from physicians across the United States. Approximately 3500 physicians participate each 3-month period and provide information on patients they examine in 2 consecutive workdays. Information focuses on specific diagnoses and medications, not on patient adherence. This study analyzed the number of asthma visits (based on International Classification of Diseases, 9th revision, codes) and medications used to treat asthma each year from 1978 to 2002, primarily in an outpatient setting. Medications were classified as controllers (eg, inhaled corticosteroids) or relievers (eg, short-acting, $\beta_2$-receptor agonists).

**Results.** The annual number of patient visits for treatment of asthma doubled from 1978 (8.5 million) to 1990 (17.7 million) and then demonstrated a plateau, with a mean of 16 million cases per year, from 1991 to 2002. The treatment of asthma changed tremendously during the 25-year study period. Prescription rates for controllers increased; in 2001, controllers were prescribed more than relievers (83% vs 80%) for the first time. Prescriptions for relievers increased from 1978 to 1993 but decreased thereafter. From 1978 to 1988, prescriptions for inhaled corticosteroids remained at 8% with respect to the annual total of asthma visits. This number increased to 48% in 2002. The use of long-acting, $\beta_2$-receptor agonists alone peaked in 2000 and declined to 9% in 2002, most likely because of increased use in combination with inhaled corticosteroids (20% of visits). The use of leukotriene modifiers steadily increased after their release in 1997, to 24% in 2002, whereas xanthine use decreased to 2% and cromone use decreased to <1%. Oral corticosteroid use was constant at 20%. The number of medications was stable, at a mean of 2 per patient, during the past decade.

**Conclusions.** The study concluded that, although the number of asthma visits increased during the study period, the number of return visits for treatment of asthma decreased. Prescriptions for controller medications increased, whereas prescriptions for relievers decreased. This pattern suggests that asthma treatment is changing to be more consistent with current guidelines.

**Reviewers’ Comments.** Consensus guidelines for asthma are helpful for adequate diagnosis and treatment of this disease. Trends in asthma pharmacotherapy are changing, so that controller medications are prescribed more often, leading to decreased need for relievers and better control of asthma. This study did not include asthma-related visits to emergency departments or hospital-based clinics; therefore, more severe cases of asthma might not have been adequately analyzed.

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**Methods.** A single telephone interview with parents of eligible children was used to assess 1) classes of medications (controller and reliever) in use and frequency of use in the previous 4 weeks; 2) asthma symptoms during days, but not nights, in the previous 2 weeks; 3) visits to specialists, outpatient doctors, or emergency departments or hospitals; and 4) the existence and use of a written action plan.

**Results.** Of the children who participated, 68% had 0 to 4 symptom days in the previous 2 weeks, 16% had 5 to 9 symptom days, and 16% had 10 to 14 symptom days. Sixty-five percent had a health care visit in the previous month; 23% went to an emergency department, 14% saw an asthma specialist, and 4% were hospitalized. Most children with frequent symptom days were receiving controller medicines and used reliever medicines. Poor adherence to controller medicines was common (40%), especially among those with few symptom days. Sixty-four percent of children with persistent asthma had excessive symptoms or high reliever medication use and were considered to have inadequately controlled conditions. Approximately one-third of these patients had not been prescribed controllers. Written care plans were received by 21% of patients, and the existence of a plan was not protective against inadequate control.

**Conclusions.** Inadequate asthma control, defined as frequent symptoms or high reliever medication use, was common even when controller medications were prescribed. Nonadherence to controller medications and over-reliance on reliever medications were common.

**Reviewers’ Comments.** This is an important study emphasizing that asthma control remains a significant problem for children. This study highlights 2 factors that contribute to poor asthma control, namely, lack of adherence to controller medications and lack of appropriate prescription of controllers. Younger age and being treated by an asthma specialist were associated with better asthma control. The study excluded important groups, including children <3 years of age, children treated by a specialist, and patients with intermittent or severe persistent asthma. Patients themselves were not interviewed (only the parents were interviewed), which is a known limitation in adolescent studies. Surveyed controller and reliever use was not compared with actual prescription refills or mechanical dose-counting results. Nonetheless, this is another study suggesting that asthma among children is not well controlled and that we need to assist our patients with medication adherence and to make sure that patients with persistent asthma are prescribed controller medications.

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**ASTHMA MEDICATION USE AND DISEASE BURDEN IN CHILDREN IN A PRIMARY CARE POPULATION**


**Purpose of the Study.** To describe the use of asthma medications and the disease burden among children with persistent asthma and to estimate asthma control.

**Study Population.** A total of 638 children (3–15 years of age) with persistent asthma, drawn from private insurance claims and pharmacy databases, who were recruited for the Pediatric Asthma Care Patient Outcomes Research Team II study from 42 primary care practices in 3 urban locales were studied.

**Diagnosis and Management**

**EFFECTS OF EDUCATIONAL INTERVENTIONS FOR SELF-MANAGEMENT OF ASTHMA IN CHILDREN AND ADOLESCENTS: SYSTEMATIC REVIEW AND META-ANALYSIS**


**Purpose of the Study.** To determine the effectiveness of educational programs for the self-management of asthma among children and adolescents.

**Study Population.** Eligible studies were published, randomized, controlled trials of educational programs for the self-management of asthma among children and adoles-
cents, identified from the databases of Cochrane Airways Group and PsychINFO and from reference lists of review articles and eligible studies.

Methods. The eligible, randomized, controlled trials for children and adolescents reported lung function, morbidity, self-perception of asthma control, or utilization of health care services. Eligible studies were abstracted, assessed for methodologic quality, and pooled with fixed-effects and random-effects models.

Results. Thirty-two of 45 identified trials were eligible, with a total of 37,006 patients 2 to 18 years of age. Education regarding asthma was associated with improvements in lung function (standardized mean difference: 0.50; 95% confidence interval [CI]: 0.25–0.75) and self-efficacy (mean difference: 0.36; 95% CI: 0.15–0.57) and reductions in absenteeism from school (mean difference: −0.14; 95% CI: −0.23 to −0.04), number of days of restricted activity (mean difference: −0.29; 95% CI: −0.33 to −0.09), and number of visits to an emergency department (mean difference: −0.21; 95% CI: −0.33 to −0.09). When pooled with a fixed-effects model but not a random-effects model, education was also associated with a reduced number of nights disturbed by asthma. The effects on morbidity were greatest for programs with strategies based on peak flow, interventions targeted at the individual, and participants with severe asthma.

Conclusions. Educational programs for the self-management of asthma among children and adolescents improve lung function and feelings of self-control and reduce absenteeism from school, number of days of restricted activity, number of visits to an emergency department, and possibly number of disturbed nights. Educational programs should be considered part of the routine care of young people with asthma.

Reviewer's Comments. In the early 1990s, a meta-analysis found no evidence of reductions in morbidity or utilization of health care resources associated with educational programs. However, several rigorous evaluations of educational programs have been completed in the past decade. This meta-analysis provides encouraging evidence that our educational efforts regarding self-management of asthma improve lung function, reduce morbidity, and decrease utilization of emergency health care resources. Such programs should be considered routine in the care of children and adolescents with asthma.

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PROACTIVE ASTHMA CARE IN CHILDHOOD: GENERAL PRACTICE-BASED, RANDOMIZED, CONTROLLED TRIAL


Purpose of the Study. To assess the feasibility and effectiveness of a general practice-based, proactive system of asthma care among children.

Study Population. A total of 174 children with moderate/severe asthma who were cared for by 24 general practitioners in the Australian Capital Territory were studied.

Methods. The study was a randomized, controlled trial with cluster sampling according to general practice. The intervention involved a system of structured asthma care called the 3+ visit plan, which included families being reminded to visit the general practitioner. Visit 1 was a baseline visit in which the concept of a “contract” for care was discussed. Visit 2 was used to assess asthma status, history, drug treatment, and management. Education and review of medications were performed. Visit 3 occurred 2 weeks later and included spirometric evaluation and a review of patient and peak flow records. An asthma action plan was completed. Allergen skin testing or radioallergosorbent testing was used to identify triggers. Visit 4 occurred 4 weeks later; progress was assessed and the asthma action plan was reviewed. Allergy test results were discussed and education was reinforced. Main outcome measures were rates of asthma consultations with the general practitioner, written asthma plans, completion of the 3+ visit plan, lung function test results, emergency department visits for treatment of asthma, days absent from school, asthma symptoms, and medication use.

Results. The intervention group had more asthma consultations (odds ratio [OR] for ≥3 asthma consultations: 3.8; 95% confidence interval [CI]: 1.9–7.6; P < .01), asthma action plans (OR: 2.2; 95% CI: 1.2–4.1; P = .01), and 3+ visit plans (OR: 24.2; 95% CI: 5.7–103.2; P < .01) than did the control group. The intervention group experienced less reduction in forced expiratory volume in 1 second after cold air challenge (2.6%; range: 1.7–3.5%; P < .01) than did the control group. The intervention group experienced less speech-limiting wheeze (OR: 0.2; 95% CI: 0.1–0.4; P < .01) and was more likely to use spacers (OR: 2.8; 95% CI: 1.6–4.7; P < .01), compared with the control group. No differences in days absent from school or symptom-free days were observed.

Conclusions. Proactive care with active recall for children with moderate/severe asthma is feasible in general practice and seems to be beneficial.

Reviewer’s Comments. Delivering optimal health care for chronic illnesses such as asthma requires health systems to move from a reactive approach to a proactive approach. The study nicely evaluates the role of a general practice-based, proactive approach to pediatric asthma care. Studies such as this are often quite difficult to conduct and interpret in a controlled manner; however, this study represents 1 step in evaluating proactive primary care strategies. Reinforcement of education through frequent follow-up visits and encouragement of active recall appear to be feasible and beneficial in a general practice setting.

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PEDIATRICIAN SELF-EFFECTIVENESS FOR COUNSELING PARENTS OF ASTHMATIC CHILDREN TO QUIT SMOKING


Purpose of the Study. Although environmental tobacco smoke is a known risk factor for asthma exacerbations among children, pediatricians infrequently advise parents who smoke to discontinue smoking. It has been shown that high physician self-efficacy or self-confidence in the counseling of parents regarding smoking discontinuation is related to increased physician screening and counseling on this issue. It is unclear, however, which factors are associated with high physician self-efficacy for counseling (eg, previous training in smoking cessation counseling or number of years in pediatric practice). The objective was to identify parameters related to physician self-efficacy in smoking cessation counseling.

Methods. This was a cross-sectional survey of a national random cohort of 829 primary care physicians.

Results. The response rate was 55% (457 of 829 physicians). The percentages of physicians with high levels of self-efficacy for screening parents and children to identify
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