

Sub-optimal asthma control: prevalence, detection and consequences in primary practice.

by

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## Abstract

**Background:** Telephone surveys describing sub-optimal asthma control may be biased by low response rates.

**Objectives:** To obtain an unbiased assessment of asthma control and assess its impact in primary care.

**Methods:** Primary practitioners used a one page control questionnaire in 50 consecutive asthma patients.

**Results:** Of 10,428 patients assessed by 354 physicians, 59% were uncontrolled, 19% well-controlled and 23% totally controlled. Physicians overestimated control, regarding only 42% of patients as uncontrolled. Physicians were more likely to report plans to alter the regimens of uncontrolled patients than controlled patients (1.29 versus 0.20 medication changes per patient,  $p < 0.01$ ) doing so in a fashion consistent with guideline recommendations. Of uncontrolled patients, 59% required one or more urgent care or specialist visits versus 26% of well-controlled and 15% of totally controlled patients. Patients were more likely to report short term symptom control when they had not required urgent or specialist care (OR 5.68; 95% CI 4.91 - 6.58).

**Conclusions:** The majority of asthma patients treated in primary practice are uncontrolled. Lack of control can be recognized by physicians who are likely to consider appropriate changes to therapy. A lack of short term symptom control of asthma is associated with excess health care utilization.

## Introduction

The assessment of asthma control has become pivotal in the management of asthma. However, several surveys in developed nations have shown that the majority of patients with asthma do not enjoy adequate asthma control(1-5). This is not because asthma control is unrealistic and not achievable; the multi-centre, multi-national study of asthma management, the GOAL study, has shown that well-controlled asthma is achievable in the majority of patients(6). Another plausible explanation for these findings is that the prevalence of poor asthma control has been overestimated by surveys that rely upon random digit telephone dialing techniques. In the "Asthma in Canada" survey, for example, 49,767 Canadian households were contacted to identify 801 adults with asthma and 200 parents of children with asthma willing to participate in the survey, a response rate of 2% as compared to the prevalence of asthma in the general population between 5 and 10%(1). Participation in the study was voluntary and it is possible that the study was skewed toward patients who with poor disease control.

It has also been suggested that there is a discrepancy between what is achievable and what is achieved in asthma management because patient appear to have low expectations for their own disease control. Amongst poorly controlled Canadian patients surveyed, 84% regarded their disease as "adequately controlled" or "very well controlled"(1). Moreover, physicians surveyed believe that the majority of their patients enjoy optimal control of their disease. The failure of patients to voice their concerns or report troublesome symptoms and a low index of suspicion for poor control by physicians could account for the perpetuation of the current lack of asthma control(7). Moreover, we know relatively little of how practitioners evaluate control in their own practices. For these reasons, we undertook the following study.

Our study in primary practice attempted to address the gap between asthma control achieved and asthma control achievable by developing a practice audit for physicians. Participating physicians surveyed consecutive patients with asthma, asking asthma symptom control questions and deciding each patient's control status and the steps most appropriate in subsequent management. Using this intervention, we undertook to (a) obtain an unbiased assessment of asthma control in the primary practice setting, (b) to determine the ability of primary practitioners to assess control in their own practices (c) to determine the factors associated with sub-optimal control, (d) learn the actions taken by practitioners when they identify sub-optimal control and (e) gauge the health care utilization impact of sub-optimal symptom control.

## Methods

Primary care physicians in a national database of physicians were recruited to participate in a Personal Practice Assessment Program as part of a nationally accredited continuing medical education program. Physicians from urban and rural practices and from both anglophone and francophone communities were eligible to participate if they were in active non-specialty practice. Before patient data collection, physicians completed a written questionnaire concerning their management of asthma. They also received a pad of 50 one page questionnaires to allow them to record symptom control in the next consecutive 50 patients with asthma attending the practice (See online appendices). Patients were eligible to participate if they had physician diagnosed asthma and they were 12 years of age or older. Patients were eligible whether or not they were visiting the practice on that day for asthma care or for other reasons. Control symptom questions were based upon the Canadian consensus guidelines for the management of asthma and are outlined in Table 1(8). Symptoms concerning the use of short-acting beta<sub>2</sub> agonist and the frequency of daytime and nighttime symptoms were asked in reference to the previous week.

Questions concerning the limitation of activities and absence from work or school were made in reference to the previous three months. The patient questionnaire was modified after approximately half of the patient data had been collected to add three questions concerning health care utilization for urgent asthma care in the previous year. Patients also responded to questions concerning their medications, action plans and education received for asthma self-care. After collection of the symptom control information, physicians were asked to indicate on the same questionnaire page whether or not they considered the patient's asthma to be under control and what further management steps they would consider including medication prescriptions and follow-up. Physicians had been provided a copy of the Canadian consensus guidelines at the beginning of the study and were familiar with the general objectives and hypotheses of the study. Participating physicians gave written consent to participate in the program and the program was reviewed and approved by a national ethics review board.

Patients were classified as having uncontrolled asthma if they fell short of the acceptable levels of control on any of the five key symptom parameters outlined in Table 1: daytime symptoms, sleep disturbances, physical activity limitations, absenteeism and use of relief medication. Asthma was considered controlled if patients did not exceed guideline recommendations for these parameters. Patients who did not provide information to evaluate control were excluded. For some analyses, we categorized patients further to denote those with no asthma symptoms as enjoying total control.

### *Data Analysis*

Relationships between physician characteristics and asthma control were explored by comparing the physicians divided into those who had more than the median percentage of uncontrolled patients to those who had the median percentage or less. Logistic regression with backward selection was used to determine predictors of control; variables included sex, age, smoking status, self

reported compliance, inhaler instruction given and whether or not lung function had been measured by the physician. Healthcare utilization was analyzed separately, in a univariate model, as these data were collected only during the second half of the study. Odds ratios and confidence intervals were calculated using logistic regression. Chi-square test was used to compare proportions. Statistical level of significance was 0.05. All analysis was done in SAS Windows v8.2.

## Results

### *Participating Physicians*

Eighty-one percent of 570 physicians approached to participate did so. We could detect no difference between participating and non-participating physicians in terms of age, gender, type of practice or community of practice. Of the 462 physicians enrolled, 354 provided patient data, 22% were women, 25% were in solo practices, 28% practiced in towns of less than 50,000 and 36% had graduated from medical school more than 20 years before the study. Median enrollment was 26 patients per physician. We could detect no differences in physicians' characteristics between practices with higher than median (57%) or lower than median percentage of patients controlled.

### *Patient Characteristics*

Of 10,428 patients surveyed, 60% were women. Thirty-six percent were 35 years or younger and 15% were over 65 years. Patient socioeconomic data were not collected but all were receiving care through Canada's universal health care system and a selection of small community and urban practices increased the likelihood that the patients represented the spectrum of Canadian demographics. Fewer than 3% of patients approached declined to participate. The majority of patients were lifetime non-smokers (56%) while 24% were

current smokers and 19% were former smokers. The majority of patients (59%) were uncontrolled; 41% were controlled, 19% being considered adequately controlled while 22% were considered totally controlled. The frequency of symptoms and bronchodilator use is shown in Table 2. Limitation of physical activity due to asthma symptoms was reported by 45% of uncontrolled patients and an absence from work, school or usual activities by 27% of uncontrolled patients.

Amongst all patients, 57% were considered by their physicians to have non-asthma reasons for visiting the physician's office, 26% were attending for "routine" asthma care and 16% were attending for "urgent" asthma care. Uncontrolled patients were more often considered to be making a visit for urgent asthma care needs as compared to controlled patients (26% vs. 2% ;  $p < 0.001$ ). Similar proportions of controlled and uncontrolled patients were attending for routine asthma care. Twenty percent of patients used inhaled quick-acting beta<sub>2</sub> agonist bronchodilators alone, 39% used an inhaled corticosteroid maintenance monotherapy, 35% used an inhaled corticosteroid and inhaled long-acting beta<sub>2</sub> agonist maintenance therapy, 1% used maintenance leukotriene receptor antagonists, 2% used miscellaneous regimens and 3% reported using no asthma medication at the time of the survey. There was no difference between controlled and uncontrolled patients with respect to the medications being used for their asthma management.

As shown in Figure 1, controlled asthma was positively associated with male sex, age < 35 years, non-smoking or ex-smoking status, the availability of a written action plan and self-reported compliance with therapy. As shown in Figure 2, controlled asthma was negatively associated with receiving inhaler instruction and with having had an objective measurement of lung function. Control was unrelated to physician characteristics including gender, size of practice and years since graduation from medical school.

Of uncontrolled patients, 59% required one or more urgent care or specialist visits whereas 26% of adequately controlled and 15% of totally controlled patients had required such care. Urgent office visits accounted for 63.1%, ER visits 20.2%, specialist visits 12.5% and hospitalizations 4.2%. Patients were more likely to report short term symptom control of asthma when they had not required urgent or specialist care as compared to requiring one or more such visits (OR 5.68; 95% CI 4.91 – 6.58). Comparing the types of urgent care needs between uncontrolled and controlled patients, unscheduled office visits for urgent care were reported by 47% versus 13%, emergency room visits by 15% versus 4% and hospital admission by 3% versus 0.6%, for all  $p < 0.001$ .

When patients described their use of asthma medications 47% reported that they always did so, 10% did so “when they remembered” and 41% did so “only when [they] need to”. Management shortcomings were commonly reported by patients; 80% did not have a written action plan to guide their handling of an exacerbation, 32% had never demonstrated their inhaler use to a health care professional and 44% had never had spirometry.

#### *Physician Assessment and Proposed Management of Patients Surveyed*

Physicians significantly overestimated control amongst their patients, regarding only 42% as uncontrolled. Physicians were discordant with guideline classification of control in 31% of uncontrolled patients, 13% of well-controlled patients and 2% of totally controlled patients. Most commonly, physicians were discordant with guideline criteria when patients showed lack of control in terms of only one parameter, most often the overuse of quick relief medication.

Despite the under-recognition of uncontrolled asthma, physicians were more likely to manage uncontrolled patients differently from controlled patients. A follow-up visit within three months was requested for 69% of uncontrolled patients but for just 25% of controlled patients ( $p < 0.001$ ). Physicians were

more likely to report plans to alter the regimens of uncontrolled patients than controlled patients (1.29 versus 0.20 medication changes per patient,  $p < 0.01$ ). Amongst uncontrolled patients not using asthma medication at the time of the survey, the most frequently recommended change was the initiation of inhaled corticosteroids (41% of such patients) (see Figure 3a). Similarly, amongst uncontrolled patients using only a quick reliever, initiating inhaled corticosteroid monotherapy as maintenance treatment was the most frequently recommended step (52% of such patients)(see Figure 3b). Amongst patients already using an inhaled corticosteroid monotherapy, initiation of combination therapy was the most frequently recommended step (53% of such patients) (see Figure 3c). For those already taking combination therapy and uncontrolled, an increase in the formulation strength or dosing schedule was the single most common recommendation (for 36% of such patients) (see Figure 3d). Other changes such as the prescription of prednisone, anti-leukotriene agents or theophylline were infrequent (see Figures 3a-d). For 18% of uncontrolled patients, physicians reported plans to schedule quick-acting bronchodilator use, confusing their role as quick relievers with that of maintenance medications.

## Discussion

Our findings confirm and extend the previous examinations of asthma control in practice settings. First, we have confirmed in a relatively unbiased primary practice sample of patients in Canada that the majority of patients do not enjoy adequate guideline defined asthma control. Second, we have found that sub-optimal control is more likely in women, current smokers, older patients and those who lack a written action plan exacerbation management. Third, the lack of short term symptom control is not a trivial or non-significant finding;

patients lacking symptom control are far more likely to require urgent asthma care in the form of an emergency visit or hospitalization than their counterparts with asthma who enjoy adequate guideline defined control. Finally, primary practitioners recognize a lack of control amongst most but not all of their uncontrolled asthma patients. Despite this imperfect assessment of control, they are still likely to recommend appropriate medication changes and aftercare of their patients who fail to achieve guideline targets for asthma control.

Our methodology overcomes the potential concern that telephone survey methodologies have overestimated the prevalence of poor control, a concern that is plausible if poorly controlled patients are more troubled by their asthma and more likely to take the time to respond to a telephone survey. Moreover, our survey, undertaken by practitioners themselves, offers greater confidence that the patients who are surveyed suffer from physician-diagnosed asthma and not from other respiratory diseases such as chronic obstructive pulmonary disease (COPD). It might be argued that by surveying patients in a medical care setting, we have biased the study towards finding patients who lack adequate asthma control given that such patients are more likely to require care, particularly urgent care. We think that this is unlikely. The proportion of patients who were uncontrolled was similar whether we looked at all patients surveyed (59%), all patients who had attended for routine assessment or non-asthma related visit (51%) or only patients with asthma who had attended for non-asthma reasons (47%).

Our finding that women were less likely to have symptom controlled asthma than men is consistent with the observation that in asthma as in several chronic disease settings that women may report symptoms differently from men, being more likely to volunteer symptoms of disease and to seek medical care.(9;10) However, physiological explanations are also of potential importance; non-specific bronchial hyperresponsiveness is found more commonly

amongst women than men, a finding in general population surveys and in selected smoking populations (11;12). The association between smoking and a lack of asthma control is plausibly explained the direct airway irritant effect of tobacco smoke and the more recently described corticosteroid resistance amongst patients with asthma who smoke (13;14). Although the relationship between age and asthma is complex, the weak association we describe between increasing age and decreasing asthma control is consistent with descriptions of adult onset asthma gradually worsening in severity over time(15). It might be argued that our finding linking current smoking and increasing age with poor control of asthma could also reflect contamination of the patient population by patients who have COPD. In the absence of specific pulmonary function testing, we cannot rule out such confounding but we think it is unlikely to be a major factor for several reasons. First, we note that few patients in the survey were using inhaled anticholinergic agents, a common practice that may help to distinguish physicians' customary management of COPD from their customary management of asthma(16). Second, the increased risk of uncontrolled asthma was present in current smokers but not former smokers, an unlikely finding if the tobacco related problem was persistent airflow limitation. Finally, more than half of the surveyed patients had undergone spirometry and had these results been more typical of COPD than asthma, the patients would not have been regarded by their physicians as being asthma patients eligible for the survey.

Our finding of an association between written action plan availability and achieving asthma control is generally consistent with the benefit of action plans as described in randomized trials(17;18). We must note, however, that the availability of a written action plan may not account directly for the benefit of short term asthma symptom control but may be an indication that such patients have received more general asthma education or specialized care. In this context, it seems counterintuitive that demonstrating ones inhaler technique to a health care professional is associated with a lower likelihood of achieving control

but the relationship is clearly not causal. This finding almost certainly indicates that inhaler teaching is not a routine part of asthma care but is reserved for patients whose disease is more symptomatically troublesome. We believe that similar reasoning accounts for the relationship between having had spirometry and having a higher likelihood of uncontrolled asthma (16;19;20).

We believe that our findings highlight one of the important factors responsible for the high prevalence of poorly controlled asthma. Physicians' assessments of asthma control were not concordant with guideline assessment recommendations; physicians often failed to identify as poorly controlled patients who exceeded guideline parameters for adequate control, particularly the too frequent use of quick relief bronchodilators. We suspect that this overestimate of asthma control occurs more commonly in actual practice settings than was revealed by our study in which physicians were asked to focus on asthma control in their patients, were given questionnaires to guide them through control assessments and had previously been given a copy of the current Canadian asthma guidelines publication. Our study suggests that a systematic audit by primary practitioners of their own patients could lead to management changes consistent with guideline recommendations. If validated, this strategy could be used to improve the management of not only asthma but other chronic diseases.

Some limitations to our study must be noted. First, the physicians who participated in our study were volunteering to participate in a continuing medical education program and may represent physician group less in need of an educational intervention in asthma. Second, we have no way of knowing whether or not physicians acted upon the changes in management for uncontrolled patients they suggested during the study. Further research will be required to determine if guided assessment of asthma control in primary practice can lead not only to changes in management but to improved outcomes. Finally, our study used a definition of control based upon Canadian guidelines, a

definition similar but not identical to GINA guidelines. Our simplified questionnaire does not allow us to recalculate the prevalence of control by alternate definitions.

We believe that our study has confirmed the feasibility of studying asthma management practices in the primary care setting and in doing so has confirmed the high prevalence of uncontrolled asthma in Canada. Moreover, the process of guided assessment of asthma control leads to the identification of inadequate control by physicians and corresponding proposals to change medication therapy appropriately. We believe that further study is warranted to determine if the practice audit can be used to improve the recognition and treatment of poorly controlled asthma, thereby helping to close the gap between guideline recommendations and guideline implementation.

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**Table 1: Criteria for Asthma Control**

<b>Parameter</b>	<b>Controlled</b>	<b>Uncontrolled</b>
1. Daytime symptoms	<4 days/week	4 or more days/week
2. Night-time symptoms	<1 night/week	1 or more nights/week
3. Physical activity	Normal	Restricted in past 3 months
4. Absenteeism	None	Missed school/work or social engagement in past 3 months
5. As-needed short-acting bronchodilator use	<4 doses/week	4 or more doses/week (excluding pre-exercise)

Table 2: Bronchodilator use and symptom frequency of controlled and uncontrolled patients.

	Use of as-needed bronchodilator per week				Days with asthma symptoms per week				Nights with asthma symptoms per week			
	0	1-3	4-7	>7	0	1-2	3-4	5-7	0	1-2	3-4	5-7
Controlled (n = 4,282)	66%	34%	0	0	69%	31%	0%	0%	100%	0%	0%	0%
Uncontrolled (n = 6,023)	23%	29%	25%	22%	13%	31%	27%	30%	35%	37%	17%	11%

Legends for Figures:

Figure 1.

Patient characteristics positively associated with achieving asthma control; odds ratios  $\pm$  95% CI.

Figure 2.

Patient characteristics negatively associated with achieving asthma control; odds ratios  $\pm$  95% CI.

Figure 3

Medication changes recommended for patients surveyed; controlled versus uncontrolled.

- (A) Patients using no medication.
- (B) Patients using short-acting bronchodilators only.
- (C) Patients using inhaled corticosteroid maintenance therapy without adjunctive maintenance medications.
- (D) Patients using inhaled corticosteroid and long-acting bronchodilator maintenance therapy.

Figure 1.

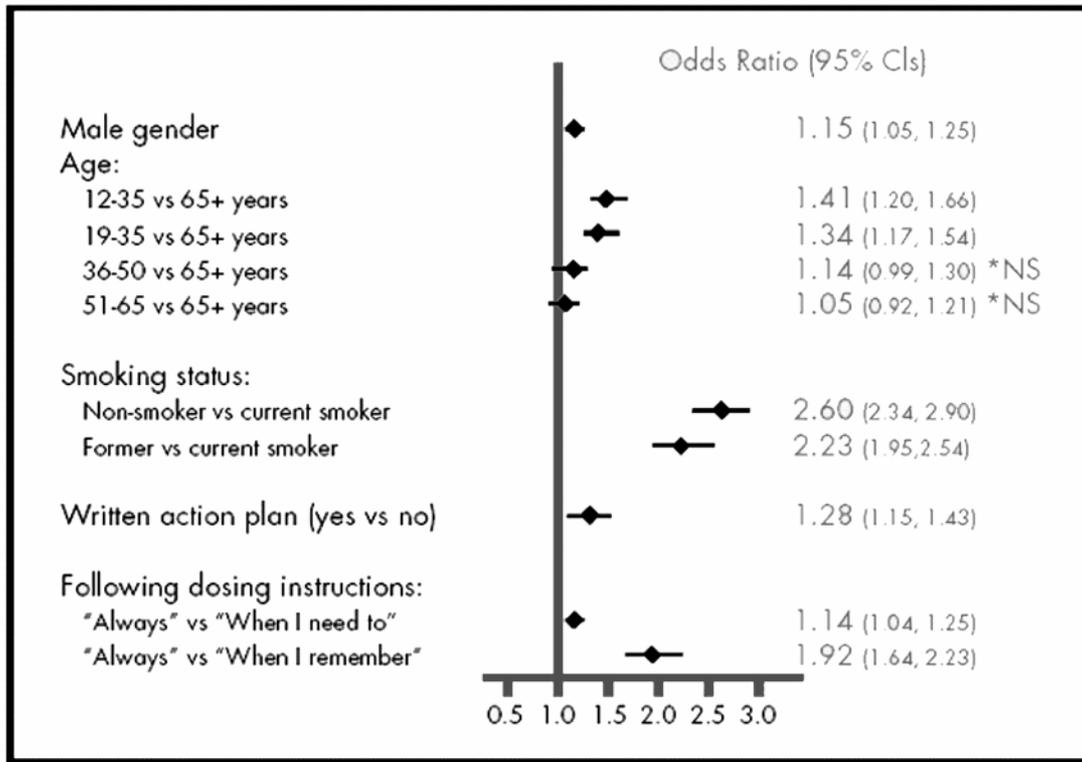


Figure 2.

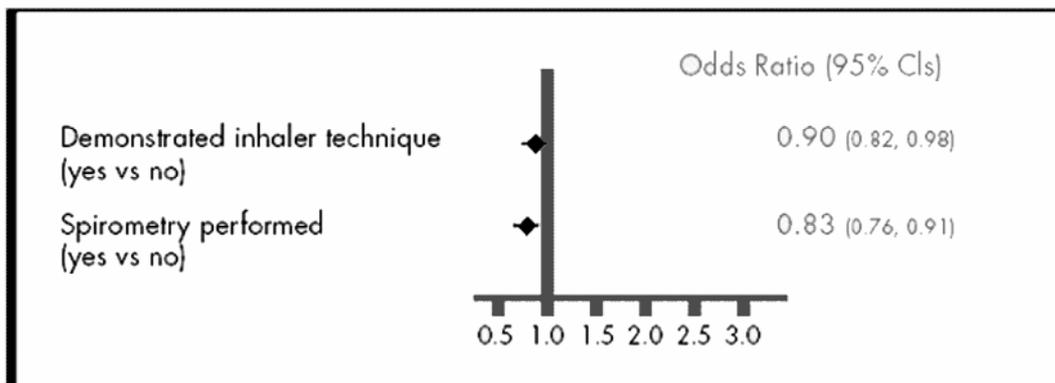


Figure 3 (A)

Figure 3A. Medication changes proposed in patients using no medication.

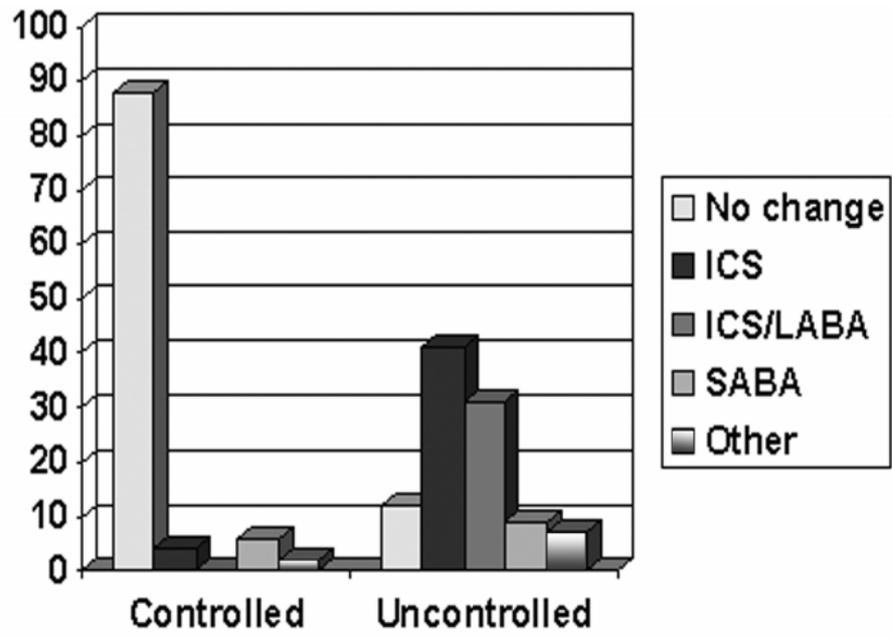


Figure 3 (B)

Figure 3B. Medication changes proposed in patients using SABA only.

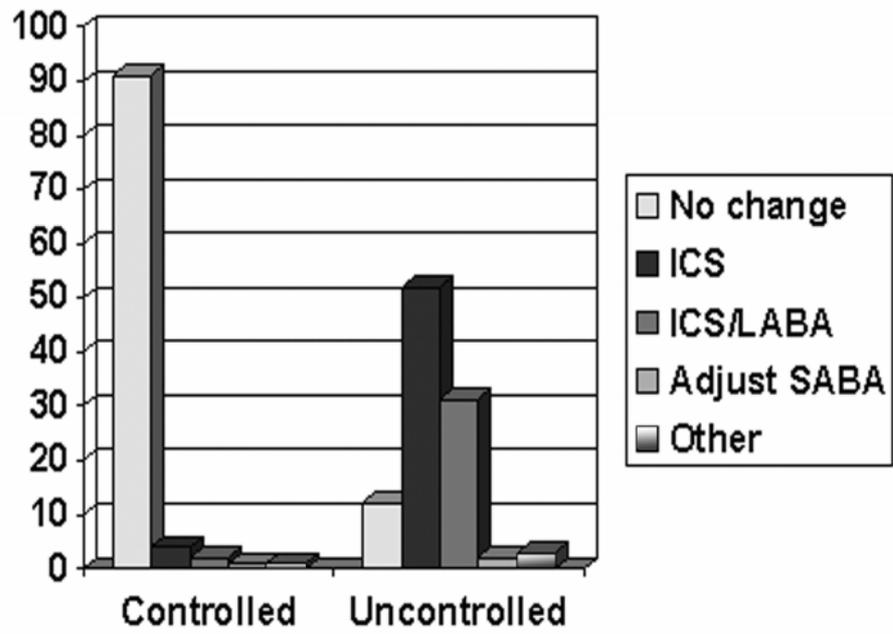


Figure 3 (C)

Figure 3C. Medication changes proposed in patients using ICS.

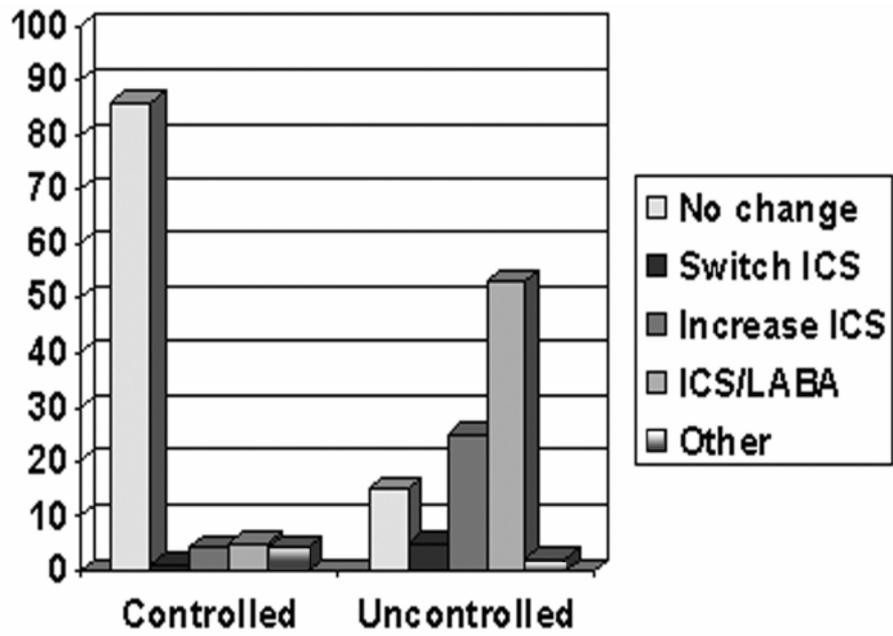


Figure 3 (D)

Figure 3D. Medication changes proposed in patients using ICS/LABA

