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May 1, 2019

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Physician-Focused Payment Model Technical Advisory Committee
c/o Assistant Secretary of Planning and Evaluation
U.S. Department of Health and Human Services
200 Independence Ave. S.W.
Washington, D.C. 20201
PTAC@hhs.gov

Re: The Patient-Centered Asthma Care Payment (PCACP)

Dear Committee Members:

On behalf of our 6,000 members, the American College of Allergy, Asthma and Immunology is pleased to submit the Patient-Centered Asthma Care Payment (PCACP) for the committee's review.

We believe the PCACP meets proposal criteria in that it encourages value-based care, provides new innovative care options for asthma patients, and appropriately balances practice financial incentives and risk. Structured as a bundled payment model, we believe this APM will optimize asthma health outcomes, improve beneficiary experience, and reduce utilization of unnecessary services while decreasing Medicare spending, thereby optimizing both the value and quality of care for asthma patients.

Thank you for your consideration. We look forward to your comments.

Sincerely,

Todd A. Mahr, MD, FAAAAI
President, American College of Allergy, Asthma & Immunology

Stephen Imbeau, MD, FAAAAI
Chair, Advocacy Council of the American College of Allergy, Asthma & Immunology

PATIENT-CENTERED ASTHMA CARE PAYMENT

AN ALTERNATIVE PAYMENT MODEL FOR PATIENT-CENTERED ASTHMA CARE

Submitted by:

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I. Abstract

Asthma is a chronic condition common among Medicare beneficiaries.¹ The current model of reimbursement for asthma care delivery does not take into account the additional time or resources physicians must use to properly diagnose and manage their asthma patients. This failure of the current fee-for-service payment model limits opportunities to accurately diagnose and treat and manage complex asthma cases. As a result, patients with asthma and asthma-like symptoms may be misdiagnosed or incorrectly treated, and may experience continued symptoms or side effects of medication that could have been avoided. These inadequately managed asthma patients may also be hospitalized or seen in an emergency department for asthma exacerbations that could have been prevented.

The Patient-Centered Asthma Care Payment (PCACP) model is an Alternative Payment Model designed to give physicians specializing in asthma care and primary care providers (PCPs) the resources and flexibility they need to more accurately diagnose, treat and manage patients with asthma and asthma-like symptoms.

The PCACP model would replace current evaluation and management (E/M) payments with a flexible payment² designed to enable physicians to deliver a range of services to patients without the restrictions of the current fee-for-service system. In addition, practices willing to do so could accept larger bundled versions of payments, which would include funds to pay for some or all the other services that asthma patients receive. The payment model involves shared risk and is designed to encourage collaboration between the asthma specialist and the patient's primary care provider; more appropriately compensate physicians for the care they provide to asthma patients; and hold these physicians accountable for improper diagnosis or management of asthma patients. The shared risk/bundled payment model would enable asthma specialists and PCPs to collaboratively treat patients with asthma and asthma-like symptoms and co-manage their asthma problems.

¹ Wolff JL, Starfield B, Anderson G. Prevalence, Expenditures, and Complications of Multiple Chronic Conditions in the Elderly. *Arch Intern Med.* 2002;162(20):2269–2276. doi:10.1001/archinte.162.20.2269

² Payment varies based on patient category. Physicians would receive monthly payments for Categories 1 and 2, and add-on payments (in addition to E/M) for Category 3.

II. Model Description

1. Background

Asthma afflicts 26.5 million people in the United States³ including about 3.5 million Medicare beneficiaries. More than 3,500 people die of the disease each year.⁴ Recent statistics show that almost half of people with asthma have at least one asthma attack each year.⁵ The cost and prevalence of asthma have steadily increased over time and is currently over 8.3 percent of the United States population.³ The total annual cost of asthma to society is approximately \$56 billion, with productivity losses due to morbidity and mortality accounting for \$5.9 billion.⁶ Although there are no precise data, we estimate that the total costs to Medicare annually for ED visits is about \$454 million and just under \$1.1 billion for hospital admissions. (See Scope of Model, below)

When correctly diagnosed and managed, asthma does not have to be a life-threatening and costly disease. In fact, much of the expense of asthma is attributed to costs that can be avoided or reduced when the disease is properly controlled. We believe there is a significant savings opportunity for Medicare in this proposal primarily in ED and hospital admissions that are avoided through better outpatient management of the disease.

Today, physicians treating patients with asthma and asthma-like symptoms are paid based on the number of times the patient comes to the physician's office or the number of tests the patient receives. There is no payment at all for many high-value services, such as phone calls to respond to patient problems and coordination calls with other physicians, and Evaluation and Management (E&M) payments do not support the additional time and services needed by patients with difficult-to-diagnose or difficult-to-treat asthma or asthma-like symptoms.

As a result, patients may be inaccurately diagnosed or incorrectly treated, they may experience continued asthma-like symptoms or side effects of medication that could have been avoided, and they may be hospitalized or be seen in an emergency department for asthma exacerbations that could have been prevented.

2. Model Overview

The Patient-Centered Asthma Care Payment (PCACP) model is a bundled payment Alternative Payment Model (APM) that would give physicians specializing in asthma care and primary care providers (PCPs) the resources and flexibility they need to deliver accurate diagnoses and more

³ 2016 National Health Interview Survey (NHIS) data
(https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm)

⁴ 2016 National Health Interview Survey (NHIS) data
(https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm)

⁵ 2016 National Health Interview Survey (NHIS) data
(https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm)

⁶ Barnett SB, Nurmagambetov TA. Costs of asthma in the United States: 2002-2007. *J Allergy Clin Immunol.* 2011;127(1): 145-152. <https://www.ncbi.nlm.nih.gov/pubmed/21211649>

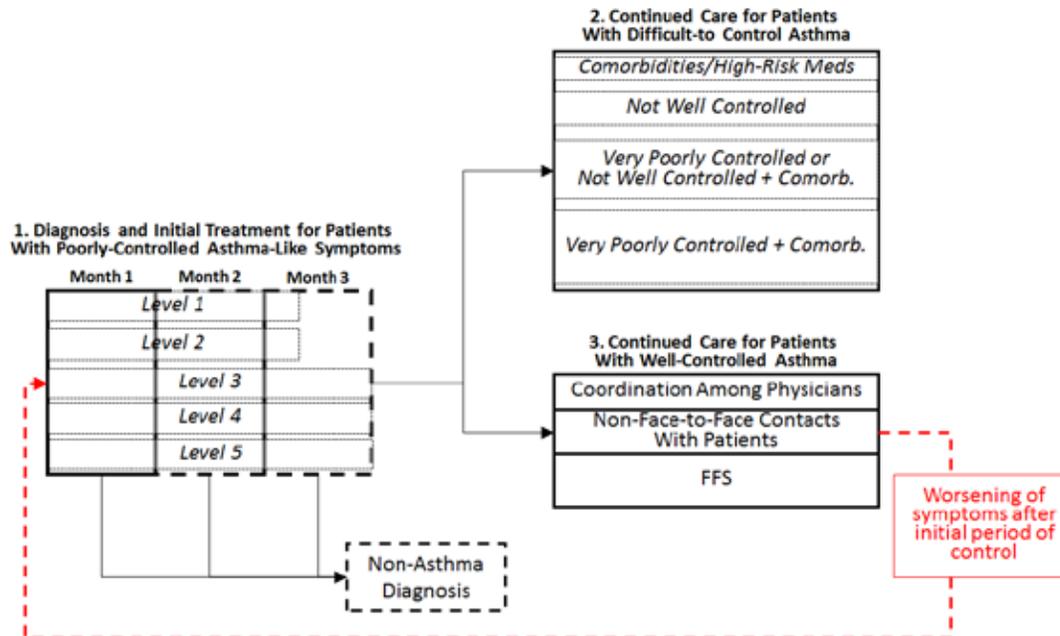
appropriately manage patients with asthma and asthma-like symptoms. It is the only APM we are aware of that focuses on care integration provided by allergists and pulmonologists and supporting full co-management of patients by PCPs.

Unlike the existing fee-for-service payment model, it provides payments, incentives and accountability for participating physicians to make efficient use of resources and the flexibility to design a treatment plan that meets the unique needs of the individual patient. Broad implementation of the model would provide significant cost savings for Medicare, other payers, and society. Paying physicians in a way that allows them to spend more time with complex patients results in more accurate and timely diagnosis, proper use of medications and other treatments, and reduced unnecessary urgent care visits, ED visits and hospitalizations.

Asthma patients require varying levels of care depending on their stage of treatment (e.g. diagnosis vs. treatment), the frequency and severity of the symptoms, and the ability of available therapies to control their symptoms. In order to provide the type of care that patients with asthma and asthma-like symptoms need, the PCACP bundled payments model would apply to three categories of patients:

- 1. Diagnosis and Initial Treatment for Patients with Poorly Controlled Asthma-Like Symptoms.** This would be a monthly payment designed to support evaluation, testing, diagnosis, treatment planning, and initial treatment for up to 3 months for a new patient who is experiencing asthma-like symptoms and who has not received effective treatment for those symptoms. It would also support re-evaluation and revision of treatment for an established patient with asthma who had previously well-controlled symptoms but experiences a significant increase in the frequency or severity of asthma symptoms.
- 2. Continued Care for Patients with Difficult-to-Control Asthma.** This would be a monthly payment designed to support ongoing care for patients for whom asthma has not been successfully controlled after an initial period of treatment, or whose treatment regimens require close monitoring and management.
- 3. Continued Care for Patients with Well-Controlled Asthma.** For patients who have achieved control of their asthma following an initial period of treatment, physicians would be able to bill and be paid for non-face-to-face visits in addition to traditional E&M services in order to support continued successful care of the patients' asthma.

In the first two categories of patients and care, PCACP would replace current E&M payments with a fixed payment amount. A diagram of the model is included below.



PCACP is designed to support co-management of asthma patients by both PCPs and asthma specialists, who would work together as part of an asthma care team to treat and manage patients with asthma. This is a new, innovative care option for asthma patients, which should result in improved care coordination, patient safety and cost savings.

The model includes shared risk by physicians and holds them accountable for meeting quality and cost measures. Asthma care teams participating in PCACP would be incentivized to meet patient quality measures while controlling asthma-related ED visits, hospitalizations, and medication costs. Participating physicians would receive payments that allow flexibility to provide additional types of services to asthma patients, including:

- Phone/email communications between asthma specialists and PCPs to facilitate accurate diagnosis and effective treatment of asthma and to avoid unnecessary office visits.⁷
- Spending time with patients on education, reviewing medication side effects, and identifying and addressing barriers to medication adherence.
- Staff and provider telephone or telemedicine contacts with patients to encourage and assist with medication adherence, respond to patient problems, etc.
- Evaluation and modification of the patients' living environment to reduce exposure to asthma triggers.
- Outreach and remote monitoring to ensure the asthma care plan is working.

We believe implementation of PCACP would result in a significant reduction in Medicare ED visits and hospital admissions for participating beneficiaries due to improved patient care.

⁷ New Medicare policy effective January 1, 2019 provides for payment for interprofessional consultations; however, use of these codes requires patient consent and payment of a copayment which creates obstacles to their use.

Category 1: Diagnosis and Initial Treatment for Patients with Poorly Controlled Asthma-Like Symptoms.

Patients with asthma-like symptoms or poorly controlled asthma would see an asthma specialist or PCP for evaluation, testing, diagnosis and initial treatment. During this phase, the Asthma Care Team would:

- Determine whether the patient's symptoms are due to asthma or another healthcare problem (e.g., vocal cord dysfunction), including using spirometry, fractional exhaled nitric oxide (FeNO) and other testing as appropriate.
- Engage in a shared decision-making process with patients regarding treatment options for their asthma, or, if appropriate, refer the patient to an appropriate physician for treatment of a non-asthma diagnosis.
- Develop an asthma treatment plan for the patient.
- Provide patient education regarding the treatment plan.
- Supervise the implementation of the treatment plan, provide follow-up care and make revisions as necessary.

It may take up to three months for a physician to complete this phase for a patient, depending on the frequency and severity of symptoms, varying co-morbidities, variability in testing requirements and the success of medication and other treatment options. For patients who symptoms are not caused by asthma, it may be possible for a physician to make a diagnosis quickly, or it may take several days, weeks or months to do so.

Category 2: Continued Care for Patients with Difficult-to-Control Asthma

Patients who have not been able to successfully control their asthma after this initial period of treatment, or whose treatment regimens require close monitoring and management, will need ongoing specialized care. During this phase, the Asthma Care team would:

- Supervise the patient's treatment.
- Evaluate changes in the patient's asthma frequency or severity.
- Evaluate changes in any medication side effects.
- Adjust medications to reduce cost and/or improve efficacy.
- Provide prompt response to asthma exacerbations.
- Provide revisions to the patient's treatment plan and Asthma Action Plan as necessary.

Category 3: Continued Care for Patients with Well-Controlled Asthma.

Once a patient's asthma is being effectively managed, it is important to maintain their health. This part of the PCACP would support the Asthma Care Team making calls to patients or emailing to respond to questions or concerns. It would also support communications between the PCP and the allergists or pulmonologist about how to effectively respond to treatment issues.

Because patients with different characteristics will need different amounts of services, the payment amounts in the first two categories would be stratified based on specific patient characteristics such as their diagnosis, the frequency and severity of their symptoms, and other comorbidities.

The basic Patient-Centered Asthma Care Payment system is designed to be easily implementable by both physician practices and payers. The physician practice would bill one of a new series of service codes instead of or in addition to billing traditional E&M codes, depending on model phase, each of which will be assigned a distinct mutually determined value. In return for these new and supplemental payments, the physicians would take accountability for controlling the cost and quality of the asthma care their patients receive.

III. Response to Criteria

1. Scope of Model

- Asthma affects about 26.5 million Americans, including over 6 million children and over 3.5 million individuals ages 65 and over. The overall prevalence in the population is 8.3% and growing.⁸
- It is estimated that total costs of asthma in the U. S. population are \$56 billion per year including societal costs.⁹
- In 2018 there were approximately 59.7 million Medicare beneficiaries enrolled in Medicare.¹⁰ Approximately 7.4 percent of adults ages 65 and over have asthma.¹¹
- In 2015 there were approximately 1.74 million emergency department visits where asthma was the primary diagnosis.¹² Data shows that about 17.7 percent of all ED visits (307,980) were from Medicare patients.¹² The mean Medicare payment for asthma-related ED visits was \$2,211¹³ and for the one third of Medicare patients who are admitted following an ED visit, the median Medicare reimbursement was \$10,567.¹⁴
- This amounts to an estimated annual cost to Medicare for ED visits for asthma of approximately \$454 million and a likely \$1.08 billion for the one third that are admitted.
- Asthma is one of the most difficult diseases to manage and mismanagement comes at a high price in terms of both patient suffering and health care costs. It has been estimated

⁸ https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm

⁹ https://www.cdc.gov/asthma/impacts_nation/asthmafactsheet.pdf

¹⁰ CMS Research, Statistics, Data and Systems. <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMS-Fast-Facts/index.html>

¹¹ https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm

¹² https://www.cdc.gov/nchs/data/nhamcs/web_tables/2015_ed_web_tables.pdf; tables 6 and 12

¹³ Emergency Department Charges for Asthma-Related Outpatient Visits by Insurance Status - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4063557/>; note, the article refers to “charges” rather than “payments” but the source is the [Medical Expenditure Panel Survey](#), which specifically refers to “expenditures”

¹⁴ Extrapolated from 2015 Medicare 5 percent data set. These numbers do not include asthma patients with COPD.

that 80 percent of all resources expended for asthma treatment are spent on 20 percent of patients whose disease is not controlled.¹⁵

- When aggressively managed by a specialist working in coordination with the patient's primary care physician (PCP), asthma can be controlled so that acute asthma attacks are avoided in most patients. PCACP would give allergists and PCPs working together the resources and flexibility to improve patient care and reduce asthma exacerbations.
- There are currently no APMs for allergists/immunologists or pulmonologists, and there are no APMs specifically designed to support co-management of patients by PCPs and specialists. There are also no APMs that address caring for patients with asthma.

A. Provider Participation: There are approximately 4,600 practicing allergists in the United States and approximately 5,400 pulmonologists.¹⁶ Most physicians in these specialties care for patients with asthma and could potentially participate in the PCACP. In addition, primary care physicians or other primary care providers (e.g., Nurse Practitioners, Physician Assistants) with a formal arrangement with an asthma specialist to serve as a consultant under the PCACP would also be eligible to receive PCACP payments.

Many allergists are in solo practice or groups of 2-4 physicians. The PCACP could be implemented by small practices as well as by allergists and PCPs employed in large health care systems. Specialists and primary care providers would be able to use the enhanced payment to establish asthma care teams that could include certified asthma educators, social workers and care coordinators.

B. Patient Participation: The PCACP could potentially cover any Medicare patient or commercially insured patient (if the plan agrees to participate) who agrees to the PCACP conditions and who does not fall into any of the exclusion categories. In 2014, there were approximately 238,920 Medicare patients newly diagnosed with asthma who did not have COPD as a comorbidity.¹⁷ Physicians caring for newly diagnosed patients would likely qualify for the Category 1 payment for up to 3 months and then be eligible for Category 2 or 3 depending on the patient's condition.

Given the prevalence of asthma in the population generally, and especially in children, there is an opportunity for this model to succeed with commercially insured populations as well as Medicaid and TriCare.

The evidence supports a significant reduction in cost and in the number of ED visits and hospital admissions when patients have their asthma care properly managed by a specialist.¹⁸

¹⁵ Smith DH, Malone DC, Lawson KA, et al. A national estimate of the economic costs of asthma. *Am J Respir Crit Care Med.* 1997;156:878-793.

¹⁶ <https://www.aamc.org/data/workforce/reports/458712/1-3-chart.html>

¹⁷ Extrapolated from Medicare 5 percent Limited Data Set. Patients with COPD are not eligible for participation in the PCACP.

¹⁸ [Asthma Management and the Allergist: Better Outcomes at Lower Cost](#), pages 11-12. ACAAI 2015.

Patients under the care of an allergist consistently experience better outcomes at lower cost because of:

- Fewer emergency care visits.
- Fewer hospitalizations.
- Reduced lengths of hospital stays.
- Fewer sick care visits.
- Fewer days missed from work or school.
- Increased productivity in work and personal lives.
- Greater satisfaction with their care.
- An improved quality of life.

Patients would be protected against any incentives to limit, overutilize or deny necessary care because physicians participating in the PCACP would be required to meet minimum quality standards and would also have their performance assessed on cost, performance and outcome measures. Physicians that performed well on these measures would receive increased payment and those that performed poorly would have payment reduced.

2. Quality and Cost

- Studies have demonstrated decreases in hospital admissions of between 60% and 89% when patients were referred to an asthma care specialist and similar reductions in ED visits.¹⁸ When PCACP is fully implemented, we conservatively estimate it will reduce asthma-related ED visits and inpatient admissions for all Medicare patients by at least 50%. This would be a potential annual savings to Medicare of approximately \$227 million in ED visits and \$540 million in hospitalization costs (not including associated physician costs).¹⁹
- The total annual estimated savings to Medicare of \$767 million would more than offset increased costs associated with medication and outpatient care.

The PCACP plans to reduce the high cost of asthma care through a bundled payment model that is designed to improve care and reduce costs. The model would create three types of bundled payments depending on the patient's status: (1) diagnosis and initial treatment for patients with poorly controlled asthma or asthma-like symptoms; (2) continued care for patients with difficult to control asthma; and (3) continued care for patients with well-controlled asthma. The asthma care team, which would include the asthma specialist, the patient's primary care physician (PCP) and other professionals such as nurses and asthma educators, would work together to treat and manage patients with asthma. The bundled payment is designed to give the asthma care team the time, resources and flexibility necessary to accurately diagnose the cause of a patient's asthma-

¹⁹ Based on estimated Medicare costs due to asthma calculated at top of section 1: Scope of Model.

like symptoms and provide an appropriate and cost-effective asthma treatment plan. This would improve care by:

- Ensuring use of appropriate medications to adequately control asthma.
- Avoiding unnecessary use of medications.
- Educating and encouraging patients to use prescribed medications properly.
- Identifying triggers for asthma and educate/encourage/assist patients to avoid the triggers.
- Responding rapidly to patients experiencing asthma exacerbations.
- Avoiding ED visits and hospitalizations due to asthma or asthma-like exacerbations.
- Avoiding complications due to asthma medication side effects.

The current payment system does not allow asthma specialists and primary care physicians to provide the full range of services the patient needs because those services are not compensated under the current fee-for-service payment model. Some of the services that would now be reimbursed under this model include:

- Phone/email communications between asthma specialists and PCPs to facilitate accurate diagnosis and effective treatment of asthma and to avoid unnecessary office visits.²⁰
- E/M services needed to accurately diagnose causes of asthma-like symptoms and refractor asthma and to plan treatment for complex cases.
- Extra time spent with patients on education, reviewing medication side effects, and identifying and addressing barriers to medication adherence.
- Telephone or telemedicine contacts with patients to encourage and assist with medication adherence, respond to patient problems, etc.
- Phone response/triage when patients call with problems.
- Holding open times on the practice schedule in order to treat serious exacerbations in the office rather than in an emergency department.
- Evaluation and modification of the patients' living environment to reduce exposure to asthma triggers (e.g., removal of carpets, use of air conditioners, tobacco use).
- Outreach and monitoring necessary to ensure the asthma care plan is working.
- Remote monitoring technology for improved adherence and early recognition of exacerbations.
- Increased use of certified asthma educators.

²⁰ New Medicare policy effective January 1, 2019 provides for payment for interprofessional consultations; however, use of these codes requires patient consent and payment of a copayment which creates obstacles to their use.

The PCACP is designed to ensure patients have access to this enhanced care. As discussed above, asthma is a difficult disease to manage. The PCACP bundled payment gives physicians the flexibility and resources to provide the treatment and services needed to improve the quality of care for asthma patients.

PCACP has not yet been tested with pilot practices, so there is no hard data on cost savings generated by the model.

3. Payment Methodology

Overview

This is a bundled payment model that groups patients into three categories for payment purposes:

1. Diagnosis and Initial Treatment for Patients with Poorly Controlled Asthma and Asthma-Like Symptoms.
2. Continued Care for Patients with Difficult to Control Asthma.
3. Care for Patients with Well-Controlled Asthma.

The first two categories have specific patient eligibility criteria and the bundled payment is stratified into four levels based on severity of symptoms and comorbidities. The physician must meet certain quality standards as a threshold for payment and can also receive a bonus based on meeting quality and cost measures. The third category would include payment for both the asthma specialist and the PCP.

For patients in the first two categories of the model, physicians would have an incentive to contain their costs to below the bundled payment they would receive. This would encourage timely and accurate diagnosis and appropriate medication use. Adjustments to payments based on performance would also create incentives to provide high quality, efficient care.

3.1 - Category 1: Bundled Payment for Diagnosis and Initial Treatment for Patients with Poorly Controlled Asthma and Asthma-Like Symptoms

3.1.1 Provider Eligibility

Two types of physicians would be eligible to receive this payment:

- An allergist, pulmonologist, or other physician specializing in the treatment of asthma.
- A primary care physician or other primary care provider (NP, PA) if they have a formal arrangement with a specialist in asthma to serve as a consultant under PCACP.

3.1.2 Patient Eligibility

A physician or team of physicians could receive this payment for a new patient who:

- Has been experiencing asthma-like symptoms and has not been diagnosed or treated by a provider for those symptoms within the past year.
- Or has received treatment from a different physician practice that has not been successful in controlling the severity or frequency of asthma-like symptoms.
- Or has received treatment for asthma from a different physician practice that has been successful in controlling asthma symptoms, but the patient is using medications to control their symptoms that are not consistent with current treatment guidelines.

In addition, a physician or team of physicians would be eligible to receive this payment for an existing patient with diagnosed asthma who had been well controlled in the past but has recently experienced severe or frequent asthma exacerbations and if it has been more than a year since the last time the physicians received the Diagnosis and Initial Treatment Payment.

In order for the physician(s) to receive this payment for an eligible patient, and in order for the patient to benefit from the enhanced services available through the payment, the patient would need to explicitly designate the physician or team of physicians receiving the payment as the patient’s “Asthma Care Team” and agree to receive all of their asthma-related services from the members of that team, or from other providers designated by that team, for a three-month period of time.

3.1.3 Structure of Payments and Services Covered

3.1.3.A. Payment for Physician Services

The Asthma Care Team would receive a bundled monthly Diagnosis and Initial Treatment Payment for up to three months to support most of the *asthma-related clinical services* that an eligible patient needs from the physician practice(s) on the Team to support the following activities:

- Determination of whether the patient’s symptoms are due to asthma or another healthcare problem (e.g., vocal cord dysfunction), including using spirometry and other testing as appropriate.
- Engaging in a shared decision-making process with patients regarding treatment options for their asthma, or referring the patient to an appropriate physician for treatment of a non-asthma diagnosis.
- Development of an asthma treatment plan for the patient in cooperation with any other physicians or providers who are caring for the patient’s other healthcare needs.
- Provision of patient education regarding the treatment plan.
- Supervision of the implementation of the treatment plan and making revisions as necessary.

The Diagnosis and Initial Treatment Payment would be “bundled” in the sense that it would replace current payments for (a) Evaluation & Management (E&M) services payments and (b) selected tests:

- The physician(s) would no longer bill the patient’s payer (or the patient) for office visits or other E&M services during the three-month period covered by the payment, but instead would bill for the Diagnosis and Initial Treatment payment. The Asthma Care Team would have the flexibility to use this payment in ways that are not currently permitted or adequately supported with Evaluation & Management services payments, e.g., the payments could support, without limitation, non-face-to-face communications between physicians and patients (such as phone calls and emails), services delivered to patients by nurses and other practice staff, longer visits for higher-need patients, open time on the practice schedule to treat patients experiencing exacerbations, etc.
- The physician(s) would not bill the patient’s payer (or the patient) separately for performing spirometry or exhaled nitric oxide testing during the months in which the Diagnosis and Initial Treatment payment was received.

If a patient with asthma visits the physician(s) for a health problem other than asthma, those visits would still be paid for separately under the regular physician fee schedule (or under an alternative payment model designed for those other health problems). Exercise challenge tests, chest x-rays, and other imaging studies would continue to be paid separately, but spending on these tests would be included in the accountability measures described in Section 3.1.4 below. Allergy testing would also be paid separately, but through a new bundled payment specifically for allergy testing described in Appendix A.

The Diagnosis and Initial Treatment Payment would be billed and paid monthly for up to three months as long as the physician was either (a) still in the process of determining whether the patient had asthma, or (b) treating the patient for diagnosed asthma. If a determination was made that the patient did not have asthma but had a different health problem, the patient would either be referred to a different physician for treatment of that health problem or the patient would be treated for that health problem by the same physician; once the patient is diagnosed with a condition other than asthma, payments for future services would be made through the standard fee for service system or through an Alternative Payment Model specific to their health problem.

3.1.3.B Payment for Other Asthma-Related Services

The payer would pay directly for all other asthma-related services – medications, emergency department visits, hospitalizations, etc. – that are received by the patient during the months in which the Diagnosis and Initial Treatment Payment was being paid, but the Asthma Care Team would be accountable for utilization and/or spending on those services as discussed in Section 3.1.4.

Asthma Care Teams and their patients would be exempt from any prior authorization requirements for ordering tests or medications. Payers should make patients of Asthma Care Teams eligible to receive all prescribed brand-name drugs at the lowest cost-sharing rate for brand-name drugs or at the cost-sharing rate for generic drugs if there is no generic equivalent available.

Asthma Care Teams would have the option of accepting a bundled payment that would cover the costs of some or all the other asthma-related services the patient receives in addition to the clinical services from the physicians, as described in more detail in Appendix B.

3.1.4 Accountability for Quality, Spending, and Outcomes

The Asthma Care Team would accept accountability for specific aspects of the quality of care delivered to the patient, the cost of the asthma-related services the patient receives, and the outcomes achieved for the patient.

3.1.4.A Minimum Quality Standards

The Asthma Care Team would be required to meet minimum quality standards (see Appendix C) in order to bill for the Diagnosis and Initial Treatment Payment for a patient. These standards would apply to the full 1-3 month period in which the Diagnosis and Initial Treatment Payment is billed; they would not need to be repeated or re-documented during each month.

3.1.4.B Accountability for Service Utilization and Spending

The Asthma Care Team's performance would be assessed on the following two measures of utilization/spending for patients during the months in which the Diagnosis and Initial Treatment Payments were paid:

1. Average number of months during which the Diagnosis and Initial Treatment Payments were billed before a diagnosis was assigned. Use of this measure would avoid any concerns that the Asthma Care Team was delaying determining that the patient did not have asthma in order to increase the number of months in which the practice could bill for the Diagnosis and Initial Treatment payment.
2. Standardized average total per-patient spending (during the months in which the Diagnosis and Initial Treatment Payments are being billed) on (a) allergy testing (i.e., the payments for allergy testing bundles billed by the practice and any spending on allergy tests billed by other physician practices or hospitals), (b) asthma-related medications, (c) urgent care visits for asthma-like symptoms, (d) emergency department visits for asthma-like symptoms or complications of asthma treatment, and (e) hospitalizations for conditions potentially related to asthma.²¹

Use of this price-standardized spending measure would avoid putting the physician at risk for changes in the prices charged by or amounts paid to pharmacies, hospitals, and urgent care centers, while still holding the physician accountable for avoiding overutilization of medications and services, particularly the most expensive medications and services.

²¹ Spending would be "standardized" by establishing a "standard" price for each type of medication, each urgent care visit, each emergency department visit, and each hospital admission, multiplying that price by the actual utilization of medications, urgent care and ED visits, and hospital admissions, and then summing the products. The standard price would be based on the average amount paid by the payer in the local market for the types of medications, ED visits, and hospitalizations that are received by patients with asthma and asthma-like symptoms. The measure would also be stratified into the five subcategories for which separate payments are defined.

3.1.4.C Accountability for Care Quality and Outcomes

The Asthma Care Team’s performance would be assessed on the following four quality and outcome measures during the 3-month diagnosis and initial treatment period, with each measure stratified into five severity categories for payment purposes (see Appendix D).

1. % of patients whose asthma-like symptoms have improved from moderate/severe to intermittent/mild persistent based on patient self-reports.
2. % of patients with improved spirometry measures.
3. % of patients with ED visits or urgent care visits for asthma-like symptoms.
4. % of patients rating access to physician as “very good” or “excellent” using an appropriately designed and administered patient survey.

Patients would be excluded from the numerators and denominators of the measures if:

- They failed to stop smoking.
- Or they failed to obtain the prescribed medications (either due to inability to afford the medications or other reasons).
- Or they failed to attend scheduled appointments despite three documented attempts by the practice to contact the patient by phone.

Patients also would be excluded from the numerators and denominators of the measures for *any month* in which they did not have medication insurance coverage with affordable cost-sharing for the prescribed medications and there was no more affordable medication that could be prescribed.

3.1.4.D Assessment of Performance

Performance on the quality/outcomes measures would be determined by comparing the Asthma Care Team’s performance during each year to the average performance of all Asthma Care Teams in the PCACP receiving the Diagnosis and Initial Treatment Payment during the *prior* year.

Performance on the utilization of testing and standardized spending measure would be determined by comparing the Team’s performance to the average performance of all Teams during the *current* year. As long as the Team’s performance on a measure was within reasonable statistical variation around the applicable average, the Team’s performance would be deemed “good performance.” If performance was significantly better than this range, it would be deemed “high performance” and if it was significantly worse, it would be deemed “low performance.”

During the initial years of implementation when there are not sufficient prior year data available on Asthma Care Teams’ performance under this payment for comparison purposes, performance would be determined based on comparisons to the average performance on the measures for all asthma patients for whom data are available in the prior year.

3.1.4.E Adjustment of Payment Based on Performance

The Asthma Care Team would receive the default payment level for the Diagnosis and Initial Treatment Payment for each eligible patient as long as the Team's performance during the most recent measurement period was "good" on all measures. The payment would be increased if all measures were "good" and some were "high," and the payment would be reduced if some measures were "low." The maximum increases and decreases would initially be $\pm 5\%$ and then would increase over time to $\pm 9\%$. (These percentages are based on the maximum adjustments required in the Medicare Merit-Based Incentive Payment System.)

3.1.5 Stratification of Payments and Performance Measures Based on Patient Characteristics

Individuals with asthma-like symptoms differ significantly in the frequency and severity of their symptoms, in the health problems causing their symptoms, and in their other health problems besides asthma. These factors can affect:

1. The amount of time and resources that the physician practice(s) receiving the payment would need to spend in determining a diagnosis, developing a treatment plan, and supervising the initial treatment of the patient.
2. The number, type, and cost of testing, drugs, and other services that the patient would need that are not delivered directly by the physician practice(s) receiving the payment.
3. The outcomes, such as reductions in the frequency and severity of asthma-like symptoms, medication side effects, etc. that would be achievable for the patients based on current treatments that are available.

For patients whose symptoms are not caused by asthma, it may be possible for a physician to make a diagnosis quickly, or it may take several days, weeks, or months to do so. During this time, patients with more serious or frequent symptoms will be at greater risk of emergency department visits and other problems. For some patients, it may not be possible to make a diagnosis until one or more medication regimens are tried. Patients with significant comorbidities will likely be at even greater risk of complications and the physician will also likely require additional time to make a diagnosis and establish an effective treatment plan for these patients.

To address the differences in the time and resources needed by physicians in determining a diagnosis and managing initial treatment and the differences in the risk of complications for patients, payment amounts and performance measures for the Diagnosis and Initial Treatment Payment would be stratified into five subcategories. Tables showing each category and significant comorbidities are in Appendix D.

At the end of each month in which a patient received diagnosis and initial treatment services, the physician would bill for the subcategory that best described the patient's symptoms and diagnoses at the end of the month. For example, if the physician could not determine that the patient did not have asthma until after conducting a series of tests that took six weeks to complete, then the physician would bill for a payment in subcategory 3, 4, or 5 at the end of the first month and a subcategory 1 or 2 payment at the end of the second month. Once the patient was determined not to have asthma, the physician would no longer bill for the Diagnosis and

Initial Treatment Payment. If a patient received a diagnosis other than asthma and was referred elsewhere for treatment, the physician would be able to bill for a subcategory 1 or 2 payment even if the patient only received services for a brief period of time.

3.2 – Category 2: Continued Care for Patients with Difficult-to-Control Asthma

Physicians eligible to receive payment are the same as described above with respect to the Diagnosis and Initial Treatment category.

3.2.1 Eligible Patients

A physician or team of physicians could receive this payment for a patient who has received a diagnosis of asthma and meets any one of the following criteria:

- Does not have well-controlled asthma symptoms after:
 - Ø Completing an adequate trial of at least two steps in the NHLBI stepwise approach to using medication for treatment of asthma²², starting with the recommended step.
 - Ø Or completing an adequate trial of Step 5 or Step 6 in the NHLBI approach, if that is the recommended initial step.
- Uses any combination of the following treatments to achieve good control of asthma symptoms:
 - Ø High-dose inhaled corticosteroids
 - Ø A medium-dose inhaled corticosteroid and long-acting beta-agonist
 - Ø Oral steroids
 - Ø Biologic medications
 - Ø Immunotherapy
- Has experienced severe asthma symptoms and/or hospitalization for asthma-related problems after being well-controlled for at least 3 months.
- Has well-controlled asthma but has significant comorbidities.

In order for the physician(s) to receive this payment for an eligible patient, and in order for the patient to benefit from the enhanced services available through the payment, the patient would need to explicitly designate the physician or team of physicians receiving the payment as the patient’s “Asthma Care Team” and agree to receive all of their asthma-related services from the members of that team, or from other providers designated by that team, during the month covered by the payment. Since the payments would be made monthly, a patient would only be limited to using a particular set of providers for one month at a time. (This is similar to the way the Medicare Chronic Care Management payment is structured.)

²² <https://www.nhlbi.nih.gov/files/docs/guidelines/asthsumm.pdf>

3.2.2 Structure of Payments and Services Covered

3.2.2.A. Payment for Physician Services

The Asthma Care Team would receive a bundled Continued Care for Patients with Difficult-to-Control Asthma Payment each month to support all the *asthma-related clinical services* that an eligible asthma patient needs from the physician practice(s) on the Team during the month to support the following activities:

- Supervision of the patient's treatment.
- Evaluation of changes in the patient's asthma frequency or severity.
- Evaluation of changes in any medication side effects.
- Adjustment of medications to reduce cost and/or improve efficacy.
- Prompt response to asthma exacerbations.
- Revisions to the patient's treatment plan and Asthma Action Plan as necessary.

The Continued Care for Patients with Difficult-to-Control Asthma Payment would be "bundled" in the sense that it would replace current payments for (a) Evaluation & Management (E&M) services payments and (b) selected tests for these patients:

- The physician(s) would no longer bill the patient's payer (or the patient) for office visits or other E&M services during a month for which the Continued Care Payment was billed. The Asthma Care Team would have the flexibility to use this payment in ways that are not currently permitted or adequately supported with Evaluation & Management services payments, e.g., the payments could support non-face-to-face communications between physicians and patients (such as phone calls, telemedicine, and emails), services delivered to patients by nurses and other practice staff, longer visits for higher-need patients, open time on the practice schedule to treat patients experiencing exacerbations, etc.
- The physician(s) would not bill the patient's payer (or the patient) separately for the following tests when they are performed during a month in which he or she billed for a Continued Care Payment:
 - Ø Spirometry.
 - Ø Exhaled nitric oxide tests.
 - Ø Additional allergy tests beyond what were performed during the Diagnosis and Initial Treatment phase.

The payment would only replace E&M payments for those office visits related to asthma care. If a patient with asthma visits the physician(s) for a health problem other than asthma, those visits would still be paid for separately under the regular physician fee schedule (or under an alternative payment model designed for those other health problems). Pulmonary function tests, exercise challenge tests, chest x-rays, and other imaging studies would continue to be paid separately, but spending on these tests would be included in the accountability measures described in Section 3.2.3.

3.2.2.B Payment for Other Asthma-Related Services

Payment for other asthma-related services would follow the same rules as described above with respect to the Diagnosis and Initial Treatment category.

Asthma Care Teams would also have the option of accepting a bundled payment that would cover the costs of some or all the other asthma-related services the patient receives in addition to the clinical services from the physicians, as described in more detail in Appendix B.

3.2.3 Accountability for Quality, Spending, and Outcomes

The Asthma Care Team would accept accountability for specific aspects of the quality of care delivered to the patient, the cost of the asthma-related services the patient receives, and the outcomes achieved for the patient.

The Asthma Care Team would be required to meet specific minimum quality standards in order to bill for the Continued Care for Difficult to Control Asthma for a particular patient (see Appendix C).

3.2.3.A Accountability for Service Utilization and Spending

The Asthma Care Team's performance would be assessed on the same standardized average total per-patient spending measure as applies to the Diagnosis and Initial Treatment category, stratified into the four subcategories described in Appendix D.

3.2.3.B Accountability for Care Quality and Outcomes

The Asthma Care Team's performance would be assessed on the following quality and outcome measures during the months they are eligible for these payments, with each measure stratified into the four severity categories for which separate payments are defined (see Appendix D).

- % of patients moving from "very poorly controlled" to "not well controlled" or "well controlled," or moving from "not well controlled" to "well controlled."
- % of patients moving from "not well controlled" to "very poorly controlled," or moving from "well controlled" to "not well-controlled" or "very poorly controlled."
- % of patients rating access to the physician as "very good" or "excellent" using an appropriately designed and administered patient survey.

Exclusion criteria are the same as for Diagnosis and Initial Treatment patients referenced above.

3.2.3.C Assessment of Performance

Assessment of performance on the utilization/spending measures would be determined using the same measures and same methodology as for the Diagnosis and Initial Treatment category described above except that performance would be measured based on patients in the same category (e.g., patients with difficult-to-control asthma would be compared with other patients with difficult-to-control asthma).

3.2.3.D Adjustment of Payment Based on Performance

The Asthma Care Team would receive the same payment adjustments as described above with respect to the Diagnosis and Initial Treatment category.

3.2.4 Stratification of Payments and Performance Measures Based on Patient Characteristics

Individuals with difficult to control asthma differ significantly in the frequency and severity of asthma exacerbations they experience, and they differ in terms of the other health problems they have besides asthma. These factors can affect three things:

- The amount of time and resources that the physician practice(s) receiving the payment would need to spend in supervising the treatment of the patient.
- The number, type, and cost of testing, drugs, and other services that the patient would need that are not delivered directly by the physician practice(s) receiving the payment.
- The outcomes, such as reductions in asthma frequency and severity, medication side effects, etc. that would be achievable for the patients based on current treatments that are available.

To address this, payment amounts and performance measures for the Continued Care for Difficult-to-Control Asthma Payment would be stratified into four categories (see Appendix D).

At the end of each month in which a patient received Continued Care for Difficult-to-Control Asthma, the physician would bill for the category that best described the patient's symptoms, comorbidities, and medications.

3.3 - Category 3: Care for Patients with Well-Controlled-Asthma

3.3.1 Eligible Providers

The following types of physicians would be eligible to receive this payment:

- Primary care physician, or other primary care provider (NP, PA).
- An allergist, pulmonologist, or other physician specializing in treatment of asthma.

3.3.2 Eligible Patients

A physician or team of physicians could receive Continued Care for Patients with Well-Controlled Asthma Payments for a patient who:

- Was eligible for and received services supported by the Diagnosis and Initial Treatment for Poorly Controlled Asthma-Like Symptoms Payment, received a diagnosis of asthma, and now has well-controlled asthma.
- Was eligible for and received the Continued Care for Patients with Difficult-to-Control Asthma Payment for one or more months but now has well-controlled asthma and no

longer meets the eligibility criteria for the Continued Care for Patients with Difficult-to-Control Asthma Payment.

As with the other payment categories, the patient would need to explicitly consent to receiving services from the Asthma Care Team under the same policies as described above with respect to the other two payment categories

3.3.3 Structure of Payments and Services Covered

The Asthma Care Team would be eligible to bill for the following services in addition to current Evaluation & Management Services payments:

Billing Code	Service Delivered
xxx31	A telephone or e-mail response to questions or concerns raised by patients about a change in the frequency or severity of their asthma, about side effects from their medication, about the appropriate use of their medications, or about other asthma-related issues;
xxx32	A telephone or e-mail communication between a primary care physician and an allergist or pulmonologist to determine the most appropriate response to issues regarding a patient's treatment

Other asthma-related services – tests, medications, hospitalizations, etc. – that are received by the patient would continue to be paid separately, but the Asthma Care Team would be accountable for utilization and/or spending on those services as discussed in Section 3.3.4.

Asthma Care Teams and their patients would be exempt from any prior authorization requirements for ordering tests or medications, and their patients would be eligible to receive all prescribed brand-name drugs at the lowest cost-sharing rate for brand-name drugs or at the cost-sharing rate for generic drugs if there is no generic equivalent available.

3.3.4 Accountability for Quality, Spending and Outcomes

The Asthma Care Team would accept accountability for specific aspects of the quality of care delivered to the patient, the cost of the asthma-related services the patient receives, and the outcomes achieved for the patient.

The Asthma Care Team's spending performance would be assessed on the same standardized average total per-patient spending measure as applies to the Diagnosis and Initial Treatment Category described above.

The Asthma Care Team's performance would be assessed on the following quality and outcome measures during the months they are eligible for these payments:

- % of patients moving from “well controlled” to “not well-controlled” or “very poorly controlled.”

- % of patients rating access to the physician as “very good” or “excellent” using an appropriately designed and administered patient survey.

Patients would be excluded from the numerators and denominators of the measures for any of the behaviors listed above with respect to Diagnosis and Initial Treatment.

Assessment of performance on the utilization/spending measures would be determined using the same measures and same methodology as for the Diagnosis and Initial Treatment category described above except that performance would be measured based on patients in the same category (e.g., patients with well-controlled asthma would be compared with other patients with well-controlled asthma).

The Asthma Care Team would receive the same payment adjustments as described above with respect to the Diagnosis and Initial Treatment category.

3.4 Setting and Adjusting Payment Amounts

A default payment amount would be established for each subcategory of patients. The payment amounts would be designed to achieve three goals:

- **Provide adequate resources to support the services patients need for high-quality care and good outcomes.** The amount of payment for each subcategory of patients should be adequate to support the time and costs that the physician practice(s) would need to spend for patients with the characteristics defined in the subcategory during the relevant phase of patient care.
- **Avoid losses of revenue to high-quality, efficient practices.** The aggregate amount of net revenue that a physician practice would receive under the new payment system from a participating payer should be no less than the aggregate amount of revenue that the practice would have received from that payer under the current payment system. There may be some shift in revenues from one subcategory to another if the current payment system provides higher payments relative to costs in one subcategory than another.
- **Budget neutrality/savings for payers.** The total spending by the payer on asthma care for the patients in all participating physician practices, considering both what is paid to the practices and what is paid for other costs of asthma care to the practices’ patients (e.g., testing, emergency room visits, hospitalizations, drugs, etc.) should be no greater than it would otherwise be if the current payment system had continued, and ideally would represent lower spending than would have otherwise been expected.

It is important to recognize that the payments received by a physician practice under the PCACP would differ from payments under the current payment system in two important ways:

1. The total net revenue the *physician practice* receives could be *greater* than under the current system, while *total spending on asthma care* by payers is *lower* than under the current system. This is because the net revenue to the practice represents only a small proportion of the total spending on asthma care for its patients, and so the savings from reductions in avoidable emergency room use and hospitalizations, reductions in unnecessary medications, etc. could more than offset higher payments to the physician practices.

2. The total payment that a physician practice receives for any *individual patient* would inherently differ from what the practice would have received under the current payment system, since the PCACP is designed to give practices more predictable and flexible payments for patients. The payment levels would be set such that the total amount of the payments averaged across all a practice's patients would be greater than or equal to the payments that would be received under the current fee-for-service system during the initial year of implementation. However, over time, practices would likely redesign care in more patient-centered ways without the fear that revenues would decline under the less flexible payment system used today.

3.5 Optional Larger Bundled Payments

In addition, physician practices and health systems that are willing and able to do so could accept larger “bundled” versions of the PCACP in one or both of the first two categories of payment. Instead of a monthly payment that is designed only to cover the clinical services directly delivered by the physician managing the patient's care, these optional bundled payments would include the funds to pay for some or all the other services that patients with asthma and asthma-like symptoms receive. These bundled payments would give the physician practice greater flexibility to redesign the way care is delivered, but they would also require the physician practice to take greater accountability for managing utilization and spending. An optional approach could include all or part of the patient's other asthma-related treatment costs in the payment bundle in addition to the physicians' services. These optional larger bundled payments are outlined in Appendix B.

4. Value over Volume

The current fee-for-service system does not link asthma-related payments to quality, but rather rewards volume of care regardless of outcomes or need. Conversely, the PCACP emphasizes value over volume in several ways. Model payments are bundled and are not based on the number of visits. Similarly, the model includes bundled payments for allergy testing, which encourages efficiency in the number and types of tests used while guarding against underuse by compensating physicians separately for these tests. Finally, the model provides optional larger bundled payments, which include all or part of the patient's other asthma-related treatment costs (such as medications, ED visits, etc.) in addition to physicians' services.

In exchange for these bundled payments, the Asthma Care Team accepts accountability for quality of care, cost of the asthma-related services the patient receives, and the patient outcomes. Payments are tied directly to quality standards; performance on service utilization and spending; and performance on care quality and outcomes.

5. Flexibility

Fee-for-service payments – which this model seeks to replace – inherently limit the flexibility of clinicians in the care options they pursue. The PCACP model would give practices flexibility in how to reinvest payments into the model. For example, they could put more resources into home

out-reach or into hiring asthma educators or providing a 24/7 hotline or implementing telemedicine visits. Approximately 50% of allergists practice in groups of 3 or less and this model is intended to work for them as well as larger groups. The ACAAI is committed to providing technical support to help practices implement the model during development.

6. Ability to Be Evaluated

- The model aims to reduce the number of and costs associated with unnecessary urgent care visits, ED visits and hospitalizations, in addition to costs for asthma-related medications and allergy testing.
- The model also aims to evaluate performance on care quality and outcomes, including improvement in asthma severity, improvement in spirometry measures, and patient access to physicians.
- Data from Medicare claims, practice EHRs and patient surveys would be used to evaluate cost, utilization and quality metrics.

The quality, cost and utilization data that will be used to assess performance measures are available through Medicare claims, practice EHRs and patient surveys. Cost and utilization data are available at both the population and provider levels. Quality and outcome data will be available at the practice level via the EHR.

7. Integration and Care Coordination

The monthly payment supports the creation of an Asthma Care Team, which encourages collaboration and care coordination between PCPs and specialists caring for asthma patients. In PCACP, every category of asthma patient will be supported by a team of specialists and PCPs that is co-managing the patient's care in a coordinated way. The balance and involvement of PCPs and specialists will depend on the category and characteristics of the patient and the level and types of care required. For example, asthma specialists may take a larger role in the diagnosis and treatment of individuals with poorly controlled asthma-like systems. However, the system is designed to send well-managed patients back to their PCP with continued involvement by the specialist.

8. Patient Choice

PCACP enhances patient choice by providing additional care options for patients. Asthma specialists could serve as a "specialty medical home" for patients with asthma, as well as work in concert with PCPs or other specialists to co-manage the patient's asthma in a more coordinated way. For example, the model enables the well-managed patient to get support from an allergist through his PCP rather than only by visiting the allergist.

Preserving choice is a key component of this model. Patients would have to opt-in to the model but would remain free to obtain care from any Medicare enrolled provider legally authorized to deliver that service.

9. Patient Safety

The PCACP would enhance patient safety by:

- Promoting early and accurate diagnosis of asthma and development of a care plan and appropriate medication.
- Identifying asthma exacerbations before they become severe thereby avoiding emergency department visits and hospitalizations.
- Educating patients about their disease and proper use of medications.
- Requiring quality standards be met in exchange for bundled payments. This protects the patient against undertreatment since specified services must be provided.

One of the major goals of the PCACP is to improve the way the PCPs and specialists can work together to provide better care. Where care of the patient is split between the asthma specialist and the primary care physician, the bundled payment and the payment for specialist/PCP phone or email conferencing should increase coordination of care among all providers and reduce risks to patients associated with fragmented care.

10. Health Information Technology

Clinical practices participating in PCACP are expected to have certified electronic health record technology (CEHRT) in order to more easily track quality outcomes and share data across participating providers.

Regular electronic communication between asthma specialists and PCPs will be required, and PCACP payments will support that communication. Participating practices using CEHRT must be capable of capturing and reporting the quality metrics listed in Section 3: Payment Methodology. For example, CEHRT would need to capture and report the level of control of asthma symptoms (very poorly controlled, not well controlled, well controlled, etc.) as measured by FEV₁ over time, as well as document the use and results of spirometry over time.

IV. Appendices

Appendix A: Bundled Payment for Allergy Testing

If the Asthma Care Team thought allergy testing (using either skin tests or blood tests) was necessary to develop an accurate diagnosis and appropriate treatment plan for a patient, the practice would bill for and receive a single payment to cover all the appropriate allergy tests for that patient, rather than billing individually for each test. The amount of the payment would be based on the average number of tests that are appropriately administered to patients with asthma-like symptoms to determine the presence and cause of allergies. A higher bundled payment amount would be paid for patients who have skin conditions or who are taking medications that preclude the use of skin allergy tests. An additional “outlier” payment could be billed for patients requiring an unusually large number of allergy tests if the physician provides documentation showing that the patient was sensitive to unusual allergens.

Bundling the payment for allergy testing would encourage efficiency in the number and types of tests used, but paying for the allergy testing separately from the monthly Diagnosis and Initial Treatment Payment would avoid creating an inappropriate financial incentive for the Asthma Care Team to underuse allergy testing. Overuse of allergy testing would be avoided through the overall spending measure described in Section 3.1.4.

Appendix B: Optional Larger Bundled Payments

The payments previously described in this model above would bundle asthma-related *physician services* into a single payment for a single month. An optional approach would be to include all or part of the patient's *other asthma-related treatment costs* in the payment bundle in addition to the physicians' services. This would provide additional flexibility and an alternative approach to accountability:

- The physician or team of physicians could use the resources available in the larger bundle to pay for services that would not be eligible for payment under the standard fee-for-service payment system.
- The physician(s) would be accountable for ensuring the average of amount of spending for their patients on the services covered by the bundled payments remained within the revenues from those payments.

Because many of the other services covered by the bundled payment would not be delivered directly by the physician practice, the most common way of implementing this type of a bundled payment would be using an administrative process called retrospective reconciliation. The patient's health plan would pay the other providers who deliver services in the bundle based on current fee-for-service rates, and the health plan would then tabulate the total amount paid on all services during the month and compare that total to the bundled payment amount.

If the total payments were less than the bundled payment amount, the balance would be paid to the physician(s) managing the bundled payment; if the total payments were larger than the bundled payment amount, the balance would be paid to the health plan by the physicians managing the bundled payment. To avoid the need for repayments, the health plan could "withhold" a portion of the physicians' payments, and then if the payments on all services exceed the bundled payment amount, the health plan would only repay a portion of the withhold to the physicians.

Option A: Inclusion of Medication Costs in the Bundled Payments

Under Option A, the bundled payment would be designed to cover the cost of medications used to treat asthma in addition to physician services. Outlier payments or adjustments to the payment amounts would be made when new drug options become available that have significantly higher efficacy but also significantly higher cost, or when drug manufacturers increase prices of drugs.

Option B: Inclusion of Emergency Department Visit Costs in the Bundled Payment

Under Option B, the bundled payment would be designed to cover the cost of urgent care and Emergency Department visits related to asthma. Outlier payments and risk corridors would be

established to protect physician practices from financial risk associated with price increases on hospital services or resulting from patients needing unusually expensive care.

Option C: Inclusion of All Asthma-Related Services in the Bundled Payment

Physician practices with the size and capabilities to do so could accept a bundled payment that would be designed to cover the average costs of all asthma-related services needed by patients during a month of care. Outlier payments and risk corridors would be established to protect physician practices from financial risk associated with price increases on drugs or hospital services or resulting from patients needing unusually expensive care.

Option D: Population-Based Payment for Asthma Care

A fourth option would be for a physician practice or group of physician practices to accept a condition-based payment to manage the asthma-related care of all individuals with diagnosed asthma in a broader pre-defined population, such as all the patients in an accountable care organization or a health plan's membership. The physician practice(s) would receive one monthly payment for all of the individuals with asthma in that population, regardless of which category/phase of care they were in, but the amount of the payment would be adjusted based on the proportion of patients in different phases of care (i.e., the relative costs of different phases of care would be used to risk-adjust the overall payment amount) and the characteristics of the patients. This monthly payment could be designed to cover all costs of asthma-related care for the patients (as Option C would do for a particular phase of care) or for a portion of those costs (as the basic payment model and Options A and B would do for each phase of care).

Appendix C: Minimum Quality Standards

Minimum Quality Standards – Diagnosis and Initial Treatment Payment

- Have at least one face-to-face visit with the patient to conduct a history and physical during the 1-3 month period in which the Diagnosis and Initial Treatment Payment is billed.
- Make at least one follow-up contact with the patient via phone, email, or office visit after testing was performed or medication was prescribed (or document in the patient's records that reasonable attempts were made to contact the patient).
- Document the presence of any significant comorbidities.
- Document the use of spirometry in patients 5 years of age and older.
- Perform appropriate allergy testing or document why it was not performed.
- Determine a diagnosis for the patient and document the basis for the diagnosis (or document why a diagnosis could not be determined).
- In partnership with the patient and family, develop a written asthma action plan that is consistent with guidelines developed by the American College of Allergy, Asthma²³, and Immunology and educate the patient and family on how to use it.

Minimum Quality Standards – Patients with Difficult to Control Asthma

- Have at least one face-to-face visit with the patient every six months.
- Make at least one follow-up contact with the patient via phone or email each month.
- Document the use of spirometry annually in patients 5 years of age and older.
- In partnership with the patient and family, maintain a written asthma action plan that is consistent with guidelines developed by the American College of Allergy, Asthma, and Immunology.²⁴

²³ https://www.nhlbi.nih.gov/files/docs/public/lung/asthma_actplan.pdf - see Appendix F.

²⁴ https://www.nhlbi.nih.gov/files/docs/public/lung/asthma_actplan.pdf - see Appendix F.

Appendix D: Payment and Performance Subcategories for Categories 1 and 2 of PCACP

1. Diagnosis and Initial Treatment of Poorly Controlled Asthma-Like Symptoms

Subcategory	Billing Code	Patient Characteristics
Level 1	xxx11	Intermittent or mild persistent asthma-like symptoms diagnosed as due to a condition other than asthma
Level 2	xxx12	Moderate or severe persistent asthma-like symptoms diagnosed as due to a condition other than asthma
Level 3	xxx13	Asthma with intermittent or mild persistent symptoms; OR Intermittent or mild persistent asthma-like symptoms, with testing/treatment underway to determine diagnosis
Level 4	xxx14	Asthma with moderate or severe persistent symptoms; OR Moderate or severe persistent asthma-like symptoms, with testing/treatment underway to determine diagnosis; OR Intermittent or mild persistent asthma-like symptoms and significant comorbidities (either diagnosed as asthma or with testing/treatment underway to determine diagnosis)
Level 5	xxx15	Asthma with moderate or severe persistent symptoms and significant comorbidities; OR Moderate or severe persistent asthma-like symptoms and significant comorbidities, with testing/treatment underway to determine diagnosis

2. Continued Care for Difficult-to-Control Asthma

Subcategory	Billing Code	Patient Characteristics
Level 1	xxx21	Well controlled asthma, but with comorbidities and/or medications requiring special management
Level 2	xxx22	Not well controlled asthma (symptoms > 2 days/week, etc.)

Level 3	xxx23	Very poorly controlled asthma (daily symptoms, etc.) or Not well controlled asthma with significant comorbidities
Level 4	xxx24	Very poorly controlled asthma with significant comorbidities

For purposes of the above two payment categories, a patient would qualify as having “significant comorbidities” if he or she had:

- Any *one* of the following conditions:
 - Ø Smoking
 - Ø Coronary Artery Disease (CAD)
 - Ø Use of beta blockers
 - Ø Regular use of day care (for young children)
- Two or more of the following conditions:
 - Ø Gastroesophageal reflux disease (GERD)
 - Ø Obesity (BMI >25)
 - Ø Obstructive sleep apnea
 - Ø Diabetes
 - Ø Vocal cord dysfunction (in addition to asthma)
 - Ø Rhinitis or sinusitis
 - Ø Depression/anxiety
 - Ø Exposure to second-hand smoke (for children under 18)

Patients known to have the following conditions would not be included in the payment model even if they also had asthma:

- Allergic bronchopulmonary aspergillosis
- COPD
- Other restrictive lung diseases
- Structural lung diseases (e.g., Bronchiectasis, cystic fibrosis)
- Lung cancer
- Severe personality disorders

Abstracts of Outcome and Cost Studies

Abramson MJ, Puy RM, Wiener JM. Allergy immunotherapy for asthma. *Cochrane Database Syst Rev.* 2000;2:CD001186.

Conclusion: Immunotherapy may reduce asthma symptoms and use of asthma medications.

Specific findings: A review of 54 trials was conducted to assess the effects of allergen-specific immunotherapy for asthma. Overall, patients receiving immunotherapy experienced a significant reduction in asthma symptoms and medication use compared to those randomized to placebo.

Baptist AP, Baldwin JL. Physician attitudes, opinions, and referral patterns: comparisons of those who have and have not taken an allergy/immunology rotation. *Ann Allergy Asthma Immunol.* 2004;93:227-231.

Conclusion: There are significant differences in the attitudes, opinions and referral patterns between physicians who have and have not taken an allergy/immunology rotation.

Specific findings: An anonymous questionnaire completed by 227 primary care physicians found that those who had taken an A/I rotation were more likely to feel they knew the types of cases seen by an allergist compared to those who had not taken an A/I rotation (75.9 percent vs 33.3 percent), to feel they knew an adequate amount about A/I (59.3 percent vs 19.5 percent), to view immunotherapy as effective (70.0 percent vs 52.3 percent) and to have referred a patient to an allergist (77.8 percent vs 46.0 percent).

Barnes CS, Amado M, Portnoy JM. Reduced clinic, emergency room, and hospital utilization after home environmental assessment and case management. *Allergy Asthma Proc.* 2010 Jul-Aug;31(4):317-323.

Conclusion: Home environmental assessment and case management may reduce medical care utilization for children suffering from allergic rhinitis and asthma.

Specific findings: This study retrospectively examined health care utilization of pediatric patients that had a home environmental assessment recommended by a pediatric allergist as part of a comprehensive case management program. Subjects were referred for case management by pediatric allergy specialists in a hospital-based clinic as indicated by high emergency room (ER) and hospital utilization. Case management included education, clinic visits, environmental assessment, and a single person responsible for following the subject's care. Home assessment included airborne spore collections, surface collections, and dust collection for evaluation of antigens.

Barnett SB, Nurmagambetov TA. Costs of asthma in the United States: 2002-2007. *J Allergy Clin Immunol.* 2011;127(1):145-152.

Conclusion: The current study finds that the estimated costs of asthma are substantial, which stresses the necessity for research and policy to work toward reducing the economic burden of asthma.

Specific findings: Over the years 2002-2007, the incremental direct cost of asthma was \$3,259 (2009 dollars) per person per year. The value of additional days lost attributable to asthma per year was approximately \$301 for each worker and \$93 for each student. For the most recent year available, 2007, the total incremental cost of asthma to society was \$56 billion, with productivity losses due to morbidity accounting for \$3.8 billion and productivity losses due to mortality accounting for \$2.1 billion.

Blaiss MS, Kaliner MA, Baena-Cagnani CE. Barriers to asthma treatment in the United States: results from the global asthma physician and patient survey. *World Allergy Org J.* 2009;2(12):303-313.

Conclusion: Similar to the global GAPP survey, the U.S.-specific findings indicate that in general there is a lack of asthma control, poor adherence to therapy, and room for improvement in patient-physician communication and partnership in treating asthma.

Specific findings: 208 adults with asthma and 224 physicians responded to the questionnaire. The majority of patients were being treated by a primary care physician (64 percent), 15 percent were being treated by specialists and 21 percent were not having their asthma treated by any physician or health care professional. Many of the patients may not have had well-controlled asthma, as 20 percent reported making an unscheduled telephone call to the doctor, 20 percent an unscheduled office visit, 6 percent an emergency department visit, and 4 percent reported being admitted to hospital in association with their asthma over the last year. Barriers to successful asthma treatment are created by notable differences between physician and patient perceptions regarding asthma and its effective treatment. The differences are particularly pronounced with regard to asthma education, awareness of side effects, disease symptoms, and adherence to asthma therapy.

Blanchette CM, Culler SD, Ershoff D, Gutierrez B. Association between previous health care use and initiation of inhaled corticosteroid and long-acting beta2-adrenergic agonist combination therapy among US patients with asthma. *Clin Ther.* 2009;31(11):2574-2583.

Conclusion: Just fewer than 40 percent of patients met the criteria for appropriate initiation of ICS/LABA therapy. Patients with appropriate initiation were significantly more likely to be treated by pulmonologists and allergists than by family medicine/general practitioners.

Specific findings: Of 16,205 patients initiated on ICS/LABA therapy, 39.2 percent met one or more criterion for appropriate use. Patients prescribed budesonide/formoterol fumarate dihydrate (BFC) had a significantly higher likelihood of meeting appropriateness criterion compared with fluticasone propionate/salmeterol (FSC) users. Also significantly associated with appropriate use were receipt of the initial ICS/LABA prescription from a pulmonologist or allergist rather than from a physician in family medicine/general practice, residence in the West relative to the Northeast and presence of specific comorbidities (allergic rhinitis, sinusitis, gastroesophageal reflux disease, and acute respiratory infection).

Broder MS, Gutierrez B, Chang E, Meddis D, Schatz M. Ratio of controller to total asthma medications: determinants of the measure. *Am J Manag Care.* 2010;16(3):170-178.

Conclusion: A high ratio of controller to total asthma medications is associated with greater controller adherence and with more controller fills. The ratio can be calculated using 1 or 2 quarters of pharmacy claims data, at a time when intervention may reduce asthma-related exacerbations. Interventions that may improve the ratio include changing from single inhaled corticosteroid therapy and to asthma specialist care.

Specific findings: The final study group comprised 38,538 patients with persistent asthma; 28,496 (73.9 percent) had high ratios. Specialty of usual-care physician differed, with more high-ratio patients than low-ratio patients having an allergist or pulmonologist. Patients who received combination

inhaled corticosteroid–long-acting β -agonist therapy or leukotriene receptor antagonist therapy were more likely to be in the high-ratio group compared with those dispensed a single inhaled corticosteroid.

Castro M, Zimmermann NA, Crocker S, Bradley J, Leven C, Schechtman KB. Asthma intervention program prevents readmissions in high healthcare users. *Am J Resp Critical Care Med.* 2003;168:1095-1099.

Conclusion: A brief intervention program focusing on high health care users with asthma resulted in improved asthma control, reduced hospital use and substantial cost savings.

Specific findings: A total of 96 adult subjects hospitalized with an asthma exacerbation who had a history of frequent health care use, were randomized to care by an asthma specialist or a generalist for six months. There was a 60 percent reduction in total hospitalizations, a 54 percent reduction in readmissions for asthma and a marked reduction in lost work or school days (246 vs 1,040 days) in the intervention group compared to the control group. Care by an asthma specialist resulted in a savings of \$6,462 per patient.

Cisternas MG, Blanc PD, Yen IH, Katz PP, Earnest G, et al. A comprehensive study of the direct and indirect costs of adult asthma. *J Allergy Clin Immunol.* 2003;111(6):1212-1218.

Conclusion: Asthma-related costs are substantial and are driven largely by pharmaceuticals and work loss.

Specific findings: In a study of 401 adults with asthma, total per-person annual costs of asthma averaged \$4,912, with direct costs accounting for \$3,180 (65 percent) and indirect costs \$1,732 (35 percent). The largest components of direct costs were pharmaceuticals, hospital admissions and non-emergency department ambulatory visits. Total cessation of work and the loss of entire work days accounted for 89 percent of indirect costs. Total per-person costs were \$2,646, \$4,530 and \$12,813 for persons reporting mild, moderate and severe asthma, respectively.

Curwick CC, Bonauto DK, Adams DA. Use of objective testing in the diagnosis of work-related asthma by physician specialty. *Ann Allergy Asthma Immunol.* 2006;97:546-550.

Conclusion: Appropriate diagnostic care received by workers with work-related asthma may be lacking, and physicians who have questions about diagnostic procedures should consider referral to a specialist.

Specific findings: A comparative evaluation of 301 workers' compensation claimants with work-related asthma found that only 36.9 percent were treated by specialists and less than half the claimants (43.2 percent) had received an objective evaluation of pulmonary function. Claimants treated by specialists were significantly more likely to have received diagnostic testing during evaluation of their disease than those treated solely by generalists (82.9 percent vs 20.0 percent).

Diette GB, Skinner EA, Nguyen, TT, et al. Comparison of quality of care by specialist and generalist physicians as usual source of asthma care for children. *Pediatrics* 2001;108(2):432-437.

Conclusion: Asthma care in children in two large managed care organizations was more likely to be consistent with national guidelines when a specialist was the primary provider.

Specific findings: A cross-sectional study of 260 children with asthma reviewed four domains of patient care, including patient education, control of factors contributing to asthma symptoms, periodic physiologic assessment and monitoring, and proper use of medications. In all four domains, care provided by a specialist was more likely to be consistent with guidelines. The greatest differences between specialist and generalist disease management were in the use of controller medications, having had a pulmonary function test and having been told about asthma triggers and how to avoid them.

Doan T, Grammar LC, Yarnold PR, et al. An intervention program to reduce the hospitalization cost of asthmatic patients requiring intubation. *Ann Allergy Asthma Immunol.* 1996;76:513-518.

Conclusion: An intervention program that included education, specialist care, regular outpatient visits and access to an emergency call service significantly reduced the cost of asthma care in patients intubated for asthma.

Specific findings: In a study of nine patients, the mean total cost of care decreased from \$43,066 the year before the intervention to \$4,914 the year after. Inpatient hospitalization costs decreased from \$40,253 to \$1,926. The costs of emergency services, outpatient services and medicines did not change significantly.

Finkelstein JA, Lozano P, Farber HJ, Miroshnik I, Lieu TA. Underuse of controller medications among Medicaid-insured children with asthma. *Arch Pediatr Adolesc Med.* 2002;156:562-567.

Conclusion: Medicaid-insured children who receive action plans, have follow-up visits or specialty consultations are less likely to be symptomatic underusers of controller medications.

Specific findings: Telephone surveys conducted with parents of children and adolescents aged 2 to 16 years with asthma who were enrolled in one of five managed care plans found widespread underuse of medications that control asthma symptoms. Having seen an asthma specialist was a factor associated with lower rates of underuse.

Finkelstein JA, Lozano P, Shulruff R, et al. Self-reported physician practices for children with asthma: Are national guidelines followed? *Pediatrics.* 2000;106(4):886-896.

Conclusion: Most physicians for children report having read and adopted NAEPP guideline recommendations for asthma treatment, but criteria for referral to an asthma specialist often differed from those of the guidelines. Opportunities for improvement also exist in areas such as the use of written care plans, optimizing anti-inflammatory medications and providing routine follow up.

Specific findings: In a survey, 427 pediatricians and family physicians reported criteria for referral that differed from national guidelines when it came to managing more severe patients without input from an asthma specialist. Family physicians were more likely than pediatricians to refer a child after a single hospitalization, two to three emergency department visits, two disease exacerbations, or when the child was under age three and required daily medications.

Gaioni SJ, Korenblat-Hanin M, Fisher EB, Korenblat P. Treatment outcomes in an outpatient asthma center: retrospective questionnaire data. *Amer J Managed Care*. 1996;999-1008.

Conclusion: Aggressive treatment at an asthma center had a positive and significant impact on asthma health outcomes and health system cost savings.

Specific findings: Treatment at an asthma specialty center resulted in a 78 percent reduction in hospitalizations, a 73 percent reduction in emergency room visits and a 48 percent reduction in unscheduled physician visits, according to a survey of 207 patients who had been treated at the center for at least one year. Overall net savings in medical system use was estimated to be \$2,714 per patient per year, for a total savings of more than \$560,000. Other improvements included decreases in severe shortness of breath from 48 percent to 15 percent, frequent depressed mood from 32 percent to 13 percent, and severe interference with daily activities from 31 percent to 11 percent. Patients also noted an increase from 48 percent to 96 percent in knowledge of self-care for asthma, and from 21 percent to 78 percent in satisfaction with professional asthma care.

Hankin CS, Cox L, Lang D, et al. Allergen immunotherapy and health care cost benefits for children with allergic rhinitis: a large-scale, retrospective, matched cohort study. *Ann Allergy Asthma Immunol*. 2010;104:79-85.

Conclusion: This study demonstrates the potential for early and significant cost savings in children with AR treated with immunotherapy. Greater use of this treatment in children could significantly reduce AR-related morbidity and its economic burden.

Specific findings: Among children with a Florida Medicaid paid claim between 1997 and 2007, immunotherapy treated patients were selected who had at least 18 months of data after their first immunotherapy administration. A control group of patients who had not received immunotherapy also were identified, and up to 5 were matched with each immunotherapy-treated patient by age at first AR diagnosis, sex, race/ethnicity, and diagnosis of asthma, conjunctivitis, or atopic dermatitis. Immunotherapy-treated patients had significantly lower 18-month median per-patient total health care costs (\$3,247 vs \$4,872), outpatient costs exclusive of immunotherapy-related care (\$1,107 vs \$2,626), and pharmacy costs (\$1,108 vs \$1,316) compared with matched controls. The significant difference in total health care costs was evident 3 months after initiating immunotherapy and increased through study end.

Lafata JE, Xi H, Divine G. Risk factors for emergency department use among children with asthma using primary care in a managed care environment. *Ambul Pediatr*. 2002;2:268-275.

Conclusion: Encouraging routine primary care visits and referral to an allergist may reduce emergency department use among children with asthma.

Specific findings: Children with asthma aged 5-14 treated by pediatricians in a large group practice were followed for two years. Emergency department use tended to be less among children who saw an allergist.

Legorreta AP, Christian-Herman J, O'Connor RD, Hassan MM, Evans R, Leung KM. Compliance with national asthma management guidelines and specialty care: a health maintenance organization experience. *Arch Intern Med.* 1998;158:457-464.

Conclusion: Although the National Asthma Education Program expert panel guidelines for the diagnosis and management of asthma were initially published in 1991, a survey of a major California HMO found compliance with the guidelines low. The results showed that asthma specialists provided more thorough care than did primary care physicians in treating patients with asthma.

Specific findings: Survey data were analyzed for 5,580 asthma patients covered by Health Net in California in 1996. Of respondents with severe asthma, 72 percent reported having a steroid inhaler, but only 54 percent used it daily. The patients of specialists were more likely to have a steroid inhaler and peak flow meter and to use them daily. Specialists also provided more patient education on how to prevent and control asthma attacks.

Liebhaber M, Bannister R, Raffetto W, Dyer Z. Drop-in group medical appointments for patients with asthma: a four-year outcomes study. *ISRN Allergy.* 2011 Jun 7;ID#178925.

Conclusion: Doctor Interactive Group Medical Appointments (DIGMA) was an effective, multidisciplinary asthma intervention that focused on behavior. It fulfilled the goals of asthma care as described by the 2007 NAEPP guidelines.

Specific findings: DIGMA was established to allow patients time to interact with an allergist, a behaviorist and an asthma educator in a group setting. Weekly meetings targeted patients with chronic asthma. Outcome parameters were established to assess the effectiveness of the program over a 4 year time period. Sixty four adult asthmatic patients were enrolled and followed for 4 years. The AQLQ test was administered each year. Spirometry, an analog self-assessment scale and the ACT were administered at each visit. Baseline rescue inhaler use was 4 per week compared to 1.5 per week at last visit. ACT scores are 18 at baseline and 19 at last visit. ER claims are 5 at one year prior to enrollment and 2 at the last year of DIGMA. Patient satisfaction improved from 30 to 34 at the last visit.

Mahr TA, Evans R. Allergist influence on asthma care. *Ann Allergy Asthma Immunol.* 1993;71:115-120.

Conclusion: Follow-up care by an allergist after hospitalization for asthma resulted in a decrease in subsequent hospitalizations and emergency room visits.

Specific findings: The retrospective study compared 83 patients who received asthma follow-up care by an allergist and 40 patients who received care from a non-allergist after hospitalization. Of patients who received follow-up care by an allergist, 13 percent were subsequently hospitalized, compared to 35 percent by non-allergists and 18 percent of the allergist patients had emergency room visits compared to 47 percent treated by non-allergists. There were significant increases in use of all medications and devices in the group treated by allergists.

Moller C, Dreborg S, Hosne FA, et al. Pollen immunotherapy reduces the development of asthma in children with seasonal rhinoconjunctivitis (the PAT-study). *J Allergy Clin Immunol.* 2002;109(2):251-256.

Conclusion: Immunotherapy can reduce the development of asthma in children with seasonal rhinoconjunctivitis.

Specific findings: More than 200 children ages 6 to 14 with moderate-to-severe hay fever symptoms were enrolled in the study. At the start of the study, none of the children reported an asthma diagnosis requiring daily treatment, however 20 percent had mild asthma symptoms during the pollen season(s). Among those without asthma, the children actively treated with immunotherapy had significantly fewer asthma symptoms after three years as evaluated by clinical diagnosis.

Moore CM, Ahmed I, Mouallem R, May W, Ehlal M, Sorensen RU. Care of asthma: allergy clinic versus emergency room. *Ann Allergy Asthma Immunol.* 1997;78:373-380.

Conclusion: The decreased morbidity of asthma and cost of care for the allergy clinic patients, compared to the emergency room patients, are likely due to the care given in the allergy-immunology clinic.

Specific findings: Fifty emergency room patients and 25 allergy clinic patients were studied. The data showed no demographic or socioeconomic differences between the two groups. However, the clinic group had significantly less nocturnal cough, sleep interruption, missed school and emergency room visits resulting in approximate average savings of \$137 per patient per year.

Nyman JA, Hillson S, Stoner T, DeVries A. Do specialists order too many tests? The case of allergists and pediatric asthma. *Ann Allergy Asthma Immunol* 1997;79:496-502.

Conclusions: Allergists' test-intensive practice style is cost-effective.

Specific findings: A review of 1,574 pediatric asthma cases in a large health plan found that cases managed by allergists were no more costly than those managed by non-allergists, despite the fact that the allergists ordered significantly more tests and required more office visits than non-allergists. Patients treated by allergists experienced fewer hospitalizations and emergency room visits resulting in cost-savings due to improved outcomes and disease control.

Patel MR, Valerio MA, Janevic MR et al. Long-term effects of negotiated treatment plans on self-management behaviors and satisfaction with care among women with asthma. *J Asthma.* 2013; 50(1):82-89.

Conclusion: Women with asthma who had a negotiated treatment plan were more likely to see an asthma specialist. In the long-term, not having a treatment plan that is developed in partnership with a clinician may have an adverse impact on medication use and patient views of clinical services.

Specific findings: 38 percent reported having a negotiated treatment plan at three time points. Seeing an asthma specialist was associated with having a plan. Women who did not have a negotiated treatment plan at baseline, but acquired one at 12 or 24 months were more likely to report greater urgent office visits for asthma. No associations were observed between having a plan and urgent health care use or symptom frequency. When adjusting for household income, level of asthma control, and

specialty of the caregiving provider, women who did not have a negotiated treatment plan and those with a plan at fewer than three time points were less likely to report medication adherence and satisfaction with their care. No differences in asthma management self-efficacy or asking the doctor questions about asthma were observed.

Piecoro LT, Potoski M, Talbert JC, et al. Asthma prevalence, cost, and adherence with expert guidelines on the utilization of health care services and costs in a state Medicaid population. *Health Serv Res.* 2001;36(2): 357-371.

Conclusion: A review of asthma prevalence and utilization of health services in a Kentucky Medicaid population found widespread nonadherence to the National Asthma Education Program expert panel guidelines associated with an increase in asthma exacerbations that resulted in hospitalizations.

Specific findings: Of 530,000 Medicaid recipients, 24,365 (4.6 percent) were identified as having asthma. Average annual asthma-related costs (\$616) accounted for less than 20 percent of total health care costs (\$3,645). Less than 40 percent of the patients received a prescription for a rescue medication and fewer than 10 percent of the patients who received daily inhaled short-acting beta-2 agonists were regular users of inhaled steroids. Nonadherence to the guidelines was associated with an increased risk of an asthma-related hospitalization.

Schatz M, Cook EF, Nakahiro R, Petitti D. Inhaled corticosteroids and allergy specialty care reduce emergency hospital use for asthma. *J Allergy Clin Immunol.* 2003;111:503-508.

Conclusion: Care by allergy specialists and increased use of inhaled corticosteroids reduces emergency hospital use for asthma.

Specific findings: More than 9,600 asthmatic patients aged 3 to 64 years of age were identified from an electronic database of a large health maintenance organization. Dispensing of seven or more canisters of inhaled corticosteroids (ICs) annually and care by an allergy specialist were independently associated with reduced emergency hospital care. Patients with allergy specialist care were more likely than those without specialty care to receive seven or more dispensations of ICs.

Schatz M, Zeiger RS, Mosen D, Apter AJ, Vollmer WM, et al. Improved asthma outcomes from allergy specialist care: A population-based cross-sectional analysis. *J Allergy Clin Immunol.* 2005;116(6):1307-1313.

Conclusion: Allergist care is associated with a wide range of improved outcomes in asthmatic patients compared with care provided by primary care providers.

Specific findings: In a random sample of 3,568 patients with persistent asthma, patients of allergists reported significantly higher general physical and asthma-specific quality of life, less asthma control problems, less severe symptoms, higher satisfaction with care and greater self-management knowledge compared with those whose disease was managed by primary care providers. Patients of allergists were less likely to require an asthma hospitalization, unscheduled office visit or to overuse beta agonists, and were more likely to have received inhaled steroids during the past year.

Schatz M, Zeiger RS, Vollmer WM, Mosen D, Cook EF. Determinants of future long-term asthma control. *J Allergy Clin Immunol.* 2006;148(5):1048-1053.

Conclusions: Effective management strategies are associated with improved asthma control, even after accounting for characteristics that put patients at high risk for poor control.

Specific findings: Oral corticosteroids, unscheduled medical visits in the prior year, prior asthma hospitalizations, smoking, chronic obstructive pulmonary disease, male sex, black race and lower educational level were independently associated with poorer asthma control. Regular inhaled corticosteroids, long-acting beta agonists and asthma specialist care were independently associated with better control in high risk patients.

Shields AE, Comstock C, Finkelstein JA, Weiss KB. Comparing asthma care provided for Medicaid-enrolled children in a primary care case manager plan and a staff model HMO. *Ambul Pediatr.* 2003;3:253-263.

Conclusion: Children enrolled in a staff model HMO that provided greater access to asthma specialists were less likely to require emergency department visits or hospitalization, or to meet federal criteria for persistent asthma compared to patients in a primary care case manager plan (PCCM) that provided less access to specialist care.

Specific findings: In a study of 2,365 children with asthma in the Massachusetts Medicaid program, children in the HMO were only 54 percent as likely as those in the PCCM plan to experience an asthma emergency department visit or hospitalization, only half as likely to meet the NCOA definition for persistent asthma and only 32 percent as likely to have prior ED visits or hospitalizations. Children in the HMO were 2.9 times as likely to receive timely follow-up care and 1.8 times as likely to receive a specialist visit during the year.

Sin DD, Tu JV. Underuse of inhaled steroid therapy in elderly patients with asthma. *Chest.* 2001;119:720-725.

Conclusion: Despite their proven efficacy, inhaled steroids are underused in the elderly asthmatic population, with patients of primary-care physicians less likely to receive the therapy than patients of specialists.

Specific findings: Of the 6,254 Ontario, Canada, patients age 65 and older who experienced a recent acute exacerbation of asthma, 2,495 patients (40 percent) did not receive inhaled steroid therapy within 90 days of discharge from their initial hospitalization for asthma. Nonreceipt of inhaled steroid therapy was particularly prominent in older patients with multiple comorbidities. Moreover, those who received care from primary-care physicians were less likely to receive inhaled steroid therapy, compared to those who received care from specialists.

Slejko JF, Ghushchyan VH, Sucher B, et al. Asthma control in the United States, 2008-2010: Indicators of poor asthma control. *J Allergy Clin Immunol.* 2014;133(60):1579-1587.

Conclusion: Improvement of asthma control continues to be a US public health concern. Results suggest suboptimal asthma control with underuse of long-term control medications, overuse of quick-relief inhalers, and a significant number of self-reported asthma exacerbations.

Specific findings: The 2008, 2009, and 2010 Medical Expenditure Panel Surveys were used to examine the national prevalence of self-reported asthma, trends in medication use, and demographic characteristics of asthmatic patients. Of the 102,544 subjects asked about an asthma diagnosis, 9,782 reported lifetime asthma, and 8,837 reported current asthma. An asthma exacerbation in the previous year was reported by 5,005, of whom 4,521 used a quick-relief inhaler for asthma symptoms. Of this group, 60 percent were using daily long-term control medication but still required significant use of quick-relief inhalers, whereas 28 percent had never used long-term control medication. Of those who had a recent exacerbation, 29 percent were using daily preventive medication, whereas 54 percent had never used long-term control medication.

Smith DH, Malone DC, Lawson KA, et al. A national estimate of the economic costs of asthma. *Am J Respir Crit Care Med.* 1997;156:787-793.

Conclusion: Future asthma research and intervention efforts directed at reducing hospitalization and providing better care for high-risk asthma patients could help to decrease health care resource use and provide cost savings.

Specific findings: Based on an analysis of the 1987 National Medical Expenditure Survey, the total estimated annual cost of asthma is \$5.8 billion, with hospitalization accounting for half of all expenditures. More than 80 percent of resources were used by 20 percent of the population. The estimated annual per patient cost for high-risk patients was \$2,584, compared to \$140 for the rest of the sample.

Sullivan SD, Rasouliyan L, Russo PA, Kamath T, Chipps BE for the TENOR Study Group. Extent, patterns and burden of uncontrolled disease in severe or difficult-to-treat asthma. *Allergy.* 2007;62(2):126-133.

Conclusion: This multi-center U.S. study found that few severe or difficult-to-treat asthma patients achieved control over a two-year period and the economic consequence of uncontrolled disease is substantial.

Specific findings: The Epidemiology and Natural History of Asthma: Outcomes and Treatment Regimens (TENOR) study found that 83 percent of patients had uncontrolled asthma, 16 percent had inconsistent control and 1.3 percent were controlled. Controlled patients experienced fewer work or school absences and less health care resource use than uncontrolled patients. Costs for uncontrolled patients were more than double those of controlled patients throughout the study (\$14,212 vs \$6,452, adjusted to 2002 dollars).

Taylor DM, Auble DE, Calhoun WJ, et al. Current outpatient management of asthma shows poor compliance with international consensus guidelines. *Chest.* 1999;116:1638-1645

Conclusions: The outpatient management of most asthma patients requiring emergency room care does not comply with the consensus guidelines and patient knowledge of asthma is poor.

Specific findings: A prospective, researcher-administered questionnaire was used to evaluate 85 patients requiring emergency room treatment for asthma. The majority of the patients were not managed in compliance with expert guidelines, with 62 percent under treated with medications and 87 percent having no written plan of action. Only 28 percent of the severe asthmatics were treated by asthma specialists, far short of the 100 percent recommended by the guidelines. Knowledge of the disease and proper medication use also was low.

Vargas PA, et al. Symptoms profile and asthma control in school-age children. *Ann Allergy Asthma Immunol.* 2006;96:787-793.

Conclusion: Asthma was uncontrolled in 85 percent of inner-city students with asthma in Little Rock, Ark., based on the presence of symptoms and the need for rescue medicines.

Specific findings: Half of the children with active asthma had been treated in the emergency department at least twice in the previous two years, 52 percent often had to limit their activities, 29 percent reported nighttime symptoms once or more per week and 17 percent reported missing five or more days of school per year because of asthma.

Villanueva AG, Mitchell L, Ponticelli D, Levine AS. Effectiveness of an asthma center in improving care and reducing costs in patients with difficult-to-control asthma. Abstract presentation. American College of Chest Physicians annual meeting. Oct 2000.

Conclusion: A multi-disciplinary team specializing in the treatment of patients with difficult-to-control asthma can affect substantial cost savings while improving quality of care.

Specific findings: A review of 125 patients receiving care in an asthma center (AC) found high patient satisfaction, a significant reduction in the number of inhaled beta agonist prescriptions filled relative to the number of inhaled steroid prescriptions filled, large reductions in ER and hospital utilization and resultant decrease in cost. The number of hospitalizations was 38 before AC vs 4 after AC (89 percent reduction). The mean cost of the initial AC visit was \$770. The cost of ER care totaled \$34,706 before AC vs \$7,973 after AC. The cost of inpatient care totaled \$192,926 before AC vs \$20,308 after AC.

Vollmer WM, O'Hollaren M, Ettinger K, et al. Specialty differences in the management of asthma. A cross-sectional assessment of allergists' patients and generalists' patients in a large HMO. *Arch Intern Med.* 1997;157(11):1201-1208.

Conclusion: Specialist care was found to be of benefit to asthma patients in a large HMO. The allergists' patients conformed more closely to national asthma management guidelines and reported better quality of life than did the patients of generalists.

Specific findings: Nearly 400 patients ages 15 - 55 with physician-diagnosed asthma were studied. Patients receiving their primary asthma care from an allergist were considerably more likely to report using inhaled anti-inflammatory agents, oral steroids and regular breathing medications to control their asthma. Allergists' patients were more likely to have asthma exacerbations treated in a clinic rather than an emergency room and reported significantly improved quality of life.

Wang LY, Zhong Y, Wheeler L. Direct and indirect costs of asthma in school-age children. *Prev Chronic Dis* 2005;2(1).

Conclusion: The economic impact of asthma on school-age children, families and society is immense, and more public health efforts to better control asthma in children are needed.

Specific findings: An estimated 2.52 million children aged 5 - 17 years were treated for asthma in 1996. The total economic impact of asthma in school-age children was nearly \$2 billion, or \$719 per child with asthma. Costs were calculated in 2003 dollars.

Westley CR, Spiecher B, Starr L, et al. Cost effectiveness of an allergy consultation in the management of asthma. *Allergy Asthma Proc.* 1997;18:15-18.

Conclusion: Referral to an allergist reduced the cost of asthma care by \$2,100 per patient.

Specific findings: The retrospective study evaluated the outcomes and treatment costs for 70 moderate-to-severe asthma patients treated in a Kaiser Permanente health plan in Denver. All patients were followed for at least one year by a primary care physician prior to evaluation and follow-up by a specialist for at least one year. Findings after the evaluation and follow-up with a specialist included a 67 percent decrease in the number of hospitalizations, a decrease in average hospital days from 4 to 2.5, a 45 percent decrease in sick care office visits and a 56 percent decrease in emergency room visits. Estimated cost savings for the 70 patients was \$145,500.

Wu A, Young Y, Skinner EA, et al. Quality of care and outcomes of adults with asthma treated by specialists and generalists in managed care. *Arch Intern Med.* 2001;161:2554-2560.

Conclusion: In a managed health care setting, physicians' specialty training and self-reported expertise in treating asthma were related to better patient-reported care and outcomes.

Specific findings: Based on a survey of 1,954 adult asthma patients enrolled in 12 managed care organizations and their 1,078 corresponding physicians, significant differences were noted for patients of specialist and generalist physicians. Compared with patients of generalists, outcomes for patients of allergists were significantly better with regard to canceled activities, hospitalizations and emergency department visits for asthma, quality of care ratings and physical functioning.

Zieger RS, Schatz M, Solari PG, Zazzali JL, Chen W. Real-time asthma outreach reduces excessive short-acting β 2-agonist use: a randomized study. *J Allergy Clin Immunol Pract.* 2014;2(4):445-456.

Conclusion: A novel administrative-based asthma outreach program improves markers of asthma impairment in patients without prior asthma specialist care and is adaptable to managed care organizations with electronic medical records.

Specific findings: Compared with controls, intervention patients reached 7 short-acting β 2-agonist (SABA) canisters ("rescue" medications) less frequently and later. The intervention reduced the risk of ≥ 7 SABA canister dispensings in patients without specialist care compared with patients with specialist care in the prior 3 years. Visits to allergists were more frequent for intervention patients (30.9 percent) than for control patients.

Asthma Action Plan

For: _____ Doctor: _____ Date: _____
 Doctor's Phone Number _____ Hospital/Emergency Department Phone Number _____

GREEN ZONE

Doing Well

- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

And, if a peak flow meter is used,

Peak flow: more than _____
 (80 percent or more of my best peak flow)

My best peak flow is: _____

Take these long-term control medicines each day (include an anti-inflammatory).

Medicine	How much to take	When to take it
_____	_____	_____
_____	_____	_____
_____	_____	_____

Before exercise _____ 2 or 4 puffs _____ 5 minutes before exercise

YELLOW ZONE

Asthma Is Getting Worse

- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

-Or-

Peak flow: _____ to _____
 (50 to 79 percent of my best peak flow)



Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.

_____ 2 or 4 puffs, every 20 minutes for up to 1 hour
 (short-acting beta₂-agonist) Nebulizer, once



If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:

Continue monitoring to be sure you stay in the green zone.

-Or-

If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:

Take: _____ 2 or 4 puffs or Nebulizer
 (short-acting beta₂-agonist)

Add: _____ mg per day For _____ (3–10) days
 (oral steroid)

Call the doctor before/ within _____ hours after taking the oral steroid.

RED ZONE

Medical Alert!

- Very short of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in Yellow Zone

-Or-

Peak flow: less than _____
 (50 percent of my best peak flow)

Take this medicine:

_____ 4 or 6 puffs or Nebulizer
 (short-acting beta₂-agonist)

_____ mg
 (oral steroid)

Then call your doctor NOW. Go to the hospital or call an ambulance if:

- You are still in the red zone after 15 minutes AND
- You have not reached your doctor.

DANGER SIGNS ■ **Trouble walking and talking due to shortness of breath** ■ **Take 4 or 6 puffs of your quick-relief medicine AND**
 ■ **Lips or fingernails are blue** ■ **Go to the hospital or call for an ambulance _____ NOW!**
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How To Control Things That Make Your Asthma Worse

This guide suggests things you can do to avoid your asthma triggers. Put a check next to the triggers that you know make your asthma worse and ask your doctor to help you find out if you have other triggers as well. Then decide with your doctor what steps you will take.

Allergens

Animal Dander

Some people are allergic to the flakes of skin or dried saliva from animals with fur or feathers.

The best thing to do:

- Keep furred or feathered pets out of your home.

If you can't keep the pet outdoors, then:

- Keep the pet out of your bedroom and other sleeping areas at all times, and keep the door closed.
- Remove carpets and furniture covered with cloth from your home. If that is not possible, keep the pet away from fabric-covered furniture and carpets.

Dust Mites

Many people with asthma are allergic to dust mites. Dust mites are tiny bugs that are found in every home—in mattresses, pillows, carpets, upholstered furniture, bedcovers, clothes, stuffed toys, and fabric or other fabric-covered items.

Things that can help:

- Encase your mattress in a special dust-proof cover.
- Encase your pillow in a special dust-proof cover or wash the pillow each week in hot water. Water must be hotter than 130° F to kill the mites. Cold or warm water used with detergent and bleach can also be effective.
- Wash the sheets and blankets on your bed each week in hot water.
- Reduce indoor humidity to below 60 percent (ideally between 30—50 percent). Dehumidifiers or central air conditioners can do this.
- Try not to sleep or lie on cloth-covered cushions.
- Remove carpets from your bedroom and those laid on concrete, if you can.
- Keep stuffed toys out of the bed or wash the toys weekly in hot water or cooler water with detergent and bleach.

Cockroaches

Many people with asthma are allergic to the dried droppings and remains of cockroaches.

The best thing to do:

- Keep food and garbage in closed containers. Never leave food out.
- Use poison baits, powders, gels, or paste (for example, boric acid). You can also use traps.
- If a spray is used to kill roaches, stay out of the room until the odor goes away.

Indoor Mold

- Fix leaky faucets, pipes, or other sources of water that have mold around them.
- Clean moldy surfaces with a cleaner that has bleach in it.

Pollen and Outdoor Mold

What to do during your allergy season (when pollen or mold spore counts are high):

- Try to keep your windows closed.
- Stay indoors with windows closed from late morning to afternoon, if you can. Pollen and some mold spore counts are highest at that time.
- Ask your doctor whether you need to take or increase anti-inflammatory medicine before your allergy season starts.

Irritants

Tobacco Smoke

- If you smoke, ask your doctor for ways to help you quit. Ask family members to quit smoking, too.
- Do not allow smoking in your home or car.

Smoke, Strong Odors, and Sprays

- If possible, do not use a wood-burning stove, kerosene heater, or fireplace.
- Try to stay away from strong odors and sprays, such as perfume, talcum powder, hair spray, and paints.

Other things that bring on asthma symptoms in some people include:

Vacuum Cleaning

- Try to get someone else to vacuum for you once or twice a week, if you can. Stay out of rooms while they are being vacuumed and for a short while afterward.
- If you vacuum, use a dust mask (from a hardware store), a double-layered or microfilter vacuum cleaner bag, or a vacuum cleaner with a HEPA filter.

Other Things That Can Make Asthma Worse

- Sulfites in foods and beverages: Do not drink beer or wine or eat dried fruit, processed potatoes, or shrimp if they cause asthma symptoms.
- Cold air: Cover your nose and mouth with a scarf on cold or windy days.
- Other medicines: Tell your doctor about all the medicines you take. Include cold medicines, aspirin, vitamins and other supplements, and nonselective beta-blockers (including those in eye drops).

