

Puget Sound

Health Alliance

*Asthma Clinical
Improvement Team
Final Report*



Puget Sound Health Alliance

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ASTHMA CLINICAL IMPROVEMENT TEAM FINAL REPORT

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The Asthma Clinical Improvement Team Final Report

Executive Summary

The Asthma Clinical Improvement Team (CIT) was convened to provide guidance to the Puget Sound Health Alliance on improving the quality of asthma care in the region. Asthma, an inflammatory disease of the airways, affects over twenty-two million Americans, six million of them children. Asthma is one of the few chronic diseases to affect large numbers of both adults and children. Washington State has one of the highest rates of asthma in the country, with almost 1 in 10 Washingtonians suffering from asthma.¹

For asthma sufferers, poorly controlled disease leads to morbidity and mortality, lost school and workdays, and reduced quality of life. The total cost of asthma in the United States is estimated to be over 16 billion dollars per year, including both direct health care costs and the indirect costs of lost productivity in the workplace and at home.

Guidelines:

The National Heart, Lung and Blood Institute's National Asthma Education and Prevention Program (NAEPP) recently convened a third Expert Panel to review the most recent evidence for effective management of asthma. Their report, the NAEPP EPR-3 *Guidelines for the Diagnosis and Management of Asthma 2007*, was published in August 2007.² These guidelines update prior versions published in 1997 and 2002, and offer graded recommendations for components of asthma management including assessment and monitoring, education, reduction of environmental triggers and comorbidities, and medication use. The 2007 NAEPP guidelines place more emphasis on determining the level of asthma control than prior guidelines, with the aim of achieving good control for all asthma sufferers.

Despite the availability of evidence-based clinical guidelines for the disease, asthma care still falls short of recommended standards, leading to unnecessary disease burden and its consequences. The purpose of the Asthma CIT was to provide specific recommendations for improving the quality of asthma care for each of the participating Alliance stakeholders: providers, patients and their families, health plans, employers and other purchasers, and policy makers and public health. The CIT organized its work around the four components of care outlined by the NAEPP report.

Clinical Performance Measures:

One of the primary activities of the Alliance is issuing public reports on provider performance in managing and preventing a variety of chronic diseases. The report does not currently include

¹ The Burden of Asthma in Washington State (the Burden Report) Washington State Department of Health 2005. Available at: http://www.doh.wa.gov/cfh/asthma/publications/burden_wa_asthma_05.pdf

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

any metrics pertaining to asthma; the Asthma CIT was asked to make recommendations on clinical performance measures to be included in future releases of the report. As with other CITs, the Asthma CIT was requested to recommend nationally vetted measures based on administrative data. Toward this end, the CIT identified two such measures:

1. The percentage of patients aged 5 to 56 years during the measurement year who were identified as having persistent asthma and who were prescribed medications acceptable as primary therapy for long-term control of asthma during the measurement year.³ (NCQA HEDIS)
2. Percentage of patients aged 5 to 55 with persistent asthma with spirometry documented during the measurement year.⁴ (an adaptation of a measure available from ICSI)

The Asthma CIT weighed in on possible future measures based on clinical data drawn from disease registry input. Items that are important components of asthma care could be included in such a measure set, such as screening and brief intervention for smoking, annual flu shot, planned visits for asthma (at least two per year), assessment of level of asthma control, patient self-management goals and written asthma action plan, and allergy testing.

General Recommendations:

In addition to focusing its discussion on the NAEPP's four components of care, the Asthma CIT also formulated three general recommendations for improving asthma care that cut across topics and stakeholder groups. The first of these is a recommendation to **support the Washington State Collaborative for Health Improvement**⁵, specifically the Asthma Collaborative that will be implemented in 2008. The Collaborative are geared towards health care providers and are designed to provide practices with disease registries and technical support, information on evidence-based guidelines, and other educational resources and activities that are necessary to produce the system-wide changes required to appropriately manage asthma and other chronic diseases. The experiences gained in the Collaborative help practices develop models for change that will aid them in a planned, proactive approach to the management of asthma and other chronic diseases.

The CIT's second general recommendation pertains to developing provider incentives for change in the form of pay-for-performance programs. The Asthma CIT recommends an **incremental approach to pay-for-performance**, with the first tier rewarding practices and providers for meeting the criteria of a patient-centered medical home, the qualifications of which are currently being determined through a revision of the NCQA's Physician Practice Connections⁶ tool. The second tier of payment is reserved for those practices or providers who achieve a certain target level on clinical performance measures such as those described above for asthma.

The CIT's final general recommendation encourages plans and purchasers to **innovate and**

³ NCQA The State of Healthcare Quality 2007: HEDIS Measures of Care. Available at: <http://web.ncqa.org/tabid/543/Default.aspx>

⁴ The Institute for Clinical Systems Improvement. Diagnosis and Outpatient Management of Asthma. 2005. http://www.icsi.org/asthma_outpatient/asthma_diagnosis_and_outpatient_management_of_12573.html

⁵ Washington State Collaborative to Improve Health. <http://www.doh.wa.gov/cfh/WSC/default.htm> and <http://www.doh.wa.gov/cfh/WSC/publications/WSC6Advance-factsheet.pdf>

⁶ NCQA Physician Practice Connections <http://web.ncqa.org/tabid/141/Default.aspx>

evaluate with benefit design and payment practice so that the community may become more knowledgeable about strategies that both improve health outcomes while controlling health care costs.

NAEPP Components of Care:

In their report, the NAEPP Expert Panel identified four critical components of asthma care: Assessment and Monitoring, Education for a Partnership in Asthma Care, Environmental Triggers and Comorbid Conditions, and Medications. Each component should be carried out in an organized, consistent and comprehensive fashion to achieve optimal health outcomes in asthma. The Asthma CIT chose to structure the bulk of its work and recommendations around these four components.

1. Assessment and Monitoring

The NAEPP EPR-3 2007 report emphasizes the importance of accurately and repeatedly assessing and monitoring asthma severity, control, and responsiveness to treatment. The 2007 report differs from prior versions in that a greater emphasis is placed on the degree of asthma control (as opposed to severity). Asthma control changes over time, and should be monitored on a regular basis. The NAEPP identifies two domains of asthma control: impairment (current symptoms and objective lung function) and risk (risk of exacerbation or decline in lung function). In order to assure regular assessment of impairment and risk, the Asthma CIT recommends that providers and patients conduct **planned, regularly scheduled visits** devoted to asthma management, at a frequency tailored to individual patient needs. Planned visit care requires a proactive approach, and the Asthma CIT highlights the importance of providers having **disease registry** capability (which can be electronic or manual) to track asthma patients over time, and ensure regular follow-up. Visits should be **structured** around necessary components of care as outlined in the body of this report. Spirometry, or objective pulmonary function testing, is an important part of assessment and monitoring, and should be conducted at regular intervals by providers caring for asthma patients. Patients and parents of children with asthma should be taught to assess asthma severity and control over time based on their symptoms. Some patients may benefit from home peak flow monitoring as well.

Health plans and purchasers can aid in the proactive approach to asthma management by **removing barriers to care such as co-pays for chronic care visits**, and developing **care management** strategies for patients with asthma. Care management should always be coordinated with the primary care provider to provide continuity of care.

2. Education for a Partnership in Asthma Care

Optimal asthma management requires ongoing education for providers, patients and their families. Asthma is a chronic disease that can fluctuate from day to day, and patients' **self-management** of their disease is an important component of care. Providers should find an opportunity for patient-centered education and self-management support at every visit for asthma. Patients are encouraged to be knowledgeable about their disease, and to understand how to interpret their symptoms, manage their medications, and when to seek medical help. An important component of self-management support is a **written asthma action plan**, discussed and reviewed between patient and provider, that includes instructions on daily management of asthma as well as information on what to do when symptoms deteriorate.

Patient asthma education should be offered in a variety of formats and venues, and not be limited to the provider's office. Appropriate asthma educational activities have been shown to be cost-saving in reducing healthcare costs,⁷ and health plans and purchasers are encouraged to play an active role in this regard by offering and funding educational and patient self-management support activities, such as asthma classes, group visits, web-based learning opportunities, and school and home-based educational support.

Provider education in asthma care is equally important. Providers should be familiar with up-to-date evidence-based clinical guidelines, such as the NAEPP EPR-3 guidelines, when treating asthma patients. The Asthma CIT offers tools and resources for providers seeking to further their knowledge of asthma care. The Asthma CIT further recommends the **Washington State Asthma Collaborative**, since learning collaboratives have been shown to be an effective method of provider education in chronic disease management.

3. Environmental Triggers and Comorbid Conditions

Asthma can be triggered or exacerbated by external factors such as environmental triggers (indoor and outdoor allergens, inhalant irritants, and occupational exposures) or co-existing medical conditions (sinusitis, bronchopulmonary aspergillosis, sleep apnea, obesity, GERD and others). In order to achieve optimal asthma control, patients and providers must be aware of these factors and take steps to avoid or reduce them. The Asthma CIT did not discuss the management of comorbid conditions in detail, but does recommend that they be considered in any patient with poorly controlled asthma. This section of the report focuses on the Asthma CIT recommendations for reducing environmental triggers of asthma, following the guidelines of NAEPP EPR-3 2007.

Some of the most insidious environmental triggers are those found in the home, such as indoor allergens from pets, cockroaches, rodents, molds, and inhalant irritants such as environmental tobacco smoke (ETS), wood smoke, and nitrogen dioxide from gas stoves and appliances. Studies have shown that education on in-home asthma triggers provided in the clinical setting has limited value, and that home visits that include environmental assessment, education and interventions to reduce triggers are most effective. The Asthma CIT endorses **home visits for environmental assessment and remediation**. Resources on ongoing home environmental assessment opportunities in several counties are provided, including the American Lung Association of Washington's Master Home Environmentalist program. The CIT recommends that this program be available in all five counties represented by the Puget Sound Health Alliance. Home environmental assessments are cost effective and reasonable, especially when compared to the cost of medications used to treat asthma, and the CIT strongly encourages purchasers and health plans to provide reimbursement or funding to make home visits accessible to all asthma patients. Environmental trigger reduction activities can involve the provision of pillow and mattress covers to reduce dust mite exposure, HEPA air purifiers for pet dander and ETS, and vacuums equipped with HEPA filters, as well as mold removal and structural repairs to close holes and leaks or vent appliances. Interventions are more cost-effective and more likely to be carried out when they are targeted to triggers to which a patient is sensitive. The Asthma CIT recommends early **allergy testing** (skin prick or *in vitro* RAST testing) with a limited battery of common allergens for any patient with poorly controlled asthma in order to target trigger

⁷ Asthma Regional Council, Investing in Best Practices for Asthma. 2007.
<http://www.asthmaregionalcouncil.org/about/documents/InvestinginBestPracticesforAsthmaJune2007.pdf>

reduction efforts to specific allergens to which a patient is both exposed and sensitive.

4. Medications

Any patient with persistent asthma should be on long-term controller medications, such as inhaled corticosteroids (ICS) or acceptable alternatives as outlined in the NAEPP EPR-3 2007 guidelines for step therapy (see Appendix 2). Rescue medications, such as short-acting bronchodilators, may be needed for acute asthma exacerbations but should not be the mainstay of treatment for persistent asthma. Provider compliance with recommended treatment guidelines for asthma medications can be increased through education, as discussed above, and through **feedback on prescribing practices from health plans and pharmacy benefit managers**.

Patient education and self-management support can increase patients' understanding of, and compliance with, medication use for asthma. In addition to the other sources of patient education discussed above, pharmacists can play a role in teaching about medications through **Medication Therapy Management (MTM) Services**.

The Asthma CIT identified cost as a major barrier to compliance with asthma medications, especially since none of the commonly used medications for asthma are available as generic options. The Asthma CIT recommends that health plans and purchasers work to **reduce the barrier of cost** for asthma medications by placing inhaled corticosteroids, long-acting beta agonists, and rescue medications on Tier 1 of their formularies, with no or low copayments. Other needed asthma medications should be moved to Tier 1 within a stepped care approach.

I. Introduction

A. Background

The Puget Sound Health Alliance was created in response to recommendations made by the *The King County Health Advisory Task Force*⁸, a leadership group convened by King County Executive Ron Sims in 2003 to address the systemic problems facing the health care system in the Puget Sound region. As part of their recommendation to develop an integrated strategy to improving health care, the Task Force advised creating a regional partnership to provide the necessary leadership to forge changes in the existing system. The Puget Sound Health Alliance (the Alliance) was created to fill this role, with the vision to develop a state-of-the-art health care system that provides better care at a more affordable cost, resulting in healthier people in the Puget Sound Region. Its mission is to build a strong alliance among patients, doctors and other health care providers, hospitals, employers and health plans to promote health and improve quality and affordability by reducing overuse, under-use and misuse of health services.

The Alliance has developed an extensive membership of providers, employer/purchasers, hospitals, health care associations, health plans and individual consumers in a five county region composed of King, Snohomish, Pierce, Thurston and Kitsap Counties.

The strategic approach of the Alliance addresses several key elements to improve health, quality, and cost outcomes, including: chronic disease management, scientific evidence to guide providers and patients in value-based medical decision-making, decreased practice variation, and quality measurement and reporting to support practice improvement and allow patients to seek appropriate care.

The Alliance Board of Directors selected seven initial areas of focus for clinical improvement: heart disease, diabetes, back pain, depression, pharmacy, prevention and asthma. A Clinical Improvement Team (CIT), made up of local experts representing various stakeholder groups, was convened to look at each condition. Each CIT reported to the Quality Improvement Committee (QIC) and developed recommendations to the Board on standard guidelines, performance metrics and measurement approaches, and implementation and monitoring strategies for quality improvement in each area.

The Asthma CIT, the last of the seven initial Alliance CITs, was convened in June 2007, and conducted meetings through November 2007. This report highlights the work of the Asthma CIT in identifying nationally recognized evidence-based clinical guidelines and clinical performance measures for asthma, and developing strategies to improve asthma management at the point of care as well as for creating a community environment that is supportive of change.

⁸ King County Health Advisory Task Force Final Report, June 2004 [Accessed online 11_30_07 at: <http://www.metrokc.gov/exec/hatf/063004report.pdf>]

B. The Asthma Burden

What is Asthma?

Asthma is a chronic disease involving the airways of the lungs. It is an inflammatory disorder, in which underlying inflammation causes airway edema (swelling), excess mucous production, airway hyper-responsiveness (susceptibility to spasm), and obstruction of airflow. Acute symptoms of asthma usually arise from bronchospasm (constriction of the airways), but it is underlying inflammation that can affect the airway caliber and airflow, as well as bronchial hyper-responsiveness and the susceptibility to bronchospasm.⁹

Asthma is one of the few chronic diseases that are common in both adults and children. Some children may outgrow their tendency towards asthma as they develop, but people may also develop asthma for the first time in adulthood.

Symptoms of asthma may include cough, wheezing, shortness of breath or difficulty breathing, and chest tightness. More severe attacks may lead to lethargy, confusion and even death. Symptoms of asthma may vary from one individual to another and within the same individual over time. Asthma may be intermittent or persistent. Severe exacerbations may occur in either intermittent or severe asthma. People with asthma may experience missed days of school or work, poor quality of life for themselves and their families, interrupted sleep, financial burdens from healthcare costs, and increased depression and suicide ideation, especially among youth.¹⁰

The Burden of Asthma in the United States

More than 22 million American adults and children suffer from asthma. It is one of the most common chronic diseases of childhood, affecting more than 6 million children in the United States. The prevalence of asthma is increasing (see Figure 1, below). While the number of deaths per year due to asthma has decreased over the past decade, the number of hospitalizations has remained relatively constant, with nearly half a million hospital admissions due to asthma annually. While lower rates of hospitalizations have been observed in some groups, this has been offset by a higher rate among young children ages 0-4. This may in part be due to increased reporting of asthma in young children, but the burden of avoidable hospitalizations remains high.¹¹

The economic costs of asthma are significant. The total cost (direct and indirect) of asthma in the United States was estimated at \$16.1 billion in 2004. Direct costs (medical expenditures) were estimated at \$11.5 billion, including \$5 billion for prescription drugs. Indirect costs were approximately \$4.6 billion, which included lost school and workdays, lost housekeeping work, and mortality.¹²

⁹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹⁰ The Burden of Asthma in Washington State (the Burden Report) Washington State Department of Health 2005. Available at: http://www.doh.wa.gov/cfh/asthma/publications/burden_wa_asthma_05.pdf

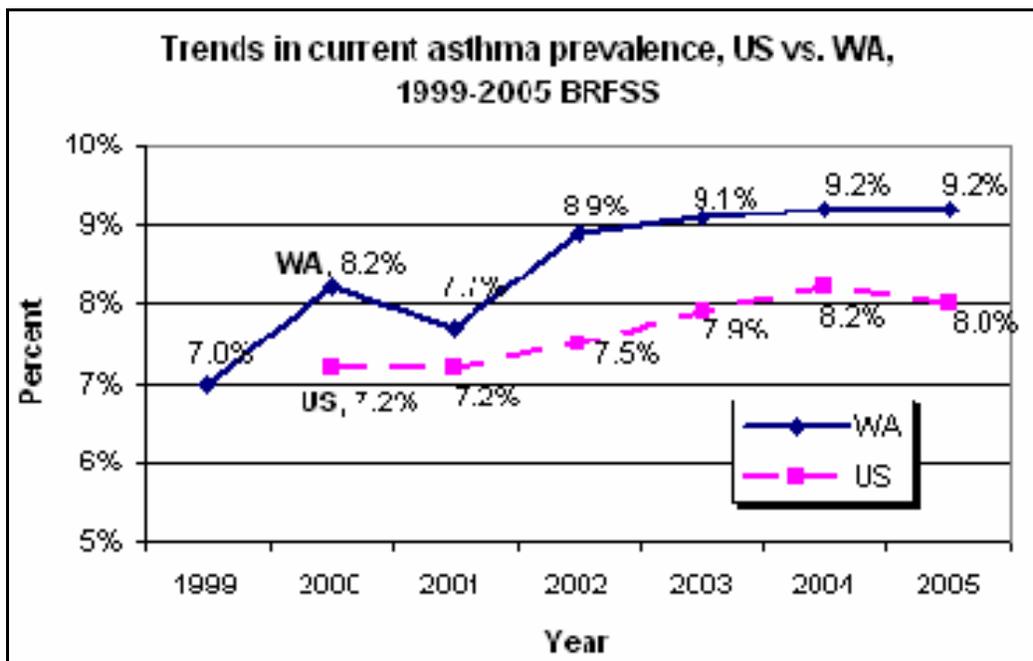
¹¹ Statistics quoted here are from a variety of sources, quoted in the NAEPP

¹² Asthma in King County. Public Health Data Watch. November 2005. Available at: <http://www.metrokc.gov/health/datawatch/asthma-2005.pdf>

The Burden of Asthma in Washington State

The prevalence of asthma in Washington State for both adults and children is higher than the national average. The Centers for Disease Control have identified the prevalence of asthma in Washington State as one of the highest in the nation. In 2005, the Washington State Department of Health issued a report entitled the *Burden of Asthma in Washington State* (known as the Burden Report),¹³ which identified the prevalence and cost of asthma across the state. As shown in Figure 1, the prevalence of asthma in Washington is increasing, and is significantly higher than that for the United States as a whole. According to the Burden Report, in 2003 approximately 400,000 adults and 120,000 children and adolescents in Washington State suffered from asthma; that number had increased significantly from 1999 figures for both adults and households with children (see Figure 1). About 1 in 10 women and 1 in 14 men in Washington are estimated to have asthma. Between 7 and 10% of middle/high school-aged children have asthma, and 1 in 10 households with children of any age have a child with asthma.¹⁴

Figure 1:



BRFSS= Behavioral Risk Factor Surveillance System

From: Washington State Department of Health Asthma Program: Data and Surveillance.

http://www2.doh.wa.gov/cfh/asthma/data_surveillance.htm

¹³ The Burden of Asthma in Washington State (the Burden Report) Washington State Department of Health 2005. Available at: http://www.doh.wa.gov/cfh/asthma/publications/burden_wa_asthma_05.pdf

¹⁴ 1999-2003 Washington State Behavioral Risk Factor Surveillance System (BRFSS), as quoted in the Burden Report: The Burden of Asthma in Washington State, Washington State Department of Health 2005. Available at: http://www.doh.wa.gov/cfh/asthma/publications/burden_wa_asthma_05.pdf

Over 5,000 people are hospitalized every year from asthma in Washington State- more than 100 per week.¹⁵ About 48,000 adults with asthma make at least one emergency department visit per year, and 100,000 make at least one urgent visit to see their doctors for worsening asthma symptoms. For adults, having asthma may reduce quality of life, limit activities, and lead to missed work days. For children, asthma is the leading cause of school absenteeism caused by chronic health conditions. Asthma is responsible for an estimated 14 million lost school days nationally, and 20 percent of children with asthma miss a week or more of school per year.¹⁶

Direct medical costs for asthma in Washington were approximately \$240 million in 2005. Total costs for both medical expenditures and lost productivity for the state were more than \$400 million per year.¹⁷ For children alone, childhood asthma costs in Washington are estimated at \$127 million a year.¹⁸

At the county level, asthma prevalence rates for four of the five counties affiliated with the Puget Sound Health Alliance are available from the American Lung Association, and are listed in Table 1. Statistics for King County show that among county residents in 2004, the total hospital charges for asthma were \$11.8 million, averaging \$8,826 per hospitalization, with an average stay of 2.6 days.¹⁹ Among children in King County, 648 are hospitalized annually for asthma at a cost of \$3.5 million.²⁰

Table 1: Asthma Prevalence in Puget Sound Health Alliance Five-County Region 2004^{21,22}

County	Total Population	Adults with Asthma	Children with Asthma
King	1.79 million	120,833	32,485
Pierce	732,282	47,403	16,273
Snohomish	633,947	41,146	13,978
Thurston	217,641	15,544	4,381

Asthma is a disease in which socioeconomic and racial disparities are prominent. Both nationally and in King County, 62 percent of African-American children suffer from asthma.

¹⁵ National Hospital Discharge Survey, Washington State Comprehensive Hospital Abstract Reporting System (CHARS). Asthma as principal diagnosis, age-adjusted to 2000 US Population, as quoted in The Burden Report: The Burden of Asthma in Washington State, Washington State Department of Health 2005. Available at:

http://www.doh.wa.gov/cfh/asthma/publications/burden_wa_asthma_05.pdf

¹⁶ Schual-Berke. Kids with asthma are helped. Highline Times 2007. Available at:

<http://www.highlinetimes.com/articles/2007/10/09/interact/opinion/opinion01.txt>

¹⁷ Weiss, K., Sullivan, S. The health economics of asthma and rhinitis. I. Assessing the economic impact. J Allergy Clin Immunol 2001; 107: 3-8, as quoted in: The Burden Report: The Burden of Asthma in Washington State Washington State Department of Health 2005. Available at:

http://www.doh.wa.gov/cfh/asthma/publications/burden_wa_asthma_05.pdf

¹⁸ Schual-Berke. Kids with asthma are helped. Highline Times 2007. Available at:

<http://www.highlinetimes.com/articles/2007/10/09/interact/opinion/opinion01.txt>

¹⁹ Asthma in King County. Public Health Data Watch. November 2005. Available at:

<http://www.metrokc.gov/health/datawatch/asthma-2005.pdf>

²⁰ State Representative 33rd District Shay Schual-Berke Health Care Resource Guide

http://housedemocrats.wa.gov/members/schual-berke/SchualBerke_07HealthReport.pdf

²¹ From the American Lung Association State of the Air 2004: Washington. Available at:

http://lungaction.org/reports/SOTA04_statesensitive.html?geo_area_id=53

²² Data not available for Kitsap County.

The rate of hospitalization for asthma among children living in low-income King County neighborhoods is 188 percent higher than the rate for children living in more affluent neighborhoods.²³

Current Practices in Asthma Management - Room for Improvement

The quality of asthma management often falls short of best practices, both locally and nationally. The only nationally collected performance measure for asthma is the NCQA HEDIS measure for appropriate prescription of long-term anti-inflammatory controller medications. Health plan data shows that performance on this measure has risen to 91.6% for commercial plans and 87.1% for Medicaid programs in 2006.²⁴ However, the NCQA also estimates that \$1 billion dollars in lost productivity and 6.3 million sick days in 2006 were attributable to unexplained variations in asthma care across the country.²⁵ This latter figure highlights the ongoing need for improvement and consistency in the multifaceted management of asthma.

At the local level, a review of asthma care provided to over 300 children in King County in 2002-2003 found that care often did not meet national guidelines.²⁶ “Only 32% of the caregivers reported receiving an asthma management plan. Anti-inflammatory medicines were under-used, with 50% of children with asthma not using any anti-inflammatory agents. Caretakers reported receiving advice on indoor asthma triggers inconsistently from their providers. Adherence with prescribed medications was relatively low, with 35% of caretakers reporting that their children had stopped or forgotten to take medicines or had taken less than prescribed.”²⁷ In another study, part of the King County Asthma Forum Allies Against Asthma grant,²⁸ a chart review of 129 randomly selected medical records were abstracted of children ages 4-17 who had two or more clinic visits for asthma during the past year from safety net health providers in the county. “The results showed that few of the children had documented allergy tests, spirometry, or education concerning indoor asthma triggers. Less than one third of the patients had a documented asthma action plan and inhaled steroids were underutilized.”²⁹

Appropriate care of people with asthma is a complex process, with the need for proactive management of the disease and the cooperation of multiple stakeholders, such as patients and parents, providers, and the community of allied health professionals, community health workers and advocacy groups. Such collaboration will not occur in a consistent fashion without a concerted effort on the part of all players to work together to bring about improvement in the health outcomes for asthma sufferers.

²³ Schual-Berke. Kids with asthma are helped. Highline Times 2007. Available at: <http://www.highlinetimes.com/articles/2007/10/09/interact/opinion/opinion01.txt>

²⁴ NCQA The State of Healthcare Quality 2007: HEDIS Measures of Care. Available at: <http://web.ncqa.org/tabid/543/Default.aspx>

²⁵ The National Committee on Quality Assurance (NCQA) State of Healthcare Quality 2007. Available at: <http://web.ncqa.org/tabid/566/Default.aspx>

²⁶ Kids Get Care: Children’s Health Improvement Collaborative <http://www.metrokc.gov/health/kchap/chic.htm>

²⁷ Ibid

²⁸ King County Asthma Forum Allies Against Asthma Planning Year Evaluation Report, January 1, 2002 – December 31, 2002 Available at: <http://www.metrokc.gov/health/asthma/aaareport.pdf>, p. 12

²⁹ King County Asthma Forum, Allies Against Asthma Planning Evaluation Report. January 1, 2002 – December 31, 2002. <http://www.metrokc.gov/health/asthma/aaareport.pdf>

C. Asthma CIT – Overview

1. Members of the CIT

The Asthma CIT consisted of local experts in asthma management, prevention, and education, representing the stakeholder members of the Alliance, including consumers and consumer advocacy groups, health care providers, public health, employers and other health care purchasers, and health plans. A list of Asthma CIT members and participating staff can be found in Appendix 1.

2. Scope and Focus of the Asthma CIT

The Asthma CIT chose to focus on asthma in both adults and children without age range limitations.

Framework: As discussed below, the National Asthma Education and Prevention Program (NAEPP) released new guidelines for the management of asthma this year, focusing their recommendations around four components of asthma management:

1. Measures of Asthma Assessment and Monitoring
2. Education for a Partnership in Asthma Care
3. Control of Environmental Factors and Co-morbid Conditions
4. Medications

The Asthma CIT chose to adopt the NAEPP's four components as a framework for the CIT work. It should be noted that the NAEPP focuses on clinical aspect of care. Here we expand to include roles for each of the Alliance stakeholders.

Each focus area was discussed in terms of strategies for improvement that could be initiated by each of four identified Alliance member stakeholder groups. These stakeholders include the “4 P’s”: Patients, Providers, Purchasers (Employers, Union Trusts, State of Washington), and Plans (Health Plans and self-insured employers). A 5th “P”, “Policy Makers and Public Health”, was added in some instances because it was important to emphasize the role of community and government in creating an environment conducive to improvements in asthma care and outcomes.

II. Guidelines

The Asthma CIT selected the National Heart Lung and Blood Institute's **National Asthma Education and Prevention Program Expert Panel Report-3 2007 (NAEPP EPR-3 2007)**³⁰ as the recommended evidence-based clinical guidelines for asthma management. These guidelines are widely recognized as the national standard for asthma care. It was fortunate and timely that the NAEPP five-year updated guidelines for 2007 were released in August 2007, during the convening of the Asthma CIT. In October 2007 the NAEPP released a summary version of the guidelines,³¹ which is recommended by the Asthma CIT for easy reference for clinicians.

NAEPP's Ranking of Evidence

The NAEPP EPR-3 provides an extensive review of the literature for evidence in making its recommendations, and grades the evidence as to quality. The system used to describe the level of evidence is described in the table below.

Evidence Category A: Randomized controlled trials (RCTs), rich body of data.

Evidence is from end points of well-designed RCTs that provide a consistent pattern of findings in the population for which the recommendation is made. Category A requires substantial numbers of studies involving substantial numbers of participants.

Evidence Category B: RCTs, limited body of data. Evidence is from end points of intervention studies that include only a limited number of patients, post hoc or subgroup analysis of RCTs, or meta-analysis of RCTs. In general, category B pertains when few randomized trials exist; they are small in size, they were undertaken in a population that differs from the target population of the recommendation, or the results are somewhat inconsistent.

Evidence Category C: Nonrandomized trials and observational studies. Evidence is from outcomes of uncontrolled or nonrandomized trials or from observational studies.

Evidence Category D: Panel consensus judgment. This category is used only in cases where the provision of some guidance was deemed valuable, but the clinical literature addressing the subject was insufficient to justify placement in one of the other categories. The Panel consensus is based on clinical experience or knowledge that does not meet the criteria for categories A through C.

When a recommendation is carried over from the NAEPP 1997 Expert Panel Report-2³², the prior report is referenced and no new level of evidence is given.

³⁰ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

³¹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3 Report: Guidelines for the Diagnosis and Management of Asthma, Summary Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthsumm.pdf>

³² National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma 1997. Available at: <http://www.nhlbi.nih.gov/guidelines/archives/epr-2/index.htm>

In addition to specifying the level of evidence supporting a recommendation, the Expert Panel agreed to indicate the strength of the recommendation. When a certain clinical practice **“is recommended,”** this indicates a strong recommendation by the panel. When a certain clinical practice **“should, or may, be considered,”** this indicates that the recommendation is less strong. This distinction is an effort to address nuances of using evidence ranking systems. For example, a recommendation for which clinical RCT data are not available (e.g., conducting a medical history for symptoms suggestive of asthma) may still be strongly supported by the Panel. Furthermore, the range of evidence that qualifies a definition of “B” or “C” is wide, and the Expert Panel considered this range and the potential implications of a recommendation as they decided how strongly the recommendation should be presented.”³³

State and Local Organizations Involved in Asthma Care

One of the goals of the Alliance is to foster regional collaboration, and to build upon the work of others. Towards this end, the Asthma CIT emphasized the importance of identifying and recognizing those organizations actively involved in asthma care and prevention.

- The Department of Health Asthma Program
<http://www.doh.wa.gov/cfh/asthma/default.htm>
- The Department of Health Steps to a Healthier US
<http://www.doh.wa.gov/cfh/steps/default.htm>
- The Washington State Collaborative for Improved Health
<http://www.doh.wa.gov/cfh/WSC/default.htm>
- The King County Asthma Forum
<http://www.metrokc.gov/health/asthma/forum.htm>
- The Children’s Health Improvement Collaborative and the Child Health Institute
www.childhealthinstitute.org
- The Washington Asthma Initiative
http://www.alaw.org/asthma/washington_asthma_initiative
- The American Lung Association of Washington
<http://www.alaw.org/>

³³ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

III. Clinical Performance Measures

In selecting clinical performance measures, the Asthma CIT was aware that the Alliance's efforts in public reporting of provider performance currently utilize administrative (claims-based) data, collected from health plans and aggregated by the contracted data vendor Milliman. The priority for the Asthma CIT members was to identify measures for asthma that could be obtained from administrative data. In addition, the CITs have been tasked with choosing measures that have been vetted by nationally recognized organizations, particularly those that are endorsed by the National Quality Forum (NQF). The Alliance does not have the resources to test and validate new measures, and thus CITs were encouraged not to develop measures *de novo*. In selecting claims-based measures, the Asthma CIT chose one measure from the IOM Starter Set, and recommended adapting another measure from the Institute for Clinical Systems Improvement (ICSI), a nationally recognized organization committed to improving healthcare quality, and whose measures have been tested and validated.

A. Measures Based on Administrative Data

1. Appropriate use of controller medications

The NAEPP EPR-3 2007 guidelines emphasize the importance of long-term controller medications in the management of persistent asthma (see section on Medications for full discussion of NAEPP recommended step-therapy approach).

The Asthma CIT selected the NCQA³⁴ HEDIS³⁵ measure for appropriate use of controller medications, adapting the wording for use for patient populations (included in IOM Starter Set).

Measure:

The percentage of patients aged 5 to 56 years during the measurement year who were identified as having persistent asthma* and who were prescribed medications acceptable as primary therapy for long-term control of asthma[#] during the measurement year.³⁶

* Patients are identified as having persistent asthma if they have one of the four criteria below, during both the measurement year and the year prior to the measurement year (criteria need not be the same in both years).

- At least one emergency department visit with asthma as the principal diagnosis
- At least one acute inpatient discharge with asthma as the principal diagnosis
- At least four outpatient visits with asthma as one of the listed diagnoses and asthma medication dispensed at least twice
- At least four occasions on which an asthma medication is dispensed³⁷

[#]Appropriate Controller Medications:

Inhaled corticosteroids, cromolyn sodium, leukotriene modifiers, methylxanthines and nedocromil.³⁸

³⁴ NCQA = National Committee for Quality Assurance

³⁵ HEDIS = Healthcare Effectiveness Data and Information Set

³⁶ NCQA The State of Healthcare Quality 2007: HEDIS Measures of Care. Available at: <http://web.ncqa.org/tabid/543/Default.aspx>

³⁷ HEDIS 2007, Volume 2, Use of Appropriate Medications for People with Asthma. Full specifications of the HEDIS measure are proprietary and copyrighted by NCQA.

³⁸ Ibid

NCQA collects the measure separately for children, adolescents and adults, and reports the data by age stratification (5-9, 10-17, and 18-56 years of age)³⁹ and as a total rate.

2. Spirometry Use

The NAEPP EPR-3 2007 guidelines recommend that objective measurements of lung function, such as FEV1 or FEV1/FVC, be part of routine monitoring of asthma control.

The Asthma CIT selected the ICSI measure for spirometry, adapting for consistency in time frame and denominator definition with the HEDIS measure above. The original measure includes spirometry or peak flow, but the NAEPP EPR-3 2007 guidelines recommend FEV1 or FEV1/FVC as the preferred measurements for assessing control, and these are obtained from spirometry.

Measure:

Percentage of patients aged 5 to 55 [with persistent]* asthma with spirometry documented during the measurement year. ^{#, 40}

* The definition of persistent asthma as for the HEDIS measure above

The ICSI measure specifies the timeframe as “in the last visit”, but CIT members felt that spirometry at each visit may not be necessary for patients with controlled asthma and that once per year is a minimum standard.

B. Measures Based on Clinical Data

In the future, the Alliance hopes to expand its performance reporting to measures based on clinical data, such as lab data or chart or registry-based data. The Asthma CIT has endorsed the use of disease registries in management of chronic diseases such as asthma, and suggests that in the future key items of an asthma registry could be used for the development of clinical measures of quality asthma care. Such key registry components include documentation of:

- Smoking status and advice to quit for smokers
- Annual flu shot
- Planned visits (at least two per year)
- Assessment of level of asthma control at each visit (impairment and risk domains)
- Self-management goals and a written asthma action plan
- Environmental history
- Allergy testing (limited battery skin prick or RAST testing) performed for all patients with asthma that is not well-controlled

³⁹ NCQA The State of Healthcare Quality 2007: HEDIS Measures of Care. Available at: <http://web.ncqa.org/tabid/543/Default.aspx>

⁴⁰ Based on the measure on spirometry and peak flow as defined in: The Institute for Clinical Systems Improvement. Diagnosis and Outpatient Management of Asthma. 2005. http://www.icsi.org/asthma_outpatient/asthma_diagnosis_and_outpatient_management_of_12573.html

IV. Recommendations of the Asthma CIT

A. General Recommendations

- The Asthma CIT recommends that the Alliance and its members support the Washington State Children and Adult Asthma Collaboratives.
- The Asthma CIT supports an incremental Pay-for-Performance model that rewards providers for (1) meeting qualification standards for a patient-centered medical home (PCMH) and (2) achieving target levels for designated process or outcome clinical performance measures.
- The Asthma CIT encourages plans and purchasers to be innovative with approaches to encourage healthy behaviors among employees and members, and to evaluate and communicate the outcomes of any such approaches.

1. Support the Washington State Asthma Collaborative

Many activities recommended by the Asthma CIT for improving asthma care, such as the development of disease registry capabilities, provider education and training, patient education (especially that occurring outside the health care setting), home visits, and environmental assessment and control measures, are not supported by traditional health care reimbursement strategies set up by health plans, and are subject to the precarious and fragmented funding of grant or demonstration projects.

The most effective way to obtain sustainable funding for asthma education, prevention and management activities is through a public-private partnership, in which purchasers, health plans, and state and federal dollars are leveraged to fill in the gaps of asthma care in the state. Ideally, the roles of such a partnership would be two-fold: (1) to provide a single regional repository for information and resources pertaining to quality, evidence-based asthma care, and (2) to provide a sustainable source of funding for a hub of activities that are not typically reimbursed by health plans or other funding sources.

The Asthma CIT discussed this concept in some detail in an attempt to identify the most appropriate members for such a partnership, and to determine who might play a leading role in convening these members and obtaining funding.

There are some local and regional precedents for creating coordinated coalitions and resource hubs for asthma management; the Asthma CIT recommends drawing on this experience. In 2002-2005 the King County Asthma Forum received funding from the Robert Wood Johnson Foundation Allies Against Asthma (AAA) project to improve the health of low-income children with asthma located in Central and South Seattle and Southwest King County.⁴¹ The King County AAA project was charged with many of the activities cited above, such as improving clinical management practices through learning collaboratives and establishing registries, community coalition building, educational activities, and increasing coordination of services.⁴²

⁴¹ The King County Allies Against Asthma Project. Information available at: <http://www.metrokc.gov/health/asthma/evaluation/index.htm>

⁴² An evaluation of the project can be found at: <http://www.metrokc.gov/health/asthma/evaluation/index.htm>

The Washington State Children’s Health Improvement Collaborative (CHIC) used quality improvement methodology and the Breakthrough Series Collaborative model to improve the delivery of care for low-income children suffering from asthma.⁴³ CHIC was funded by the Washington State legislature with additional support from several local funders. Funding ended in 2007, and future efforts and expertise will be directed towards the Washington State Asthma Collaborative.

The Asthma CIT strongly endorses the work of the Washington State Collaborative for Improved Health⁴⁴ and recommends the Children’s and Adult Asthma Collaboratives as the most appropriate venues for housing coordinated activities around asthma care. The Collaboratives are geared towards health care providers and are designed to provide practices with disease registries and technical support, information on evidence-based guidelines, and other educational resources and activities. The Asthma CIT recommends continued support of the Washington Collaboratives from the State Legislature.

At current funding levels, the 2008-2009 Asthma Collaboratives will prioritize practices with five or fewer physicians and will accommodate up to ten practices in each of the two focus areas (Childhood and Adult Asthma). However, many clinics have participated in past collaboratives, developing the technical expertise and tools to embark upon asthma care improvements using the CDEMS registry and other materials from past collaboratives. Nonetheless, additional funding could allow the Asthma Collaborative to expand their scope. The American Lung Association of Washington and the Washington Asthma Initiative are other potential partners to this effort who may provide expertise or the ability to leverage additional funding.

2. Pay for Performance: Rewarding System Change

Although pay-for-performance programs have had mixed results in terms of improving provider performance, quality of care, and outcomes,⁴⁵ there have been examples of successful pay-for-performance programs that reward system change.⁴⁶ For example, a recent study in a children’s physician-hospital organization (PHO) showed that a pay-for-performance model that aligns provider incentives with the objectives of an asthma improvement collaborative can build sustainable system change and accelerate improvement.⁴⁷ The authors of the study concluded that to “be successful [pay-for-performance programs] will likely need to align provider, provider group, payer, and quality incentives and objectives.” The model described in the study, which reinforces the collaborative environment and system change, is one way to reimburse providers for quality improvement efforts.

⁴³ Children’s Health Improvement Collaborative. <http://www.metrokc.gov/health/kchap/chic.htm>

⁴⁴ Washington State Collaboratives to Improve Health <http://www.doh.wa.gov/CFH/WSC/default.htm>

⁴⁵ E.g., Glickman et al. Pay for Performance, Quality of Care, and Outcomes in Acute Myocardial Infarction *JAMA*. 2007;297:2373-2380; Lindenauer et al. Public Reporting and Pay for Performance in Hospital Quality Improvement *N Engl J Med* 2007; 356:486-96; Rosenthal et al. Early Experience With Pay-for-Performance: From Concept to Practice *JAMA*. 2005;294:1788-1793 <http://jama.ama-assn.org/cgi/content/full/294/14/1788>

⁴⁶ Dershewitz, Journal Watch Commentary: A Successful Pediatric Pay-for-Performance Program. *Journal Watch*, July 17, 2007. Available at: <http://generalmedicine.jwatch.org/cgi/content/full/2007/717/5#>

⁴⁷ Mandel KE and Kotagal UR. Pay for performance alone cannot drive quality. *Arch Pediatr Adolesc Med* 2007 Jul; 161:650-5. <http://archpedi.ama-assn.org/cgi/content/full/161/7/650>

With this in mind, the Asthma CIT recommends developing an **incremental approach** to pay-for-performance (see Table 2). The suggested reimbursement not only rewards performance, but also helps practices to offset costs of developing system changes. These changes might include the adoption of registries and electronic health records, care coordination through a care coordinator, proactive outreach to patients, accessibility through expanded office hours or open access scheduling, and patient advocacy efforts.

Table 2: Tiers of a Pay-For-Performance Model

Tier 1	Additional reimbursement for meeting qualification standards for a patient-centered medical home (PCMH)
Tier 2	Tier 1, plus pay-for-performance for meeting designated targets for process of care or outcome measures .

Patient-Centered Medical Home (PCMH) and NCQA Physician Practice Connections (PPC)

The concept of a patient-centered medical home is gaining traction in Washington State⁴⁸ and across the country. Pioneered by the American Academy of Pediatrics as early as the 1967,⁴⁹ the concept has more recently has been embraced by other primary care organizations, such as the American Academy of Family Practice in their 2004 *Future of Family Medicine* report.⁵⁰

The definition of a medical home continues to be refined, but essential components include the seven principles jointly agreed upon in March 2007 by four primary care organizations⁵¹ representing 333,000 physicians.⁵² According to these principles, a medical home must have the following elements:⁵³

1. **Personal physician**⁵⁴ - each patient has an ongoing relationship with a personal physician trained to provide first contact, continuous and comprehensive care.

⁴⁸ Washington State Department of Health. Washington State Medical Home.

<http://www.medicalhome.org/about/medhomeplan.cfm>

⁴⁹ Sia, Tonniges. The History of the Medical Home Concept: Excerpt from: Medical Home Primer for Community Pediatricians and Family Physicians. *Pediatrics* Suppl. 2004.

<http://internet.dsc.uic.edu/forms/medicalhome/HistoryoftheMedicalHomeConcept.pdf>

⁵⁰ Board Adopts Policy on Personal Medical Home. AAFP News Now May 23, 2006.

<http://www.aafp.org/online/en/home/publications/news/news-now/professional-issues/20060522medicalhome.html%20>

⁵¹ The American College of Physicians, American Academy of Family Physicians, American Academy of Pediatrics and American Osteopathic Association.

⁵² Adams. Societies set principles for medical home. Amednewsnow.com April 9, 2007. Available at:

<http://www.ama-assn.org/amednews/2007/04/09/prsc0409.htm> and Joint Principles of a Patient-Centered Medical Home Released by Organizations Representing More Than 300,000 Physicians AAFP Press Room, March 5, 2007.

<http://www.aafp.org/online/en/home/press/aafpnewsreleases/20070301releases/20070305pressrelease0.html>

⁵³ Joint Principles of the Patient-Centered Medical Home February 2007.

http://www.aafp.org/online/etc/medialib/aafp_org/documents/policy/fed/jointprinciplespcmh0207.Par.0001.File.dat/022107medicalhome.pdf

⁵⁴ Some members of the CIT suggest that a medical home could be provided by independent health care providers other than physicians (such as nurse practitioners) in some circumstances, and recommend that this be kept in mind as the Alliance and others further define the medical home.

2. **Physician-directed medical practice** – the personal physician leads a team of individuals at the practice level who collectively take responsibility for the ongoing care of patients.
3. **Whole person orientation** – the personal physician is responsible for providing for all the patient’s health care needs or taking responsibility for appropriately arranging care with other qualified professionals. This includes care for all stages of life; acute care; chronic care; preventive services; and end of life care.
4. **Care that is coordinated and/or integrated** across all elements of the complex health care system (e.g., subspecialty care, hospitals, home health agencies, nursing homes) and the patient’s community (e.g., family, public and private community-based services). Care is facilitated by registries, information technology, health information exchange and other means to assure that patients get the indicated care when and where they need and want it in a culturally and linguistically appropriate manner.
5. **Quality and safety** are hallmarks of the medical home.⁵⁵
6. **Enhanced access** to care is available through systems such as open scheduling, expanded hours and new options for communication between patients, their personal physician, and practice staff.
7. **Payment** appropriately recognizes the added value provided to patients who have a patient-centered medical home.⁵⁶

National efforts are currently underway to come up with a system for “qualifying” patient-centered medical homes using the above principles. These efforts are directed toward modifying the existing NCQA Physician Practice Connections (PPC) tool,⁵⁷ ultimately merging the two concepts into a PPC-PCMH. The current PPC designation identifies health care providers who use systematic processes of care, and are thus better able to:

1. Monitor their patients' medical histories
2. Work with patients over time, not just during office visits

⁵⁵ Further details on quality and safety requirements are outlined in the full joint statement of principles: http://www.aafp.org/online/etc/medialib/aafp_org/documents/policy/fed/jointprinciplespcmh0207.Par.0001.File.dat/022107medicalhome.pdf

⁵⁶ Further details on proposed payment principles are outlined in the full joint statement of principles. http://www.aafp.org/online/etc/medialib/aafp_org/documents/policy/fed/jointprinciplespcmh0207.Par.0001.File.dat/022107medicalhome.pdf

⁵⁷ NCQA Physician Practice Connections standards include:

1. Enabling patients to communicate with and access the practice easily
2. Using systems to track patients, their treatments and conditions
3. Managing patients’ care proactively over time
4. Supporting patients’ self-management of their health
5. Using electronic prescribing tools
6. Tracking and following up lab and imaging tests
7. Tracking and following up referrals
8. Measuring performance and working to improve
9. Updating to interoperable electronic systems

More information on the PPC evaluation program is available at: <http://web.ncqa.org/tabid/141/Default.aspx>

3. Follow up with patients and with other providers
4. Manage populations, not just individuals, using evidence-based care
5. Assist patients to manage their own health better
6. Avoid medical errors⁵⁸

An updated version of the combined PCC_PCMH is due out in January 2008. It is this qualification upon which the Asthma CIT hopes to build its first tier of pay-for-performance.

The Asthma CIT would like to acknowledge that there are a number of state efforts already underway to define a medical home. To date, these efforts have resulted in agreement on a medical home definition that is very similar to the principles laid out above.

Performance Measures

In the second tier of the model, defined target performance on clinical performance measures, such as those endorsed by the Asthma CIT, could be used to offer further rewards to providers, either at the group level (thus further supporting system change) or at the individual provider level.

3. Benefit Design and Payment Practice: Innovate and Evaluate

The Asthma CIT recognizes that plans and purchasers are concerned about quality improvement strategies that may increase overall costs, and are interested in strategies that both improve health outcomes while controlling health care costs. The Asthma CIT encourages plans and purchasers to be innovative with approaches to encourage healthy behaviors among employees and members, and to evaluate and communicate the outcomes of any such approaches so that evidence on successful cost-effective benefit designs and incentives can accumulate and be disseminated.

Examples of impacts/outcomes to measure and report on include:

- The impact of introducing low or no copays for controller medication on adherence to treatment
- The impact of reducing or eliminating visit copays on compliance with planned visits for chronic care
- The impact and ROI of providing in-home assessments and interventions as part of asthma disease management programs to specific populations and demographics
- The impact of pharmacist-provided Medication Therapy Management services on adherence to medication and healthcare costs
- The impact of providing care management (disease and/or case management) services to members with asthma at high risk for exacerbation on absenteeism and presenteeism⁵⁹ in the workplace

⁵⁸ NCQA Physician Practice Connections <http://web.ncqa.org/tabid/141/Default.aspx>

⁵⁹ Presenteeism may be defined as being present at work but functioning at less than full capacity because of illness. It is usually measured by self-report in surveys with standardized questions, although it may also be measured productivity metrics in some workplaces. For more information on measuring presenteeism, see: Mattke et al. A Review of Methods to Measure Health-related Productivity Loss. The American Journal of Managed Care. 2007.

B. Assessment and Monitoring

1. Overview

In the NAEPP Expert Panel Report (EPR)-3 2007,⁶⁰ the first component of asthma care discussed is Assessment and Monitoring. This is defined as “measures of assessment and monitoring, obtained by objective tests, physical examination, patient history and patient report, to diagnose and assess the characteristics and severity of asthma and to monitor whether asthma control is achieved and maintained.”⁶¹

The report emphasizes the importance of accurately and repeatedly assessing and monitoring asthma **severity**, **control**, and **responsiveness to treatment** in management of the disease. This section highlights that asthma, like any chronic disease, requires appropriate diagnosis with regular follow-up for optimal outcomes.

The NAEPP Expert panel breaks down asthma assessment and monitoring into four components: (1) diagnosis, (2) initial assessment, which includes classification of severity with assessment of impairment, and assessment of risk (see table below for definitions), (3) periodic assessment and monitoring of asthma control, including objective monitoring of pulmonary function with spirometry and peak flow, symptom-based assessment, and monitoring of quality of life, frequency of exacerbations, and pharmacotherapy use, and (4) referral to a specialist for consultation or co-management.

NAEPP EPR-3 2007: Overview of Measures of Asthma Assessment and Monitoring⁶²

The functions of assessment and monitoring are closely linked to the concepts of severity, control, and responsiveness to treatment:

— **Severity:** the intrinsic intensity of the disease process. Severity is measured most easily and directly in a patient not receiving long-term-control therapy.

— **Control:** the degree to which the manifestations of asthma (symptoms, functional impairments, and risks of untoward events) are minimized and the goals of therapy are met.

— **Responsiveness:** the ease with which asthma control is achieved by therapy.

Both severity and control include the domains of current impairment and future risk:

— **Impairment:** frequency and intensity of symptoms and functional limitations the patient is experiencing or has recently experienced

— **Risk:** the likelihood of either asthma exacerbations, progressive decline in lung function (or, for children, reduced lung growth), or risk of adverse effects from medication

13 (4): 211-217 http://www.ajmc.com/files/articlefiles/AJMC_07aprMattke211to217.pdf

⁶⁰ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

⁶¹ Ibid.

⁶² Ibid, p. 36.

The NAEPP EPR-3 authors state “[d]iagnosing a patient as having asthma is only the first step in reducing the symptoms, functional limitations, impairment in quality of life, and risk of adverse events that are associated with the disease. The ultimate goal of treatment is to enable a patient to live with none of these manifestations of asthma, and an initial assessment of the severity of the disease allows an estimate of the type and intensity of treatment needed. Responsiveness to asthma treatment is variable; therefore, to achieve the goals of therapy, follow-up assessment must be made and treatment should be adjusted accordingly. Even patients who have asthma that is well controlled at the time of a clinical assessment must be monitored over time, for the processes underlying asthma can vary in intensity over time, and treatment should be adjusted accordingly.”⁶³

Given the changing nature of asthma, asthma care can be complex and multifaceted. An organized and comprehensive approach to the disease is necessary for both clinicians and patients, and yet this presents many challenges. This section makes recommendations for involved stakeholders to help to achieve the goals of appropriate assessment and monitoring of asthma.

2. Change Strategies

Improvement at the Point of Care:

a. Providers

Asthma CIT Recommendations:

- Follow evidence-based clinical guidelines, such as the NAEPP EPR-3 2007 Guidelines for The Diagnosis and Management of Asthma,⁶⁴ in the diagnosis, initial assessment, ongoing assessment and monitoring, and referral for asthma.
- Utilize office-based spirometry in the initial assessment of asthma severity and in follow-up to assess level of control.
- Provide self-management support to patients, including working with them to develop asthma self-management goals and an asthma management plan, to enable them to actively participate in the management and control of their disease.
- Plan regularly scheduled follow-up visits for patients with asthma at a frequency determined by individual patient needs.
- Track asthma patients over time using a disease registry (manual or electronic) that is able to follow patients proactively, and send out reminders to patients who are due for follow-up.

⁶³ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>, p. 37

⁶⁴ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

i. Evidence-based Guidelines

Resources for Providers:

NAEPP Expert Panel Report- 3 2007
<http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

NAEPP Expert Panel Report 3 Summary 2007
<http://www.nhlbi.nih.gov/guidelines/asthma/asthmasumm.htm>

ii. Spirometry

The NAEPP EPR-3 recommends that objective pulmonary function testing, or spirometry, be used in the diagnosis and monitoring of patients with asthma. All providers who care for patients with asthma should have access to office-based spirometry.

NAEPP EPR-3 2007 Recommendations on Spirometry:⁶⁵

- The Expert Panel recommends that spirometry measurements—FEV₁, forced expiratory volume in 6 seconds (FEV₆), FVC, FEV₁/FVC—before and after the patient inhales a short-acting bronchodilator should be undertaken for patients in whom the diagnosis of asthma is being considered, including children ≥ 5 years of age (EPR-2 1997)
- The Expert Panel recommends that office-based physicians who care for asthma patients should have access to spirometry, which is useful in both diagnosis and periodic monitoring. Spirometry should be performed using equipment and techniques that meet standards developed by the ATS (EPR-2 1997)

The purchase of a spirometer and training for its use are expensive to provider practices. However, there can be a rapid return on investment for this outlay if spirometry is used regularly in asthma diagnosis and management, since most insurance carriers reimburse the appropriate CPT codes for office-based spirometry.

iii. Planned Visits

There is a large body of evidence suggesting that planned visits improve outcomes for patients with chronic conditions.⁶⁶ In the busy office practice, with time-limited multiple issue visits, appropriate chronic disease management is unlikely to occur. Self-management support, patient education and shared decision-making will not happen without planned visits. The Asthma CIT therefore recommends a planned care model for the management of patients with asthma. Example of asthma care

⁶⁵ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

⁶⁶ Bodenheimer, Planned visits to help patients self manage chronic conditions. AFP 2005. 72(8) Available at: <http://www.aafp.org/afp/20051015/editorials.html>, and Sadur et al. Diabetes Care 1999; 22:2011. Wagner EH et al. Diabetes Care 2001; 25:695. Peters, Davidson. Diab Care 1998; 21:1037. Anderson, Funnell et al. Diab Care 1995; 18:943. Renders et al. Interventions to improve the management of diabetes mellitus in primary care, outpatient and community settings. Cochrane Review. In Cochrane Library Issue 3, 2001.

plans for planned asthma visits have been provided by clinician members of the CIT (see Appendix 3).

iv. Frequency of Visits

The NAEPP Expert panel recommends that patients who have intermittent or mild persistent asthma that has been under control for at least 3 months should be seen by a clinician about every 6 months, and patients who have uncontrolled and/or severe persistent asthma and those who need additional supervision to help them follow their treatment plan need to be seen more often.⁶⁷ The NAEPP EPR-3 Summary Report 2007 suggests that “asthma is highly variable over time, and periodic monitoring is essential. In general, consider scheduling patients at 2- to 6-week intervals while gaining control; at 1–6 month intervals, depending on step of care required or duration of control, to monitor if sufficient control is maintained; at 3-month intervals if a step down in therapy is anticipated.”⁶⁸

v. Components of Planned Visits for Asthma Monitoring

In order for planned visits to be successful, they should have structured components. For asthma, key aspects of the planned care visit are **monitoring control** by assessing levels of **impairment** and **risk**. Planned care visits for asthma should contain the following components:

- Assessment of control⁶⁹
 - Monitoring signs and symptoms of asthma
 - Monitoring pulmonary function (spirometry/peak flow)
 - Monitoring quality of life
 - Monitoring history of exacerbations
 - Monitoring pharmacotherapy for adherence or potential side effects
 - Monitoring patient-provider communication and patient satisfaction
- Patient education (see CIT Recommendations Part C: Education)
 - Education about asthma, medication use, and environmental triggers
 - Provision and review of a written asthma action plan
 - Patient self-management support
- Environmental trigger assessment (see CIT Recommendations Part D: Environmental Triggers and Comorbidities)

⁶⁷ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>, p. 56.

⁶⁸ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3 Report: Guidelines for the Diagnosis and Management of Asthma, Summary Report 2007. <http://www.nhlbi.nih.gov/guidelines/asthma/asthsumm.pdf>

⁶⁹ Ibid, p. 57

- Review of environmental triggers
- Assess exposure and sensitivity
- Discuss and review trigger control measures
- Assessment of comorbidities

The NAEPP EPR-3 Report highlights questions and actions to take in monitoring asthma control (Figure 3-6), as well as sample clinical assessment questions (Figure 3-7).⁷⁰

At least some of the planned care visits to assess control could be with allied health professionals, such as a case manager, community health worker or pharmacist (see Section 4: Medications, for a discussion of pharmacy medication therapy management services), and could be on an individual or group basis. Coordination among the health care team is crucial to the successful monitoring and follow-up of asthma patients.

For providers, planned care visits have the advantage of being pro-active rather than reactive, organized, and focused on a single disease, and help to provide a predictable source of practice revenue.

vi. Disease Registry

In order for the planned care model to work, it is essential to identify patients with chronic diseases and to proactively ensure that they are receiving appropriate care and follow-up. Such a proactive approach requires a **disease registry** or electronic health record (EHR) with registry function. The Asthma CIT recognizes the challenges faced by providers, especially those in small practices, in bringing about needed system changes, such as implementing EHRs, but emphasizes that these changes are crucial if we are to improve the outcomes for patients with asthma and other chronic diseases. There are opportunities that should allow even small practices to participate in innovating change, including participation in publicly-funded disease collaboratives, such as the **Washington State Asthma Collaborative** (see also sections on Education and General Recommendations) that provides access and training for the free CDEMS disease registry, or low-cost registry solutions such as DOCSITE.⁷¹

b. Patients and Parents

Asthma CIT Recommendations:

- Develop asthma self-management goals and an asthma management plan with your provider.
- Have regular follow-up with your provider, according to an agreed-upon planned care model.
- Be able to assess the severity of your asthma symptoms over time.

⁷⁰ Ibid, pp. 78-79

⁷¹ DOCSITE. http://www.docsite.com/ds_pages/ds_registry.html. Licensing fee is approximately \$600 per physician.

i. Asthma Action Plan

Patient education, self-management and the development of a written asthma action plan are discussed in detail in Section 2: Education.

ii. Planned Care Model

As described above for providers, a planned care model of asthma management, with regularly scheduled visits devoted to asthma, can help ensure that patients receive appropriate care. The Asthma CIT members emphasized that this approach will help patients learn what to expect from their asthma management program, and be better able to actively participate in self-management. Patients should have something concrete to take away from each planned visit, such as spirometry results and an updated written plan. Some have suggested a patient notebook can be helpful for patients to track their progress over time.⁷²

iii. Assess Asthma Symptoms

Patients should learn to assess the severity of their asthma symptoms, so that they accurately report them to their provider and seek care when their symptoms worsen. The written asthma plan (see Section 2: Education) is based on symptom assessment. Over time, most patients can learn to identify the severity of their symptoms subjectively. However, some patients have difficulty assessing their symptoms and for them objective measurement, such as home peak flow monitoring, can be helpful.

NAEPP EPR-3 Recommendations on Patient Self-Assessment⁷³

- The Expert Panel recommends that every patient who has asthma should be taught to recognize symptom patterns that indicate inadequate asthma control. Either symptom and/or [peak expiratory flow] (PEF) monitoring should be used as a means to determine the need for intervention, including additional medication, in the context of a written asthma action plan.
- The Expert Panel recommends that clinicians should encourage patients to use self-assessment tools to determine from the perspective of the patient and/or the patient's family whether the asthma is well controlled (EPR-2 1997). The two general methods are (1) a daily diary and (2) a periodic self-assessment form to be filled out by the patient and/or family member, usually at the time of the follow-up visits to the clinician.

⁷² Tschopp et al. Asthma outpatient education by multiple implementation strategy. Outcome of a programme using a personal notebook. *Respiratory Medicine* 2005, Volume 99(3): 355-362

⁷³ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

Several self-assessment tools have been validated and are included in the NAEPP EPR-3 2007 report.⁷⁴ One such tool, the **Asthma Control Test (ACT)**⁷⁵ was discussed and recommended by the Asthma CIT, and is included in the NAEPP EPR-3 2007 guidelines.

It should be noted that these questionnaires assess only the impairment domain of asthma control, and not the risk domain. The NAEPP EPR-3 2007 report emphasizes that “measure of risk, such as exacerbations, urgent care, hospitalizations, and declines in lung function, are important elements of assessing the level of control.”⁷⁶

Creating a Supportive Community Environment for Change

c. Health Plans

Asthma CIT Recommendations:

- Remove barriers to planned chronic care by eliminating co-payments or deductibles for planned care visits or needed medications.
- Provide care management (disease and/or case management) services to members with asthma at high risk for exacerbation based on history, co-morbidities or socioeconomic factors. A triggered approach to patient enrollment is recommended, with such factors as two or more acute events (emergency room or urgent care visits, or hospitalizations) in a year, or two or more prescriptions of a short-acting rescue medication without inhaled corticosteroids, triggering referral to the disease management services.
- Coordinate care management services with clinical care providers.
- Agree upon a standard regional set of clinical performance measures for asthma care.

i. Benefit Design

Health plans can play an important role in removing barriers to care through benefit design, by eliminating or lowering out-of-pocket costs for asthma patients for planned care, and for needed medications (for further discussion on benefit design for prescription drugs, see Section 4: Medications).⁷⁷

⁷⁴ See Figure 3-8 of the NAEPP EPR-3 report for several validated self-assessment tools. National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

⁷⁵ Asthma Control Test <http://www.asthmacontrol.com/>. The Asthma Control Test is recommended by the American Lung Association. This site is sponsored by Glaxo Smith Kline.

⁷⁶ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>, p. 80

⁷⁷ Aetna has initiated a pilot program eliminating out of pocket costs for several chronic diseases. Program outcomes are not yet available. Personal communication, Drew Oliviera, Asthma CIT member.

ii. Care Management

Care management services for chronic diseases may be offered by health plans directly or through contracted vendor services. Outcomes for case and disease management programs have been mixed, but programs that combine motivational counseling with patient self-management support are most useful.

In an evaluation of 69 studies conducted by the National Pharmaceutical Council on asthma disease management programs,⁷⁸ the intervention was found to significantly reduce the number of emergency department visits, admissions, readmissions, inpatient days, physician office visits, and absenteeism from school or days lost from work. Patients' knowledge about asthma increased significantly as a result of the intervention in all 19 studies in which cognitive outcomes were measured. A significant improvement in control of asthma symptoms (e.g., symptom or activity tolerance scores, number of days of restricted physical activity, peak expiratory flow rate, number and duration of acute asthma attacks) was associated with the intervention in studies that assessed symptom control. In 23 (72%) of 32 studies using quality of life as an outcome measure, the intervention produced a beneficial effect on quality of life. The intervention was cost-effective in the 17 studies that assessed the cost savings attributed to the intervention (e.g., reduced emergency department expenses) and the costs of providing the intervention.

Several years ago, the Washington State Department of Social and Health Services began an asthma disease management program for Medicaid patients. The program consisted of disease education, symptom awareness and management, trigger avoidance, self-monitoring, and education on recommended medication strategies. Evaluation of the program revealed that participants were twice as likely to have written care plans, but there was no effect on ER visits, hospitalizations or overall length of stay. However, length of stay decreased by one day in high risk/high cost participants who were hospitalized.⁷⁹

The Asthma CIT recommends that any disease or case management programs for asthma be coordinated with the primary care provider, to build upon and enhance the collaborative model of care that we have emphasized throughout this report.

iii. Clinical Performance Measures

One of the goals of the Alliance is to develop a standardized set of clinical performance measures used throughout the Puget Sound Region. The Asthma CIT endorses this effort, and has contributed recommendations for asthma clinical performance measures (see Chapter 3).

⁷⁸ Disease Management for Asthma. National Pharmaceutical Council Monograph, 2004.
<http://www.npcnow.org/resources/PDFs/AsthmaMonograph2004.pdf>

⁷⁹ Lind et al. Evaluation of an Asthma Disease Management Program in a Medicaid Population Disease Management & Health Outcomes, Volume 14, Number 3, 2006, pp. 151-161(11) Abstract available at:
<http://www.ingentaconnect.com/content/adis/dmho/2006/00000014/00000003/art00004>

d. Purchasers

Asthma CIT Recommendations:

- Remove financial barriers to asthma care by providing comprehensive benefits for chronic disease care and asthma management.
- If disease management programs are offered through the workplace, they should be coordinated with providers.
- Agree to a standard regional measure set for provider performance measurement of asthma management.

The recommendations for purchasers and employers echo the recommendations for health plans.

C. Education for a Partnership in Asthma Care

1. Overview

Both patients and clinicians often view asthma as a series of acute events. However, asthma is a chronic disease, and should be managed as such using the Chronic Care Model,⁸⁰ with an emphasis on planned care and regular follow-up, patient education, and self-management support. The NAEPP Expert Panel Report-3 2007⁸¹ emphasizes the importance of education in developing a partnership between patients, providers, and the community in the management of asthma. Patient self-management of their disease is an essential component of this partnership, and self-management support should be integrated into all aspects and at all points of asthma care. At the same time, a key aspect of self-management is regular review by an informed clinician of the status of a patient's asthma control. This integrated approach to asthma management involves education of both providers and patients and their family members.

While education is central to managing asthma, studies indicate that appropriate asthma education is often lacking. For example, a recent study at Seattle Children's Hospital and Regional Medical Center showed that only 55% of families with children admitted to hospital for asthma had received prior asthma education.⁸² Challenges to adequate patient or family education in asthma include lack of systematic support to identify and track patients with asthma over time (including the extent of education received and the response to such education); poor reimbursement for educational activities for both patients and providers; cultural, linguistic and socioeconomic barriers; and lack of provider training in developing patient partnerships in care. Some of these barriers are addressed below, with recommendations for each of the involved stakeholder groups.

⁸⁰ The Chronic Care Model: Wagner EH. Chronic disease management: What will it take to improve care for chronic illness? *Effective Clinical Practice*. 1998;1:2-4.

<http://www.improvingchroniccare.org/change/model/components.html>

⁸¹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at:

<http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

⁸² Carter. Baseline asthma severity, controller medication use, documentation of asthma education and frequency of pulmonary consultation in children hospitalized with acute asthma. *Chest* 2007. 132(4): 484b

<http://meeting.chestjournal.org/cgi/reprint/132/4/484b>

2. Change Strategies

Improvement at the Point of Care:

a. Providers

Asthma CIT Recommendations:

- Be familiar with current evidence-based clinical guidelines for asthma care, such as the 2007 NAEPP EPR-3 Guidelines for Asthma Diagnosis and Management Guidelines,⁸³ and incorporate these guidelines into management of patients with asthma.
- Engage in educational activities such as interactive seminars, workshops, and learning collaboratives, in addition to formal group or individual CME activities, in order to stay current with evidence-based asthma management strategies and practices. Providers in the Puget Sound region are especially encouraged to join the Washington State Asthma Collaborative.
- Incorporate patient education into each asthma care visit, depending on individual patient needs.
- Develop skills needed to effectively communicate with patients and aid them in developing self-management skills.
- Develop a written asthma action plan for patients to help them control their symptoms on a daily basis and manage acute exacerbations.
- Incorporate group patient asthma education sessions with health educators into regular asthma care.

i. Provider Education

Improving provider knowledge and performance in asthma management requires a multi-pronged approach. Providers should be familiar with and adhere to current evidence-based guidelines, such as the NAEPP EPR-3 2007 Guidelines for the Diagnosis and Management of Asthma,⁸⁴ when managing asthma patients. However, providing information or guidelines alone does not improve provider performance.

Provider education can occur in such forms as group or individual educational activities, peer teaching or coaching, and learning collaboratives. Although passive dissemination of guidelines or information, and classic continuing medical education (CME) classes do not work alone to change provider behavior, these strategies may augment other efforts when used in a combination approach.

⁸³ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

⁸⁴ Ibid

Educational strategies that **have been shown to be most effective** in improving provider performance include:

- One-on-one **academic detailing**⁸⁵ and other means of active distribution of guidelines and information can improve provider performance, especially in the area of prescribing.⁸⁶
 - Standard sets of teaching materials can be developed that allow clinicians to become teachers of their peers.
- Structured **skills-building group activities or workshops**⁸⁷
 - E.g., Physician Asthma Care Education (PACE),⁸⁸ is an interactive seminar for physicians based on self-regulation theory has been shown to effectively improve physician performance in terms of prescription of inhaled corticosteroids, and in outcomes such as symptom free days, emergency room visits and hospitalizations for children with asthma.⁸⁹

⁸⁵ “Academic detailing” is a term originally coined to imply educational interventions around pharmaceutical drugs provided to clinicians at their practice site by non-biased educators from non-profit organizations. E.g. Soumarai and Avorn. Principles of educational outreach (‘academic detailing’) to improve clinical decision making JAMA January 26, 1990. Abstract available at: <http://jama.ama-assn.org/cgi/content/abstract/263/4/549>. The term has since broadened to include other on-site provider educational activities, such as dissemination of guidelines, recommendations for evidence-based diagnostic and treatment approaches, etc. The following definition comes from Dalhousie University in Nova Scotia, Canada: “Academic detailing is a process by which a health educator visits a physician in his/her office to provide a 15 to 20 minute educational intervention on a specific topic. Academic detailing provides complete and objective information based on best available evidence.” http://www.gov.ns.ca/heal/pharmacare/ads_summary.htm

⁸⁶ Cochrane Review: Educational outreach visits: effects on professional practice and health care outcomes <http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD000409/frame.html>

⁸⁷ Agency for Healthcare Research and Quality (AHRQ) 2005. Chronic Care for Low-Income Children with Asthma: Strategies for Improvement <http://www.ahrq.gov/research/chasthria/chasthria.htm#Improvecare> and Clark NM, Gong M, Schork MA, et al. Impact of education for physicians on patient outcomes. *Pediatrics* 1998; 101(5):831-6 and Clark NM, Gong M, Schork MA, et al. Long-term effects of asthma education for physicians on patient satisfaction and use of health services. *Eur Respir J* 2000; 16:15-21

⁸⁸ Agency for Healthcare Research and Quality (AHRQ) 2005. Chronic Care for Low-Income Children with Asthma: Strategies for Improvement Box 4. Interactive Seminar for Physicians Based on Self-regulation Theory (Physician Asthma Care Education: PACE). Available at: <http://www.ahrq.gov/research/chasthria/chasthbox4.htm>

⁸⁹ Agency for Healthcare Research and Quality (AHRQ) 2005. Chronic Care for Low-Income Children with Asthma: Strategies for Improvement <http://www.ahrq.gov/research/chasthria/chasthria.htm#Improvecare> “Self-regulation theory focuses on the ways in which people direct and monitor their activities and emotions in order to attain their goals. Studies found that a two-session interactive seminar for physicians using this theory to assist in altering physician treatment practices resulted in more children being placed on inhaled corticosteroids. This regimen, coupled with physician education in communication and education techniques, resulted in significantly fewer symptoms and fewer follow up office visits, non-emergency physician office visits, emergency department visits, and hospitalizations in the treatment group compared to controls. The effects of the physician education persisted over 2 years, and treatment group physicians expended no more time with their patients than controls. Children of younger single mothers reaped the greatest benefit from the physician education.”

- Broad system change approaches, such as **learning collaboratives**

Learning collaboratives provide not only provider education, but also a basis for systems change to support quality improvement. The Chronic Care Model,⁹⁰ developed by Alliance Quality Improvement Committee member Ed Wagner, emphasizes the importance of systems change in effectively managing chronic diseases. The literature on health care quality improvement clearly shows that systematic approaches, utilizing a combination of strategies, are more effective than any one change affected in isolation.⁹¹ System changes that support the chronic care model include, but are not limited to, patient registries, patient and provider recall and reminder systems, provider prompts at the point of care, and cooperation and collaboration among clinician and healthcare staff to provide ongoing and proactive chronic disease management. Electronic health records with embedded quality improvement functions such as those described are a useful adjunct to implementing the chronic care model, and their adoption by clinics in the Puget Sound region should be encouraged.

While the learning collaborative approach has been shown to be effective in improving provider performance in management of chronic diseases,⁹² it is expensive to administer on an ongoing basis. In addition, experience with the Washington State Diabetes Collaborative indicates that while considerable improvements can be made in provider performance and improved process of care, the improvements in diabetes outcomes were modest over the time frame evaluated.⁹³ Further study will be required to determine if collaboratives in asthma care can improve outcomes for asthma such as decreased nocturnal symptoms, increased symptom-free days, decreased emergency room and unplanned provider visits, decreased hospitalizations, and fewer lost work or school days. It is also important to determine whether any improvements can be sustained, and the Asthma CIT recommends that evaluation includes a longitudinal component.

Examples of recent or existing asthma learning collaboratives in the region include:

- The King County Asthma Forum⁹⁴ received funding from Allies Against Asthma (AAA) to develop a learning collaborative in four community clinic sites in 2002-2005, using a modified version of the Institute for Healthcare

⁹⁰ The Chronic Care Model: Wagner EH. Chronic disease management: What will it take to improve care for chronic illness? *Effective Clinical Practice*. 1998;1:2-4.

<http://www.improvingchroniccare.org/change/model/components.html>

⁹¹ For example, Agency for Healthcare Quality and Research Technical Review, Number 9: Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies, Vol. 2- Diabetes Mellitus Care, 2004.

⁹² See, for example, results from the Washington State Diabetes Collaborative:

<http://www.olympicphysicians.com/pdf/casestudy.pdf>

⁹³ El-Battawissi and Norman. Results of Washington State Collaboratives on Diabetes. *Washington Family Physician*. July, 2007: 24-25.

⁹⁴ King County Asthma Forum Evaluation Report, August 2005. Section 4.

<http://www.metrokc.gov/health/asthma/evaluation/section4.pdf>

Improvement (IHI)⁹⁵ Health Disparities Collaboratives model.⁹⁶ Three of the clinics made significant improvements in asthma care, including forming improvement teams with active clinical champions, actively testing changes, using asthma registries and beginning to spread improvements to other provider practices in their clinic systems. Registry data showed an improvement in the quality of asthma care, as measured by an increased use of controller medications and an increase in the percent of visits where the asthma severity level was assessed. The Forum also funded the development of asthma registries at five community clinics and one City of Seattle clinic site. Important lessons were learned regarding learning collaboratives that are shared in the evaluation report:

<http://www.metrokc.gov/health/asthma/evaluation/section4.pdf>

- In recent years, The Washington State Children’s Health Improvement Collaborative (CHIC) used quality improvement (QI) methodology and the Breakthrough Series Collaborative (BTS) model to improve the delivery of care for low-income children suffering from three specific chronic illnesses: asthma, attention deficit/hyperactivity disorder (ADHD), and overweight. CHIC was funded by the Washington State legislature with additional support from several local funders. The collaborative was jointly staffed by Public Health-Seattle & King County and the Child Health Institute. The Child Health Institute is an inter-disciplinary research group comprised of faculty and staff from the Schools of Medicine, Dentistry, and Public Health and Community Medicine at the University of Washington:

<http://www.metrokc.gov/health/kchap/chic.htm> and
www.childhealthinstitute.org

The funding for this program was not renewed for 2008, and these efforts will be combined into the Washington State Asthma Collaborative described below. An evaluation on the outcome of this collaborative is pending.

- The **Washington State Children’s and Adult Asthma Collaborative** will be launched in early 2008, as part of the Washington State Collaborative to Improve Health.⁹⁷ Building upon the experience and resources (such as the CDEMS disease registry) established in the Diabetes, Hypertension and Heart Disease Collaboratives, the Washington State Department of Health (DOH) will be enrolling clinics in the Adult and Children’s Asthma Collaboratives beginning in December 2007. (Other DOH collaboratives with active enrollment for next year include the following focus areas: Adults – Diabetes and Hypertension, and Children – Asthma, Overweight Prevention, and Medical Home).

⁹⁵ Institute for Healthcare Improvement. www.ihl.org

⁹⁶ King County Asthma Forum Evaluation Report, August 2005. Section 4.
<http://www.metrokc.gov/health/asthma/evaluation/section4.pdf>

⁹⁷ Washington State Collaborative to Improve Health. <http://www.doh.wa.gov/cfh/WSC/default.htm> and
<http://www.doh.wa.gov/cfh/WSC/publications/WSC6Advance-factsheet.pdf>

The 2008 Washington State Collaboratives for adults and children are designed for practices with five or fewer providers, and will enroll a maximum of ten clinics in each focus area. Information on joining the collaboratives can be found at:

http://www.doh.wa.gov/cfh/WSC/publications/Wa-State-Health-Improvement-Collaborative_web.pdf

The Asthma CIT encourages provider participation in the state Asthma Collaborative, and supports the collaborative process as a means of promoting appropriate and proactive chronic disease management.

ii. Patient Education

The goal of asthma education is to aid the patient in **self-management** of their disease. The NAEPP Expert Panel found strong evidence for the value of self-management education in the clinic setting, but also found evidence to support such education in the emergency department, pharmacies, patients' homes (especially around environmental trigger reduction), and schools.⁹⁸ The Expert Panel recommends that patient education occur at all points of care where health professionals interact with patients. Nonetheless, studies such as The Asthma Health Outcomes Project⁹⁹ found that programs that had a component that took place in a physician's office or clinic were more likely to report a positive impact on emergency department visits, and, of programs that used asthma education as a program strategy, those programs in which the asthma education was received by health care providers (including school nurses) were more likely to report a positive impact on school absences. This suggests that programs with a component that closely involved health care providers were more likely to report positive results. Thus, while asthma education can occur in a variety of sites, the role of the health care provider should not be underestimated, and self-management education should be an integral component of each asthma visit.

The NAEPP EPR-3 Summary Report 2007¹⁰⁰ provides a structured overview of educational activities to include in asthma care visits, including basic facts about asthma, the role of medications and understanding the difference between long-term controller medications and rescue medications, and reinforcing patients' skills such as inhaler use, avoidance of environmental triggers, self-monitoring and using a written asthma action plan. The report highlights patient education topics to cover at the initial visit, early follow-up visits, and subsequent visits.¹⁰¹

⁹⁸ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

⁹⁹ U.S Environmental Protection Agency. The Asthma Health Outcomes Project. <http://www.epa.gov/asthma/ahop.html> and Draft Final Report May 2007 http://www.asthma.umich.edu/media/ahop_autogen/draft_final_AHOP_report.pdf

¹⁰⁰ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3 Report: Guidelines for the Diagnosis and Management of Asthma , Summary Report 2007. <http://www.nhlbi.nih.gov/guidelines/asthma/asthsumm.pdf>

¹⁰¹ Ibid, Figure 7, pp. 22-23.

iii. Patient-Provider Communication

In addition to becoming knowledgeable about evidence-based practice standards for the management of asthma, providers must also develop the skills necessary to effectively communicate these standards to patients and to motivate patients to become active participants in the management of their disease. The NAEPP EPR-3 2007 guidelines specifically emphasize the value of the patient-provider partnership in developing self-management skills. Techniques in self-management support such as **motivational interviewing**¹⁰² and **collaborative decision-making** can be useful in readying patients for change.

- The **California HealthCare Foundation (CHCF)** offers tools and resources for clinicians interested in providing self-management support and engaging in collaborative decision-making with their patients. One report, *Helping Patients Manage Their Chronic Conditions*,¹⁰³ offers five strategies for providers on self-management support.
 - The authors of the report acknowledge that “successful and appropriate self-management support is a challenge for primary care practices.” They suggest that development of a collaborative team that includes non-physician caregivers working with physicians, combined with care innovations such as group settings and the use of interactive phone messaging systems, personal digital assistants (PDAs), and Web-based software, may aid in successful chronic disease self-management.”¹⁰⁴

iv. The Written Asthma Action Plan

One aspect of developing patient self-management of their asthma is the **written asthma action plan**. This is discussed in detail below, under Patients. A useful online site to help providers create an asthma action plan for their patients can be found at:

Accomplishing Strategies Together for Healthier Minnesotans with Asthma: Action Plan: <https://www.mnasthma.org/aap/AAP.asp>

Resource for providers for encouraging patient self-management support

Coleman and Newton. Supporting self-management in patients with chronic illness. *American Family Physician* 72 (8). 2005.

<http://www.aafp.org/afp/20051015/1503.html>

¹⁰² For a review on motivational interviewing, see: Britt et al. Motivational interviewing in health settings: a review. *Patient Education and Counseling* 2004. 53 147–155

¹⁰³ The California HealthCare Foundation: Bodenheimer et al. *Helping Patients Manage Their Chronic Conditions*. <http://www.chcf.org/topics/chronicdisease/index.cfm?itemID=111768>

¹⁰⁴ Ibid

v. Group Visits

One way to overcome poor reimbursement for patient educational activities is to plan group educational sessions with health educators. The Asthma CIT recommended consideration of group visits as an efficient way to provide patient education for asthma. Informal discussions with representatives of local health plans suggested that brief individual patient contact visits followed by group educational sessions would be reimbursed under standard E/M billing codes. Medicaid covers group visits.

b. Patients and Parents

Asthma CIT Recommendations:

- Patients (or parents of children with asthma) should take an active role in asthma self-management, working in collaboration with their healthcare providers to develop self-management goals and action plans.
- Patients should ask their providers to work with them to develop a written asthma action plan as part of their self-management goals, and to review and discuss the plan on an ongoing basis.

i. Patient Education

Patient education is central to the prevention and management of asthma. Patients must have access to ongoing educational activities in order to improve their compliance with their medication regimen, identify and control asthma triggers, and work collaboratively with their providers to maximize their asthma self-management.

Parents need on-going education regarding appropriate levels and strategies to begin to share management for asthma with their child so the child ultimately becomes a well-informed user of care.

Patient education, to be effective, should be provided using a multifaceted approach. Patient education in the form of information only has been shown to have little effect on patient behavior or asthma control.¹⁰⁵ More comprehensive approaches, especially those including self-management support, are recommended.¹⁰⁶

¹⁰⁵ Cochrane Review. Limited (information only) patient education programs for adults with asthma 2002. <http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD001005/frame.html>

¹⁰⁶ Cochrane Review. Self-management education and regular practitioner review for adults with asthma 2002. <http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD001117/frame.html> ; Cochrane Review: Educational interventions for asthma in children 2002. <http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD000326/frame.html> ; National Asthma Education and Prevention Program Expert Panel Report II. 1997 <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdl.pdf> , 2002 Update: <http://www.nhlbi.nih.gov/guidelines/asthma/asthmafullrpt.pdf> and National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdl.pdf>

Educational programs should be available in multiple formats and venues to maximize acceptability to patients. These include:

- **Community-based** asthma classes
 - Emphasis should be on self-management goals. Classes should be tailored for different age groups - e.g., children (parents), teens, adults. Examples of community-based classes/programs for asthma education:
 - Asthma and Allergy Foundation (AAFA) ACT for Kids Program (may be administered in health care or community settings)
<http://www.cdc.gov/asthma/interventions/act.htm>
 - AAFA Wee Wheezers program - small group sessions for parents with children under the age of seven
<http://www.aafa.org/display.cfm?id=4&sub=79&cont=434>
- **Clinic-based** educational activities
 - Education provided by health care provider on an ongoing basis in regularly scheduled asthma visits
 - One-on-one counseling with a nurse or certified asthma educator to establish self-management strategies
 - Group visits for patients with asthma
- **Web-based** educational materials
 - Web-based activities should be used in conjunction with other educational modalities. They are unlikely to change patient behavior if used alone but can be an important and convenient adjunct to other strategies, especially for younger, computer-literate patients. Strategies should be developed to encourage patients to access websites. The NAEPP EPR-3 guidelines suggest that web-based educational material may be most appropriate for children and adolescents.¹⁰⁷ Examples of web-based programs include
 - The National Heart, Lung, and Blood Institute
http://www.nhlbi.nih.gov/health/dci/Diseases/Asthma/Asthma_WhatIs.html
 - California Department of Health Services Asthma Education Center
www.Asthmaeducationcenter.net/
 - Asthma and Allergy Network Mothers of Asthmatics: America's College of Asthma and Allergy
<http://www.aanma.org/college/>

¹⁰⁷ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

- **In-person or telephone coaching**
 - Studies have shown that telephone coaching can improve asthma symptoms and follow-up after an emergency room visit, at least in the short term.¹⁰⁸
- **Home visits** by a nurse, asthma care manager or community health worker
 - Home visits, as part of a multifaceted approach to asthma management, are especially useful in education about, and reduction of, environmental triggers in the home.¹⁰⁹
 - The Seattle Healthy Homes I and II Asthma Projects provided in-home outreach, education, and resources to low income children¹¹⁰
 - The Inner City Asthma Study provided an individualized, home-based, comprehensive environmental intervention to decrease exposure to indoor allergens, including cockroach and dust-mite allergens, resulting in reduced asthma-associated morbidity.¹¹¹
- **Settings** for other educational opportunities include **schools, pharmacies, emergency rooms and hospitals**¹¹²
 - In the Power Breathing Program, a school-based educational program for adolescents (an AAFA validated program),¹¹³ participants reported that knowledge gained from the program and from individual counseling sessions improved trigger avoidance, increased medication adherence, and decreased the frequency of asthma episodes.¹¹⁴
 - American Lung Association Open Airways for Schools - a program of lectures for school-aged children that occur at school with a certified instructor <http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=44142>

¹⁰⁸ Smith et al. Improving follow-up for children with asthma after an acute Emergency Department visit. The Journal of Pediatrics 2004. 145 (6):772-777; Abstract available at: http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WKR-4DXSX8R-11&_user=10&_coverDate=12%2F01%2F2004&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=6266d5d4cb1a76c701c8f7b2d5b28d1f

¹⁰⁹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹¹⁰ Healthy Homes I: Krieger JW, Song L, Takaro T. The Seattle-King County Healthy Homes Project: A Randomized, Controlled Trial of a Community Health Worker Intervention to Decrease Exposure to Indoor Asthma Triggers among Low-income Children. American Journal of Public Health, 2005;95:652-659 and Healthy Homes II: <http://www.metrokc.gov/health/asthma/healthyhomes/overview.htm>

¹¹¹ Morgan et al; Inner-City Asthma Study Group. Results of a home-based environmental intervention among urban children with asthma. N Engl J Med. 2004. 351(11):1068-80 Available at: <http://content.nejm.org/cgi/reprint/351/11/1068.pdf>

¹¹² National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹¹³ The Power Breathing Program. <http://www.aafa.org/display.cfm?id=4&sub=79&cont=436>

¹¹⁴ Berg et al. Evaluation of an Educational Program for Adolescents with Asthma. Journal of School of Nursing. 2004. 20(1):29-55. Abstract available at: [http://nasn.allenpress.com/nasnonline/?request=get-abstract&doi=10.1622/1059-8405\(2004\)020\[0029:EOAEPF\]2.0.CO;2](http://nasn.allenpress.com/nasnonline/?request=get-abstract&doi=10.1622/1059-8405(2004)020[0029:EOAEPF]2.0.CO;2)

- Environmental Protection Agency Tools for Schools
<http://www.epa.gov/iaq/schools/>
- Note that most of these settings were not discussed in detail by the Asthma CIT, whose primary focus was improving care in the ambulatory setting. However, these sites are recommended for educational opportunities by the NAEPP guidelines and are important venues and opportunities for asthma education.

Resource for patients:

Allies against Asthma publishes a toolkit for evaluating asthma educational resources, including a listing of the key asthma topics that should be covered in any patient education activities: <http://www.metrokc.gov/health/asthma/docs/asthma-toolkit.pdf>

ii. Self-Management Support

Patient self-management education and support has been shown to improve asthma outcomes.¹¹⁵ The NAEPP guidelines recommend that all patients with persistent asthma develop self-management goals for managing their disease. “Optimal” self-management support includes self-monitoring of symptoms and/or peak flow, regular review by a clinician, and a written asthma action plan.¹¹⁶

Treatment goals for patients with asthma include:¹¹⁷

1. Minimal or no chronic asthma symptoms, day or night
2. No limitations on activities; no school or work missed because of asthma
3. Minimal or no recurrent exacerbations of asthma; minimal or no emergency department visits or hospitalizations
4. Minimal use of rescue medications such as inhaled short-acting Beta2 agonists
5. Minimal or no adverse side-effects from medications
6. Satisfaction with asthma care

In order to achieve these goals, collaborative care between patient and provider is important, and must include aspects of self-management. Self-management support should extend beyond one-time teaching to encompass intensive skills training (such as on how to use inhalers and the difference between rescue and controller medications), goal-setting, and regular follow-up.¹¹⁸

¹¹⁵ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹¹⁶ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program (NAEPP) Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹¹⁷ NAEPP Expert Panel 2: Guidelines for the Diagnosis and Management of Asthma. 1997.

¹¹⁸ The California HealthCare Foundation: Bodenheimer et al. Helping Patients Manage Their Chronic Conditions. <http://www.chcf.org/topics/chronicdisease/index.cfm?itemID=111768> and Patient Self-Management Tools: An Overview. <http://www.chcf.org/topics/chronicdisease/index.cfm?itemID=111783>;

Resources for Patient Education and Self-Management

American Lung Association of Washington:

http://www.alaw.org/asthma/asthma_management/asthma_management_plan

National Heart Lung and Blood Institute “So You Have Asthma” patient educational materials: <http://hp2010.nhlbihin.net/asthma>

The Chest Foundation. Controlling Your Asthma

http://www.chestnet.org/downloads/patients/guides/controllingYourAsthma_eng.pdf
(English);

http://www.chestnet.org/downloads/patients/guides/controllingYourAsthma_sp.pdf
(Spanish)

iii. Written Asthma Action Plan

Asthma self-management should include a written asthma action plan with specific instructions on medication use and general actions for patients with asthma at various symptomatic levels, or zones.

NAEPP EPR-3 2007 Recommendations for a Written Asthma Action Plan:¹¹⁹

- Clinicians provide to all patients who have asthma a written asthma action plan that includes instructions for (1) daily management and (2) recognizing and handling worsening asthma, including adjustment of dose of medications. Written action plans are particularly recommended for patients who have moderate or severe persistent asthma, a history of severe exacerbations, or poorly controlled asthma (Evidence B).
- Written asthma action plans may be based on PEF [peak expiratory flow] measurements or symptoms or both, depending on the preference of the patient and clinician (Evidence B).¹²⁰

Although the evidence for improved clinical outcomes using written asthma action plans is mixed,¹²⁰ studies suggest that they may help patients improve control of their asthma, particularly in preventing or managing exacerbation. Further studies have shown that medication adjustments using a written asthma action plan produce no worse outcomes than when a clinician adjusts medications, suggesting that the written asthma action plan is a safe and effective means for helping patients to self-manage their disease.¹²¹

Bodenheimer, Self Management Support: Is it enough? (PowerPoint) Available at:

<http://www.dhs.ca.gov/cclho/Agendas%20minutes%20materials/Semi-Annual%20Meetings/CCLHO%20Spring%202007%20SemiAnnual/BodenheimerCCLHO.pdf>

¹¹⁹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at:

<http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>, p.115

¹²⁰ Ibid, pp. 116,120

¹²¹ Ibid, p. 120

Designed primarily for the patient with moderate to severe persistent asthma, the written asthma action plan is typically divided into three zones based on degree of symptoms - green for a baseline symptom-free or minimal symptom state, yellow for moderate symptoms, and red for severe symptoms. A written plan provides information to patients so they may self-adjust their medications and seek medical help as their symptoms exacerbate, and should provide information on agreed-upon daily therapy goals and monitoring measures. The written asthma action plan is developed in collaboration with a healthcare provider, and tailored to an individual patient's needs.

In a Cochrane Review evaluating Australian asthma guidelines, it was found that education in self-management, including a written asthma plan, significantly reduced emergency room visits, nocturnal asthma symptoms, days off work or school, and unscheduled visits to the doctor. Training programs that enabled people to adjust their medications using a written action plan appeared to be more effective than other forms of asthma self-management.¹²² In a separate review, looking specifically at written asthma action plans, the Cochrane Group found insufficient evidence to suggest improved outcomes with the use of written asthma action plans. They evaluated written plans that were based on either objective peak flow measurements or subjective symptoms (or both), and found no consistent superiority of one type of plan over another.¹²³ The NAEPP Expert Panel Review 2002 likewise found that data were insufficient to support or refute the benefits of a written asthma action plan to improve outcomes, but the authors supported the use of a written asthma action plan as part of an overall strategy to educate and engage patients in self-management of their disease, especially for patients with moderate or severe persistent asthma, and those with a history of severe exacerbations.¹²⁴ In the 2007 update, the NAEPP Expert Panel makes the statement that “self-management education that included a written asthma action plan appeared more effective than other forms of self-management education,” based on findings from a large randomized control trial of asthma self-management plans published in 2003.¹²⁵

There is currently no evidence that peak flow monitoring offers an advantage over subjective symptom reporting. For example, a recent study on middle-aged to older adults showed that peak flow monitoring was not associated with improved outcomes. However, in this study all of the participants were educated in asthma self-

¹²² Gibson PG, Powell H, Coughlan J, Wilson AJ, Abramson M, Haywood P, Bauman A, Hensley MJ, Walters EH. Self-management education and regular practitioner review for adults with asthma. *Cochrane Database of Systematic Reviews* 2002, Issue 3. Art. No.: CD001117. DOI: 10.1002/14651858.CD001117.

¹²³ Toelle BG, Ram FSF. Written individualised management plans for asthma in children and adults. *Cochrane Database of Systematic Reviews* 2004, Issue 1. Art. No.: CD002171. DOI: 10.1002/14651858.CD002171.pub2 <http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD002171/frame.html>

¹²⁴ NAEPP Expert Panel Report. Guidelines for the Diagnosis and Management of Asthma- Update on Selected Topics 2002.

¹²⁵ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>, p.98

management.¹²⁶ The NAEPP 2007 Expert Panel suggests that a peak-flow-based plan may be particularly useful for patients who have difficulty perceiving signs of worsening asthma.

Recommendations for a Written Asthma Action Plan:

- The NAEPP Expert Panel Report 2007 emphasizes that a written asthma action plan should include instructions for (1) daily management and (2) management of exacerbations, including adjustment of medications.
- The American Lung Association of Washington/Washington State Department of Health/Washington State Medical Association Asthma Guidelines recommend that:¹²⁷
 - All asthmatics (especially those with moderate-to-severe persistent asthma or a history of severe exacerbations) should have a written plan. The plan should include written instructions on:
 - Recognizing signs and symptoms of worsening asthma.
 - Taking appropriate medicines (type, dose and frequency).
 - Recognizing when to seek medical care and a 24/7 number where advice can be obtained.
 - Monitoring response to medications.
 - Symptom-based plans may be equally effective as plans based on peak flow monitoring.
 - The plan should be reviewed and adjusted at every visit.
 - There is evidence to suggest that following up to be sure that patients understand and follow their asthma plan is central to success. One-time teaching is ineffective.¹²⁸
 - A copy of a child's plan should be given to every caregiver and to the school.

Examples of Written Asthma Action Plans:

- Regional Asthma Management Program (RAMP):
<http://www.rampasthma.org/actionplan.htm> (action plans for children or adults available; pictorial descriptions accompany subjective descriptions of asthma symptoms in each zone; available in multiple languages - English, Spanish, Chinese and Vietnamese; can be filled in online).
- The NAEPP EPR-3 2007 Guidelines include the RAMP Asthma Action Plan:
<http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>, pp. 117-118

¹²⁶ Buist et al. A randomized clinical trial of peak flow versus symptom monitoring in older adults with asthma. *Am J Respir Crit Care Med* 2006. 174:1077-87.

¹²⁷ American Lung Association. Asthma: Guidelines. Part 4: Written Asthma Guidelines.
http://zed.alaw.org/asthma/ames/pdfs/amesAsthmaGuidelinesPart4_modified06-30-2005.pdf

¹²⁸ Bodenmeier, Self Management Support: Is it enough? (PowerPoint) Available at:
<http://www.dhs.ca.gov/cclho/Agendas%20minutes%20materials/Semi-Annual%20Meetings/CCLHO%20Spring%202007%20SemiAnnual/BodenheimerCCLHO.pdf> and Stern et al. *Ann Allergy Asthma Immunol* 2006;97:40.2006;97:40

- American Lung Association of Washington:
http://www.alaw.org/pdfs/asthma_management_plans/alaw_english.pdf (pictorial descriptions accompany subjective descriptions of asthma symptoms in each zone)
- National Heart Lung and Blood Institute (NHLBI):
http://www.nhlbi.nih.gov/health/public/lung/asthma/actionplan_text.htm (less attractive visual format but contains more cues for providers)
- Interactive form (can be prefilled online):
 - Accomplishing Strategies Together for Healthier Minnesotans with Asthma: Action Plan
 - Fully interactive program that pre-fills in medications and optional peak flow targets for each zone from prompted questions for the provider.
<https://www.mnasthma.org/aap/AAP.asp>
 - American Lung Association of Washington:
 - Allows the provider to type directly on form and print it. It prefills peak flow targets for each zone from personal best (but note that the NAEPP recommends that asthma action plan zones may be based on symptoms or peak flow readings, and that peak flow determinations are not required or appropriate for all patients. Peak flow readings are only useful for adults).
http://www.alaw.org/pdfs/asthma_management_plans/alaw_interactive_english.pdf

Creating a Supportive Community Environment for Change

c. Purchasers

Asthma CIT Recommendations:

- Understand the return on investment (ROI) for asthma education for employees and their dependents.
- Foster a comprehensive approach to asthma care by contributing to regional resources for patient and provider education on asthma.

i. ROI and Asthma Education

The Asthma CIT emphasizes the business case for asthma education for purchasers and employers. In their report, **Investing in Best Practices for Asthma**,¹²⁹ the Asthma Regional Council of New England (ARC) analyzed the results of 16 trials that examined the costs of patient education and self-management programs, and came to the following conclusions:

¹²⁹Asthma Regional Council, Investing in Best Practices for Asthma. 2007.
<http://www.asthmaregionalcouncil.org/about/documents/InvestinginBestPracticesforAsthmaJune2007.pdf>

“The literature examined provides strong evidence that effective asthma education programs targeted to high risk patients are likely to result in health care cost savings, as high risk patients tend to use health services most frequently. The literature also suggests that programs targeting patients whose health service utilization is lower may or may not generate net cost savings, but will result in improved health outcomes, such as quality of life, lung function, and reduced school and work absences. For example, a 2003 randomized control trial of adults receiving group education sessions in the clinic, by phone and at home as needed by an Asthma Nurse Specialist at a cost of \$186 per patient saved \$6,650 per patient in direct and indirect health care expenditures (\$36 saved in health care costs and lost work days for every \$1 spent on the program).” (Other examples of cost-saving asthma education programs are cited in the report).

ii. Regional Collaborative Efforts

See General Recommendations on support for the Washington State Asthma Collaboratives at the beginning of this section.

Resource for Purchasers:

Asthma Regional Council, Investing in Best Practices for Asthma. 2007.
<http://www.asthmaregionalcouncil.org/about/documents/InvestinginBestPracticesforAsthmaJune2007.pdf>

d. Health Plans

Asthma CIT Recommendations:

- Reimburse nurse visits, educational group visits, home visits and other educational modalities for members with asthma.¹³⁰
- Provide online web site tools for asthma education and self-management support to members with asthma.
- Foster a comprehensive approach to asthma care by contributing to regional resources for patient and provider education on asthma.

¹³⁰ As recommended by the NAEPP EPR-3 2007 Report. “The NAEPP 2007 Expert Panel recommends that asthma self-management education that is provided by trained health professionals be considered for policies and reimbursements as an integral part of effective asthma care; the education improves patient outcomes (Evidence A) and can be cost-effective (Evidence B). In National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program (NAEPP) Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

D. Control of Environmental Factors and Comorbid Conditions That Affect Asthma

1. Overview

The third component of asthma management highlighted in the NAEPP EPR-3 2007¹³¹ report is the control of environmental factors and comorbidities (coexisting diseases or conditions) that can affect asthma. According to the NAEPP experts, “for successful long-term management of asthma it is essential to identify and reduce exposures to relevant allergens and irritants and to control other factors that have been shown to increase asthma symptoms and/or precipitate asthma exacerbations.”¹³²

Many studies have shown that reduction of environmental triggers to which a patient is sensitive can improve their asthma control. The Asthma Health Outcomes Project¹³³ evaluated 223 asthma programs with an environmental component that reported having a positive outcome on asthma health. An in-depth analysis of a subset of 65 of these programs that used a randomized control trial design saw recurrent themes emerge. Programs most likely to report a positive impact on health outcomes were those that were:

- Community centered
- Collaborative
- Clinically connected
- Responsive to need

Locally, the Inner City Asthma Study (ICAS-Seattle)¹³⁴ reiterates these themes. ICAS targeted low income children with asthma, and showed that a multifaceted asthma program that coordinated in-home environmental assessments and interventions with clinical evaluations and follow-up resulted in a reduction in asthma symptoms, an increase in symptom-free days, and fewer school days lost to asthma.

It is important to keep these criteria in mind when making recommendations around the reduction of environmental triggers for asthma. The Alliance, with its multi-stakeholder membership, is in a unique position to offer recommendations that stress the need for coordinated and collaborative interventions that are ultimately patient-centered.

¹³¹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹³² Ibid

¹³³ The Asthma Health Outcomes Project was conducted by the University of Michigan with funding from the Environmental Protection Agency (EPA). Information available at: <http://www.epa.gov/asthma/ahop.html> ; Draft Final Report May 2007 http://www.asthma.umich.edu/media/ahop_autogen/draft_final_AHOP_report.pdf

¹³⁴ Morgan et al; Inner-City Asthma Study Group. Results of a home-based environmental intervention among urban children with asthma. N Engl J Med. 2004. 351(11):1068-80. Available at: <http://content.nejm.org/cgi/reprint/351/11/1068.pdf>

Environmental Factors

Environmental triggers for asthma are common and can be found in the home, outdoors and in the workplace. Identifying and controlling environmental triggers is a key component of asthma management for both adults and children. Environmental triggers can include indoor and outdoor allergens, occupational exposures, and irritants such as air pollution, tobacco smoke, chemicals, and other compounds. A list of major environmental asthma triggers and their sources is listed in Table 3 below.

Table 3: Environmental Triggers of Asthma

Environmental Triggers	Agent	Source
Indoor allergens (perennial)	Animal antigens	Pet and rodent dander, feces, urine and saliva
	Dust mite allergen	Dust mites
	Cockroach allergen	Cockroaches
	Mold allergen	Indoor molds
Environmental Triggers	Agent	Source
Outdoor allergens (seasonal)	Pollens	Trees (spring), grass (summer), weeds (late summer, fall)
	Mold allergen	Outdoor fungus spores, e.g., <i>Alternaria</i>
Occupational exposures	Chemicals	Multiple, including isocyanates, formaldehyde
	Mold allergen	Indoor and outdoor molds
	Other allergens	Plant or animal products
	Dust and irritants	Multiple sources
Irritants	Indoor particulate pollutants	Environmental tobacco smoke (ETS), wood smoke from wood burning stoves or fireplaces
	Formaldehyde and volatile organic compounds	Linoleum, carpets, wall coverings, particle board, furniture, recent painting, etc.
	Nitrogen dioxide	Gas stoves and appliances
	Air pollution - particulate matter, ozone, sulfur dioxide	Multiple sources of emission

Inhalant Allergens

Exposure to inhaled allergens to which an asthma patient is sensitive can exacerbate asthma symptoms and increase airway inflammation. Perennial indoor allergens are especially troublesome in this regard, since people spend most of their time indoors, although seasonal outdoor allergens such as pollens and mold also play a role at specific times of the year.

NAEPP EPR-3 Recommendations on Inhalant Allergens:¹³⁵

- The NAEPP Expert Panel recommends that patients who have asthma at any level of severity should be queried about exposures to inhalant allergens, particularly indoor allergens, and their potential effect on the patient's asthma (Evidence A).

The first and most important step to controlling allergen-induced asthma is reducing exposure to allergens. Reduction of allergen exposure requires a multifaceted, comprehensive approach. Individual steps are generally not effective alone.¹³⁶ Strategies to help asthma sufferers reduce their allergen exposure will be discussed in detail in the section on change strategies, below.

Immunotherapy (allergy shots) to desensitize patients to particular antigens may be appropriate in patients for whom there is a significant allergic component to their asthma.

Occupational Exposures

For working age adults, exposures to chemicals, allergens and irritants at the workplace can play a significant role in asthma. Some potential occupational asthma triggers are listed in Table 3. Occupational sources should be considered when asthma flares at work and in any adult with new onset asthma.

Irritants

There are numerous irritants that can exacerbate asthma symptoms and worsen lung function in patients with asthma. Indoor irritants may exist in the home and, along with indoor allergens, can be particularly problematic for asthma sufferers, since people spend the majority of their time in the home.

NAEPP EPR-3 Recommendations on Irritants:¹³⁷

- The Expert Panel recommends that clinicians query patients who have asthma at any level of severity about exposures to irritants that may cause their asthma to worsen, and advise them accordingly about reducing relevant exposures (EPR-2 1997).

One of the most commonly encountered particulate irritants is **environmental tobacco smoke (ETS)**. People with asthma who smoke tend to have more severe asthma, and children exposed to secondhand smoke early in life are at risk for developing asthma. Secondhand smoke can also trigger asthma symptoms in people with asthma. An evaluation in King County¹³⁸ showed that among adults with asthma, 18% were current smokers and exposure to secondhand smoke in the home was common. Among adults with current asthma, 24% reported having at least one smoker in the household and 10% reported that someone smoked inside the home during the previous 30 days. Among King County children less than five years old, 21% had at least one smoker in the home and 5% were exposed to tobacco smoke inside the home during the previous thirty days in 2003.

¹³⁵ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at:

<http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹³⁶ Ibid

¹³⁷ Ibid

¹³⁸ Public Health Seattle King County Public Health Data Watch, November, 2005.

<http://www.metrokc.gov/health/datawatch/asthma-2005.pdf>

The NAEPP Expert Panel strongly recommends that clinicians ask all adult patients with asthma whether they smoke, and to advise and assist them in smoking cessation. Parents of children with asthma should be asked whether they smoke, and whether there is any exposure of the child to second-hand tobacco smoke in the home.

Wood burning stoves and fireplaces also produce particulate irritants that can exacerbate asthma in sensitive individuals.

Patients identified as having exposure to these irritants should be advised about reducing their exposure.

NAEPP EPR-3 2007 Recommendations on Environmental Tobacco Smoke (ETS):¹³⁹

- The Expert Panel recommends that clinicians advise persons who have asthma not to smoke or be exposed to ETS (Evidence C).
- Query patients about their smoking status and specifically consider referring to smoking cessation programs adults who smoke and have young children who have asthma in the household (Evidence B).

Nitrogen dioxide from gas stoves and appliances can be found indoors, especially with poorly ventilated appliances or rooms. **Formaldehyde** is an irritant released from multiple household items, such as particleboard, new carpet, new paint, furniture and linoleum.

Indoor Environmental Triggers and Socioeconomic Status

Socioeconomic factors play a role in exposure to environmental triggers for asthma. Many of the indoor allergens and irritants, such as rodent, cockroach, dust mite and mold allergens, tobacco smoke, poorly vented gas appliances, and wood smoke, are more common in lower income households. Lower income housing is prone to dampness and humidity which fosters the growth of dust mites and molds, structural defects which can cause water leaks and permit the entry of rodent and insect pests, and poorly functioning or poorly ventilated gas or wood stoves, heaters or appliances that send nitrogen dioxide and particulate irritants into the air. Smoking is also more prevalent in low-income households. Data obtained for King County, including the Inner City Asthma Study (ICAS-Seattle),¹⁴⁰ Healthy Homes I¹⁴¹ and Healthy Homes II¹⁴² provide

¹³⁹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹⁴⁰ Crain et al. Home and Allergic Characteristics of Children with Asthma in Seven U.S. Urban Communities and Design of an Environmental Intervention: The Inner-City Asthma Study. *Environ Health Perspect* 2002. 110:939–945 (2002) Available at: <http://www.ehponline.org/members/2002/110p939-945crain/EHP110p939PDF.PDF>; Seattle statistics quoted in: Public Health Seattle King County Public Health Data Watch, November, 2005. <http://www.metrokc.gov/health/datawatch/asthma-2005.pdf>; and Morgan et al; Inner-City Asthma Study Group.

Results of a home-based environmental intervention among urban children with asthma. *N Engl J Med*. 2004. 351(11):1068-80. Available at: <http://content.nejm.org/cgi/reprint/351/11/1068.pdf>

¹⁴¹ Krieger JW et al. Asthma and the home environment of low-income urban children: preliminary findings from the Seattle-King County Healthy Homes Project. *Journal of Urban Health*. 2000. 77(1): 50-67; Takaro, Krieger and Song. Effect of environmental interventions to reduce exposure to asthma triggers in homes of low-income children in Seattle. *Journal of Exposure Analysis and Environmental Epidemiology* (2004) 14, S133–S143. Abstract available at: <http://www.nature.com/jea/journal/v14/n1s/abs/7500367a.html> and Krieger JW et al. The Seattle-King County Healthy Homes Project: A Randomized, Controlled Trial of a Community Health Worker

evidence that exposure to these triggers is widespread among low income households. Among homes in Healthy Homes II, 76% had at least one trigger present and 12% had three or more. In the study, 60% of children had allergies to at least one trigger and 36% were allergic to three or more. People with household incomes below 250% of the federal poverty level were more likely to report mold in their homes than those above 250% of the poverty level (22.6% vs. 13.8%, respectively).

In the Inner City Asthma Study (ICAS)¹⁴³ children from seven U.S. urban communities (including Seattle) with poorly controlled asthma were evaluated. The children were eligible for enrollment in the study if they had two or more emergency room visits or one hospitalization for asthma in the prior six months and had a least one positive skin test to one of eleven common indoor skin allergens. More than 50% of enrolled children across the seven communities had positive skin tests to three or more allergen groups. Cockroaches were reported in 58% of homes, wall-to-wall carpeting in the child's bedroom in 55%, a smoker in 48%, mice or rats in 40%, and furry pets in 28%. Although dust mites cannot be detected by examining a household, they are widespread across the Northwest because of the dampness of the climate.¹⁴⁴ In ICAS, nearly two out of three children were allergic to dust mites. The authors concluded that most inner city children with moderate to severe asthma are sensitized to multiple indoor allergens and that environmental factors known to be associated with asthma severity are commonly present in their homes.

Low-income adults and children are significantly more likely to have current asthma than higher income persons.¹⁴⁵ For example, the Behavioral Risk Factor Surveillance System (BRFSS) telephone survey from 2004 indicated that adults living below 200% of the federal poverty level in King County had a significantly higher prevalence of asthma than those living above 200% of the poverty level (12.0% vs. 7.8 % prevalence, respectively).¹⁴⁶ People from high poverty neighborhoods in King County were also much more likely to be admitted to the hospital for asthma compared to people from low poverty communities (about two times more likely for adults and three times for children).¹⁴⁷ Any efforts to address comprehensive asthma management should take into account socioeconomic factors, as well as cultural beliefs and practices that may increase the risk or severity of asthma.

Intervention to Decrease Exposure to Indoor Asthma Triggers. *American Journal of Public Health*. 2005; 95:652-659. Abstract available at: <http://www.ajph.org/cgi/content/abstract/95/4/652>. Statistics quoted in: Public Health Seattle King County Public Health Data Watch, November, 2005.

<http://www.metrokc.gov/health/datawatch/asthma-2005.pdf>

¹⁴² Full results pending. Statistics on exposures quoted in: Public Health Seattle King County Public Health Data Watch, November, 2005. <http://www.metrokc.gov/health/datawatch/asthma-2005.pdf>

¹⁴³ Crain et al. Home and Allergic Characteristics of Children with Asthma in Seven U.S. Urban Communities and Design of an Environmental Intervention: The Inner-City Asthma Study. *Environ Health Perspect* 110:939-945 (2002) Available at: <http://www.ehponline.org/members/2002/110p939-945crain/EHP110p939PDF.PDF>

¹⁴⁴ Seattle King County Public Health Dust Mite Guidelines

http://www.metrokc.gov/health/asthma/docs/Dust_Mite_Protocol.pdf

¹⁴⁵ Public Health Seattle King County Public Health Data Watch, November, 2005.

<http://www.metrokc.gov/health/datawatch/asthma-2005.pdf>

¹⁴⁶ Data from BRFSS quoted in: Public Health Seattle King County Public Health Data Watch, November, 2005.

<http://www.metrokc.gov/health/datawatch/asthma-2005.pdf>

¹⁴⁷ Ibid

Comorbid Conditions

Comorbid conditions are diseases other than asthma that can exacerbate asthma symptoms. Such conditions are generally more of a concern in adults than children, but any patient with poorly controlled asthma should have possible contributing conditions considered, and either excluded or treated. Treatment of comorbid conditions can improve asthma control, although some conditions are more easily addressed than others. Conditions that have been shown to affect asthma include bronchopulmonary aspergillosis (a fungal infection of the lungs that should be considered in any asthma patient with pulmonary infiltrates on chest x-ray), gastroesophageal reflux disease (GERD), chronic nasal or sinus infection, obesity, and sleep apnea. In addition, depression has been shown to have a negative impact on patients' ability to manage their asthma, and any patient with asthma should be screened for depression.

NAEPP EPR-3 2007 Recommendations for Evaluation of Comorbid Conditions:¹⁴⁸

- The Expert Panel recommends that clinicians evaluate a patient for presence of a chronic comorbid condition when the patient's asthma cannot be well controlled.
- Treating the following conditions may improve asthma management: Bronchopulmonary aspergillosis (Evidence A), gastroesophageal reflux (Evidence B), obesity (Evidence B, limited studies), obstructive sleep apnea (Evidence D), rhinitis/sinusitis (Evidence B), chronic stress/depression (Evidence D).

2. Change Strategies

Improvement at the Point of Care

a. Providers

Asthma CIT Recommendations:

- Take a detailed patient history for each asthma patient in order to assess exposure and sensitivity to possible environmental triggers, including indoor and outdoor allergens, occupational exposures, and irritants.
- Perform allergy testing (skin prick test or *in vitro* RAST test) on all asthma patients whose asthma is not under good control.
 - Primary care providers are encouraged to provide allergy testing to common indoor and outdoor allergens (*not* food allergens) in their offices to avoid the need for referral outside the patient's medical home.
 - Allergy testing in the primary care setting should be limited to a small battery of tests for the most common allergens, i.e. dust mites (*D. farinae* and *D. pteronyssinus* or mix), cat, dog, molds (*Alternaria* or *Aspergillus* or mix), tree pollens (birch, alder, cottonwood), grass pollen and weed pollen.

¹⁴⁸ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

- Skin prick testing is less expensive and more specific than *in vitro* RAST testing, and is recommended as the preferred method. However, RAST testing, which involves only a blood draw, may be appropriate if the primary care provider is uncomfortable with skin testing.
- Educate patients on steps to reduce allergen and irritant exposures in their home and outdoors, including the establishment of a “safe sleeping zone.”
- Refer patients with poorly controlled symptoms for in-home assessment of allergen and irritant exposures, and request feedback from such programs so that there is a coordinated approach to asthma management.
- Provide pillow and mattress covers at the point of care for asthma patients shown to be sensitive to dust mites by allergy testing.
- Screen all asthma patients and parents of children with asthma for smoking and advise and assist those who smoke in quitting.
- Offer annual flu shots to all asthma patients and their families.
- Consider comorbid conditions that may affect asthma, including bronchopulmonary aspergillosis, gastroesophageal reflux disease (GERD), chronic nasal or sinus infection, obesity, and sleep apnea, especially in patients with difficult to control disease.

i. Allergy Testing

The NAEPP Expert Panel recommends skin testing or *in vitro* testing to determine the presence of specific IgE antibodies to indoor allergens to which the patient is exposed year round. Allergy testing for seasonal outdoor allergens may not be necessary, since history is often adequate to assess sensitivity to outdoor allergens. However, in selected patients, detection of specific IgE testing to outdoor allergens may help with patient education and self-management motivation.

The NAEPP EPR-3 guidelines recommend a three-step approach to determining allergen sensitivity, described in detail in the table below.

NAEPP EPR-3 2007 Recommendations for Determination of Allergen Sensitivity¹⁴⁹

The Expert Panel recommends that, given the importance of allergens and their control to asthma morbidity and asthma management, patients who have persistent asthma should be evaluated for the role of allergens as possible contributing factors as follows (EPR-2 1997):

- Determine the patient’s exposure to allergens, especially indoor inhalant allergens.

¹⁴⁹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

- Assess sensitivity to the allergens to which the patient is exposed.
 - Use the patient's medical history, which is usually sufficient, to determine sensitivity to seasonal allergens.
 - Use skin testing or in vitro testing to determine the presence of specific IgE antibodies to the indoor allergens to which the patient is exposed year round.
 - Allergy testing is the only reliable way to determine sensitivity to perennial indoor allergens.
 - For selected patients who have asthma at any level of severity, detection of specific IgE sensitivity to seasonal or perennial allergens may be indicated as a basis for education about the role of allergens for avoidance and for immunotherapy.
- Assess the clinical significance of positive allergy tests in the context of the patient's medical history.

The Asthma CIT concurs with the NAEPP recommendations for allergy testing, adding that while dust mites cannot be detected on home inspection, the damp climate of the Northwest assures that **most people in the Puget Sound region are exposed to dust mites**. Thus, the Asthma CIT recommends that **early allergy testing, with a limited battery of tests for allergens** including dust mites, be done for any patient whose asthma is not under good control. If testing is to be done for dust mites, inclusion of other common allergens at the same time seems cost-effective (see recommendation above for a list of recommended allergens for testing). The NAEPP Expert Panel, which issues national guidelines, recognizes that regional variations in allergen prevalence and exposures may lead to more appropriate approaches in specific areas of the country.

ii. Patient Education

Once allergens and other environmental triggers have been identified, providers can provide targeted education and counseling on avoidance of both indoor and outdoor triggers to asthma patients and their families.

The NAEPP EPR-3 2007 guidelines contain recommendations for reducing exposure to environmental triggers for asthma.¹⁵⁰

¹⁵⁰ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>, pp 169-172.

NAEPP EPR-3 2007 Recommendations for Indoor Allergen Control:¹⁵¹

- The Expert Panel recommends that patients should reduce exposure, as much as possible, to allergens to which the patient is sensitized and exposed.
- The first and most important step in controlling allergen-induced asthma is to advise patients to reduce exposure to relevant indoor and outdoor allergens to which the patient is sensitive. (Evidence A)
- Effective allergen avoidance requires a multifaceted, comprehensive approach; individual steps alone are generally ineffective. (Evidence A)
- Consider multifaceted allergen-control education interventions provided in the home setting that have been proven effective for reducing exposures to cockroach, dust mite, and rodent allergens for patients sensitive to those allergens. (Evidence A)

One focus of educational efforts in the clinical setting should be providing advice on creating a “safe sleeping zone” (see below). This educational model was included in the Inner City Asthma Study¹⁵² and identified key things that parents could do to reduce allergen exposure in their child’s bedroom. The advice for a safe sleeping zone is especially useful when combined with clinical data, such as known sensitivity to dust mites or mold from allergy testing, and discussion of asthma symptoms, such as nocturnal exacerbation.

Safe Sleeping Zone:¹⁵³

Goal for parents: Make your child's bedroom as allergen free and smoke free as possible.

- Do not allow smoking in the child’s bedroom.
- Apply mattress and pillow covers.
- Install air vent filtration covers where applicable; check for mold.
- Wash bedding in hot water at least every 2 weeks.
- Remove or vacuum carpets, damp dust every week.
- Freeze/wash stuffed toys.

The provider can also focus efforts on screening parents for smoking and offering smoking cessation advice as necessary. Messaging from a health care provider can be particularly powerful in motivating change. Clinicians should also remember that studies have shown that a multifaceted approach to environmental trigger reduction,

¹⁵¹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹⁵² Crain et al. Home and Allergic Characteristics of Children with Asthma in Seven U.S. Urban Communities and Design of an Environmental Intervention: The Inner-City Asthma Study. Environ Health Perspect 110:939–945 (2002) Available at: <http://www.ehponline.org/members/2002/110p939-945crain/EHP110p939PDF.PDF>;
Appendix 1: Safe Sleeping Zone. http://findarticles.com/p/articles/mi_m0CYP/is_9_110/ai_94261108/pg_10

¹⁵³ Ibid

especially of indoor allergens, is most effective at improving outcomes. Thus, education in the clinical setting is valuable, but should be combined and coordinated with educational opportunities in the home, school and community. In-home environmental assessments and remediation assistance are key components of a multifaceted approach, and can be combined with clinical advice and teaching. In-home assessments are discussed further below.

iii. Educational Resources for Patients on Environmental Triggers for Asthma:

The following resources may be reproduced as handouts for patients on allergen and irritant reduction in their homes.

- Thurston County STEPS Program: Asthma Trigger Checklist: A room by room guide to environmental triggers in the home and what to do about them. http://www.co.thurston.wa.us/health/steps/pdf/triggers_web.pdf
- NAEPP EPR-3 2007 Report. Figure 3-16. How to Control Things That Make Your Asthma Worse <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf> pp. 129-130

iv. In-Home Assessment and Intervention for Allergen Control

Results from environmental assessment and intervention programs, such as the Inner City Asthma Study¹⁵⁴ and Healthy Homes I,¹⁵⁵ have shown that a multifaceted, individualized, environmental approach to allergen control, delivered in the home setting, can be effective in reducing exposure to certain in-home allergens. The NAEPP Expert Panel summarizes the evidence as follows:

“Multifaceted programs that focus on educating patients and providing tools for reducing exposure to cockroach, dust-mite, and rodent allergens have demonstrated success in reducing exposure and reducing asthma morbidity. Further evaluation is needed of the cost-effectiveness and feasibility for widespread implementation of these interventions; however, the efficacy of the interventions warrants their consideration, if available, for patients sensitive to these allergens.”¹⁵⁶

Moreover, the Asthma Health Outcomes Project, conducted by the University of Michigan, evaluated over 200 asthma programs, 65 in depth, and found that “asthma programs that address environmental triggers work best to improve health outcomes such as reduced emergency room visits, improved quality of life, and fewer missed

¹⁵⁴ Morgan et al; Inner-City Asthma Study Group. Results of a home-based environmental intervention among urban children with asthma. *N Engl J Med.* 2004. 351(11):1068-80. Available at: <http://content.nejm.org/cgi/reprint/351/11/1068.pdf>

¹⁵⁵ Krieger J, Takaro T, Song L et al. The Seattle-King County healthy homes project: A randomized, controlled trial of a community health worker intervention to decrease exposure to indoor asthma triggers, *Amer Journal of Public Health.* 2005; 95(4):642- 659 <http://www.asthmaregionalcouncil.org/about/documents/KriegeretalHealthyHomes2005AJPH.pdf>

¹⁵⁶ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

days of school or work when they build strong connections with front-line health care providers and local communities.¹⁵⁷

Providers should be familiar with and refer to local or regional programs that offer comprehensive approaches to allergen control. Providers should also encourage feedback from these referrals, and work in a coordinated fashion with community health workers or volunteer environmental specialists to optimize environmental trigger reduction in the homes of their asthma patients.

The Asthma CIT further makes the recommendation that in-home assessments of asthma control be coordinated through the local public health jurisdictions, many of which are already active in this regard (see below under Policy Makers and Public Health).

- Local resources for in-home environmental assessments:
 - American Lung Association of Washington and City of Seattle:
 - Free in-home assessments by trained Master Home Environmentalist volunteers using the Home Environmental Assessment List (HEAL™) http://www.alaw.org/air_quality/master_home_environmentalist/home_health_assessment.html
 - Do-it-yourself home assessments using the HEAL™ are also available. Registration is required to track enrollment. http://zed.alaw.org/forms/mhe_do_it_yourself_heal/
 - Public Health Seattle King County:

There will be two programs that provide in-home asthma environmental assessments through Public Health Seattle King County:

 - HomeBASE (Home Based Asthma Support and Education) - Adults (funded by National Institutes of Health)
 - Medicaid Asthma Home Visit Pilot - Children (contract with Washington State Department of Social and Health Services)
 - Thurston County:
 - STEPS Home Environmental Assessment List (self-assessment). Tel. (360) 754-4111.
 - Tacoma-Pierce County:
 - Asthma Prevention Partnership - Clean Air for Kids. An Asthma Outreach Worker provides communication with provider, an in-home environmental assessment and assistance with home remediation to reduce exposure to triggers. The program provides a summary letter to the

¹⁵⁷ Morgan et al; Inner-City Asthma Study Group. Results of a home-based environmental intervention among urban children with asthma. N Engl J Med. 2004. 351(11):1068-80. Available at: <http://content.nejm.org/cgi/reprint/351/11/1068.pdf>

primary care physician so that there is continuity and coordination of care, an important recommendation by the Asthma CIT.

<http://www.tpchd.org/page.php?id=126> and

<http://www.tpchd.org/page.php?id=14>

v. Pillow and Mattress Covers

Because of the high prevalence of dust mites in our region, the Asthma CIT recommends that providers caring for patients with asthma make pillow and mattress covers available in their office for distribution to patients since convenience for patients can improve compliance. These items should be targeted to those patients with a known sensitivity to dust mites based on allergy testing.

Pillow and mattress covers, if prescribed by a physician, may be reimbursable as durable medical equipment by some health plans. Providers may become familiar with the rules of the major health plans with which they contract, and patients should inquire about reimbursement with their own plan. These items are relatively low cost and should be affordable as out-of-pocket expenses for some patients.

If referring patients to purchase these items on their own, the following toll-free hotlines provide information on companies that distribute products that help reduce allergen exposure:

- Asthma and Allergy Foundation of America: 800–727–8462
- Allergy Asthma Network/Mothers of Asthmatics: 800–878–4403

vi. Screening and Intervention for Smoking

Providers should screen all patients for smoking and offer advice and counseling on quitting (see Prevention CIT Final Report section on Tobacco Cessation).¹⁵⁸ For patients with asthma, this is a crucial step in disease management, and should include inquiries not only into smoking behavior but also exposure to second hand smoke. Further information on helping patients quit smoking is available in the Alliance’s Prevention CIT Final Report.¹⁵⁹

vii. Flu Shots

Asthma patients are at high risk from influenza and should be offered an annual flu vaccine, as should their families and caretakers. Indeed, the Alliance Prevention CIT recommends that everyone over the age of six months be offered a flu shot each year. Further information on flu shots is found in the Alliance’s Prevention CIT Final Report.¹⁶⁰

¹⁵⁸ Puget Sound Health Alliance Prevention CIT Final Report. Link pending at: <http://www.pugetsoundhealthalliance.org/members/PreventionClinicalImprovementTeamCIT.cfm> Requires user ID and password for access. Contact the Puget Sound Health Alliance at 206-448-2570 for more information.

¹⁵⁹ Puget Sound Health Alliance Prevention CIT Final Report. Link pending at: <http://www.pugetsoundhealthalliance.org/members/PreventionClinicalImprovementTeamCIT.cfm> Requires user ID and password for access. Contact the Puget Sound Health Alliance at 206-448-2570 for more information.

¹⁶⁰ Ibid

viii. Comorbid Conditions

Discussion of management of comorbid conditions such as those described above is beyond the scope of the Asthma CIT, but the CIT members emphasize that clinicians should be aware of and look for conditions that impede asthma management, especially in patients with poorly controlled disease. In addition, screening for and treating depression is an important component of any chronic disease management strategy.

b. Patients and Parents

Asthma CIT Recommendations:

- Talk to your healthcare provider about things that seem to make your asthma worse. Keep an asthma diary, including what times of day and in what locations your asthma seems to exacerbate.
- Learn about environmental triggers for asthma.
- Arrange for an in-home assessment of asthma triggers in your home.
- Take steps to reduce allergens and other triggers in your home.
- Don't smoke if you have asthma, and avoid exposure to second hand tobacco smoke. Parents of children with asthma should not smoke near their children.
- All members of the family over six months of age should get an annual flu shot.

i. Education and Resources for Patients

See Provider Section for a list of patient education materials on environmental triggers, as well as resources for performing in-home environmental assessments.

Creating a Supportive Community Environment for Change

c. Health Plans

Asthma CIT Recommendations:

- Offer coverage for items that mitigate allergen exposure for members with asthma, including mattress and pillow covers, HEPA machines and replacement filters.
- Provide in-home environmental assessments and interventions as part of asthma disease management programs, and/or support local public health jurisdiction efforts in this area through grants or other funding support.

i. Offer Coverage for Items that Mitigate Allergen Exposure in the Home

Items such as pillow and mattress covers (dust mites), HEPA filters (mold spores, ETS, cat dander and dog allergens),¹⁶¹ and HEPA vacuums (house dust) have been shown to reduce allergen exposure.¹⁶² The Asthma Regional Council of New England produced a White Paper outlining strategies for comprehensive asthma disease management programs, and recommends that health plans cover medically necessary items that mitigate allergen exposure.¹⁶³ A 2004 survey of health plans by Taking on Asthma, an initiative supported by the American Academy of Asthma and Immunology and the EPA, indicated that only 17.4% of plans offered coverage for environmental management tools such as mattress covers, roach eradication systems, or air purifiers. A further 6% of plans offered such coverage to certain high-risk groups.¹⁶⁴ A follow-up survey published in 2007 showed that the total number had increased to 27% of surveyed plans.¹⁶⁵

The Asthma CIT recommends that health plans reimburse for reasonable cost items for targeted patients who are exposed to given allergens. Since almost all homes in the Puget Sound region have dust mites, pillow and mattress covers should be covered for all asthma patients with a documented sensitivity to dust mites. Air purifiers such as HEPA filters should be considered for coverage for patients with sensitivities and exposure to mold, pet dander, and ETS. The Asthma CIT did not feel it was reasonable to expect plans to cover HEPA vacuums.

ii. In-Home Evaluation of Environmental Asthma Triggers

As discussed above under Providers, multifaceted approaches to reducing environmental exposures delivered in the home setting can have beneficial effects on health outcomes for asthma patients. The Asthma CIT recommends in-home assessments as part of comprehensive asthma disease management programs.

Because several local health jurisdictions have in-home environmental assessment programs underway, the Asthma CIT members felt this was a logical place to house such efforts. However, the capacity of public health departments to provide these services is limited, and health plans can certainly play a role in this regard, both in offering services directly to members, or contributing to health department efforts. There was discussion of developing a source of pooled funding from purchasers and plans to further support such programs.

¹⁶¹ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>, p 174

¹⁶² Ibid

¹⁶³ New England Asthma Regional Council (ARC) Improving Asthma Management by Addressing Environmental Triggers: Challenges and Opportunities for Delivery and Financing Symposium Edition December 6, 2004 www.asthmaregionalcouncil.org/documents/PayerIntExecSummfinal.doc

¹⁶⁴ Asthma Regional Council Taking on Asthma. Approaches to Asthma Management. 2005 <http://www.takingonasthma.org/Coverage2005asthmaarticle.pdf>

¹⁶⁵ Breathing. Health plan programs that take a more aggressive approach to asthma management show promise. <http://www.takingonasthma.org/pdf/Cov507Breathing.pdf>

There is precedent elsewhere in the country for health plans, as part of their comprehensive disease management strategies, to engage in home environmental assessments and mitigation, usually for higher risk asthma patients who are deemed under poor control by predetermined criteria, such as number of emergency room visits, hospitalizations or rescue medication use.

Examples of Best Practices:

Taking on Asthma: <http://www.takingonasthma.org/bestpractices.htm>

- Neighborhood Health Plan of Rhode Island (NHPRI) (focus on environmental trigger reduction): <http://www.takingonasthma.org/pdf/Cov507Breathing.pdf>
- Michigan: <http://www.takingonasthma.org/pdf/PriorityHealth.pdf> (part of a comprehensive plan)
- Maine: <http://www.takingonasthma.org/pdf/MaineHealth.pdf> (reduction of wood burning stoves)

Resources for Plans:

The Environmental Protection Agency (EPA): The EPA offers information for plans wanting to implement asthma home visit programs. The EPA cites examples of cost-savings realized by health plans who implemented home visit programs. For example, “one Mid-Atlantic health plan saw dramatic cost savings and improved health outcomes within 6 months of enrolling people with asthma in its home visit program. The plan saved \$74.83 per member per month (PMPM) after instituting a home visit program. Participating enrollees had significantly fewer hospitalizations, fewer emergency department visits, and fewer urgent physician visits. Preventive medication use increased, while the use of “rescue” medications decreased, an indication that the enrollees were managing their disease better.”¹⁶⁶

- EPA: Implementing an Asthma Home Visit Program: Ten Steps to Help Health Plans Get Started.
http://www.epa.gov/asthma/pdfs/implementing_an_asthma_home_visit_program.pdf
- EPA In-Home Assessment Checklist. The Checklist provides step-by-step instructions on conducting in-home environmental assessments and mitigating asthma triggers commonly found in homes.
http://www.epa.gov/asthma/pdfs/home_environment_checklist.pdf

¹⁶⁶ EPA: Implementing an Asthma Home Visit Program: Ten Steps to Help Health Plans Get Started
http://www.epa.gov/asthma/pdfs/implementing_an_asthma_home_visit_program.pdf

d. Purchasers

Asthma CIT Recommendations:

- Understand the potential return on investment (ROI) for comprehensive asthma programs that include in-home education, environmental assessment, and mitigation of asthma triggers. Request that contracted health plans offer such programs as part of asthma disease management, and/or contribute funding to programs run through local public health jurisdictions.
- If offering Health Care Flexible Spending Accounts (HC-FSAs) or Health Savings Accounts (HSAs), inform employees that these accounts can be used for expenses related to asthma trigger mitigation equipment.
- Offer reimbursement or vouchers for needed equipment such as pillow and mattress covers, or HEPA filters for employees with asthma.

i. Business Case for Home-based Environmental Interventions

The results of two recent studies indicate that the costs for high-intensity interventions for asthma that include home environmental assessments and interventions are cost-effective, and may be cost-savings if higher cost items are avoided.

The Inner City Asthma Study¹⁶⁷ delivered a high intensity home-based environmental intervention program targeting high-risk asthmatic children. With an overall cost of \$1,469 per patient, the intervention resulted in 37.8 more symptom-free days over a two-year period among those receiving the intervention compared with those in the control group—a cost of **\$28 for each symptom-free day gained**.¹⁶⁸

Healthy Homes I¹⁶⁹ was a high intensity home-based environmental intervention program targeting medium- to high-risk children with asthma. The program cost \$1,124 per patient and resulted in fewer urgent care visits due to asthma, fewer symptom days, and improved quality of life for caregivers. The program's cost effectiveness was calculated at **\$23 for each symptom-free day gained**. The cost for each symptom-free day gained by children who received just one home visit (compared to the 5-9 visits for the high-intervention group) was just \$2 (the cost of the single visit was \$215). The results suggest health outcome improvements result from relatively small interventions.¹⁷⁰

¹⁶⁷ Kattan M, Stearns S, Crain E et al. Cost effectiveness of a home-based environmental intervention for inner-city children with asthma, *Journal of Allergy and Clinical Immunology*. 2005; 116(5):1058-1063

¹⁶⁸ Summarized in Asthma Regional Council (ARC) Investing in Best Practices. A Business Case for Education and Environmental Interventions.

<http://www.asthmaregionalcouncil.org/about/documents/InvestinginBestPracticesforAsthmaJune2007.pdf>

¹⁶⁹ Krieger J, Takaro T, Song L et al. The Seattle-King County healthy homes project: A randomized, controlled trial of a community health worker intervention to decrease exposure to indoor asthma triggers, *Amer Journal of Public Health*. 2005; 95(4):642- 659

<http://www.asthmaregionalcouncil.org/about/documents/KriegeretalHealthyHomes2005AJPH.pdf>

¹⁷⁰ Summarized in Asthma Regional Council (ARC) Investing in Best Practices. A Business Case for Education and Environmental Interventions.

<http://www.asthmaregionalcouncil.org/about/documents/InvestinginBestPracticesforAsthmaJune2007.pdf>

In the Asthma Regional Council's (ARC's) report *Investing in Best Practices for Asthma: A Business Case for Education and Environmental Interventions*¹⁷¹ the authors conclude that “in-home environmental interventions – which cost \$2-\$28 per symptom-free day gained – are clearly within the range of what payer organizations have determined is “reasonable” to improve asthma outcomes, and may produce net cost savings if more costly treatment options are avoided.”

The cost of in-home environmental interventions also compares well with other standard treatments for asthma. A one-year supply of an inhaled corticosteroid medication, such as Flovent, costs approximately \$1,500,¹⁷² while the cost of an in-home environmental assessment is in the range of \$500 to \$1,200, depending on the training and salary level of the assessor, and the degree of remediation required.¹⁷³ This view is shared by the authors of the ARC report, who similarly suggest that “when assessing whether the cost of in-home environmental interventions for asthma are “reasonable,” it is useful to examine the cost-effectiveness of interventions that are considered the current standard of care. Two recent studies estimate that each symptom-free day gained as a result of standard pharmacotherapy interventions cost \$7.50 in adult patients with mild to moderate asthma (inhaled corticosteroids) and \$11.30 in patients 5-66 years old with mild persistent asthma (budesonide). Medications such as Xolair (omalizumab), which is prescribed to patients with moderate-severe, uncontrolled allergic asthma, cost \$523 per symptom-free day gained.”¹⁷⁴

As one member of the Asthma CIT described it, “we are willing to throw expensive medications at patients to treat their asthma, but are less willing to assist them with basic changes in their environment that could have an equal or greater impact.”¹⁷⁵ In addition, the studies cited above looked only at the offset of direct health care expenditures. The indirect costs of absenteeism and presenteeism when patients with asthma exacerbations miss work or the lost productivity of the parent who has spent the night in the emergency department with an asthmatic child were not taken into account. When these factors are included, the interventions are likely to be cost-saving in terms of direct and indirect costs.

The ARC White Paper report¹⁷⁶ cited above found that in New England, “most plans reported that providers and purchasers were not requesting that environmental supplies and referrals to in-home services be available to patients.” The Asthma CIT

¹⁷¹ Ibid

¹⁷² Based on the price estimates from Consumer Reports Best Buy Drugs, based on medium use (2 puffs twice a day), total annual cost of Flovent (fluticasone) HFA was approximately \$1,428 in 2006.

<http://crbestbuydrugs.org/PDFs/Asthma2-pager.pdf>

¹⁷³ Jim Krieger, MD, Chief of Epidemiology, Planning and Evaluation, Seattle King County Public Health, and member of Asthma CIT, personal communication, November 13, 2007.

¹⁷⁴ Asthma Regional Council (ARC) *Investing in Best Practices. A Business Case for Education and Environmental Interventions.*

<http://www.asthmaregionalcouncil.org/about/documents/InvestinginBestPracticesforAsthmaJune2007.pdf>

¹⁷⁵ Jim Stout, MD, Pediatrician, Odessa Brown Children's Clinic, personal communication, November 14, 2007.

¹⁷⁶ New England Asthma Regional Council (ARC) *Improving Asthma Management by Addressing Environmental Triggers: Challenges and Opportunities for Delivery and Financing* Symposium Edition, December 6, 2004 www.asthmaregionalcouncil.org/documents/PayerIntExecSummfinal.doc

recommends that purchasers, recognizing the cost-effectiveness of such programs, request that the health plans with which they contract offer them as covered benefits for members with asthma.

ii. Reimbursements for Equipment Required for Asthma Trigger Mitigation

Items such as pillow and mattress covers, air purifiers such as HEPA filters, and HEPA vacuums can reduce asthma symptoms in susceptible asthma patients, and yet cost is a barrier for some patients to acquire these items. The Asthma CIT recommends that purchasers cover, or contract with health plans to cover some or all of these items for targeted asthma patients. For example, a purchaser and health plan might work together to issue gift cards to employees for online purchase of asthma supplies from a designated asthma supply house as part of an overall case management strategy.

iii. Health Care Flexible Spending Accounts (HC-FSAs) and Health Savings Accounts (HSAs):

Pre-tax dollars from HC-FSAs and HSAs can be used for medical expenses that are deductible under the Federal Tax Code Section 213. These include capital expenses; a capital expense (permanent or portable) can be reimbursed if its purpose is to provide medical care for a patient, spouse or dependent. The following information from the Federal Flexible Savings Account policy should guide employers in informing their employees of their options in using HC-FSAs and HSAs dollars for equipment needed for asthma trigger mitigation.

The Federal Employee Flexible Spending Accounts allow items to mitigate allergen exposure, as "potentially eligible expenses" that require a letter of medical necessity from the health care provider in order to be considered eligible for reimbursement.¹⁷⁷ Eligible expenses include products and home improvements to treat severe allergies. Examples include:

- Electro-static air purifier
- HEPA furnace filters and HEPA vacuum cleaner filters (only the difference in cost of the HEPA product minus the standard product can be reimbursed)
- Humidifier
- Home/automobile air conditioners
- Special vacuum cleaners for persons with respiratory problems (only the difference in cost of the special vacuum cleaner minus a standard vacuum can be reimbursed)
- Special pillow cases, mattress covers, or other bedding barriers that provide protection against allergens to alleviate an allergic condition¹⁷⁸

¹⁷⁷ FSAFeds Eligible Expenses Juke Box.

<https://www.fsafeds.com/fsafeds/EligibleExpenses.asp?PrintSection=A#Allergy>

¹⁷⁸ Ibid

e. Policy Makers and Public Health

Asthma CIT Recommendations:

- Every county should have an American Lung Association of Washington Master Home Environmentalist (MHE) program funded through public-private partnerships.
- Local public health jurisdictions should house in-home environmental assessments and intervention programs.
- Results of in-home environmental assessments should be fed back to the primary care provider for coordination and continuity of care.

i. Master Home Environmentalist Program

The American Lung Association of Washington (ALAW) sponsors a program of free in-home assessments by trained Master Home Environmentalist (MHE) volunteers in the City of Seattle.¹⁷⁹ Eighty percent of the funding for the program is provided by the City of Seattle, and the remainder comes from a variety of sources, including Clear Corps,¹⁸⁰ grants, and the sale of the program to other organizations. The MHE program currently has forty volunteers, including bilingual volunteers speaking several local languages. The ALAW MHE program was awarded the Environmental Protection Agency's 2005 Children's Environmental Health Excellence Award.

The Asthma CIT recommends that funding be sought to expand this program into all counties in the Puget Sound region. Funding sources could include the state, municipal and county governments, federal grants, employers, and health plans in a public-private partnership of pooled resources.

ii. Local Public Health Jurisdictions

The Asthma CIT members suggest that the most appropriate organizations to house and coordinate in-home environmental assessments and interventions are local public health jurisdictions. The public health departments of Seattle-King County, Tacoma-Pierce County, and Thurston County are already engaged in such activities, funded through a variety of sources, such as state funding (Seattle King-County), federal STEPS funding (Thurston County), and in partnership with community organizations (e.g., American Lung Association of Washington and Tacoma-Pierce County). Many of these programs use the Home Environment Assessment List™ (HEAL™) checklist developed by ALAW.

If the ALAW MHE were to expand into all counties with increased funding, the local public health jurisdictions would be the most appropriate sites for coordination and administration of the programs, in partnership with ALAW.

¹⁷⁹ The American Lung Association of Washington Master Home Environmentalist Program. http://www.alaw.org/air_quality/master_home_environmentalist/home_health_assessment.html

¹⁸⁰ Clear Corps is an organization whose aim is to protect children from lead poisoning. <http://www.clearcorps.org/>
The ALAW MHE program examines homes for lead and other toxins in addition to allergens and inhaled irritants.

iii. Feedback to Provider

When education or intervention occurs outside the clinical setting, information is often not relayed back to the provider, resulting in fragmented care. The Asthma CIT recommends that results of in-home environmental assessments performed by volunteers, community health workers or nurses be sent to the primary care provider (PCP) in a feedback loop. An example is the Tacoma-Pierce County Partnership in Asthma Prevention Program¹⁸¹ that provides a letter to the PCP with results of the in-home assessment and any mediation that was performed. In addition to providing coordination of care, this also helps to reinforce to the patient that reduction of asthma triggers through environmental assessment and intervention is a key component of asthma management.

E. Medications

1. Overview

As we have discussed in previous sections of this report, prevention and management of asthma requires a multi-pronged approach that includes appropriate assessment and regular follow-up, patient education and self-management support, avoidance of environmental triggers, and management of co-morbid conditions. One of the key elements of asthma management is pharmacotherapy. Asthma medications are used to prevent and control asthma symptoms, reduce the frequency and severity of asthma attacks, reverse airflow obstruction, and improve overall quality of life. In recent years, new medications have been developed for the treatment of asthma, and older agents have fallen out of favor. The NAEPP EPR-3 guidelines¹⁸² review in detail the current evidence behind recommended medication management of asthma. In this section we summarize those recommendations and discuss the roles of interested stakeholders in improving the delivery of asthma pharmacotherapy.

Medications for Asthma

Medications for asthma are categorized into two general categories: rescue and controller medications. Some asthma patients have intermittent asthma symptoms, such as exercise-induced or upper respiratory infection (URI)-associated asthma, and do not require long-term controller therapy, but may use rescue medications for infrequent asthma attacks. However, the majority of asthma patients experience persistent asthma symptoms that may be interspersed with exacerbations. These patients require both controller medications and acute rescue medications.

¹⁸¹ Tacoma-Pierce County Partnership in Asthma Prevention Program <http://www.tpchd.org/page.php?id=14>

¹⁸² National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

Rescue Medications

Rescue medications are used for the quick relief of acute episodes of asthma and asthma exacerbations. Inhaled albuterol, a short-acting beta agonist (SABA) that helps to dilate bronchial passages, is the most commonly used rescue medication. Other examples include anticholinergic agents (ipratropium bromide) and systemic corticosteroids.

Controller Medications

Controller medications are used long-term to achieve control of persistent asthma. Controller medications include anti-inflammatory agents and long-acting bronchodilators.

Inhaled corticosteroids (ICS) are the mainstay of long-term asthma control. The NAEP Expert panel concludes that “ICSs are the most potent and effective anti-inflammatory medications currently available.”¹⁸³ They are the recommended first-line agents in the treatment of persistent asthma.

Some patients with severe persistent asthma will require systemic corticosteroids to control their asthma, but because the long-term use of systemic corticosteroids is associated with significant adverse effects, their use should be limited to those patients who cannot be controlled by other means.

NAEPP EPR-3 2007 Recommendations for Controller Medications:¹⁸⁴

- The Expert Panel recommends that long-term control medications be taken daily on a long-term basis to achieve and maintain control of persistent asthma. The most effective long-term-control medications are those that attenuate the underlying inflammations characteristics of asthma. (Evidence A)
- The Expert Panel concludes that ICSs are the most potent and consistently effective long-term control medication for asthma. (Evidence A)

Other anti-inflammatory agents used to treat persistent asthma include cromolyn sodium and nedocromil, which stabilize mast cells; the immunomodulator omalizumab, an anti-IgE monoclonal antibody; and leukotriene modifiers, montelukast and zafirlukast (leukotriene receptor antagonists, LTRAs) and zileuton (5-lipoxygenase inhibitor).

Long-acting beta agonists (LABA), such as salmeterol and formoterol, and the methylxanthines (slow-release theophylline) act to relax bronchial smooth muscle over time, and can be used as an adjunct to inhaled corticosteroids, but are not recommended as monotherapy for persistent asthma.

Step-Therapy

The NAEP EPR-3 20-07 guidelines identify stepped-care approaches to asthma medication management for differing age groups.¹⁸⁵ These step-wise approaches are reproduced in Appendix 1.

¹⁸³ Ibid, pp. 213, 216

¹⁸⁴ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

ICS Medications

There are six different ICSs currently available in the United States: beclomethasone dipropionate, budesonide, flunisolide, fluticasone propionate, mometasone furoate, and triamcinolone acetonide. Most studies show that equipotent doses of the various ICSs are similarly efficacious at controlling asthma symptoms and reducing the need for rescue medications,¹⁸⁶ although certain ICS formulations require a greater number or more frequent puffs to achieve the same dose as other formulations, which can have implications for compliance.

The data on adverse effects of ICSs, such as osteoporosis, growth retardation in children, acute adrenal crisis, cataracts, and glaucoma, is mixed, although most studies fail to show a strong association with any of these outcomes, and do not support the superiority of one ICS over another in terms of adverse effects.¹⁸⁷ One exception is that several head-to-head trials indicate a greater reduction in short term growth velocity in children with budesonide or beclomethasone compared to fluticasone or placebo, although the relationship to adult height is not established.¹⁸⁸

Current Rates of ICS Prescribing in Asthma Patients (Provider Factors)

Patients who are using rescue medications on a frequent or escalating basis likely have persistent asthma, and should be on long-term control medication, such as ICS. The National Committee on Quality Assurance (NCQA) 2007 State of Health Care Quality Report¹⁸⁹ provides data on asthma medication management in 2006 as measured by appropriate prescribing of long-term controller medications in patients with persistent asthma. Results show that 91.6% of commercial and 87.1% of Medicaid patients¹⁹⁰ ages 5-56 identified with persistent asthma¹⁹¹ were prescribed medications that were acceptable as primary therapy for persistent asthma (e.g., ICS or acceptable alternatives). It should be noted that the criteria for persistent asthma are fairly stringent (see footnote 188), and may miss a significant proportion of patients who do in fact have persistent asthma that affects their quality of life but who do not often seek treatment. Although trends are difficult to assess because NCQA changed the technical specifications for the measure in 2006, there has been steady improvement in appropriate prescribing for asthma patients since 1998, when commercial plans received a score of only 57.7% on this measure.

¹⁸⁵ Ibid, pp. 305-306, and p. 343

¹⁸⁶ Oregon Health Sciences University Drug Effectiveness Review Project. Drug Class Review on Inhaled Corticosteroids. 2006.

http://www.ohsu.edu/drugeffectiveness/reports/documents/_ICS%20Final%20Report%20Update%201.pdf A listing in ICSs with equipotent doses is included on page 6 of the report.

¹⁸⁷ Oregon Health Sciences University Drug Effectiveness Review Project. Drug Class Review on Inhaled Corticosteroids. 2006.

http://www.ohsu.edu/drugeffectiveness/reports/documents/_ICS%20Final%20Report%20Update%201.pdf

¹⁸⁸ Ibid

¹⁸⁹ NCQA The State of Healthcare Quality 2007: HEDIS Measures of Care. Available at:

<http://web.ncqa.org/tabid/543/Default.aspx>.

¹⁹⁰ This is up from 89.9% of commercial plans and 85.7% of Medicaid plans in 2005; NCQA 2006 State of Healthcare Quality. http://www.ncqa.org/communications/sohc2006/sohc_2006.pdf

¹⁹¹ This measure estimates the percentage of enrolled members 5 to 56 years with persistent asthma who were prescribed medications acceptable as primary therapy for long-term control of asthma. People with persistent asthma were redefined in the 2006 report as having had at least one ER visit or hospital discharge related to an asthma attack, four or more outpatient visits related to asthma, or four or more asthma medications dispensed during the prior two years. NCQA State of Healthcare Quality 2006. p. 51,

http://www.ncqa.org/communications/sohc2006/sohc_2006.pdf

Patient Adherence to Asthma Controller Medications (Patient Factors)

Studies have shown that patients who are more compliant with their asthma medications have better outcomes, such as reduced hospital emergency room visits.¹⁹² However, despite the improving performance on asthma medication prescription, patient adherence to treatment is not ideal. According to the American Academy of Allergy, Asthma and Immunology (AAAAI), patient adherence to asthma controller medications is less than 50%.¹⁹³

Patient adherence is affected by multiple factors, but studies have shown that patient or parental understanding of the nature of asthma and its treatment is a major factor underlying compliance with medication regimes. According to the AAAAI, “[a]sthma research findings indicate very clearly that patients do not have accurate knowledge regarding their disease. The Asthma in America study demonstrated that only 10 percent of patients said asthma was caused by inflammation. Furthermore, 63 percent of patients said they were taking medications to reduce inflammation when in fact the medicines were not for inflammation.”¹⁹⁴ In a study of asthma treatment in adolescents, it was found that “important barriers to appropriate AIM [anti-inflammatory medication] use were parents’ diminished expectations of treatment benefits and their fears about AIMs. Overall, 62% of parents worried about side effects, and 21% worried about addiction. Minority parents were significantly more likely than white parents to consider asthma to be unpredictable and uncontrollable and to have negative attitudes about AIMs.”¹⁹⁵ Clearly, patient and parental education, follow-up, and regular review of medications and compliance patterns are key to improving appropriate medication use in asthma. These factors have been addressed in this report as we focused upon assessment and monitoring in Section 1, and education in Section 2. This highlights the fact that all components of quality asthma care must be in place in order to achieve the desired outcomes. Appropriate medication prescription by providers is of little value without patient and parental education and regular follow-up.

Cost

In addition to the factors described above, patient adherence to long-term medications may also be compromised by barriers such as cost. Currently no asthma controller medications, including ICSs, are available as generics. With the pending ban on chlorofluorocarbon (CFC)-containing metered dose inhalers (due in December 2008), there will be a further delay in the entrance of generic ICSs into the market, as manufacturers obtain patent protection for new delivery devices, such as hydrofluoroalkane (HFA) inhalers, or dry powder delivery devices.¹⁹⁶ The ban applies to all inhalers, including albuterol.¹⁹⁷ The lack of generic availability of inhaled asthma medications provides a challenge to patients, providers, and health plans to achieve affordability for both long-term medications for asthma control and short-term rescue medications.

¹⁹² Stern et al. Medication compliance and disease exacerbation in patients with asthma: a retrospective study of managed care data *Ann Allergy Asthma Immunol* 2006;97:402. Abstract available at: <http://fiordiliji.annallergy.org/vl=1518723/cl=13/nw=1/nvportal=all/rpsv/~10259/v97n3/s23/p402>

¹⁹³ American Academy of Allergy, Asthma and Immunology Allied Health: Articles of Interest. Thomson et al. Motivating patients to change asthma medication adherence. Available at: http://www.aaaai.org/members/allied_health/articlesofinterest/motivating_patients.stm

¹⁹⁴ Ibid.

¹⁹⁵ Journal Watch commentary. Adherence to asthma medications predicted by parental education and fears. (September 22, 2007). Available at: <http://pediatrics.jwatch.org/cgi/content/full/2003/1014/4> and Yoos HL et al. Barriers to anti-inflammatory medication use in childhood asthma. *Ambul Pediatr* 2003 Jul/Aug;3:181-90.

¹⁹⁶ AAAI for Physicians http://www.aaaai.org/patients/inhalertransition/for_physicians.asp

¹⁹⁷ Hendeles et al. Withdrawal of CFC containing albuterol propellants. *NEJM* 2007. 356: 1344-51 Abstract available at: <https://content.nejm.org/cgi/content/extract/356/13/1344>

2. Change Strategies

Improvement at the Point of Care

a. Providers

Recommendations for Providers:

- Follow up-to-date evidence-based clinical guidelines, such as NAEPP EPR-3 2007 guidelines,¹⁹⁸ for appropriate medication management of patients with asthma.
- Apply the stepped care approach to medication management of asthma, as suggested in the NAEPP EPR-3 2007 guidelines.¹⁹⁹
- Engage in patient education and self-management support to foster long-term medication adherence.
- Respond to feedback on prescribing patterns provided by health plans and pharmacy benefit managers (see recommendations for Health Plans below).

i. Clinical Guidelines and Stepped Care Approach

Improving provider performance in asthma management, including appropriate medication prescription, requires provider knowledge of current guidelines. Providers should be encouraged to adhere to evidence-based guidelines when managing asthma patients. The Asthma CIT strongly encourages all providers to be familiar with and to use the NAEPP EPR 3 2007 Asthma Guideline recommendations for medications used in asthma care. Recommendations for provider education are provided in Section II: Education for a Partnership in Asthma Care.

In order to facilitate provider adherence to clinical guidelines and the stepped care approach, point-of-service prompts, such as those included in Electronic Health Record (EHR) functions or asthma management flow sheets, could be utilized.

ii. Patient Education

Because patient and parental understanding of the nature of asthma and asthma medication management is key to compliance, providers should engage in ongoing patient education and self-management support for any patients with asthma. Resources for providers to aid in establishing a collaborative relationship with patients and parents can be found at the California Healthcare Foundation,²⁰⁰ and are also discussed in more detail in Section II of this report on Education.

¹⁹⁸ National Heart, Lung, and Blood Institute National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report 2007. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

¹⁹⁹ Ibid, pp. 305-306, 343. See also Appendix 1 of this report

²⁰⁰ The California Healthcare Foundation: Bodenheimer et al. Helping Patients Manage Their Chronic Conditions. <http://www.chcf.org/topics/chronicdisease/index.cfm?itemID=111768>

b. Patients and Parents

Asthma CIT Recommendations for Patients and Parents:

- Be knowledgeable about asthma and its treatment, including the need for long-term control medications for persistent asthma.
- Engage in self-management of asthma.
- Adhere to medication regimens discussed with your healthcare provider and written in your asthma plan.

Patient education and self-management support are discussed in detail in Section II: Education for a Partnership in Asthma Care

Creating a Supportive Community Environment for Change

c. Health Plans

Asthma CIT Recommendations for Health Plans:

- Provide all medically necessary asthma medications in the first tier of a tiered co-payment system, with low or no co-payments required.
- Cover asthma inhaler accessories, including spacers and masks that may be required by patients such as children, the disabled or the elderly.
- Convene regional pharmacy benefit managers to develop common strategies and share best practices on formulary development and medication evaluation.
- Cover Medication Therapy Management (MTM) services by trained pharmacists to enhance patient understanding of and compliance with medications.
- Provide information to providers through pharmacy data on patient medication refill patterns, and notify providers and/or patients of the need for intervention when a patient has filled two or more prescriptions for short-acting rescue medications without filling a prescription for an ICS.
- Provide feedback to physicians on their prescribing practices for patients with asthma, including information on how well they adhere to recommended evidence-based clinical guidelines. Integrate this feedback into a multifaceted program to improve asthma care.

Health plans can play an important role in improving both patient and physician compliance with recommended guidelines for asthma medication management through feedback, auditing, incentives, education, removal of cost barriers, and coordinated disease management programs. Case and disease management and patient education activities were discussed in Section 1: Assessment and Control, and Section 2: Education for a Partnership in Asthma. Here we focus on health plans' roles in reducing the cost of needed medications, and in creating provider incentives for appropriate prescribing.

i. Tiered Formulary System - The Pitney Bowes Model

Patient adherence to prescribed inhaled corticosteroids may be improved by reducing the barrier of cost. Health plans can reduce patient out-of-pocket costs by structuring their formulary system to provide all medically necessary medications to patients at low cost. This may be done through a tiered co-payment system, in which medically necessary medications for asthma, including inhaled corticosteroids, long-acting beta agonists, and other needed controller and rescue medications, are placed in Tier 1, with low or no co-payment requirement.

This recommendation is based on the Pitney Bowes model. Pitney Bowes redesigned its tiered pharmacy benefit structure to remove possible financial impediments to medication availability for people with chronic conditions. In the new system, all medications for asthma, diabetes, and hypertension were moved to Tier 1, with a 10% coinsurance.²⁰¹ After adoption of this policy, annual overall healthcare costs for Pitney Bowes employees with asthma decreased by 15%, while pharmacy costs decreased by 19%. Emergency department visits for asthma went from 21% greater than industry benchmarks to 16% below the benchmarks.²⁰²

The Asthma CIT recommends that all ICSs and necessary rescue medications be placed in Tier I. In the Rx CIT Phase II, convened earlier in 2007, a strong recommendation was made to encourage the use of generic medication where available and appropriate.²⁰³ However, in the case of ICSs, there are no generic options available. As described above, all ICSs at equipotent doses have similar efficacy, although some ICSs require greater numbers of puffs per dose and per day than others to achieve equipotent amounts of medication. Since the number of puffs may affect compliance, it is preferable to provide several options for patients.

The Asthma CIT recognizes that value-based purchasing and competition for formulary position may reduce overall prices of prescription drugs. Therefore, if plans find it not economically feasible to include *all* ICS and rescue medications on Tier 1, the Asthma CIT strongly encourages, as a secondary recommendation, that *at least some* ICS medications be available at the lowest co-pay tier, despite the lack of generic medications available in this class.

For other controller medications, including long-acting beta agonists (LABA), step therapy according to the NAEPP guidelines should guide the tier structure, with step edits and prior authorization required for some medications. Some patients require both a LABA and ICS for control of their asthma. Combination LABA-ICS formulations exist, and the Asthma CIT recommends that these formulations be made available to patients when needed according to step therapy, since the combined formulation requires fewer puffs per day, and is likely to increase compliance.

²⁰¹ Goldman DP et al, Pharmacy Benefits and the Use of Drugs by the Chronically Ill, Journal of the American Medical Association, Vol. 291, No. 19, May 18, 2004, pp. 2344–2350. Cited in: Fact Sheet: How Cost-sharing affects use of drugs by the chronically ill. Available at: http://www.rand.org/pubs/research_briefs/RB9109/index1.html

²⁰² Reports: Benefit copays in the real world: The employer perspective. The American Journal of Managed Care. 2006. 12(13) Sup.: s353-s358.

²⁰³ Puget Sound Health Alliance Rx CIT Final Report. 2007. Available at: <http://www.pugetsoundhealthalliance.org/members/documents/RxCITPhaseIIFinalReport.pdf> (requires member log-in to access- for assistance please contact Sean McCliment at sean@pugetsoundhealthalliance.org)

Combination medications can improve compliance, and should be covered in a step therapy fashion as well. Patients who require two medications available as a combination should not be required to purchase each medication separately.

ii. Medication Therapy Management (MTM) Services by Pharmacists

Health plans should consider reimbursing pharmacists to engage in Medication Therapy Management services, or pharmacy consults, with patients. This recommendation is based on experience gained from the Asheville Project, in which employees of the City of Asheville, NC received medications for chronic conditions for free if they participated in a pharmacy care MTM program. The program, initially designed around diabetes, but expanded to include asthma and other conditions, provided education, counseling, and follow-up by pharmacists on appropriate medication use.²⁰⁴ An analysis performed by the Lewin Group confirmed that MTM services can reduce overall healthcare expenditures and improve outcomes.²⁰⁵ MTM services are discussed in more detail in the Rx CIT Final Report.²⁰⁶

iii. Information Exchange

Health plans and Pharmacy Benefit Managers (PBMs) can utilize pharmacy claims data to provide information to providers on the prescription medication patterns of their patients with asthma, such as when patients fill prescriptions for rescue medications without concomitant prescriptions for controller medications.

In addition, such information can also be fed to patients with instructions to follow-up with their healthcare provider.

iv. Provider Performance Audit and Feedback

Health plans, either independently or collectively through the Alliance, can play a role in helping to improve physician behavior in asthma management. According to the Cochrane Reviews, auditing of provider performance and providing feedback on adherence to recommended clinical guidelines in relation to their peers has had some limited success in improving provider performance.²⁰⁷ In the report, the Cochrane panel reviewed 118 studies examining the effect of provider audit and feedback and found mixed results. The authors report that “audit and feedback can be effective in improving professional practice. When it is effective, the effects are generally small

²⁰⁴ An Innovative Approach to Employee Diabetes Management: How the Asheville Model adds a valuable link to the diabetes care delivery chain. Sanofi-aventis monograph., provided courtesy David McCaughey, sanofi-aventis. Information available from www.sanofi-aventis.com, and Cranor, CW. The Asheville Project: Long-Term Clinical and Economic Outcomes of a Community Pharmacy Diabetes Care Program. J Am Pharm Assoc. 2003;43:173–84. Available at: <http://www.npharmacists.org/associations/4188/files/NCCPCfour.pdf>

²⁰⁵ The Lewin Group. 2005. Medication management Services. A Critical Review. <http://www.aphanet.org/AM/Template.cfm?Section=Home&CONTENTID=3317&TEMPLATE=/CM/ContentDisplay.cfm>

²⁰⁶ Puget Sound Health Alliance Rx CIT Final Report. 2007. Available at: <http://www.pugetsoundhealthalliance.org/members/documents/RxCITPhaseIIFinalReport.pdf> (requires member login to access- for assistance please contact Sean McCliment at sean@pugetsoundhealthalliance.org)

²⁰⁷ Cochrane Review: Audit and feedback: effects on professional practice and health care outcomes 2007. <http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD000259/frame.html>

to moderate. The relative effectiveness of audit and feedback is likely to be greater when baseline adherence to recommended practice is low and when feedback is delivered more intensively.”²⁰⁸

The Asthma CIT recommended that physician audit and feedback be integrated into more comprehensive programs to improve provider behavior, such as the learning collaboratives discussed in Section 2 on Education and under General Recommendations.

- An example of provider audit and feedback that was integrated into a comprehensive program to improve asthma care comes from Community Health Plans of Washington (CHPW). CHPW provided feedback to physicians about the care they provided to plan members with asthma. It also gave doctors clinical information on their asthma patients, and used the plan’s e-prescribing system to produce reminders to physicians to use appropriate evidence-based guidelines to support clinical decisions at the point of care. In addition, the plan provided educational materials and offered educational classes for physicians and staff. This multifaceted effort was combined with outreach to patients in the form of disease management programs, educational mailings, and support groups.²⁰⁹ The results of this effort have seen a 35% reduction in emergency room utilization, a 45 % reduction in hospitalization rates, and a 53% increase in HEDIS asthma scores.²¹⁰

The Asthma CIT also discussed Pay-for-Performance and Pay-for-Program models. See General Recommendations for further discussion of these topics.

d. Purchasers

Asthma CIT Recommendation:

- Contract with health plans or pharmacy benefit managers (PBMs) that provide necessary asthma medications in Tier 1 of prescription drug formularies.

²⁰⁸ Ibid

²⁰⁹ Kantor. Breathing: Health plan programs that take a more aggressive approach to asthma care show promise. AHIP Coverage. May-June 2007.

²¹⁰ Dent, Community Health Plans of Washington. Safety Net Health Plans. PowerPoint August 29, 2006. www.communityplans.net/conf/chi_dent2006.ppt

Appendix 1: Members of the Asthma CIT

Name	Organization	Title
Corrine Bell	PacifiCare	Medical Director, Medical Management
Cindy Hamilton	Premera	Manager, Disease Management
Pamela Hayes	Washington State DOH	Asthma Program Manager
Kay Humm	Member, American College of Clinical Pharmacy	Pharmacist
Michael Kennedy	NW Asthma & Allergy	Physician
Gail Kieckhefer	University of Washington	School of Nursing
Kathy Kiwala	American Lung Association*	Asthma Manager
Jim Krieger	Seattle/King County Public Health	Chief of Epidemiology, Planning & Evaluation
Rick MacCornack	NW Physicians Network	Director, Quality Improvement
David McCaughey	sanofi-aventis	Regional Account Manager - WA/AK
Cherie Mensching	Washington Acupuncture & Oriental Medicine Association	Licensed Acupuncturist
Drew Oliveira	Aetna	Family Physician and Medical Director
Beth Shepard	WaMu	Health Promotions Specialist
Jim Stout	Odessa Brown	Physician

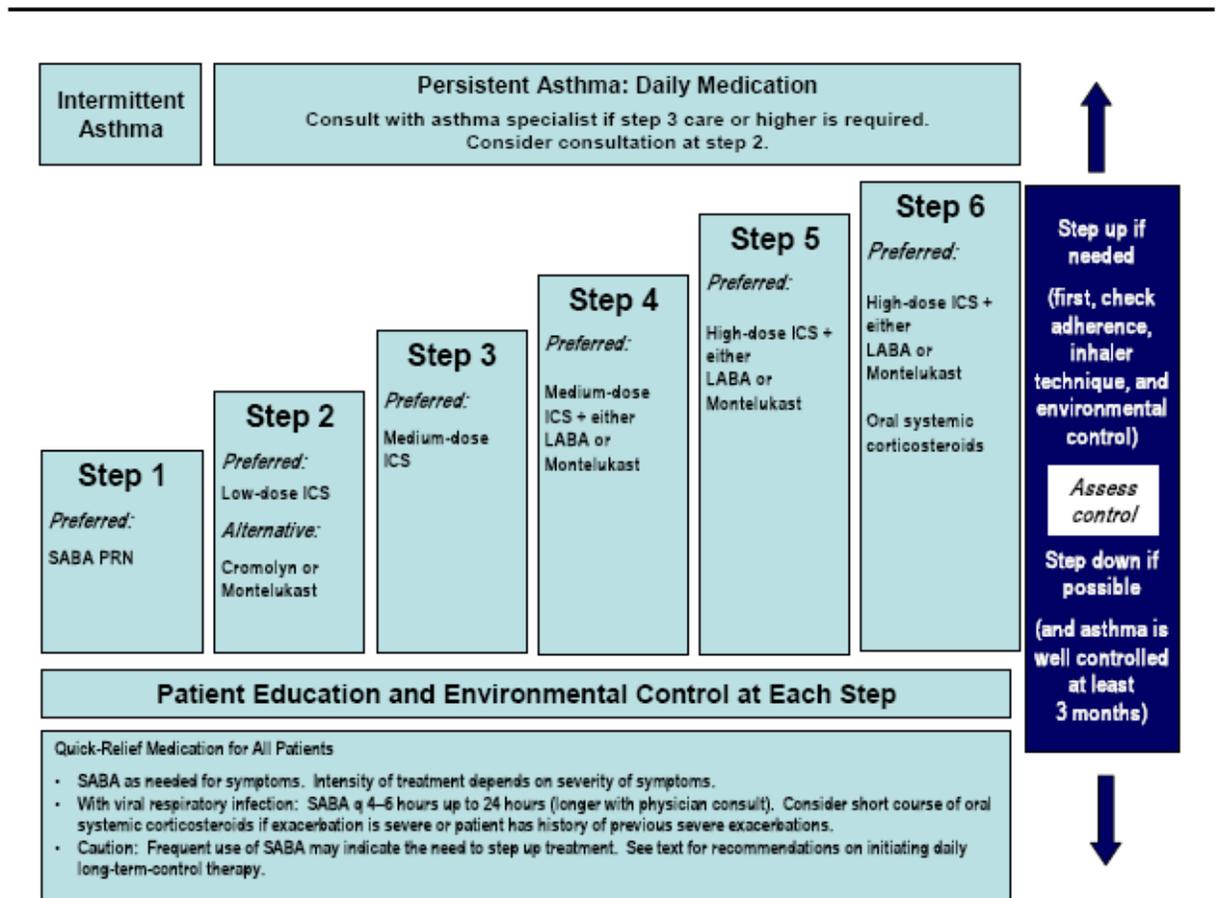
*Aileen Gagney, Asthma and Environmental Health Program Manager, American Lung Association-WA, replaced Kathy Kiwala for the final meeting

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Appendix 2: Step-Wise Approach for Managing Asthma

FIGURE 4–1a. STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 0–4 YEARS OF AGE



Key: Alphabetical order is used when more than one treatment option is listed within either preferred or alternative therapy. ICS, inhaled corticosteroid; LABA, inhaled long-acting beta₂-agonist; SABA, inhaled short-acting beta₂-agonist

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- If alternative treatment is used and response is inadequate, discontinue it and use the preferred treatment before stepping up.
- If clear benefit is not observed within 4–6 weeks and patient/family medication technique and adherence are satisfactory, consider adjusting therapy or alternative diagnosis.
- Studies on children 0–4 years of age are limited. Step 2 preferred therapy is based on Evidence A. All other recommendations are based on expert opinion and extrapolation from studies in older children.

FIGURE 4-1b. STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 5-11 YEARS OF AGE

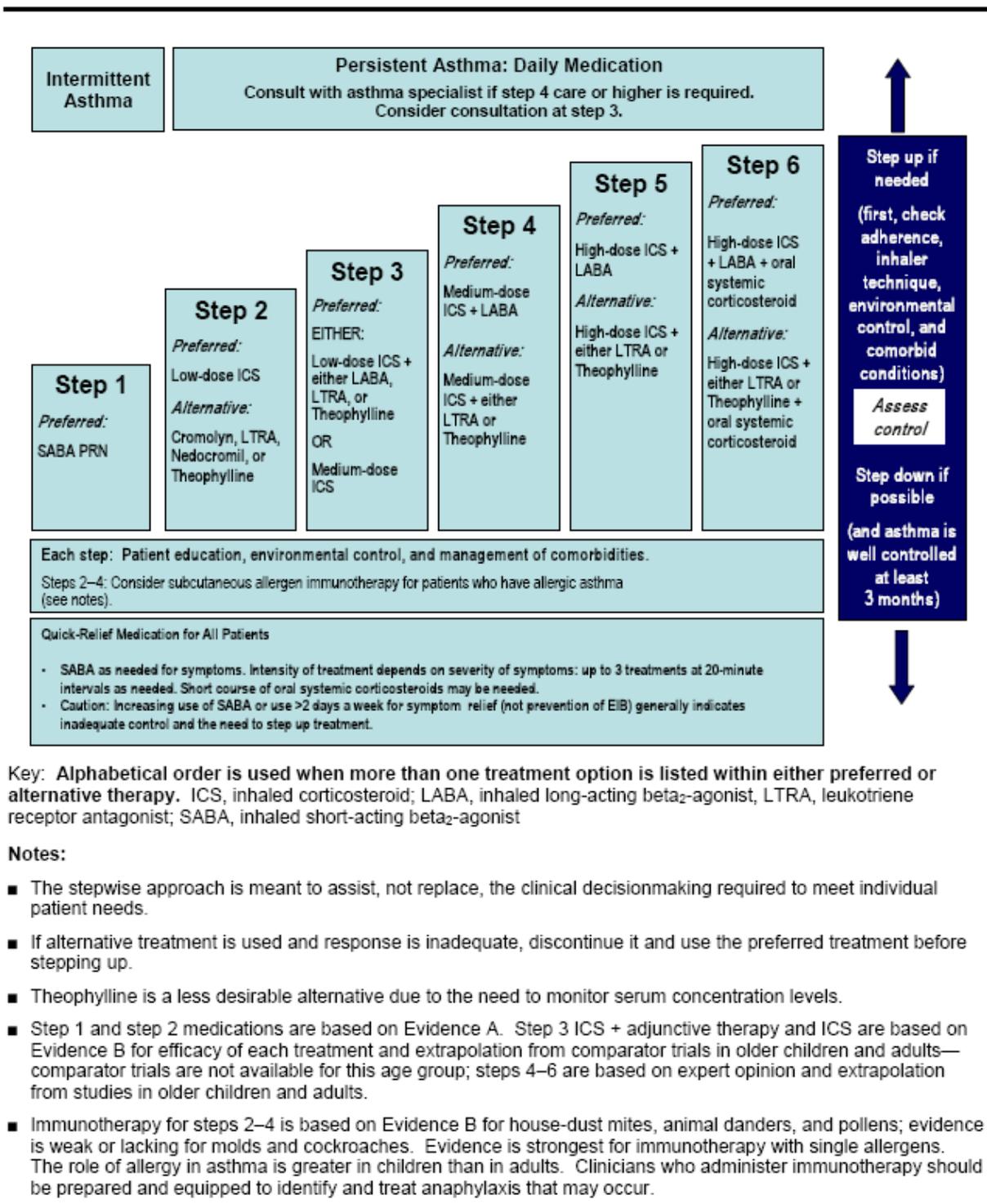
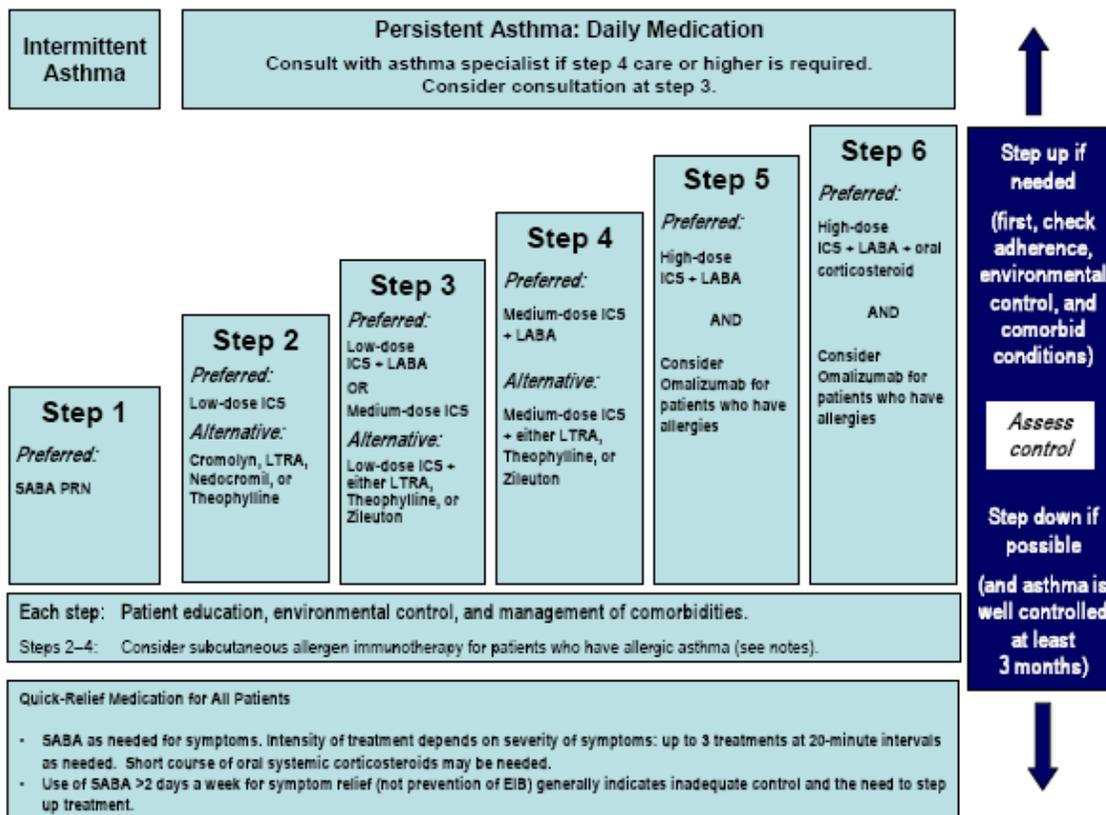


FIGURE 4–5. STEPWISE APPROACH FOR MANAGING ASTHMA IN YOUTHS ≥12 YEARS OF AGE AND ADULTS



— **Key:** Alphabetical order is used when more than one treatment option is listed within either preferred or alternative therapy. EIB, exercise-induced bronchospasm; ICS, inhaled corticosteroid; LABA, long-acting inhaled beta₂-agonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting beta₂-agonist

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- If alternative treatment is used and response is inadequate, discontinue it and use the preferred treatment before stepping up.
- Zileuton is a less desirable alternative due to limited studies as adjunctive therapy and the need to monitor liver function. Theophylline requires monitoring of serum concentration levels.
- In step 6, before oral systemic corticosteroids are introduced, a trial of high-dose ICS + LABA + either LTRA, theophylline, or zileuton may be considered, although this approach has not been studied in clinical trials.
- Step 1, 2, and 3 preferred therapies are based on Evidence A; step 3 alternative therapy is based on Evidence A for LTRA, Evidence B for theophylline, and Evidence D for zileuton. Step 4 preferred therapy is based on Evidence B, and alternative therapy is based on Evidence B for LTRA and theophylline and Evidence D for zileuton. Step 5 preferred therapy is based on Evidence B. Step 6 preferred therapy is based on (EPR—2 1997) and Evidence B for omalizumab.
- Immunotherapy for steps 2–4 is based on Evidence B for house-dust mites, animal danders, and pollens; evidence is weak or lacking for molds and cockroaches. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than in adults.
- Clinicians who administer immunotherapy or omalizumab should be prepared and equipped to identify and treat anaphylaxis that may occur.

From: NAEPP EPR-3 2007 <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>

Reproduction of pages 305, 306, 343

Appendix 3: Asthma Care Plan for Clinical Asthma Visits

DAILY ASTHMA/ALLERGY CARE PLAN

Medications	Name	Dosage	Schedule
**Rescue Medications			
Bronchodilators	Albuterol/Ventolin/Proventil Maxair Atrovent/Combivent Other _____	____ puffs or ____ cc nebulizer	As needed up to 4 times/day (every 4 to 6 hours) or 15 minutes before exercise
Oral Steroids	Prednisone Prelone/Pediapred		
Maintenance/Controller Asthma Medications			
Inhaled Non-steroids	Intal Tilade	____ puffs or ____ cc nebulizer	____ times daily
Inhaled Corticosteroids	Beclovent/Vanceril/DS Azmacort Flovent 44 / 110 / 220 Pulmicort	____ puffs	____ times daily
Combination Maint. Med.	Advair 100 / 250 / 500	____ puffs	____ times daily
Maintenance Bronchodilators	Serevent	____ puffs	____ times daily
Leukotriene modifiers	Accolate Singulair Zyflo	____ mg	____ times daily
Antibiotics			
Antihistamine			
Decongestant			
Nasal Corticosteroid		____ sprays per nostril	____ times daily
Other			

Peak Flow Monitoring	ZONE	Range	ACTION
Personal Best= _____	Green		Continue daily medications
	Yellow		Use Albuterol every 4 to 6 hours scheduled. Double up on inhaled steroid. Call if Peak Flow not improving after 24-48 hours. Other _____
	Red		Use Albuterol. Call!!! If Peak Flow is in Red Zone, repeat Albuterol in 20 minutes. If still in Red Zone, go to the Emergency Room. If Peak Flow is in Yellow Zone, follow that Action Plan.

