and counseling by health care professional with an increase in
counseling with the more severe asthma. Chi-square did not detect a relationship between severity of asthma and the frequency of using the PFM, or severity of asthma and health care utilization of the school nurses office or the asthma allergy clinic.

The qualitative data was analyzed using content analysis. The research questions that were answered with content analysis described the perceived barriers of PFM use, the benefits of PFM use, prior related behavior for use or non-use of the PFM, and the nature of education that parents and children receive regarding the PFM. Themes that provided information about the perceived barriers to using the PFM included Value of the PFM, Innovative Medication Reduces PFM use, PFM Patterns of Use, and PFM Guidance and Support. Themes providing information about the perceived benefits of PFM use included Value of the PFM, PFM Patterns of Use, and PFM Directs Medication Use. Prior related behaviors for use or non-use of the PFM provided information through the themes about the Connections Between PFM and Breathing, Child's View of the PFM, Family, and Mothers Intuition. The theme PFM Guidance and Support provided information about the nature of PFM education. In addition to the eight themes that answered the research questions, nine additional themes emerged that were significant for parents and children living with asthma.
CHAPTER 6

DISCUSSION AND IMPLICATIONS

Introduction

This study explores parents' knowledge and perceptions of using the peak flow meters (PFM) to manage their child's asthma. The revised Health-Promotion Model (HPM) by Pender (1996) was used as the theoretical framework to guide this research. Because no tool was found in the literature that was specific to PFM use, a two-part data collection procedure was undertaken using both a questionnaire and a semi-structured telephone interview.

Discussion

Demographics

The demographic data showed a wide representation of grade levels with a good distribution across the grades of kindergarten to 7th grade. The gender revealed more boys than girls and that is consistent in the literature (McEwen et al. 1998). In this sample, the ages ranged from 6 to 12 years, with the majority of the sample at either end of this distribution (see Table 1). Although the age distribution was more represented in both the younger and older groups, 75% of the sample had asthma for either four years or longer.

The sample size for the classification of mild, moderate or persistent asthma was not well distributed (see Table 2). The sample was a problem as
only one child had severe asthma, 55% of the sample had mild persistent asthma, and 40% of the sample had moderate persistent asthma. In attempting to get a good distribution of classification, asthma allergy specialty clinics were accessed; even so, severe persistent asthma was under-represented in this sample. This may reveal a conservative review by this researcher; when parents listed medication, they occasionally did not list the dosage in micrograms, and depending on the dosage strength, would have indicated a higher severity. Because of this conservative estimate, some participants may have been identified as moderate persistent asthma rather than severe persistent asthma. And lastly, control of the child's asthma may be inadequate, as three parents gave information in the interviews regarding rescue medication use as frequently as "every other day" or "three times a week." This may have revealed poorly controlled asthma, and these children may have, in fact, been categorized in the higher classification, such as moderate or severe persistent asthma, rather than mild.

School absences for children with asthma were below average as compared with one research report (McEwen, et al., 1998). This sample revealed 65% missing 0-2 days (35% of the sample missing no school and 30% of the sample missing 1-2 days). McEwen, et al. (1998) found that children with asthma miss more than twice the amount of school of children without asthma: 7.2 days/year versus 3.4 days.
Severity of Asthma and PFM Use

The data did not reveal a relationship between the severity of asthma and the frequency of PFM use. This was surprising because given the fact that the NAEPP (1997) guidelines recommend PFM use for persons with moderate to severe asthma, and this sample population had 45% with moderate or severe asthma (moderate 40%, severe 5%), it would have been expected to have more than the 25% which was found in the data that were using the PFM on a somewhat regular basis. Reason for use or non-use will be further explored.

Severity of Asthma and Health Care Visits

The severity of asthma was compared to four separate variables to analyze the data and determine if there was a relationship. Health care utilization included inpatient hospitalization, emergency department visits, school nurse visits, and asthma allergy calls or visits (See Tables 3 and 4). Hospitalization and emergency department visits showed significance at the level of p ≤ 0.05. This indicated that the greater the severity of asthma, the more utilization of health care services with both inpatient hospitalization and emergency department visits. This was an expected finding to support a greater utilization of acute health care services by children with more severe of asthma than children with less severe asthma.

The hospitalization and emergency department visits reveal that 10% of the sample reported hospitalization and 15% of the sample required emergency department visits. This utilization pattern was addressed when exploring results, because parents did not describe recent events that would substantiate such
usage patterns. School nurse visits revealed that 55% of the children did not visit the school nurse for breathing problems, only 15% of the sample had 1-2 visits, and 30% of the sample had 3 or more visits. This low utilization of the school nurse by children with asthma was surprising given the fact that children spend approximately 7 hours per day at school engaged in various physical activities.

The biggest health care utilization was the asthma allergy clinic. The CDC (1999) reports that despite improved clinical treatment of asthma, emergency department visits and hospitalization are increasing. However, in this sample, it was found that asthma allergy clinics were the most frequently used health care option. Fifteen percent of the sample reveal that they did not call or visit the specialty office for breathing problems in the last year, 35% called or visited 1-2 times, 45% called or visited 3-5 times, and only 5% accessed the clinic 6 or more times.

Severity of Asthma and Frequency of PFM Counseling

The severity of asthma and the frequency of counseling was statistically significant. This indicated that the more severe the asthma, the greater the counseling of the PFM. This was supported in the literature by the recommendations of the NAEPP (1997) guidelines that highlight the use of peak flow monitoring for short-term monitoring, managing exacerbations, and daily long-term monitoring. The NAEPP guidelines caution that the use of the PFM is for monitoring, and not diagnosis, and the PFM is recommended for patients with moderate to severe persistent asthma. The guidelines state that any patient may benefit with the use of peak flow monitoring for severe exacerbations.
Perceived Barriers

The themes that provided insight into the perceived barriers of use of the PFM included: Values of the PFM, Innovative Medication, PFM Patterns of Use, and PFM Guidance and Support (see Table 7). These themes provided parental insight into why parents are not using the PFM or what prevents them from using the PFM.

It was interesting to find that when children are healthy, parents decreased the use of the PFM. The themes of PFM Patterns of Use and Innovative Medications revealed that the children used their PFM less when healthy. This health can be attributed to well-controlled asthma and the sometimes associated connection of the newer medications. Lloyd and Ali (1992) also found healthy times as a reason for decreased use. Their sample of 50 parents responded to a four-item questionnaire that revealed only 20% wrote about the usefulness for detection of impaired respiratory changes when their child was well. Although health may not be considered a high barrier, for someone that does not have PFM use well established, it would be easy to forget about it. Cote et al. (1998) described a general decrease in compliance of PFM use over time from 63% at one month to 33% at twelve month.

The NAEPP (1997) guidelines describe using the PFM initially on a regular basis to get a baseline, but then recommend intermittent rechecks unless experiencing exacerbations. Plaut (1999) also addresses obtaining a baseline measurement and then obtaining periodic checks depending on control. Good health of these children is the desired goal, but intermittent PFM checks when
the child is well would provide valuable information as to their baseline, as well as providing information to the practitioner when the child is not well. The parents in this study addressed this sometime use of the PFM during well states with checks weekly, every few weeks, and before the doctor visit. When the parents who did use the PFM more regularly, described their use of the PFM during healthy times, they also stated that they would increase use with sick times.

A competing demand might be the overwhelming sense of breathlessness and the desire to take asthma medication before the recommended use of the PFM to ascertain medication use. Twenty percent of the sample (n=4) stated that they did use the PFM before taking medication, while 70% of the sample (n=14) stated they did not. Two parents (10%) wrote in “sometime use” of the PFM before taking medication with shortness of breath.

The theme, Value of the PFM, enlisted negative responses as to the PFM being an additional task. In Pender’s (1996) terms, if this task is seen as a barrier, and the readiness to act is low because the parents have not had strong PFM guidance and support, then the action is unlikely to occur. Similarly, barriers to action would be the child’s inability to manipulate the PFM. The NAEPP (1997) guidelines states that children as young as 5 years of age or older can learn to use the PFM correctly. With continued or persistent PFM guidance and support, the child would be able to learn to use the PFM and it would not be seen as a barrier. Some parents overcame the lack of PFM guidance and support by asking for the PFM, asking for instructions, and re-education.
Prior related behaviors are significant to the context of barriers, because the severity of the previous experiences would have both a direct and indirect effect on implementation of health promoting behaviors (Pender, 1996). The direct effect regards the activities involving habit formation, while the indirect effect regards acquisition of performing activities (Pender, 1996). This study provided evidence where habit formation and perceptions of self-efficacy in performing activities reduced the perception of the PFM as a barrier. The children that used the PFM regularly (habit) did not see the PFM as a barrier, and had perceptions of self-efficacy in performing the task of the PFM well. In contrast, if the child had been mostly healthy, as in this study, the perception of the severity would not directly stimulate the parent to promote the PFM as a health promoting behavior, as was seen in the theme, Innovative Medication.

Perceived Benefits

The perceived benefits emerged from the themes: Value of the PFM, PFM Patterns of Use, and PFM Directs Medication Use. According to Pender (1996), “One’s plan to engage in a particular behavior often hinges on the anticipated benefits or outcomes that will occur” (p. 68). In relating the revised HPM to PFM use, the perceived benefits would be for both the parent and child to have unexpected disruption and early recognition of exacerbations related to asthma. This perceived benefit would be highly motivating, as evidenced by increased control or early recognition of respiratory changes. The perceived benefits are explored with these three themes: Value of the PFM, PFM Patterns of Use, and PFM Directs Medication Use.
The parents that supported the use of the PFM gave comments on the value. These comments supported the PFM for its value to predict and validate the child’s current respiratory status. If a parent believes in the PFM as a valuable tool, they will espouse the benefits and have eloquently, and sometimes profusely, provided comments. The interpersonal influences, as seen with previous support by the health care providers, family, and friends, affected the use of the PFM. This interpersonal influence was often cited as a factor for use when parents that have used the PFM, and therefore value the PFM, encouraged others to use the PFM. If a parent believed in its value, they used it on a regular basis. Those parents that did not value the PFM as a tool to guide asthma management, admitted to not having used it regularly, and, therefore, did not find a connection between the PFM and the child’s breathing. Only one parent verbalized that it did not always reflect the child’s breathing.

The theme, PFM Patterns of Use, revealed that this tool was used to monitor the child when away from the parents. If the exacerbation of asthma altered the control that parents felt about maintaining the health of their child, the PFM empowered the parents to be able to be away from their child, but to follow the child’s asthma. It was not found in the literature where parents used the PFM to manage their child while they were not with them. Therefore this theme revealed relevant and important information for parents to expand the use of the PFM tool. This perceived benefit of action incorporated the parents’ motivation to expand the use of the PFM. The motivational importance has been supported when tested in other studies in exploring the perceived benefits of action.
(Pender, 1996). In this study, parents not only taught other adults to use the PFM, but one parent described how the child used the PFM when staying at friends' homes over night.

The theme, PFM Directs Medication Use, was a straightforward description of how the PFM guided medication use. The parents had predetermined guidelines and would adjust medication use according to the numbers obtained from the PFM. Also the PFM helped parents to determine when medications could not guide home management, and further professional intervention was necessary. The NAEPP (1997) guidelines described how management plans are based on the objective measurement of the peak flow (as obtained by the PFM) to determine necessary changes in medication. McEwen et al. (1998) found improvement with the use of the PFM such as to decrease medications. Similar to the McEwen et al. study, this study showed how parents reduced the medications over a period of time as guided by the PFM. Therefore, the PFM not only provided information to initiate the need for increased medication, but helped to guide the parent when to decrease medications.

Prior Related Behavior

The prior related behavior of the parent was considered in how the parent and child dealt with the child's breathlessness with previous asthma exacerbations. A direct effect on past behavior would include activities involving habit formation, whereas indirect effect would involve perceptions of self-efficacy in performing activities (Pender, 1996). In the example, the use of the PFM, the habit becomes strengthened by repetitive use of the PFM, and the perception of
self-efficacy indirectly strengthens this behavior. The activity and belief in this study was the belief by the parent that the child was capable to perform the PFM and the belief of the child that he/she could successfully perform the PFM. Other concepts from Pender's (1996) model included activity-related affects, which are the feelings surrounding the use of the PFM, as well as interpersonal influences.

The themes that gave information about prior related behaviors included: Connections Between PFM and Breathing, Child's View of the PFM, Family, and Mother's Intuition. The Connections Between PFM and Breathing was previously discussed in perceived benefits. Many parents admitted to not using the PFM regularly, and, therefore did not find a connection. Therefore, this lack of use diminishes this prior related behavior in supporting use. Parents that felt there was connection between breathing patterns and the PFM used the PFM as a health promoting tool. The connection of breathing pattern and the PFM involved both perceptions of self-efficacy and habit formation, and is both a direct and an indirect effect of the prior related behaviors.

The Child's View of the PFM was a positive aspect of prior related behavior. In this study, the child viewed the PFM either in a neutral way or managed to use the PFM in a playful way. In using a Pender term, the positive activity related affect would aid in promoting the desired behavior of PFM use.

The Family and Mother's Intuition revealed very significant information about prior related behavior. Having other family members or being a family member with asthma had an impact on how the child's asthma was managed. This was not fully explored in itself in this study, but only extracted as a theme.
The emotional connection to having seen family members experience the effects of asthma will affect how the parent manages the child with asthma. One mother described that she had asthma as a child and was limited in her activities, and she tries to not let the asthma limit the child's activities. Another mother described her own fears saying "Big impact—child carried inhaler and I would worry that he wouldn't have it or have a problem without me." The past experiences of these mothers is inherent in how they manage the child's asthma and the level of surveillance they require over their child's asthma. The past experiences of observing a family member or children with asthma, or experiencing asthma first hand themselves, influences the level of anxiety associated with respiratory changes. One mother, who has asthma herself, was able to allow her child more freedom and stay overnight at a friends' house, but maintained some supervision using the PFM to monitor the child's asthma.

The Mother's Intuition was a theme that is very concerning. Four mothers described how 'they could just tell when their child was having a problem'. The literature provided much information about variation in accuracy of perception. Fritz et al. (1990) found that there was a wide variation in accuracy of perception. Their research revealed that only one fifth of the study population could accurately perceive asthma symptoms, and one third was extremely inaccurate. In other words, the perception of asthma symptoms did not match the degree of respiratory compromise. This study concluded that the children with inaccurate reports were advised to use PFM at home on a regular basis. Ferguson (1998) also described that symptoms are not reliable predictors of an attack.
(exacerbation). The literature review in Chapter 2 was quite extensive in describing the variation of perception of breathlessness.

The NAEPP (1997) guideline emphasized self-monitoring for the effective management of asthma whether this management included peak flow monitoring, symptom monitoring, or a combination of approaches. In light of the difficulties of perception discussed, the objectivity of the PFM seems to offer a valuable tool for asthma patients to quantify their respiratory activity and level of distress. In addition, some parents relied on the child as a predictor, and given the above concerns, and especially given the age group involved in this study, this is cause for added concern.

**Interpersonal influences.** Interpersonal influences were a strong concept in using Pender's revised Health Promotion Model, and are significant to both prior related behaviors of the PFM and education about the PFM. "Interpersonal influences are cognitions concerning the behaviors, beliefs, or attitudes of others" (Pender, 1996, p. 70). Interpersonal influences involve the family, friends, peer group, and professional support. Interpersonal influences are significant when discussing prior related behaviors because it affects acceptance or non-acceptance of the PFM. The themes discussed in prior related behaviors included Child's View of the PFM, Family, and Mother's Intuition. These three themes exemplified how the interpersonal influences affected the asthma management, and more specifically, the use of the PFM. When children were competing with each other while using the PFM, this interpersonal influence encouraged the use of the PFM. Also, previous family members' experience with
asthma, or the mother's perception of her capabilities to manage asthma, are reflected in interpersonal influences.

Pender specifically addressed the issue of children and adolescents. According to Pender (1996), "approaches to enhancing self-care behaviors of children and adolescents must focus on both families and peer groups. This dual approach is critical, since values, attitudes, beliefs, and behavior of families and peers influence children's lifestyles" (p. 101). The interpersonal influence is also very present in the nature of education as discussed below.

Nature of Education

Nature of education explored what the parents and children were taught about the PFM, how they learned, and who taught them. Interpersonal influences were intricate when describing the nature of education. The support that the child and parents felt regarding the use of the PFM by the health care professionals was a significant concept as related to the revised Health Belief Model. The theme that provided information about the nature of education was PFM Guidance and Support. Essentially, if the health care provider supported the use of the PFM as a valuable tool, parents used this tool for home management. To be included in this study, the child had to have used the PFM before. The prior use among the children ranged from brief use with diagnosis, to frequent and regular use of the PFM as a tool to manage their asthma. The data analysis fully explored how the child and parent learned about the PFM, and went into detail about how the continued use was supported or not supported by the health care provider (usually the specialty physician). Although some parents learned outside
the specialty office, at least some education was addressed by the specialty office.

The nature of education is paramount in the continuation of use. Specialty offices that support the use of the PFM have the child review technique with each visit, provide written data to show the physician about recent use of the PFM, or merely review how the child is using the PFM. These ongoing assessments showed support as to the value of use of the PFM and the need for continued use of the PFM. Literature was not found specific to in-office review of the PFM techniques. The literature does support self-management for asthma control. One study by Lahdensuo et. al. (1996) found the self-management group to have fewer unscheduled health care visits and higher quality of life scores. Other literature described research on asthma self-management, with regular monitoring in the school-based setting, which followed the children to monitor for outcomes (Christiansen, Martin, Schleicher, Koziol, Mathews, & Zuraw, 1997; Horner, 1998; Lurie, Bauer, & Brady, 2001).

In reviewing both the questionnaire and content analysis, the counseling on the PFM was inconsistent. The questionnaire revealed that only 15% of the sample described professional counseling of the PFM with every visit, 60% of the sample with sometimes but not every visit, and 25% of the sample with only the first visit (see Table 6). The questionnaire would support the content analysis where 6 parents (30%) described lack of follow up or actual disregard for the PFM. Modeling, a sub-concept of the activity related affect in the revised HPM, "portrays the sequential components of a health behavior and is an important
strategy for behavior change in social cognitive theory” (Pender, 1996, p. 71). The modeling may include practice and acquisition of a learned activity as was portrayed with the review of PFM technique with office visits, as well as the connection of an asthma support network.

Motivation, as addressed with perceived benefits, was well connected to nature of education. As stated, parents that were motivated to learn often sought out their own learning opportunities. As previously described, some parents received information from family and friends, in addition to health care providers. This outside network encouraged the parent to seek out or include the specialty office in their care. Palmer (2001) describes how caregivers gain information through persistence with clinicians, self-teaching, networking, and dissemination of information. The specific knowledge acquisition did not identify PFM use but could certainly lend towards a more unified approach to asthma management.

Methodological Limitations

The major limitation in this study was the small sample size. The goal was to have a sample size of 30. It was thought that this size would be sufficient to utilize non-parametric statistics and gain an understanding of parental perception and the child’s use of the PFM. This sample size was reduced to 20 due to the inability to get the preferred sample size after 14 weeks. Initially, the nurse researcher sat in the office waiting for potential participants that would fit the criteria. Many potential participants fit three of the four criteria, but the criteria requiring that the child had experience using the PFM (even once before)
excluded them from the study. On monitoring potential subjects on any given day, 5 to 7 participants were lost due to having never used the PFM. The office staff would then make telephone calls on the nurse researchers behalf, but again, many prospective participants had never used the PFM. Four weeks into the study, the nurse researcher discussed this lack of PFM use with the specialist. The specialist was genuinely surprised at the lack of PFM use. Prior to initiating this study, the specialist was asked if he had 50-60 children between the ages of 6-12 years who used the PFM. The specialist felt comfortable that he had that many prospective clients in the three, targeted offices. Although the specialist perceived that his patients used the PFM, many of his young patients had never used the PFM. Despite expanding the method to enlist participants, such as having the office personnel call on the researchers behalf, the asthma allergy offices of the intermountain region had still been exhausted of potential participants. Therefore, 10 weeks into the study, the area of interest went beyond the asthma allergy clinics in the rural setting to include participants from an urban, intermountain region that fit the four criteria for inclusion.

In addition to size of the sample, the distribution of the demographic data was limited. This sample was homogenous, in that all participants were Caucasian and 95% had private insurance. Although this may be reflective of the target communities where the study took place and the use of a specialty office, this may limit the study finding for generalizing the findings across the health care spectrum.
Another limitation may have been the choice to sit in an asthma allergy office waiting for participants to arrive. When exploring other options to increase the study sample, one physician from an urban area suggested providing a flyer to prospective clients that he would have identified as having fit the criteria. The physician could then refer the patient to the researcher. This may be an option for future studies.

Lastly, there were limitations with the questionnaire. In at least three instances, the choice selection was not reflective of this population. Parents added their own choice for grade in school, sometime use of the PFM around medication use, and the choice of PFM use greater than 1 year. Also, categories needed to be collapsed to satisfy the assumptions of chi-square analysis that was previously noted to be a limitation of the sample size.

Implications for Nursing

This study enhances the limited body of knowledge about the current use of PFM in the child with asthma. It is hoped that the information obtained will encourage further recommendations for use of the PFM and consequent research to further dispute or validate the information.

Health care providers can support the use of the PFM. Despite advances in health care, the American Lung Association (2000) reports that the prevalence of and mortality for asthma have steadily increased in the last two decades. The PFM has been explored as a valuable tool to aid in the management of asthma as a health promoting behavior. The PFM as a health promoting intervention can promote change. Pender (1996) collectively describes behavior specific
cognitions and affects which include the perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences. These variables provide the "core" for intervention, because these variables can be affected by nursing interventions to promote change.

Results about severity of asthma and PFM counseling support the need for health care providers to provide education about the PFM. In addition, it has been well documented in the literature about the variability of perception. The qualitative data provided information as to the implications for practice. The theme, Family and Mother's Intuition, gave examples of how decisions on asthma management were decided without objective information. The NAEPP (1997) guideline emphasized self-monitoring for effective management, with recommendations to include peak flow monitoring, symptom monitoring, or a combination of approaches. Although the theme, Family and Mother's Intuition, may reveal symptom monitoring, the objectivity of the PFM seems to offer a valuable tool. Another theme, Connection Between Breathing and PFM Use, gave example of parents either seeing a connection, or admitting that they had not used the PFM enough to see a relationship. Only one parent felt there was an inconsistent relationship, and was ambiguous about the benefits of the PFM. This parent, in particular, would benefit from education to strengthen prior related behaviors if health care professional desired for this child to use the PFM more regularly.

Lastly, the theme, Child's View of the PFM, described how children used the PFM in a playful or constructive way. The parents described that the child
had either a positive or neutral view of the PFM, and no parents described resistance from their children when using the PFM. Pender (1996) described activity related affects, as behaviors, and when associated with a positive affect, were likely to be repeated. This is important for health care professionals to associate health-promoting behaviors, such as the PFM, with a positive association to promote desired behaviors.

Summary

This study attempted to explore the parents' knowledge and perceptions of using the PFMs to manage their child's asthma. The researcher aimed to gather the information about the child through the parents' perception. Both a questionnaire and interview were used to obtain this information. There was a benefit in using both the both quantitative and qualitative method for data collection to provide support for the PFM that was not strongly evident in the quantitative analysis.

The results of this study support the use of the PFM as a viable tool to aid the parent in monitoring and acting on asthma problems and baseline maintenance. The parents that used the PFM as a tool to manage their child's asthma espoused the value of this tool. Additionally, the support that a parent received was related to the perceived value and usage patterns. There was much disparity in usage patterns and counseling, but 9 of 20 parents verbalized value of the PFM at various times throughout the interview. This value, even though intermittent for some, would indicate that the PFM is a valuable tool. If the
clinician values the PFM as a tool, the child and parent will be influenced as to
the value the PFM as well. Even so, given the fact of new medications, and
variable use of the PFM among the health care community, maybe the standards
needs to be changed to reflect these variations and inconsistencies.

The assumptions of the revised HPM (Pender, 1996) are significant to the
use of the PFM as a valuable tool as discussed in Chapter 3. This study reflected
on the following four assumptions of the model: individuals seek to regulate their
behavior, individuals interact with their environment, health professionals are
included in the interpersonal environment, and self-initiated change is essential
to behavioral change. Klements (2001) incorporated Pender's model for
monitoring peak flow rates as a health promoting behavior. This study also used
Pender's model, but expanded upon the individual to include the family and
obtain information through the parents' perspective. Motivation and interpersonal
influences as described in these assumptions were interwoven throughout the
discussion.

In addition to addressing the specific information about the PFM, this
study also provided detailed information about how children and families live with
asthma and the impact of asthma throughout their young lives. It was learned
that 75% of the sample has been living with asthma for four years or more, and
through the parents, information about control, triggers, impact, and
preparedness emerged. This additional information provided an expanded
perspective for clinicians who interact with children and families with asthma.
Recommendations for Further Research

Recommendations for further research would be to develop a valid and reliable research tool on PFM use both in general and, more specifically, in children. This study set out to gather information about PFM use in the child with asthma; because there were no tools available specific to PFM use, tools were developed. At the inception of this study, it was hoped that this information would provide the groundwork for developing a reliable and valid questionnaire specific to PFM use.

Other recommendations would target an increase in sample size. A larger study population that included more urban centers may increase the sample size to provide more quantifiable information about health care utilization and comparative information about the three classification categories to include more children with mild, moderate, and severe persistent asthma.

The qualitative nature of this study provided much information about asthma and PFM use, and further studies could expand upon this. In addition to learning more about PFM use, another area of interest would be to gather qualitative data about the parents' prior experience with other family members' asthma or their own asthma, and how this impacts how they manage their child's asthma.
REFERENCES


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APPENDIX I

INFORMED CONSENT
General Information:

Constance McMenamin, RN, BSN, is graduate student from the University of Nevada, Las Vegas (UNLV), and is pursuing a Master of Science Degree in Nursing. She is currently working on a research study as part of the requirements for this degree. The purpose of this study is to determine the practice patterns for use or non-use of the peak flow meter (PFM) as identified by the parents perception of use. You are invited to participate in this study which will consist of a questionnaire to be completed in the waiting room of this Asthma & Allergy clinic and a phone interview. If your child has ever used a peak flow meter, you are invited to participate.

Procedure:

If you volunteer to participate in this study, you will be asked to take approximately 10 minutes to complete a questionnaire while you are here at the clinic and an additional 15 minutes for telephone interview that would be scheduled at your convenience approximately within one week of the clinic visit. The telephone interview would consist of specific questions concerning your child's asthma and the use of the peak flow meter. Only I will have access to the data and the individual findings will not be shared with the office staff. The results of the questionnaire and notes from the telephone interview will be locked in a cabinet at UNLV. The office staff will maintain your confidentiality, and the only information that I receive will be what you provide for me in the questionnaire and interview. The telephone interview may require a second follow-up call within 10 days of the interview if further details or clarification is necessary.

Benefits of Participation:

There is no direct benefit to you in participating in this study. However, it is hoped that the information gained will help health care professionals to learn more about peak flow meter use in children with asthma.

Risks of Participation:

There are only minimal risks associated with this study. Minimal risks may include feeling uncomfortable when responding to some of the questions asked. Also, the participant is giving of their time in that it requires 10 minutes for completion of the in-office questionnaire and 15-minute telephone interview. There is no financial compensation as a result of your participation, and you may choose to withdraw at any time during the study.

Department of Nursing
4505 Maryland Parkway • Box 453018 • Las Vegas, Nevada 89154-3018
(702) 895-3360 • FAX (702) 895-4807

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Confidentiality:
All information gathered in this study will be completely confidential. Other than access to the specialty asthma clinic, no records will be reviewed. The only information obtained will be that gathered from the questionnaire and interview. The data will be presented in a combined form to further provide for confidentiality. Your consent will be locked at the UNLV Nursing office for three years as required by the Office for the Protection of Research Subjects.

Voluntary Participation:
Your participation in this study is voluntary. You may refuse to participate in this study or at any time throughout the study. You are encouraged to ask questions about this study at the beginning of the study or at any time throughout the study. After reading this consent form, please sign below before answering the questionnaire.

Contact Information:
If you have any questions about the study, you may ask me at this time, or contact me Constance McMenamin at the UNLV, Department of Nursing at 1-702-895-3360. If you have any questions regarding human subjects rights, you may contact the UNLV Office for the Protection of Research Subjects at 1-702-895-2794.

Participant Consent:
I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

_________________________________________  __________________________
Signature of Participant                          Date

_________________________________________  __________________________
Participant Name (Please Print)                  Home phone
APPENDIX II

QUESTIONNAIRE / SEMI-STRUCTURED INTERVIEW QUESTIONS
ASTHMA QUESTIONNAIRE

Please respond to the following items in relation to your child with asthma. Check only one response for questions 1 through 15.

1. How old is your child: 6-8____, 9-10____, 11-12____.

2. My child is: boy______, girl______.

3. My child is the following race:
   African American______, Hispanic American______, Native American______, White______, Asian or Pacific Islander______, Other______.

4. My child will advance to this grade in the fall:
   K-2______, 3-4______, 5-6______.

5. How many years has your child had asthma (please round up to the nearest year): 0-1______, 2-3______, 4-5 years______, more than 5 years______.

6. What type of health insurance do you have: self pay/no insurance______, Medicaid______, private insurance______, other government______.

7. How many times has your child been hospitalized in the past year for breathing problems: 0______, 1-2______, 3-4______, 5 or more times______.

8. How many times has your child been to the emergency department in the past year for breathing problems:
   0______, 1-2______, 3-4______, 5 or more times______.
9. How many days has your child missed school in the past school year for breathing problems: 0 ____, 1-2_____, 3-5_____, 6-10_____, more than 10________.

10. How many times has your child gone to the school nurse in the past year for breathing problems: 0____, 1-2____, 3-5____, 6-10____, more than 10________.

11. How many times did you call or visit the asthma allergy office in the past year for breathing problems: 0____, 1-2____, 3-5____, 6-10____, more than 10________.

12. Has your child ever told you that he/she has used a PFM in the school nurses office? Yes______, No________.

13. When your child has shortness of breath, does he/she use the PFM before taking medication? Yes______, No______.

14. Please indicate if your child has used his/her peak flow meter in the last day______, week______, month__________, six months______, year__________

15. How often has a health care professional counseled you on the use of a PFM? With the first clinic visit______, every visit______, sometimes, but not every visit______.

16. Please list all the medications and inhalers that your child takes for asthma. Please include medications used on a daily basis and others if used only sometimes.
SEMI-STRUCTURED INTERVIEW

1. Tell me about you and your child’s use of PFM?

2. Tell me how you and your child learned to use a PFM?

3. Over the last month, how has your child’s health been specific to your child’s asthma?

4. How has your child’s asthma impacted activities for the family or your child?

5. Have you found a relationship between your child’s breathing and PFM readings?

6. Tell me how you would decide what to do about your child’s asthma based on your child’s PFM readings?
APPENDIX III

HUMAN SUBJECTS RIGHTS
Notice of Approval to Conduct Research Involving Human Subjects

DATE: May 15, 2002

TO: Constance A. McMenamin, Nursing
Dr. Susan Michael (Advisor)

FROM: Dr. Jack Young, Chair
UNLV Biomedical Sciences Institutional Review Board

RE: Status on Research Project Entitled: Parental Perception Concerning the Use of Peak Flow Meters in the Child with Asthma

OPRS Number: 50180402-334
Approval Date: May 15, 2002

This memorandum is official notification that the protocol for the project referenced above has been reviewed by the Office for the Protection of Research Subjects (OPRS) and has been determined as having met the criteria for exemption from full review by the UNLV Biomedical Sciences Institutional Review Board (IRB) as indicated in regulatory statues 45CFR 46.101. The protocol has been submitted through the expedited review process and has been approved for a period of one year from the date of this notification. Work on the project may proceed.

Should the use of human subjects described in this protocol continue beyond May 15, 2003, it will be necessary to request an extension. Should there be ANY changes to the protocol, it will be necessary to submit those changes to the Office for the Protection of Research Subjects.

If you have questions or require any assistance, please contact the Office for the Protection of Research Subjects at 895 - 2794.

cc: OPRS File
APPENDIX IV

REQUEST AND PERMISSION FORMS
Dear Dr. Henry,

Thank you for allowing me to observe you in your practice setting. The two days spent with you were very informative. I not only enjoyed learning about your specialty, but I enjoyed observing your wonderful approach to your patients. Thank you for your time.

I have attached my questionnaire and interview questions for my thesis, "Parental Perceptions and the Use of Peak Flow Meters in the Child with Asthma". I was unable to find a tool that specifically addressed the use of the PFM and the perceptions of the use of the PFM, therefore I developed a questionnaire and semi-structured interview tool. The questionnaire will provide the baseline information for demographics and usage patterns of the PFM. Because I would like to understand what people do and do not like about the PFM, and how they perceive the barriers and benefits of use, I have seven semi-structured interview questions to gather this information. I am interested in speaking with parents of children with asthma. Criteria for inclusion in this study is: (1) the child has experience using the peak flow meter, (2) the child is between the ages of 6-12 years old, (3) the child has been seen at the asthma/allergy clinic at least once before, and (4) the parents' of these children agree to participate in this study. To clarify on “experience using the peak flow meter”, the child has to have used it once before.

If you agree to allow me access to your patients, I would like to visit both the Elko and Twin Falls clinics. As we had tentatively discussed, I would be available in Elko during your bi-monthly visits; I would attend the Twin Falls clinics on alternating weeks on Thursday and Friday. Although you are not present in the office on Fridays, you had suggested that Drew Simmons might allow me access to his patients. This study is not designed to specifically follow one practitioner, and therefore allows me the opportunity to gather the data from other practitioners as well.

For the data collection, I would like to be able to sit in your waiting room. When patients who fit this criteria are checked in, they would then be referred to this researcher in a defined area. The parents would read and fill out the consent form prior to the questionnaire or interview. The questionnaire and interview will take approximately 15-20 minutes. I would like to conduct this interview prior to the office visit and ideally the interview would be conducted in a private room.

Thank you for your consideration. I would be happy to provide you with any other information that would help clarify my proposal or request. If you would be willing to allow me access to your patient population, I would need a letter of acceptance to be included when my proposal is presented to the Human Subject Rights Committee. My home phone number is (775) 753-7573 and e-mail mc2@citlink.net

Constance McMenamin
482 Blakeland Drive
Spring Creek, NV 89815
April 4, 2002

To Whom It May Concern,

On behalf of Dr. Richard Henry, and Asthma and Allergy of Idaho/Nevada, we give permission for Constance McMenamin to collect data at both our Twin Falls, Idaho and Elko, Nevada office sites regarding her proposed thesis and the study of parental perceptions of peak flow meters.

Sincerely,

Vicki Stewart, CPC
Office Manager
Constance McMenamin  
482 Blakeland Drive  
Spring Creek, NV 89815  

June 17, 2002  

Emily McGee  
Pearson Educational Publishing  
1 Lake Street  
Upper Saddle River, NJ 07458  

Dear Ms. Emily McGee:  

I am requesting permission to use Dr. Nola Pender's diagram of the Revised Health Promotion Model as presented on page 67 of *Health Promotion in Nursing Practice* (3rd ed.). (Copyright year, 1996. [ISBN 0-8385-3659-X]).  

I am a graduate student in the Family Nurse Practitioner program at the University of Nevada, Las Vegas. I am currently working on my master's thesis and am using Dr. Pender's revised Health Promotion Model for my theoretical base. The title of my thesis is *Parental Perception Concerning the Use of the Peak Flow Meter in the Child with Asthma*. My intent is to submit this research for publication as a thesis and possibly as a medical journal article. I would appreciate your assistance in obtaining written permission for this purpose.  

If you have further questions, you may contact me at (775)-753-7573, e-mail at mc2@citlink.net. My thesis chair is Dr. Susan Michael, University of Nevada, Las Vegas, Department of Nursing, 702-895-4719. Thank you for your assistance.  

Sincerely,  

Constance McMenamin
August 29, 2002

Constance McMenamin
482 Blakeland Drive
Spring Creek, NV 89815

Dear Ms. McMenamin,

You have our permission to include in your Master's Thesis the diagram of Revised Health Promotion Model Pg. 67 from our text, *Health Promotion in Nursing Practice, 3/E* by Nola Pender.

Permission is granted to reproduce 5 copies for your Master's Thesis at The University of Nevada, Las Vegas.

Please credit our material as follows -

Sincerely,

Marianna Baum
Permissions Administrator
INDIVIDUAL CHARACTERISTICS AND EXPERIENCES

BEHAVIOR-SPECIFIC COGNITIONS AND AFFECT

PERCEIVED BENEFITS OF ACTION

PERCEIVED BARRIERS TO ACTION

PERCEIVED SELF-EFFICACY

ACTIVITY-RELATED AFFECT

IMMEDIATE COMPETING DEMANDS (low control) AND PREFERENCES (high control)

COMMITMENT TO A PLAN OF ACTION

HEALTH PROMOTING BEHAVIOR

PRIOR RELATED BEHAVIOR

PERSONAL FACTORS
Biological
Psychological
Socio-cultural

INTERPERSONAL INFLUENCES
(Family, Peers, Providers; Norms, Support, Models)

SITUATIONAL INFLUENCES
Options Demand Characteristics Aesthetics

Revised Health Promotion Model

<table>
<thead>
<tr>
<th>Classification of Asthma Severity as Determined by Medication Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mild Intermittent</strong></td>
</tr>
<tr>
<td>• Long term control—No daily meds needed.</td>
</tr>
<tr>
<td>• Short term control—Use short acting bronchodilator such as an inhaled beta 2 agonist for use as needed. (If used more than two times/week may indicate need for long term control therapy.)</td>
</tr>
<tr>
<td><strong>Mild Persistent</strong></td>
</tr>
<tr>
<td>• Long term control—Once daily medication.</td>
</tr>
<tr>
<td>  o Ant-inflammatory—low dose inhaled corticosteroid or cromolyn or nedocromil</td>
</tr>
<tr>
<td>  o Sustained-release theophylline, (not first line treatment)</td>
</tr>
<tr>
<td>  o Leukotriene receptor antagonist—Zafirlukast (accolate) and Montelukast Sodium (singulair) with age specific approval.</td>
</tr>
<tr>
<td>• Short term control—Use short acting bronchodilator: such as inhaled beta 2 agonist as needed to control symptoms.</td>
</tr>
<tr>
<td><strong>Moderate Persistent</strong></td>
</tr>
<tr>
<td>• Long term control—Once daily medication.</td>
</tr>
<tr>
<td>  o Inhaled medium dose corticosteroid or inhaled low-medium dose corticosteroid and long acting bronchodilator (long acting inhaled beta 2 agonists, sustained release theophylline, or long acting beta 2 agonist tablets.)</td>
</tr>
<tr>
<td>  o If needed—Inhaled medium-high dose corticosteroid and long acting bronchodilator.</td>
</tr>
<tr>
<td>• Short term control—Use short acting bronchodilator such as inhaled beta 2 agonist as needed to control symptoms.</td>
</tr>
<tr>
<td><strong>Severe Persistent</strong></td>
</tr>
<tr>
<td>• Long term control—Inhaled high dose corticosteroid and long acting bronchodilator and corticosteroid tablets or syrup.</td>
</tr>
<tr>
<td>• Short term control—Use short acting bronchodilator such as inhaled beta 2 agonist as needed to control symptoms.</td>
</tr>
</tbody>
</table>

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Figure 1. Classification of Asthma Severity as Determined by Medication Use. Adapted from the 1997 National Asthma Education Program and Prevention Guidelines (NAEPP), and the NAEPP Expert Panel Update (2002).
### Table 1 Summary of Age, Gender, and Grade Level

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<tr>
<td>9 - 10</td>
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<tr>
<td>11 - 12</td>
<td>8</td>
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<table>
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<th>Percent</th>
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<tbody>
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<td>Kindergarten to grade 2</td>
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<td>30%</td>
</tr>
<tr>
<td>Grade 3-4</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>Grade 5-6</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>Grade 7</td>
<td>4</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Table 2 Summary of Total Years of Living with Asthma and Classification of Asthma Severity

<table>
<thead>
<tr>
<th>Years</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 years</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>2-3 years</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>4-5 years</td>
<td>7</td>
<td>35%</td>
</tr>
<tr>
<td>More than 5 years</td>
<td>8</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asthma Severity</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Persistent</td>
<td>11</td>
<td>55%</td>
</tr>
<tr>
<td>Moderate Persistent</td>
<td>8</td>
<td>40%</td>
</tr>
<tr>
<td>Severe Persistent</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 3 Summary of Hospitalizations and Emergency Department (ED) Visits for Breathing Problems in the Past Year

<table>
<thead>
<tr>
<th>Hospitalizations</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>18</td>
<td>90%</td>
</tr>
<tr>
<td>1-2</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>3-4</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>5 or more</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ED visits</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>17</td>
<td>85%</td>
</tr>
<tr>
<td>1-2</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>3-4</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>5 or more</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 4 Summary of Visits to the School Nurse's Office and Calls or Visits to the Asthma Allergy Office for Breathing Problems in the Past Year

<table>
<thead>
<tr>
<th>School Nurse Visits</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>11</td>
<td>55%</td>
</tr>
<tr>
<td>1-2</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>3-5</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>6-10</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>More than 10</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calls or visits</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>1-2</td>
<td>7</td>
<td>35%</td>
</tr>
<tr>
<td>3-5</td>
<td>9</td>
<td>45%</td>
</tr>
<tr>
<td>6-10</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>More than 10</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 5 Summary of School Absences in the Past Year for Breathing Problems in the Past Year and Use of the PFM in the School Nurse's Office

<table>
<thead>
<tr>
<th>School Absences</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7</td>
<td>35%</td>
</tr>
<tr>
<td>1-2</td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>3-5</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>6-10</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>More than 10</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PFM use</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>No</td>
<td>15</td>
<td>75%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 6 Summary of Frequency of PFM Use, Professional Counseling on the Use of the PFM, and Use of the PFM Prior to Medication Use

<table>
<thead>
<tr>
<th>PFM use</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within the last day</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Within the last week</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Within the last month</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Within the last six months</td>
<td>4</td>
<td>20%</td>
</tr>
<tr>
<td>Within the last year</td>
<td>7</td>
<td>35%</td>
</tr>
<tr>
<td>More than one year</td>
<td>4</td>
<td>20%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Counseling</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>First visit</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>Every clinic visit</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>Sometimes, but not every visit</td>
<td>12</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PFM use</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
<td>20%</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>70%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>
### Table 7 Specific Themes About the Peak Flow Meter (PFM)

<table>
<thead>
<tr>
<th>Themes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFM Patterns of Use</td>
<td>Describes the frequency and reasons for use of the PFM.</td>
</tr>
<tr>
<td>PFM Directs Medication Use</td>
<td>Describes how parents use the PFM to guide medication use.</td>
</tr>
<tr>
<td>PFM Guidance and Support</td>
<td>Describes counseling by the health care professionals on the use of the PFM.</td>
</tr>
<tr>
<td>Value of the PFM</td>
<td>Describes parents perception on the barriers and benefits of using the PFM.</td>
</tr>
<tr>
<td>Connection Between PFM and</td>
<td>Describes relationship between breathing and objective numerical values of</td>
</tr>
<tr>
<td>Breathing</td>
<td>PFM.</td>
</tr>
<tr>
<td>Child's View of the PFM</td>
<td>Describes the child’s positive, negative, or neutral response to using the PFM.</td>
</tr>
<tr>
<td>Innovative Medication</td>
<td>Describes advances in new medication for improved asthma control and</td>
</tr>
<tr>
<td></td>
<td>relationship to PFM use.</td>
</tr>
<tr>
<td>Family and Mother's Intuition</td>
<td>Describes immediate or extended family members' previous experience with</td>
</tr>
<tr>
<td></td>
<td>asthma, and the impact on how they approach asthma management for their</td>
</tr>
<tr>
<td></td>
<td>child.</td>
</tr>
<tr>
<td>Themes</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Control</td>
<td>Describes recent health within the context of the child’s asthma, and includes general medication use not specific to the PFM.</td>
</tr>
<tr>
<td>Triggers</td>
<td>Describes causes for exacerbation of asthma symptoms that include seasonal, environmental, and exercise components.</td>
</tr>
<tr>
<td>Impact</td>
<td>Describes the impact of asthma on health and includes routine accommodations to minimize asthma exacerbations.</td>
</tr>
<tr>
<td>Be Prepared</td>
<td>Describes having the necessary medications and equipment in the event of an asthma exacerbation.</td>
</tr>
<tr>
<td>Past History</td>
<td>Describes remote events involving the child’s past health history.</td>
</tr>
<tr>
<td>Guidance and Support Unrelated to the PFM</td>
<td>Describes the parents’ positive and negative perceptions about professional support, unrelated to the PFM.</td>
</tr>
<tr>
<td>Themes</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Spirometry</td>
<td>Describes use of the spirometry at the asthma allergy office.</td>
</tr>
<tr>
<td>Child as Predictor</td>
<td>Describes how parents rely on their child to get information about an asthma exacerbation.</td>
</tr>
<tr>
<td>Thwarted Efforts</td>
<td>Describes one parents unsuccessful efforts to improve her child's asthma.</td>
</tr>
</tbody>
</table>
Vita

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  2002

Thesis Title: Parental Perception Concerning the Use of Peak Flow Meters in the Child with Asthma

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