A SURVEY OF ASTHMA MANAGEMENT: THE PHYSICIANS' PERSPECTIVE

by

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy, Graduate Department of the Institute of Medical Science, University of Toronto.

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ABSTRACT

"Asthma management" refers to the formulation and execution of treatment decisions and patient education strategies within the context of the physician-patient relationship. However, little is known about the physician’s perspective on these elements of asthma management. This gap in knowledge is important, given the lack of unanimity regarding the optimal approach to asthma management, and the reported increases in asthma morbidity and mortality rates.

The purpose of this study was threefold: (i) to examine treatment and education strategies of physicians who manage adult asthma patients; (ii) to determine if strategy differences exist between family physicians and specialists; and (iii) to examine the consistency between physicians’ treatment recommendations and those advocated by existing guidelines.

Using a mailed survey, data were collected from 163 randomly selected Ontario family physicians (n= 80; 78% response rate) and specialists (n= 83; 83% response rate) representing an overall response rate of 80%. The questionnaire sought self reports about treatment recommendations for 6 hypothetical asthma profiles, the provision of 9 asthma patient education activities, and patient involvement in management decisions.

The profiles revealed particular areas of physician uncertainty regarding asthma treatment, for the group as a whole as well as within each physician subgroup. The education provision scores varied according to the level of disease severity (F= 205; p< 0.01), and the specialists (70 ± 6.4) obtained higher mean scores for overall education provision than family physicians (66 ± 8.4; t= 2.9, p< 0.01). The physicians indicated
that they perceive that patients are less involved in managing asthma than they would prefer (z= 6.0, p< 0.01). For the full study group, the mean overall score for consistency with guidelines was 4.6 ± 1.2 (theoretical total score: 6), and the subgroup mean scores differed significantly (family physicians: 4.2 ± 1.2; specialists 5.1± 0.9; t= 5.46, p<0.01).

These results imply that the provision of patient education and the consistency of treatment recommendations with published guidelines may interact with the disease severity and the physician’s professional background. The descriptive patterns identified here form a comparison database for future comparative investigations of the patients’ perspective regarding these elements of asthma management.
TABLE OF CONTENTS

ABSTRACT........................................................................................................ ii
LIST OF TABLES............................................................................................. viii
LIST OF FIGURES............................................................................................ xi

CHAPTER I: INTRODUCTION

Background....................................................................................................... 1
Definition of Asthma....................................................................................... 2
Asthma Epidemiology..................................................................................... 3
Contributing Factors to Suboptimal Treatment.................................... 4
Purposes of a Research Program............................................................... 5
Problem Statement....................................................................................... 7
Conceptual Framework.................................................................................. 7
Literature Review.......................................................................................... 10
  Appropriate Therapy of Asthma............................................................... 10
  Provision of Asthma Education............................................................... 25
  Partnership Between Physician and Patient............................................ 31
  Summary: Review of Literature............................................................... 35
Research Questions....................................................................................... 36
Key Terms...................................................................................................... 37

CHAPTER II: METHODS

Sample........................................................................................................... 40
Target Population.......................................................................................... 40
Estimation of Sample Size.......................................................................... 40
Raw, Summative, and Overall Scores for Provision of Educational Activities.......................... 106
Summary: Provision of Education............................. 111
Level of Patient Involvement in Management Decisions...... 112
Consistency with Published Asthma Guidelines............... 116
Selection of First Priority Actions.............................. 116
Consistency of First Priority Actions with the
Canadian Guidelines............................................. 117
Differing Interpretations of the Guidelines..................... 128
Summary: Consistency with Guidelines......................... 128
Demographic and Practice Characteristics..................... 128

CHAPTER IV: DISCUSSION & INTERPRETATION
Interim Summary.................................................... 131
General Assumptions and Limitations.......................... 132
General Strengths.................................................. 134
Appropriate Asthma Therapy..................................... 135
Self Reports Regarding Therapy................................. 135
Consistency with Canadian Guidelines........................ 148
Research and Clinical Implications Regarding Therapy........ 156
Provision of Asthma Education.................................. 164
Self Reports Regarding Education Provision.................... 164
Research and Clinical Implications Regarding Provision of Education.......................... 171
Partnering for Care................................................ 173
Assessing Perceived Patient Involvement in
Management.................................................. 173

Research and Clinical Implications Regarding Perceived
Patient Involvement in Asthma Management......... 175

Overall Implications for Asthma Care.................. 177

Implications for Clinical Practice....................... 177

Implications for Theory and Research.................. 178

Summary and Concluding Statement..................... 186

REFERENCES.......................................................... 190

APPENDICES
Appendix A: Letters Sent to Potential Participants...... 210
Appendix B: The Physicians’ Questionnaire.............. 217
LIST OF TABLES

TABLES

1 Demographic and Practice Characteristics for the Aggregate Group and Subgroups of Family Physicians and Specialists................................. 57
2 Asthma Related Practice Characteristics................................................................. 59
3 Respondents’ Attendance at Asthma Seminars and Personal Experience with Asthma Symptoms................................................................. 59
4 Treatment Judgements for Asthma Profiles A-F: Percent Distribution for Actions Recommended/Not Recommended
   4a Asthma Profile A................................................................. 62
   4b Asthma Profile B................................................................. 63
   4c Asthma Profile C................................................................. 66
   4d Asthma Profile D................................................................. 67
   4e Asthma Profile E................................................................. 68
   4f Asthma Profile F................................................................. 70
5 Treatment Actions Recommended According to Asthma Profile
   5a Full Study Group................................................................. 74
   5b For Family Physicians................................................................. 78
   5c For Specialists................................................................. 82
6 Differences Between Family Physicians and Specialists for the Recommended Use of:
   6a Inhaled β2 Agonists................................................................. 84
   6b Inhaled Ipratropium (Atrovent).................................................. 84
   6c Inhaled Corticosteroids................................................................. 85
   6d Non-steroidal Anti-inflammatory.................................................. 87
   6e Oral Theophylline................................................................. 88
Repeated Measures Analysis of Variance of Provision of Education
According to Severity Level................................................................. 110

Selection of First Priority Actions:

17a  Asthma Profile A................................................................. 118
17b  Asthma Profile B................................................................. 118
17c  Asthma Profile C................................................................. 119
17d  Asthma Profile D................................................................. 119
17e  Asthma Profile E................................................................. 120
17f  Asthma Profile F................................................................. 121

Treatment Recommendations According to the Canadian Guidelines ...... 122

Consistency of Physicians’ First Priority Actions with 1990 Canadian
Guidelines........................................................................................... 124

Between Subgroup Differences in Tallies for Consistency with
Guidelines, According to Asthma Profiles............................................ 125
LIST OF FIGURES

FIGURES

1  Survey Timeline ................................................................. 49
2  Response Rate for Family Physician Subgroup.......................... 56
3  Response Rate for Specialist Subgroup........................................ 56
4  Usual Level of Patient Involvement in Asthma Management Decisions Reported by the Full Study Group........ 113
5  Ideal Level of Patient Involvement in Asthma Management Decisions Reported by the Full Study Group........ 113
6  Usual Level of Patient Involvement in Asthma Management Decisions Reported by Family Physicians........ 114
7  Ideal Level of Patient Involvement in Asthma Management Decisions Reported by Family Physicians........ 114
8  Usual Level of Patient Involvement in Asthma Management Decisions Reported by Specialists...................... 115
9  Ideal Level of Patient Involvement in Asthma Management Decisions Reported by Specialists...................... 115
10 Distribution of Scores for Overall Consistency with the 1990 Canadian Guidelines: Full Study Group.................. 126
11 Distribution of Scores for Overall Consistency with Guidelines: Subgroups.................................................. 127
CHAPTER I:
INTRODUCTION

I. BACKGROUND

Asthma has received considerable attention in the last decade because of reported increases in the rates of morbidity and mortality as well as the personal and social costs attributable to the disease. Paradoxically, these trends have occurred despite supposed advances in our understanding of the pathophysiology of the disease and the introduction of new and potent medications designed, not only to treat the symptoms, but also to modify the course of the disease. Several hypotheses have been proposed to explain this phenomenon (Rea et al., 1987; British Thoracic Society, 1982; Ormerod and Stableforth, 1980; Macdonald et al., 1976; Cochrane and Clark, 1975) that fall into two broad categories: patient related and medically (physician) related. Examples of the former include the failure of patients to identify the seriousness of exacerbations, a delay in taking appropriate steps to reverse the exacerbation, and a lack of knowledge regarding asthma and its self-care. Medically related factors that have been implicated are numerous and include: (1) undertreatment and delays in treatment with bronchodilators and corticosteroids; (2) general inadequacies with medical management; (3) increased and/or routine \( \beta_2 \) agonist use, especially in severe asthma; (4) shifting patterns of physician diagnosis of asthma, especially from bronchitis to asthma in children; and (5) the availability of better diagnostic tests. In addition, it has been suggested that these increased rates are associated with global increases in the prevalence and severity of asthma.

This thesis is concerned with an initial study of a research program interested in both physicians’ and patients’ asthma management perspectives. This study is the first to examine asthma management according to a model of asthma care. The major components of this model are appropriate therapy, provision of asthma education, and developing a partnership between
the patient and physician. The current study focused on physicians’ asthma management strategies for each of the aforementioned components of the asthma care model. The physicians’ approach was examined first because of the numerous medically related factors associated with suboptimal care. In addition, patients’ initial information about a disease and its treatment are usually provided by their physician.

Before discussing the specifics of the current study, asthma will be defined and current epidemiological trends pertaining to this disorder discussed.

A. DEFINITION OF ASTHMA

Over thirty years after the first formal attempt by an expert study group to define asthma, a widely accepted definition remains elusive (Ciba Foundation Symposium, 1959 cited in NHLBI: Guidelines for the diagnosis and management of asthma, 1991). Various types of clinicians, physiologists, pathologists, and immunologists have different perspectives on asthma. These perspectives are difficult to merge into one comprehensive definition specific and exclusive to asthma because other respiratory disease entities often share one or more of the characteristics of asthma. In general, a working definition of asthma recognizes that: “Asthma is a lung disease characterized by (1) reversible airway obstruction (although not completely so in some individuals) either spontaneously or in response to treatment, (2) airway inflammation, and (3) airway hyperresponsiveness” (American Thoracic Society, 1987).

Airway obstruction is responsible for most of the symptoms of asthma such as wheezing, cough, and dyspnea. The degree of airway obstruction may worsen gradually or abruptly and can persist despite therapy until the point of producing respiratory failure. The degree of airflow obstruction is influenced by a number of factors including edema of the bronchial wall, mucus production, bronchial smooth muscle contraction, and bronchial hypertrophy. Airway obstruction is thought to be initiated by inflammatory events occurring in the airways. This in turn is a key factor in one of the cardinal laboratory features of asthma, airway hyperresponsiveness, which is defined as an exaggerated bronchoconstrictor
response to stimuli/agents that generally produce no or minimal response in normal individuals. The level of airway hyperresponsiveness usually correlates well with the clinical severity of asthma (Quackenboss et al., 1991) and with medication requirements (Cockroft, 1987).

B. ASTHMA EPIDEMIOLOGY

Epidemiologic data highlight the significance that asthma plays in the health of our society and the impact it has on our health care system. Studies in the Netherlands, Australia, and New Zealand have reported that the prevalence of bronchial hyperresponsiveness (one feature of asthma) to be 11 and 24% among asymptomatic children and adults (Rijcken et al., 1987; Salome et al., 1987; Sears et al., 1991). Recent data also suggest that the prevalence of asthma (NHLBI, 1989; Gergen et al., 1988; Evans et al., 1987), the morbidity rates associated with asthma as judged by the number of hospitalizations (Weiss et al., 1993; Evans et al., 1987), and the disease specific mortality rates are all increasing (Asthma-United States, 1990; Evans et al., 1987; Sly 1988; British Thoracic Association, 1982).

In Canada, asthma is estimated to affect over a million people (Mao, 1991). A recent study reported that the national rate of hospital admissions for asthma increased greatly during the 1980s (Wilkins and Mao, 1993), with increases of over 90% observed in Prince Edward Island (from 850/10,000 to 1932/10,000) and New Brunswick (from 389/10,000 to 783/10,000) in the under 15 years age group. Mortality rates associated with asthma in Canada demonstrated a sharp increase during the 1970s, especially among young adults and children (Mao et al., 1987). However, more recent studies have reported that asthma-related mortality rates stabilized during the 1980s (Wilkins and Mao, 1993), and one study reported a decline in these rates from a high of 3-6 deaths per 100,000 Canadians in 1951-1955 to approximately 2 deaths per 100,000 in 1986-1990 (Hogg et al., 1995).

• Costs of Asthma

The cost of asthma-related illness in the United States in 1990 was estimated to be $6.2 billion (Weiss et al., 1992), of which inpatient hospital services accounted for $1.6 billion.
Although asthma is usually considered to be a mild chronic disease requiring predominantly ambulatory care, this study reported that 43% of its economic impact was related to the use of Emergency Department visits, hospitalizations, and premature deaths. Approximately two-thirds of the ambulatory visits were to three primary care specialties - pediatricians, family physicians, and general internists.

The health care costs associated with acute asthma are substantial. For example, a recent unpublished study at a Canadian metropolitan teaching hospital estimated the direct and indirect costs of hospital based asthma care to be $224,232.00 over a six month period in 1993 (Awadh et al., 1994). Seventy percent of this amount was due to direct costs which included fixed costs of $116,209.00 (70%), laboratory procedures and medication costs of $25,027.00 (15%), physician fees of $16,450.00 (10%), and ambulance services costs of $7,200.00 (4%). The mean cost per Emergency Department visit was $513.00 and the mean total cost per hospitalization was $4,798.00. In 1990-1991, over 279,000 patient hospital days in Canada were attributable to asthma, at a cost of $137 million (Statistics Canada, 1990-1991).

A recent Canadian study by Krahn et al. (1996) reported that the estimated total annual cost associated with asthma was between $504 million and $648 million (depending on the assumptions) in 1990 dollars. The cost of medications ($124 million) was the largest component of the $306 million in direct costs. The largest component of indirect costs ($198 million) was the $76 million associated with illness-related disability.

C. CONTRIBUTING FACTORS TO SUBOPTIMAL TREATMENT

Since asthma patients are required to play a major role in the daily management of their disease, the reduction in asthma-related morbidity and mortality rates and associated costs can only occur through an improvement in the self care practice. The degree of effectiveness in patients' asthma management decisions is in turn a consequence of patients' knowledge, attitudes, and expectations regarding asthma (Cicuttto et al., 1993; Cicuttto, 1992; Sibbald, 1989). The patient's knowledge, attitudes, and expectations are partially derived from
interactions with her/his physician. Therefore, at least in part, the patient’s self care practices can only be as effective as his or her physician’s asthma management practices. However, previous studies have observed that uncertainty exists amongst physicians regarding the “best management” for successful asthma control (Engel et al., 1989; Neville et al., 1993; Epton et al., 1994). Guidelines for the management of asthma have been developed in an attempt to reduce uncertainty or variability in asthma practice, but recent studies have demonstrated that inconsistencies with the guidelines still exist (Neville et al., 1993; Thompson et al., 1993; Phin and Oates, 1993).

II. PURPOSES OF A RESEARCH PROGRAM

To identify the factors that contribute to suboptimal asthma care and to understand the interrelationships among these factors requires an extensive research program involving multiple studies. The current study is envisioned as one of the studies in such a research program. Such a program of studies would need to (i) identify and investigate how these factors are interrelated in the individual patient, the individual physician, and the patient-physician relationship; and then based upon the observations of the previous studies, (ii) develop and evaluate interventions aimed at decreasing morbidity and mortality rates and costs associated with asthma through modifying the factors identified.

The short-term purpose of such a research program would be to describe both physicians’ and patients’ self reports of asthma management. (“Asthma management” refers to recommended treatment, asthma education, and level of patient involvement.) In addition, the degree of congruence or incongruence between patients’ and physicians’ perspectives with regards to asthma management would be examined. The long-term purpose of this research program would be to use the results from earlier studies in the development of interventions that would promote patient and physician congruency for the use of appropriate asthma management strategies. The use of patient and physician decision aids is an example of one possible type of intervention.
A Starting Point

Previous work by the investigator provides evidence that suggests a possible causal link between patients’ inappropriate self management decisions and their physicians’ level of specialty (e.g. respirology or family medicine) (Unpublished work of investigator, Cicutto, 1992, University of Toronto). In this earlier work, we assessed: (1) the appropriateness of management actions selected by individuals with asthma during hypothetical exacerbations; and (2) whether the appropriateness of their management actions was related to their asthma knowledge, attitudes towards asthma, and the accuracy of their expectations regarding the effectiveness of the management actions in relieving asthma symptoms (Cicutto et al., 1992; Cicutto et al., 1993). Forty adults with stable asthma, recruited from outpatient asthma clinics, completed a 15-item asthma knowledge questionnaire. They then read two hypothetical asthma scenarios describing a rapid (1.5 hr.) and a slow-onset (6 days) asthma exacerbation. Each scenario consisted of three progressively severe stages; at each stage the individual selected from among five actions the one he/she would perform to relieve the exacerbation, for a total of six management decisions. For each stage of the two scenarios, the patient also indicated, on a linear scale with end-points of 0% (no chance) to 100% (certainty), his/her expectation of the effectiveness of each action in relieving the asthma symptoms. Respondents’ results were compared to an expert panel-derived “gold standard” to compute scores representing the appropriateness of management and accuracy of expectations.

The results of the preliminary study suggest that individuals followed by respirologists possess a greater degree of asthma knowledge and are more likely to select appropriate treatment for the management of hypothetical exacerbations than are those patients followed by family physicians. Patients of respirologists were observed to have higher mean scores than patients of family physicians for asthma knowledge (11.4 ± 2.4 versus 8.6 ± 3.6; t = 2.9, p = 0.006) and for the selection of appropriate self care activities (4.7 ± 1.3 versus 3.3 ± 1.5; t = 3.3, p = 0.002). These preliminary observations imply that it would be worthwhile to begin
exploring the complexities and interrelationships of contributing factors in situations involving asthma self care decisions by examining physicians’ approaches to asthma management in greater depth, with special attention focused on professional preparation.

III. PROBLEM STATEMENT

In the proposed full research program there are several areas to be addressed, including patients’ and physicians’ self reports of asthma management and the level of congruence or incongruence between the individual patient and his/her physician. A logical next step is focus on the problem highlighted in the preliminary work, that implied that differences in patients’ asthma knowledge and selection of self care activities were related to the professional preparation of their physician (ie. respirologists or family physicians). Therefore, in the study reported here we examined the physicians’ perspectives on asthma management.

We identified areas of agreement and disagreement in asthma management among physicians who treat adult outpatients with asthma. For the purpose of this study, asthma management included: (a) use of medications and medical services, (b) provision of various asthma educational activities, and (c) level of patient involvement in management decisions. In addition, the differences between the management approaches of specialists and family physicians (recommended use of medications and medical services, provision of educational activities, and level of patient involvement) were explored.

IV. CONCEPTUAL FRAMEWORK

A. RATIONALE: ASTHMA GUIDELINES AS A MODEL FOR ASTHMA CARE

In response to the reported increasing asthma morbidity and mortality rates in the 1970s and early 1980s, and the suggested factors related to these increases, several professional societies in different countries developed practice guidelines for the treatment of asthma, including Canada (Hargreave et al., 1990), Britain (British Thoracic Society, 1990 and 1993), the United States (NHLBI, 1991), and Australia and New Zealand (Thoracic Society of
Australia and New Zealand, 1989). In addition, the International Consensus Report (NHLBI, 1992) was developed on the management of asthma. The different sets of asthma guidelines from the various countries are comparable. The guidelines do not focus solely on the pharmacological treatment of asthma but take a broader perspective of the management of this disease. For example, the guidelines make recommendations about providing education, using diagnostic procedures, establishing a partnership with the patient, and providing follow-up care as a means to achieving successful control of asthma. Thus, these guidelines go beyond simply making treatment recommendations and appear to constitute a loose framework for asthma care. Several models have been proposed for developing and providing asthma education programs although these models do not discuss asthma treatment (Kotses et al., 1990; Creer, 1991; Clark et al., 1993; Clark and Starr-Schneidkraut, 1994; Kotses et al., 1995; Partridge, 1995). The conceptual framework selected for this study is the model for asthma care proposed by the most published guidelines, specifically, the 1990 Canadian consensus report on asthma (Hargreave et al., 1990).

According to the 1990 Canadian guidelines, the primary objective for management of asthma is to achieve and maintain optimal control of the disease. The criteria for asthma control include the following:

- minimal daily symptoms (preferably none);
- ability to perform normal daily activities (work, school, recreational activities);
- use of inhaled β₂ agonists should not exceed two times per day (ideally none);
- normal or near normal airflow rates at rest;
- normal airflow rates post-bronchodilator;
- peak expiratory flow fluctuations < 20% and ideally <10%; and
- minimal side effects from anti-asthma medications.
The Canadian guidelines indicate that the *principles of asthma management* required to achieve successful control of the disease consist of:

- making the correct diagnosis of asthma;
- providing appropriate therapy;
- developing a partnership between the physician and the individual with asthma for the management of the disease; and
- providing patient education.

(Note: Since the time of the literature review and the investigation, the 1990 Canadian guidelines (Hargreave et al., 1990) have undergone revision and are now evidence-based whereas the original guidelines were based on consensus of expert opinion. The revised guidelines have been published in March/April 1996 of the *Canadian Respiratory Journal*, volume 3, number 2.)

The guidelines provide a model for asthma care and enumerate the necessary components of a program designed to achieve successful control of the disease. The International Consensus Report (NHLBI, 1992) appeals for such a unified approach to asthma care, on a global basis.

The overall framework for this study is based on the following summary. Increasing morbidity and mortality rates and costs associated with asthma are occurring globally. It is thought that one factor contributing to these increases is the existence of suboptimal care and variations in disease management. Possible solutions, for which there is some supporting evidence, include the use of appropriate therapy, the provision of asthma education to patients, and the development of partnerships between patients and their physicians for managing asthma (Hargreave et al., 1990; NHLBI, 1991 and 1992; Boulet et al., 1994).

These components of asthma care guided the literature review and the selection of methods used to investigate physicians' self-reports of asthma care. The review begins by discussing the current thinking about what constitutes appropriate asthma therapy. Within this
first section, each of the classes of current pharmacologic agents and their potential role in controlling asthma is discussed briefly. Following this is a discussion of physician practice variations in the use of asthma therapy and in the area of asthma management as a whole.

The second section of the review focuses on the provision of asthma education. In this section, the importance of and components of asthma education are discussed. In addition, studies that have evaluated existing educational programs and cost effectiveness are reviewed.

The final section of the literature review discusses the third key component to asthma management, the physician-patient partnership. In this section, the construct of “partnership” is defined and the need for this type of relationship discussed. The studies reviewed in this section have been performed in non-asthma subject populations. Currently, there are no studies which have specifically evaluated this component of asthma management.

IV. LITERATURE REVIEW
A. APPROPRIATE THERAPY OF ASTHMA

Asthma is a chronic condition with episodic exacerbations that requires a continuous and dynamic care approach to reduce airway inflammation, control symptoms, and prevent exacerbations. The increased appreciation of the importance of airway inflammation in the pathogenesis of asthma over the past decade has intensifies the interest in the use of anti-inflammatory agents. As a result, the focus of asthma management has shifted from treating the bronchoconstrictive component of asthma to treating the underlying inflammatory component. Accordingly, the first line therapy for chronic asthma has changed from the use of bronchodilators to the use of anti-inflammatory agents, specifically inhaled corticosteroids. Therefore, appropriate asthma therapy treats the underlying pathophysiology of asthma. Therapy should not merely alleviate symptoms but also prevent exacerbations and symptoms by controlling airway inflammation. It is anticipated that the use of inhaled steroids will lead not only to a reduction in airway hyperresponsiveness but also to the prevention of irreversible
airway obstruction and asthma morbidity (Juniper et al., 1990; Van Essen-Zandvliet et al., 1992).

Although environmental control, through removal of offending antigens, may be sufficient to improve asthma in certain individuals, pharmacologic therapy is usually required to prevent or minimize symptoms. The medications currently in use can be divided into two broad categories: anti-inflammatory agents and bronchodilators. Anti-inflammatory agents interrupt the inflammatory cascade occurring in the airways, in order to reduce and prevent inflammation. Bronchodilators act principally to dilate the airways by causing relaxation of bronchial smooth muscle. The recommended use for each of these agents will be discussed with reference to the 1990 Canadian guidelines (Hargreave et al., 1990).

a) Anti-inflammatory Agents

- **Corticosteroids.**

  Corticosteroids are currently the most effective class of anti-inflammatory agents available for the treatment of asthma. The exact mechanisms of action for these agents are not understood. They may be administered parenterally, orally, or by inhalation. Currently, corticosteroids, specifically inhaled corticosteroids, are the recommended first-line of therapy for asthma (Hargreave et al., 1990). They are recommended for patients who use an inhaled β₂ agonist more than one or two times a day (Hargreave et al., 1990). The recommended initial dose of inhaled corticosteroid is 200-500 µg per day, for beclomethasone dipropionate or budesonide (Hargreave et al., 1990). If asthma symptoms still persist on this dose, it is recommended that the dose be increased to 800-1,000 µg or more per day (Hargreave et al., 1990). The most common adverse effects of inhaled corticosteroids include hoarseness and oropharyngeal candidiasis. These adverse effects can often be prevented by rinsing the mouth with water after each series of inhalations.

  Oral corticosteroids are recommended for patients whose asthma is still uncontrolled despite the use of a high dose (>800 µg per day) of inhaled corticosteroid and for early
treatment of exacerbations to reduce the need for Emergency Department visits or hospitalization and the morbidity experienced from the disease. For control of exacerbations, an oral corticosteroid is usually taken for one to two weeks while an inhaled corticosteroid is continued long-term. Adverse effects from prolonged therapy with oral corticosteroids can be serious and include hyperglycemia, osteoporosis, weight gain, Cushing’s syndrome, hypertension, cataracts, hypothalamic-pituitary axis suppression, and compromised immune mechanisms. For long-term treatment of the disease, higher doses of inhaled corticosteroids are preferable to the oral route due to the increased frequency and severity of adverse effects associated with the latter (Morris, 1985; Wilmsmeyer et al., 1990).

- **Cromolyn and Nedocromil**

  Cromolyn and nedocromil are inhaled non-steroidal anti-inflammatory agents for which the exact mechanisms of action are also not fully understood. They are thought to work by stabilizing mast cells and inhibiting the IgE-mediated release of inflammatory mediators including histamine and cytokines (Howarth et al., 1985). It is not always possible to predict who will have a beneficial response to this treatment but these agents are believed to be most efficacious in those with mild allergic asthma. In the Canadian guidelines, a trial of cromolyn may be indicated for: (a) individuals with mild asthma to be taken before a provocation (e.g. exercise) in addition to an inhaled β2 agonist; and (b) occasionally in patients who experience daily symptoms, or who use their inhaled β2 agonist more than twice a day to control symptoms. If this treatment fails to achieve control, it is replaced by an inhaled corticosteroid. The Canadian guidelines report that cromolyn is primarily used in children with asthma (Hargreave et al., 1990), but other reports argue for a larger role in adult asthma therapy (Svendsen and Jorgensen, 1991; Dukes et al., 1994).
b) Bronchodilators

- \( \beta_2 \) adrenergic agonists:

Inhaled \( \beta_2 \) adrenergic agonists are the most frequently used bronchodilator agents. Their main effect is to produce dilation of the airways by relaxing airway smooth muscle. The most common side effects from inhaled \( \beta_2 \) adrenergic agonists are tremor and an increase in heart rate.

There has been debate over whether inhaled \( \beta_2 \) agonists should be taken on a regular basis or on an “as needed” basis (Sears et al., 1990; Spitzer et al., 1992; Bleecker and Meltzer, 1993; Page, 1993; Wanner, 1995; Sears, 1995; van Schayck et al., 1995; Ernst et al., 1995; Drazen et al., 1996). Regular use of these drugs have been associated with diminished control of asthma (Crane et al., 1989; Sears et al., 1990; Spitzer et al., 1992; Cheung et al., 1992; Cockcroft et al., 1993; Ernst et al., 1995). As a result of this observation, it is currently recommended that regular use of inhaled \( \beta_2 \) agonists be kept to a minimum, and that the preferred method of dosing is on an “as needed” basis. It is also considered very important that anything other than mild and intermittent asthma be treated with an anti-inflammatory preparation in addition to the “as needed” inhaled \( \beta_2 \) agonist. In summary, the use of inhaled \( \beta_2 \) agonists is recommended for all levels of asthma severity; however, these agents are to be used on an “as needed” basis and in addition to an anti-inflammatory preparation for anything more than mild episodic asthma (e.g. inhaled \( \beta_2 \) agonist use > twice a day).

- Ipratropium Bromide (Atrovent)

Inhaled ipratropium is an anticholinergic that produces bronchodilation by decreasing the intrinsic vagal tone to the airways. In asthma, inhaled anticholinergics are generally felt to be less potent than inhaled \( \beta_2 \) agonists and tend to have a slower onset of action. The benefits of chronic treatment with ipratropium in asthma have not been established, although it is recognized as an alternative to inhaled \( \beta_2 \) agonists for those who experience adverse effects such as tremor and tachycardia with the latter agents.
• **Theophylline Preparations**

Theophylline has been used for several decades in the treatment of asthma and remains the most widely prescribed anti-asthma drug in the world, although the development of newer therapies, especially inhaled steroids and inhaled β₂ agonists, has resulted in its declining use in industrialized nations (Barnes and Pauwels, 1994). Theophylline is given orally to reduce symptoms caused by airflow limitation or intravenously for acute life threatening exacerbations. Theophylline administration must be monitored because it has the potential to produce significant side effects (ie. tremor, restlessness, tachycardia, headache, gastric irritation and, in severe theophylline intoxication, seizures, cardiac arrhythmias, and death). Over the past decade, a number of sustainedreleased theophylline products have been introduced that offer the advantage of once or twice daily dosing and the ability to control nocturnal asthma (Martin et al., 1989; Zwillich et al., 1989). Recent reports suggest a role for theophylline as an adjunct to inhaled steroids and as-needed inhaled β₂ agonists in the management of chronic asthma (Barnes and Pauwels, 1994; Rivington et al., 1995).

c) **Stepped Approach To Pharmacologic Therapy**

The selection of pharmacologic therapy from the armamentarium of medications is made primarily on the basis of asthma severity. Severity of asthma is based on symptoms, airflow rates, and the use of inhaled β₂ agonists on an "as needed" basis. Because asthma is an episodic as well as chronic condition, drug regimens need to be flexible. In the Canadian guidelines, treatment recommendations are based on a stepped approach to asthma care, according to four levels of asthma severity (Refer to Table 1 based on Hargreave et al., 1990).
### Table I: Stepwise Approach Recommended by Canadian Guidelines

<table>
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<tr>
<td>- asthma is controlled</td>
<td>- slightly more symptoms than when asthma is controlled</td>
<td>- symptoms of breathlessness or chest tightness</td>
<td>- symptoms at rest</td>
</tr>
<tr>
<td>- minimal symptoms</td>
<td>- symptoms elicited more easily in response to mild provocation</td>
<td>- symptoms upon awakening or interrupting sleep</td>
<td>- incomplete relief by inhaled β₂ agonist</td>
</tr>
<tr>
<td>- normal activities of daily living</td>
<td>- inhaled β₂ agonist needed more often (1-4 times a day)</td>
<td>- inhaled β₂ agonist used &gt;q.i.d.</td>
<td>- PEFR or FEV₁ &lt;60% of predicted</td>
</tr>
<tr>
<td>- inhaled β₂ agonist needed &lt; twice a day</td>
<td>- PEFR or FEV₁ about 85% of predicted or best known result</td>
<td>- PEFR or FEV₁ 60%-85% of predicted or best known result</td>
<td></td>
</tr>
<tr>
<td>- normal or near normal flow rates at rest</td>
<td>- PEFR variability 20% -30%</td>
<td>- PEFR variability &gt;30%</td>
<td></td>
</tr>
<tr>
<td>- PEFR variations &lt;20%, best &lt;10%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Treatment:**
- inhaled β₂ agonist, as needed
- ± cromolyn prior to provocation

**Treatment:**
- level 1 plus inhaled corticosteroid or perhaps cromolyn

**Treatment:**
- level 1 treatment plus high-dose inhaled steroid

**Treatment:**
- level 3 plus an oral corticosteroid
- ± trial of adding theophylline
- ± inhaled ipratropium bromide

Current asthma therapy focuses on treating the underlying pathogenesis of the disease, airways inflammation, with an inhaled anti-inflammatory preparation supplemented by an inhaled β₂ agonist. The most commonly recommended anti-inflammatory preparations are inhaled corticosteroids. In general, the remaining asthma medications (eg. ipratropium bromide, oral corticosteroids, non-steroidal anti-inflammatories, and theophylline preparations)
are used to supplement the use of an inhaled $\beta_2$ agonist and an inhaled corticosteroid when this combination therapy does not maintain control of asthma.

- **PRACTICE VARIATION**

Several studies have established the existence and importance of practice variation in health care. Practice variation is defined as differences in the manner in which apparently similar patients are managed. This phenomenon can be observed in both inpatient and outpatient facilities (Welch et al., 1993), among various disease states (Goel et al., 1996; Arroll et al., 1995; Afridi et al., 1994; McFall et al., 1993; Smith and Herbert, 1993), and among various physician specialties (Noren et al., 1980; Bennett et al., 1983; Greenwald et al., 1984).

The treatment of asthma is not exempt from these observations. Variations in the treatment of asthma have been observed between physician specialties (Engel et al., 1989; Phin and Oates, 1993; Pearson et al., 1995), across patient age groups (Pearson et al., 1995; Barritt and Staples, 1991), and on several continents (Harrison and Pearson, 1993; Phin and Oates, 1993; Epton et al., 1994; Crain et al., 1995). Even with the advent of practice guidelines, variations from these guidelines continue to exist (Thompson et al., 1993; Barritt and Staples, 1991; Neville et al., 1993; Phin and Oates, 1993; Crain et al., 1995; Ernst et al., 1995).

a) **Differences Between Specialties**

Although asthma is a common and costly health problem, relatively little is known about how the management of patients with asthma differs between medical specialties. Several studies have reported differences between specialists and generalists pertaining to selected areas of asthma treatment (Pearson et al., 1995; Phin and Oates, 1993; Ip et al., 1993; Tan et al., 1992; Baldwin et al., 1990; Engel et al., 1989; Bucknall et al., 1988). Some of these studies have focused on the hospital management of acute asthma by performing audits (Pearson et al., 1995; Baldwin et al., 1990; Bucknall et al., 1988) while others have focused on the treatment of acute and chronic asthma in children and adults using questionnaires (Phin
and Oates, 1993 (only children); Ip et al., 1993; Tan et al., 1992; Engel et al., 1989). These studies are discussed below.

Perhaps the best studied area is the difference in management of hospitalized patients between specialists and generalists which may reflect the relative accessibility of in-patient charts for review. The results of three of these will be highlighted (Pearson et al., 1995; Baldwin et al., 1990; Bucknall et al., 1988). All three of the studies randomly selected and reviewed charts of patients admitted with a diagnosis of asthma. Differences were apparent in three main areas: use of diagnostic tests, use of corticosteroids, and out-patient follow-up. These studies observed that specialists utilized peak flow meters (73-89% for specialists vs 42-83% for generalists) and arterial blood gases (68-79% for specialists vs 27-58% for generalists) more frequently than did generalists. Similarly, specialists were observed to utilize corticosteroids more frequently than generalists. In particular, systemic corticosteroids were used more frequently by specialists (83%) when compared to generalists (67-73%) within the first 24 hours of admission. Specialists also discharged patients more frequently on oral corticosteroids (86-96% for specialists and 61-89% for generalists) and/or inhaled corticosteroids (55-85% for specialists compared to 28-74% for generalists) than did general practitioners. These studies also noted that specialists more frequently provided a follow-up appointment than did generalists (91-94% for specialists and 56-74% for generalists).

Baldwin et al. (1990) also compared the results of their 1985 study to another study completed eight years earlier (in 1978) which used the same hospitals and methods. Between 1978 and 1985, in-hospital asthma management improved and the differences observed in 1978 between respirologists and general physicians in asthma practices diminished in the 1985 study. However, the above mentioned differences between the groups remained in 1986 (more frequent monitoring of peak expiratory flow rates and arterial blood gases, a higher proportion of patients discharged on oral steroids and/or inhaled preventive drugs, and more frequent arrangement for a follow-up visit by specialists). The Bucknall study was the only one that
reported differences in patient outcomes between the two physician groups. They reported that patients of specialists had less sleep disturbances (23% vs 41%), experienced less morning chest tightness (37% vs 55%) and wheeze (34% vs 58%), and were less likely to be re-admitted (2% vs 20%) than patients of generalists. These studies (Pearson et al., 1995; Baldwin et al., 1990; Bucknall et al., 1988) conclude that deficiencies in hospital management of acute severe asthma occur more frequently on units covered by general physicians.

The studies by Phin and Oates (1993) and Engel et al. (1989) that explored the outpatient management of asthma, are discussed in some detail because of the stronger study design than other studies in the same area and because they used methods similar to the current study. Phin and Oates (1993) used a six-item mailed questionnaire to assess the management of childhood asthma among pediatricians (n= 88), general practitioners (n= 198), and respiratory physicians (n= 51). The following areas were examined: (1) patient assessment, (2) treatment of acute and mild asthma, (3) use of prophylactic treatment, and (4) preferred inhalational devices. The investigators reported agreement amongst the three groups of physicians for most aspects of asthma management. However, some striking differences were observed: these included (a) a relatively high rate of use of orally administered β2 agonists by general practitioners (40% general practitioners compared to 17% and 12% for pediatricians and respirologists, respectively); (b) a higher rate of use of intravenous aminophylline by general practitioners (40%) and respirologists (30%) than pediatricians (20%); (c) a greater preference to use the intravenous route over the oral for corticosteroids by respirologists (40%) in acute severe exacerbations than pediatricians (15%) and general practitioners (31%); (d) a higher rate of use of cromolyn in children over eight years by pediatricians (71%) for inhaled prophylactic treatment than by respirologists (51%) and general practitioners (63%); and (e) a higher rate of use of inhaled corticosteroids in children over eight years by respirologists (49%) and general practitioners (37%) for inhaled prophylactic treatment than pediatricians (29%). A
limitation of this study was the moderate response rates for general practitioners (66%) and respirologists (51%) in contrast to the high response rate of pediatricians (88%).

Engel et al. (1989) have reported differences between allergists and primary care physicians (ie. pediatricians and family practitioners) regarding the intensity of therapy. Engel et al. (1989) assessed intensity of therapy in two ways. The first method presented two hypothetical clinical profiles describing adolescents with asthma to 40 primary care physicians and 13 allergists. The first profile described a moderate exacerbation of asthma and the second described a patient who was chronically undermanaged. The investigators observed that allergists prescribed oral and inhaled corticosteroids more frequently than primary care physicians. Engel also surveyed 283 consecutive patients (age 6-40 yrs.) of the participating physicians to assess their use of medications, particularly their use of corticosteroids over the past year. Patient reports suggested that patients of allergists were treated more aggressively with corticosteroids than patients of primary care physicians, and they also reported taking a greater number of pharmacologic agents over the past year (2.8 vs. 1.3; p<0.001). The observations generated by the two methods were in agreement (physician response to hypothetical profiles and patient questionnaires) and imply that allergists more frequently recommend the use of oral corticosteroids than primary care physicians.

In addition, the study explored the importance of specialty differences with respect to cost and outcomes of treatment (Freund et al., 1988; Freund et al., 1989). Note that Freund et al. (1988 and 1989) and Engel et al. (1989) reported on different aspects of the same study. They observed that patients of allergists incurred greater costs due to the volume of medications prescribed and allergy shots administered but had fewer Emergency Department visits and hospitalizations, reported less intrusiveness of the disease, and reported fewer days of missed school/work. However, the actual differences between the groups were not reported. In contrast, there were no observed differences between patient groups for degree of restricted activity. The investigators concluded that the higher costs for patients of allergists are offset by
the benefits (reduced work/school days missed). However, patients of non-allergists performed at about the same level as patients of allergists, even though their care incurred less cost.

There are some limitations of this study. Firstly, a convenience sample of patients was asked to recall the treatment of their asthma for the preceding year which raises the question of the representativeness of the sample and the role of recall bias. Second, patients of family physicians and pediatricians combined accounted for only 35% of participants, and the remaining 65% were patients of allergists which is not representative of the current situation. The majority of individuals with asthma are not followed by allergists. Finally, the study used two versions of a physician questionnaire, one for allergists and the other for family physicians and pediatricians. The investigators did not provide a description of the differences between the two versions of the questionnaire and conceivably, this could account for some of the variability among specialty groups. It should be emphasized, however, that the two different methodologies for assessment of intensity of therapy (physician medication preferences on clinical vignettes and actual reporting of medication use by their patients) were complementary, and the parallel nature of the results obtained supports the validity of the observations.

Other comparative assessments of physicians' approaches to asthma management support the above observations regarding the increased use of corticosteroids by specialists. Kemp (1993) reviewed the results of two unpublished U.S. marketing studies (National Analysts, 1990 and Medi-Probe Inc., 1990 cited in Kemp, 1993) which report that allergists and respirologists prescribe inhaled steroids to their asthma patients more frequently than primary care physicians. In addition, the Hong Kong and Singapore surveys of generalists and specialists suggested that specialists preferred a more dominant role for corticosteroids, both oral and inhaled, in the treatment of acute and chronic asthma in children and adults than did general practitioners; however these differences did not reach statistical significance (Tan et al., 1992; Ip et al., 1993).
b) Comparing Asthma Practice to Guidelines

A survey of management of asthma attacks conducted in the United Kingdom for 1991-1992 reported that management was frequently at variance with published guidelines (Neville et al., 1993). The survey involved 218 general practitioners, of which approximately 50% were members of an asthma interest group, who completed self reported questionnaires on 1,775 patients who had a total of 1,805 attacks over a three month period. At the end of the study period, the management of each patient was compared with published guidelines for adults or children. The study observed suboptimal care of asthma exacerbations in the following areas: (1) the incomplete recording of objective clinical signs such as pulse (reported in 54% of cases), blood pressure (15% of cases), and respiratory rate (63% of cases); (2) the underuse of nebulised inhaled β₂ agonists (31% of patients managed exclusively by general practitioners and 59% of patients discharged from Emergency Department or hospital) and systemic corticosteroids (56% of patients managed exclusively by general practitioners and 46.5% of patients discharged from Emergency Department or hospital); and (3) gaps in the pattern of maintenance treatment before and after the exacerbation (15-23%). A sizable percentage of patients graded as "breathless and distressed" or "too breathless to talk" did not receive the nebulised bronchodilators (46% and 18%, respectively) and systemic corticosteroids (48% and 15%, respectively) as recommended by the British Thoracic Society guidelines.

There are some important limitations to this study. The sample only included general practitioners who were self-selected on the basis of an interest in asthma. This combined with a 9% overall response rate (27% response rate for the asthma interest group and 6% response rate for non-members), raises serious doubts about the representativeness and generalizability of this study. A distance learning package on asthma accompanied the package of booklets for recording the attack and its management. Participants were “invited to record” the details of all patients who presented with an asthma attack during a predetermined three month period. Keeping in mind these limitations, this study may actually be reporting on "best case"
situations. Nonetheless, this study is useful because it describes the management of asthma attacks in outpatient, Emergency Department, and in-hospital settings for both children and adults and compares it to the guidelines recommendations.

Two other studies published during or after completion of our study (Epton et al., 1994; Crain et al., 1995) compared asthma care in the Emergency Department to published asthma guidelines and noted inconsistencies similar to Neville’s observations. Specifically, these studies reported that peak flow measurements and corticosteroids were underused (in-hospital and for discharge to home), and that deficiencies existed in follow-up care.

Studies assessing the management of children report similar suboptimal treatment (Thompson et al., 1993; Phin and Oates, 1993). Thompson et al. (1993) examined the prescriptions of children with asthma, and Phin and Oates (1993) surveyed the management of pediatricians, general practitioners, and respirologists. Both investigators assessed consistency with the Australian and New Zealand guidelines for treating childhood asthma and both reported reluctance to use anti-inflammatory preparations (specifically corticosteroids in acute exacerbations) and high rates of regular β₂ agonist use (often by the oral route: 5-40%). Phin and Oates reported that approximately 30% of physicians preferred to administer intravenous aminophylline over systemic corticosteroids, in response to a hypothetical acute asthma attack. Phin and Oates also reported that approximately 25% of physicians reported using prophylactic treatment on an intermittent basis when regular use on a daily basis was indicated. These observations are inconsistent with the guidelines recommendations, which stress regular use of anti-inflammatory preparations, use of inhaled β₂ agonists only on an “as needed” basis, and the use of systemic corticosteroids for the treatment of acute exacerbations.
c) **Interventions to Improve Consistency with Guidelines**

In response to observed inconsistencies with guidelines, some investigators have developed and evaluated interventions to improve the quality of asthma care in their clinics (Webb et al., 1992; Barritt and Staples, 1991; Hendricson et al., 1994). Webb and Barritt and Staples developed local practice guidelines to promote regional acceptance, and Hendricson developed a curriculum for pediatric residents. Investigators used standard protocol forms like a checklist of key activities (Barritt and Staples, 1991), a protocol order sheet (Webb et al., 1992), or pocket cards (Hendricson et al., 1994) to help integrate the guidelines into clinical practice. To evaluate the effectiveness of the guidelines, Barritt and Staples interviewed patients of all ages and severity of asthma, Webb carried out a chart audit of hospitalized children with status asthmaticus, and Hendricson evaluated residents’ knowledge of asthma care. All of the investigators noted some improvements before and after the development of the guidelines. Webb et al. (1992) reported that a larger percentage of physicians ordered a wider range of management options, a decrease in epinephrine injections, and an increase in inhalational treatments following the development of guidelines and the standardized protocol sheet. However, comparison of patient outcomes before and after introduction of the protocol showed no differences for length of hospital stay or readmission rate within 30 days.

Barritt and Staples (1991) reported that improved levels of asthma care were achieved following an intervention which included the distribution of asthma guidelines and associated checklists for physicians, the distribution of pocket booklets to physicians, and the use of repeat audits for quality of care. The authors equated “improved asthma care” from 1984 (n= 126) to 1987 (n= 192) with improvements in the following variables: (a) an increase in ownership of peakflow meters (75% to 97%; p<0.05) and their use for monitoring (6% to 20%; p<0.05); (b) decreases in daily episodes of asthma (35% to 13%; p<0.001) in adults, and (c) increases in adult peak expiratory flow measurements (381 to 412 l/min; p<0.001).

However, many areas of disability measured (symptoms, nighttime asthma, time off from
school or work) showed no improvement and the authors noted that 17% of adult patients would benefit from using inhaled corticosteroids.

Hendricson et al. reported improvements in pediatric residents’ knowledge about the evaluation of asthma (86% to 90%), pulmonary function testing (64% to 73%; p=0.02) and medical management (77% to 93%; p=0.01). In addition, participants reported enhanced levels of confidence in their ability to manage asthma.

These studies demonstrate that interventions designed to increase consistency with management guidelines for asthma can improve some areas of asthma care; however, whether or not they improve asthma outcomes is still debatable. All of the studies had major limitations. The Barritt and Staples study only involved a two-doctor semi-rural practice, the pre-printed standardized protocol form in the study by Webb et al. (1992) was used for only 24% of the patients, and only 32% of the residents completed all of the components of the asthma curriculum in the Hendricson study. None of the studies reported improvement in utilization of medical or hospital services, which are stronger predictors of improvements in asthma related morbidity rates and costs. In addition, long-term effects of the interventions on physician behavior and patient outcomes were not evaluated.

d) Summary: Practice Variations

The literature suggests that physicians' treatment of asthma is varied and in some cases suboptimal, and that this situation continues despite the existence of asthma treatment guidelines. Moreover, some studies have reported differences between asthma specialists and generalists in the approach to asthma management and in outcomes; in particular, the use of corticosteroids and β2 agonists varies among physicians and between specialties. However, the majority of these studies were done in an in-hospital or Emergency Department setting, and it remains unknown if the same results would be obtained if the management of adult asthma in an outpatient setting was assessed. The shortcomings of these studies include low response rates, small sample sizes, and non-random selection of subjects.
B. PROVISION OF ASTHMA EDUCATION

Individuals with asthma must be responsible for a certain level of self management. The term "self" may cause some misunderstanding. Self management does not imply that individuals are solely responsible for their treatment and divorced from the physician's guidance and recommendations. Rather, the individual and the physician work together in partnership, communicating as frequently as necessary so that both independent and joint decisions are made with complete information.

These decisions are often difficult in the face of ongoing changes in medical knowledge about asthma, the individual's daily situation, and the state of the disease itself. Current management approaches recommend that patients follow complex regimens and environmental control measures. Therefore, the physician must transfer some of his/her clinical knowledge and expertise to the patient. This will assist the patient in making appropriate management decisions both jointly with the physician and independently when the physician is not available. Patients must be knowledgeable about the disease and know how to translate this information into daily management steps and problem solving. Unfortunately, many individuals with asthma never receive the asthma education they need to be active participants in their care and to make this approach work effectively for them.

Provision of information is essential but not sufficient for this approach to succeed (Hilton et al., 1986; Jenkinson et al., 1988). The educational process should emphasize both the development of the individual's asthma management skills and help to establish the confidence that he/she can achieve control of their disease. Educational topics that are considered to be fundamental include: general asthma information (e.g. anatomy and physiology of the lungs, definition of asthma, etiology and pathophysiology), information about medications (e.g. mechanisms of action, rationale for use, side effects, indications for use), environmental control measures (e.g. actions related to avoiding or minimizing exposure to allergens or irritants), warning signs of worsening asthma (e.g. increased use of \( \beta_2 \) agonist,
increased symptoms, nighttime or early morning awakenings due to asthma), and indications to seek medical attention (Hargreave et al., 1990; NHLBI, 1991; NHLBI, 1992; Bailey et al., 1990; Bolton et al., 1991; Wilson et al., 1993).

Skills that need to be taught include: the proper use of inhalational devices, the proper use and reading of peak expiratory flow meters (if they are to be used), and maintenance of an asthma diary. In addition, every patient should be provided with a decision matrix or ‘action plan’, which is a decisional algorithm that outlines the steps that should be taken to manage worsening of the disease (Hargreave et al., 1990). These asthma action plans may be based on the individual’s symptoms and the need for β₂ agonist or they can be based on a combination of symptoms, inhaled β₂ agonist use, and changes in peak expiratory flow rates (PEFR).

a) Evaluation of Asthma Education

Educational programs have used both individualized and group formats, and have been conducted in hospital in-patient settings, outpatient clinics, Emergency Departments, physicians’ offices, schools, camps, and homes. Several techniques have been used, including lectures, videos, checklists, booklets, computer games or tutorials, problem solving sessions, promotion of diaries and peak flow monitoring, and repeated audits. There is a growing body of research related to education and self management of asthma. To date, there have been more studies evaluating asthma programs for children than for adults (Clark et al., 1993).

Current information suggests that the best results are achieved by programs directed not only at increasing knowledge, but also towards changing behavior by developing skills (Taggart et al., 1991; Mulhauser et al., 1991; Windsor et al., 1990; Bolton et al., 1991; Bernard-Bonnin et al., 1995; Bailey et al., 1990; Wilson et al., 1993). Investigators evaluating asthma education for adult patients have reported numerous benefits. Improvements in inhaler technique (Wilson et al., 1993; Bailey et al., 1990), asthma knowledge (Kotses, 1995; Wilson et al., 1993; Bailey et al., 1990; Worth, 1990; Modell, 1983), self management behaviors
(Kotses, 1995; Wilson et al., 1993; Bailey et al., 1990; Modell, 1983; Beasley et al., 1983), functional status (Kotses, 1995; Wilson et al., 1993; Bailey et al., 1990; Beasley et al., 1983), lower asthma attack frequency (Kotses, 1995; Wilson et al., 1993; Bolton et al., 1991; Muhlhauser et al., 1991; Bailey et al., 1990), reduced need for medication (Kotses, 1995), increased self confidence (Kotses, 1995), reduced absenteeism from work (Trautner et al., 1993; Muhlhauser et al., 1991; Beasley et al., 1983), and reduced health care services utilization (Mayo, 1990; Bolton et al., 1991; Muhlhauser et al., 1991; Trautner et al., 1993; Wilson et al., 1993) have all been reported. However, some of these studies report improvements in the control groups for some of the same variables (e.g. use of health care services, symptom scores).

Results from a few studies evaluating the long term effects of asthma education for adult patients that used randomly assigned control groups are used to illustrate the magnitude of reported improvements described above. Wilson et al. (1991) reported that physician evaluation of asthma status at the five month follow-up period had improved for 52% of patients in an experimental group and for 31% of patients in the control group (p=0.03) and for 67% and 39% of patients in the experimental and control groups, respectively, at the one year follow-up point (p=0.04). Wilson also reported reductions in the number of acute medical visits between an experimental group (a reduction of 2.0 visits) and the control group (a reduction of 1 visit; p< 0.05). Similarly, Kotses (1995) reported a reduction in physician visits of 25% for the experimental group as compared to a 9% increase for the control group during the first two months of follow-up and follow-up at months 5 and 6. Mayo (1990) reported that patients in the experimental group had fewer hospitalizations (0.4 per patient versus 1.2 per patient; p<.004) and days in the hospital (3.1 versus 6.7 days) than did the patients in the control group during a 32 month follow-up.

Studies reporting the greatest reduction in health care services involved adults with more severe asthma or those previously requiring hospitalization or Emergency Department
visits (Mayo et al., 1990; Bolton et al., 1991; Trautner et al., 1993; Yoon et al., 1993). Studies involving children with asthma also demonstrated the greatest reductions in health care service utilization in those with more severe asthma or in the group of frequent users of health care services (Clark et al., 1986; Toelle et al., 1993). Kotses et al. (1995) reported short-term reductions in health care service utilization were primarily observed among patients already under good control who followed a self management program.

The format and length of the educational programs differ slightly among the studies. In addition, not all of the studies used control groups. However, these studies conclude that asthma education for adults can improve patients’ understanding of their disease and its treatment and increase their sense of self confidence that asthma can be controlled (although self confidence was not measured in all studies). These effects may, in turn, increase adherence to their medication regimen and improve self management behavior resulting in control of their asthma.

b) Asthma Action Plans: Peak Flow Rates or Symptoms Only?

Originally, it was thought that action plans based on peak expiratory flow rates were superior to those based on symptoms alone. The argument for this reasoning is that the assessment of symptoms alone is an unreliable indicator of asthma severity which can lead to important delays in recognizing deteriorating asthma and in initiating appropriate treatment (Rubinfield et al., 1976; Kendrick et al., 1993). Some individuals with asthma may have little or no symptoms in the presence of substantial airflow limitation, whereas other patients complain of symptoms with normal rates of airflow. Therefore, it has been suggested that regular objective assessment of airflow obstruction (ie. the home use of peak flow meters) is necessary to assist patients with management.

A study by Beasley et al. (1989) supports this argument. Patients in this study were managed by an individualized action plan in which treatment decisions were made strictly in accordance with regular peak expiratory flow rate recordings. Patients’ experiences with their
asthma for six months before and six months after the provision of the action plan were compared. Their intervention resulted in significant improvements in asthma severity as judged by increases in objective lung measurements (baseline FEV$_1$ 76% predicted compared to 92% at final visit; p<0.01), reductions in the number of days off work or school during preceding six month period (12.9 days at baseline compared to 1.7 at final visit; p<0.01), and number of nocturnal awakenings during preceding six months (4.3 at baseline compared to 0.7 at final visit; p<0.01). When interpreting and considering the results of this study, the following limitations should be kept in mind: (a) a convenience sample was used; (b) there was no concurrent control group for comparisons; and (c) some of the baseline data were collected retrospectively (patients’ recall of the past 6 months).

Other investigators subsequently compared peak flow action plans and action plans based on symptoms alone (Charlton et al., 1990; Malo et al., 1993; Grampion Asthma Study of Integrated Care (GRASSIC), 1994). The results of their controlled studies suggest that the addition of peak expiratory flow rates to action plans does not provide any additional benefit to those based upon symptoms alone. For example, Charlton et al. (1990) observed that significant and approximately equivalent reductions occurred in the number of physician consultations and in the use of oral corticosteroids when either type of action plan was used.

c) Cost Effectiveness of Asthma Education

Two cost-effectiveness analyses concluded that asthma education programs result in a decrease in health care costs (Bolton et al., 1991; Trautner et al., 1993). The Bolton (1991) study was a randomized controlled trial of 241 adult patients recently seen in the Emergency Department of two Detroit hospitals (one urban and one suburban); follow-up for the study occurred over 12 months. Patients in the intervention group were asked to attend three educational sessions on asthma. The Trautner study (1993) evaluated a five-day in-patient programme in 132 consecutively admitted patients for three years. Bolton (1991) reported a difference in the number of Emergency Department visits for the 12 month follow-up for the
experimental group (16/100 persons) and the control group (39/100 persons for the 12 month follow-up; p= 0.0005). Trautner also reported benefits to patients and the health care system as a result of their program. They observed that the number of days in hospital reduced steadily over a three year period from 10 days per year at baseline to 7.4, 3.7, and 3.5 days per year at years 1, 2, and 3 of follow-up (p= 0.02). A similar trend in a decrease in the number of physician visits per year was observed from 3.3 at baseline to 1.2, 1.0 and 0.8 visits per year at 1, 2, and 3 years of follow-up (p< 0.001)(Traumer et al., 1993).

Both reports indicate that the monetary benefits of the program outweighed the costs. Bolton et al. (1991) reported that the $85 per person cost of the program resulted in a savings of $1,913.00 per person over the first year following program attendance. Most of the savings arose from the reduced number of Emergency Department visits during the initial four months post-intervention.

Trautner (1993) reported savings over a three year period. In the first post-intervention year, the mean per patient costs of the program were DM 3,250, including direct (DM 2,250) and indirect (DM 1,000) costs. The largest savings resulted from a reduction in the number of days absent from work.

These studies suggest that asthma education programs may be cost effective. However, important limitations of these studies need to be pointed out. Both studies involved participants who were already high utilisers of the health care system (medical and hospital services) and therefore one could argue that improvements would be anticipated (regression towards the mean). In addition, both studies relied on patients’ recall and there was missing data for some comparative endpoints. With regards to the financial analyses, some components were not considered; for instance, the costs of medications, the costs associated with days lost from work (Bolton et al., 1991), and costs associated with lost days of productivity for those who were not employed. Analysis for both studies was strictly limited to effects measurable in monetary terms. Another limitation to the Trautner study is the
pre/post design of the study which assumes that the rates for hospitalizations and Emergency Department visits would have remained the same across time. Specific to the Bolton study, only 59% of subjects in the experimental group attended any of the classes. One could argue that even greater benefits would be anticipated if these individuals had participated; however, this attendance problem is indicative of a larger problem of attracting at-risk patients to participate in such educational programs.

d) Summary: Patient Education

The literature on asthma education suggests that the provision of asthma education programs may be cost-effective and improve asthma patient outcomes. Educational activities thought to be important include: (a) provision of information about asthma, medications, warning signs, and environmental control measures; (b) provision of an asthma action plan whether it is based on symptoms or a combination of symptoms and peak expiratory flow rates; and (c) demonstration of the proper use of inhalational devices.

The studies mentioned above typically occurred in either university-affiliated hospitals or large university-affiliated Health Maintenance Organizations that provided a formalized asthma patient education program staffed by allied health care professionals who specialized in asthma. To date, there is a paucity of information regarding the provision of asthma education by physicians who practice in the community and are not affiliated with an asthma education program.

C. PARTNERSHIP BETWEEN PHYSICIAN AND PATIENT

As a result of the consumerism movement and the literature supporting increased patient involvement in health care (Brody, 1980; Speedling and Rose, 1985; Greenfield et al., 1985; Orth et al., 1987; Greenfield et al., 1988; Kaplan et al., 1989; Stewart, 1995), especially for those patients with chronic diseases, members of expert panels for asthma management have included the development of a partnership between physician and patient as one tenet in the practice of optimal asthma care (Hargreave, 1990; NHLBI, 1991; NHLBI, 1992).
It is suggested that successful management of a chronic disease can only occur with the patient actively implementing the therapeutic regimen and attempting to minimize the limitations on her or his daily life. In order to maximize disease control, patients must participate actively and effectively in their health care through good working relationships with caregivers (Greenfield et al., 1985; Greenfield et al., 1988; Kaplan et al., 1989; Stewart, 1995). Ideally, every individual with asthma would develop a treatment or action plan jointly with his/her physician that best suits his/her disease state, personality and life-style. Doctors' appointments provide opportunities for interactions between the patient and the physician to increase their mutual understanding of the medical process, particularly the rationale behind the treatment and the need for monitoring and follow-up, as well as patients' perspectives on living with asthma. Patients who do not have these opportunities may not acquire the knowledge, skill, and sense of confidence and control that is needed for the management of their chronic diseases (Greenfield et al., 1985; Greenfield et al., 1988; Lerman et al., 1990).

Although increased participation by patients in management decisions has been advocated, relatively little is known about the degree of participation in decision making that patients prefer, about the level of physician appreciation of these preferences, or the mechanisms of how increased involvement may lead to improved patient outcomes. Do patients want to participate in medical decision making? The answer to this question is sometimes "yes" and sometimes "no". Research has indicated that patients' preferences for participation in clinical/treatment decisions may vary greatly (Vertinsky et al., 1974; Cassileth et al., 1980; Strull et al., 1984; Ende et al., 1989; Sutherland et al., 1989; Lerman et al., 1990). Although, patients commonly express a high preference for information about their illness and treatment (Cassileth et al., 1980; Strull et al., 1984; Ende et al., 1989; Sutherland et al., 1989; Lerman et al., 1990; Beisecker and Beisecker, 1990; Deber, 1994). They may not necessarily want to be responsible for making the management decisions.
a) Patient Participation

Studies by Greenfield et al. (1985; 1988; 1994), Kaplan et al. (1989) and Brody et al. (1989) suggest that active patient participation is associated with better outcomes. These investigators explored the relationships among patients' perceptions about the roles they played and their subsequent attitudes, self-rated improvement, and physiological measures (Greenfield et al., 1985, 1988, 1994; Brody et al., 1989; Kaplan et al., 1989). Study participants included patients with diabetes, hypertension, peptic ulcer, and minor illnesses including musculoskeletal pain, sore throat, and vaginal discharge. Three of the studies (Greenfield et al., 1985; Greenfield et al., 1988; Kaplan et al., 1989) evaluated a 20 minute session for randomly selected patients that was designed to improve their level of participation in interview (doctor's appointment) and their information seeking skills. These results implied that patients who played an "active" role in their care reported a decrease in role and physical limitations, increased functional status, more alleviation of discomfort, an improvement in overall medical condition and improvements in objective measures of disease control (e.g., reduced blood glucose levels in diabetics from pre-post intervention levels of 10.6 to 9.1 for the experimental group compared to pre-post intervention levels of 10.3 and 10.6 for the control group) for those patients who played an active role compared to patients who played a "passive" role. Brody et al. (1989) reported that patients playing an active role were twice as likely to feel that their illness had improved maximally one week after their office visit compared to those who felt they played a passive role.

Evaluations of the role of active participation in controlling asthma have not been conducted, but one would anticipate that similar benefits would occur. Asthma has similarities to the disease states in which benefits from active participation have been observed; it is a chronic disease state requiring the patient to be at least somewhat involved in the management and it is primarily managed on an outpatient basis.
b) Potential Theories That Account for Improved Health

Investigators exploring the relationship between patients playing an “active role” in their care and improved health postulate that a more active role in a visit with the physician may generate a greater sense of control over the disease and therefore lead to better health outcomes (Greenfield et al., 1985; Greenfield et al., 1988; Brody, 1989; Lerman, 1990). Brody (1989) speculates that actively involved patients believe that they can successfully take appropriate action to adapt to and control their illness.

Lerman et al. (1990) observed, in 131 primary care patients, that the doctor’s facilitation (r = 0.26) and patient decision making (r = 0.24) were weakly related to patient satisfaction and attitudes regarding illness. Specifically, patients who indicated that they were more involved in decision making tended to be more satisfied with the technical aspects of the medical visit. In addition, the doctor’s facilitation of patient involvement and information exchange related to patients’ perceptions of post-visit changes in their understanding of their medical problem (facilitation: r = 0.36; information: r = 0.47), reassurance regarding their health status (facilitation: r = 0.30; information: r = 0.33), perceived control over their medical problem (facilitation: r = 0.42; information: r = 0.27), and anticipated functional capacity during the following week (as compared to the current situation) (facilitation: r = 0.46; information: r = 0.35).

c) Clinicians’ Perspectives of Patient Involvement in Treatment Decisions

Very little is known about physicians’ perspectives of or preferences for patient involvement in decision making. The majority of studies have focused on the patients’ perspectives and desires for level of involvement in management decisions. Strull et al. (1984) reported on clinicians’ estimates of the role that patients reported they played and the estimates of what clinicians perceived to be the role patients desired to play. A convenience sample of 210 hypertensive patients and their physicians completed questionnaires assessing the patient’s level of participation and the patient’s preferred level of participation. Clinicians overestimated
the patient's perceived role in 48% of the cases and overestimated the patient's preference for their role in decision making in 32% of the cases. In addition, physicians underestimated their patients' preference to discuss therapy in 29% of the cases and overestimated in 11%. However, Strull did not report on the preferences of physicians for the level of patient involvement in decision making.

Physicians' perspectives of the current level of patient involvement or their preferences for the ideal level of patient involvement in asthma care have not been reported. For the reasons mentioned above, it is worth describing the distributions of the physicians' perspectives for the current role that patients are playing in management decisions as well as the physicians' preferences for patient involvement in management decisions for specialists and family physicians. In turn, this descriptive work would form a baseline for future comparisons with patients' reports of the current level of involvement in asthma management decisions and their preferred level of involvement in decisions.

d) Summary: Physician-Patient Partnership

While much has been done in this general area, there is still a great deal to explore and understand since, in asthma management, there are no studies examining the physicians' perspectives and preferences for level of patient involvement. A partnership between the asthma patient and physician may be beneficial since many of the favorable studies examining increased patient involvement included patients with chronic diseases who were seen in an outpatient setting where the majority of asthma cases are followed. From the previous discussion we know that some patients desire a more active role in their management while others prefer to maintain a more "passive" role. However, the correlations observed between greater participation and improved health outcomes suggest that a passive role, though preferred by some patients, may result in poorer outcomes. This is especially true of individuals with asthma; because of its episodic nature, the patient's clinician cannot always be
with the patient to make the necessary management decisions which may be required on a daily basis.

D. SUMMARY: REVIEW OF LITERATURE

The above review has discussed each of the components of the model of asthma care (appropriate therapy, provision of education, and partnering for care) proposed by the published guidelines. It is apparent that there is variability among physicians and between specialties in the treatment of asthma which may result in suboptimal patient care. The provision of asthma education programs appears to be cost-effective and improve asthma patient outcomes. Several educational activities are thought to be fundamental to successful programs. While the area of patient involvement in care has been well studied, much remains to be explored and understood about the physicians’ perspectives and preferences for level of patient involvement in asthma management. An understanding of physicians’ perspectives and preferences is important to gain a broader understanding of the patient-physician relationship and perhaps to assist in developing interventions aimed at increasing shared decision making.

In addition, most of the studies to date have been done primarily in either university-affiliated hospitals or Health Maintenance Organizations and in an in-hospital or Emergency Department setting. The applicability of these results to the management of adult asthma in an outpatient setting is uncertain. Accordingly, there is a need for a study which evaluates the model of asthma care in a cohesive manner in an adult outpatient setting.

V. RESEARCH QUESTIONS

The following section outlines the principal research questions of this investigation. The principal research questions are organized into three general areas regarding self-reported asthma management: (1) description of physicians’ asthma management approaches; (2) detection of differences between family physicians and specialists; and (3) evaluation of the degree of consistency between physicians’ treatment strategies with the recommendations of the published Canadian asthma guidelines.
**Research Question 1:** What approach to asthma management do Ontario family physicians and respirologists report they take with regards to their…

(a) treatment action judgements?

(b) approach to providing asthma education activities to patients?

(c) usual level of patient involvement in asthma management decisions?

(d) ideal level of patient involvement in asthma management decisions?

**Research Question 2:** Are there differences in reported asthma management approaches between family physicians and specialists, with regards to their…

(a) treatment action judgements?

(b) approach to providing asthma education activities to patients?

(c) usual level of patient involvement in asthma management decisions?

(d) ideal level of patient involvement in asthma management decisions?

**Research Question 3:**

A. For the following physician groups, how consistent are their recommendations with the published 1990 Canadian guidelines for the management of asthma:

(a) the aggregate group of physicians?

(b) the subgroup of family physicians?

(c) the subgroup of specialists?

B. Are there differences in the degree of consistency between specialists and family physicians?
VI. KEY TERMS

The term "family physician" is used throughout this text to refer to physicians who are general practitioners, as well as physicians who have attained a certificate from the College of Family Physicians.

A. ASSESSING TREATMENT ACTION JUDGEMENTS

Asthма Profiles: Six hypothetical clinical profiles, portraying adults with asthmа that ranged in severity from mild to severe, were used to elicit the physicians’ recommended treatment strategies.

Treatment Actions: For each of the six asthma profiles, there were at least seven treatment options: (a) inhaled β₂ agonists, (b) inhaled ipratropium bromide, (c) inhaled corticosteroids, (d) non-steroidal anti-inflammatories, (e) theophylline preparations, (f) no action currently needed, and (g) same day medical care. There was an additional option of using oral corticosteroids for all profiles except the one describing mild asthma. In addition, the sixth profile had the option of ‘starting a course of antibiotics’.

Treatment Action Judgements: For each of the treatment actions, the physician was asked to judge whether or not he/she would recommend to their patient the use of the particular treatment action to manage the described asthma profile. There were two response categories to this question; “Yes, I would recommend this action” or “No, I would not recommend this action”.

B. ASSESSING APPROACH TO ASTHMA EDUCATION

Asthма Education Activities: Physicians considered nine patient education activities: (a) general information about asthmа; (b) information about asthma medications; (c) a demonstration of the proper use of inhalational devices; (d) information on avoidance of asthma triggers and environmental control; (e) information on the warning signs of worsening asthma; (f) an asthma action plan based on symptoms; (g) information about monitoring peak flow rates; (h) an asthma action plan based on symptoms and peak
expiratory flow rates; and (i) referral to community non-profit organizations (eg. Canadian Lung Association, Asthma Society).

**Approach to Providing Asthma Education Activities:** Physicians were asked to indicate their usual approach to providing these asthma education activities to patients with varying degrees of asthma severity (mild, moderate, severe). (These degrees of severity are broad and are not meant to align with the hypothetical asthma profiles used to assess treatment action judgements.) For each degree of asthma severity, the respondent selected a response which most closely reflected his/her usual approach to providing information for each of the nine asthma education activities.

**Raw Score for Provision of Education:** The term “raw” refers to a respondent’s score for a particular educational activity.

**Summative Scores for Provision of Education:** A “summative” score was generated by adding all of the raw scores from the nine individual educational activities for each severity level (mild, moderate, severe). The summative scores provided an opportunity to look at differences in provision of education across the three severity levels.

**Overall Score for Provision of Education:** The “overall” score for provision of education was generated by adding respondent’s summative scores. The overall scores allowed for a general perspective on the level of education provided to asthma patients.

C. **ASSESSING PATIENT INVOLVEMENT**

**Patient Involvement in Asthma Management Decisions:** Strull’s (1984) scale was used to measure the level of patient involvement in decision making regarding asthma management. The scale consisted of 5 descriptive sentences ranging from preferring the physician to assume primary responsibility for decision making to that of preferring the patient to do so. This scale was used to assess physician reports of the usual level of patient involvement in asthma management decisions, as well as physician preferences regarding the ideal level of patient involvement.
I. SAMPLE

A. TARGET POPULATION

This study involved family physicians and specialists (primarily respirologists) from across Ontario who were likely to treat individuals with asthma.

B. ESTIMATION OF SAMPLE SIZE

To guide sample size estimation, we used the research question regarding differences between family physicians and specialists in the extent to which their recommended treatment actions are consistent with the published Canadian asthma treatment guidelines. We used this research question because of the importance placed on the use of appropriate therapy in achieving successful asthma control and, because at present, the published guidelines are most representative of a "gold standard" for appropriate asthma therapy.

Accordingly, the participants' first priority action served as the critical variable. Assuming a power of 0.80, an alpha of 0.05 with a two-tailed test, and that 85% of specialists would be consistent with the Canadian guidelines for managing moderate asthma, the STPLAN program indicated that, with 70 members per physician group, we would be able to detect a 20% absolute difference in consistency rates. The 85% baseline for specialists was derived from a previous study of respirologists which involved the selection of appropriate therapy in response to hypothetical asthma exacerbations (Cicutto et al., 1992).

The selection of a 20% difference was based on the subjective assumption that this difference in self-reported management might represent a clinically important difference in actual treatment and a reduction in favorable patient outcomes. In Canada, Ernst et al. (1995) used a nested case control study to examine the potential impact of treatment inconsistent with
the asthma guidelines on the risk of life-threatening asthma. They reported that in Saskatchewan from 1980-1987, pharmacological therapy inconsistent with the guidelines was more common among cases of fatal and near fatal asthma. These observations suggest that deviation of physicians' practice from the guidelines has negative consequences for achieving the best possible asthma outcomes and the most efficient use of our health care dollars. Therefore, it is important to be able to detect inter-specialty variation, if it exists, even in terms of physician self-reports.

C. SAMPLING PROCEDURES

a) Specialists/Respiratory Physicians

The sampling frame of respirologists was compiled from the 1994 members of the Ontario Medical Association who indicated a specific interest in respiratory medicine, the 1994 membership lists of the American College of Chest Physicians and the American Thoracic Society, and the Ontario respiratory medicine section of the 1994 Canadian Medical Directory. These databases were selected to capture the largest number of Ontario specialists interested in lung diseases; however, the majority of names in this sampling frame were obtained from the Ontario Medical Association list.

The membership list from the Ontario Thoracic Society was not available for our study. It is their policy not to share their mailing list or membership list with outside agencies. However, it is unlikely that members of this respiratory interest society would not be members in one of the organizations used to complete our sampling frame.

The selection criteria used to derive the study sample included the completion of specialty training and current practice in Ontario. This information was obtained from the Canadian Medical Directory and the member information/background section of the published membership directories for the American College of Chest Physicians and the American Thoracic Society. These criteria generated a full sampling frame of 175 names. The Macintosh Statview Statistical program was then used to randomly select the names of 103 potential
participants. Our sample size estimation procedures indicated that 70 actual participants would be needed; this number was increased by 33 to allow for incorrect addresses, non-respondents, and participant ineligibility.

b) Family Physicians

The sample of family physicians was randomly drawn from a sampling frame of family physicians and general practitioners developed and maintained by J.I. Williams. Development of the sampling frame database started with the 1989 and 1993 Canadian Medical Directories and systematically selected every fifth physician from Ontario. In order for the physician to be included in the database he or she had to meet the following eligibility criteria: (a) a non-specialist; (b) practicing medicine for five years or more; (c) in the same Ontario practice for three years; (d) under 60 years of age; and (e) have a community based practice. After this exercise, the database contained information on 910 family physicians and general practitioners. The physicians then had random numbers assigned to them so that the names and addresses of 200 family physicians could be randomly selected from this database. From this list, the investigator of the current study reapplied the exclusion criteria of being a non-specialist general practitioner or family physician against the 1994 Canadian Medical Directory. After this exercise, the final list of family physicians consisted of 127 potential participants.

Our sample size estimation procedure indicated that 70 family physicians would be needed; this number was increased by 57 to take into account the larger number of incorrect addresses, ineligible individuals, and non-respondents anticipated in the family physician subgroup. Originally, it was assumed that a response rate of 60-70% would be achievable; therefore, 100 to 117 would be needed in the sample. However, because such a large number (approximately 36%) of family physicians from the original data base were practicing outside of Ontario or not treating individuals with asthma, ten extra individuals who were randomly selected were included in the sample.
II. DESIGN

The study design consisted of a mailed survey and used Dillman's methodology. Dillman's Total Design Method (TDM) emphasizes devising each aspect of the survey process in a manner that enhances response rates and completeness of these responses (Dillman, 1983).

The TDM general principles of questionnaire design are as follows:

A. The questionnaire is designed as a booklet.
B. Resemblance to advertising brochures is strictly avoided.
C. Questions are not placed on the cover page or back cover page.
D. Questions/sections are ordered in a topic-related sequence.
E. Each page is formatted according to the following principles: (i) to prevent skipping items, each page is designed so that whenever possible respondents can answer in a vertical fashion instead of moving back and forth and across the page; (ii) cues are used to warn the participant of changes in topics; and (iii) only one question is asked at a time and cues are used to provide directions.

Furthermore, the TDM strategy involves the following:

1. A one page introductory letter is sent one week prior to mailing the questionnaire.
2. Mailing of the questionnaire occurs one week following the mail-out of the introductory pre-survey letter.
3. Reminders are sent to non-respondents at 2, 5, and 9 weeks after the initial mailing of the questionnaire. Replacement questionnaires are included at weeks 5 and 9.

Dillman's implementation procedures constitute a carefully integrated system. The mail-out procedures rely heavily on a personalized approach. For example, individual names and addresses are printed in type that match the text of the pre-survey and cover letters, the investigators' names are individually signed with a blue ballpoint pen using sufficient pressure to produce slight indentations, and all material is sent by first class post. These personalized
activities help to convey to the potential respondents the importance of their participation in the study.

All of these recommended design elements were incorporated into this study. The introductory pre-survey letter, the cover letter, and all follow-up letters are included in Appendix A.

III. PHYSICIANS’ QUESTIONNAIRE

The mailed questionnaire consisted of four sections designed to be completed in about 10-15 minutes (please refer to Appendix B: The Physicians’ Questionnaire).

A. SECTION 1 - PATIENT EDUCATION ACTIVITIES

The first section assessed physicians' usual approach to providing asthma education activities to their patients with varying degrees of asthma severity (mild, moderate, and severe). Each asthma severity level was explicitly defined and accompanied by statements describing the frequency of asthma symptoms experienced as well as lung function measurements. For each asthma severity level, the respondents were asked to indicate their usual approach to the provision of the following educational activities: (a) general asthma information (eg. etiology, pathophysiology); (b) information about asthma medications (eg. mode of action, dose, side effects); (c) a demonstration on the proper use of inhalational devices; (d) information on trigger avoidance and environmental control (eg. control of dust mite, moulds, and animal dander exposure); (e) information on the warning signs of worsening asthma; (f) an asthma action plan based on symptoms; (g) monitoring of peak flow rates; (h) an asthma action plan based upon symptoms and peak expiratory flow rates; and (i) referral to community non-profit organizations (eg. Lung Association, Asthma Society).

For each of these activities, three response categories were used to obtain physicians' self-reports of their usual approach and were scored the following way: (1) "I do not provide this information"; (2) "I provide this information only if the patient asks"; (3) "I provide this information without waiting for the patient to ask". This type of questioning and
accompanying response categories were used previously to assess physicians' usual approach to providing treatment information to women with node-negative breast cancer and to patients with asymptomatic hypercholesterolemia (O'Connor et al., 1996; Llewellyn-Thomas and Norton, work in progress).

B. SECTION 2 - TREATING ASTHMA

In Section 2, respondents carried out three tasks. First, participants were presented with a clinical scenario ("asthma profile") to read. Participants were then asked to indicate, for a series of treatment actions, whether or not they would recommend that patients use each of the actions to control the asthma profile described. Finally, participants selected the action that they considered to be of the highest priority for the clinical situation described in the profile (i.e. the "first priority action").

a) Asthma Profiles

Six adult asthma outpatient clinical profiles were presented in the questionnaire. Each represented a specific combination of clinical characteristics including: degree of asthma symptoms experienced, triggers of asthma symptoms, and use of inhaled bronchodilating agents and/or inhaled corticosteroids.

Development of the profiles took into account the recommendations of the Canadian, British, and United States guidelines on the diagnosis and treatment of asthma as well as advice from asthma consultants (Hargreave et al., 1990; NHLBI, 1991; BTS, 1993). The set of asthma profiles was intended to be representative of typical patients seen for asthma. [The asthma profiles used to elicit treatment judgements were not designed to parallel the descriptions of different asthma severity levels used in Section 1: Patient Education Activities.]

b) Treatment Judgements

The listed treatment actions varied somewhat with the different profiles. The basic options for all profiles included the use of: (1) inhaled β2 agonists, (2) inhaled ipratropium bromide (Atrovent), (3) inhaled steroids, (4) non-steroidal anti-inflammatories (eg.
nedocromil, ketotifen, cromoglycate), (5) theophylline preparations, (6) oral steroids (except Profile A), (7) no action (waiting and seeing), and (8) same day outpatient visit or medical consultation (either an Emergency Department visit or office visit). An additional option was provided for Asthma Profile F which listed the option of starting a course of oral antibiotics. In addition, for all six profiles, an ‘other’ category was available for the respondent to supply a personal answer.

The respondents considered each action associated with each profile, and indicated either “Yes, I would recommend...” or “No, I would not recommend...” that treatment action by checking the appropriate response box.

c) First Priority Action

Then, for each asthma profile, the participant was asked to select, from the list of potential treatment actions, the one action that s/he considered to be the action of first priority for the treatment of that particular asthma profile. The respondent placed a checkmark in the column labelled “First Priority Action” next to the treatment action s/he selected.

C. SECTION 3 - INDIVIDUAL PRACTICE

This section asked about physicians’ views on the level of patient involvement in their asthma practice. Respondents were asked to indicate their opinions about the ‘usual’ and ‘ideal’ role of a patient with asthma in making decisions about the management of his/her disease. The five response categories ranged from the patient taking a very passive role in decision making to taking a very active role in decision making and were arranged in ascending order of patient involvement. The first category described the physician as the sole decision maker. In the middle category (category 3), both the patient and the physician share equally in making management decisions. The last category (category 5) described the patient as the sole decision maker, assuming primary responsibility for treatment decisions. These categories were developed and previously used by Strull (1984) in 210 hypertensive patients and their physicians.
This instrument was also used to assess cancer patients’ ideal and usual role in treatment decisions. Sutherland et al. (1989) asked a convenience sample of 52 outpatients who required post-surgical treatment for cancer to indicate both their ideal level and their usual level of participation in treatment decision making. The investigators observed that the majority of patients reported congruence between their ‘actual’ and ‘ideal’ experience but, for those who reported a lack of congruence, the ‘actual’ level of participation was less than their ‘ideal’ level.

D. SECTION 4 - PRACTICE AND DEMOGRAPHIC CHARACTERISTICS

In Section 4, the following practice and demographic information was elicited: gender, age, number of years in practice, type of medical specialty and practice, respondent’s personal history of experiencing asthma-like symptoms, existence of a nurse or other health care professional in clinic/practice, frequency of attendance at conferences or continuing education sessions on asthma, percentage of practice that involves treating individuals with asthma, number of asthma patients seen per week, and approximate percentage of asthma patients treated who have mild, moderate, or severe asthma.

IV. DATA COLLECTION PROCEDURES

Before initiating the study, approval was obtained from the Ethics Review Board of the University of Toronto’s Office of Research Services. The Physicians’ Questionnaire was pre-tested using two strategies prior to the formal mail-out. First, 5 physicians who treat asthma were asked to “think aloud” while answering the questions, commenting on each question and explaining how their final response was chosen. Next, the investigator asked 10 physicians who treat asthma to complete the questionnaire. The investigator then interviewed each physician and discussed any problems associated with completing the questionnaire and the representativeness of the asthma profiles. These two strategies allowed the investigator to assess the content, the clarity, the ease of completing the forms, and to identify problem areas. Based on the pre-testing information, the questionnaire subsequently underwent minimal revision. Examples of the revisions made include re-ordering a couple of the sections,
dropping one-open ended question regarding asthma management, and rewording some phrases.

Data collection occurred over a five month period beginning in September 1993 and finishing in January 1994. Data collection procedures for the full study involved several steps (Figure 1). First, the physicians received an introductory pre-survey letter, one week before the questionnaire booklet was sent out, explaining the following details: (a) the purpose of the study; (b) that participation in the study was voluntary; (c) that they were free to refuse to answer any of the questions; (d) that by filling out the forthcoming questionnaire and returning it, the individual was providing consent to use his/her responses in the analysis; (e) that there were no risks associated with participation; (f) the benefits to participating in the study (financial reimbursement of $50.00 and, if they wished, receipt of a report of the final results); and (g) that their responses on the questionnaire would be kept confidential and their anonymity preserved.

Second, the questionnaire and a cover letter were sent out to the physicians one week after the pre-survey letter. Prior to mailing, the questionnaires were assigned identification numbers which were explained in the cover letter. A cover letter and instructions for completing the questionnaire accompanied the first mailing of the questionnaire. The individual was requested to complete the questionnaire and return it to the investigators using addressed, postage-paid envelopes included with the questionnaire. Reminders were sent to non-respondents at 2, 5, and 9 weeks after the original mail-out. Replacement questionnaires accompanied the reminder letters at weeks 5 and 9. Prior to the final mailing at week 9, the offices of non-respondents were telephoned to verify their address and receipt of previously sent questionnaires. They (or their secretaries) were informed that an additional questionnaire would be sent which they would receive shortly, and that this was the last time the questionnaire would be sent to them.
**Figure 1: Survey Timeline**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Pre-survey letter sent</td>
</tr>
<tr>
<td>1 week</td>
<td>Questionnaire sent</td>
</tr>
<tr>
<td>2 weeks</td>
<td>Reminder note sent to non-respondents</td>
</tr>
<tr>
<td>5 weeks</td>
<td>Reminder letter and questionnaire sent to non-respondents</td>
</tr>
<tr>
<td>8 weeks</td>
<td>Phone call made to non-respondents to verify correct mailing address and receipt of previous questionnaire</td>
</tr>
<tr>
<td>9 weeks</td>
<td>Reminder letter and final questionnaire sent to non-respondents</td>
</tr>
</tbody>
</table>

The physicians' names did not appear on any of the data forms. When a respondent returned a completed questionnaire, a coded tear-off ID card was separated from the questionnaire booklet by a clerical person who did not have access to the master list of code numbers that were assigned to each physician prior to mail-out.
V. DATA ANALYSIS PLAN

The questionnaire data were coded, stored, and analyzed by the Macintosh Statview Statistical Program (1992). For clarity, the data analytic plan is described for each of the study's research questions.

A. RESEARCH QUESTION 1

The first research question is concerned with describing the respondents' self-reports of their current approach to asthma management. Therefore, for the full study group of physicians as well as the two subgroups (specialists and family physicians), frequency distributions, measures of central tendency, and measures of dispersion were computed for their treatment action judgements, approach to providing asthma education, and the usual and ideal levels of patient involvement.

a) Treatment Action Judgements

Physician agreement and disagreement regarding the various treatment actions was assessed in a manner similar to that proposed by Rand (Brook et al., 1986; Park et al., 1986). For each treatment action, in each of the six asthma profiles, we determined if physicians agreed or disagreed with recommending or not recommending its use. Thus, for a particular action, there could be physician agreement for recommending its use, agreement for not recommending its use, or disagreement on its recommendation status. Agreement was defined as: at least 75% of physicians must have indicated that they would either recommend or not recommend the particular treatment action. By default, areas of disagreement emerged when less than 75% of the physicians indicated they would either recommend or not recommend a particular treatment. This assessment was carried out for the full study group and for each of the physician subgroups.
b) Approach to Providing Asthma Education

Respondents were asked about their level of provision for nine asthma education activities to patients with mild, moderate, and severe asthma. Specifically, the respondent for each of the education activities and for each level of severity, selected a response category which most closely reflected his/her usual approach to providing information. The response categories and their corresponding raw score were: (1) “I do not provide this information”, worth 1 point; (2) “I only provide this information if the patient asks”, worth 2 points; and (3) “I provide this information without waiting for the patient to ask”, worth 3 points. This scale can be considered to represent increasing provision of information. Summative scores for education provision were computed for each level of severity (mild, moderate, and severe) and also to indicate overall provision. The summative score for each level of severity was determined by adding the response points for the nine educational activities for that particular severity level (potential range of 9-27). The overall education provision score was computed by adding the summative scores for each of the three severity levels (potential range of 27-81).

c) Scores for Level of Patient Involvement

This scale consisted of five descriptive sentences ranging from preferring the physician to assume primary responsibility for decision making (score = 1) to that of preferring the patient to do so (score = 5), yielding scores ranging from 1-5. Since this scale format was used for determining both the usual and ideal levels of patient involvement, two scores were obtained for each respondent.
B. RESEARCH QUESTION 2

Differences between family physicians and specialists were explored in terms of their:
(1) treatment judgements for each asthma profile; (2) provision of asthma education activities; and (3) usual and ideal level of patient involvement in asthma management decisions.

a) Treatment Action Judgements

For each asthma profile and each treatment action, we computed the frequency of respondents in each physician group who provided a “yes” response, then used chi-square tests to assess subgroup differences in recommendations for using the different asthma medications. With this approach, we could detect whether, for example, family physicians recommended the use of inhaled corticosteroids as frequently as did the specialists.

b) Scores for Education Provision

Summary scores reflecting the usual approach to providing asthma education activities were computed for: (a) the activities provided given each asthma severity level (ranged from 9 to 27); and (b) the physicians’ overall approach to providing asthma information, taking into account all three levels of severity (ranged from 27 to 81). Unpaired t-tests were used to determine if there were subgroup differences in the three severity level scores, as well as in the overall score (ie. four unpaired t-tests). We also used repeated measures analysis of variance to determine whether education provision scores were related to the level of asthma severity.

c) Scores for Level of Patient Involvement

The respondents’ scores for both “usual” and “ideal” level of patient involvement ranged ordinally from 1 to 5. Mann-Whitney U tests were used to determine if there were subgroup differences in reports of “usual” and “ideal” level of patient involvement.
C. RESEARCH QUESTION 3

The last research question explored physicians’ recommended treatment actions in terms of their consistency with the published guidelines for treating asthma and whether the two subgroups of physicians differed in degree of consistency.

- **Physicians’ Treatment Consistency with Published Guidelines**

  Computing consistency with guidelines tallies involved identifying, for each profile, the treatment action designated as the first priority action, which was then assessed for consistency with the published guidelines. If the first priority action was consistent, one count was tallied and if the action was inconsistent, a count of zero was assigned. However, after receiving completed questionnaires, we observed that some physicians selected more than one first priority action. We therefore modified the tally system to include partial consistency represented as a tally count of 0.5 point. This issue will be discussed further in Chapter III.

  Then, for each profile, Mann-Whitney U tests were used to detect subgroup differences. For instance, perhaps the family physicians were more consistent with the guidelines for Profiles A, D, and E but the specialists were more consistent for Profiles B, C, and F.

  Also, a score representing a participant’s overall consistency with guidelines was computed by adding the consistency tallies for each of the six asthma profiles. Therefore, a physician’s overall consistency score could range from 0-6. The unpaired t-test was then used to detect subgroups differences in physicians’ overall consistency scores. This analytic step would indicate, in general, which physician subgroup tended to be more consistent with the guidelines over all six profiles.
CHAPTER III: RESULTS

- **Interim Summary**

  Data collection occurred over a five month period (September, 1994 to January, 1995). The results of the study are presented in five sections. The first section outlines the characteristics of the physician sample. Sections 2-4 present the data on the physicians' self reports of recommended treatment for the six asthma profiles, self reports of asthma education activities provided to patients, and reported levels of patient participation in management decisions, and are organized according to Research Questions 1 and 2. Therefore, descriptive statistics are presented first for both the full study group and the two subgroups (family physicians and specialists), followed by the differences between the two subgroups. The fifth section addresses Research Question 3, which explores the degree of consistency between the physicians' reported asthma management and the published Canadian asthma management guidelines.

I. CHARACTERISTICS OF THE SAMPLE

  Letters were sent to 230 Ontario physicians (127 family physicians and 103 specialists) asking for their participation in this study (Figures 2-3). Of these 230, 27 were found to be ineligible because they had moved out of the province or country, were on sabbatical, had their medical license suspended, or were not caring for individuals with asthma. The remaining 203 were assumed to be eligible. From these 203 we received 163 completed questionnaires; thus our overall response rate was 80.3% (163/203).

  The response rate for the family physicians was 77.7%. From the original 127 family physicians who were sent letters, 24 were found to be ineligible because they had moved or were not treating patients with asthma. We received 80 completed questionnaires from family
physicians. The remaining 23 physicians left unaccounted for were presumed to be eligible. (Refer to Figure 2).

The response rate for the specialists was 83.0%. Letters were sent to 103 potential participants. From these 103 specialists, 3 were ineligible because they had moved, were on sabbatical, or had their medical license suspended. From the remaining 100 potential participants, 83 returned completed questionnaires and 17 did not respond but were assumed to be eligible. (Refer to Figure 3).

Table 1 displays the demographic and practice characteristics for the entire sample and for the two specialty subgroups. There was virtually equal representation of family physicians and specialists who managed individuals with asthma (80 and 83 in number, respectively). The mean age of the full sample was 46.3 years (standard deviation (SD) = 9.5). The majority of the participants were male (81.6%). Overall, physicians in academic practices (29.0%), community-based group practices (31.5%), and community-based solo practices (39.5%) were approximately equally represented. The majority of participants (72%) had been in medical practice for more than 10 years. One-third of the physicians had a health care professional to assist them with the care and/or education of asthma patients.

While the mean ages and male/female ratio of the two subgroups were similar, the subgroups were different in a number of other respects. The family physicians had been in medical practice for a longer time (U=2482.0; z = 2.78; p=0.005) than the specialists, which is partially explained by the selection scheme used for family physicians (those in practice for five or more years). Specialists, on the other hand, were more likely to have an office assistant than were family physicians (χ² = 12.69; p=0.0004). Specialists and family physicians also tended to be in different types of medical practices; family physicians were typically associated with a community group practice and specialists were more likely to be affiliated with a university or be in solo practice (χ² = 61.58; p=0.0001).
Figure 2 Response Rate for Family Physician Subgroup

127 Family Physicians Sent Questionnaires

24 ineligible: 3 moved
21 not treating asthma

103 Potentially Eligible Participants

23 non-respondents (assumed eligible)

80 Returned Completed Questionnaires  Overall response rate = 77.7%

Figure 3 Response Rate for Specialty Subgroup

103 Specialists Sent Questionnaires

3 ineligible: 1 moved
1 sabbatical
1 license suspended

100 Potentially Eligible Participants

17 non-respondents (assumed eligible)

83 Returned Completed Questionnaires  Overall response rate = 83.0%
Table 1: Demographic and Practice Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Total (n=163)</th>
<th>Family Physician (n=80)</th>
<th>Specialist (n=83)</th>
<th>statistic p value (between subgroups)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age: mean, SD</strong></td>
<td>46.3 ± 9.5</td>
<td>46.9 ± 9.6</td>
<td>45.7 ± 9.3</td>
<td>t = 0.848</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.398</td>
</tr>
<tr>
<td><strong>Sex: no., (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>133 (81.6)</td>
<td>61 (76.3)</td>
<td>72 (86.7)</td>
<td>χ² = 2.99</td>
</tr>
<tr>
<td>Female</td>
<td>30 (18.4)</td>
<td>19 (23.7)</td>
<td>11 (13.3)</td>
<td>0.084</td>
</tr>
<tr>
<td><strong>Practice type: no., (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>47 (29.0)</td>
<td>4 (5.1)</td>
<td>43 (51.8)</td>
<td>χ² = 61.58</td>
</tr>
<tr>
<td>Community- group</td>
<td>51 (31.5)</td>
<td>44 (55.7)</td>
<td>7 (8.4)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Community- solo</td>
<td>64 (39.5)</td>
<td>31 (39.2)</td>
<td>33 (39.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(n=162)</td>
<td>(n=79)</td>
<td>(n=83)</td>
<td></td>
</tr>
<tr>
<td><strong>Years in practice: no., (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>46 (28.2)</td>
<td>12 (15.0)</td>
<td>34 (41.0)</td>
<td>U = 2482.0</td>
</tr>
<tr>
<td>11-20</td>
<td>67 (41.1)</td>
<td>40 (50.0)</td>
<td>27 (32.5)</td>
<td>z = 2.78</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>50 (30.7)</td>
<td>28 (35.0)</td>
<td>22 (26.5)</td>
<td>0.005</td>
</tr>
<tr>
<td><strong>Nurse or other assistant: no., (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td>χ² = 12.69</td>
</tr>
<tr>
<td></td>
<td>57 (35.6)</td>
<td>17 (21.8)</td>
<td>40 (48.8)</td>
<td>0.0004</td>
</tr>
<tr>
<td></td>
<td>(n=160)</td>
<td>(n=78)</td>
<td>(n=82)</td>
<td></td>
</tr>
</tbody>
</table>
Tables 2 and 3 describe some of the asthma related features of the respondents’ practices. On average, these physicians reported that 19.4% of their practice was dedicated to patients with asthma, and that 36 asthma patients were seen per month. The majority of the physicians’ asthma practice was spent managing patients with mild (40.8%) and moderate disease (37.7%). The majority of participants (69.0%) attended an asthma conference or seminar at least once a year. One-third of the respondents reported ever experiencing asthma-like symptoms.

As anticipated, there were significant differences between the subgroups with regards to asthma practice characteristics. Compared to family physicians, a larger percentage of specialists’ practices was dedicated to managing asthma (29% versus 8%, t = 9.9; p< 0.0001), and they also saw more asthma patients per month (48 versus 23, t = 4.5; p< 0.0001). An analysis of variance revealed that the family physicians followed proportionally more patients with mild asthma and fewer patients with moderate and severe asthma than did the specialists, (F = 47.2; p< 0.0001). Specialists also attended more asthma conferences or seminars than did family physicians (U = 1587; z = 5.3; p< 0.0001). Specialists more frequently reported having experienced asthma-like symptoms, but this did not reach statistical significance.

II. ASTHMA PROFILES & TREATMENT JUDGEMENTS: AREAS OF AGREEMENT & DISAGREEMENT

For each of six different asthma patient profiles, physicians indicated whether they would or would not recommend some or all of the following treatment actions: (1) use of inhaled β2 agonists (either initiation of medication or adjustment of dose); (2) initiation of inhaled ipratropium bromide (Atrovent); (3) use of inhaled corticosteroids (either initiation of medication or adjustment of dose); (4) initiation of a non-steroidal anti-inflammatory (ketotifen, cromoglycate, or nedocromil); (5) initiation of a theophylline preparation; (6) initiation of an oral corticosteroid preparation; (7) initiation of a course of oral antibiotics; (8) option of waiting
Table 2: Asthma Related Practice Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Total (mean, SD)</th>
<th>Family Physicians (mean, SD)</th>
<th>Specialists (mean, SD)</th>
<th>statistic p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of practice treating asthma</td>
<td>19.4 ± 16.8</td>
<td>8.0 ± 8.7</td>
<td>29.2 ± 16.0</td>
<td>t = 9.89 p&lt;0.0001</td>
</tr>
<tr>
<td>no. of asthma patients/month</td>
<td>36.2 ± 36.3</td>
<td>23.0 ± 19.1</td>
<td>48.1 ± 43.5</td>
<td>t = 4.49 p&lt;0.0001</td>
</tr>
<tr>
<td>% with mild asthma</td>
<td>40.8 ± 26.5</td>
<td>60.3 ± 19.1</td>
<td>22.7 ± 18.1</td>
<td>F = 47.2 p&lt;0.0001</td>
</tr>
<tr>
<td>% with moderate asthma</td>
<td>37.7 ± 18.9</td>
<td>28.3 ± 12.3</td>
<td>46.5 ± 19.8</td>
<td></td>
</tr>
<tr>
<td>% with severe asthma</td>
<td>20.7 ± 19.4</td>
<td>11.3 ± 12.4</td>
<td>29.4 ± 20.7</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Respondents' Attendance at Asthma Seminars and Personal Experience with Asthma Symptoms

<table>
<thead>
<tr>
<th></th>
<th>Total no., (%) (n=158)</th>
<th>Family Physicians no., (%) (n=78)</th>
<th>Specialists no., (%) (n=80)</th>
<th>statistic p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance at asthma seminars/ conferences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- less than 1/ year</td>
<td>49 (31.0)</td>
<td>36 (46.2)</td>
<td>13 (16.3)</td>
<td>U = 1587 z = 5.33</td>
</tr>
<tr>
<td>- 1-4/ year</td>
<td>97 (61.4)</td>
<td>40 (51.3)</td>
<td>57 (71.3)</td>
<td></td>
</tr>
<tr>
<td>- more than 4/ year</td>
<td>12 (7.6)</td>
<td>2 (2.6)</td>
<td>10 (12.5)</td>
<td></td>
</tr>
<tr>
<td>Personal experience with asthma symptoms</td>
<td>52 (33.0)</td>
<td>21 (26.9)</td>
<td>31 (38.8)</td>
<td>χ² = 2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.114</td>
</tr>
</tbody>
</table>
and seeing; and (9) an outpatient visit (i.e. seeking medical attention on the same day either in the Emergency Department (ED) or as a doctor’s office appointment). Areas of agreement and disagreement were identified from the raw data, using the Rand approach (Brook et al., 1986). Given a particular asthma profile and a particular treatment action, when 75% or more of the participants provided the same recommendation status, that is 75% either indicated that “Yes, I would recommend...” or “No, I would not recommend...”, they were considered to be in agreement. By corollary, the areas of disagreement are those in which fewer than 75% of the participants provided the same recommendation status.

In the next 4 subsections (A-D), the data distributions for the treatment judgments are presented in detail. Subsection A describes the agreement and disagreement patterns for each profile. Subsection B describes the agreement and disagreement patterns for each action across profiles. Subsection C applies inferential statistics to evaluate between subgroup differences in recommendation patterns. Finally in subsection D, all agreement/disagreement patterns and differences between subgroups are summarized.

A. ASTHMA PROFILES: AGREEMENT AND DISAGREEMENT FOR EACH PROFILE

In this subsection, each profile is examined in terms of agreement (either to recommend or to not recommend) and disagreement regarding treatment actions, for the full study group and for each of the subgroups. See Tables 4a-4f. In these tables, cells in which agreement to recommend or not recommend an action was observed are presented in bold type.

a) Asthma Profile A (Table 4a)

This profile describes a case of mild asthma in which the individual experienced brief asthma symptoms in response to strenuous activity.

• Agreement

Overall, the physicians agreed to either recommend or not recommend each of the potential treatment actions. The dominant action recommended for management of this asthma
profile was the initiation of an inhaled β2 agonist and there was agreement to not recommend starting inhaled ipratropium, an inhaled steroid, a non-steroidal anti-inflammatory, an oral theophylline or a same day outpatient visit (to the office or an Emergency Department (ED)).

- **Disagreement**

  In the total sample and in the specialist subgroup, no area of disagreement emerged; however, the family physician subgroup disagreed about recommending an outpatient visit.

b) **Asthma Profile B** (Table 4b)

  This profile describes a patient experiencing a mild-moderate exacerbation as demonstrated by an increased use of inhaled β2 agonist from once or twice a day to four to six times a day. Compared with Asthma Profile A, greater variation in agreement/disagreement was observed.

- **Agreement**

  Overall, the physicians tended to be in agreement to either recommend or not recommend the potential treatment actions. The dominant agreed upon recommended treatment action was the initiation of an inhaled corticosteroid. There was agreement to not recommend starting ipratropium, a non-steroidal anti-inflammatory, an oral theophylline preparation, an oral corticosteroid, or to wait and see. The subgroups’ agreement patterns were consistent with the full study group’s pattern with one exception.

- **Disagreement**

  Overall, the physicians disagreed about increasing the dose of an inhaled β2 agonist and the use of an outpatient visit. Family physicians were almost twice as likely as specialists to recommend a same day outpatient visit. The subgroups’ disagreement patterns were similar to these overall observations. However, the family physicians were also in disagreement regarding the use of ipratropium. As a group they were more likely to recommend its use in this situation than specialists.
Table 4a: Treatment Judgements for Asthma Profile A (mild): Percent Distributions for Actions Recommended/ Not Recommended

<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample (%)</th>
<th>Family Physicians (%)</th>
<th>Specialists (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recommend</td>
<td>Not Recommend</td>
<td>Recommend</td>
</tr>
<tr>
<td>Start inh. β₂ agonist</td>
<td>91.4</td>
<td>8.6</td>
<td>90.0</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>5.5</td>
<td>94.5</td>
<td>6.3</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>14.7</td>
<td>85.3</td>
<td>16.3</td>
</tr>
<tr>
<td>Add non-steroidal anti-inflammatory *</td>
<td>9.9</td>
<td>90.1</td>
<td>10.0</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>1.2</td>
<td>98.8</td>
<td>2.5</td>
</tr>
<tr>
<td>Wait and See</td>
<td>7.4</td>
<td>92.6</td>
<td>10.0</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>17.8</td>
<td>82.2</td>
<td>28.8</td>
</tr>
</tbody>
</table>

*1 data point missing for total sample and specialist group
Table 4b: Treatment Judgements for Asthma Profile B (mild to moderate exacerbation): Percent Distributions for Actions Recommended/Not Recommended

<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample (%)</th>
<th>Family Physicians (%)</th>
<th>Specialists (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recommend</td>
<td>Not Recommend</td>
<td>Recommend</td>
</tr>
<tr>
<td>Increase inh. β2 agonist</td>
<td>32.5</td>
<td>67.5</td>
<td>27.5</td>
</tr>
<tr>
<td>Start Atrovent *</td>
<td>16.7</td>
<td>83.3</td>
<td>27.8</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>87.7</td>
<td>12.3</td>
<td>87.5</td>
</tr>
<tr>
<td>Add non-steroidal anti-inflammatory</td>
<td>13.5</td>
<td>86.5</td>
<td>16.3</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>3.7</td>
<td>96.3</td>
<td>7.5</td>
</tr>
<tr>
<td>Start oral corticosteroid</td>
<td>10.4</td>
<td>89.6</td>
<td>5.0</td>
</tr>
<tr>
<td>Wait and See</td>
<td>0.6</td>
<td>99.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>50.3</td>
<td>49.7</td>
<td>63.8</td>
</tr>
</tbody>
</table>

* 1 data point missing for total sample and family physician group
c) **Asthma Profile C** (Table 4c)

This profile describes an individual experiencing a moderate to severe exacerbation. Specifically, the patient had increasing symptoms over the past three days and used his/her inhaled $\beta_2$ agonist every 1-2 hours.

- **Agreement**

  Overall, the physicians' dominant recommended action was a same day outpatient visit and agreed not to recommend increasing the inhaled $\beta_2$ agonist, adding a non-steroidal anti-inflammatory, starting theophylline, or waiting and seeing. The family physicians' and specialists' had comparable agreement patterns except that the family physicians agreed to recommend starting an inhaled steroid, whereas the specialists agreed to start a course of oral corticosteroids. In addition, specialists also agreed to not recommend ipratropium.

- **Disagreement**

  Overall, the physicians disagreed about starting ipratropium bromide, starting inhaled corticosteroids or oral corticosteroids. However, as noted above, these disagreement patterns were not consistent when the subgroups were examined separately.

d) **Asthma Profile D** (Table 4d)

This profile described a rapid-onset severe exacerbation. The patient was described as experiencing a sudden onset of severe asthma symptoms which were incompletely relieved by his/her inhaled $\beta_2$ agonist and only able to speak two to three words before needing to take another breath. This asthma profile was associated with a diverse range of opinions regarding recommendations for treatment.

- **Agreement**

  Overall, the physicians' dominant recommended action was a same day outpatient visit to the Emergency Department or the doctor's office, and the treatment actions agreed upon as not recommend were adding a non-steroidal anti-inflammatory, starting a theophylline
preparation, or waiting and seeing. The two subgroups’ agreement patterns were consistent with those observed overall.

- **Disagreement**

  Overall, the physicians disagreed about the actions of increasing the dose of the inhaled \( \beta_2 \) agonist, starting ipratropium, starting an inhaled steroid, and starting a course of oral corticosteroids. The disagreement patterns for the subgroups were consistent with this overall picture.

  e) **Asthma Profile E** (Table 4e)

  This profile describes a patient who has been chronically undertreated with a low-dose inhaled corticosteroid and an inhaled \( \beta_2 \) agonist on an “as needed” basis.

- **Agreement**

  Overall, the physicians’ dominant recommended action was to increase the current dose of the inhaled corticosteroid. They also agreed to not recommend the actions of adding a non-steroidal anti-inflammatory, starting theophylline, starting a course of oral corticosteroids, a same day outpatient visit, or waiting and seeing. The specialists subgroups agreement pattern was comparable with the overall agreement pattern. Specialists also agreed to not recommend starting inhaled ipratropium or increasing the dose of inhaled \( \beta_2 \) agonist. However, the family physicians subgroup differed from the full group pattern.

- **Disagreement**

  Overall, the physicians disagreed about the actions of increasing the use of the inhaled \( \beta_2 \) agonist and starting ipratropium. However, when the subgroups’ patterns of disagreement are examined, variances from the overall picture become apparent. The subgroup of family physicians disagreed about five of the actions (ie. increasing the inhaled \( \beta_2 \) agonist, starting ipratropium, adding a non-steroidal anti-inflammatory, and an outpatient visit) while the specialists did not disagree about any of the treatment actions.
Table 4c: Treatment Judgements for Asthma Profile C (moderate, slow-onset exacerbation): Percent Distributions for Actions Recommended/Not Recommended

<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample (%)</th>
<th>Family Physicians (%)</th>
<th>Specialists (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recommend</td>
<td>Not Recommend</td>
<td>Recommend</td>
</tr>
<tr>
<td>Increase inh. β2 agonist</td>
<td>14.1</td>
<td>85.9</td>
<td>10.0</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>32.7</td>
<td>67.3</td>
<td>40.5</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>71.8</td>
<td>28.2</td>
<td>76.3</td>
</tr>
<tr>
<td>Add non-steroidal anti-inflammatory**</td>
<td>9.3</td>
<td>90.7</td>
<td>18.0</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>12.9</td>
<td>87.1</td>
<td>21.3</td>
</tr>
<tr>
<td>Start oral corticosteroid*</td>
<td>67.3</td>
<td>32.7</td>
<td>53.8</td>
</tr>
<tr>
<td>Wait and See</td>
<td>0.6</td>
<td>99.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td><strong>80.4</strong></td>
<td>19.6</td>
<td>78.8</td>
</tr>
</tbody>
</table>

* 1 data point missing for total sample and specialist group
** 2 data points missing for total sample and family physician subgroup
Table 4d: Treatment Judgements for Asthma Profile D (severe, rapid-onset exacerbation): Percent Distributions for Actions Recommended/Not Recommended

<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample (%)</th>
<th>Family Physicians (%)</th>
<th>Specialists (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recommend</td>
<td>Not Recommend</td>
<td>Recommend</td>
</tr>
<tr>
<td>Increase inh. $\beta_2$ agonist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>42.3</td>
<td>57.7</td>
<td>33.8</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>34.4</td>
<td>65.6</td>
<td>32.5</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40.5</td>
<td>59.5</td>
<td>43.8</td>
</tr>
<tr>
<td>Add non-steroidal anti-inflammatory</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.7</td>
<td>96.3</td>
<td>7.5</td>
</tr>
<tr>
<td>Start theophylline*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.3</td>
<td>88.7</td>
<td>19.0</td>
</tr>
<tr>
<td>Start oral corticosteroid**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>65.2</td>
<td>34.8</td>
<td>56.4</td>
</tr>
<tr>
<td>Wait and See</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>99.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>93.3</td>
<td>6.7</td>
<td>93.8</td>
</tr>
</tbody>
</table>

* 3 data points missing from total sample: 1 from family physician group & 2 from specialists
** 2 data points missing from total sample and family physician group
Table 4e: Treatment Judgements for Asthma Profile E (chronically undertreated): Percent Distributions for Actions Recommended/Not Recommended

<table>
<thead>
<tr>
<th></th>
<th>Total Sample (%)</th>
<th>Family Physicians (%)</th>
<th>Specialists (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recommend</td>
<td>Not Recommend</td>
<td>Recommend</td>
</tr>
<tr>
<td>Increase inh. β₂ agonist*</td>
<td>25.9</td>
<td>74.1</td>
<td>38.0</td>
</tr>
<tr>
<td>Start Atrovent**</td>
<td>33.5</td>
<td>66.5</td>
<td>42.3</td>
</tr>
<tr>
<td>Increase inh. steroid*</td>
<td>80.9</td>
<td>19.1</td>
<td>70.9</td>
</tr>
<tr>
<td>Add non-steroidal anti-inflammatory**</td>
<td>23.6</td>
<td>76.4</td>
<td>32.0</td>
</tr>
<tr>
<td>Start theophylline**</td>
<td>14.9</td>
<td>85.1</td>
<td>17.9</td>
</tr>
<tr>
<td>Start oral corticosteroid</td>
<td>12.9</td>
<td>87.1</td>
<td>17.5</td>
</tr>
<tr>
<td>Wait and See</td>
<td>1.2</td>
<td>98.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Outpatient visit**</td>
<td>24.2</td>
<td>75.8</td>
<td>37.2</td>
</tr>
</tbody>
</table>

* 1 data point missing from total sample and family physician group

** 2 data points missing from total sample and family physician group
f) **Asthma Profile F (Table 4f)**

This profile describes a patient experiencing an asthma exacerbation associated with an upper respiratory tract infection (URI). (Symptoms of the URI included a productive cough associated with whitish-yellow sputum, sore throat, nasal and sinus congestion, and rhinorrhea.) The patient was described as taking a low dose of an inhaled corticosteroid (400 μg/day) and an inhaled β₂ agonist in a dosage of 2 puffs four times a day (QID) prior to the exacerbation. This profile was associated with a broad range of opinions regarding treatment recommendations.

- **Agreement**

  In contrast to the previous asthma profiles, the physicians did not have a dominant action that they agreed to recommend. Overall, the physicians did agree to **not** recommend the actions of decreasing the dose of inhaled β₂ agonist, starting ipratropium, decreasing the dose of inhaled corticosteroid, adding a non-steroidal anti-inflammatory, starting oral theophylline, or waiting and seeing. The subgroups’ agreement pattern for actions **not** to recommend was generally consistent with this overall picture. However, each of the subgroups had a dominant treatment action to recommend; for the specialists the dominant action was increasing the inhaled corticosteroid dose, and for the family physicians the dominant action was to start a course of oral antibiotics.

- **Disagreement**

  The full study group of physicians disagreed about increasing the dose of inhaled β₂ agonist or inhaled steroid, starting a course of oral corticosteroids or oral antibiotics, and a same day outpatient visit. For both subgroups, the pattern of disagreement was fairly comparable to the overall picture. The family physicians also disagreed on the use of ipratropium, but recommended the use of oral antibiotics. In contrast to the family physicians’ agreement to recommend antibiotics, the specialists disagreed on their use.
Table 4f: Treatment Judgements for Asthma Profile F (exacerbation associated with URI): Percent Distributions for Actions Recommended/Not Recommended

<table>
<thead>
<tr>
<th></th>
<th>Total Sample (%)</th>
<th>Family Physicians (%)</th>
<th>Specialists (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recommend</td>
<td>Not Recommend</td>
<td>Recommend</td>
</tr>
<tr>
<td>Decrease inh. β₂ agonist</td>
<td>3.7</td>
<td>96.3</td>
<td>3.8</td>
</tr>
<tr>
<td>Increase inh. β₂ agonist</td>
<td>33.1</td>
<td>66.9</td>
<td>27.5</td>
</tr>
<tr>
<td>Start Atrovent***</td>
<td>23.1</td>
<td>76.9</td>
<td>28.2</td>
</tr>
<tr>
<td>Decrease inh. steroid</td>
<td>2.5</td>
<td>97.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Increase inh. steroid</td>
<td>71.8</td>
<td>28.2</td>
<td>60.0</td>
</tr>
<tr>
<td>Add non-steroidal anti-inflammatory*</td>
<td>6.8</td>
<td>93.2</td>
<td>12.7</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>8.5</td>
<td>91.5</td>
<td>15.0</td>
</tr>
<tr>
<td>Start oral corticosteroid*</td>
<td>34.0</td>
<td>66.0</td>
<td>26.6</td>
</tr>
<tr>
<td>Start antibiotics</td>
<td>63.2</td>
<td>36.8</td>
<td>78.8</td>
</tr>
<tr>
<td>Wait and See</td>
<td>1.2</td>
<td>98.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>54.0</td>
<td>46.0</td>
<td>72.5</td>
</tr>
</tbody>
</table>

* 1 data point missing from total sample and family physician group

*** 3 data points missing for total sample: 2 family physician group & 1 specialist group
B. TREATMENT JUDGEMENTS: AGREEMENT AND DISAGREEMENT FOR TREATMENT ACTIONS ACROSS PROFILES

In this section, the judgements reported for each treatment action are examined across the six asthma profiles, in terms of areas of agreement to recommend or to not recommend and areas of disagreement (Tables 5a-c). For clarity, these across-profile examinations are first presented for the full study group, then by each subgroup. In these tables, agreement to recommend or to not recommend is indicated with bold type.

a) Full Study Group (Table 5a)

- Use of Inhaled $\beta_2$ Agonists

The action of “starting an inhaled $\beta_2$ agonist” was only provided in Asthma Profile A (mild asthma), and overall agreement to recommend this treatment was observed.

The action of “decreasing the inhaled $\beta_2$ agonist” was available only to Profile F (an exacerbation associated with an URI), and there was overall agreement to not recommend this treatment option.

“Increasing the inhaled $\beta_2$ agonist” was a potential action for Profiles B-F. There was overall agreement to not recommend this action for Profile C. Overall disagreement was observed for the remaining four profiles (B, D, E, F). Overall agreement to recommend this action was not observed for any of the profiles.

In summary, physicians tended to agree that an inhaled $\beta_2$ agonist be started in a patient who experiences asthma symptoms following strenuous activity about twice a week. However, for the options of increasing the dose of inhaled $\beta_2$ agonist across profiles varying in asthma severity, the trends in recommendations are not so clear. Profile F was the only one that included the action of decreasing the dose of inhaled $\beta_2$ agonist which was rejected by 96.4% of respondents.
• **Use of Inhaled Ipratropium Bromide (Atrovent)**

   This action was provided in all six profiles. There was overall agreement to not recommend starting inhaled ipratropium for Profiles A, B, and F, and overall disagreement for Profiles C, D, and E.

   Starting inhaled ipratropium was generally not recommended for treatment especially for mild to moderate asthma. However, for profiles describing more severe asthma, its recommended use increased.

• **Use of Inhaled Corticosteroids**

   The action of “starting an inhaled corticosteroid” was provided in Profiles A through D. There was overall agreement to recommend this action only for Profile B (mild-moderate exacerbation). Overall agreement to not recommend this action was seen for Profile A (mild asthma), while disagreement about starting an inhaled corticosteroid was seen in Profiles C and D, which represented more severe asthma exacerbations.

   The option of “increasing the inhaled corticosteroid” was provided only in Profiles E and F. There was agreement to recommend this action for Profile E (chronically undertreated patient) and disagreement (although a trend towards recommending it) about its use in Profile F (exacerbation associated with an URI).

   “Decreasing the inhaled corticosteroid” was provided only in Profile F, and there was overall agreement to not recommend its use.

• **Adding a Non-steroidal Anti-inflammatory**

   Adding a non-steroidal anti-inflammatory was an action provided to all six profiles and for all six profiles there was overall agreement to not recommend it.

• **Starting Theophylline**

   Starting theophylline was also provided to all six profiles and again, for all six profiles, there was very strong agreement to not recommend its use.
- **Use of Oral Corticosteroids**

  The action of "starting a course of oral corticosteroids" was provided in Profiles B through F. There was overall agreement to not recommend this action for Profiles B (mild to moderate) and E (chronically undertreated), and overall disagreement for its use in the other three profiles (C, D, and F).

  The study physicians never clearly indicated that this would be recommended treatment for any of the profiles, even for the more severe exacerbations. However, the physicians were consistent in their recommendations that this drug should not be used in the more mild to moderate profiles. This treatment action was characterized by the most heterogeneity; physicians disagreed on this action for 3 of the 5 relevant profiles.

- **Start Antibiotics**

  This action was a provided option only for Profile F, and overall disagreement about its use was observed.

- **Waiting and Seeing**

  The action of waiting and seeing (observation only) was included in all six profiles and, for all six profiles, there was agreement to not recommend this action.

- **Outpatient Visit**

  The action of a "same day outpatient visit" (either to the physician's office or the Emergency Department) was included in all six profiles. There was overall agreement to recommend this action for Profiles C and D (those describing severe exacerbations), and overall agreement to not recommend its use in Profiles A (mild) and E (chronically undertreated). The physicians disagreed about the use of this action for Profiles B (mild to moderate) and F (exacerbation associated with an URI).
Table 5a: Treatment Actions Recommended by the Full Study Group, According to Asthma Profile *

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Profile A %</th>
<th>Profile B %</th>
<th>Profile C %</th>
<th>Profile D %</th>
<th>Profile E %</th>
<th>Profile F %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. β₂ agonist</td>
<td>91.4</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Decrease inh. β₂ agonist</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>25.9</td>
<td>33.1</td>
</tr>
<tr>
<td>Increase inh. β₂ agonist</td>
<td>----</td>
<td>32.5</td>
<td>14.1</td>
<td>42.3</td>
<td>33.5</td>
<td>23.1</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>5.5</td>
<td>16.7</td>
<td>32.7</td>
<td>34.4</td>
<td>(54/161)</td>
<td>(37/160)</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>14.7</td>
<td>87.7</td>
<td>71.8</td>
<td>40.5</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Decrease inh. steroid</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>2.5</td>
</tr>
<tr>
<td>Increase inh. steroid</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>80.9</td>
<td>71.8</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>9.9</td>
<td>13.5</td>
<td>9.3</td>
<td>3.7</td>
<td>23.6</td>
<td>6.8</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>1.2</td>
<td>3.7</td>
<td>12.9</td>
<td>11.3</td>
<td>14.9</td>
<td>8.5</td>
</tr>
<tr>
<td>Start oral corticosteroid</td>
<td>----</td>
<td>10.4</td>
<td>67.3</td>
<td>65.2</td>
<td>12.9</td>
<td>34.0</td>
</tr>
<tr>
<td>Start antibiotics</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>63.2</td>
</tr>
<tr>
<td>Wait and See</td>
<td>7.4</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>17.8</td>
<td>50.3</td>
<td>80.4</td>
<td>93.3</td>
<td>24.2</td>
<td>54.0</td>
</tr>
</tbody>
</table>

* Bold values represent an area of agreement (ie. recommend or not recommend).
--- indicates that particular treatment action was not a provided option
(x/x) Denominator used in computing percentages is < 163 due to missing data.
b) Family Physicians (see Table 5b)

- **Use of Inhaled $\beta_2$ Agonists**

  For the action of “starting an inhaled $\beta_2$ agonist,” which was included only in Profile A (mild asthma) agreement among family physicians to recommend this treatment was observed. “Decreasing the inhaled $\beta_2$ agonist” was an option only available to Profile F (an exacerbation associated with an URI), and there was almost uniform agreement that this treatment option should not be recommended.

  “Increasing the inhaled $\beta_2$ agonist” was a possible action for Profiles B-F. There was agreement to not recommend this action for Profile C (slow onset exacerbation). Overall disagreement was observed for the remaining four profiles (B, D, E, and F). Agreement to recommend this action was not observed for any of the profiles.

  Overall, the family physicians agreed that an inhaled $\beta_2$ agonist be started in a patient who experiences asthma symptoms following strenuous activity. However, when the recommendation status for increasing the dose of inhaled $\beta_2$ agonist is examined across the other profiles, there was less consensus.

- **Starting Inhaled Ipratropium Bromide (Atrovent)**

  This option was available for all six profiles. There was agreement to not recommend starting inhaled ipratropium for Profile A, and overall disagreement for the remaining profiles.

  For family physicians, this action was associated with the most heterogeneity. Family physicians disagreed about its use for 5 of the 6 profiles. They did agree that it was not to be used in the profile describing a patient with mild asthma induced by strenuous activity. However, for all of the remaining profiles describing moderate to severe asthma, its recommendation status was less certain.
• **Use of Inhaled Corticosteroids**

The action of "starting an inhaled corticosteroid" was possible in Profiles A through D. Among the family physicians there was agreement to recommend this action for Profiles B (mild to moderate exacerbation) and C (moderate to severe, slow-onset exacerbation), agreement to **not** recommend it for Profile A (mild asthma), and disagreement about its use in Profile D (severe, rapid-onset exacerbation).

"Increasing the inhaled corticosteroid" was an action available to only Profiles E and F. There was disagreement to recommend this action for both Profiles (chronically undertreated an exacerbation associated with an URI) among the family physicians.

"Decreasing the inhaled corticosteroid" was an option available only to Profile F, and there was strong agreement to **not** recommend it.

Although family physicians tended to recommend the use of inhaled corticosteroids in moderate and severe asthma, there was diversity of opinion regarding the dose of these drugs in chronically undertreated asthma, in asthma exacerbated by an URI, and in a severe rapid onset exacerbation.

• **Adding a Non-steroidal Anti-inflammatory**

The action of adding a non-steroidal anti-inflammatory preparation was a consideration for all six profiles and there was general agreement among the family physicians that the option **not** be recommended for use in all profiles except Profile E. For Profile E, a chronically undertreated patient, family physicians disagreed about its recommendation status.

• **Starting Theophylline**

This action was available to all six profiles, and the family physicians agreed that this action was **not** recommended for all six profiles.
• **Starting Oral Corticosteroids**

This action, possible for Profiles B through F, was agreed to be not recommended for Profiles B (mild to moderate) and E (chronically undertreated), while there was disagreement for its use in the other three profiles (C, D, and F).

Note that family physicians never clearly indicated that starting oral corticosteroids was a recommended treatment for any of the profiles, even with the more severe exacerbations. This treatment action was characterized by the most heterogeneity; family physicians disagreed on this action for 3 of the 5 relevant profiles.

• **Start Antibiotics**

The treatment action of starting a course of oral antibiotics was a consideration only in Profile F, and here the family physicians were in agreement that this action should be used to treat the profile.

• **Waiting and Seeing**

This action was possible to all six profiles, and the family physicians strongly agreed that this action was not recommended for all six profiles.

• **Outpatient Visit**

A same day outpatient visit to the physician’s office or the Emergency Department was possible in all six profiles. Family physicians agreed to recommend its use for Profiles C and D, the most severe asthma profiles, and disagreed about its use for the remaining profiles.

The need for a same day office visit was clearly recommended for the more severe profiles; however, for the more mild to moderate profiles there was no clear indication to recommend or not recommend this action.
Table 5b: Treatment Actions Recommended by Family Physicians, According to Asthma Profile *

<table>
<thead>
<tr>
<th></th>
<th>Profile A</th>
<th>Profile B</th>
<th>Profile C</th>
<th>Profile D</th>
<th>Profile E</th>
<th>Profile F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. $\beta_2$ agonist</td>
<td>90.0</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Decrease inh. $\beta_2$ agonist</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>3.8</td>
</tr>
<tr>
<td>Increase inh. $\beta_2$ agonist</td>
<td>---</td>
<td>27.5</td>
<td>10.0</td>
<td>34.2</td>
<td>38.0</td>
<td>(30/79)</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>6.3</td>
<td>27.8</td>
<td>40.5</td>
<td>32.5</td>
<td>42.3</td>
<td>(33/78)</td>
</tr>
<tr>
<td></td>
<td>28.2</td>
<td>(22/78)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>16.3</td>
<td>87.5</td>
<td>76.3</td>
<td>43.8</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Decrease inh. steroid</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>5.0</td>
</tr>
<tr>
<td>Increase inh. steroid</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>70.9</td>
<td>60.0</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>10.0</td>
<td>16.3</td>
<td>18.0</td>
<td>7.7</td>
<td>32.0</td>
<td>(25/78)</td>
</tr>
<tr>
<td></td>
<td>(14/78)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start theophylline</td>
<td>2.5</td>
<td>7.5</td>
<td>21.3</td>
<td>19.0</td>
<td>17.9</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>(15/79)</td>
<td></td>
<td></td>
<td>(14/78)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start oral corticosteroid</td>
<td>---</td>
<td>5.0</td>
<td>53.8</td>
<td>56.4</td>
<td>17.5</td>
<td>26.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(44/78)</td>
<td></td>
<td>(21/79)</td>
</tr>
<tr>
<td>Start antibiotics</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>78.8</td>
</tr>
<tr>
<td>Wait and See</td>
<td>10.0</td>
<td>0.0</td>
<td>1.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>28.8</td>
<td>63.8</td>
<td>78.8</td>
<td>93.8</td>
<td>37.2</td>
<td>72.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(29/78)</td>
<td></td>
</tr>
</tbody>
</table>

* Bold values represent an area of agreement (ie. recommend or not recommend).
--- indicates that particular treatment action was not a provided option
(x/x) In some cells the denominator used in computing percentages is < 80 due to missing data.
c) Specialists (Table 5c)

- **Use of Inhaled $\beta_2$ Agonists**

  The action of “starting an inhaled $\beta_2$ agonist” was possible only in Asthma Profile A (mild asthma), and agreement to recommend this treatment was observed among the specialists.

  The action of “decreasing the inhaled $\beta_2$ agonist” was possible only in Profile F (an exacerbation associated with an URI), and there was agreement to not recommend this treatment option.

  “Increasing the inhaled $\beta_2$ agonist” was a possible action for Profiles B-F. There was agreement to not recommend this action for Profiles C (slow onset exacerbation), and E (chronically undertreated). Disagreement was observed for the remaining three profiles (B, D and F). Agreement to recommend this action was not observed for any of the profiles.

- **Starting Inhaled Ipratropium Bromide (Atrovent)**

  This action was possible in all six profiles. There was agreement to not recommend its use for Profiles A, B, C, E, and F, and disagreement for D. Specialists did not agree to recommend this action for any of the profiles.

  For the most part, specialists agreed that it should not be recommended; however, they were more uncertain regarding its use in the profiles describing a severe rapid onset asthma exacerbation.

- **Use of Inhaled Corticosteroids**

  The action of “starting an inhaled corticosteroid” was available in Profiles A through D. There was agreement to recommend this action for Profile B (mild-moderate exacerbation), agreement to not recommend it for Profile A (mild asthma), and disagreement about its use in Profiles C (moderate-severe, slow-onset exacerbation) and D (severe, rapid-onset exacerbation).
“Increasing the inhaled corticosteroid” was a consideration for Profiles E and F and there was agreement to recommend this action for both profiles.

“Decreasing the inhaled corticosteroid” was available only to Profile F, and none of the specialists recommended this approach.

Specialists tended to recommend the use of increasing the dose of inhaled corticosteroids for moderate asthma, and to differ in their opinions regarding initiating their use when the profiles described more severe asthma exacerbations.

- **Adding a Non-steroidal Anti-inflammatory**
  Adding a non-steroidal anti-inflammatory preparation was a consideration for all six profiles and, for all six profiles, there was strong agreement among specialist to **not** recommend this action.

- **Starting Theophylline**
  Strong agreement to **not** recommend starting theophylline was consistent among the specialists for all six profiles.

- **Use of Starting Oral Corticosteroids**
  "Starting a course of oral corticosteroids “was considered in Profiles B through F. There was agreement to recommend this action for Profile C (moderate to severe, slow-onset exacerbation), agreement to **not** recommend this action for Profiles B (mild to moderate) and E (chronically undertreated), and disagreement for its use in the other two profiles (D: severe and F: exacerbation associated with an URI).

  Specialists agreed not to recommend the use of oral corticosteroids in milder asthma but were less certain about its use for profiles describing exacerbations associated with an URI and for a severe rapid-onset exacerbation.

- **Start Antibiotics**
  The use of oral antibiotics was a consideration only for Profile F and disagreement about its use was observed among specialists.
• **Waiting and Seeing**

  This was a possible action for all six profiles and there was strong agreement to not recommend it. Specialists agreed that all six profiles required some type of action.

• **Outpatient Visit**

  This was a potential option for all 6 profiles. Specialists agreed to recommend the action of a same day outpatient visit to the physician’s office or the Emergency Department for Profiles C and D, the most severe asthma profiles, and agreed to not recommend the action for Profiles A (mild asthma) and E (chronically undertreated). Disagreement about its use was observed for Profiles B (mild-moderate) and F (exacerbation associated with URI).

  A same day visit was recommended by the specialists for profiles describing more severe profiles and less likely to be recommended for the other profiles.
### Table 5c: Treatment Actions Recommended by Specialists, According to Asthma Profile *

<table>
<thead>
<tr>
<th>Treatment Action</th>
<th>Profile A %</th>
<th>Profile B %</th>
<th>Profile C %</th>
<th>Profile D %</th>
<th>Profile E %</th>
<th>Profile F %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. $\beta_2$ agonist</td>
<td>92.8</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Decrease inh. $\beta_2$ agonist</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Increase inh. $\beta_2$ agonist</td>
<td>----</td>
<td>37.3</td>
<td>18.1</td>
<td>50.6</td>
<td>14.5</td>
<td>38.6</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>4.8</td>
<td>6.0</td>
<td>25.3</td>
<td>36.2</td>
<td>25.3</td>
<td>18.3 (15/82)</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>13.3</td>
<td>88.0</td>
<td>67.5</td>
<td>37.3</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Decrease inh. steroid</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>0.0</td>
<td>----</td>
</tr>
<tr>
<td>Increase inh. steroid</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>90.4</td>
<td>83.1</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>9.8 (8/82)</td>
<td>10.8</td>
<td>1.2</td>
<td>0.0</td>
<td>15.7</td>
<td>1.2</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>0.0</td>
<td>0.0</td>
<td>4.8</td>
<td>3.7 (3/81)</td>
<td>12.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Start oral corticosteroid</td>
<td>----</td>
<td>15.6</td>
<td>80.5 (66/82)</td>
<td>73.5</td>
<td>8.4</td>
<td>41.0</td>
</tr>
<tr>
<td>Start antibiotics</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>48.2</td>
</tr>
<tr>
<td>Wait and See</td>
<td>4.8</td>
<td>1.2</td>
<td>0.0</td>
<td>1.2</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>7.3</td>
<td>37.3</td>
<td>81.9</td>
<td>92.8</td>
<td>12.0</td>
<td>36.1</td>
</tr>
</tbody>
</table>

* Bold values represent an area of agreement (ie. recommend or not recommend).
--- indicates that particular treatment action was not a provided option
(x/x) In some cells the denominator used to compute percentages is < 83 due to missing data.
C. SUBGROUP DIFFERENCES IN RECOMMENDED TREATMENT

Chi square tests were used to explore subgroup differences in the frequency counts of respondents who recommended each of the treatment actions for the six asthma profiles (Tables 6a-6h). (This analytical step disregards areas of agreement and disagreement.)

- Use of Inhaled β₂ Agonists (Table 6a)

The two subgroups did not statistically differ in their recommendations for the use of an inhaled β₂ agonist for four of the asthma profiles (A, B, C, and F). However, for Profiles D and E, there were significant differences between the subgroups. For Profile D (severe, rapid-onset exacerbation), specialists recommended increasing the dose of the medication more frequently than did family physicians. In comparison, family physicians more frequently recommended increasing the dose of the medication for treating Profile E (chronically undertreated case).

- Starting Inhaled Ipratropium Bromide (Atrovent) (Table 6b)

Family physicians more frequently recommended that inhaled ipratropium be added to the current drug regimen for the treatment of Profiles B (mild-moderate exacerbation), C (moderate-severe exacerbation with a slow onset), and E (chronically undertreated case). There were no significant subgroup differences for the remaining three profiles.

- Use of Inhaled Corticosteroids (Table 6c)

The two subgroups of physicians generally provided comparable responses for the use of inhaled steroids. However, for Asthma Profiles E (chronically undertreated case) and F (an exacerbation associated with an URI), the specialists recommended increasing the dose of the medication more frequently than did the family physicians. However, for Profile F, the family physicians more frequently recommended lowering the dose of inhaled steroids.
Table 6a: Differences Between Family Physicians and Specialists for the Recommended Use of Inhaled $\beta_2$ Agonists

<table>
<thead>
<tr>
<th>Profile</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile A (start drug)</td>
<td>72 (90.0)</td>
<td>77 (92.8)</td>
<td>0.40, p = 0.528</td>
</tr>
<tr>
<td>Profile B (↑ dose)</td>
<td>22 (27.5)</td>
<td>31 (37.3)</td>
<td>1.80, p = 0.180</td>
</tr>
<tr>
<td>Profile C (↑ dose)</td>
<td>8 (10.0)</td>
<td>15 (18.1)</td>
<td>2.19, p = 0.139</td>
</tr>
<tr>
<td>Profile D (↑ dose)</td>
<td>27 (33.8)</td>
<td>42 (50.6)</td>
<td>4.47, p = 0.035</td>
</tr>
<tr>
<td>Profile E† (↑ dose)</td>
<td>30 (37.5)</td>
<td>12 (14.5)</td>
<td>11.66, p = 0.0006</td>
</tr>
<tr>
<td>Profile F (↑ dose)</td>
<td>22 (27.5)</td>
<td>32 (38.6)</td>
<td>2.25, p = 0.134</td>
</tr>
<tr>
<td>Profile F (↓ dose)</td>
<td>3 (3.8)</td>
<td>3 (3.6)</td>
<td>0.002, p = 0.963</td>
</tr>
</tbody>
</table>

† 1 family physician did not respond to Profile E

Table 6b: Differences Between Family Physicians and Specialists for the Recommended Use of Inhaled Ipratropium (Atrovent)

<table>
<thead>
<tr>
<th>Profile</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile A</td>
<td>5 (6.3)</td>
<td>4 (4.8)</td>
<td>0.16, p = 0.689</td>
</tr>
<tr>
<td>Profile B †</td>
<td>22 (27.8)</td>
<td>2 (6.0)</td>
<td>13.88, p = 0.0002</td>
</tr>
<tr>
<td>Profile C †</td>
<td>32 (40.5)</td>
<td>21 (25.3)</td>
<td>4.25, p = 0.039</td>
</tr>
<tr>
<td>Profile D</td>
<td>26 (32.5)</td>
<td>30 (36.2)</td>
<td>0.24, p = 0.624</td>
</tr>
<tr>
<td>Profile E ‡</td>
<td>33 (42.3)</td>
<td>21 (25.3)</td>
<td>5.22, p = 0.020</td>
</tr>
<tr>
<td>Profile F ‡ &amp;</td>
<td>22 (28.2)</td>
<td>15 (18.3)</td>
<td>2.21, p = 0.137</td>
</tr>
</tbody>
</table>

† 1 family physician did not respond to Profiles B & C
‡ 2 family physicians did not respond to Profiles E & F
□ 1 specialist did not respond to Profile F
Table 6c: Differences Between Family Physicians and Specialists for the Recommended Use of Inhaled Corticosteroids

<table>
<thead>
<tr>
<th>Profile A (start drug)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 (16.3)</td>
<td>11 (13.3)</td>
<td>0.29, p = 0.589</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile B (start drug)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 (87.5)</td>
<td>73 (88.0)</td>
<td>0.008, p = 0.930</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile C (start drug)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>61 (76.3)</td>
<td>56 (67.5)</td>
<td>1.55, p = 0.213</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile D (start drug)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 (43.8)</td>
<td>31 (37.3)</td>
<td>0.69, p = 0.405</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile E† (↑ dose)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>56 (70.9)</td>
<td>75 (90.4)</td>
<td>9.92, p = 0.0016</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile F (↑ dose)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 (60.0)</td>
<td>69 (83.1)</td>
<td>10.76, p = 0.0010</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile F (↓ dose)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (5.0)</td>
<td>0 (0.0)</td>
<td>4.25, p = 0.039</td>
<td></td>
</tr>
</tbody>
</table>

† 1 family physician did not respond to Profile E
- **Adding a Non-steroidal Anti-inflammatory** *(Table 6d)*

  Although non-steroidal anti-inflammatories were not commonly recommended, family physicians recommended their use more frequently than specialists, and this difference reached statistical significance for four of the asthma profiles (C, D, E, and F).

- **Starting Theophylline** *(Table 6e)*

  Similar to the use of non-steroidal anti-inflammatories, the addition of an oral theophylline preparation to the current drug regimen was not commonly recommended, although family physicians advised its use more frequently than specialists for each of the profiles. This difference reached statistical significance for Profiles B, C, D, and F.

- **Starting Oral Corticosteroids** *(Table 6f)*

  For four of the five possible asthma profiles, specialists more frequently recommended the use of oral corticosteroids than family physicians did. This difference achieved statistical significance for Profiles B, C, and D.

- **Oral Antibiotics** *(Table 6g)*

  Oral antibiotics for Asthma Profile F were more frequently recommended by family physicians than specialists, with a high level of statistical significance *(p<0.0001).*

- **Waiting and Seeing** *(Table 6h)*

  The option of waiting and seeing was rarely recommended by either physician subgroup and there was no statistical difference between subgroups.

- **Outpatient Visit** *(Table 6i)*

  In general, family physicians recommended that the patient be seen by a physician on the same day more frequently than did specialists. This difference was statistically significant for four of the asthma profiles (A, B, E, and F).
Table 6d: Differences Between Family Physicians and Specialists for the Recommended Use of a Non-steroidal Anti-inflammatory Preparation

<table>
<thead>
<tr>
<th>Profile</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile A †</td>
<td>8 (10.0)</td>
<td>8 (9.8)</td>
<td>0.002, p = 0.959</td>
</tr>
<tr>
<td>Profile B</td>
<td>13 (16.3)</td>
<td>9 (10.8)</td>
<td>1.02, p = 0.313</td>
</tr>
<tr>
<td>Profile C ‡</td>
<td>14 (18.0)</td>
<td>1 (1.2)</td>
<td>13.34, p = 0.0003</td>
</tr>
<tr>
<td>Profile D</td>
<td>6 (7.5)</td>
<td>0 (0.0)</td>
<td>6.63, p = 0.0100</td>
</tr>
<tr>
<td>Profile E ‡</td>
<td>25 (32.0)</td>
<td>13 (15.7)</td>
<td>5.99, p = 0.0144</td>
</tr>
<tr>
<td>Profile F □</td>
<td>10 (12.7)</td>
<td>1 (1.2)</td>
<td>8.39, p = 0.0038</td>
</tr>
</tbody>
</table>

† 1 specialist did not respond to Profile A
‡ 2 family physicians did not respond to Profiles C & E
□ 1 family physician did not respond to Profile F
Table 6e: Differences Between Family Physicians and Specialists for the Recommended Use an Oral Theophylline Preparation

<table>
<thead>
<tr>
<th></th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile A</td>
<td>2 (2.5)</td>
<td>0 (0)</td>
<td>2.10, p = 0.147</td>
</tr>
<tr>
<td>Profile B</td>
<td>6 (7.5)</td>
<td>0 (0)</td>
<td>6.44, p = 0.011</td>
</tr>
<tr>
<td>Profile C</td>
<td>17 (21.3)</td>
<td>4 (4.8)</td>
<td>9.80, p = 0.0017</td>
</tr>
<tr>
<td>Profile D †</td>
<td>15 (19.0)</td>
<td>3 (3.7)</td>
<td>9.36, p = 0.0022</td>
</tr>
<tr>
<td>Profile E ‡</td>
<td>14 (17.9)</td>
<td>10 (12.0)</td>
<td>1.10, p = 0.294</td>
</tr>
<tr>
<td>Profile F</td>
<td>12 (15.0)</td>
<td>2 (2.4)</td>
<td>8.23, p = 0.0041</td>
</tr>
</tbody>
</table>

† 1 family physician and 2 specialists did not respond to Profile D
‡ 2 family physicians did not respond to Profile E

Table 6f: Differences Between Family Physicians and Specialists for the Recommended Use of an Oral Corticosteroid Preparation

<table>
<thead>
<tr>
<th></th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile A</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Profile B</td>
<td>4 (5.0)</td>
<td>13 (15.7)</td>
<td>4.96, p = 0.026</td>
</tr>
<tr>
<td>Profile C †</td>
<td>43 (53.8)</td>
<td>66 (80.5)</td>
<td>13.15, p = 0.0003</td>
</tr>
<tr>
<td>Profile D ‡</td>
<td>44 (56.4)</td>
<td>61 (73.5)</td>
<td>5.17, p = 0.023</td>
</tr>
<tr>
<td>Profile E</td>
<td>14 (17.5)</td>
<td>7 (8.4)</td>
<td>2.98, p = 0.084</td>
</tr>
<tr>
<td>Profile F □</td>
<td>21 (26.6)</td>
<td>34 (41.0)</td>
<td>3.77, p = 0.053</td>
</tr>
</tbody>
</table>

† 1 specialist did not respond to Profile C
‡ 2 family physicians did not respond to Profile D
□ 1 family physician did not respond to Profile F
Table 6g: Differences Between Family Physicians and Specialists for the Recommended Use of an Oral Antibiotic Preparation

<table>
<thead>
<tr>
<th></th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile F</td>
<td>63 (78.8)</td>
<td>40 (48.2)</td>
<td>16.34, p &lt; 0.0001</td>
</tr>
</tbody>
</table>

Table 6h: Differences Between Family Physicians and Specialists for the Recommendation of Wait and See

<table>
<thead>
<tr>
<th></th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile A</td>
<td>8 (10.0)</td>
<td>4 (4.8)</td>
<td>1.60, p = 0.206</td>
</tr>
<tr>
<td>Profile B</td>
<td>0 (0.0)</td>
<td>1 (1.2)</td>
<td>0.97, p = 0.325</td>
</tr>
<tr>
<td>Profile C</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
<td>1.05, p = 0.307</td>
</tr>
<tr>
<td>Profile D</td>
<td>0 (0.0)</td>
<td>1 (1.2)</td>
<td>0.97, p = 0.325</td>
</tr>
<tr>
<td>Profile E</td>
<td>0 (0.0)</td>
<td>2 (2.4)</td>
<td>1.95, p = 0.162</td>
</tr>
<tr>
<td>Profile F</td>
<td>0 (0.0)</td>
<td>2 (2.4)</td>
<td>1.95, p = 0.162</td>
</tr>
</tbody>
</table>

Table 6i: Differences Between Family Physicians and Specialists for the Recommendation of a Same Day Outpatient Visit

<table>
<thead>
<tr>
<th></th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
<th>$\chi^2$ value, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile A</td>
<td>23 (28.8)</td>
<td>6 (7.2)</td>
<td>12.90, p = 0.0003</td>
</tr>
<tr>
<td>Profile B</td>
<td>51 (63.8)</td>
<td>31 (37.3)</td>
<td>11.36, p = 0.0008</td>
</tr>
<tr>
<td>Profile C</td>
<td>63 (78.8)</td>
<td>68 (81.9)</td>
<td>0.26, p = 0.610</td>
</tr>
<tr>
<td>Profile D</td>
<td>75 (93.8)</td>
<td>77 (92.8)</td>
<td>0.062, p = 0.80</td>
</tr>
<tr>
<td>Profile E †</td>
<td>29 (37.2)</td>
<td>10 (12.0)</td>
<td>13.84, p = 0.0002</td>
</tr>
<tr>
<td>Profile F</td>
<td>58 (72.5)</td>
<td>30 (36.2)</td>
<td>21.68, p &lt; 0.0001</td>
</tr>
</tbody>
</table>

† 2 Family physicians did not respond to Profile E
D. SUMMARY: TREATMENT JUDGEMENTS

Having presented the physicians' treatment judgements in detail for each profile as well as across profiles, the general patterns can now be summarized.

a) Areas of Treatment Agreement: Actions Recommended

Tables 7a-c summarize those treatment actions for which agreement to recommend use was observed, for the full study group and for each of the subgroups.

In general, for each of the asthma profiles, agreement to recommend only one treatment action was observed. For Asthma Profiles A, B, and D, the full study group and the two subgroups agreed to recommend the following: (a) Asthma Profile A, an inhaled β2 agonist; (b) Asthma Profile B, initiate the use of an inhaled corticosteroid; and (c) Asthma Profile D, have the patient seen that same day either in the office or in the Emergency Department. For Asthma Profile C, each subgroup agreed to recommend two actions. Family physicians agreed to recommend starting an inhaled corticosteroid and an outpatient visit and specialists agreed to recommend oral corticosteroids and an outpatient visit. For Asthma Profile E, the specialists agreed to recommended increasing the current dose of the inhaled corticosteroid, whereas the family physicians did not agree on a specific action to recommend. For Asthma Profile F, family physicians agreed to recommend a course of antibiotics, while specialists agreed to recommend increasing the dose of inhaled corticosteroid.

b) Areas of Treatment Agreement: Actions Not Recommended

Tables 8a-c summarize those treatment actions for which agreement to not recommend use was observed, for the full study group and for each of the subgroups.

For the six profiles, there was considerable agreement for the actions not recommended for treatment. In general, physicians agreed that the actions of starting an oral theophylline, adding a non-steroidal anti-inflammatory, and waiting and seeing were not recommended across all asthma profiles. Specialists also tended to agree that inhaled ipratropium bromide would not be recommended.
Table 7a: Areas of Treatment Agreement: Actions Recommended by the Entire Sample

<table>
<thead>
<tr>
<th>Action</th>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod, URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. β₂ agonist</td>
<td>✓ (91.4%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Atrovent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td></td>
<td></td>
<td>✓ (87.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td>✓ (80.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start theophylline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start oral steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start antibiotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>✓ (80.4%)</td>
<td>✓ (93.3%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

✓ Indicates an area of agreement for a recommended treatment action
(%) is the percentage of MDs who recommended the treatment

■ Indicates that the particular treatment action was not an option
**Table 7b: Areas of Treatment Agreement: Actions Recommended by Family Physicians**

<table>
<thead>
<tr>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod,URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start inh. β₂ agonist</strong></td>
<td>✓ (90.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start Atrovent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start inh. steroid</strong></td>
<td>✓ (87.5%)</td>
<td>✓ (76.3%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Add non-steroidal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start theophylline</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start oral steroid</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start antibiotic</strong></td>
<td></td>
<td></td>
<td>✓ (78.8%)</td>
<td></td>
<td>✓ (78.8%)</td>
</tr>
<tr>
<td><strong>Outpatient visit</strong></td>
<td>✓ (78.8%)</td>
<td>✓ (93.8%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

✓ Indicates an area of agreement for a recommended treatment action

(%) is the percentage of MDs who recommended the treatment action

■ Indicates that the particular treatment action was not an option
Table 7c: Areas of Treatment Agreement: Actions Recommended by Specialists

<table>
<thead>
<tr>
<th>Treatment Action</th>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod, URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. β₂ agonist</td>
<td>✓ (92.8%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Atrovent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>✓ (88.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ (83.1%)</td>
</tr>
<tr>
<td>↑ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ (90.4%)</td>
<td></td>
</tr>
<tr>
<td>↓ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start theophylline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start oral steroid</td>
<td></td>
<td></td>
<td></td>
<td>✓ (80.5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start antibiotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient visit</td>
<td></td>
<td></td>
<td>✓ (81.9%)</td>
<td>✓ (92.8%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

✓ Indicates an area of agreement for a recommended treatment action  
(%) is the percentage of MDs who recommended the treatment  
ⓘ Indicates that the particular treatment was not an option
Table 8a: Areas of Treatment Agreement: Actions Not Recommended by the Entire Sample

<table>
<thead>
<tr>
<th></th>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod, URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. $\beta_2$ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. $\beta_2$ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. $\beta_2$ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>✓ (94.5%)</td>
<td>✓ (83.3%)</td>
<td></td>
<td></td>
<td></td>
<td>✓ (76.9%)</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>✓ (85.3%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ (97.5%)</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>✓ (90.1%)</td>
<td>✓ (86.5%)</td>
<td>✓ (90.7%)</td>
<td></td>
<td>✓ (96.3%)</td>
<td>✓ (93.2%)</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>✓ (98.8%)</td>
<td>✓ (96.3%)</td>
<td>✓ (87.1%)</td>
<td></td>
<td>✓ (88.7%)</td>
<td>✓ (91.5%)</td>
</tr>
<tr>
<td>Start oral steroid</td>
<td></td>
<td></td>
<td></td>
<td>✓ (89.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start antibiotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait and see</td>
<td>✓ (92.6%)</td>
<td>✓ (99.4%)</td>
<td>✓ (99.4%)</td>
<td></td>
<td>✓ (99.4%)</td>
<td>✓ (98.8%)</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>✓ (82.2%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ (75.8%)</td>
</tr>
</tbody>
</table>

✓ Indicates an area of agreement for not recommending the treatment action

(%) is the percentage of MDs who did not recommend the treatment action

■ Indicates that the particular treatment action was not an option
<table>
<thead>
<tr>
<th></th>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod, URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start inh. β2 agonist</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. β2 agonist</td>
<td></td>
<td></td>
<td>✓ (90.0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. β2 agonist</td>
<td>✓ (93.7%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start Atrovent</strong></td>
<td>✓ (93.7%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start inh. steroid</strong></td>
<td>✓ (83.7%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. steroid</td>
<td>✓ (95.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Add non-steroidal</strong></td>
<td>✓ (90.0%)</td>
<td>✓ (83.7%)</td>
<td>✓ (82.0%)</td>
<td>✓ (92.5%)</td>
<td>✓ (87.3%)</td>
<td></td>
</tr>
<tr>
<td><strong>Start theophylline</strong></td>
<td>✓ (97.5%)</td>
<td>✓ (92.5%)</td>
<td>✓ (78.7%)</td>
<td>✓ (81.0%)</td>
<td>✓ (82.1%)</td>
<td>✓ (85.0%)</td>
</tr>
<tr>
<td><strong>Start oral steroid</strong></td>
<td></td>
<td></td>
<td>✓ (95.0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start antibiotic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wait and see</strong></td>
<td>✓ (90.0%)</td>
<td>✓ (100%)</td>
<td>✓ (98.7%)</td>
<td>✓ (100%)</td>
<td>✓ (100%)</td>
<td>✓ (100%)</td>
</tr>
<tr>
<td><strong>Outpatient visit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

✓ Indicates an area of agreement for not recommending a treatment action

(%) is the percentage of MDs who did not recommend the treatment action

■ Indicates that the particular treatment action was not an option
<table>
<thead>
<tr>
<th>Treatment Action</th>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod, URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. β₂ agonist</td>
<td></td>
<td></td>
<td>✓ (81.9%)</td>
<td></td>
<td>✓ (85.5%)</td>
<td></td>
</tr>
<tr>
<td>↓ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ (96.4%)</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>✓ (95.2%)</td>
<td>✓ (94.0%)</td>
<td>✓ (74.7%)</td>
<td></td>
<td>✓ (74.7%)</td>
<td>✓ (81.7%)</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>✓ (86.7%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ (100%)</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>✓ (90.2%)</td>
<td>✓ (89.2%)</td>
<td>✓ (98.8%)</td>
<td>✓ (100%)</td>
<td>✓ (84.3%)</td>
<td>✓ (98.8%)</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>✓ (100%)</td>
<td>✓ (100%)</td>
<td>✓ (95.2%)</td>
<td>✓ (96.3%)</td>
<td>✓ (88.0%)</td>
<td>✓ (97.6%)</td>
</tr>
<tr>
<td>Start oral steroid</td>
<td></td>
<td></td>
<td>✓ (84.3%)</td>
<td></td>
<td></td>
<td>✓ (91.6%)</td>
</tr>
<tr>
<td>Start antibiotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait and see</td>
<td>✓ (95.2%)</td>
<td>✓ (98.8%)</td>
<td>✓ (100%)</td>
<td>✓ (98.8%)</td>
<td>✓ (97.6%)</td>
<td>✓ (97.6%)</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>✓ (92.8%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ (88.0%)</td>
</tr>
</tbody>
</table>

✓ indicates an area of agreement for not recommending the treatment action

(%) is the percentage of MDs who did not recommend the treatment action

 Indicates that the particular treatment action was not an option
c) **Areas of Treatment Disagreement**

Tables 9a-c summarize those treatment actions for which disagreement was observed, for the full study group and for each of the subgroups.

Several treatment actions were characterized by disagreement regarding their recommendation status (either to recommend or to not recommend). The use of inhaled $\beta_2$ agonists was characterized by disagreement on the part of both family physicians and specialists. This disagreement was associated with determining the dosage of inhaled $\beta_2$ agonists and usually emerged when the profile described a patient who was already taking the medication three or more times a day.

For the full study group and the family physician sub-group, disagreement also characterized the use of ipratropium and inhaled and oral corticosteroids. Disagreement about initiating or increasing the dose of an inhaled corticosteroid and starting a course of oral corticosteroids typically occurred for the same profiles (C, D, and F). This may indicate disagreement not so much for the use of the class of medications (corticosteroids) but rather for the preferred delivery route and associated dose (eg. inhaled versus oral).

In contrast to the specialist subgroup, family physicians disagreed about the recommendation status of a same day outpatient visit in 4 out of the 6 profiles.

In general, there was overall greater disagreement for treatment of the more severe asthma profiles (C, D, F) than for the milder severity profiles (A, B, E). There was disagreement for 44.4% of the option selections in the more severe profiles (12/27) and in only 17.4% of the options for the milder severity profiles (4/23). The family physicians’ responses revealed disagreement about more treatment actions than did specialists’ responses. Respondents assessed a total of 50 treatment actions; family physicians’ responses to 20 of these revealed areas of disagreement (40%), while specialists’ responses revealed 11 areas of disagreement (22%).
Table 9a: Areas of Treatment Action Disagreement by the Entire Sample

<table>
<thead>
<tr>
<th></th>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod, URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. $\beta_2$ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\uparrow$ inh. $\beta_2$ agonist</td>
<td>$\checkmark$ (33/67)</td>
<td>$\checkmark$</td>
<td>$\checkmark$ (42/58)</td>
<td>$\checkmark$</td>
<td>$\checkmark$ (26/74)</td>
<td>$\checkmark$ (33/67)</td>
</tr>
<tr>
<td>$\downarrow$ inh. $\beta_2$ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Atrovent</td>
<td></td>
<td>$\checkmark$</td>
<td>$\checkmark$ (34/66)</td>
<td>$\checkmark$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>$\checkmark$ (72/28)</td>
<td>$\checkmark$</td>
<td></td>
<td>$\checkmark$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\uparrow$ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$\checkmark$ (72/28)</td>
<td></td>
</tr>
<tr>
<td>$\downarrow$ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start theophylline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start oral steroid</td>
<td>$\checkmark$ (67/33)</td>
<td>$\checkmark$</td>
<td></td>
<td></td>
<td>$\checkmark$ (34/66)</td>
<td></td>
</tr>
<tr>
<td>Start antibiotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$\checkmark$ (63/37)</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>$\checkmark$ (50/50)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$\checkmark$ (54/46)</td>
</tr>
</tbody>
</table>

$\checkmark$ Indicates an area of disagreement for a treatment action (n/n) recommended / not recommended split in percentages

Indicates that the particular treatment action was not an option
Table 9b: Areas of Treatment Action Disagreement by Family Physicians

<table>
<thead>
<tr>
<th>Treatment Action</th>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod, URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. β₂ agonist</td>
<td>✓ (28/72)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>✓ (28/72)</td>
<td>✓ (41/59)</td>
<td>✓ (33/68)</td>
<td></td>
<td>✓ (42/58)</td>
<td>✓ (28/72)</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td>✓ (44/56)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ (71/29)</td>
<td>✓ (60/40)</td>
</tr>
<tr>
<td>↓ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓ (32/68)</td>
<td></td>
</tr>
<tr>
<td>Start theophylline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start oral steroid</td>
<td></td>
<td></td>
<td>✓ (54/46)</td>
<td>✓ (56/44)</td>
<td></td>
<td>✓ (27/73)</td>
</tr>
<tr>
<td>Start antibiotic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>✓ (29/71)</td>
<td>✓ (64/36)</td>
<td></td>
<td></td>
<td>✓ (37/63)</td>
<td>✓ (73/27)</td>
</tr>
</tbody>
</table>

✓ Indicates an area of disagreement for a treatment action (n/n) recommended / not recommended split in percentages

 Indicates that the particular treatment was not an option
Table 9c: Areas of Treatment Action Disagreement by Specialists

<table>
<thead>
<tr>
<th>Treatment Action</th>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod, URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Inh. $\beta_2$ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ Inh. $\beta_2$ agonist</td>
<td>✓ (37/63)</td>
<td>✓ (51/49)</td>
<td>✓ (39/61)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ Inh. $\beta_2$ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Atrovent</td>
<td></td>
<td>✓ (36/64)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Inh. steroid</td>
<td>✓ (67/33)</td>
<td>✓ (37/63)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ Inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ Inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start theophylline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start oral steroid</td>
<td></td>
<td>✓ (73/27)</td>
<td>✓ (41/59)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start antibiotic</td>
<td></td>
<td></td>
<td>✓ (48/52)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>✓ (37/63)</td>
<td></td>
<td></td>
<td>✓ (36/64)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

✓ Indicates an area of disagreement for a treatment action recommended / not recommended split in percentage

Indicates that the particular treatment was not an option
d) Differences Between Subgroups for Recommended Use of Treatment

There were differences between subgroups for the use of the medications and medical services. Family physicians recommended the use of oral theophylline preparations, non-steroidal anti-inflammatories, oral antibiotics, and a same day outpatient visit more frequently than did specialists. In contrast, specialists more frequently recommended the use of oral corticosteroids than did family physicians.

III. PROVISION OF PATIENT EDUCATION ACTIVITIES

This section is subdivided into two main sections. The first presents the overall results for physicians' reported provision of educational activities and has three subsections: i) most frequently and infrequently provided actions (Tables 10, 11, 12); ii) differences between family physicians and specialists (Tables 13 -14); and iii) educational activities provided according to asthma severity level (Tables 10-13 and Table 16). The second section then presents the summative scores for the provision of educational activities.

Nine asthma education activities were examined: (1) provision of general asthma information; (2) discussion of medications prescribed; (3) demonstration of the proper use of inhalational devices; (4) provision of information regarding asthma trigger avoidance and environmental control activities; (5) discussion of warning signs of uncontrolled asthma; (6) provision of an asthma action plan based solely on symptoms; (7) discussion of the purpose and proper use of peak flow meters; (8) provision of an action plan based on peak flow rates and symptoms; and (9) provision of a referral to a non-profit community organization for further information about asthma. For each of these nine actions, participants indicated their usual approach to the provision of information to patients with mild, moderate, and severe asthma by selecting one of three response categories. Each response category carried a point value that ranged from 1 to 3. Higher scores indicated more frequent provision of information. For each physician, this point system was used to compute a provision of education score for each level of asthma severity (mild, moderate, and severe) by summing his/her points across
the educational activities; therefore an individual's summed scores could range from 9-27, for each severity level. An overall score for provision of education was also calculated for each respondent by adding the summed scores for each of the three severity levels; these scores could range from 27-81.

A. FREQUENCY DISTRIBUTION OF SELF REPORTS

a) Activities Provided Relatively Frequently and Infrequently

Table 10 presents results from the full study group regarding the self-reported provision of the nine educational activities, according to the presence of mild, moderate, or severe asthma. These frequencies and percentages identified those activities which constitute the "basic" or most commonly provided asthma education activities. For all three degrees of severity, the self-reported activities that were most frequently provided spontaneously were: (1) information about the general nature of asthma, (2) information about the medications prescribed, and (3) a demonstration on the correct use of inhalational devices. All three of these activities were reported to be spontaneously provided by over 85% of physicians regardless of severity levels. The response frequencies associated with ≥ 75% of physicians reporting provision of activities appear in bold text in Table 10.

In comparison, the activity most infrequently reported was referral to a community non-profit organization. Apparently, action plans and the use of peak flow meters were relatively infrequently discussed with patients, especially those with mild asthma. Moreover, these physicians' reports indicated that they commonly informed patients with moderately severe asthma about warning signs of worsening asthma, but still infrequently provided them with an action plan or a peak flow meter. Even with severe asthma, a quarter of physicians reported that they did not spontaneously discuss with patients the use of action plans based on symptoms and even fewer discussed action plans based on peak flow rates and symptoms. Overall, family physicians' and specialists' patterns for provision of education were similar to those described above (Tables 11-12).
Table 10: Reported Provision of Educational Activities by Full Study Group (N=163)

<table>
<thead>
<tr>
<th>Educational Activities</th>
<th>Mild Asthma no., (%)</th>
<th></th>
<th>Moderate Asthma no., (%)</th>
<th></th>
<th>Severe Asthma no., (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Request Spont</td>
<td></td>
<td>No Request Spont</td>
<td></td>
<td>No Request Spont</td>
<td></td>
</tr>
<tr>
<td>General information</td>
<td>5 (3.1) 16 (9.8)</td>
<td></td>
<td>142 (87.1) 2 (1.2)</td>
<td></td>
<td>6 (3.7) 155 (95.1)</td>
<td>1 (0.6) 3 (1.8) 159 (97.6)</td>
</tr>
<tr>
<td>Information re: meds</td>
<td>0 (0) 16 (9.8)</td>
<td></td>
<td>147 (90.2) 0 (0)</td>
<td></td>
<td>4 (2.5) 159 (97.6)</td>
<td>0 (0) 1 (0.6) 162 (99.4)</td>
</tr>
<tr>
<td>Demonstration of inhalational device</td>
<td>8 (4.9) 16 (9.8)</td>
<td></td>
<td>139 (85.3) 6 (3.7)</td>
<td></td>
<td>7 (4.3) 150 (92.0)</td>
<td>6 (3.7) 3 (1.8) 154 (94.5)</td>
</tr>
<tr>
<td>Information re: avoidance of triggers</td>
<td>6 (3.7) 43 (26.4)</td>
<td></td>
<td>114 (69.9) 1 (0.6)</td>
<td></td>
<td>31 (19.0) 131 (80.4)</td>
<td>0 (0) 23 (14.1) 140 (85.9)</td>
</tr>
<tr>
<td>Information re: warning signs</td>
<td>6 (3.7) 35 (21.5)</td>
<td></td>
<td>122 (74.8) 2 (1.2)</td>
<td></td>
<td>8 (4.9) 153 (93.9)</td>
<td>2 (1.2) 3 (1.8) 158 (96.9)</td>
</tr>
<tr>
<td>Action plan based on symptoms</td>
<td>34 (20.9) 67 (41.0)</td>
<td></td>
<td>62 (38.0) 18 (11.0)</td>
<td></td>
<td>44 (27.0) 101 (62.0)</td>
<td>16 (9.8) 27 (16.6) 120 (73.6)</td>
</tr>
<tr>
<td>Information re: use of peak flow meters</td>
<td>92 (56.4) 54 (33.1)</td>
<td></td>
<td>17 (10.4) 50 (30.7)</td>
<td></td>
<td>64 (39.3) 49 (30.0)</td>
<td>34 (20.9) 31 (19.0) 98 (60.1)</td>
</tr>
<tr>
<td>Action plan based on symptoms &amp; PEFR</td>
<td>106 (65.0) 46 (28.2)</td>
<td></td>
<td>11 (6.7) 60 (36.8)</td>
<td></td>
<td>60 (36.8) 43 (26.4)</td>
<td>45 (27.6) 33 (20.3) 85 (52.1)</td>
</tr>
<tr>
<td>Referral to non-profit organization</td>
<td>56 (34.4) 77 (47.2)</td>
<td></td>
<td>30 (18.4) 40 (24.5)</td>
<td></td>
<td>78 (47.9) 45 (27.6)</td>
<td>33 (20.2) 72 (44.4) 58 (35.8)</td>
</tr>
</tbody>
</table>

Legend:
No - Information not provided to the patient.
Request - Information provided only if the patient requests.
Spont. - Information is provided to the patient spontaneously.
PEFR - Peak expiratory flow rates.
### Table 11: Reported Provision of Educational Activities by Family Physicians (N=80)

<table>
<thead>
<tr>
<th>Educational Activities</th>
<th>Mild Asthma no., (%)</th>
<th>Moderate Asthma no., (%)</th>
<th>Severe Asthma no., (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Request</td>
<td>Spont</td>
</tr>
<tr>
<td>General information</td>
<td>3</td>
<td>(3.8)</td>
<td>13 (16.3)</td>
</tr>
<tr>
<td>Information re: meds</td>
<td>0</td>
<td>(0.0)</td>
<td>13 (16.3)</td>
</tr>
<tr>
<td>Demonstration of inhalational device</td>
<td>6</td>
<td>(7.5)</td>
<td>13 (16.3)</td>
</tr>
<tr>
<td>Information re: avoidance of triggers</td>
<td>4</td>
<td>(5.0)</td>
<td>23 (28.8)</td>
</tr>
<tr>
<td>Information re: warning signs</td>
<td>3</td>
<td>(3.7)</td>
<td>22 (27.5)</td>
</tr>
<tr>
<td>Action plan based on symptoms</td>
<td>18</td>
<td>(22.5)</td>
<td>33 (41.3)</td>
</tr>
<tr>
<td>Information re: use of peak flow meters</td>
<td>46</td>
<td>(57.5)</td>
<td>26 (32.5)</td>
</tr>
<tr>
<td>Action plan based on symptoms &amp; PEFR</td>
<td>53</td>
<td>(66.3)</td>
<td>22 (27.5)</td>
</tr>
<tr>
<td>Referral to non-profit organization</td>
<td>29</td>
<td>(36.3)</td>
<td>37 (46.3)</td>
</tr>
</tbody>
</table>

**Legend:**
- No - Information not provided to the patient.
- Request - Information provided only if the patient requests.
- Spont. - Information is provided to the patient spontaneously.
- PEFR - Peak expiratory flow rates
Table 12: Reported Provision of Educational Activities by Specialists (N=83)

<table>
<thead>
<tr>
<th>Educational Activities</th>
<th>Mild Asthma no., (%)</th>
<th>Moderate Asthma no., (%)</th>
<th>Severe Asthma no., (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No  (%)</td>
<td>Request (%)</td>
<td>Spont (%)</td>
</tr>
<tr>
<td>General information</td>
<td>2 (2.4)</td>
<td>3 (3.6)</td>
<td>78 (94.0)</td>
</tr>
<tr>
<td>Information re: meds</td>
<td>0 (0.0)</td>
<td>3 (3.6)</td>
<td>80 (96.4)</td>
</tr>
<tr>
<td>Demonstration of inhalational device</td>
<td>2 (2.4)</td>
<td>3 (3.6)</td>
<td>78 (94.0)</td>
</tr>
<tr>
<td>Information re: avoidance of triggers</td>
<td>2 (2.4)</td>
<td>20 (24.1)</td>
<td>61 (73.5)</td>
</tr>
<tr>
<td>Information re: warning signs</td>
<td>3 (3.6)</td>
<td>13 (15.7)</td>
<td>67 (80.7)</td>
</tr>
<tr>
<td>Action plan based on symptoms</td>
<td>16 (19.3)</td>
<td>34 (41.0)</td>
<td>33 (40.0)</td>
</tr>
<tr>
<td>Information re: use of peak flow meters</td>
<td>46 (55.4)</td>
<td>28 (33.7)</td>
<td>9 (10.8)</td>
</tr>
<tr>
<td>Action plan based on symptoms &amp; PEFR</td>
<td>53 (63.9)</td>
<td>24 (28.9)</td>
<td>6 (7.3)</td>
</tr>
<tr>
<td>Referral to non-profit organization</td>
<td>27 (32.5)</td>
<td>40 (48.2)</td>
<td>16 (19.3)</td>
</tr>
</tbody>
</table>

Legend:
No - Information not provided to the patient.
Request - Information provided only if the patient requests.
Spont. - Information is provided to the patient spontaneously.
PEFR - Peak expiratory flow rates
b) Educational Activities According to Asthma Severity Level

Physicians consistently reported providing more information to patients with more severe asthma (Table 13). Based on percentage spreads, the educational activities showing the greatest variation across levels of severity were information about peak expiratory flow meters, provision of action plans (based either on symptoms or a combination of symptoms and peak flow rates), and the warning signs of worsening asthma. For both subgroups, these were the activities associated with the greatest variation across severity levels (Tables 11-13), in that these activities tended to be those reserved for patients with more severe asthma.

c) Differences Between Family Physicians and Specialists

Table 13 presents the frequencies at which the full study group and each subgroup reported they spontaneously provide each educational activity for each severity level. The response category of "spontaneous advice" was specifically explored because we assumed that educational activities receiving this categorical response would be those on which physicians placed the greatest importance. For 24 of the 27 educational activities for the three degrees of asthma severity, a greater proportion of specialists reported that they spontaneously provided information than did family physicians.

B. RAW, SUMMATVE, AND OVERALL SCORES FOR PROVISION OF EDUCATIONAL ACTIVITIES

Table 14 presents, for each severity level, the Mann-Whitney U value, the z-value, and the z value corrected for ties. When differences between family physicians and specialists were explored for individual educational activities, the following reached statistical significance: (a) the provision of an action plan based on symptoms for patients with severe asthma (U= 2703; z= 2.05; p= 0.040); (b) the provision of information regarding the purpose and use of peak expiratory flow meters to patients with moderate and severe asthma (U= 2723; z= 1.98; p= 0.047 and U= 2334; z= 3.28; p= 0.001); and (c) the provision of an action plan based upon symptoms and peak expiratory flow rates to patients with moderate and severe asthma
Table 13: Educational Activities Spontaneously Provided to Patients, According to Asthma Severity Level

<table>
<thead>
<tr>
<th>Educational Activities</th>
<th>% Full Study (N=163)</th>
<th>% Family Physicians (N=80)</th>
<th>% Specialists (N=83)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild Asthma</td>
<td>Moderate Asthma</td>
<td>Severe Asthma</td>
</tr>
<tr>
<td>General information</td>
<td>87.1</td>
<td>95.0</td>
<td>97.6</td>
</tr>
<tr>
<td>Information re: meds</td>
<td>90.2</td>
<td>97.6</td>
<td>99.4</td>
</tr>
<tr>
<td>Demonstration of inhalational device</td>
<td>85.3</td>
<td>92.0</td>
<td>94.5</td>
</tr>
<tr>
<td>Information re: avoidance of triggers</td>
<td>69.9</td>
<td>80.4</td>
<td>85.9</td>
</tr>
<tr>
<td>Information re: warning signs</td>
<td>74.8</td>
<td>93.9</td>
<td>96.9</td>
</tr>
<tr>
<td>Action plan based on symptoms</td>
<td>38.0</td>
<td>62.0</td>
<td>73.6</td>
</tr>
<tr>
<td>Information re: use of peak flow meters</td>
<td>10.4</td>
<td>30.0</td>
<td>60.1</td>
</tr>
<tr>
<td>Action plan based on symptoms &amp; PEFR</td>
<td>6.7</td>
<td>26.4</td>
<td>52.1</td>
</tr>
<tr>
<td>Referral to non-profit organization</td>
<td>18.4</td>
<td>27.6</td>
<td>35.8</td>
</tr>
</tbody>
</table>
Table 14: Differences Between Family Physicians and Specialists for Educational Activities: Results from Mann-Whitney U Tests

| Information about asthma | Mild Asthma | | | | Moderate Asthma | | | | | Severe Asthma | | |
|--------------------------|-------------|---|---|---|-----------------|---|---|---|---|-----------------|---|---|---|
| U | z | p | tied z | tied p | U | z | p | tied z | tied p | U | z | p | tied z | tied p |
| 2864 | 1.51 | 0.13 | 2.60 | 0.009 | | | | | | | | | |
| 2901 | 1.39 | 0.16 | 2.70 | 0.007 | | | | | | | | | |
| 2736 | 1.94 | 0.052 | 3.15 | 0.001 | | | | | | | | | |
| 3063 | 0.86 | 0.39 | 1.07 | 0.29 | | | | | | | | | |
| 2936 | 1.28 | 0.20 | 1.69 | 0.09 | | | | | | | | | |
| 3161 | 0.53 | 0.60 | 0.57 | 0.57 | | | | | | | | | |
| 3246 | 0.25 | 0.81 | 0.28 | 0.78 | | | | | | | | | |
| 3235 | 0.28 | 0.78 | 0.34 | 0.74 | | | | | | | | | |
| 3181 | 0.46 | 0.64 | 0.50 | 0.62 | | | | | | | | | |

z = z value, tied z = z corrected for ties; p = p value, tied p = p corrected for ties
(U= 2656; z= 2.21; p= 0.027 and U= 2262; z= 3.51; p= 0.0004). When the z values were corrected for ties, the statistical significance of these differences between the subgroups of physicians increased. In addition to the above actions, statistically significant differences between subgroups were observed when the z values were corrected for ties for the following actions: (a) the provision of general asthma information for mild asthma (tied z value= 2.6; p= 0.009); (b) the provision of information about prescribed medications for mild asthma (tied z value= 2.70; p= 0.007); and (c) the provision of a demonstration on the proper use of inhalers for mild (tied z value= 3.15; p= 0.0016), moderate (tied z value= 2.15; p= 0.032) and severe asthma (tied z value= 2.48; p= 0.013).

The raw scores for the individual items were also added to generate a mean summative score for each of the three asthma severity levels. In addition, an overall score for provision of asthma education was generated by adding the three summative scores for severity level. Table 15 presents this summary data. A first impression of Table 15 suggests that summative scores increased as asthma severity increased and that specialists tended to have higher summative and overall scores than did family physicians.

Unpaired t-tests demonstrated that, for each of the three summative severity level scores, and also for the overall provision of education score, the specialists’ scores were significantly higher than those of family physicians (See Table 15).

According to a repeated measures analysis of variance, the increase in summative scores across the levels of asthma severity (F= 204.896, p< 0.0001) was statistically significant. This supports the earlier impression that physicians report providing educational activities more frequently to patients with more severe asthma (See Table 16).
Table 15: Summative and Overall Scores for Provision of Educational Activities: Differences Between Subgroups

<table>
<thead>
<tr>
<th></th>
<th>Full Study Group (\bar{x}, SD)</th>
<th>Family Physicians (\bar{x}, SD)</th>
<th>Specialists (\bar{x}, SD)</th>
<th>Differences between subgroups (t value, p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild asthma</td>
<td>20.89 ± 2.97</td>
<td>20.42 ± 3.17</td>
<td>21.34 ± 2.71</td>
<td>1.98, p = 0.049</td>
</tr>
<tr>
<td>Moderate asthma</td>
<td>22.93 ± 2.78</td>
<td>22.48 ± 2.94</td>
<td>23.36 ± 2.51</td>
<td>2.05, p = 0.042</td>
</tr>
<tr>
<td>Severe asthma</td>
<td>24.11 ± 2.67</td>
<td>23.36 ± 3.02</td>
<td>24.86 ± 2.04</td>
<td>3.66, p &lt; 0.0003</td>
</tr>
<tr>
<td>Overall</td>
<td>67.86 ± 7.59</td>
<td>66.17 ± 8.38</td>
<td>69.50 ± 6.37</td>
<td>2.85, p &lt; 0.005</td>
</tr>
</tbody>
</table>

Table 16: Repeated Measures Analysis of Variance of Provision of Education According to Severity Level

<table>
<thead>
<tr>
<th></th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-Value</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>162</td>
<td>3116.593</td>
<td>19.238</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category for education of severity</td>
<td>2</td>
<td>873.427</td>
<td>436.714</td>
<td>204.896</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>
C. SUMMARY: PROVISION OF EDUCATION

a) Activities Provided Relatively Frequently and Infrequently

According to physician self-reports, the asthma educational activities most frequently provided to patients, regardless of severity level, are the provision of general asthma information, the provision of information about prescribed medications, and the demonstration of the proper use of inhalational devices. The activity that physicians reported least frequently was a referral to a community non-profit organization for further information about asthma.

b) Educational Activities According to Asthma Severity Level

For all activities, the physicians consistently reported that they provided more asthma education activities to patients with more severe asthma. The educational activities that tended to be reserved for more severe asthma were discussing the use of peak flow meters and the provision of action plans, whether based solely on symptoms or a combination of symptoms and peak flow rates.

c) Differences between Family Physicians and Specialists

In general, specialists reported providing more educational activities than did family physicians. This pattern was observed for the summative severity level scores and for the overall score. These differences are primarily accounted for by the following activities: (a) the provision of an action plan based on symptoms; (b) the provision of information regarding the purpose and use of peak expiratory flow meters; and (c) the provision of an action plan based on symptoms and peak expiratory flow rates.
IV. LEVEL OF PATIENT INVOLVEMENT IN MANAGEMENT DECISIONS

One of the key aspects of successful asthma management is the involvement of the individual in management decisions (Hargreave et al., 1990; NHLBI, 1991 and 1992). Physicians were asked about the level of involvement their patients usually play in management decisions and the role that they would ideally like them to play. Their responses are summarized in Figures 4-9, for the full study group and the two subgroups.

The majority of the full study group (59%) reported that, in their current practice, they made the decisions but strongly considered the patient's opinion (Figure 4). The majority also indicated that, ideally, they would prefer their patients to be more involved in decision making (Figure 5). For the full study group, the difference between the scores for “usual” and “ideal” level of patient involvement was statistically significant (Wilcoxon signed rank: $z=5.9$, $p<0.0001$).

The patterns for both subgroups were very similar to those of the entire physician sample for reported levels of usual and ideal patient involvement (Figures 6-9).
Figure 4: Usual Level of Patient Involvement in Asthma Management Decisions Reported by Full Study Group

Legend
1 - MD sole decision maker
2 - MD make decision but consider patient input
3 - Equal sharing of decisions
4 - Patient make decision but consider MD input
5 - Patient sole decision maker

Frequency

Involvement Scores

n = 161

Figure 5: Ideal Level of Patient Involvement in Asthma Management Decisions Reported by Full Study Group

Legend
1 - MD sole decision maker
2 - MD make decision but consider patient input
3 - Equal sharing of decisions
4 - Patient make decision but consider MD input
5 - Patient sole decision maker

Frequency

Involvement Scores

n = 161
Figure 6: Usual Level of Patient Involvement in Asthma Management Decisions Reported by Family Physicians

Legend

1 - MD sole decision maker
2 - MD make decision but consider patient input
3 - Equal sharing of decisions
4 - Patient make decision but consider MD input
5 - Patient sole decision maker

Figure 7: Ideal Level of Patient Involvement in Asthma Management Decisions Reported by Family Physicians
Figure 8: Usual Level of Patient Involvement in Asthma Management Decisions Reported by Specialists

Legend

1 - MD sole decision maker
2 - MD make decision but consider patient input
3 - Equal sharing of decisions
4 - Patient make decision but consider MD input
5 - Patient sole decision maker

Figure 9: Ideal Level of Patient Involvement in Asthma Management Decisions Reported by Specialists
V. CONSISTENCY WITH PUBLISHED ASTHMA GUIDELINES

A. SELECTION OF FIRST PRIORITY ACTIONS

For each asthma profile, physicians indicated their first priority action (Tables 17 a-f). Each table presents, for the full study group and each subgroup, the distributions across treatment actions selected as the first priority action for each asthma profile. For each asthma profile, with one exception (Profile F), a single first priority action was identified in the full sample as well as in each subgroup. In each table the action which the highest percentage of physicians identified as their first priority action appears in bold text.

Overall, for Profile A (asthma symptoms experienced after strenuous activity), 76.1% of physicians would initiate an inhaled β2 agonist as the first priority action. For Profiles C (54.8%) and D (86.9%), which represented situations involving more moderate to severe asthma, the first priority action was to have the patient seen by a physician that same day. The first priority action for Profiles B, E, and F was an inhaled corticosteroid. For Profile B (a moderate exacerbation), 60.3% of physicians would start an inhaled corticosteroid; for Profile E (undertreated asthma) and Profile F (exacerbation associated with a URI), increasing the current dose of the inhaled corticosteroid would be the first priority action for 67.0% and 37.0% of the respondents, respectively. Note that there was no single predominant first priority action for the Profile F; although 42.8% selected an inhaled steroid (takes into account those who selected more than one action), another 21.4% indicated that they would start a course of oral antibiotics, and a further 20.8% would have the patient seen by a physician that same day.

The first priority actions reported by specialists and family physicians were similar for all profiles except F. For Profile F, the family physicians were evenly split between starting a course of antibiotics (32%) and having the patient seen by a physician the same day (32%), whereas the specialists more frequently (48.1%) selected an increase in the inhaled...
corticosteroid. The percentages for the most commonly selected first priority action tended to be higher among the specialists than the family physicians, implying that the group of specialists were more congruent in their identified first priority action. However, for Profile C (moderate to severe, slow-onset exacerbation), the specialists were roughly split between a same day outpatient visit (47.5%) and starting a course of oral corticosteroids (33.8%), whereas in the family physician subgroup, the majority (62.3%) selected the same day outpatient visit as the first priority action.

B. CONSISTENCY OF FIRST PRIORITY ACTIONS WITH THE CANADIAN GUIDELINES

a) Consistency by Profile

The recommendations of the Canadian guidelines for the treatment of the six asthma profiles are presented in Table 18 (Hargreave et al., 1990). At the risk of being redundant, we remind the reader that for each profile, each physician’s first priority action was compared to the first line therapy recommended by these guidelines. If the physician’s first priority action was consistent with the guidelines, a consistency count of 1.0 was tallied; otherwise, a consistency count of 0.0 was tallied.

In a few cases, participants indicated that two actions were of equal priority status (16 participants for 31 of the 978 consistency matches). In these cases, both actions were compared to the guidelines, and if both were consistent, a consistency count of 1.0 was tallied. If only one action was consistent with the guidelines, a consistency count of 0.5 was tallied; otherwise, a consistency count of 0.0 was tallied. A small number of respondents indicated that three or more actions were of equal priority status (17 participants for 44 of the 978 consistency matches). In these cases, two of the investigators reviewed the participant’s first priority action selections. If none of the selections were consistent, a consistency count of 0.0 was tallied, if one was consistent, a count of 0.5 was tallied, and if all were consistent a full count of 1.0 was tallied.
### Table 17a: Selection of First Priority Actions: Asthma Profile A

<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample no., (%)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. $\beta_2$ agonist</td>
<td>124 (76.1)</td>
<td>55 (68.8)</td>
<td>69 (83.1)</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>3 (1.8)</td>
<td>2 (2.5)</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>7 (4.3)</td>
<td>2 (2.5)</td>
<td>5 (6.0)</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>6 (3.7)</td>
<td>3 (3.8)</td>
<td>3 (3.6)</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Wait &amp; See</td>
<td>7 (4.3)</td>
<td>5 (6.3)</td>
<td>2 (2.4)</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>13 (8.0)</td>
<td>10 (12.5)</td>
<td>3 (3.6)</td>
</tr>
<tr>
<td>$\beta$ agonist &amp; inh. steroid</td>
<td>2 (1.2)</td>
<td>2 (2.5)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>$\beta$ agonist &amp; Atrovent</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>

* 7 missing from total sample (5-family physicians & 2-specialists)

### Table 17b: Selection of First Priority Actions: Asthma Profile B*

<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample no., (%)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase inh. $\beta_2$ agonist</td>
<td>3 (1.9)</td>
<td>2 (2.7)</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>3 (1.9)</td>
<td>3 (4.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>94 (60.3)</td>
<td>39 (52.0)</td>
<td>55 (67.9)</td>
</tr>
<tr>
<td>Start oral steroid</td>
<td>4 (2.6)</td>
<td>1 (1.3)</td>
<td>3 (3.7)</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>4 (2.6)</td>
<td>2 (2.7)</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Wait &amp; See</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>42 (26.9)</td>
<td>26 (34.7)</td>
<td>16 (19.7)</td>
</tr>
<tr>
<td>$\beta$ agonist &amp; inh. steroid</td>
<td>2 (1.3)</td>
<td>0 (0.0)</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Oral steroid &amp; inh. steroid</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>Atrovent &amp; Non-steroidal</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>
### Table 17c: Selection of First Priority Actions: Asthma Profile C*

<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample no., (%)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase inh. $\beta_2$ agonist</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>2 (1.3)</td>
<td>2 (2.6)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>20 (12.7)</td>
<td>12 (15.6)</td>
<td>8 (10.0)</td>
</tr>
<tr>
<td>Start oral steroid</td>
<td>37 (26.6)</td>
<td>10 (13.0)</td>
<td>27 (33.8)</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>3 (1.9)</td>
<td>3 (3.9)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>86 (54.8)</td>
<td>48 (62.3)</td>
<td>38 (47.5)</td>
</tr>
<tr>
<td>$\beta$ agonist &amp; inh. steroid</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Oral steroid &amp; inh. steroid</td>
<td>3 (1.9)</td>
<td>0 (0.0)</td>
<td>3 (3.8)</td>
</tr>
<tr>
<td>Atrovent &amp; inh. steroid</td>
<td>2 (1.3)</td>
<td>2 (2.6)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Outpt. visit &amp; oral steroid</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Oxygen</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Spirometry</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
</tbody>
</table>

* 6 missing from total sample (3-family physicians & 3 specialists)

### Table 17d: Selection of First Priority Actions: Asthma Profile D*

<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample no., (%)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase inh. $\beta_2$ agonist</td>
<td>4 (2.5)</td>
<td>3 (3.8)</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start oral steroid</td>
<td>12 (7.5)</td>
<td>5 (6.3)</td>
<td>7 (8.6)</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>139 (86.9)</td>
<td>69 (87.3)</td>
<td>70 (86.4)</td>
</tr>
<tr>
<td>Theophylline &amp; inh. steroid</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Oral steroid &amp; inh. steroid</td>
<td>2 (1.3)</td>
<td>0 (0.0)</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Atrovent &amp; oral steroid</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.2)</td>
</tr>
</tbody>
</table>

* 3 missing from total sample (1-family physician & 2 specialists)
Table 17e: Selection of First Priority Actions: Asthma Profile E*

<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample no., (%)</th>
<th>Family Physicians no., (%)</th>
<th>Specialists no., (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase inh. β₂ agonist</td>
<td>5 (3.2)</td>
<td>5 (6.6)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>5 (3.2)</td>
<td>4 (5.3)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Increase inh. steroid</td>
<td>104 (67.0)</td>
<td>38 (50.0)</td>
<td>66 (83.5)</td>
</tr>
<tr>
<td>Start oral steroid</td>
<td>9 (5.8)</td>
<td>6 (7.9)</td>
<td>3 (3.8)</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>6 (3.9)</td>
<td>4 (5.3)</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>2 (1.3)</td>
<td>2 (2.6)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Wait &amp; See</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>12 (7.7)</td>
<td>11 (14.5)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>β agonist &amp; inh. steroid</td>
<td>2 (1.3)</td>
<td>1 (1.3)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>β agonist &amp; Atrovent</td>
<td>2 (1.3)</td>
<td>2 (2.6)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Atrovent &amp; inh. steroid</td>
<td>2 (1.3)</td>
<td>1 (1.3)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Oral steroid &amp; inh. steroid</td>
<td>3 (1.9)</td>
<td>1 (1.3)</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Theophylline &amp; inh. steroid</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Spirometry</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
</tbody>
</table>

* 8 missing from total sample (4 family physicians & 4 specialists)
<table>
<thead>
<tr>
<th>Action</th>
<th>Total Sample no, (%)</th>
<th>Family Physicians no, (%)</th>
<th>Specialists no, (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase inh. β₂ agonist</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start Atrovent</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Increase inh. steroid</td>
<td>57 (37.0)</td>
<td>19 (25.3)</td>
<td>38 (48.1)</td>
</tr>
<tr>
<td>Start oral steroid</td>
<td>18 (11.7)</td>
<td>2 (2.7)</td>
<td>16 (20.3)</td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Start theophylline</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Start antibiotics</td>
<td>33 (21.4)</td>
<td>24 (32.0)</td>
<td>9 (11.4)</td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>32 (20.8)</td>
<td>24 (32.0)</td>
<td>8 (10.1)</td>
</tr>
<tr>
<td>β agonist &amp; inh. steroid</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Atrovent &amp; inh. steroid</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Atrovent &amp; Non-steroidal</td>
<td>1 (0.6)</td>
<td>1 (1.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Antibiotic &amp; inh. steroid</td>
<td>3 (1.9)</td>
<td>1 (1.3)</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Oral steroid &amp; inh. steroid</td>
<td>3 (1.9)</td>
<td>1 (1.3)</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Outpt. visit &amp; inh. steroid</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Spirometry</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
</tr>
</tbody>
</table>

* 9 missing from total sample (5 family physicians & 4 specialists)
Table 18: Treatment Recommendations According to the 1990 Canadian Guidelines

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Profile A (mild, EIA)</th>
<th>Profile B (moderate)</th>
<th>Profile C (mod-severe)</th>
<th>Profile D (severe)</th>
<th>Profile E (undertreated)</th>
<th>Profile F (mod, URI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start inh. β₂ agonist</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↓ inh. β₂ agonist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Atrovent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start inh. steroid</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>↑ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>↓ inh. steroid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add non-steroidal</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start theophylline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start oral steroid</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Start antibiotic</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient visit</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

✓ signifies a treatment recommended

Table 19 presents the frequency counts and percentage distributions of the full study group and the physician subgroups according to consistency level, by asthma profile. In general, the physicians were consistent with the guidelines. This was most evident for Profiles A, C and D (the mildest and the most severe profiles); for all three, at least 75% of the physicians were fully consistent. The full study group was least consistent for the profiles describing more moderate asthma. These profiles included: Profile B for which 58.3% of the physicians were fully consistent, Profile E for which 63.8% of the physicians were fully consistent, and Profile F for which 68.1% of the physicians were fully consistent with the guidelines.

b) Between Subgroup Differences in Consistency with Guidelines

The family physicians tended to be less consistent with the guidelines than the specialists; the percentage of family physicians who were fully consistent ranged across the profiles from 47.5% to 92.5%, whereas the percentage of specialists who were fully consistent ranged from 66.3% to 92.8%.

Mann-Whitney U tests were used to examine differences between subgroups for consistency with guideline tallies for each asthma profile (Table 20). The results indicate that statistically significant differences exist for Asthma Profiles A, B, E, and F, with specialists demonstrating higher consistency scores with the 1990 Canadian Guidelines than family physicians.

Since consistency tallies were made for each physician and for each asthma profile, it was possible to sum a physician’s consistency tallies to yield an overall consistency score (ranging from 0 to 6). Figures 10 and 11 illustrate the distributions of the overall consistency scores for the full study group and the subgroups, respectively. The means and standard deviations of the overall consistency scores are also reported in these figures. The specialists’ mean overall consistency score was statistically significantly higher than the family physicians’ overall score ($t=5.46, p<0.0001$).
Table 19: Consistency of Physicians’ First Priority Actions with 1990 Canadian Guidelines

<table>
<thead>
<tr>
<th>Profile</th>
<th>Levels of Consistency</th>
<th>0</th>
<th>0.5</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no, (%)</td>
<td>no, (%)</td>
<td>no, (%)</td>
<td></td>
</tr>
<tr>
<td><strong>Profile A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total sample</td>
<td>30 (18.4)</td>
<td>3 (1.8)</td>
<td>130 (79.8)</td>
<td></td>
</tr>
<tr>
<td>- Family Physicians</td>
<td>19 (23.8)</td>
<td>3 (3.7)</td>
<td>58 (72.5)</td>
<td></td>
</tr>
<tr>
<td>- Specialists</td>
<td>11 (13.3)</td>
<td>0 (0.0)</td>
<td>72 (86.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Profile B</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total sample</td>
<td>60 (32.8)</td>
<td>8 (4.9)</td>
<td>95 (58.3)</td>
<td></td>
</tr>
<tr>
<td>- Family Physicians</td>
<td>37 (46.2)</td>
<td>3 (3.8)</td>
<td>40 (50.0)</td>
<td></td>
</tr>
<tr>
<td>- Specialists</td>
<td>23 (27.7)</td>
<td>5 (6.0)</td>
<td>55 (66.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Profile C</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total sample</td>
<td>10 (6.1)</td>
<td>5 (3.1)</td>
<td>148 (90.8)</td>
<td></td>
</tr>
<tr>
<td>- Family Physicians</td>
<td>7 (8.7)</td>
<td>3 (3.8)</td>
<td>70 (87.5)</td>
<td></td>
</tr>
<tr>
<td>- Specialists</td>
<td>3 (3.6)</td>
<td>2 (2.4)</td>
<td>78 (94.0)</td>
<td></td>
</tr>
<tr>
<td><strong>Profile D</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total sample</td>
<td>11 (6.7)</td>
<td>1 (0.6)</td>
<td>151 (92.6)</td>
<td></td>
</tr>
<tr>
<td>- Family Physicians</td>
<td>6 (7.5)</td>
<td>0 (0.0)</td>
<td>74 (92.5)</td>
<td></td>
</tr>
<tr>
<td>- Specialists</td>
<td>5 (6.0)</td>
<td>1 (1.2)</td>
<td>77 (92.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Profile E</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total sample</td>
<td>48 (29.4)</td>
<td>11 (6.8)</td>
<td>104 (63.8)</td>
<td></td>
</tr>
<tr>
<td>- Family Physicians</td>
<td>39 (48.8)</td>
<td>3 (3.7)</td>
<td>38 (47.5)</td>
<td></td>
</tr>
<tr>
<td>- Specialists</td>
<td>9 (10.8)</td>
<td>8 (9.7)</td>
<td>66 (79.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Profile F</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total sample</td>
<td>44 (27.0)</td>
<td>8 (4.9)</td>
<td>111 (68.1)</td>
<td></td>
</tr>
<tr>
<td>- Family Physicians</td>
<td>31 (38.8)</td>
<td>3 (3.7)</td>
<td>46 (57.5)</td>
<td></td>
</tr>
<tr>
<td>- Specialists</td>
<td>13 (15.7)</td>
<td>5 (6.0)</td>
<td>65 (78.3)</td>
<td></td>
</tr>
</tbody>
</table>
Table 20: Between Subgroup Differences in Tallies for Consistency with Guidelines, According to Asthma Profiles

<table>
<thead>
<tr>
<th>Asthma Profile</th>
<th>U value</th>
<th>z value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2863.5</td>
<td>2.17</td>
<td>0.030</td>
</tr>
<tr>
<td>B</td>
<td>2722.0</td>
<td>2.29</td>
<td>0.022</td>
</tr>
<tr>
<td>C</td>
<td>3102.5</td>
<td>1.44</td>
<td>0.150</td>
</tr>
<tr>
<td>D</td>
<td>3252.0</td>
<td>0.47</td>
<td>0.640</td>
</tr>
<tr>
<td>E</td>
<td>2114.5</td>
<td>4.73</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>F</td>
<td>2571.0</td>
<td>3.05</td>
<td>0.0023</td>
</tr>
</tbody>
</table>
Figure 10: Distribution of Scores for Overall Consistency with the 1990 Canadian Guidelines: Full Study Group

Mean = 4.63 ± 1.15
Figure 11: Distribution of Scores for Overall Consistency with the 1990 Canadian Guidelines: Subgroups

- Family Physicians: Mean 4.17 ± 1.16
- Specialists: Mean 5.08 ± 0.96

* t = 5.46, p < 0.0001
C. DIFFERING INTERPRETATIONS OF THE GUIDELINES

For some clinical situations, the recommendations of published guidelines are not explicit and therefore are subject to different interpretations. This problem was particularly evident for Asthma Profile C. For this profile, two or three treatment actions could be considered consistent with the guidelines. The guidelines clearly recommended the use of oral corticosteroids and a same day visit to the doctor's office or the Emergency Department. However, the recommendation status for the use of an inhaled corticosteroid was less clear. A conservative or less stringent approach would allow for all three actions while a more stringent approach would allow for only the first two actions. Application of the more stringent criteria decreases the number of consistency tallies for Profile C from 90.8% to 77.9% for the full study group, from 87.5% to 72.5% for family physicians, and from 94.0% to 83.1% for specialists. The analysis and results presented in this thesis use the most conservative (or least stringent approach) for determining consistency with guidelines.

D. SUMMARY: CONSISTENCY WITH GUIDELINES

Treatment recommendations for profiles describing the mildest and most severe asthma (Profiles A, C, and D) were most consistent with the guidelines (over 75% of physicians were consistent). Specialists were more consistent with the guidelines than were family physicians for the treatment of Profiles A, B, E, and F, and the specialists’ overall consistency scores were significantly higher than those of family physicians (t = 5.46, p < 0.0001).

VI DEMOGRAPHIC AND PRACTICE CHARACTERISTICS

The full study group’s demographic and practice characteristics were examined in terms of their differences between and their relationships with the three primary study variables of provision of asthma education, level of patient participation (usual and ideal), and consistency with guidelines. Potential differences or relationships were explored for number of years in
practice, attendance at asthma related continuing medical education seminars, gender, type of practice, availability of office assistance, and personal experience with asthma symptoms.

Due to the ordinal nature of the variables, the Spearman rank correlation coefficient was used to assess the relationship of level of patient involvement (usual and ideal) with years in practice and with attendance at asthma-related seminars. There were weak positive relationships between attendance at asthma-related seminars and patient level of involvement (n= 156; usual: rho= 0.28, p= 0.0005; ideal: rho= 0.21, p= 0.0085); however, when these relationships were corrected for ties only the relationship observed between usual level of patient involvement and attendance at seminars remained statistically significant (rho= 0.158, p= 0.049). There was also a positive weak relationship observed between usual level of involvement and years in practice (n= 161; rho= 0.22, p= 0.0057); however, after correcting for ties, this relationship became weaker and was no longer statistically significant (rho= 0.09, p= 0.24).

The Spearman rank correlation coefficient was used to assess the relationships of the remaining two primary variables (provision of education and consistency with guidelines) with years in practice and attendance at asthma-related seminars. There was a weak negative relationship between the number of years in practice and overall consistency with guidelines scores (n= 163; rho= -0.27, p= 0.0006), after correcting for ties the relationship was strengthened (rho= -0.35, p< 0.0001). In addition, there were weak positive relationships between attendance at asthma related seminars and overall score for provision of educational activities (n= 158; rho= 0.27, p= 0.0008; rho corrected for ties= 0.24, p= 0.0026), and overall score for consistency with guidelines (n= 158; rho= 0.27 p= 0.0008; rho corrected for ties= 0.21, p= 0.0075).

The possibility of differences between demographic and practice variables (gender, the availability of office help, personal experience with asthma symptoms, and practice type) and the three primary variables (provision of education, consistency with guidelines, level of
patient involvement) were also examined. Significant differences in overall scores for consistency with guidelines were observed for practice type (n= 162, F= 8.7, p= 0.0003); physicians affiliated with a university had the highest scores (n=46, \( \bar{x} = 5.08 \pm 1.02 \)) followed by those in a group practice (n= 65, \( \bar{x} = 4.69 \pm 1.04 \)), and then those in solo practice (n= 51, \( \bar{x} = 4.15 \pm 1.25 \)). (Note that 52% of the specialists are university affiliated whereas only 5% of family physicians are university affiliated.) Practice type was the only demographic or practice characteristic in which a statistically significant difference was observed.
CHAPTER IV:
DISCUSSION AND INTERPRETATION

- **Interim Summary**

It is hypothesized that increasing asthma morbidity, mortality, and costs are related to both physician factors (underuse of corticosteroids, over reliance on inhaled $\beta_2$ agonists, and poor long term care) and patient factors (delays in seeking medical attention, failure to appreciate severity, and non-adherence to medical recommendations) (Rea et al., 1987; British Thoracic Society, 1982; Ormerod and Stableforth, 1980; Macdonald et al., 1976; Cochrane and Clark, 1975). Previous work of the investigator also suggests an interplay of patient and physician factors. This work explored the self care decisions of adults with asthma and suggested that differences between patients' level of asthma knowledge and selection of appropriate self care activities in response to hypothetical scenarios was correlated with the specialty level of their physicians (family physicians and respirologists). Accordingly, the purpose of the current study was: (i) to examine the management strategies of physicians from across Ontario who were caring for individuals with asthma, and (ii) to determine if differences existed between family physicians and specialists with respect to asthma management. Areas of asthma management examined included self-reported provision of patient education, level of patient involvement in management decisions, and treatment for various asthma patient profiles. Data were collected from 163 Ontario physicians (80% response rate) by a mailed survey using Dillman’s protocol. The questionnaire consisted of four sections: (a) section one assessed the provision of nine patient education activities; (b) section two assessed the treatment actions that were either recommended or not recommended for treating six asthma profiles which varied in severity; (c) section three assessed physicians’ perceived and preferred levels of patient involvement in management decisions; and (d) section four collected
demographic and practice information. The work completed in this study provides a framework for future intervention studies to improve asthma management and thereby decrease the associated morbidity and mortality rates with expected cost savings for the health care system.

- **General Assumptions and Limitations**

  At the outset, it is important to recognize the assumptions and limitations to be considered when interpreting the results of this study.

1. Mailed survey studies typically have more non-responders than interview-structured studies, thus threatening the representativeness of the sample. However, the high response rate of the current study (83% for specialists, 78% for family physicians, and 80% for the full study group) indicates that this was not a serious threat in this study.

2. Some questions were left unanswered or incorrectly completed, perhaps because of difficulty in interpreting the question or because interviewer clarification was not easily accessible (the individual would have to telephone the investigator). However, this did not result in a significant loss of data (< 1% of data fields).

3. Mailed surveys run the risk of having someone other than the intended respondent complete the questionnaire without the investigator’s knowledge.

4. It is also assumed that respondents answered in a manner reflecting their actual practice rather than what they felt was optimal practice. The potential role of this social desirability bias was reduced by using an anonymously returned questionnaire.

5. The modest percentage of family physicians asked to participate from the population of Ontario family physicians may affect the representativeness of the sample. In order to assess the representativeness of the participating family physicians, we compared their demographic characteristics to the descriptive database for non-specialist physicians that is generated by the College of Physicians and Surgeons Peer Assessment Program. The Peer Assessment Program has been described previously (Norton et al., 1994).
The data from the Peer Assessment Program are complete, and describe the practice patterns of 456 Ontario physicians who are less than 70 years old, do not have specialist certification, have been in practice at least 5 years, and spend 50% or more of their time in typical office practice. The variables that were selected for comparison include age, gender, percentage in solo practice, and an RN or RNA in the practice. The characteristics of our sample are very comparable to the Peer Assessment Database (PAD). For example: the percentage of females in our study was 25% compared to 23% for the PAD; the mean age for our respondents was 47 years compared to 46 years for the PAD; 40% of the survey respondents were in solo-practice compared to 47% for the PAD; and the percentage of physicians in our study with an office assistant was 21% compared to 14% of physicians with an RN or RNA for the PAD. In summary, for the demographic variables mentioned above, our set of family physician respondents is representative of the population of Ontario non-specialist physicians.

6. It is assumed that the respondents in the specialist-respirologist subgroup are representative of respirologists in Ontario. The investigator is unaware of any published reports detailing the characteristics of specialist-respirologists in Ontario. However, for our study, 103 respirologists (59%) from the provincial total of 175 were asked to participate in the study. Since the majority of respirologists in Ontario were asked to participate in the study and 83% of these responded, it is likely that our set of specialist-respirologist respondents is representative of the population of Ontario specialist-respirologist physicians.

7. Given the large number of statistical computations performed (over 90), there is a chance that statistically significant observations occurred by chance alone (i.e. with $p = 0.05$, there is a 1 in 20 chance of a statistically significant observation). However, for over 80 of the statistical computations nonparametric tests were used, and, to the best of the investigator’s knowledge, there is not a correction factor for nonparametric as there is for parametric tests (e.g. Tukey’s or Bonferroni). Accordingly, the reader should keep in mind the possibility
that some of the reported statistically significant observations may have occurred by chance alone, and may wish to apply a more stringent p value while interpreting the study’s results.

In addition, other limitations specific to each section of the questionnaire are discussed in the relevant sections to follow.

- **General Strengths**

  While it is important to recognize the assumptions and limitations of this study it is also important to highlight its strengths.

1. Potentially participating respirologists were randomly selected from a comprehensive sampling frame, and potentially participating family physicians were randomly selected from a sampling frame that was representative of the target population of family physicians. The responding respirologists and family physicians were in turn representative of the province of Ontario.

2. The study achieved a very high response rate for both specialty groups, and as a result the questionnaire was completed by a relatively large sample of Ontario family physicians and specialists (respirologists) who treat asthma.

3. The study examined a very important component of patient care for family physicians and specialists.

4. The methods and results of this study may have implications for other chronic diseases.

5. This study explored several aspects of adult outpatient asthma management- use of medications and medical services, provision of education, and patient involvement in management decisions.

6. This was the first study to explore asthma management according to a model of asthma care proposed in the Canadian guidelines, as well as other countries’ guidelines such as Australia, New Zealand, and the United States.
- Asthma Care

Since the model of asthma care proposed in the published guidelines provided the study’s framework, it is used to structure the discussion and interpretation of the results. The remaining sections of this chapter are organized according to the conceptual framework in Chapter I (model of asthma care) and are discussed in the following order: (i) appropriate therapy, (ii) provision of asthma education, and (iii) partnering for care. Each section presents a discussion of the relevant assumptions and limitations, the links between the results of this study and previous investigations, and the relevant implications for theory, research, and practice. Finally, the chapter ends with a section regarding the study’s overall implications for asthma care.

I. APPROPRIATE ASTHMA THERAPY

A. SELF REPORTS REGARDING THERAPY

a) Assumptions and Limitations

This study was based on physician reports of asthma care practices rather than observations of actual physician behavior, and we assume that these self reports reflect usual practice.

Currently, there is no single “best” method for measuring or assessing physician behavior that provides valid and reliable information while minimizing intrusiveness and cost. One approach involves using written case simulations to present hypothetical cases of patient management problems. Such simulations are used frequently for teaching purposes, to investigate physicians’ decision making regarding diagnosis, treatment, and referral, and to investigate clinical competence (Vayda et al., 1982; Elstein et al., 1983; Jones et al., 1990; Langley et al., 1991). The use of this approach is based on the assumption that physicians’ responses closely agree with their responses to actual clinical encounters.
Jones et al. (1990) reviewed the health sciences literature to address this issue of agreement between physicians' judgements of written case simulations and behavior in actual clinical practice. Their review focused on criterion validity, defined as the extent of agreement between physicians' clinical judgement or behavior, as elicited by the written case simulation, and a reference measure of the same judgement or behavior ("gold standard"). (In reality, the assessment of criterion validity involves determining the extent of agreement between the measurement of responses to the written cases and the measurement of the responses to the "gold standard"). The investigators applied methodologic criteria to 74 published articles that used written simulations to investigate health professionals' decision making and clinical competence. While most of the studies did not address criterion validity, 15% (11) reported an actual assessment of the criterion validity of their written case simulations. The gold standards used varied from chart extraction to data bases of health services utilization to actual clinical encounters. Half of the 11 studies were characterized by a high degree of correspondence between the judgement or behavior elicited and the "gold standard".

Despite the limitations associated with written case simulations, they continue to be frequently used because of several appealing attributes. Disease and patient factors are controlled for by having subjects evaluate the same cases. In addition, large numbers of participants can be surveyed using relatively inexpensive survey methods that are relatively non-intrusive and allow for anonymity and confidentiality. Given these advantages and the aim of the study reported here, written case simulations were used.

Two previous studies assessing physician management of asthma have used written case simulations (Engel et al., 1989; Phin and Oates, 1993). Phin and Oates (1993) presented two hypothetical scenarios describing children with asthma (acute attack and mild asthma) and asked respondents to rank a series of medications in the order they would give them. Engel et al. (1989) used two hypothetical scenarios (moderate asthma and moderate to severe asthma) to assess use of corticosteroids in asthma. Information presented in the hypothetical scenarios
included the patient's experience with symptoms and their use of current medications, and, in one of Engel's scenarios, information about the patient's pulmonary function (forced expiratory volume in one second) was included. Engel also assessed physicians' use of corticosteroids as reported by their patients and observed that the two methods (hypothetical scenarios and patient reports) were in close agreement. However, the investigators did not ascertain the strength of the relationship using a correlation coefficient.

For the current study, hypothetical asthma profiles were chosen to explore physicians' approaches to asthma management over the use of reports of managing real patients. A primary reason for this decision was that the use of real patients makes it difficult to standardize patient cases because each patient and each physician practice are quite different. Comparing the patients of family physicians and specialists would likely not be a fair comparison. The asthma profiles used here described the clinical features of varying levels of severity instead of actual cases. The clinical characteristics described in the profiles were limited to the experience of symptoms and the use of medications. The asthma profiles did not include information on pulmonary function status (peak expiratory flow rates (PEFR), forced expiratory volume in one second (FEV₁), or vital capacity (VC)). This information was excluded not because it was judged to be unimportant, but in order to mirror the current circumstances of some community physicians who often do not have this information available when making treatment decisions.

The list of potential treatment actions included only the most frequently prescribed classifications of medications, the option of waiting and seeing, and the use of a same day office visit or visit to the Emergency Department. This list did not include the use of diagnostic tests (e.g. pulmonary function tests, tests for atopic status, bronchoprovocational challenges) or follow-up office visits. In addition, long acting inhaled β₂ agonists were not yet approved at the time of the study.
The profiles were developed to represent a broad range of adult asthma patients followed on an outpatient basis. The existence of face and content validity for the six hypothetical asthma profiles was supported by the results obtained during pre-testing of The Physicians' Questionnaire.

b) Discussion Regarding Therapy Judgements

This section will discuss the physicians’ asthma treatment judgements within and across the asthma profiles for the full study group and for each of the two subgroups, and will highlight the differences between the subgroups.

i) Therapy Judgements by the Full Study Group and the Subgroups

• Use of Inhaled β2 Agonists

Over the past seven years, controversy has existed over the use and safety of inhaled β2 agonists in asthma. The debate has been triggered by recent reports of adverse effects associated with daily or regular use of inhaled β2 agonists (Crane et al., 1989; Sears et al., 1990; Beasley et al., 1991; Spitzer et al., 1992; Ernst et al., 1993), and this controversy was reflected in the results of our study. In general, physicians disagreed about increasing the dose for profiles describing patients taking the medication more than 3 to 4 times a day. However, physicians agreed that the dose should not be decreased in a situation involving use of an inhaled β2 agonist two puffs four times a day (Profile F). Disagreement amongst physicians for increasing the dose of an inhaled β2 agonists occurred for four out of the six profiles (Profiles B, D, E, and F) which described asthma severity levels ranging from moderate to severe.

Profile D (a severe rapid-onset exacerbation) was associated with the greatest disagreement; overall, 42% of the physicians recommended increasing the dose of an inhaled β2 agonist, while 58% did not recommend increasing the dose (Table 9a). The recommendation to increase the dose of inhaled β2 agonist makes clinical sense, given the
severity and acuteness of the exacerbation described in Profile D (Beveridge et al., 1993; BTS, 1993). Possible explanations for this disagreement are that (i) some of the physicians selected only the action of highest priority (receiving medical attention), (ii) physicians assumed that the action of receiving medical attention would routinely include increasing the dose of inhaled β2 agonist, and (iii) many believe that taking inhaled β2 agonists more than four times a day is harmful.

Profile F (a moderate exacerbation associated with an URI) also demonstrates the controversy surrounding the appropriate dosing of inhaled β2 agonists. This profile elicited separate physician judgements for the two actions of increasing and decreasing the current dose of the inhaled β2 agonist from four times a day. The majority of physicians (63%) indicated that they would maintain the current dose of the drug, 4% indicated they would decrease the dose, and 33% indicated they would increase the dose. These data suggest that apparently the recent controversy over the safety of routine (QID) use of inhaled β2 agonists may be stimulating reevaluation and caution in terms of the appropriate dose of this class of drugs in the treatment of asthma.

The published Canadian asthma guidelines (Hargreave et al., 1990; Ernst et al., 1996) are not explicit regarding the dosing of inhaled β2 agonists. However, they do state that asthma should not be viewed as ‘under control’ if inhaled β2 agonists are required routinely; indeed, such use is not recommended. Before any explicit guidelines can be developed regarding the most appropriate role and dose of these agents for various levels of asthma severity, additional clinical trials are needed.

- **Use of Theophylline Preparations and Ipratropium Bromide**

The proper place of theophylline preparations in the armamentarium of asthma therapy is also being reconsidered. Studies reporting on theophylline usage patterns suggest that, on a global level, this medication is not being used consistently. Studies performed in Greece and
Singapore suggest that theophylline still plays a central role in the treatment of asthma (Gourgoulianis et al., 1994; Tan et al., 1992), whereas investigations in Australia, the United Kingdom, and Hong Kong suggest a more minor role (Tse et al., 1991; Ip et al., 1993; Johnston and Jenkinson, 1995). The latter three studies are consistent with the results of our study, which suggests that theophyllines play an even smaller role in asthma treatment in Ontario than in Australia and Hong Kong. For all six clinical profiles, more than 75% of physicians agreed that using a theophylline preparation was an action that they would not recommend. This is consistent with the Canadian guidelines suggesting a limited role for theophylline in asthma therapy.

The recommended use of theophylline preparations was low for both physician subgroups; however, family physicians did recommend their use more frequently than did specialists for Profiles B, C, D, and F (Table 6e). Consistent with our observations, Tan et al. (1994) also reported that family physicians recommended theophylline more frequently. On the other hand, Ip et al. (1992) reported that both family physicians and specialists recommended the use of theophylline to a similar degree.

The use of ipratropium bromide (Atrovent) was also associated with physician disagreement regarding its recommendation status for Profiles C, D, and E (Table 9a). Although the majority of physicians (66-67%) did not recommend its use, a sizable minority (33-34%) of physicians consistently recommended its use for these three profiles (Tables 4c-e). Family physicians recommended starting ipratropium more frequently than did specialists for Profiles B, C, and E (Table 6b). Previous studies reporting on the use of ipratropium in asthma therapy suggest that it has a minor role (Tse et al., 1991; Ip et al., 1992; Tan et al., 1993; Gourgoulianis et al., 1994). The studies by Ip (1992) and Tan (1993) suggest that family physicians and specialists recommend the use of ipratropium equally infrequently. However, these studies only assessed the 'usual' use of asthma medications for treatment of chronic asthma in adults; therefore, our observation of subgroup differences across profiles
regarding ipratropium may be due to treatment differences generally associated with varying degrees of asthma severity.

Typically, theophylline and ipratropium are viewed as third and fourth line therapies for the management of asthma. In aggregate, these physicians (family physicians and specialists) did not commonly recommend the use of any of these drugs (Tables 6d-e). Family physicians, however, more frequently recommended the use of theophylline preparations and ipratropium for treatment of the six asthma profiles than did specialists.

These results indicate that some physicians are still recommending drugs that are not as effective as the 'first line' medications currently available. This might be explained in part by the rapidity of change in the medications available for the therapy of asthma. Over the past twenty years, asthma therapeutics has moved from an era where there were relatively few effective drugs to one in which there is a wide choice of effective anti-asthma medications. Possibly the large number of available medications is causing some degree of confusion. In addition, treatment approaches to asthma have changed significantly. Theophylline, once considered a pillar of asthma therapy, is now regarded as third or fourth line adjuvant therapy. Today the mainstays of asthma therapy are inhaled corticosteroids and inhaled \( \beta_2 \) agonists. Perhaps some physicians continue to recommend use of these drugs because of the persistent influence of therapeutic trends that were in place during their training. Over 30% of the physicians in our sample had completed their training in the 1970s and early 1980s, at a time when the accepted therapy of asthma primarily involved bronchodilators (e.g. theophylline and \( \beta_2 \) agonists) given on a regular basis.

- **Use of Corticosteroids**

  The percentage of physicians who, contrary to the current guidelines, did not recommend either the use of inhaled corticosteroids or oral corticosteroids, was relatively high: Profile B-11.7%, Profile C- 8.6%, Profile D- 29.5%, Profile E- 12.9%, and Profile F-14.7%. The results from Profile D, a rapid severe exacerbation, may not reflect actual practice
because physicians overwhelmingly recommended that the patient seek medical attention and they may have assumed that the patient would routinely be given corticosteroids under these circumstances. However, the observation that 9 to 15% of physicians (excluding Profile D) did not recommend the use of corticosteroids when they were clearly indicated in the guidelines suggests that there is room for improvement.

Disagreement about whether or not to recommend inhaled and oral corticosteroids occurred for three of the six clinical profiles (C, D, and F). These profiles described moderate to severe asthma exacerbations, one of which was associated with an URI. This disagreement was observed for both physician subgroups. It is likely that the use of corticosteroids was not felt to be the issue questioned in these three cases. Rather the delivery route (oral versus inhaled) and therefore dose were the likely sources of uncertainty. Factors which could contribute to physicians' disagreement include the fact that oral corticosteroids at high doses provide rapid relief but with potentially more systemic side effects, while the inhaled route at smaller doses provides a slower therapeutic onset but with fewer side effects. Physician disagreement about recommending an inhaled corticosteroid or an oral corticosteroid has not been previously reported. This is clearly an important area for further investigation, since the competing factors of effectiveness, side effects, and cost need to be considered.

Specialists more frequently recommended the use of inhaled corticosteroids (Profiles E and F) and a course of oral corticosteroids (Profiles B, C, D, and F) than did family physicians (Tables 6c and 6f). Our observations are consistent with those of Engel et al. (1989), who reported that specialists (allergists) used corticosteroids more aggressively than generalists (pediatricians and family physicians) to treat asthma. Engel used three methods to assess the intensity of corticosteroid use (physician reporting, physician response to written case simulations, and patient reporting), and all three consistently demonstrated that specialists more frequently used short bursts or daily maintenance doses of oral corticosteroids. It should be noted that these investigators did attempt to control for disease severity. Engel also reported
that specialists were more likely than generalists to prescribe inhaled corticosteroids; in our study, this was the case for only two of the clinical profiles (E and F). Our observations as well as those of Engel, combined with the fact that the use of oral corticosteroids is often an indication for a specialist consultation, suggest that specialists may feel more confident about the use of oral corticosteroids.

In general terms, the results from our study demonstrate that the majority of physicians (and specialists more predominantly than family physicians) recommend the use of corticosteroids. Depending on the profile, 70-91% of physicians recommended the use of a corticosteroid when clinically indicated. These high percentages of self-reported use are consistent with other studies (Tse et al., 1991; Ip et al., 1993), and suggest that corticosteroids are playing a major role in asthma therapy in Ontario.

- Use of Non-steroidal Anti-inflammatories

We observed that, for all six clinical profiles, physicians agreed that using a non-steroidal anti-inflammatory preparation (ketotifen, cromoglycate, or nedocromil sodium) was an action that more than 75% of the participants would not recommend. This observation cannot be explained by limitations placed on participants for the number of treatment options that could be recommended because, for each profile, no such limitations were placed on participants. Several other studies have reported similarly low usage patterns for non-steroidal anti-inflammatories in the management of chronic asthma in adults (Barritt and Davies, 1986; Tse et al., 1991; Tan et al., 1992; Ip et al., 1993; Gourgoulianis et al., 1994). For the current study, the percentage of physicians who recommended the use of these types of medications was even lower than that reported in previous studies. Nonetheless, our results are noteworthy. Recent reports have promoted the use of non-steroidal anti-inflammatories as adjuvant therapy to inhaled corticosteroids in moderate and severe asthma because of their potential steroid sparing effects (Dukes et al., 1994; Svendsen et al., 1991). Our results,
however, suggest that Ontario physicians are not using non-steroidal anti-inflammatory preparations as either primary or adjuvant therapy for asthma.

In general, physicians' recommended use of non-steroidal anti-inflammatory preparations was low for both physician subgroups; however, family physicians did recommend their use more frequently than did specialists for the Profiles of C, D, E, and F. (Refer to Tables 4a-f and Table 6d.) Of the three previous studies comparing the use of non-steroidal anti-inflammatories by family physicians and specialists, one observed no difference between the groups (Ip et al., 1993), one observed that specialists recommended them more frequently (Phin and Oates, 1993), and the third observed that family physicians recommended them more frequently (Tan et al., 1992).

In summary, the low recommendation level for the use of this drug category might be anticipated since the numerous studies and asthma guidelines which advocate the use of inhaled corticosteroids as first line therapy appear to leave little room for the use of non-steroidal anti-inflammatories in adults (Hargreave et al., 1990; Juniper et al., 1990; British Thoracic Society, 1993). Other possible explanations include a lack of familiarity with these medications or, alternatively, that physicians may have used them and been unsatisfied with the results.

- **Use of Antibiotics**

  The use of oral antibiotics was assessed only in Clinical Profile F, a case describing an exacerbation associated with an URI. For this profile, the majority of family physicians (79%) recommended the use of antibiotics, whereas the specialists were split with 48% recommending and 52% not recommending their use (Table 4f). Connolly et al. (1991) used a questionnaire designed to elucidate views on the frequency of infection in asthma and its management from general practitioners, general internists, pediatricians, and respirologists. They reported that, on the whole, general practitioners and general internists overestimated the risk of bacterial infection, and that this resulted in more frequent prescriptions for oral antibiotics. The investigators also reported that those who prescribed oral antibiotics also
tended to withhold corticosteroids. Our data provide some support for this observation. In general, family physicians more frequently recommended oral antibiotics (79%) and were less inclined to recommend the use of corticosteroids (oral: 27%; inhaled: 60%) than were specialists, who more frequently recommended the use of corticosteroids (oral: 41%; inhaled: 83%) and were less inclined to recommend antibiotics (48%) (Table 4f).

Connolly et al. (1991) also examined the indicators that physicians used for determining the need for antibiotics. They reported that frequent prescribers of antibiotics were more likely to regard purulent sputum, subacute onset of the exacerbation, and persistent deterioration as indications of bacterial infection and therefore a need for antibiotics than the less frequent prescribers of antibiotics. Similarly, frequent prescribers were more likely to provide antibiotics in doubtful cases of bacterial infection. The clinical profile (F) used to elicit judgements about antibiotics described a patient who had been experiencing a sore throat, rhinorrhea, nasal and sinus congestion, and cough productive of whitish-yellow sputum, in addition to worsening asthma symptoms of wheezing and dyspnea for the past 2-3 days. The hypothetical patient was currently taking 400 mcg/day of an inhaled steroid and an inhaled $\beta_2$ agonist QID. There was no mention of the patient having a fever or producing purulent sputum. However, possibly the subacute onset of the exacerbation was viewed an indicator of the need for antibiotics by ‘frequent prescribers’.

An additional potential explanation for this subgroup difference pertains to the number of years since completion of training or duration in practice. Perhaps those individuals who completed their training earlier were more likely to recommend the use of antibiotics because this was regarded as appropriate therapy at that time. In this regard, it is noteworthy that the subgroup of family physicians had been in practice longer than the specialists. As well, specialists may be more confident than family physicians in withholding antibiotics for asthma exacerbations because they may have greater experience dealing with these cases.
The frequent recommendation for the use of antibiotics in this study is probably not justified by the published evidence (Graham et al., 1982; Connolly et al., 1991). Although inappropriate use of antibiotics is rarely harmful to the individual, it is costly and has important implications for the acquisition of bacterial resistance which should not be dismissed lightly in this era of multiresistant bacterial strains. The volume of work completed in this area is small, given the large clinical problem in which it presents, and should be the subject of a future study.

- **Use of Outpatient Visits**

Family physicians were more likely to recommend that the patient be seen that same day either in his/her office or in the Emergency Department than were specialists (Profiles A, B, E and F; Table 6i). Other studies comparing generalists and specialists in terms of the number of office visits for a particular problem have reported mixed results. Consistent with our study, Bennett et al. (1983) reported that family physicians tended to see patients more frequently for a particular problem than did internists. The latter study was done in university-affiliated outpatient clinics and may not be generalizable to the non-educational setting.

The recommendation of a same day outpatient visit was assessed in the contexts of mild to severe asthma exacerbations. The observation that family physicians more frequently recommended a same day outpatient visit may indicate that, compared with specialists, they do not feel as comfortable or as confident in making treatment recommendations without having examined the patient first. Because specialists see more asthma patients (twice as many in a month) than family physicians, they may develop more confidence in their treatment recommendations. Naylor (1996) reported the existence of greater uncertainty among family physicians than among specialists and suggests that differences in levels of uncertainty reflect not only knowledge of evidence from published clinical trials but also inference and experience. Our study did not specifically measure physicians' confidence levels in their treatment judgements, but these results indicate that this is an area worth exploring.
ii) Differences Between Subgroups Regarding Therapy Judgements

As previously discussed, statistically significant differences were observed between the two subgroups of physicians for several of the individual treatment actions. The family physicians more frequently recommended: (a) increasing the dose of an inhaled β2 agonist (Profile E); (b) starting ipratropium bromide (Profiles B, C, and E); (c) decreasing the dose of an inhaled corticosteroid (Profile F); (d) starting a non-steroidal anti-inflammatory preparation (Profiles C, D, E, and F); (e) starting a theophylline preparation (Profiles B, C, D, and F); (d) initiating a course of oral antibiotics (Profile F); and (e) seeking a same day outpatient visit (Profiles A, B, E, and F) (Tables 6a-f). In comparison, specialists more frequently recommended: (a) increasing the dose of an inhaled β2 agonist (Profile D); (b) increasing the dose of inhaled corticosteroids (Profiles E and F); and (c) initiating a course of oral corticosteroids (Profiles B, C, D, and F) (Tables 6a-f). Examination of the total number of recommendations for use of medications and medical services over all six profiles revealed that family physicians recommended a greater number of treatment actions than did specialists (family physicians: \( \bar{x} = 57.6 \pm 5.4 \), specialists: \( \bar{x} = 55.5 \pm 4.7 \); \( t = 2.7, p = 0.008 \)).

- Possible Differences in Cost

The subgroup differences discussed above might suggest that asthma management is more costly when provided by family physicians than by specialists. Freund et al. (1989) evaluated the costs of treating asthma by different physician specialties and observed that the patients of allergists had higher asthma costs than did patients followed by non-allergists (ie. family physicians and pediatricians). They reported that patients of allergists took more prescription drugs, received more allergy shots, and rented more medical equipment than did those followed by non-allergists. This is in contrast to our results, which imply that patients followed by family physicians would be taking more prescription medications than patients of specialists. However, the direct comparability of these two studies is questionable, given that
the costs of allergy shots were included in total costs examined in Freund's study, and such interventions are typically not recommended or given by respirologists. The degree of non-comparability is difficult to determine, since Freund does not state the percentage of the total costs due to allergy shots.

Perhaps cost modelling could be used specifically to look at the implied costs generated by the two subgroups of physicians. However, important costs that should be taken into account include those generated by the use of diagnostic tests (e.g. pulmonary function testing, bronchoprovocational challenges, allergy testing), which were not addressed in the study reported here, but have previously been shown to be utilized more by specialists (Greenwald et al., 1984). In addition, Bennett et al. (1983) reported that medical residents in specialty training (internal medicine) charged more per patient visit than did residents in family medicine, but that the cost differences essentially disappeared when the summation of encounter charges was considered over 18 months. Recall that, in the current study, we also observed that family physicians recommended medical encounters more frequently. Taken together, our observations and those of previous investigators suggest that this is an area worthy of more detailed investigation.

B. CONSISTENCY WITH CANADIAN GUIDELINES

a) Assumptions and Limitations

One of the aims of this study was to determine if the treatment of hypothetical asthma profiles by physicians (family physicians and specialists) was consistent with the 1990 Canadian Conference Report on The Assessment and Treatment of Asthma. Due to the nature of the consensus conference, which involved a limited number of participants, there is a lack of methodologic rigor to these guidelines and recommendations for asthma care. However, at the time of the study, the 1990 Conference Report was the "best" one available for identifying and describing optimal asthma therapy. Since completion of this study, a revised set of consensus conference guidelines has been published with recommendations based on a critical review of
the literature and categorized according to the strength of the scientific evidence supporting each recommendation (Ernst et al., 1996). The 1990 and 1996 consensus conference guidelines are very comparable in their treatment recommendations. One manner in which the guidelines have changed is that the 1990 guidelines used a stepped approach to management whereas the 1996 guidelines have abandoned this approach. Throughout this discussion, the term “guidelines” refers to the 1990 Canadian Conference Report on The Assessment and Treatment of Asthma published in the *Journal of Allergy and Clinical Immunology*.

Some areas of the 1990 guidelines are not explicit about recommended therapy and are therefore open to interpretation. Consequently, it is sometimes difficult to determine consistency with the guidelines, which was apparent in the current study. In particular, differing interpretations of the guidelines might result in disparate recommendations for Asthma Profile C (ie. a moderate to severe, slow-onset exacerbation). For instance, when applying the more restrictive criteria, 77.9% of physicians were fully consistent with the guidelines for Asthma Profile C; however, when applying the least restrictive criteria, 90.2% of physicians were consistent with the guidelines. In our study the least restrictive or most conservative approach was used to determine physician consistency with the guidelines. As exemplified by Profile C, we acknowledge that differences in the interpretation of the guidelines and the subsequent selection of consistency criteria may yield somewhat different levels of apparent consistency.

Because of its non-penalizing orientation (did not apply penalty points for inconsistent recommendations), the scoring system used for this study may imply higher levels of consistency than actually exist. If penalties had been assigned for selections that were inconsistent with the guidelines, the results might also have been interpreted differently. Previous studies evaluating physician consistency with asthma guidelines did not use a scoring system to ascertain consistency with guidelines (Epton et al., 1994; Neville et al., 1993; Phin and Oates, 1993; Thompson et al., 1993). To the best of the investigators’ knowledge, this is...
the first study to use a scoring system to describe differences between physician specialties in terms of consistency with asthma guidelines for adult outpatient management.

With these limitations in mind, the remainder of this section highlights the aggregate group’s results and the differences observed between the subgroups.

b) Discussion: Consistency with Canadian Guidelines

i) Full Group

Several other studies assessing the degree of consistency with asthma guidelines also report that some areas of physician management are at variance with recommended guidelines (Baldwin et al., 1990; Tse et al., 1991; Neville et al., 1993; Thompson et al., 1993; Phin and Oates, 1993; Epton et al., 1994; Pearson and Harrison, 1995; Crain et al., 1995; Ernst et al., 1995). Primarily, they report the underuse of inhaled $\beta_2$ agonists in acute asthma, over reliance on $\beta_2$ agonists for routine therapy, underuse of corticosteroids, lack of planned patient follow-up after an exacerbation, and the lack of a patient asthma action plan.

Direct comparison of the results from the current study to those of previous consistency studies is difficult because most earlier studies focused on the assessment and management of childhood asthma (Thompson et al., 1993; Phin and Oates, 1993), Emergency Department management (Epton et al., 1994; Phin and Oates, 1993; Crain et al., 1995), and/or in-hospital management of asthma (Bucknall et al., 1988; Baldwin et al., 1990; Pearson and Harrison, 1995). The current study, to the best of the investigator’s knowledge, is the only one that compared physician management of adult outpatients with varying profiles and levels of asthma severity to the recommendations of published guidelines.

When physician consistency with guidelines was looked at according to individual asthma profiles, 58.3% to 92.6% of physicians were consistent with the guidelines (Table 19). The identification of treatment areas that seem inconsistent with the guidelines supports and expands the observations made in the earlier studies cited above. Results from this study
suggest that some physicians may recommend overuse of inhaled β₂ agonists for maintenance therapy. This trend was most pronounced for Asthma Profiles E and F. For Profile E, which describes a patient who is using an inhaled β₂ agonist on an as-needed basis (usually 2-3 times a day) and low dose inhaled steroids but still experiencing break-through symptoms, 26% of the physicians indicated they would recommend increasing the use of this drug to more than two puffs two to three times a day (Table 5a). Profile F describes a patient experiencing an exacerbation associated with an upper respiratory tract infection who is taking 2 puffs QID of the inhaled β₂ agonist. For this profile 33% of the physicians recommended increasing the dose and 63% of physicians indicated that they would keep the current dosing schedule of 2 puffs QID. Recommendations of the 1990 and the 1996 Canadian guidelines explicitly state that the use of inhaled β₂ agonists should be on an as-needed basis and if breakthrough symptoms occur (as in Profile E), the dose of inhaled corticosteroids should be increased. The 1990 guidelines recommend that, ideally, patients should not use inhaled β₂ agonists more than twice daily. The 1996 guidelines are even more restrictive and recommend no more than 3 doses per week.

Physician underuse of corticosteroids, reported in previous studies, was apparent in Asthma Profiles E and F. For these profiles, 17% to 27% of physicians underused corticosteroids (systemic or inhaled). The approach used to compute these percentages may imply a higher level of corticosteroid use than actually exists (i.e. a ‘best case scenario’), because it was assumed that those physicians who selected a same day medical visit would have used corticosteroids (oral or inhaled). In other words, participants’ selections of inhaled corticosteroids, oral corticosteroids, and a same day outpatient visit were not included in this percentage.
Neville (1993) observed that the pharmacological regimen for many patients remained unchanged despite experiencing an exacerbation, which was contrary to the results in the current study. However, this discrepancy could be related to methodological differences. Neville collected data from medical records, whereas the current study used hypothetical cases with a checklist of possible treatment options which could have increased the propensity for a change in medications (a "cueing" effect). However, the treatment option of waiting and seeing with no change in medication usage was always offered, but rarely selected (<1%).

ii) Differences Between Subgroups

Previously, comparisons between specialists and generalists for consistency with asthma guidelines suggested that specialists are more consistent (Barritt and Davies, 1986; Bucknall et al., 1988; Engel et al., 1989; Baldwin et al., 1990; Phin and Oates, 1993; Pearson and Harrison, 1995). Our study confirmed this observation; specialists scored higher ($\bar{x} = 5.08 \pm 0.96$) for overall consistency with guidelines than did family physicians ($\bar{x} = 4.17 \pm 1.16$) and this difference was statistically significant ($t = 5.46, p < 0.0001$) (Figures 10 and 11). In addition, specialists were more consistent for Asthma Profiles A, B, E, and F (Tables 19 and 20). The family physicians' actions that accounted for the largest percentage of inconsistency included use of a same day medical visit, starting an oral corticosteroid, increasing the current dose of the inhaled $\beta_2$ agonist, starting ipratropium bromide (Atrovent), adding a non-steroidal anti-inflammatory preparation, and initiating a course of oral antibiotics.

When focusing solely on asthma profiles for differences in consistency with guidelines, it is apparent that treatment of Profiles E and F accounted for the largest portion of the differences (Table 20). This is surprising, given the prevalence of these types of case scenarios. Profile F describes a patient experiencing an exacerbation associated with an URI and the other describes a chronically undertreated patient. For Profile F, 78.3% of specialists were consistent with the guidelines compared to 57.5% of family physicians ($U = 2571; z =$
3.1, p= 0.0023) (Tables 19 and 20) and for Profile E, 79.5% of specialists were consistent with the guidelines as compared to 47.5% of family physicians (U= 2115; z= 4.7, p< 0.0001) (Tables 19 and 20).

Previous studies assessing asthma management and consistency with guidelines have not focused on the varying treatment approaches to differing asthma profiles. In addition, there have been no prior studies that have identified specific outpatient asthma profiles as areas of suboptimal care and therefore in need of improvement. These clinical situations might be targeted for special attention in continuing medical education courses and treatment updates. Results from our study support this notion; physicians who reported attending more asthma-related continuing medical education seminars demonstrated higher scores for overall guideline consistency than those who reported attending fewer asthma seminars. Intuitively, this is logical and suggests that continuing medical education may play a role in improving asthma care. However, it may also be that those who are more interested in asthma and already managing asthma appropriately are the attenders of such programs. The number of asthma seminars/conferences attended could also be a surrogate measure for identifying specialists. Specialists, by their very nature of practice, are interested in asthma care and therefore are more likely to attend such seminars. In addition, the majority of specialists in our study were university affiliated and may have greater expectations placed upon them for attending seminars and conferences and greater opportunity and/or time to attend asthma related educational activities than would family physicians in solo practice. These possible associations could also help explain our observation that physicians affiliated with a university demonstrated higher consistency scores than did physicians in a group or solo practice.

In addition, we observed that physicians who had been in practice the longest had lower consistency scores than did their counterparts who had practiced for a shorter time. Previous studies have also reported that more recent graduates are more up-to-date with current
trends in therapy for various disease states than are physicians who completed their training many years ago (Afridi et al., 1994; McFall et al., 1994; Arroll et al., 1995).

Whether or not the subgroup differences in consistency with the 1990 Canadian guidelines are clinically significant is not immediately apparent. Because the published guidelines have not been specifically evaluated, it is difficult to determine the degree of difference that is clinically significant. Does consistency with guidelines result in reduced asthma morbidity and/or mortality rates? This study is unable to answer this question because patient outcome measures were not obtained. A rule of thumb might be that differences between the subgroups of less than 10% are probably not clinically significant, differences between 10 and 20% may or may not be significant, but differences over 20% are probably clinically significant. The latter degree of difference (over 20% between subgroups) was observed for Asthma Profiles E and F.

Freund et al. (1988) reported differences in health outcomes between patients followed by allergists and primary care physicians; patients of allergists considered their disease less intrusive and had fewer days off from work or school. The investigators suggest that these differences were related to allergists’ more aggressive use of corticosteroids (oral and inhaled). The specialists in our study were also more likely to use corticosteroids than were family physicians. When considered in conjunction with Freund’s observations, the current study’s results may imply that clinically significant differences in outcomes may exist between specialists and family physicians. However, this statement needs to be viewed with extreme caution, because more research is required before it can be concluded that consistency with guidelines signifies higher quality of care or at what cut-off point consistency with guidelines signifies higher quality of care.

Studies in the United Kingdom assessing in-hospital management of asthma before and/or after the advent of guidelines show that the processes and outcomes of care of asthma patients are significantly better for those followed by teams that included a respiratory
physician than by teams that did not (Bucknall et al., 1988; Baldwin et al., 1990; Harrison and Pearson, 1993; Pearson et al., 1995). Bucknall and colleagues (1988) speculate that the better outcomes are due to specialists’ more frequent use of corticosteroids. Because Bucknall reports differences of approximately 15-25% between generalists and specialists for use of oral corticosteroids, this is partially the reason for considering the above-cited difference of 20% between specialities as potentially clinically significant. However, it is important to recognize that Bucknall’s study was performed in an in-hospital setting for cases of acute severe asthma and may not be generalizable to outpatient management of asthma and were not evaluated for physician consistency with guidelines.

The large percentage of physicians in our study whose treatment recommendations were consistent with the guidelines was not expected. Before initiating this study, anecdotal evidence from asthma care professionals and the literature suggested that physicians’ management of asthma was frequently not consistent with the guidelines. One possible explanation for this observation is the recent development and widespread dissemination of the Canadian guidelines for the diagnosis and treatment of asthma in numerous peer-reviewed journals and other areas of medical literature as well as significant pharmaceutical detailing. Pharmaceutical companies interested in asthma promoted the awareness and knowledge of the guidelines by sponsoring continuing education sessions across the province, and by developing and distributing educational materials (eg. pocket size step-chart, interactive computer programs, pamphlets, etc.).

The methods used in this study might also partially explain the higher than expected guideline consistency scores. Physicians’ self-reports of their usual asthma care practice may not represent “real” practice. Potentially, participants may know the “right” answer, but, they may not always incorporate the guidelines’ recommendations into their practice. A study by Engel et al. (1989) involving primary care physicians, allergists, and their patients suggests that this issue may not play a large role. Engel reported that, in response to hypothetical
asthma profiles, physicians' use of corticosteroids was consistent with their actual use as measured by their patients' reports.

An additional reason for the higher than anticipated consistency scores may be related to our methods for determining consistency with guidelines. For example, our scoring system may have been generous and, in consequence, artificially inflated the physicians' consistency scores. Our approach for determining consistency was conservative; whenever a particular action was in question or open to interpretation with regards to its consistency with guidelines, it was considered to be consistent. In addition, as previously mentioned we did not apply penalty points for incorrect answers.

Another potential factor may be related to the provided list of possible treatment actions which may have cued respondents to select consistent recommendations. The list of treatment options was limited and varied slightly for some profiles. In the real practice setting physicians have almost a limitless choice of treatment recommendations whereas for this study the number of options ranged from 7 to 11. For instance, the use of oral corticosteroids was not available for Profile A (mild asthma) but appeared on the list for the remaining five profiles. This may have influenced respondents to recommend this treatment action. The use of oral corticosteroids was consistent with the guidelines for three (C, D, and F) of the five applicable profiles.

C. RESEARCH AND CLINICAL IMPLICATIONS REGARDING THERAPY

- Asthma Costs

This study points towards several avenues for future investigation. One of these is the exploration of the costs of asthma care in Canada according to physician specialty. The current study could provide some insight into the costs associated with treatment such as the costs of the various treatment approaches for treating the six profiles. Krahn and colleagues (1996) have recently reported that the annual direct and indirect costs of asthma care in Canada total between $504 - $648 million in 1990 dollars (depending on assumptions); however, their
study did not examine cost differences between specialties or costs associated with patient education when performed in an outpatient setting by someone other than the physician. Differing physician styles of asthma management should be evaluated for their cost-effectiveness since substantial health care dollars could be saved through the identification of effective asthma management styles.

- **Guideline Development and Dissemination Studies**

  Even if it can be assumed that physicians are aware of the content of the guidelines, a necessary condition for physician acceptance of guidelines is their confidence in the usefulness of the particular guidelines (Kibbe et al., 1994). Acceptance of a guideline or practice recommendation depends, to a large extent, on whether or not physicians feel they can trust the process by which the guideline was developed (Kibbe et al., 1994). Perhaps family physicians may not have accepted the guidelines as readily as specialists for the following reasons. First, family physicians were not represented on the expert panel who developed and approved the guidelines. This could potentially introduce a bias based on differences in training, in disease severity level, and how patients are accrued (specialists' practices are based primarily on referral). Second, there was no methodologic grading of the quality of studies from which the recommendations were based, nor was there a description of the methods used for literature retrieval. Possibly, family physicians did not trust the creation process and/or felt that their own perspectives and issues were not represented in the content of the guidelines. If this is the case, then it is not surprising that specialists scored higher in terms of consistency with (their own) guidelines.

  There is some evidence to suggest that family physicians may find the 1990 Canadian asthma guidelines unacceptable. Family physician reviewers of the *Guidelines for the Diagnosis and Management of Asthma*, produced by the Expert Panel on the Management of Asthma under the auspices of the National Heart, Lung, and Blood Institute in the United States, found the guidelines unacceptable for some of the reasons mentioned above (Berg and
May, 1992). In the opinion of the reviewing family physicians, “the hundreds of policies that comprise this report are practice options that practitioners should treat as they would any recommendation from a consultant: as expert opinion and not as science-based policy” (Berg and May, 1992). It is interesting to note that the recently revised 1996 Canadian asthma consensus conference did include family physicians as participants and also based its recommendations on a critical review of the scientific literature and the strength of scientific evidence.

Although the expectations are high for asthma guidelines to reduce suboptimal care in asthma, it is likely that guidelines alone are insufficient. They guide physicians to “do the right thing” but fail to address the corresponding issue of “how to do the right thing in the right way.” In addition, considerable time and resources are often spent on the developmental process of guidelines but relatively little on the implementation and evaluative processes.

A review of published British asthma audits suggests that despite the generation and publication of guidelines on the management of asthma in 1990 by the British Thoracic Society and the Royal College of Physicians, asthma mortality rates remained unchanged (Harrison and Pearson, 1993). This review also stated that the same areas for improvement identified in the 1970s and 1980s still exist in the 1990s. They include: (a) undertreatment with steroids, (b) inappropriate therapy, (c) underestimation of the severity of the condition by the attending physician, (d) underestimation of the severity of the condition by the patient, and (d) failure to recognize or treat months or weeks prior to acute attack. These observations imply that the development and publication of asthma guidelines in isolation is insufficient and that more attention needs to be focused on implementation and evaluation.

Intervention studies conducted to compare differing asthma guideline implementation strategies on physician performance have yielded mixed results. Interventions used in the studies have included academic detailing (Health Resources and Services Administration (HRSA), 1993), CME conferences or educational meetings (Webb et al., 1992; HRSA, 1993).
computer modules (HRSA, 1993), personalized feedback (Barritt and Staples, 1991; HRSA, 1993), preprinted checklists (Barritt and Staples, 1991) and protocol order sheets (Webb et al., 1992), the development of local guidelines based on national guidelines (Webb et al., 1992), and a multicomponent asthma management curriculum (Hendricson et al., 1994). The study by Hendricson (1994) was the only evaluation of an intervention targeted to pediatric residents. The remaining studies involved primary care physicians. In addition, all of these studies utilized a quasi-experimental design, therefore leaving this important area in need of further more rigorous examination.

All of the studies reported some improvement in one or more areas of asthma care or enhanced knowledge of appropriate care. Improvement in asthma care was judged in terms of more frequent prescriptions or performance of an activity such as the use of objective lung measurements and other diagnostic tools, administration of medications, and/or patient education. However, not all variables were associated with improvement; the Webb et al. and the HRSA studies also reported that close to 50% of the variables examined did not improve. Hendricson reported that pediatric residents demonstrated significant improvements in knowledge of appropriate care and confidence in ability to manage asthma after completing an asthma management curriculum. However, this study did not actually examine improvements in asthma care.

Two of the studies assessed asthma patient outcomes with conflicting results. Webb (1992) reported no changes in total hospital stay or readmission rates within 30 days of the initial Emergency Department visit. In contrast, Barritt and Staples (1991) reported significant improvements in nighttime episodes of asthma in children and daytime episodes of asthma in adults after a guideline implementation program directed at physicians. However, when overall disability scores were compared, there was no difference between patients scores before and after the guideline implementation program. One important limitation of the Barritt and Staples study is that only one practice with two physicians participated.
Review of these studies suggests that combined approaches appear to be more successful in achieving desired outcomes than are those which focus on a single type of intervention. A review article of randomized controlled trials that evaluated strategies for improving prescribing practice also concluded that combined methods are needed to lead to improvements in care while dissemination of printed material alone is insufficient to improve practice (Anderson and Lexchin, 1996). They noted that successful education strategies included face to face contact between an expert and a physician in addition to feedback that involved specific recommendations for change. It is apparent that considerable uncertainty remains in this area. For example, it is not known how long the effect of an intervention or educational program will last in altering physician behavior.

Currently, in Toronto, an initiative is underway in pediatric asthma that may provide some insight into guideline development and dissemination. The Hospital for Sick Children, in conjunction with community-hospitals in the Toronto area, is working to develop local guidelines that go beyond the published guidelines. In addition to merely providing specific recommendations for asthma treatment in an outpatient setting, a hospital setting, and an Emergency Department setting, these guidelines will also provide recommendations for the use of diagnostic procedures, the provision of asthma education, indication for a referral to a specialist, and the provision of high quality follow-up care. This initiative involves specialists (both allergists and respirologists) and non-specialists, university affiliated and non-university affiliated physicians, other health professionals interested in asthma care, and a community non-profit organization (The Ontario Lung Association).

Physicians who have been identified as role models from the various hospitals are participating in the developmental process and will take the locally developed consensus guidelines back to their institutions for dissemination. Thus far, the dissemination process involves mini-symposia and workshops and the use of preprinted checklists, flip-charts and posters of the guidelines, and other support materials. It is anticipated that this project will be
evaluated in terms of its ability to alter physician behavior and improve patient outcomes. In addition, this project will illuminate the area of guideline development and implementation, as well as the usefulness of guidelines in asthma care.

- **Consistency Studies**

  In the current study, we compared self reported asthma care practice to the 1990 Canadian guidelines. It is difficult to characterize the overall degree of consistency between the guidelines and the physicians' self reported treatment of the six profiles. The majority of previous studies evaluating consistency with asthma guidelines do not report, in a qualitative or quantitative manner, the degree of consistency with the guidelines. Instead, they tend to report the areas of highest and lowest consistency and suggest that the areas associated with the lowest consistency are in need of improvement.

  A study by Ernst and colleagues (1995) reported on consistency with asthma guidelines. The objective of the study was to assess the potential impact of the overreliance on $\beta_2$ agonists and the underuse of steroids on the risk of life-threatening asthma by reviewing the medications that 258 subjects had been dispensed over a two year period. Their study design was a nested case-control which used a linked health insurance database (Saskatchewan) to identify asthma cases who experienced life threatening episodes as well as control cases. Further clinical information was obtained from hospital medical records and physician questionnaires. Two clinical experts judged the management of asthma as "at least partially compatible" or "incompatible" with the Canadian guidelines. A single assessor also determined a weighted score for asthma management based on the use of anti-inflammatory medication, $\beta_2$ agonists, contra-indicated medications, and oral corticosteroids for patients recently discharged from hospital; scores could range from 0-10 (1 reflecting treatment most compatible and 10 representing treatment least compatible). They reported that patient cases judged as "incompatible" with the guidelines were more common among cases of fatal and near fatal
asthma than were those cases judged as “at least partially compatible” with the guidelines in Saskatchewan from 1980–1987. This difference reached statistical significance when at least one of the clinician reviewers judged the treatment as “incompatible”; however, when applying the criterion that both reviewers must judge the case as “incompatible”, the difference was no longer statistically significant. In addition, the score for asthma management was 3.5±1.7 for cases experiencing a life threatening episode compared to 0.8±1.4 for controls, thus suggesting that the quality of pharmacological treatment was worse in the life threatening cases (p<0.001). This study did not examine differences between physician specialty subgroups. These results imply that cases experiencing fatal or near-fatal asthma were more likely than controls to have received treatment judged as inadequate by the 1990 Canadian guidelines (specifically, less anti-inflammatory and more β₂ agonist treatment).

The study by Ernst (1990) provides indirect support for the assumption that physician asthma practice which is consistent with the guidelines leads to improved asthma outcomes. However, as discussed above, there is a paucity of studies evaluating the effectiveness of guidelines in the outpatient management of adult asthma. In the absence of this type of information, it is difficult to even speculate what cut-off points for consistency with guidelines represent appropriate or inappropriate outpatient care and about the level at which we should be satisfied that physicians are consistent with the guidelines. If 75% of physicians are consistent with the guidelines, is improvement still needed? Is 90% sufficient or should we strive for 100% consistency with the guidelines? This is an area worthy of further investigation.

In the current study, specialists’ consistency scores were statistically significantly higher than those of family physicians’ scores. The absolute difference in mean scores for overall consistency with guidelines was 0.91 (out of a possible score range of 0-6), which is equivalent to specialists having a score of 85% and family physicians having a score of 70%. Is this difference clinically significant? As discussed above, the clinical significance of this difference is unclear. Perhaps it is not so surprising that there is a difference in scores, given
that the specialists wrote the guidelines and family physicians were excluded from the developmental process.

From the above discussion, it is apparent that asthma guidelines have rarely been evaluated systematically. This is consistent with the overall state of evaluation for clinical practice guidelines (Carter et al., 1995; Basinski, 1995). Carter reported that only 13% of 55 participating organizations interested in clinical practice guidelines indicated, in response to a questionnaire, that some type of formal evaluation of the guidelines was performed. The authors of these articles cite many barriers to evaluation including expense, time, expertise, and a lack of data.

- **Revised Asthma Guidelines**

Consistency with 1990 Canadian guidelines was a primary variable explored in this study. However, since completion of the study, a new set of evidence-based guidelines were formulated and published by The Canadian Thoracic Society. It would now be interesting to evaluate the consistency of the physicians' self reports on asthma treatment with reference to the new revised guidelines. When the recommendations of the 1996 guidelines were applied to treating the six hypothetical asthma profiles in the current study, only one recommendation differed from the 1990 guidelines. The recommendations of the revised guidelines for treatment of Profile C is the use of oral corticosteroids whereas the 1990 guidelines allows the use of inhaled corticosteroids and oral corticosteroids. In addition, the use of non-steroidal anti-inflammatory agents for the treatment of mild asthma induced by strenuous activity is not as explicitly recommended in the revised guidelines as in the 1990 guidelines. This study could serve as a baseline study and be repeated some time later to evaluate the acceptance, knowledge of, and implementation process of the revised guidelines.
II. PROVISION OF ASTHMA EDUCATION

A. SELF REPORTS REGARDING EDUCATION PROVISION

a) Assumptions and Limitations

This section is most vulnerable to social desirability bias, given the use of a check list to assess provision of education. In the extreme, respondents might have indicated that they spontaneously provided all nine of the educational activities for all three severity levels, when in actual practice they did not. However, large variations in the responses were actually observed (Tables 10-13). The statistically significant differences across severity levels and between subgroups provide some evidence that respondents were not merely providing "socially desirable" responses. In addition, Roter et al. (1994) reported that underreporting of patient education activities of physicians poses an even greater threat to accurate estimates of physician practice than overreporting, when they compared physician reports in response to a questionnaire to audiotaped interactions among physicians and patients with chronic diseases.

Over the past decade, emphasis has been placed on physicians demonstrating and assessing the correct use of inhaler devices. Data from the current study confirms that physicians agree they need to demonstrate the proper use of these devices although direct assessment of the accuracy of their demonstrations was not carried out. A recent study assessing pediatric residents' proper use of inhalers and spacing devices reported, that on average, only 3.8 steps out of the 7 recommended steps were performed correctly (Amirav et al., 1994). Similarly, a study by Hanania et al. (1994) reported that approximately 50% of physicians used inhalational devices incorrectly.

The next section discusses physicians' self-reported provision of education for the most and least frequently provided educational activities, their provision of these activities according to the asthma severity level, the differences observed between subgroups, and concludes with a discussion of the implications.
b. Discussion Regarding Provision of Education

i) Provision of Education for the Full Group

• Most Frequently Provided Activities

Participants' self-reports indicated that three educational activities were most frequently provided to individuals with asthma of all severity levels: providing general information about the disease; providing information about prescribed medications; and demonstrating the use of inhalational devices (Table 10). These activities were reported to be spontaneously provided to individuals with asthma at all three severity levels (mild, moderate, severe) by over 85% of the physicians. These items, therefore, may be thought of as the "basic" elements of the physicians' asthma education program. The remaining six activities were provided less frequently and the provision of some of these activities was more dependent on asthma severity. For example, action plans, whether based solely on asthma symptoms or on a combination of peak expiratory flow rates and symptoms, were reported to be reserved for patients with more severe asthma. On the other hand, the action of referring the patient to a community nonprofit organization to receive further information about asthma was generally not provided irrespective of severity level.

Tse et al. (1991) reported that 473 Australian general practitioners most frequently self-reported providing general information about asthma and information about medications while least frequently providing an asthma action plan. Although Tse and colleagues did not assess the provision of educational activities for different levels of asthma severity, their observations do support those of the current study. General asthma information and information about medications were self-reported by 87%-99% of our respondents and by 84%-93% of physicians surveyed by Tse.

In both studies, provision of an action plan was one of or the least frequently reported actions. The current study assessed two types of action plans, one based solely on symptoms and the other, based on a combination of symptoms and PEFR. This is in contrast to Tse's
(1991) study which only assessed the general provision of an action plan to asthma patients. Self-reported levels for provision of an action plan based solely on symptoms were similar when mild asthmatics from our study were compared to those in the study by Tse (38% versus 34%, respectively). However, in the current study, reported provision levels for this action were higher for patients with moderate and severe asthma. These were the only educational activities that allowed direct comparisons.

- **Less Frequently Provided Activities**
  
  The “basic” educational activities reported in the current study were consistent with several published asthma management guidelines (British Thoracic Society 1993; Hargreave et al., 1990; National Heart, Lung, and Blood Institute (NHLBI), 1991; NHLBI, 1992); however, other educational activities explicitly recommended were not consistent. The Canadian guidelines (Hargreave et al., 1990) suggest that each patient be provided with a written personal action plan. In our study, 38 -74% of physicians reported spontaneously providing an action plan based upon symptoms and fewer reported providing action plans based upon a combination of symptoms and peak expiratory flow measurements (7 - 52%). Recently, studies that have compared the efficacy of the two types of action plans report no difference in the way patients provide self care during periods of worsening asthma, visits to the physician or Emergency Department, or hospital admission rates (D’Souza et al., 1994; Garrett et al., 1994; GRASSIC, 1994; Malo et al., 1993; Charlton et al., 1990). However, for those individuals who are poor perceivers of worsening asthma symptoms, action plans based on the combination of PEFR and symptoms are still recommended (GRASSIC, 1994).

  Potential explanations for the infrequent reports of providing action plans include the lack of physician awareness of the need for every patient to have an action plan for worsening asthma, the assumption by many physicians that patients will contact them if they worsen, the brief time that physicians spend with patients during visits, and the lack of resources to either develop or purchase action plan templates. A possible solution might include providing
physicians, free of charge, with action plan templates to complete for each asthma patient. These templates could be distributed to physicians in numerous ways: (1) mailed to physicians from the Canadian Task Force on Asthma, Health Canada, or other official bodies (the Canadian Thoracic Society, Family Physicians Interested in Asthma Association (FPIAA), or the Canadian Network for Asthma Care (CNAC)), (2) provided to physicians from non-profit community organizations, or (3) pharmaceutical representatives could personally deliver them during office visits. The problems of increasing physician awareness of the need for asthma education, their willingness to provide written action plans, and the short duration of office visits are more difficult to solve. Several attempts have previously been made to increase awareness of the need for asthma patient education, specifically the use of action plans and self monitoring skills, through the publication of articles in journals targeted to various levels of specialization (Parker et al., 1989; Evans, 1993; FitzGerald et al., 1992; Bone, 1993; Clark et al., 1993; McCarthy, 1993; Hauptman, 1994; Partridge, 1995).

The educational activity reported least frequently (18-36%) was a referral to a community nonprofit asthma organization to obtain further asthma education. The use of nonprofit organizations to provide further information could actually assist physicians with the provision of supplemental information about asthma. It is anticipated that, given the restricted financial environment of health care, office visits with physicians will not be increasing in duration but actually shortening; therefore, the services offered by community agencies could be used to enhance and supplement these visits.

Potential reasons for not providing these referrals could include the lack of physician awareness about these agencies (Unpublished qualitative study, Glaxo Canada, 1994), the possibility that patients will become “too educated” about asthma and not return for future care (Bauman et al., 1990), or the perception that these agencies are not knowledgeable or qualified to provide such information. Two unpublished qualitative studies completed recently in the Toronto region (CNAC, 1995; Glaxo, 1994), indicate that physicians are unaware of the
activities (e.g. seminars, courses) performed by and the instructional media (videos, pamphlets, booklets) distributed through community agencies.

Steps could be taken by the community agencies and other stakeholders of asthma care (professional associations) to increase physician awareness of the educational opportunities afforded to patients by these community agencies and how their services are accessed. If indeed physicians are fearful of losing their patients once they become educated, community agencies could work on establishing partnerships with physicians in educating individuals with asthma. Physicians' fear of losing patients will diminish through the development of a partnering relationship between physician and community nonprofit agencies.

- **Education and Level of Asthma Severity**

Results from this study suggest that the level of asthma education is directly related to the patient's asthma severity level. All nine asthma education activities exhibited this trend. The actions that tended to be reserved for those with moderate to severe asthma were: (i) information about avoidance of triggers and environmental control measures, (ii) information about warning signs, (iii) provision of action plans (both types), and (iv) providing a referral to a community nonprofit organization interested in asthma. The provision of education based on severity level and reserving some types of information for those with more severe asthma may make intuitive sense. However, there are no studies demonstrating that asthma severity level is the best indicator for the content and intensity of education needed to reduce morbidity and mortality rates and costs associated with asthma. Furthermore, the most important or essential types of educational activities for the reduction of adverse outcomes associated with asthma have not yet been identified. Therefore, one could argue that most of these basic educational activities should probably be provided to all patients with asthma. For example, anyone prescribed an inhaler must know how to use it correctly; similarly, all individuals with asthma should know signs of worsening asthma and what to do in response to them. Until there are studies demonstrating that patients with milder asthma do not require these educational
activities for successful control and/or do not desire the information and activities, it is the opinion of the author that all patients with asthma should be provided this information.

ii) Differences Between Subgroups Regarding Provision of Education

Differences were observed between physician subgroups regarding self-reported provision of asthma education to patients. The overall score for provision of education was greater for specialists than for family physicians, and specialists reported providing more educational activities to patients with mild, moderate, and severe asthma (Tables 14 and 15). The following activities demonstrated the greatest differences between subgroups: (1) demonstration of the proper use of inhalational devices; (2) providing information about peak flow monitoring; and (4) providing an action plan based on symptoms and PEFR (Tables 13 and 14). These differences were most striking for patients with moderate and severe asthma.

A study performed by the U.S. National Institutes of Health (NIH) (Woelle and Cwi, 1995) supports our observation that differences exist among specialty areas. Although 80% of physicians, despite area of specialty, reported providing most of the information to asthma patients, respirologists and allergists more frequently reported performing educational or counselling activities than did internists, family physicians, and occupational health physicians. The activities associated with the most variance across specialties were discussions of asthma control with family members and provision of instructions on peak flow monitoring; the latter observation regarding peak flow monitoring is consistent with our observations.

Direct comparisons of reported levels of education provision are difficult because our study was stratified with respect to various degrees of asthma severity while the NIH study was not. In the NIH study, 54% of the respirologists and 20% of family physicians reported providing instructions about peak flow monitoring, whereas, in our study, depending on severity level, 11% - 72% of the respirologists and 10% - 47% of family physicians reported providing this activity. The NIH study did not indicate whether or not the reported differences across specialties reached statistical significance.
One possible explanation for this observation is that specialists spend more time per patient visit than do family physicians thereby providing a greater opportunity to perform patient teaching (Greenwald et al., 1984; Noren et al., 1980). In support of this notion, Noren reported that, on average, internists spent 18.4 minutes per office visit whereas, family physicians (family-general practitioners) spent 13.0 minutes per office visit for a variety of diagnoses. Greenwald (1984) did not specify time spent per visit or the absolute time difference between the groups, but did report the difference as statistically significant. (Asthma was one of the disease classifications examined in this study.) Noren also reported that specialists provided more health education than did family physicians. Methods used in these two studies were similar in that data were collected from physicians' self-completed records of patient encounters. In Noren’s study, 610 physicians reported on 15,500 patient encounters and Greenwald indicated that 3,000 physicians completed records of 125,000 patient encounters.

iii) Provision of Education Summary

Over 85% of physicians in our study reported providing basic asthma information, providing information about prescribed medications, and demonstrating the correct use of the inhaler device to patients regardless of their asthma severity level. Action plans were one of the least reported activities, but when they were provided, physicians preferred those based solely upon symptoms. Physicians also perceived the need for asthma education to be greater for patients with more severe asthma than for those with less severe asthma. Until definitive evidence exists identifying what type of educational activities are required for different asthma patients, it is the opinion of the author that the most conservative and utilitarian approach be taken: all patients should know what asthma is, understand their medications and their correct use, be informed of the warning signs of worsening asthma and what steps should be undertaken to control the situation, and be informed of ways to identify and avoid their own personal asthma “triggers”.
B. RESEARCH AND CLINICAL IMPLICATIONS REGARDING PROVISION OF EDUCATION

Considerable information has accumulated over the past decade regarding asthma education. However, major gaps in our knowledge remain. Some areas appropriate for future studies include:

- the assessment of patients' perception or recall of education provided to them by their physicians;
- the identification of specific educational activities that contribute to successful control of asthma; and
- the development and evaluation of models or programs aimed at improving the ability of physicians and other health care professionals to educate patients and improve their self management skills.

Currently in Canada, there are only two organizations, The Quebec Asthma Education Network and the Alberta Asthma Program, that offer formal training programs for preparing asthma educators (physicians and other health professionals). The Canadian Network for Asthma Care (CNAC) is also working collaboratively with the Alberta and Quebec programs to develop a set of criteria for establishing a Certified Asthma Educator program at a national level. Upon successful completion of the program, participants would obtain the Certified Asthma Educator status from the Canadian Network for Asthma Care. CNAC anticipates that national certified asthma educator programs will be available in the Fall of 1997. Other countries that have national programs for certifying asthma educators are the United Kingdom and New Zealand. Unfortunately, there have not been any published studies evaluating the effectiveness of such national programs.

The list of educational activities used in the current study was useful for identifying activities that physicians frequently and infrequently provided as well as identifying those activities which were reserved for individuals with moderate or severe asthma. This list of
educational activities identified gaps in asthma education as reported by physicians and could potentially be used to identify education gaps as perceived by patients.

It is also important to go beyond recall of patients and physicians with respect to asthma education. Assessment and analysis of the patient-physician interaction using audio or videotaping would be insightful in many ways. This method would allow a comparison of physicians' and patients' perceptions of asthma education provided with the results of the taped interaction. In addition, it would allow investigators to explore the communication styles and behaviors of physicians and asthma patients. Studies examining patient-physician interactions have been used in other areas of disease specific or general health education in order to develop specific interventions targeted to both patients and physicians that might improve patients' disease/health outcomes (Roter et al., 1977; Greenfield et al., 1985; Greenfield et al., 1987; Anderson et al., 1991). Effective communication on the part of the physician and the patient is an essential element of asthma education (Evans, 1993; Partridge, 1995; Clark, 1993). This type of study (comparison of patient and physicians perceptions of provided asthma education and results of taped interactions) would assist in identifying key components of asthma education and evaluating the effectiveness of varying approaches to asthma education. The checklist of educational activities used in this study could assist in the coding of the patient-physician interactions in terms of identifying key (or thought to be) educational activities. In addition, the methods used in the current study were useful for describing physicians' usual provision of asthma education to patients which can serve as a baseline for future comparisons; however, studies required at this time must assess the educational behaviors of patients and physicians and not just their perceptions.
III. PARTNERING FOR CARE

A. ASSESSING PERCEIVED PATIENT INVOLVEMENT IN MANAGEMENT

a) Assumptions and Limitations

The assessment of physicians' perceptions of the usual and ideal levels of patient involvement in their asthma practice is vulnerable to social desirability bias. Physicians may feel that they are expected to involve patients in management decisions. Currently, a great deal of pressure is placed on physicians to develop a patient-physician partnership, especially in the area of asthma care (Hargreave et al., 1990; NHLBI, 1991; NHLBI, 1992; Deber, 1994). Accordingly, respondents might have indicated that their patients 'usually' contribute at least equally to management decisions, and similar effects may have been induced for reported preferences regarding the 'ideal' situation. However, if this had invariably happened, we would have observed neither the range of responses to each of these questions nor the statistically significant differences between the “usual” and “ideal” situations that are reported here. These observations provide some evidence that respondents were not merely providing invariant “socially desirable” responses.

b) Discussion Regarding Perceived Patient Involvement

Establishing a partnership between the physician and the patient is thought to be one of the key elements to successful asthma management (Hargreave et al., 1991; NHLBI, 1991; NHLBI, 1992). In this study, most physicians indicated that the usual situation was one in which the physician makes the decisions but strongly considers the patient’s opinion, and that an equal sharing of the responsibility for management decisions was the preferred ideal (Figures 4-9). This difference between physicians' reported usual level of patient involvement and their ideal level of patient involvement reached statistical significance (z = 5.9, p < 0.0001). This is the first time that physicians' perceptions of usual and ideal level of patient involvement in asthma care and an apparent difference between the two have been reported. Degner et al.
(1988) have reported similarities in cancer patients' perceptions of their preferred role and of their role typically played in management decisions, but physician perceptions of the two roles were not reported.

A study by Strull et al. (1984) suggested that physicians often overestimate patients' desires to participate in decision making and underestimate the role that patients perceived themselves as playing in decision making. When the patients in Strull's study were asked "Who do you think should make the decisions about medicines for the treatment of high blood pressure?", almost half replied that the clinician should make the decision without patient participation. Only 22% of the patients stated they wished to play an equal or greater role with the physician in management decisions. Strull's observation that patients prefer not to be involved in treatment decisions is echoed by our observation that physicians perceive that they are the ones who make the decisions while keeping in mind the patient's opinion.

The primary purpose of a study by Kaplan et al. (1996) was to identify physician and practice characteristics associated with the tendency to involve patients in decisions. They observed that physicians in lower-volume practices and those who received primary care training or training in interviewing skills scored higher than physicians in higher volume practices and those without such training. In the current study, we did not examine these variables directly. However, if one assumed that physicians who received more training about the management of asthma also received training in establishing a partnership between the patient with asthma and the physician, then our results are consistent with their results. In addition, the results of the two studies are consistent because both reported no statistically significant differences associated with physician specialty, gender, and age.

There is a paucity of studies assessing physician preferences for decision making. The majority of studies have focused solely on the patients' perspectives regarding involvement in decision making, and these have been done in diverse settings and for multiple disease states (Vertinsky et al., 1974; Brody et al., 1989; Sutherland et al., 1989; Degner et al., 1988;
Lerman et al., 1990; Ende et al., 1989; Llewellyn-Thomas et al., 1991). The results of these previous studies are not always in agreement; some report that patients desire a more participatory role while others come to the opposite conclusion.

We are aware of only one study that has reported on asthma patients' preferences for participation in management decisions (Koning et al., 1995). These investigators reported that one-third of the patients surveyed by a mailed questionnaire wanted more participation in treatment decisions. Limitations of this study include the restrictive population from which the sample was drawn (4 general practitioners and 1 chest physician), a relatively low response rate (55%), and the observation that only 23% of participants labelled their symptoms as due to asthma (the remaining participants referred to their symptoms as COPD or COLD). Koning did not report on the patients' perceived level of participation in management decisions; they reported only that patients desired more participation. The observations from our study and from Koning's suggest that both patients and physicians report a desire for an increased participatory role for the patient in asthma management decisions. If patients and physicians are reporting similar preferences for patient involvement, strategies/interventions will be needed to assist both parties in the achievement of their ideal level of involvement.

B. RESEARCH AND CLINICAL IMPLICATIONS REGARDING PERCEIVED PATIENT INVOLVEMENT IN ASTHMA MANAGEMENT

For the reasons mentioned above, Koning's (1995) study does not sufficiently address the area of patients' perceptions and desires for involvement in management decisions. This an area that should be explored in some detail. Studies are needed that go beyond simply assessing patients' preference for participation in treatment decisions because asthma is a disease that requires the patient to make such decisions on a routine basis. The preferred level of participation should also be examined in terms of asthma outcomes. In the current study, Strull's 5 descriptive statements for levels of patient involvement were useful for identifying physicians' perspectives on patient involvement level and for detecting differences between the
usual and the ideal level of involvement and might also be useful to assess patients’ preferences.

Do patients who prefer a more “active” role in treatment decisions experience better asthma control (higher quality of life and reduced health care utilization rates) than those who prefer a less active role in treatment decisions? If the answer to this question is “yes”, then it would be important to develop interventions targeted to those individuals who desire a more passive role. There is a body of literature suggesting that patients with chronic illnesses (diabetes, hypertension, peptic ulcer disease) who play a more active role in decisions experience better health outcomes (Greenfield et al., 1985; Greenfield et al., 1988; Kaplan et al., 1993; Greenfield et al., 1994). Because these studies were completed in patients with chronic diseases that require daily usage of medication and behavioral changes, it is anticipated that comparable benefits would be observed in asthma. Individuals with asthma, whether they want to or not, are faced with self management decisions routinely. Therefore, it is important that they play an “active” role in the relationship with their physician. In doing so, patients may be more inclined to seek and obtain information from the physician and other sources that will assist them in self management decisions.

The level of congruence between what the physician reports and what his/her patient reports for the usual and ideal level of patient involvement in asthma management decisions also needs to be studied. This is an important area in order to ascertain the existence of partnerships or imbalanced relationships.

Kaplan (1996) compared reported levels of involvement in decisions of patients with hypertension, coronary heart disease, diabetes, and depression and their physicians. They observed a statistically significant correlation between physicians’ and patients’ reports. In order to develop and foster a partnering relationship, it is important that both parties’ perceptions and expectations be identified and, if required, negotiated. Improved communication between the physician and his/her patient with regards to one another’s
expectations and preferences for decision making may result in increased satisfaction for both parties and potentially better medical outcomes for the patient (Brody, 1980; Greenfield et al., 1985; Greenfield et al., 1988; Greenfield et al., 1994).

IV. OVERALL IMPLICATIONS FOR ASTHMA CARE

A. IMPLICATIONS FOR CLINICAL PRACTICE

• *Use of Continuous Quality Improvement and Clinical Practice Guidelines*

  Applying some of the principles of continuous quality improvement (CQI) may prove useful in the enhancement of asthma care. An important concept in the application of CQI is the integration of knowledge for improvement with professional knowledge (Headrick et al., 1994). *Knowledge for improvement* is distinguished from professional knowledge which comprises the traditional areas of anatomy, pathophysiology, diagnosis and therapeutics. Professional knowledge, though necessary, is not sufficient for improvements in care; it is also essential that knowledge for improvement be integrated with professional knowledge.

  Briefly, knowledge for improvement has four components - knowledge of a system, knowledge of variation, knowledge of psychology, and knowledge of theory (Headrick et al., 1994). Knowledge of a system involves clarifying the process of providing care; that is, tracing the actual steps in the process of asthma care as they take place. Knowledge of variation suggests that just getting rid of the “bad apple” (ie. physicians who fall outside the expected range of practice) will only have a minimal effect on improving care. For example, asking the question, “What causes variations in asthma outcomes and costs?” will be more productive than asking, Who are the “bad” doctors?”. Knowledge of psychology relates to the motivation of physicians and other individuals involved in asthma care, including the individual with asthma. The last component, theory of knowledge, relates to the methods of human learning and calls for learning based on evidence (Headrick et al., 1994).

  If quality improvement in asthma care requires linking both professional knowledge and knowledge for improvement, then the mere provision of asthma guidelines will be
insufficient to achieve high quality asthma care. According to the principles espoused by CQI, asthma guidelines are a tool only for improving professional knowledge but do nothing to address knowledge for improvement. The clinical practice guideline movement has assumed that the individual physician is the appropriate target, and, therefore, is primarily responsible for the quality of care that patients receive. While it is true that physicians are a major factor in determining the quality of care and they influence the costs associated with that care through the tests and therapies used, they are only one part of the process leading to health outcomes. If, in fact, we are moving away from a physician-centered model of health care to one of a participatory model in health care, then there must be a sharing of the responsibility for improving asthma care among caregivers, organizations, and individuals with asthma. Asthma care has become a collaborative process that depends on the cooperative and coordinated effort of many people.

B. IMPLICATIONS FOR THEORY AND RESEARCH

Given the discussion to this point, further investigations in asthma care could proceed in a number of directions.

a) Possible Areas for Further Research

• Identifying Characteristics of “Best” Practitioners

The current study could suggest further investigation to identify or predict which physicians provide the “best management” or, conversely, the outliers from “usual” asthma management. Secondary analyses of data from this study could be carried out in an attempt to identify physician profiles associated with the “best asthma management,” as defined by a high level of asthma education provision, a high level of patient involvement, and a high level of guideline consistency. Such analyses would only be exploratory, however, since this study was not originally designed to address this area and several major potential problems exist. First and foremost is that the definition of “best asthma management” is, at best, arbitrary. Currently, there are no studies that define optimal care or indicate the levels of guideline
consistency and education provision required to achieve optimal care. Such secondary analyses of the current data set could only assist in the identification of important variables for a future study deliberately designed to address this research question.

- **Evaluating the Effectiveness of the Model of Asthma Care**

  Another area worthy of investigation is the formal evaluation of the effectiveness of the model of asthma care proposed by the guidelines (ie. appropriate therapy, asthma education, and developing a partnership between the physician and the patient). This has never been done. Components of the model of asthma care have been evaluated individually, especially the areas of asthma education and appropriate treatment. However, the proposed model must be evaluated in its entirety to determine its effectiveness in successfully controlling asthma. In addition, the area of patient satisfaction with asthma care that is provided according to the model could also be explored. Patient satisfaction has been correlated with the participatory style of the physician, the physician’s explanation of what was done, the physician’s technical skills, the office visit overall, and the patient’s self reported level of participation (Lerman et al., 1990; Kaplan et al., 1996). Completing such a study would be a difficult endeavor because we currently lack a good definition of quality of care. Moreover, we have not even determined the best indicators of or the best way to measure successful asthma management (Bailey et al., 1994).

- **Pediatric Asthma**

  Another avenue of future investigation is the application of methods similar to those used in the current study to the area of pediatric asthma. Studies in other countries have assessed physician practice patterns for childhood asthma and have reported differences between specialization categories (Phin & Oates, 1993; Thompson et al., 1993). However, these studies have not included the areas of patient/parent involvement in management decisions or the provision of many of the asthma educational activities assessed in the current study. Physician subgroups that should be assessed include pediatricians, pediatric
respirologists, pediatric allergists, family physicians, and general practitioners. Involving all levels of specialists allows for the identification of practice styles specific to specialization. In addition, such a study could identify areas of physician agreement and disagreement and, potentially, areas for improvement in the management of childhood asthma.

The methods used in the current study would be useful in conducting a descriptive baseline study for asthma management in the pediatric population. A mailed survey involving randomly selected physicians who follow children with asthma could assess the same key components of asthma care described above (appropriate therapy, provision of education, and patient and or family involvement in management decisions). Modifications to the current questionnaire would be needed in all sections to reflect the differences in asthma management of children, both older and younger, compared to asthma management in adults, although the basic structure of the questionnaire could remain unchanged. This approach may well identify major differences in approaches to asthma care in the pediatric population compared with adults. For example, non-steroidal anti-inflammatory preparations might be used more frequently in the pediatric population and perhaps peak flow meters to assist parents with management decisions about school aged children. Taken together, the results from the current study and from a study of pediatric asthma could guide the establishment of a research program in asthma care which is relevant to all age groups.

b) Future Directions for This Investigator in Asthma Care

- The Building Blocks

This study highlights areas for improvement in physicians' approaches for managing asthma. Results from physicians' self-reports for providing asthma education imply that they tend to provide asthma education activities according to severity levels; the more severe a person's asthma, the more educational activities he/she will receive. The action observed to be most reserved for individuals with moderate to severe asthma was the use of action plans either based solely on symptoms or based on a combination of symptoms and peak flow rates. Our
results also suggest that physicians have differing opinions about the use of medications and medical services in the following areas of asthma treatment: (a) the correct dosing of inhaled β₂ agonists; (b) the use of ipratropium; (c) the preferred route of delivery and dose for corticosteroids (oral vs inhaled) for more moderate to severe asthma; (d) the use of non-steroidal anti-inflammatory for more moderate to severe asthma; (e) the use of oral theophylline for more moderate to severe asthma; (f) the use of oral antibiotics to treat an exacerbation associated with an upper respiratory tract infection; and (g) the need for a same day medical visit for moderate asthma. For both asthma education and treatment, we observed that differences in asthma management exist between family physicians and specialists. In general, specialists were in agreement more frequently about the use of the various treatment options, reported providing more asthma education to patients of all severity levels, and were more consistent with the guidelines than family physicians. These observations provide insight into the investigator’s previous work in which patients of specialists possessed more asthma knowledge and were more likely to select appropriate self care actions than were patients of family physicians. Taken together, these observations suggest that the specialists’ scores for education provision and treatment consistency may partially explain their patients’ higher scores for asthma knowledge and appropriateness of self care selections.

The observation from our previous study that differences in approaches to self care existed between patients followed by family physicians and respirologists provided the impetus for the current study which attempted to gain a better understanding of physicians’ approaches to asthma management and to explore the possibility of differences between specialties. Indeed, the results from the current study taken together with the results of our previous work suggest the need for further studies. It is now important to explore the level of congruence between the individual patient and her/his physician and the possibility that the asthma patient’s appropriate or inappropriate approach to self care is related to his/her physician’s approach.
Asthma Management Approaches of Patients and Physicians: Are They Congruent?

To date, there has not been a study which has explored both the patient's and the physician's asthma management perspectives and the degree to which they are complementary. Some of the research questions that could be addressed include: (1) What are the approaches of asthma patients to the management of their disease?; (2) Are there differences in patient self management approaches according to their primary asthma caregivers' level of specialization?; (3) To what extent is there congruence between asthma patients and their caregivers approaches to asthma management?; (4) Are there differences in the degree of congruence between patient-physician pairs for different physician specialties?; (5) For patient-physician pairs congruent in their approach to appropriate asthma management, are the patients experiencing better asthma control (quality of life, functional status) than patients incongruent with their physicians?

As described earlier, individuals with asthma routinely face making management decisions in absence of their physician. In the extreme, the physician can be viewed as an expert consultant to the individual with asthma regarding the best approach to take in controlling the disease. For this reason it is important to understand the management approach of individuals with asthma. It is anticipated that the best case scenario would be congruence for asthma management between the individual with asthma and his/her physician who recommends appropriate treatment, educates the patient about control of the disease, and shares responsibility and input in management decisions. One would hypothesize that congruence between the individual with asthma and his/her physician, as in the case just described, would result in appropriate self care activities and therefore lead to successful asthma control. Conversely, it could be hypothesized that patients who are incongruent with their physician would experience inadequate or suboptimal control of their asthma.

The next step for the investigator is to conduct a study examining and evaluating the role of patient-physician congruency in approaches to asthma management and the asthma
outcomes associated with different congruency levels. Currently, the investigator is developing a pilot study to ensure that the methods proposed are feasible and valid. A version of The Physicians’ Questionnaire used in this study has been developed for patients to assess the same three components of asthma care (appropriate treatment, asthma education, and a partnership between the patient and physician). Each of these components is expanded upon below.

- **Appropriate Therapy**

  In the current study we used physician consistency with guidelines as an indicator of appropriateness of therapy. However, the results for consistency can be influenced in a number of ways by the methods used. First, the results are influenced by the stringency of the criteria used to define consistency with guidelines. Using the more liberal set of criteria is conservative because any bias is in the direction of under-estimating the number of respondents inconsistent with the guidelines. Second, the results can be influenced by the point system used to determine level of consistency with guidelines. The original point system proposed provided a dichotomous variable (consistent or not consistent). A revised point system had to be developed because some participants were unable (or unwilling) to select only one action as their first priority action, and a revised point system allowed for partial consistency. This strategy also served to underestimate inconsistencies. However, even after using these conservative methods, the revised strategy was able to detect variances with the guidelines and differences between subgroups and thus is suitable to be used in future studies.

  The methods used in the future study will be similar to those used in the current study. In a future study, patient and physician treatment recommendations will be elicited using hypothetical asthma scenarios of varying levels of severity. These judgements will be compared to one another to examine the degree of treatment congruence between the patient and physician and to the guidelines in order to determine consistency and appropriateness. In addition, the 1996 Canadian guidelines’ recommendations will serve as the “gold standard” for
appropriate treatment, despite their incomplete validation. The treatment options of salmeterol (Serevent) and fluticasone (Flovent) will be added to the list of potential treatment options. By using these proposed methods, we will be able to detect the level of congruence between patient and physician and determine appropriateness of treatment.

- **Asthma Education**

  The section on asthma education will assess the physicians' perceptions of the education activities they provide to patients, as well as patients' reports of their receipt of the same educational activities from their physicians. The same nine educational activities will be assessed because the current study detected differences in provision levels across educational activities, severity levels, and physician subgroups. A request to the patient for a demonstration of inhaler use will be added and scored, since the proper use of inhalers is one of the essential skills in managing asthma. In addition, patients will be asked to indicate which educational activities they think are essential in order to manage asthma to gain insight into patients' desires for information. These data will allow us to explore the possibility that patients with varying degrees of asthma severity have differing preferences for types and quantity of information provided. The current study observed that patients with more severe asthma were provided more educational activities; this next study might reveal if this provision pattern is a consequence of patient preferences.

- **A Partnership Between the Patient and the Physician**

  Strull's five categories describing various levels of patient involvement will also be used to assess patients' and their physicians' perceptions of the usual and ideal level of patient involvement in their asthma management. This instrument will be used again, in part, to investigate the degree of agreement between the usual level and the ideal level of patient involvement. If there are discrepancies in patient-physician reports of the usual level of patient involvement in management decisions and their preferred ideal level of involvement, this would imply that neither party is satisfied with the current level of involvement. Previously,
Koning (1995) reported that patients desired an increased role in asthma management decisions. In the case that both patients and physicians are dissatisfied with the usual level of patient involvement and desire an increased level of patient involvement, then this suggests the need for interventions targeted at improving shared decision making.

Patients will also be asked to rate their physician's participatory style by using an instrument developed for the Medical Outcomes Study (MOS) (Kaplan et al., 1996; Tarlov et al., 1989). The instrument involves answering three questions using a 5 point scale: (1) "If there was a choice between treatments, would this doctor ask you to help make the decision?"; (2) "How often does the doctor make an effort to give you some control over your treatment?"; (3) "How often does this doctor give you some control over your treatment?" This instrument has previously been shown to be reliable and to correlate with physicians' reports of participatory decision making style (Kaplan et al., 1996).

- **Asthma Outcomes**

  In addition to obtaining basic demographic data, participants will be asked to provide some information about outcomes of asthma care, including the number of previous hospitalizations and or Emergency Department visits, number of visits to the physician for asthma, days missed from school/work due to asthma, and days of restricted activity due to asthma. Patients' current asthma control will also be assessed by questions pertaining to the need for inhaled $\beta_2$ agonist use, daytime and night-time symptoms, and frequency of exacerbations. By obtaining this type of information we will be able to explore the possible asthma outcomes associated with congruent/incongruent patient-physician pairs and perhaps gain insight into the importance of each of the three primary components of the model of asthma care (appropriate treatment, patient education, and level of patient involvement) on outcomes of asthma care.

  The data analytic plan will involve comparing individual patients' responses to those of their physicians' in order to determine the levels of congruence for each of the variables of
primary interest. The Physician’s Questionnaire and the Patient’s Questionnaire were
developed so that the questions align with one another. A pilot study will be done to assess
sampling/recruitment strategies, to determine the required sample size for the full study, and the
feasibility of such an investigation.

The full study proposed here will identify areas of agreement and disagreement for
approaches to asthma management between physicians and patients. In addition, the proposed
study will provide some insight into the usefulness of the model of asthma care suggested by
published asthma guidelines. Congruent patient-physician pairs who report the use of
appropriate therapy (as defined by the guidelines), high levels of asthma education, and a
participatory style for management decisions will be compared to those pairs that report the use
of inappropriate therapy, low levels of asthma education, and a non-participatory style for
management decisions in terms of the patients’ reported asthma outcomes.

- An Intervention Study

Results from the study described above could be incorporated into the development of
interventions targeted to both physicians and patients in order to improve asthma management. Assuming that evidence-based asthma care guidelines represent best practice, it can be argued that patients’ and physicians’ asthma practice should be consistent with evidence-based
guidelines. An intervention that combines the results of the described research program and
improving evidence-based practice of physicians and patients would need to be multifaceted.
One component of the intervention would involve educating physicians and patients about the
content of evidence-based guidelines for asthma care. Improving patients understanding of the
guidelines recommendations may also be an effective way to change physicians’ knowledge
and practice. The rationale for this is that the more patients are informed about their disease
and its management, the more likely they are to question their physicians practice, and as
result, encourage their physicians to remain up-to-date with recent developments.
There are several ways in which patients and physicians could be informed about managing asthma appropriately, and they could include the mass media venue, the involvement of community non-profit and professional organizations, and the availability of drop-in asthma education centres staffed by certified asthma educators.

Another component of an intervention study may involve the development and dissemination of local or regional guidelines because acceptance of the published guidelines is poor. With regards to physicians, the development of local guidelines may increase the sense of ownership and of meeting the region’s needs, and would therefore increase acceptance. In addition, locally developed evidence-based guidelines should be comprehensive and not only address the provision of appropriate therapy, but also the use of diagnostic procedures, indications for referral to an asthma specialist, provision of asthma education and the need for action plans, provision of high-quality follow-up care, and the need for patient involvement in care and ways to enhance this involvement. In addition, perhaps, more information should be provided specific to the treatment areas associated with physician disagreement or uncertainty as identified in the current study (appropriate dosing of inhaled β2 agonists and use of antibiotics).

Before patients and physicians receive the guidelines and education with regards to the contents of the guidelines, a needs assessment should be completed. This would provide insight into the type of information desired, the preferred format, and preferred educational methods for disseminating the guidelines for patients and physicians in order to make this information applicable and useful. It is essential to keep in mind that the mere provision of the guidelines is insufficient to change practice. Physicians and patients must understand not only what the right thing to do is, but must also be able to do the right thing, in the right way, at the right time. Therefore the intervention must improve their knowledge, management skills, and confidence in their ability to manage asthma.
An interesting study to conduct would involve comparing three groups with regards to asthma outcomes (morbidity, mortality, and costs). One group would receive the two interventions described above for improving physician and patient asthma practice. The second group would receive the intervention targeted solely to patients and the third group would receive routine care (no intervention). Because of the scope of the interventions, the sample population would probably involve communities of different provinces.

The proposed study would be difficult to complete for several reasons. One is that prior to initiating such a study, a great deal of work/research would be required for the development of the interventions. Secondly, because of its scope, it would involve multiple investigators and research assistants in different provinces which adds a layer of complexity to the study. Perhaps most important is the cost associated with performing a study of this nature and size. However, the benefits gained from the information derived from the study would be expected to far outweigh the costs associated with it. In addition, the results of this study could be applied to other chronic disease states that involve the individual to make self care decisions (e.g. diabetes, chronic obstructive pulmonary disease, arthritis) making it a worthwhile investment.

C. SUMMARY AND CONCLUDING STATEMENT

The purpose of the current study was to identify physicians' approaches to asthma management in Ontario according to the model of asthma care proposed in the 1990 Canadian guidelines. The impetus for this study was the result of secondary data analyses of previous work of the investigator which suggested that patients of respirologists possess more asthma knowledge and are more likely to select appropriate self care decisions than are patients of family physicians. In response to this observation, we also examined the possibility that differences exist between specialists' approaches to asthma management and the approaches of family physicians.
Results from the current study imply that physician uncertainty exists for some areas of asthma management and that there are treatment recommendations that deviate from the published asthma guidelines. There was also considerable variation in the reported provision of asthma education based, at least in part, to the level of asthma severity. In general, our results suggest, based on self-reports, that specialists' treatment recommendations were more consistent with the guidelines and that they provided more information to their asthma patients than did family physicians. The results from this study provide important baseline information for future work and areas that could be targeted for improvement in asthma care.

Future work of the investigator will build upon the methods used and results obtained in the current study. In order to assess the clinical significance of the apparent differences between specialties in treatment uncertainties, inconsistencies with the guidelines, and in the provision of asthma education, the investigator's next study will examine the patients' approach to asthma care concurrently with their physicians according to the model of asthma care used here. This next step is important not only for asthma care, but also for complex chronic care situations that involve self monitoring and self care, since it will bring together the perspectives of both patients and physicians and explore the interactional component so critical to attaining successful disease control.
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APPENDIX A

LETTERS TO PHYSICIANS
Dear Dr.  

Re: Survey of Physicians' Strategies for the Management of Asthma.

We are writing to ask for your assistance with a survey which will be sent to you shortly from the University of Toronto and the Clinical Epidemiology Unit at Sunnybrook Health Science Centre.

In managing asthma, there is considerable uncertainty regarding the best strategies for achieving successful control of the disease. This controversy includes such issues as which pharmacologic agent(s) to recommend and which patient education strategies assist patients to manage their asthma.

The survey questionnaire will be mailed to you and over 200 other Ontario physicians. It will ask for your opinions about: (a) the optimal pharmaceutical agents to recommend for various degrees of asthma severity; (b) asthma education strategies that should be used with patients; and (c) the level of participation that the patient with asthma should have in management decisions. The answers to these questions will allow us to determine the extent to which Ontario physicians who treat asthma agree or disagree about these issues.

Investigators from the University of Toronto and the Clinical Epidemiology Unit of Sunnybrook Health Science Centre who will manage this survey include Dr. William Geerts, Dr. Hilary A. Llewellyn-Thomas, and doctoral student Lisa Cicutto.

The questionnaire should arrive at your office within the next few days. It will take approximately 15-20 minutes to complete and there is a $50.00 honorarium for participation in the study (ie. a returned, completed questionnaire).

The success of this research depends entirely on the co-operation of Ontario physicians who treat asthma. We will ensure that any information you provide on the questionnaire will be kept confidential. As a participant in this research endeavour, if you wish, we will also send you a copy of the aggregate results of the study.

We thank you for your anticipated assistance.

Sincerely,

Lisa Cicutto, MSc               William Geerts, MD, FRCP (C)               Hilary A. Llewellyn-Thomas, PhD
Date

Dear Dr.

Re: Survey of Physicians' Strategies for the Management of Asthma.

Approximately one week ago, we sent you a letter outlining the details of a questionnaire about managing adult asthma that would be sent to you. One of the reasons for this survey is that in managing adults with asthma there is considerable uncertainty regarding which management approaches are optimal in achieving successful control of asthma. Moreover, little is known about the areas of agreement and disagreement in management approaches for asthma among Ontario physicians.

The purpose of this study is to learn what Ontario physicians think: (a) are the optimal pharmaceutical agents to recommend for various degrees of asthma severity; (b) are the asthma education strategies that should be utilized; and (c) is the ideal level of involvement that the patient should have in asthma management decisions.

Participation in this study will take approximately 15-20 minutes of your time. In appreciation of your time, a cheque for $50.00 will be sent to you. This survey has been approved by the Human Subjects Review Board at the Sunnybrook Health Science Centre and the Office of Research Services at the University of Toronto. A summary of the results will be sent to all participants who would like a copy.

The specifics of your participation are outlined on an attached page.

Thank you in advance for participating in this research endeavour. Your responses are essential to its success.

Sincerely,

Lisa Cicutto, MSc        William Geerts, MD, FRCP(C)        Hilary A. Llewellyn-Thomas, PhD
GENERAL INFORMATION

Your participation in this study involves completing a questionnaire which asks you to provide some information about:

1. Your treatment recommendations for varying levels of asthma severity;
2. Your usual approach to providing asthma education activities to your patients;
3. Your individual asthma practice characteristics.

How will confidentiality be maintained?
When you return your completed questionnaire, the coded tear-off identification card will be separated from the survey booklet by a clerical person who does not have access to the master list of the code numbers that have been assigned to each physician. That clerical person will pass the card on to a second clerical person who will have access to this master list, but not to the questionnaire responses. In this way, a cheque will be mailed to you, and confidentiality about who responded as well as specific responses can be maintained. The identification card and the master list will be destroyed. If you come across a question(s) that you do not wish to answer, simply skip the question and continue on with the remaining questions. By completing the questionnaire and returning it, it is assumed that you are providing consent to use your responses in determining the study’s results.

General Instructions
This booklet is divided into 4 sections. Each section has been streamlined for ease of usage. Please move through the sections sequentially. If you have any questions, do not hesitate to contact Lisa Cicutto, a study co-investigator, at (416) 480-6700 (collect calls are accepted), Monday to Friday between 9 a.m. and 5 p.m. at the Clinical Epidemiology Unit at Sunnybrook Health Science Centre.

Thank you very much for your participation in this survey. If you wish, we will send you a copy of the aggregate results upon completion of the study.
Date

Dear Dr.

Re: Survey of Physicians' Strategies for the Management of Asthma.

Two weeks ago a survey questionnaire sought your opinions about: (a) treatment recommendations for the management of varying degrees of asthma severity, (b) your usual approach to providing asthma education to your patients, and (c) the preferred level of patient involvement in asthma management decisions.

If you have already completed and returned the questionnaire, please accept our sincere thanks. If you have not, we encourage you to do so at your earliest convenience. It is extremely important to have your opinions included in this study, so that the results will represent the opinions of physicians who manage asthma. Once we have received your completed questionnaire, you will receive a cheque for $50.00. Additionally, if you wish, a copy of the aggregate results will be sent to you upon completion of the study.

If by some chance you did not receive the questionnaire, or can't seem to find it, please call me collect today at (416) 480-6700 and I will get another one in the mail to you at once.

Sincerely,

Lisa Cicutto, MSc
Co-investigator
Dear Dr.

Re: Survey of Physicians' Strategies for the Management of Asthma.

A few weeks ago, investigators at the Clinical Epidemiology Unit of the Sunnybrook Health Science Centre and the University of Toronto wrote to you seeking your opinions about treatment recommendations for managing asthma. As of today, we have not yet received your completed questionnaire, which is anticipated to take less than 15 minutes to complete.

We are writing to you again because of the significant contribution your completed questionnaire will have to the usefulness of this study. In order for the results to be truly representative of the opinions of physicians treating asthma, it is essential that each person in the sample return his or her completed questionnaire.

In case your questionnaire package has been misplaced, a new one has been provided.

Your cooperation and involvement in the study is truly appreciated. Once we have received your completed questionnaire, a cheque for $50.00 will be sent to you in appreciation for your time spent participating and assisting us with the investigation.

If you have any questions, please contact Lisa Cicutto at (416) 480-6700, collect calls will be accepted.

Sincerely yours,

Lisa Cicutto, MSc         William Geerts, MD, FRCPC         Hilary A. Llewellyn-Thomas,
PhD

...
Dear Dr.

Re: Survey of Physicians’ Strategies for the Management of Asthma

Thank you very much for providing us with your opinions and strategies for managing adult patients with asthma. The information you provided in the questionnaire is truly appreciated and will assist us to highlight the areas of agreement and disagreement in management approaches amongst physicians in Ontario who treat individuals with asthma.

We are happy to report that the responses have been outstanding and are anxiously anticipating completing the data analysis phase! If you indicated on the tear-off strip of your questionnaire that you would like to receive a copy of the aggregate results, we are planning on mailing you a copy of the results over the summer months.

Again, thank you very much for your assistance with this research endeavour. Your responses are truly appreciated. As a token of our appreciation for your time and effort, a cheque for $50.00 has been enclosed.

If you have any questions, please do not hesitate to call Lisa at (416) 480-6100 ext. 1-3798.

Sincerely yours,

Lisa Cicutto, MSc
Co-investigator
APPENDIX B

THE PHYSICIANS' QUESTIONNAIRE
ASTHMA MANAGEMENT STRATEGIES

University of Toronto
Clinical Epidemiology Unit

If you have difficulty completing this questionnaire, please call Lisa Cicutto at 480-6700.

c/o Sunnybrook Health Science Centre
Room G-157
2075 Bayview Avenue
North York, Ontario
M4N 3M5

Would you like a summary of the results: YES / NO

ID#__________
SECTION 1:

PATIENT EDUCATION STRATEGIES

In this section, we will ask you to indicate your usual approach to providing information to your patients with mild, moderate, and severe asthma.
In this section, we will be asking you about your usual approach of providing asthma information to adult patients with varying degrees of asthma severity. The information below is to provide you with some general guidelines for classifying asthma severity.

**Mild Asthma**
- Intermittent & infrequent (<2 times/week) asthma symptoms (wheeze, cough, dyspnea)
- Baseline lung function tests ≥ 80% of predicted lung function

**Moderate Asthma**
- Experiences asthma symptoms (wheeze, cough, dyspnea) > 2-3 times/week
- Baseline lung function 60-80% of predicted lung function

**Severe Asthma**
- Experiences daily asthma symptoms (wheeze, cough, dyspnea)
- Baseline lung function tests < 60% of predicted lung function

On the next few pages you will be presented with several different educational strategies that you may or may not provide or use with your patients. For each educational strategy, please indicate which statement most closely reflects your usual approach to providing information to patients with mild, moderate, and severe asthma by placing a check mark in the appropriate box.
1. What is your usual approach to providing general information about asthma (eg. structure of the respiratory system, mechanisms of asthma, inflammation, common triggers) to patients with...

a. **Mild Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

b. **Moderate Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

c. **Severe Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

2. What is your usual approach to providing information about prescribed asthma medications (eg. mode of action, proper dose, side effects) to patients with...

a. **Mild Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

b. **Moderate Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

c. **Severe Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.
3. What is your usual approach to demonstrating the proper use of inhalational device(s) (eg. metered dose inhaler, spacing device, Turbuhaler) to patients with...

   a. **Mild Asthma:**
      [ ] I do not provide this information.  
      [ ] I provide this information only if the patient asks. 
      [ ] I provide this information without waiting for the patient to ask.

   b. **Moderate Asthma:**
      [ ] I do not provide this information. 
      [ ] I provide this information only if the patient asks. 
      [ ] I provide this information without waiting for the patient to ask.

   c. **Severe Asthma:**
      [ ] I do not provide this information. 
      [ ] I provide this information only if the patient asks. 
      [ ] I provide this information without waiting for the patient to ask.

4. What is your usual approach to providing information on the avoidance of asthma triggers and environmental control (eg. control of house dust mites, mould, etc...) to patients with...

   a. **Mild Asthma:**
      [ ] I do not provide this information. 
      [ ] I provide this information only if the patient asks. 
      [ ] I provide this information without waiting for the patient to ask.

   b. **Moderate Asthma:**
      [ ] I do not provide this information. 
      [ ] I provide this information only if the patient asks. 
      [ ] I provide this information without waiting for the patient to ask.

   c. **Severe Asthma:**
      [ ] I do not provide this information. 
      [ ] I provide this information only if the patient asks. 
      [ ] I provide this information without waiting for the patient to ask.
5. What is your usual approach to providing information on the warning signs of worsening or uncontrolled asthma to patients with...

a. **Mild Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

b. **Moderate Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

c. **Severe Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

6. What is your usual approach to providing an asthma action plan based upon symptoms (eg. written plan that outlines steps to control/regain control of asthma including instructions to ↑ dose of drug) to patients with...

a. **Mild Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

b. **Moderate Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.

c. **Severe Asthma:**
   - [ ] I do not provide this information.
   - [ ] I provide this information only if the patient asks.
   - [ ] I provide this information without waiting for the patient to ask.
7. What is your usual approach to providing information about monitoring peak flow rates (eg. purpose, proper use of peak flow meters and proper recording of peak flow rates) to patients with...

   a. **Mild Asthma:**
      [ ] I do not provide this information.  [ ] I provide this information only if the patient asks.  [ ] I provide this information without waiting for the patient to ask.

   b. **Moderate Asthma:**
      [ ] I do not provide this information.  [ ] I provide this information only if the patient asks.  [ ] I provide this information without waiting for the patient to ask.

   c. **Severe Asthma:**
      [ ] I do not provide this information.  [ ] I provide this information only if the patient asks.  [ ] I provide this information without waiting for the patient to ask.

8. What is your usual approach to providing an asthma action plan that is based upon peak expiratory flow rates in conjunction with symptoms (eg. written plan that outlines steps to control asthma) to patients with...

   a. **Mild Asthma:**
      [ ] I do not provide this information.  [ ] I provide this information only if the patient asks.  [ ] I provide this information without waiting for the patient to ask.

   b. **Moderate Asthma:**
      [ ] I do not provide this information.  [ ] I provide this information only if the patient asks.  [ ] I provide this information without waiting for the patient to ask.

   c. **Severe Asthma:**
      [ ] I do not provide this information.  [ ] I provide this information only if the patient asks.  [ ] I provide this information without waiting for the patient to ask.
9. What is your usual approach to providing information about community non-profit organizations that provide further information about asthma (e.g. Canadian Lung Association) to patients with...

a. *Mild Asthma:*

- [ ] I do not provide this information.
- [ ] I provide this information only if the patient asks.
- [ ] I provide this information without waiting for the patient to ask.

b. *Moderate Asthma:*

- [ ] I do not provide this information.
- [ ] I provide this information only if the patient asks.
- [ ] I provide this information without waiting for the patient to ask.

c. *Severe Asthma:*

- [ ] I do not provide this information.
- [ ] I provide this information only if the patient asks.
- [ ] I provide this information without waiting for the patient to ask.

10. What is your usual approach to providing other information (please specify)

to patients with...

a. *Mild Asthma:*

- [ ] I do not provide this information.
- [ ] I provide this information only if the patient asks.
- [ ] I provide this information without waiting for the patient to ask.

b. *Moderate Asthma:*

- [ ] I do not provide this information.
- [ ] I provide this information only if the patient asks.
- [ ] I provide this information without waiting for the patient to ask.

c. *Severe Asthma:*

- [ ] I do not provide this information.
- [ ] I provide this information only if the patient asks.
- [ ] I provide this information without waiting for the patient to ask.

THANK YOU FOR COMPLETING SECTION 1
SECTION 2:

TREATING ASTHMA

In this section, we will ask you to select the treatment options you would recommend to patients with differing degrees of asthma severity.
Instructions

You will be presented with six different clinical profiles. Each profile describes an adult asthma patient whom you may treat. For each profile, you will be asked to indicate which treatment action(s) you would or would not recommend to patients. The therapeutic actions may include the following:

1. Inhaled $\beta_2$ agonists (eg. Ventolin, Pro-Air, Berotec, Bricanyl)
2. Inhaled ipratropium bromide (Atrovent)
3. Inhaled corticosteroids (eg. Beclovent, Becloforte, Pulmicort, Azmacort)
4. Non-steroidal anti-inflammatories (these include the following medications: Intal (cromolyn), Tilade (nedocromil), & Zaditen (ketotifen))
5. Oral corticosteroids
6. Oral antibiotics
7. Wait and see - at this time the patient does not need to take any asthma medication(s)
8. Outpatient visit- includes seeing the patient in your office on the same day or referring the patient to an emergency department

Please indicate for each therapeutic action listed whether or not you would recommend the action by placing a check mark in the appropriate column. A check mark in Column A indicates that you would not recommend the action and a check mark in Column B indicates that you would recommend the action. If you indicate that you would recommend more than one action, please go on to Column C: First Priority Action and indicate which one of those actions that you selected is the most appropriate, given that particular clinical profile, by placing a check mark next to the action.

When indicating whether or not you would recommend each action, please keep in mind these two points:

1. Ensure your response reflects what you do in your normal practice.
2. Assume that the individual can obtain or purchase these medications without difficulty.
Clinical Profile A: “Imagine, that a patient of yours is usually free of asthma symptoms and is currently not taking any anti-asthma medications. He/she experiences brief and infrequent episodes of asthma symptoms (about 2 times a week for less than 15 minutes). This morning the patient awoke feeling perfectly well, experiencing no symptoms. However, later in the day he/she experiences some coughing, wheezing, and shortness of breath after doing strenuous work around the house.”

<table>
<thead>
<tr>
<th>Potential Actions</th>
<th>Column A: “I would not recommend…”</th>
<th>Column B: “I would recommend…”</th>
<th>Column C: First Priority Action (Choose 1)</th>
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</thead>
<tbody>
<tr>
<td>1. Starting an inhaled β₂ agonist</td>
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<tr>
<td>2. Starting inhaled Atrovent (ipratropium bromide)</td>
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<tr>
<td>3. Starting an inhaled corticosteroid</td>
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<tr>
<td>4. Adding a non-steroidal anti-inflammatory (Intal, Tilade, Zaditen)</td>
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<td>5. Starting an oral theophylline</td>
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<tr>
<td>6. Waiting and seeing (no medication needed at this time)</td>
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<td>7. Outpatient visit (eg. same day office visit or refer to Emergency Department)</td>
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<td>8. Other (please specify)</td>
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</table>
**Clinical Profile B:** "Imagine, that normally the patient's asthma is well controlled using an inhaled β₂ agonist on an as needed basis. However, over the past 2 days, the patient notices an increase in cough, wheeze, and shortness of breath and an increase in the use of the inhaled β₂ agonist (from 1-2 times a day to every 4-6 hours)."

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<thead>
<tr>
<th>Potential Actions</th>
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<tbody>
<tr>
<td>1. Increasing current use of the inhaled β₂ agonist</td>
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<td>2. Adding inhaled Atrovent (ipratropium bromide)</td>
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<td>3. Starting an inhaled corticosteroid</td>
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<td>4. Adding a non-steroidal anti-inflammatory (Intal, Tilade, Zaditen)</td>
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<td>5. Starting an oral theophylline</td>
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<td>6. Starting an oral corticosteroid</td>
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<tr>
<td>7. Waiting and seeing (no medication needed at this time)</td>
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<td>8. Outpatient visit (eg. same day office visit or refer to E.D.)</td>
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<td>9. Other (please specify)</td>
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**Clinical Profile C:** "Imagine, that a patient of yours, whose asthma is usually asymptomatic, has been experiencing an increase in symptoms (e.g. cough, wheeze, shortness of breath) over the past 3 days. For the past 2 nights, this patient has experienced nocturnal awakenings due to asthma symptoms and last night awoke 3 times. Yesterday, the use of an inhaled $\beta_2$ agonist controlled asthma symptoms for 3-4 hours. Today, the patient is using his/her inhaled $\beta_2$ agonist approximately every 1-2 hours. The patient's usual activities are limited by these symptoms."

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<tr>
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<tbody>
<tr>
<td>1. Increasing current use of the inhaled $\beta_2$ agonist</td>
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<tr>
<td>2. Adding Inhaled Atrovent (ipratropium bromide)</td>
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<td>3. Starting an inhaled corticosteroid</td>
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<td>4. Adding a non-steroidal anti-inflammatory (Intal, Tilade, Zaditen)</td>
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<td>5. Starting an oral theophylline</td>
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<td>6. Starting an oral corticosteroid</td>
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<tr>
<td>7. Waiting and seeing (no medication needed at this time)</td>
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<tr>
<td>8. Outpatient visit (e.g. same day office visit or refer to E.D.)</td>
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<td>9. Other (please specify)</td>
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**Clinical Profile D:** “Imagine, that a patient of yours felt fine yesterday. However he/she awoke early this morning experiencing wheezing and coughing which was incompletely relieved by an inhaled $\beta_2$ agonist. One hour later, the patient is experiencing difficulty speaking and can only manage to speak 2-3 words before needing to take another breath.”

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</thead>
<tbody>
<tr>
<td>1. Increasing current use the an inhaled $\beta_2$ agonist</td>
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<tr>
<td>2. Adding inhaled Atrovent (ipratropium bromide)</td>
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<td>3. Starting an inhaled corticosteroid</td>
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<tr>
<td>7. Waiting and seeing (no medication needed at this time)</td>
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<td>8. Outpatient visit (e.g. same day office visit or refer to E.D.)</td>
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<td>9. Other (please specify)</td>
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Clinical Profile E: “Imagine, that a patient of yours experiences asthma symptoms daily despite use of an inhaled β2 agonist on an as needed basis and an inhaled corticosteroid in a dosage ≤ 500 μg/day (eg. 2 puffs Beclovent QID or 1 puff Pulmicort BID). The patient’s activities are interrupted an average of 2-3 times a day due to asthma symptoms but are controlled by taking the inhaled β2 agonist. The patient experiences no nocturnal awakenings.”

<table>
<thead>
<tr>
<th>Potential Actions</th>
<th>Column A: “I would not recommend...”</th>
<th>Column B: “I would recommend...”</th>
<th>Column C: First Priority Action (Choose 1)</th>
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</thead>
<tbody>
<tr>
<td>1. Increasing current use of the inhaled β2 agonist</td>
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<tr>
<td>2. Adding inhaled Atrovent (ipratropium bromide)</td>
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<td>3. Increasing current dose of an inhaled corticosteroid</td>
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<td>4. Adding a non-steroidal anti-inflammatory (Intal, Tilade, Zaditen)</td>
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<td>7. Waiting and seeing (no medication needed at this time)</td>
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<td>8. Outpatient visit (eg. same day office visit or refer to E.D.)</td>
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<td>9. Other (please specify)</td>
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</table>
Clinical Profile F: "Imagine, a patient of yours has been experiencing flu-like symptoms for the past 2-3 days. These symptoms include a sore throat, nasal and sinus congestion, and rhinorrhea. Additionally, the patient notices an increased cough productive of whitish-yellow sputum and increased wheezing and dyspnea to the point of disrupting his/her normal activities. The patient's asthma is usually well controlled by using an inhaled β2 agonist in a dosage of 2 puffs QID and an inhaled corticosteroid dosage of 400 μg/day."

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<tr>
<th>Potential Actions</th>
<th>Column A: &quot;I would not recommend...&quot;</th>
<th>Column B: &quot;I would recommend...&quot;</th>
<th>Column C: First Priority Action (Choose 1)</th>
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<tbody>
<tr>
<td>1. Decreasing current use of the inhaled β2 agonist</td>
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<td>2. Increasing current use of the inhaled β2 agonist</td>
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<tr>
<td>3. Adding inhaled Atrovent (ipratropium bromide)</td>
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<td>4. Decreasing current dose of the inhaled corticosteroid</td>
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<td>8. Starting an oral corticosteroid</td>
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<tr>
<td>9. Starting a course of oral antibiotics</td>
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<tr>
<td>10. Waiting and seeing (currently no medication needed)</td>
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<tr>
<td>11. Outpatient visit (e.g. same day office visit or refer to E.D.)</td>
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<td>12. Other (please specify)</td>
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</table>
THANK YOU FOR COMPLETING SECTION 2
SECTION 3:

INDIVIDUAL PRACTICE

In this section, we will ask for your opinions about the management of asthma.
1. **Usually**, in your practice, to what extent does the average patient with asthma get involved with the management decisions about his/her disease?  
(Please check (✓) the statement that most accurately reflects your opinion)

[ ] I make the decisions using all that is known about the treatments.
[ ] I make the decisions, but strongly consider the patient's opinion.
[ ] The patient and I make the decisions together on an equal basis.
[ ] The patient makes the decisions, but strongly considers my opinion.
[ ] The patient makes the decisions using all the information he/she knows about the treatments.

2. **Ideally**, in your practice, to what extent does the average patient with asthma get involved with the management decisions about his/her disease?  
(Please check (✓) the statement that most accurately reflects your opinion)

[ ] I make the decisions using all that is known about the treatments.
[ ] I make the decisions, but strongly consider the patient's opinion.
[ ] The patient and I make the decisions together on an equal basis.
[ ] The patient should make the decisions, but strongly consider my opinion.
[ ] The patient makes the decisions using all the information he/she knows about the treatments.
3. If there are any other areas or aspects of your management approach to asthma that have not been covered in this questionnaire, please take a minute to highlight them in the space provided below.

THANK YOU FOR COMPLETING SECTION 3

One more section to complete
SECTION 4:

PRACTICE CHARACTERISTICS

In this section, we will ask you some general questions about yourself and your medical practice.
CHARACTERISTICS

Please place a check mark [✓] in the appropriate box.

1. I am a: [ ] Allergist/Immunologist
   [ ] Family Physician
   [ ] General Internist
   [ ] Respirologist
   [ ] Other (please specify) ____________________________

2. I have been in medical practice for: [ ] 0 to 5 years
   [ ] 6 to 10 years
   [ ] 11 to 15 years
   [ ] 16 to 20 years
   [ ] over 20 years

3. I am: [ ] Female [ ] Male

4. My birth date is ___ / ___ ___ ___.
   month year

5. My practice is predominantly: [ ] University associated
   [ ] Community-based group practice
   [ ] Community-based solo practice
   [ ] Other (please specify) ____________________________
6. I attend conferences or seminars that have at least one session related to asthma management:

[ ] less than every 5 years
[ ] less than every 2-4 years
[ ] once every 2 years
[ ] once a year
[ ] 2 to 4 times a year
[ ] 5 or more times a year

7. Have you, personally, ever experienced asthma-like symptoms?

[ ] Yes  [ ] No

8. Do you have a nurse or other health care professional to assist you with care or education of patients with asthma?

[ ] Yes  [ ] No

9. Please fill in the blanks below.

Over the past year, ____% of my practice has been managing patients with asthma.
In an average month, I see a total of ____ (number please) asthma patients.

Of these patients, I would say that:

____% have mild asthma
____% have moderate asthma
____% have severe asthma
THANK YOU FOR COMPLETING THIS QUESTIONNAIRE AND PARTICIPATING IN THE STUDY!

PLEASE RETURN THE QUESTIONNAIRE BY USING THE SELF ADDRESSED PREPAID ENVELOPE.

A CHEQUE WILL BE MAILED TO YOU UPON RECEIPT OF THE QUESTIONNAIRE.

IF YOU WISH, A COPY OF THE RESULTS WILL BE MAILED TO YOU UPON COMPLETION OF THE ANALYSIS:

- If you would like a copy of the results, please circle the “YES” on the front cover above your ID number.
- If would not like a copy of the results, please circle the “NO” on the front cover above your ID number.

Please, use the space below to make comments about this questionnaire.
Your input is appreciated and will be used in future research endeavors.