

Managed Care Opportunities for Improving Asthma Care

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Abstract

Uncontrolled asthma is an enormous burden in terms of the propensity to reach asthma control in the future, direct and indirect costs, and health-related quality of life. The complex pathophysiology, treatment, and triggers of asthma warrant a unified, yet targeted, approach to care. No single factor is fully responsible for poor control. Complicating the problem of asthma control is adherence to long-term controller medications. The National Asthma Education and Prevention Program (NAEPP) established several key points for asthma control, and developed classifications for asthma control and recommended actions for treatment. All parties involved in the management of asthma, including physicians, pharmacists, nurses, patients, family members, and insurance companies, need to be aware of the NAEPP guidelines. To determine if the goals of asthma therapy are being met, assessment of asthma outcomes is necessary. Unfortunately, some measures may get overlooked, and patient-reported outcomes (as assessed by the validated control instruments) are not often collected during routine examinations. The Healthcare Effectiveness Data and Information Set measure for asthma may be used to quantify asthma care, but there is evidence that it does not fully capture the goals of asthma management. Most well-designed, education-based interventions are considered good value for money, but it can be difficult to put into practice such policy interventions. An optimal managed care plan will adhere to known evidence-based guidelines, can measure outcomes, is targeted to the patient's risk and impairment, and can adapt to changes in our understanding of asthma and its treatment.

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Improving Asthma Care

The National Asthma Education and Prevention Program (NAEPP) established several key points for asthma control (**Table 1**).¹ They have also established classifications for asthma control and recommended actions for treatment (**Table 2**).¹ All parties involved in the management of asthma, including physicians, pharmacists, nurses, patients, family members, and insurance companies, need to be aware of these key points.

The complex pathophysiology, treatment, and triggers of asthma further warrant a unified, yet targeted, approach to care. Obtaining and maintaining good asthma control is difficult because of these complexities, and no single factor is fully responsible for poor control. For example, Schatz et al noted that several factors independently influenced poor asthma control (eg, lower income, comorbidities, asthma severity) while other factors did not (regular inhaled steroid use, a written asthma management plan, and regular specialty care).² In another study, Bahadori et al noted that the large variation in asthma control can be partly explained by variations in guideline adherence to medication use and deficits in patients' management.³

Whatever factors play a role in poor asthma control, it is clear that uncontrolled asthma is an enormous burden in terms of the propensity to reach asthma control in the future, direct and indirect costs, and health-related quality of life.^{4,5}

Complicating the problem of asthma control is adherence to long-term controller (LTC) medication treatment. It is well known that asthma is associated with poor LTC treatment adherence, and this is linked with suboptimal asthma control.⁶ Therefore, a key to asthma management is improved treatment adherence. Poor compliance, however, is not limited to a patient forgetting their inhaler. As noted in the first article of this supplement,⁷ poor adherence to treatment can include: missing follow-up appointments, not removing known allergy trigger factors, neglecting to record symptoms, not having regular reviews, clinicians not following guidelines, insurance companies not providing or reimbursing for time to educate patients, and families not providing the needed support. All of these factors also impact asthma control.

The purpose of this article is to examine some of the ways that asthma care can be quantified and explain how managed care programs can improve asthma control.

Table 1. National Asthma Education and Prevention Program 2007: Key Points to Managing Asthma¹

Reducing impairment
Prevent chronic and troublesome symptoms (eg, coughing or breathlessness in the daytime, in the night, or after exertion)
Require infrequent use (≤2 days a week) of inhaled short-acting beta ₂ -agonist for quick relief of symptoms (not including prevention of exercise-induced bronchospasm)
Maintain (near) normal pulmonary function
Maintain normal activity levels (including exercise and other physical activity and attendance at work or school)
Meet patients' and families' expectations of and satisfaction with asthma care
Reducing risk
Prevent recurrent exacerbations of asthma and minimize the need for emergency department visits or hospitalizations
Prevent progressive loss of lung function; for children, prevent reduced lung growth
Provide optimal pharmacotherapy with minimal or no adverse effects
Adapted from National Heart, Lung, and Blood Institute. National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. August 2007. http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf . Accessed March 2, 2011.

Table 2. NAEPP Definition of Asthma Control (≥12Years of Age) and Recommended Action for Treatment¹

Components of Control		Classification of Asthma Control ^a		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakening	≤2x/month	1-3x/week	≥4x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta ₂ -agonist use for symptom relief	≤2 days/week	>2 days/week	Several times per day
	FEV ₁ or peak flow	>80% predicted	60%-80% predicted	<60% predicted
	Validated Questionnaires			
	ATAQ	0	1-2	3-4
	ACQ	≤0.75	≥1.5	N/A
ACT	≥20	16-19	≤15	
Risk	Exacerbations ^b	0-1 per year	2-3 per year ^c	>3 per year ^c
	Progressive loss of lung function	Evaluation requires long-term follow-up care.		
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
Recommended Action for Treatment	<ul style="list-style-type: none"> Maintain current step Regular follow-ups every 1-6 months to maintain control Consider step down if well controlled for at least 3 months. 	<ul style="list-style-type: none"> Step up 1 step and Reevaluate in 2-6 weeks. For side effects, consider alternative treatment options. 	<ul style="list-style-type: none"> Consider short course of oral systemic corticosteroids, Step up 1-2 steps, and Reevaluate in 2 weeks. For side effects, consider alternative treatment options. 	

FEV₁ indicates forced expiratory volume in 1 second; NAEPP, National Asthma Education and Prevention Program.

^aThe level of control is based on the most severe impairment or risk category. The validated questionnaires listed can be thought of as a proxy for measuring impairment. The impairment domain should be assessed over a 2 to 4 week recall (not applicable for spirometry).

^bExacerbation is defined as an acute episode of signs and symptoms requiring oral systemic corticosteroids.

^cExacerbation rates were taken from the 2007 draft version of the NAEPP definition for asthma control. The final version stipulates that there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control.

Adapted from National Heart, Lung, and Blood Institute. National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. August 2007. <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>. Accessed March 2, 2011.

Measuring Improvements in Asthma Care

To determine if the goals of asthma therapy are being met, assessment of asthma outcomes is necessary. The NAEPP guidelines state that periodic monitoring of asthma control should include (at a minimum): (1) signs and symptoms of asthma; (2) pulmonary function; (3) quality of life/functional status; (4) history of asthma exacerbations; (5) pharmacotherapy (checking for adherence to therapy and potential side effects from medication); and (6) patient-provider communication and patient satisfaction.¹ In terms of asthma control, the NAEPP guidelines categorize patients into levels of impairment and levels of risk, and classify patients' asthma control level based on the most severe impairment or risk component (Table 2). The guidelines are flexible on how impairment is assessed because individual components of impairment can be measured directly or alternatively, using 1 of 3 validated control instruments: Asthma Control Questionnaire, Asthma Control Test, or the Asthma Therapy Assessment Questionnaire.

Unfortunately, some of these measures may get overlooked, and patient-reported outcomes (as assessed by the validated control instruments) are not often collected during routine examinations. Clinicians may instinctively focus on the patient's asthma symptoms and downplay other measures. Outcomes, however, such as those related to quality-of-life measures, are important. Generic instruments, such as the Short Form (36) Health Survey,⁸ and asthma-specific measures, such as the Asthma Quality of Life Questionnaire,⁹ have been used in the adult asthma population. Important components of the assessment of adult asthma-related quality of life should include missed work days, reductions in activities, and disturbances in sleep. In addition to quality-of-life metrics, patient satisfaction with asthma care and management is positively correlated to treatment adherence.¹⁰ It is advised that patient perception of asthma control and quality of care be evaluated.

The Healthcare Effectiveness Data and Information Set (HEDIS) measure for asthma (ie, appropriate controller medication prescription for patients with persistent asthma) may also be used to quantify asthma care, but recent studies have criticized its value. Lim et al conducted a mail survey of adults with asthma and combined it with an evaluation of 12-month medical and pharmacy claims.¹¹ Asthma control was the most useful patient outcome quality indicator and compliance with the HEDIS asthma measure was not associated with a better patient-oriented outcome. Although this study has limitations, it provides evidence that the HEDIS measure for asthma does not fully capture the goals of asthma management.

HEDIS definitions may help us categorize patients. A retrospective cohort study examined medical records of 8634 patients with HEDIS-defined persistent asthma and determined that one method to predict emergency visits was the number of canisters of short-acting beta agonists (SABAs) dispensed.¹²

In summary, there are numerous methods available to measure outcomes in asthma. No one measure appears fully comprehensive in predicting asthma care. The NAEPP guidelines suggest directly measuring all components of asthma control or measuring the impairment component using 1 of the 3 validated control instruments. In lieu of this, the HEDIS asthma measure may provide some information in categorizing patients into risk and impairment groups.

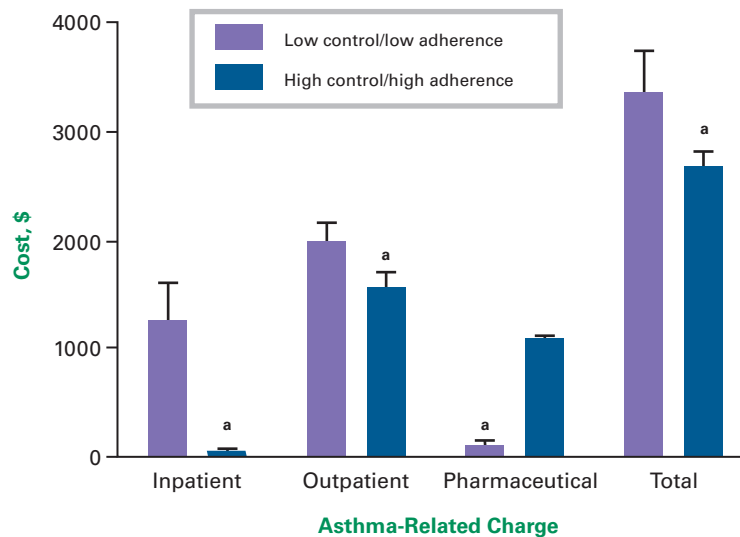
The Economics of Improving Asthma Care

Numerous studies have attempted to evaluate the clinical and economic aspects of various asthma interventions and policies. The results of these studies are mixed, and drawing conclusions is difficult given the lack of consistency defining asthma control.¹³ With that caveat, the cost-effectiveness of inhaled corticosteroid (ICS) therapy is widely accepted for those in whom treatment with an ICS is appropriate. Further, the published literature indicates that the combination of an ICS plus a long-acting beta agonist (LABA) offers favorable value for money.¹⁴⁻¹⁶ However, a comparative effectiveness research study of a high-dose ICS plus a LABA suggested limited clinical benefit.¹⁷ In this latter study, low-dose ICS therapy plus a LABA (100 or 250 µg fluticasone plus 50 µg salmeterol) and high-dose ICS therapy plus a LABA (500 µg fluticasone plus 50 µg salmeterol) was compared with the next best alternative treatment. Patients receiving the lower dose had better asthma control, while patients given the higher dose did not fare much better than patients in a control group who received other medications.

One alternative to high-dose ICS therapy plus a LABA that may provide clinical and economic value is omalizumab. The National Institute for Health and Clinical Excellence in the United Kingdom recently published a health technology assessment of omalizumab, and suggested that omalizumab may be cost-effective for patients with certain characteristics including severe, unstable allergic asthma and past severe asthma exacerbations.¹⁸ Although evidence in the literature on the cost-effectiveness of omalizumab is inconclusive, it may be good value for money in responders with severe, but uncontrolled, allergic disease.^{19,20}

The full extent to which poor treatment adherence impacts overall asthma burden and costs has yet to be determined. Navaratnam et al looked at claims for patients with

■ **Figure. Asthma-Related Charges⁶**



The mean post-index asthma-related inpatient, outpatient, pharmaceutical, and total charges among patients assigned to the HCHA or LCLA cohort are depicted. Error bars represent standard error of the mean.

^a $P \leq .0001$.

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mild asthma for 1 year and categorized them as being high control/high adherence patients (no exacerbations/ $>60\%$ days of recorded ICS use; $n = 483$) or low control/low adherence patients (exacerbations reported/ <60 days of recorded ICS use; $n = 258$).⁶ Compared with the low control/low adherence group, the high control/high adherence group had fewer asthma treatment days (3.9 vs 2.9, respectively; $P < .0001$) and lower overall asthma charges (\$3345 vs \$2655, respectively; $P < .0001$) in the post-index period. The high control/high adherence group had higher pharmaceutical-related charges, but overall charges were smaller due to the reduced need for inpatient and outpatient care (Figure).⁶

Disease Management Programs and Improving Asthma Care

Most well-designed, education-based interventions are considered good value for money by their authors, but it can be difficult to put into practice such policy interventions. To illustrate how they can impact asthma control, below are a few recent studies worth noting.

Zeiger et al examined whether following the NAEPP-recommended step-up treatment program in a managed care program would be effective.²¹ The records of 7694 patients with uncontrolled asthma were reviewed to determine if they were placed in a step-up program. Among 7177 patients who could be classified, 2160 patients (30.1%) were subse-

quently enrolled in a step-up program (5017 patients did not receive step-up care). Using a Poisson regression analysis, the authors determined that patients in the step-up program had a significant reduction in impairment (ie, fewer SABA canisters needed) over the course of a year compared with those patients who were not in a step-up program (adjusted RR, 0.84; 95% CI, 0.78-0.90). Analysis of risk over the course of the year (ie, number of emergency department/hospital visits) was not different among the 2 groups. Limitations of this study included nonrandom allocation of what the authors describe as the step-up program. Also, patients in the step-up program had more mild disease at baseline compared with those in the control group. Measurable or immeasurable differences between groups may have affected their ability to detect a difference in risk.

In the randomized, double-blind, GOAL (Gaining Optimal Asthma Control) study by Bateman et al, step-up treatment with ICS/LABA therapy achieved guideline-derived asthma control in a majority of patients.²² The GOAL trial step-up intervention was also found to be cost-effective.²³ The question remains as to how managed care organizations could replicate the GOAL trial intervention or others at the patient level, and whether or not similar effectiveness and cost-effectiveness would be observed in the real world.

Dall et al conducted an extensive evaluation of the effectiveness of a voluntary disease management program

Table 3. Economic Impact of an Urban Asthma Management Program: (A) Cost of Medication (B) Cost of Medical Services²⁵

A	Before Entering Program		After Entering Program		Cost Difference
	Prescriptions/ 100 Children/yr	Cost (2006 Dollars)	Prescriptions/ 100 Children/yr	Cost (2006 Dollars)	
Persistent asthma					
Bronchodilators	280.8	\$4953.82	272.8	\$4811.86	-\$141.94
Inhaled corticosteroids	78.4	\$8973.70	123.6	\$14,147.87	\$5174.18
Nonsteroidal	44.0	\$2482.73	30.4	\$1718.51	-\$764.22
Oral corticosteroids	32.1	\$224.70	10.8	\$75.51	-\$149.19
Total	—	\$16,634.95	—	\$20,753.75	\$4118.83
Intermittent asthma					
Bronchodilators	120.5	\$2125.27	128.1	\$2260.18	\$134.91
Inhaled corticosteroids	6.2	\$706.32	22.3	\$2551.32	\$1845.00
Nonsteroidal	7.3	\$410.96	5.9	\$332.60	-\$78.35
Oral corticosteroids	13.3	\$93.09	5.6	\$39.26	-\$53.82
Total	—	\$3335.64	—	\$5183.36	\$1847.74
B	Before entering program		After entering program		Cost Difference
	Visits/ 100 Children/yr	Cost (2006 Dollars)	Visits/ 100 Children/yr	Cost (2006 Dollars)	
Persistent asthma					
Outpatient visits	116.0	\$4871.50	89.5	\$3757.57	-\$1113.92
ED visits	15.4	\$2456.16	10.6	\$1691.84	-\$764.32
Hospitalizations	7.9	\$21,860.96	3.4	\$9572.86	-\$12,288.09
Total	—	\$29,188.62	—	\$15,022.27	-\$14,166.33
Intermittent asthma					
Outpatient visits	476	\$1997.18	41.3	\$1734.56	-\$262.63
ED visits	6.0	\$952.96	6.1	\$983.04	\$30.08
Hospitalizations	0.9	\$2503.80	1.2	\$3302.23	\$798.43
Total	—	\$5453.94	—	\$6019.83	\$565.88

ED indicates emergency department.

Reprinted with permission from Cloutier MM, Grosse SD, Wakefield DB, Nurmagambetov TA, Brown CM. *Am J Manag Care.* 2009;15(6):345-351.

for patients in the military health system.²⁴ The study examined medical claims from 23,793 individuals with asthma. Enrollment in a disease management program was associated with a reduction in annual medical costs of \$453. Use of a disease management program provided: (1) reduced emergency and hospital services; (2) increased appropriate use of medical exams and pharmaceuticals; (3) reduced annual per capita medical expenditures; and (4) increased overall satisfaction with the program and the perception that the program helped increase patients' understanding of disease, self-management skills, and quality of life.

Another study that examined the costs associated with a managed care program was conducted by Cloutier et al.²⁵ They assessed the return on investment for a 3-year asthma

management program ("Easy Breathing") among children living in a poor urban setting (n = 3298). Startup costs for the program were \$28.95 per child for the first year; continuing operating costs were \$10.28 per year per child for the last 2 years. The authors determined that if Medicaid managed care plans were charged \$10.28 per child with asthma per year, at-risk health plans would save \$26.44 per child with asthma each year. The potential return on investment for years 2 and 3 was calculated to be \$3.58 per US dollar spent. Detailed analysis showed that much of the savings is the reduced medical costs once a child with persistent asthma is enrolled in a good program. As shown in **Tables 3a** and **3b**, overall costs increased in patients with intermittent asthma properly taking their medications, but declined in patients with persistent

■ **Table 4.** HEDIS National Drug Code 2011: Recommended Asthma Medications²⁸

Description	Prescriptions
Antiasthmatic combinations	Dyphylline-guaifenesin Guaifenesin-theophylline Potassium iodide-theophylline
Antibody inhibitor	Omalizumab
Inhaled steroid combinations	Budesonide-formoterol Formoterol-mometasone Fluticasone-salmeterol
Inhaled corticosteroids	Beclomethasone Budesonide Ciclesonide Flunisolide Fluticasone (chlorofluorocarbon free) Mometasone Triamcinolone
Leukotriene modifiers	Montelukast Zafirlukast Zileuton
Long-acting, inhaled beta₂ agonists	Aformoterol Formoterol Salmeterol
Mast cell stabilizers	Cromolyn Nedocromil
Methylxanthines	Aminophylline Dyphyllin Oxtriphylline Theophylline
Short-acting, inhaled beta₂ agonists	Albuterol Levalbuterol Metaproterenol Pirbuterol

HEDIS indicates Healthcare Effectiveness Data and Information Set.

Red indicates a medication not listed in the preferred asthma medications table. Green indicates a medication that is new in 2011.

Adapted from National Committee for Quality Assurance. HEDIS 2011 Final NDC Lists. Table ASM-C/Table DASM-C: Asthma Medications. <http://www.ncqa.org/tabid/1274/Default.aspx>. Accessed January 23, 2011.

asthma.²⁵ The value of “Easy Breathing” may be higher for patients with persistent asthma. However, this study did not include quality measures. As a result, it is unclear if asthma control was improved in these patients.

Ramos et al initiated a study of another managed care program designed to reduce costs.²⁶ The program, based in Kansas City, Missouri, promoted education and involvement of the insurance companies to reduce asthma-related costs, and was associated with a reduction in unnecessary medical costs. A large part of their efforts was focused on a relatively small proportion of patients, namely those who account for a large part of medical expenditures. In such patients, there is an enhanced focus to improve patients’ understanding of their condition and environment. For example, patients may receive direct intervention from an asthma case manager and their home may be inspected by an environmental specialist.

It should be noted, however, that not all managed care programs are deemed successful.²⁷ Polisena et al found that their asthma action plan was associated with greater costs compared with a control group without demonstrating superior outcomes. Furthermore, managed care plans must be flexible to allow for changes in guidelines and preferred medications (Table 4) and also assess asthma outcomes, such as asthma control, when possible.²⁸

Conclusion

Managed care cannot improve asthma control alone. Nor can we rest the entire responsibility on the patient. It is a team effort. Whether it is making sure that a parent is involved in their teen’s asthma management,²⁹ or making sure that the patient understands asthma control instructions,³⁰ it is essential for a long-term asthma control program to require the participation of all involved parties (physicians

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and their staff, patient and their family, managed care provider). Several managed care interventions exist. An optimal plan will adhere to known evidence-based guidelines, can measure outcomes, is targeted to the patient's risk and impairment, and can adapt to changes in our understanding of asthma and its treatment. The complexity of asthma, as well as the complexity of the asthma care team, make it clear that developing a managed care program to improve asthma control is something that may be simple in design, but difficult to implement at the patient level.

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