

A Case Study in Payment Reform to Support Optimal Pediatric Asthma Care

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Executive Summary

This case study explores the role of emerging payment models in supporting care redesign for patients with poorly controlled pediatric asthma. It describes the Community Asthma Initiative (CAI), a successful initiative developed at Boston Children's Hospital that has culturally sensitive education and environmental remediation services to improve outcomes for high risk patients. However, these services are rarely covered through fee-for-service (FFS) payment models. Asthma programs providing these services have often relied on short-term grant support and philanthropic funding, but these funding mechanisms are inefficient and unstable. Alternative payment models (APMs) offer a path to sustainable change that improves value for the patient and health care system.

This paper reviews payment reforms in several states to assess how new models can support services similar to those offered by the CAI. In addition to its own version of a patient centered medical home (PCMH), Massachusetts recently received approval to pilot a high-risk asthma bundled payment funded through its Medicaid demonstration waiver. Arkansas is implementing a statewide acute care bundle for asthma and patient-centered medical home models. New Jersey is reforming their Medicaid payments through the Delivery System Reform Incentive Payment (DSRIP) program, which provides asthma case management and home assessments through a pay-for-performance (P4P) mechanism. Oregon received a federal waiver to develop Coordinated Care Organizations (CCOs) to support and coordinate health resources and develop community partnerships. These reforms have used different payment models and care delivery approaches and are in various stages of implementation.

New payment models can support care redesign and improve value in health care delivery. They give more control over health care delivery to clinicians, who are well positioned to identify problems and develop pragmatic solutions for their individual patients. However, with the greater clinical autonomy that these new models provide, clinicians bear greater responsibility for costs and outcomes. This case study draws lessons learned from the pediatric asthma case study, makes policy recommendations, and identifies challenges to successful reform.

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Photo credit: Community Asthma Initiative

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Established in 2007, the Center for Health Policy at Brookings is dedicated to providing practical solutions to achieve high-quality, innovative, affordable health care. To achieve its mission, the Center conducts research, develops and disseminates policy recommendations, and provides technical expertise to test and evaluate innovative health care solutions. The Center's activities fall within the Initiative on Value and Innovation in Health Care, and align with our four focus areas: delivery system reform, financing and physician payment reform, biomedical innovation, and public health.

The Dr. Richard Merkin Initiative on Payment Reform and Clinical Leadership

The Merkin Initiative is a national, mission-driven effort to engage physicians in current payment and delivery reform efforts and to help foster leadership and advocacy skills. As frontline decision-makers who directly influence the delivery and quality of care, clinicians have an important role to play in driving payment and delivery system reforms that move the U.S. toward a high-value health care system. Yet, many clinicians feel disengaged from critical policy discussions or efforts to transform clinical care.

The **MEDTalk** event series presents clinician-led experiences in transforming health care, particularly clinical innovations that are tied to payment reform. Using a case study format, each event will focus on a specific illness or medical condition, and profile specific strategies and techniques used in the field. The series is designed to appeal to clinicians, health care administrators, and policy makers, and will incorporate cases from across a variety of settings, including large academic medical centers, integrated health systems, community health centers, and small community practices.

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EXECUTIVE SUMMARY

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New payment models can support care redesign and improve value in health care delivery. They give more control over health care delivery to clinicians, who are well positioned to identify problems and develop pragmatic solutions for their individual patients. However, with the greater clinical autonomy that these new models provide, clinicians bear greater responsibility for costs and outcomes. This case study draws lessons learned from the pediatric asthma case study, makes policy recommendations, and identifies challenges to successful reform.

PART I: INTRODUCTION TO PEDIATRIC ASTHMA

Asthma is a disease in which the medium sized airways become inflamed and constricted, resulting in breathing difficulty. Pediatric asthma is a common chronic condition that affected approximately 7 million children ages 0-18 in 2012, just under 15% of all children in the U.S.¹ The causes of asthma have not been fully determined, although there is a clear genetic contribution. Once diagnosed, adherence to asthma medication and avoidance of triggers (**Table 1**) can effectively mitigate symptoms and prevent asthma exacerbations.²

PEDIATRIC ASTHMA BY THE NUMBERS (U.S.)

7 million: Children with asthma

14 million: Days of school missed per year

\$27 billion: Total cost of pediatric asthma in 2007

Prevalence is rising and is highest among racial minorities, low-income households, and in the northeastern United States.³⁻⁵ Although many children are able to live normal lives, approximately 46% of pediatric asthma patients have poorly-controlled asthma.⁶ Each year, over 4 million children (almost 60% of all children) with asthma suffer an asthma exacerbation, 800,000 visit the emergency department (ED), and 200,000 are hospitalized.^{3,4,7-9}

Table 1: Asthma Triggers²

INDOOR ENVIRONMENTAL TRIGGERS AND IRRITANTS	ALLERGEN TRIGGERS	OTHER SIGNIFICANT TRIGGERS
<ul style="list-style-type: none"> • 2nd and 3rd hand smoke • Cleaning chemicals • Dust mites • Pests (rodents and cockroaches) • Indoor fumes (gas/wood stoves) • Scented aerosols 	<ul style="list-style-type: none"> • Mold • Pollen • Pet dander • Mildew • Environmental pollution 	<ul style="list-style-type: none"> • Upper respiratory infections • Exercise • Cold air • Acute emotional responses • Diet

Human and Financial Burden

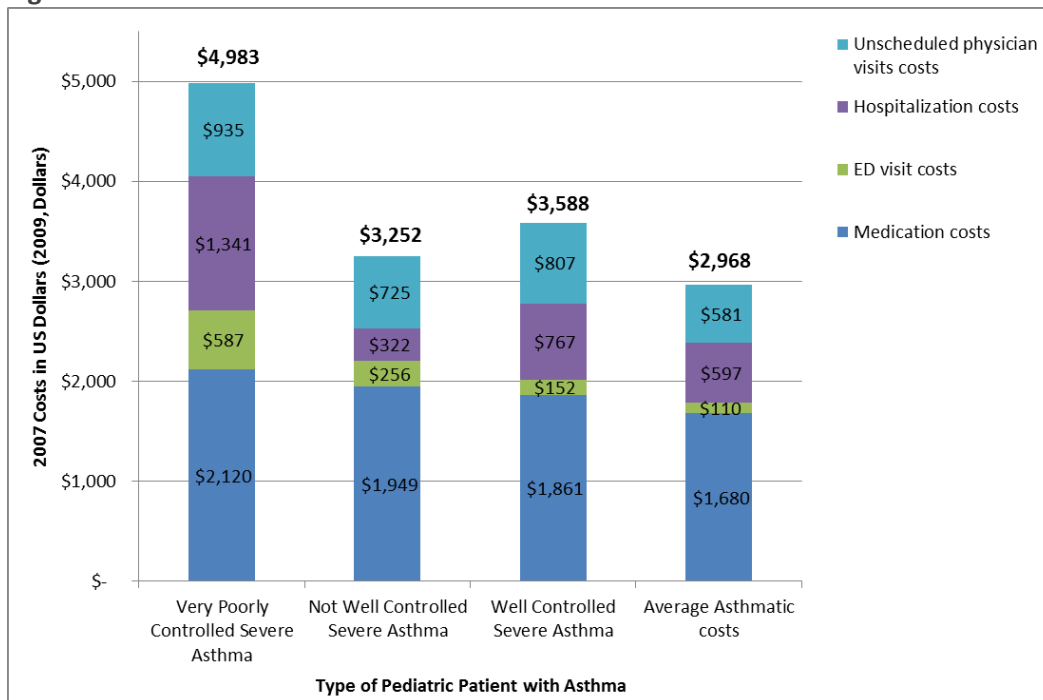
The human burden associated with asthma is great. In 2011, children missed an estimated 14.4 million school days due to asthma. As a result, parents and caregivers must miss work, with an estimated 14.2 million missed work days in 2013.¹⁰ Asthma management is complicated, costly, and provokes significant anxiety among affected families. Better asthma care could eliminate much of this burden, in part through improved family education on avoidable triggers and optimal medical care. Unfortunately, asthma control is limited by a multitude of non-medical factors:

- **Parent/caregiver expectations.** Parents (particularly those with low health literacy) often do not have the experience or support to realize the positive impact that asthma treatment can have on their children’s lives or to understand the importance of taking prescribed medications as directed.
- **Environmental Causes.** Many triggers are associated with substandard housing, which triggers asthma exacerbations.
- **Limited coverage for non-traditional services.** Many services that directly affect asthma control are not commonly covered by medical insurance. For example, environmental remediation (e.g., mold, pest control) and supply provision (e.g., high-efficiency particulate absorption [HEPA])

vacuum cleaners to eliminate dust mites, air conditioning) are not typically covered by payers but can mitigate common environmental triggers.

In 2007 the U.S. spent \$50 billion on direct care for asthma, including medications, physician visits, ED visits, and hospitalizations. Of this amount nearly \$27 billion was spent on pediatric asthma.¹¹ Twenty percent of pediatric asthma patients with poorly-controlled high-risk asthma account for 80% of pediatric asthma expenditures (**Figure 1**).^{12,13} Although medication costs account for the majority of this spending, optimal asthma management could significantly reduce ED visits, hospitalizations, and missed school days.¹³ In 2010, one study estimated that Medicaid covered nearly 629,000 ED visits at a cost of \$272 million, as well as the majority of pediatric asthma hospitalizations (\$36.9 million).^{14,15}

Figure 1: Per Patient Asthma Costs^{11,12}



Numerous trials demonstrate that a defined set of services substantially improve outcomes in pediatric asthma. These services include customized caregiver/patient self-management, asthma education, and environmental remediation for the most high-risk patients with asthma, in addition to traditional clinical care. Government agencies, hospitals, and clinical and economic studies have published replication manuals for others to use in developing effective treatment programs (See Appendix F for an extensive annotated bibliography of these programs). Despite the substantial body of evidence showing that these services improve patients’ wellbeing and reduce total costs, an adequate and sustainable funding stream for them has been and remains a tremendous challenge. Many public and private payers do not reimburse non-traditional services under fee-for-service (FFS). Simply expanding FFS coverage to include these services and products without accountability for costs and quality would be prohibitively costly.

Scope of Paper

This paper explores the ways in which payment reform can support clinicians to improve outcomes for children with asthma and lower the costs associated with care. The paper begins with an examination of the Boston Children’s Hospital Community Asthma Initiative (CAI), an enhanced asthma intervention. The paper then explores payment reforms in several states and shows how they can support

interventions like those provided through the CAI. Finally, the paper explores how medical care intersects with public health, describes payment reform challenges, discusses lessons learned, and suggests policy implications.

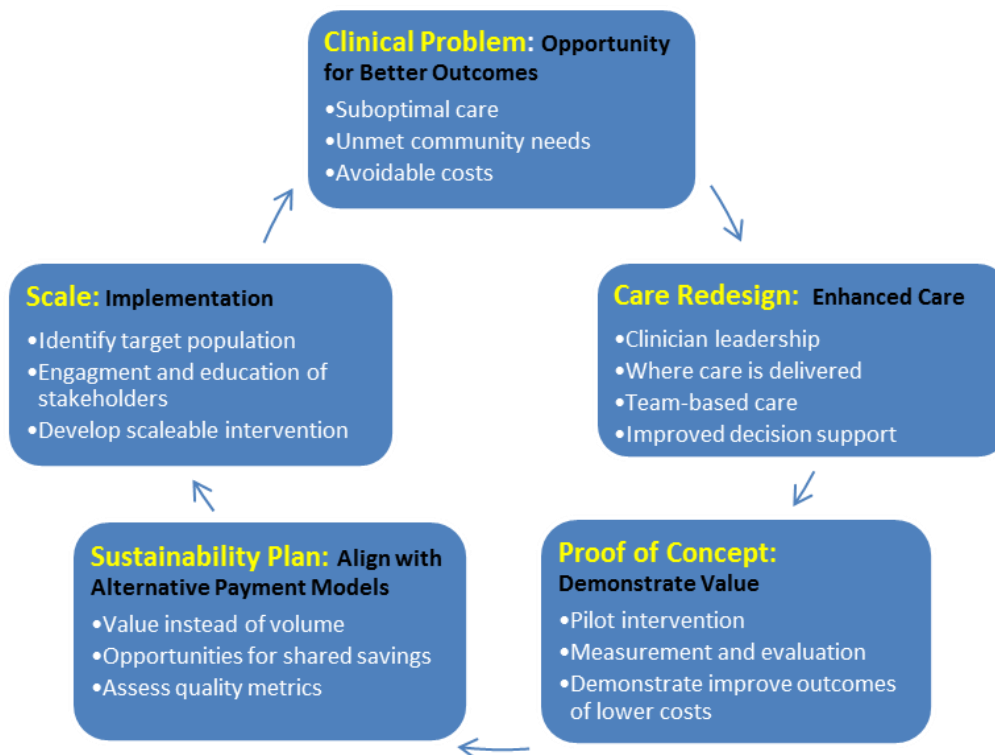
PART II: CREATION AND CARE REDESIGN OF THE COMMUNITY ASTHMA INITIATIVE

This section explores the ways in which care redesign can enhance asthma care to improve outcomes and reduce costs.

Care Redesign Framework

This case study uses a care redesign process framework to provide clinicians with a roadmap on how to transform an innovative idea into a sustainable program (Figure 2). Care redesign is an ongoing and iterative process, in which assessments after each round of change drive new improvements.

Figure 2. Care Redesign Process For Sustainable High Value Care



The following sections provide a brief overview of how the care redesign framework was applied to address pediatric asthma. A more detailed description can be found in Appendix A.

Clinical Problem

As described in Part I, the human and financial burden of asthma can be debilitating for children, families, and communities. Boston Children’s Hospital (Boston Children’s) is the largest provider of pediatric acute care in Massachusetts. Of approximately 25,000 inpatient admissions each year, asthma is the top admitting diagnosis.^{16,17} Furthermore, African American and Hispanic children are admitted to

Boston Children's at three to five times the rate of Caucasian children, a problem that hospital leadership hoped to address.

The hospital's community benefits department, the Office of Community Health (OCH), was charged with leading the mission to improve the health and well-being of children and families in the local community. As part of their work, they conduct a community needs assessment every 3 years. In 2003, asthma was identified as one of the top priorities by community members, community-based organizations, and public health agencies.¹⁷

Care Redesign

The Community Asthma Initiative (CAI) was the outgrowth of an elevated commitment by Boston Children's to its community mission. Dr. Shari Nethersole, OCH Medical Director, and Dr. Elizabeth R. Woods, who had a background in public health initiatives, were chosen to head up CAI. Boston Children's had a history of working closely with the Boston Public Health Commission (BPHC) and their Asthma Control Program and consulted with them and other community organizations, regarding the design of the CAI.¹⁸



Photo credit: Community Asthma Initiative

The mission was to provide enhanced asthma services that improve the health and quality of life for high-risk children with asthma by complementing traditional care. Services offered by the CAI include: 1) tailored education and medication adherence counseling; 2) intensive case management; and 3) home visits that include environmental assessment, remediation, and supplies. Many of these services have traditionally fallen under the purview of public health and human service providers.

Proof of Concept

The CAI pilot intervention was launched in 2005 and demonstrated improved outcomes and reduced costs. It was later expanded to include all children ages 2 through 18 in the city of Boston, who met enrollment criteria demonstrating poorly controlled asthma and had been seen at Boston Children's or referred for services.¹⁹

Sustainability Plan: The Complexities of Funding Programs like the CAI

Most CAI patients are considered low-income. Sixty-two percent of CAI families have incomes less than \$25,000 and 21.5% have income between \$25,000 and \$50,000. Furthermore, Medicaid is the primary payer for 75% of CAI patients. MassHealth (Massachusetts Medicaid) and other private payers do not currently cover critical services provided by the CAI under fee-for-service (FFS), including home visits by non-licensed community health workers and environmental remediation supplies.

To date, the program was funded primarily through Boston Children's community benefits funds, as well as grants and philanthropy. Grant support has been provided by the Centers for Disease Control and Prevention (CDC)²⁰, Healthy Tomorrows from the Maternal and Child Health Bureau, the Health Resources and Services Administration (HRSA),²¹ the American Academy of Pediatrics, and other philanthropic organizations. It is important to note that these funding sources do not represent long-term commitments and vary year-by-year.

Grant funding, while offering critical support to pilot programs like the CAI in order to demonstrate proof of concept, is not a viable funding source for wide-scale, long-term health care delivery. Boston Children's recognized this, and in collaboration with their partners, embarked on several efforts to advocate for sustainable funding:

- **Participate in local and state coalitions.** At the same time that Boston Children's was piloting CAI, it was an active participant in local and state coalitions, such as the Boston Urban Asthma Coalition, the Asthma Regional Council of New England (ARC), and later the state-wide Massachusetts Asthma Action Partnership in seeking sustainable funding for asthma home visiting services. Starting in 2005, the coalition contributed to the filing of state legislation, An Act to Improve Asthma Management, which would require health insurers to reimburse the cost of these services.
- **Acquire federal funding to establish a return on investment (ROI).** ARC and its parent agency, Health Resources in Action (HRiA), along with nine health care providers, six Medicaid payers, and policy and training partners established the New England Asthma Innovations Collaborative (NEAIC) in order to apply for a Center for Medicare and Medicaid Innovation (CMMI) Health Care Innovation Award. CMMI, a branch of the Centers for Medicare & Medicaid Services (CMS) was created by the Affordable Care Act to launch new programs that tested payment and delivery system reforms. NEAIC was awarded \$4.2 million over 3 years to implement enhanced asthma programs at seven sites across Massachusetts, Rhode Island, Connecticut, and Vermont, including CAI. NEAIC's goal is to generate a rigorous cost analysis with the inclusion of claims data from their Medicaid payer partners, in order to calculate a ROI based on claims data, which could then be used in negotiations with payers around reimbursement for asthma home visiting services.
- **Pilot new care delivery models.** Efforts were underway throughout Massachusetts, under the leadership of the Massachusetts Department of Public Health with additional grant funding, to create pilot asthma home visiting programs, based in other primary care sites both within and outside of Boston.
- **Advocate for Medicaid Waiver and budget provisions.** Boston Children's and their partners successfully advocated for a provision in the fiscal 2011 state budget that directs the Executive Office of Health and Human Services (EOHHS) to develop a bundled payment system for high-risk pediatric asthma patients enrolled in the MassHealth program, designed to prevent unnecessary hospital admissions and emergency room utilization. However, a lengthy process that included Medicaid waivers, stakeholder meetings to develop a protocol, MassHealth's release of a request for proposals in 2013 and final acceptance of 3 sites, including Boston Children's, for the pilot in the fall of 2014, has meant the pilot has yet to launch.

Efforts like these and other possible alternative payment models that could provide a path to long-term sustainability will be explored in detail in Parts III and IV.

Scale

To be cost effective, high-intensity interventions like the CAI must target the highest risk children, so that resources are directed to both the high utilizers of health care dollars and those children most likely to experience significant improvements in health and quality of life. Patients are eligible to enroll in the CAI if they have had a hospital admission or ED visit in previous 12 months, overuse of rescue medications in last 6 months, or a prescription for oral steroids in last 12 months. Specialty and primary care providers may also refer patients to the CAI.

From inception through March 2014, the CAI has served 1,264 patients. Results thus far show that the program is working: patients with any ED visits decreased by 57% and hospital admissions decreased by 80%.²² Patients with any missed school and workdays are significantly decreased as well (see figure A3 in Appendix A). As a result, the pilot has been expanded to children from all of Boston, targeting those neighborhoods with the greatest health disparities. CAI also provided technical assistance to other hospitals seeking to start programs, using community benefit funds.

Despite a positive return on investment and falling costs over time, the CAI may seem expensive (\$2,130 per child for FY2013), but it is considerably less costly than recurrent ED visits and hospitalizations. Efforts are underway to reduce costs further. Reimbursement rates are subject to negotiations and individual payers, philanthropic donors, hospital community benefits funds, and grants will potentially support a much smaller portion of the total program costs in the future. Parallel efforts were also underway during this period to advance alternative payment models, such as the MassHealth Children’s High Risk Asthma Bundled Payment model, which will be discussed in more detail in Part III.

PART III: PAYMENT REFORM AND FINANCIAL ALIGNMENT

Pediatric asthma is prevalent and costly, and interventions to improve outcomes and reduce costs are well established. Even so, both public and private payers have resisted paying for services that have not previously been considered health care interventions. Alternative payment models (APMs) are needed to support high value asthma care and take advantage of these proven care delivery strategies.

Medicaid and CHIP—The Basics

Most children, if not covered through their parent’s insurance, qualify for Medicaid or the Children’s Health Insurance Program (CHIP). Currently, 42 million children — 1 in every 3 — are covered through Medicaid or CHIP.²³ Medicaid-eligible populations are more likely to have asthma, to have poorly-controlled asthma, and to use the emergency department for crisis-oriented asthma treatment.²⁴⁻²⁶

MEDICAID/CHIP ELIGIBILITY

State Medicaid programs are strictly regulated in terms of eligibility and services provided. Eligibility for Medicaid and CHIP is based on household income, and eligibility thresholds vary between states.

CHIP covers indigent children above Medicaid’s maximum eligibility and with a much higher federal match rate. Households with children and incomes up to 133% of the federal poverty level (FPL) are generally eligible, depending on state regulations. For a family of three, this is approximately \$27,000.

States administering CHIP programs have more flexibility, particularly for covered services. Typically, CHIP covers far fewer services than Medicaid. States may require cost-sharing for CHIP beneficiaries.

Medicaid and CHIP are insurance programs for low-income families and children, jointly funded by the federal and state governments and administered by the states. The amount of federal funding given to each state, typically about 57% of the total program cost,²⁷ depends on the per capita income in each state. Although there are state by state variations, the programs pay for a range of traditional medical services, which are defined by broad federal guidelines.

Each state has its own federally-approved Medicaid State Plan. States may amend their Medicaid plans only in accordance with CMS rules. CMS may also grant States flexibility in administration of their Medicaid plans through “waivers” to implement non-standard delivery innovations. Waivers must be approved by CMS, budget-neutral, and cannot be used to decrease eligibility or exclude mandatory services. It is important to note that making the practice changes suggested throughout this paper may require further Medicaid amendments and, potentially, changes to the law.

Increasing Medicaid Costs and Reform Attempts

Medicaid expenditures have continued to grow, and cost-containment is a major focus of state and federal administrations. Between 2000 and 2012, total Medicaid expenditures increased from \$263 billion to \$429 billion dollars (4.1% compound annual growth rate).²⁸ This rapid growth can be attributed to expanded patient eligibility and parallels the growth rates of health care expenditures generally.²⁹ To address the dual problem of costs and quality, in the 1990s, states began enrolling beneficiaries into managed care plans, which often control costs by reducing physician fees.³⁰ By 2009, more than 70% of Medicaid patients were covered by a managed care plan.³¹⁻³³

Although government-run FFS Medicaid already has the lowest physician fees, many states have not seen lower costs in Medicaid managed care.^{31,34} Additionally, expected quality improvements from managed care programs have largely not materialized. Given these results, states and private insurers have begun to explore new payment and delivery models.

The Spectrum of Payment Reform Options

A spectrum of payment reforms exist, ranging from FFS to full capitation. APMs can better support clinical care redesign and delivery changes that improve value, because interventions like the CAI can improve outcomes at decreased cost. More opportunity exists for sustainable funding as reform moves toward more population-based models that give clinicians greater discretion to offer services not reimbursed under FFS. APMs are designed to improve quality and reward value, and can support system transformation. Both Medicaid and private payers are piloting APMs to incent high quality care and reduce costs. In exchange for greater autonomy, clinicians are held accountable for both costs and quality. Below, we provide an overview of the common models and illustrate reform efforts in Massachusetts and elsewhere.

Partial Capitation

Partial capitation takes two forms. The first of these is a small (\$1-\$15, risk adjusted) per-member per-month (PMPM) payment to health care providers for care coordination, in addition to any FFS revenue a provider already receives. The second form is a larger payment that

DELIVERY REFORM MECHANISMS

Patient-Centered Medical Homes (PCMHs) are intended to better manage chronic conditions like asthma by providing additional funding for care coordination and care redesign. PCMHs may also be named health homes and can serve as the hub of a larger delivery reform known as a “*medical neighborhood*”—an integrated community of both clinical and social services providers, like public health organizations, home health providers, schools, food banks, and others.

Accountable Care Organizations are vertically integrated provider organizations (primary care, inpatient, ED, post-acute care etc.) that are designed to improve coordination between providers. Providers in these organizations are jointly accountable for overall quality and cost of care.

ACUTE AND CHRONIC BUNDLES:

Bundles generally fall into two categories: acute bundles (for episodes such as a knee replacement or asthma hospitalization) or chronic care bundles (for conditions such as diabetes or chronic asthma).

- **Acute bundles** typically reimburse a fixed amount for conditions related to inpatient and outpatient services for a defined time period.
- **Chronic care bundles** typically provide a fixed reimbursement for outpatient care over a defined time period. The bundle allows significant discretion about the nature and frequency of care provided.

actually shifts provider revenue away from service-based reimbursement to person-based reimbursement (i.e., a large set of services, like evaluation and management, are covered by the payment). PMPMs can be incorporated into a variety of delivery reforms, including accountable care organizations (ACO) and patient-centered medical homes (PCMH).

Bundle or Episode Based Payments

Bundled payments provide a fixed reimbursement for a defined set of services over a limited time period. Although payments are fixed, they do vary with quality (see Appendices D and F). The provider is responsible for all included treatment costs for patients within a bundle. Providers are eligible to

share in savings for efficient care but also assume financial risk if care is more expensive than the specified bundled payment. As a result, this model financially incents providers to closely manage patient care episodes to improve value.

For pediatric asthma, providers are able to offer enhanced education and environmental remediation services to high-risk patients to prevent high cost ED visits and hospital admissions. Risk-adjusted bundles help ensure that providers are compensated fairly for treating sicker and more complicated patients.

Shared Savings/Shared Risk

Shared savings models (one-sided models) offer providers an opportunity to retain some of the savings resulting from high quality, cost-effective care, thereby providing more resources for innovative, efficient approaches to care delivery. Shared risk models (two-sided models) afford providers an opportunity to retain more of the savings resulting from high-quality, cost-effective care, but also hold them accountable for losses if costs are higher than expected. These new models encourage improved care coordination and efficiency. Both shared savings and shared risk models are common in ACO and PCMH delivery systems.

Full Capitation

A comprehensive capitated model, often referred to as a global payment, is one payment paid to the provider for a population of patients over a defined period. Most commonly taking the form of a PMPM or per-member per-year (PMPY), a provider will receive a fixed payment to provide and coordinate all the services for a particular patient; capitated payments are usually tied to a variety of quality and service metrics to ensure quality and justify bonus payments like shared savings. Capitation allows providers more flexibility and decision autonomy to offer whatever services are needed while holding them fully accountable for the overall cost of care.

There are a variety of performance metrics for asthma. Examples of process measures (generally considered to be within the control of the provider) include percentage of asthma inpatient's administered relievers or percentage discharged with a home management care plan. Better outcome measures are the ultimate goal of quality improvement and include metrics such as asthma hospital admission rates.

Financial Sustainability Efforts in Massachusetts

Massachusetts is at the vanguard of national health reform and has established a goal of transitioning at least 80% of care to new value-based models by July 2015.³⁵ There are currently 5 Pioneer ACOs operating in Massachusetts as part of the Medicare Shared Savings Program (primarily for adults).³⁶ The state has attempted, either directly or indirectly, to fund asthma education and home-based environmental interventions through several different initiatives, including payments for care coordination and a payment bundle for pediatric asthma. Even so, the state has yet to fully implement state-wide payment reforms, which could provide more sustainable and broader support for proven clinical programs like the CAI.

Table 2 illustrates how payment reforms can support non-traditional services for pediatric asthma patients in Massachusetts. Most notable is the Children’s High-Risk Asthma Bundled Payment (CHABP) pilot that provides a \$50 PMPM to support provision of non-traditional services. Children will be eligible for the CHABP if they have 1) “high-risk” asthma, defined as an asthma-related hospitalization or ED visit; or an oral corticosteroid prescription for asthma in the last 12 months and 2) poorly controlled asthma, as evidenced by two scores of 19 or lower on Quality Metric’s Asthma Control Test (ACT™).

Table 2. MassHealth (Massachusetts Medicaid) Operationalization of Spectrum of Payment Reform

MASSACHUSETTS PAYMENT REFORMS			
	PATIENT CENTERED MEDICAL HOME INITIATIVE	CHILDREN’S HIGH-RISK ASTHMA BUNDLED PAYMENT	PRIMARY CARE PAYMENT REFORM INITIATIVE
Overview	<p>From 2009-2014 MassHealth had a two-prong delivery and payment reform in which PCMHs could receive:</p> <ul style="list-style-type: none"> • Small PMPM (\$1.50 ongoing, with a \$0.6 add-on for children) for care coordination and management. • Start-up infrastructure payments for development costs (up to \$15,000 in the first year, apportioned across participating payers based on members of the practice, up to \$3,500 in the second year).³⁷ 	<p>In July 2014, MassHealth received approval from CMS to establish the bundled payment pilot. Providers will enter into contracts through a competitive procurement process.³⁸</p> <p>For Phase 1, participating practices will receive a \$50 PMPM that funds patient and family education, environmental home assessments from culturally appropriate community health workers (CHWs), and supplies to mitigate environmental asthma triggers. Participating practices continue to bill MassHealth for medically necessary covered services.</p>	<p>The Primary Care Payment Reform Initiative (PCPRI) was launched in January 2014.³⁹ The program includes a two-part comprehensive payment.</p> <ul style="list-style-type: none"> • The first part is a medical home/transformation payment (\$12.50 PMPM, with risk adjustment) for care coordination and management. • The second part pays for the majority of all primary care services and some behavioral health services (median \$60 PMPM, risk adjusted)*
Value-Based Payment Options	<p>The methodology that has been submitted to CMS but not yet approved is that providers would be eligible for shared savings beyond a 5% threshold. If approved, practices will be eligible to keep 30% of savings in year 1, 40% in year 2, and 50% in year 3.</p>	<p>In Phase 2, a comprehensive bundled payment will be developed, to fund certain both medically necessary services and the non-traditional medical services as well as the non-traditional support services provided in Phase 1.</p> <p>This model offers greater flexibility to deliver services in the most efficient manner; enabling providers to allocate staff resources and supplies in a manner that provides maximum benefit to CHABP patients.</p>	<p>Subject to CMS approval, two value-based payment streams in addition to capitated payment (Appendix B):</p> <ul style="list-style-type: none"> • Quality Payment: Based on quality metrics, providers can receive an annual retrospective incentive payment of up to 5% of the total capitation amount. • Shared savings / Shared risk[†]: Providers receive a share of savings/losses against a total medical expenditure target, with the savings/loss calculations generally capped at 10%. There are three

MASSACHUSETTS PAYMENT REFORMS

	PATIENT CENTERED MEDICAL HOME INITIATIVE	CHILDREN'S HIGH-RISK ASTHMA BUNDLED PAYMENT	PRIMARY CARE PAYMENT REFORM INITIATIVE
			options for phased risk: 1. <i>Shared savings/Shared risk</i> : Symmetric risk (60% share). 2. <i>Hybrid</i> : Gain-sharing only in Year 1 (maximum of 50% share); downside (up to 60% share) capped by 5% of target in Year 2; symmetric risk in Year 3 (up to 60% share). 3. <i>Upside only</i> : Gain-sharing only (up to 50% share)
Challenges	Generation of accurate data and attribution of patients to the correct provider was a challenge.	Complex and time-consuming waiver negotiations (especially in regards to patients' eligibility for the bundle), use of non-licensed providers, and avoiding duplication of payment and services. Only Primary Care Clinician (PCC) providers are eligible	<ul style="list-style-type: none"> Most PCC are eligible to participate if their Medicaid panel size is over 500, including pooled participants and if they meet other requirements (e.g. EHR functionality). Generating accurate data is an issue and some providers feel the system is changing too fast.
Outcomes	47 providers participated. ⁴⁰ 32 of the participating practices received payments, with an estimated 177,000 lives attributed to those practices that received payment.	A limited number of providers will participate in pilot, covering only 200 patients.	Over 75,000 MassHealth beneficiaries are currently covered. Some providers did not participate for financial reasons and desired to move toward an ACO delivery model with capitation.
<p>Accountable Care Organization (ACO); Center for Medicare & Medicaid Services (CMS); Children's High-risk Asthma Bundled Payment (CHABP); Community Asthma Initiative (CAI); Fee-for-service (FFS); Managed Care Organization (MCO); Massachusetts Medicaid (MassHealth); Patient-Centered Medical Home (PCMH); Per-member-per month (PMPM); Primary Care Clinician (PCC); Primary Care Payment Reform Initiative (PCPRI)</p> <p>*The approximate range of PMPM is: low \$30 PMPM, median \$70 PMPM, and high: \$215 PMPM. The payment is risk adjusted based on tier, cost structure, setting, patient population, leakage, etc. †Participation in the tracks depends on attributed lives, which can be pooled across providers, but providers must have a minimum of 3,000 patients for shared savings and 5,000 patients for shared risk.</p>			

Payment Reform for Asthma Care across the Nation

Multiple states are experimenting with payment reform to better align financial incentives with improved quality and lower costs. Below are selected examples from other states, which illustrate a range of options.

Arkansas: Chronic Condition Bundles and Patient-Centered Approaches

Arkansas has transformed their Medicaid system through the Arkansas's Payment Improvement Initiative (APII). APII is a state-wide, two-prong approach with the goal of eliminating FFS from Arkansas within two to three years. The reform includes bundled payments for episodic care and population-based care delivery through medical and health homes. APII was intended to offer greater flexibility for clinicians to shape care delivery while encouraging cost savings.

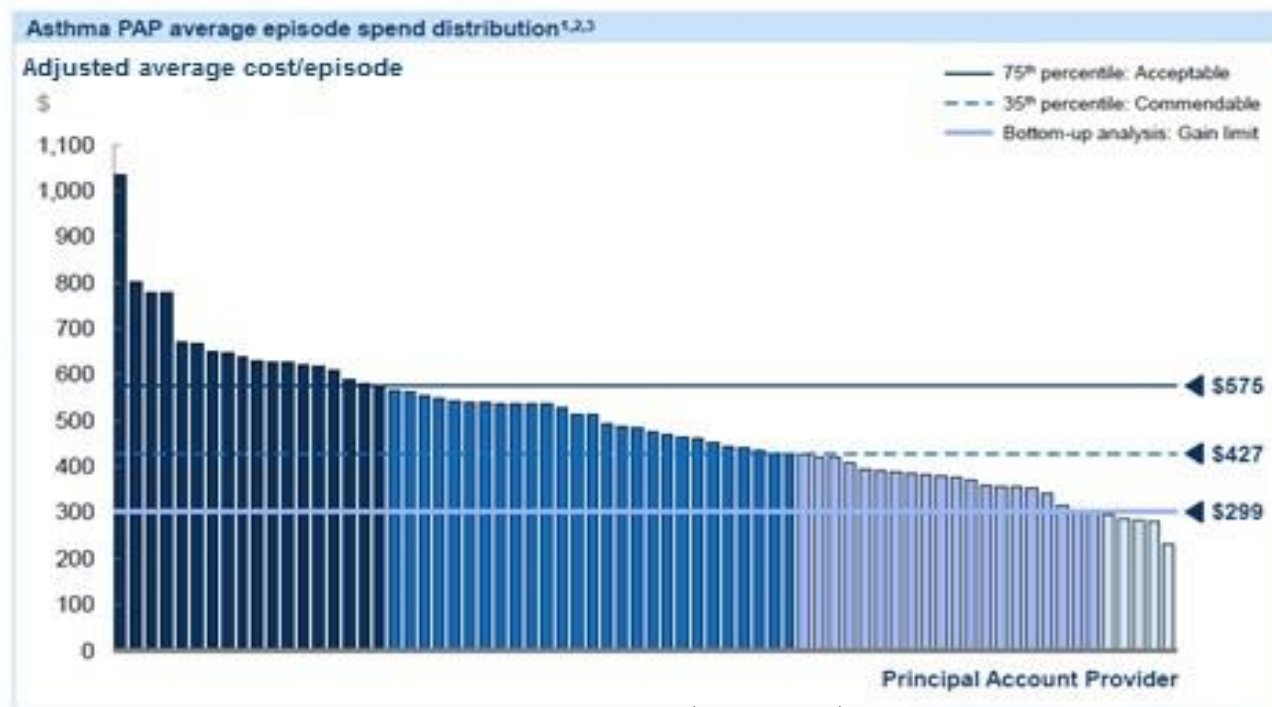
Asthma Retrospective Episodic Bundle

APII created a 30-day bundle to pay for inpatient and outpatient services triggered by either an ED visit or an inpatient admission for pediatric asthma (See Appendix C). Once triggered, the hospital becomes the Principal Accountable Provider (PAP) and is responsible for managing the patient's care.^{41 1} The PAP is responsible for coordinating services throughout the length of the bundle and is accountable for both cost and quality.⁴² PAPs submit required billing information (i.e., regular FFS claims) and quality data

¹ Private payers may choose the PAP for the asthma bundle, but most of them have chosen the hospital.

through a provider portal. Providers receive quarterly reports detailing their utilization, cost, and quality. The PAP's average cost across all episodes is compared to "acceptable" and "commendable" costs based on similar data from peers. The PAP may be eligible for savings but may also be required to refund excess charges to the payer.⁴³ **Figure 3** illustrates the "gain limits," as well as "acceptable," and "commendable" episode cost thresholds for pediatric asthma.

Figure 3. Asthma PAP average episode spend distribution, 2011-2012⁴³



Notes: Acceptable, commendable, and gain limit have been set at 75th percentile, 35th percentile, and bottom-up threshold, respectively. Only PAPs with >=5 episodes included (70 PAPs). Percentiles based on sample of PAPs with >= 5 episodes. Adjustments (adj.) reflect risk and/or severity of factors of the patient and certain patient exclusions.

Source: Arkansas Medicaid claims paid, July 2011 – June 2012

This bundle differs from MassHealth's bundle in a number of ways:

- 1) **Services Covered.** In-home education and environmental services are not specifically covered. APII providers can use "gain sharing" to provide these services to high-risk patients (about 3% of patients visiting the ED for asthma are likely to be readmitted). If the PAP could reliably identify those 3%, they might choose to provide enhanced services, may partner with public health providers, or may better coordinate with the patient's PCMH.
- 2) **Payment Timing.** The Arkansas bundle is a retrospective bundle, not a prospective bundle like Massachusetts's. Clinicians in Arkansas strongly resisted prospective bundles; resistance stemmed from concerns about the fragmented health care system and the potential for financial instability. Physician buy-in for system change was critical. After extensive review, Arkansas and its payers established a retrospective bundle instead.
- 3) **Bundle Construction.** Arkansas relied on outside data experts to a greater extent than MassHealth. Arkansas partnered with consulting firm McKinsey & Company to not only

construct the bundle, but to develop data tools for providers (such as the quarterly provider cost and quality reports). MassHealth relied on the University of Massachusetts to perform similar functions.

- 4) **Multi-payor, State-wide Initiative.** Arkansas has a unique payer landscape, such that two health plans dominated the majority of the state. This, compounded with the state-wide APII, nearly all physicians participated. Participation in Massachusetts bundle pilot was voluntary and limited, resulting in uneven coverage and reimbursement across providers and communities.

Patient-Centered Medical Homes

Arkansas began implementing patient-centered medical homes (PCMHs) in 2012 through the Comprehensive Primary Care (CPC) initiative and extended the program to its Medicaid beneficiaries in 2014. Currently, PCMH participating payers include Medicare, Arkansas Medicaid, Arkansas Blue Cross and Blue Shield, Humana, and QualChoice of Arkansas. As of December 2013, more than 600 providers had signed up to participate as PCMHs, covering 72% of all Medicaid beneficiaries in the state. Enrolled providers receive a small PMPM payment for care coordination (\$1-\$30, risk adjusted, with the average of around \$4)⁴⁴ and non-CPC providers (non-Medicare providers) receive an additional practice support and transformation fee. CPC providers with at least 5,000 members are eligible to receive shared savings if they meet specified cost and quality criteria. Participating providers receive a quarterly report to ensure accountability and transparency on important metrics, like readmission rate and percent of patients on appropriate asthma medication. An example quarterly report is available in Appendix D.⁴⁵

Arkansas's PCMH differs from other states' PCMH approach in that providers may informally pool Medicaid beneficiaries to receive shared savings without combining practices. In 2015, Arkansas will default those practices that have not self-pooled into auto-constructed pools, resulting in population-wide accountability in the Medicaid system.⁴⁶ In addition, the PCMH will also be required to track each pool's top 10% of utilizers, implement electronic-medical records, and join an electronic information sharing program to distribute hospital discharge information, among other requirements.⁴⁶

Through the enhanced practice support PMPM and shared savings, practices and providers have more flexibility to provide efficient care to their patients. For example, providers are able to offer extended services such as enhanced patient education and environmental remediation to the highest risk patients. Since providers are already required to identify their top utilizers, they are prepared to identify the children at highest risk for asthma complications.

ARKANSAS SUMMARY

- Medicaid and private payer reform through Arkansas's Payment Improvement Initiative (APII)
- Acute asthma care bundled payments managed by the hospital with an opportunity for shared savings
- PCMH coordination fee that gives providers flexibility to provide extended services

New Jersey: Delivery System Reform Incentive Payment

New Jersey is one of eight states whose Medicaid programs are experimenting with CMS's Delivery System Reform Incentive Payment (DSRIP) program. The program, implemented through a waiver, represents a total federal investment of over \$30 billion and works in concert with each state's existing health reforms to accelerate progress toward the triple aim.^{47,48} As seen in **Table 3** below, DSRIP typically involves hospitals developing plans to shift care delivery away from acute settings. Newer DSRIP payment models allow greater flexibility to customize the program to each state's infrastructure.

Hospitals are not required to participate, but if they do, they must select from list of projects pre-approved by the state and CMS.

Table 3. Summary Table of DSRIP Programs

STATE AND YEAR	TOTAL FEDERAL INVESTMENT	SCOPE OF PROGRAM
California, 2010	\$3.3 billion	Only public hospitals; 21 in total
Massachusetts, 2011	\$628 million	Only safety net hospitals; 7 in total
Texas, 2012	\$11.4 billion	Regional provider partnerships with hospital leads; 20 partnerships with hundreds of providers
Kansas, 2013	\$60 million	Only public teaching hospitals or city children’s hospitals; 2 in total
New Jersey, 2013	\$583.1 million	Only acute care hospitals; 55 in total
New York, 2014	\$6.92 billion	Regional safety net provider partnerships with hospital leads; unknown participation level
New Mexico, 2014	\$29 million	Public teaching hospitals or sole community providers; unknown participation level
Alabama, 2014 or 2015	Unknown	Still negotiating with CMS, but will likely include hospitals working with regional care organizations

In New Jersey, the projects focus on eight conditions: asthma, obesity, HIV/AIDS, cardiovascular disease, behavioral health, substance abuse, diabetes, or pneumonia.⁴⁹ Once a hospital selects one or more project areas, they develop a plan where they receive additional pay-for-performance (P4P) bonus payments over a five year period. These payments are intended to improve outcomes for an attributed population with these conditions (See Appendix E for a complete list of measurable asthma outcomes that will be used). They also incentivize hospitals to provide high-quality care, contain costs, offer services not typically compensated for, and in general, shift the focus from acute care to disease prevention and management.

NEW JERSEY SUMMARY

Medicaid reform through Delivery System Reform Incentive Payment (DSRIP) waiver

- Hospitals receive additional funding to support preventive care
- Two hospitals have pediatric asthma programs that provide case management and home assessments through a P4P model.

Three of New Jersey’s DSRIP hospitals are implementing asthma programs that include home assessments, case management, and education to teach optimal asthma care.^{50,51} Through these programs, hospitals identify children with asthma-related ED visits or inpatient admissions. A case manager then provides selected services, both environmental and educational, to better control the child’s asthma.

In the first year of the program, one of the hospitals received \$3.8 million (the hospital had 315 beds, with approximately 56% Medicaid admissions). The other hospital received \$1.8 million (500 beds, approximately 25% Medicaid). Similar to the bundled payment mechanism in Massachusetts, the P4P mechanism affords a great deal of flexibility in how care is delivered.

Oregon: Care Coordination, Health Homes, and Asthma

Much like Massachusetts, there are a number of complex health reforms underway in Oregon. In 2009, Oregon began implementing patient-centered primary care homes (PCPCH) for its entire population.⁵² These PCPCHs essentially perform the same function as the medical homes described above. In 2012,

Oregon received a CMS waiver to develop coordinated care organizations (CCOs) for its Medicaid population. These organizations coordinate and deliver medical, mental, and dental health for a defined population, not unlike a medical neighborhood or a highly integrated ACO. CCOs are funded by Oregon’s Health Authority through a global budget with a composite PMPM of approximately \$350. This PMPM rate is in stark contrast to Massachusetts’s smaller PMPM (\$12.50) because Oregon’s PMPM covers a much broader range of services. The PMPM rate is determined by a number of components including risk-adjustment, service coverage, provider tax reimbursements, and the Medicaid beneficiary’s eligibility for other programs such as Temporary Assistance for Needy Families.⁵³⁻⁵⁵

Health care entities contract with CCOs with flexible budgetary arrangements to provide appropriate medical services. Through this federal waiver, Oregon has also been able to expand the use of non-traditional services and non-traditional health workers, such as community health workers (CHWs), to provide enhanced asthma case management.⁵⁴ Waiver CCOs currently account for 90% of all Medicaid enrollees in Oregon.⁵⁶ Over the next 10 years, CCOs are projected to save more than \$11 billion.⁵⁷

OREGON SUMMARY
<ul style="list-style-type: none"> • Developed Coordinated Care Organizations (CCOs). • CCOs operate under a global budget and have a mechanism and payment to support CHWs and other non-traditional services.

Aligning Incentives and Risk Stratification

Payment reform can drive delivery transformation that enables providers to deliver high-value care. Each of the payment reforms highlighted above are customized to the local health care infrastructure, varying stakeholder buy-in, and perceived political feasibility. In some cases, total capitation (e.g., Oregon CCOs and Massachusetts PCPRI) has been implemented. In other cases, bundles and P4P payment models (e.g., Arkansas and New Jersey) have been established. Different payment models tailor financial incentives for different diseases, specialties, and care settings.

Table 4 summarizes some of the Arkansas and Massachusetts alternate payment model approaches. Patient-level data is critical to enable providers to target resources to the highest-risk patients. This allows resources to be deployed to the highest utilizers to gain better control of their asthma. Also critical is the need to coordinate care and utilize existing infrastructure. Providers should seek to partner with existing community resources that have experience and success in delivering non-medical interventions that can defray the cost of providing these interventions in a medical setting.

Table 4: Arkansas and Massachusetts Payment Model Incentive Analysis

	ARKANSAS PAYMENT MODEL	MASSACHUSETTS PAYMENT MODEL
Acute Exacerbation	<u>Acute asthma bundle</u> <ul style="list-style-type: none"> • Costs cannot exceed \$575 • Shared savings, up to a maximum of \$276. • Principle Accountable Provider (PAP) responsible for all costs within 30-day window, including readmissions. 	<u>Children’s High-risk Asthma Bundled Payment Pilot (CHABP):</u> <ul style="list-style-type: none"> • Phase 1: \$50 PMPM to fund non-traditional services such as home visits and asthma mitigation supplies • Phase 2: Comprehensive bundled payment to fund all asthma-related services (dollar amount TBD)
Primary Care	<u>Patient-Centered Medical Home (PCMH):</u> <ul style="list-style-type: none"> • \$1-\$30 PMPM, must identify top 10% utilizers. • Eligible for up to 50% of shared savings based on past utilization and quality 	<u>Primary Care Payment Reform Initiative (PCPRI):</u> <ul style="list-style-type: none"> • \$12.50 PMPM medical home/transformation payment, and median \$60 PMPM (capitation). • Subject to CMS approval, PCPRI participants may also be eligible for additional quality and shared

	benchmarks.	savings (and shared risk) payments.
Analysis	Incentives are large enough for PAPs and PCMHs to coordinate care and intervene on the highest risk patients. PAPs must avoid readmissions and PCPs must meet quality benchmarks to capture shared savings.	Providers must target services to the highest-risk patients with the greatest need. The \$50 PMPM may be a small amount relative to the total cost of the enhanced services. Providers need to pool PMPM and match intensity with patient.
Massachusetts Medicaid (MASSHealth); Patient-Centered Medical Home (PCMH); Per-Member Per-Month (PMPM); Principal Accountable Provider (PAP); Primary Care Payment Reform Initiative (PCPRI); Primary Care Provider (PCP)		

APMs increase provider flexibility and control over patient care. By shifting away from FFS payment models, APMs such as bundled payments, PMPM and other capitation models allow mid-level and clinical support staff to provide care to patients and practice at the top of their license. This increases efficiency by freeing the physician’s time to focus on the sickest and most complex patients, and allows the practice to take on more patients, without hiring new clinical staff or asking providers to increase their patient load. These new models allow enhanced interventions (e.g. CAI) to be delivered, which will help improve patient outcomes.

Payment Reform and Public Health

FFS payments support medical care for sick patients, but often fail to support non-medical interventions that can improve outcomes and reduce health care costs. APMs allow greater flexibility in provision of non-traditional services through the medical system, but in some instances these services will overlap with existing public services. In the CAI example, enhanced coordination of medical services and provision of home-based, culturally sensitive asthma education largely fall within the traditional purview of the health care system. By contrast, provision of household supplies like HEPA vacuums, air conditioners, and environmental remediation services fall outside of traditional conceptions of medical care. However medical care providers are likely the best suited to determine which patients would really benefit from these interventions. The most cost-effective method of addressing non-medical precipitants of asthma remains to be determined.

A host of local, state, and federal agencies (see **Table 5**) are relevant to effective asthma management. The CDC and local departments of public health should play an important role in disease surveillance and in coordination of an effective public response to disease. Education about basic sanitation principles may fall in the domains of the Department of Education or Department of Social Services. For indoor air pollution, Housing and Urban Development bears responsibility for inspecting and regulating public housing to ensure that buildings meet basic health and safety standards. Outdoor air pollution is regulated by the Environmental Protection Agency. Unfortunately, these disparate agencies are often not well coordinated and provide services that may be difficult for patients and clinicians to access.

Current delivery and payment reforms do little to address non-medical determinants of health and engage the public health system.⁵⁸ Even population health oriented reforms such as ACOs and PCMHs have usually relied on traditional medical providers to prevent and treat disease. Medical care currently occurs in silos isolated from public health entities, and this organizational structure is difficult to break. Some non-traditional services like those provided through the CAI could be provided on an ad-hoc basis through the health care system, but services are likely to be heterogeneously delivered and at greater cost than if they were provided through other government agencies.

Public services are better positioned to prevent some illnesses before patients engage the medical system but many are severely underfunded: 75% of health care costs are directed to treatment of

preventable diseases yet only 3% of health care dollars are spent on disease prevention.⁵⁹ The Prevention and Public Health Fund (PPHF) was created in the Affordable Care Act to expand and sustain national investments in preventive and public health services. The PPHF received a \$3.25 billion congressional appropriation through FY2013.⁶⁰ The inexorable growth of health care spending has come at the expense of other public-health related government services at the local, state, and federal levels; even the PPHF is at risk for reductions with every budget cycle.^{61,62}

Table 5: Federal Asthma Initiatives and Programs

PROGRAM/INITIATIVE	OWNER	GOALS
Healthy Homes	Housing and Urban Development (primary ownership) Other agencies provide input, including the Departments of Health and Human Services, Agriculture, and Energy; the Environmental Protection Agency; and the National Institute of Standards and Technology)	Healthy Homes grants are awarded to non-profits, for-profit firms, state and local governments, federally-recognized Native American tribes and colleges and universities to protect children and their families from housing-related health and safety hazards
National Asthma Control Program (NACP)	Centers for Disease Control and Prevention	The NACP funds states, cities, school programs, and non-government organizations to reduce deaths, hospitalizations, emergency department visits, school days or workdays missed, and limitations on activity
President's Task Force on Environmental Health Risks and Safety Risks to Children, Coordinated Federal Action Plan to Reduce Racial and Ethnic Asthma Disparities	Office of the President	To promote synergy and alignment across numerous federal programs
National Asthma Education and Prevention Program	National Heart, Lung, and Blood Institute (primary ownership) Also partners with four other major federal agencies (Department of Education, Department of Health and Human Services, Environmental Protection Agency, and Housing and Urban Development).	To provide expert medical treatment recommendations for clinicians and asthma programs
Department of Education, Office of Educational Research and Improvement	Managing Asthma: A Guide for Schools	To provide schools with practical ways to help students with asthma participate fully in school activities

Public health services are funded and delivered by a host of community organizations, county, state, and federal agencies, depending on the condition. Better coordination between existing public agencies that impact health could help prevent complications from chronic pediatric conditions like asthma, obesity, diabetes, and mental health diseases. In the absence of effective support for medical and public health partnerships, payment reforms may lead to duplication of public health services.

An alternative model is one that enhances coordination between the health care system and public health, such as the Boston Asthma Home Visit Collaborative, a collaboration between multiple asthma home visiting programs, including CAI, one payer, and the EPA, which is facilitated by the Boston Public Health Commission. The mission is to ensure that Community Health Worker asthma home visits throughout Boston are readily available, high quality, culturally and linguistically appropriate, cost-effective “and funded primarily by those sources that pay for traditional medical care.”⁶³

Another example of a state-led public health program is the Oregon Asthma Program, which has been in operation since 2000 and is funded by an ongoing grant from the CDC. The program is designed to combat asthma from a public health perspective and includes data collection and disease surveillance; dissemination of asthma resources and information to physicians, parents, and schools; and coordination with other state reforms to reduce the burden of asthma and improve care outcomes.⁶⁴ Although many enhanced asthma services are still primarily be supported through a CDC grant, the Oregon CCO asthma case manager coordinates all health resources for children with asthma. The Oregon asthma program partners with other programs including the Living Well with Chronic Conditions program,⁶⁵ the Patient-Centered Self-Management Collaborative,⁶⁶ and the state’s Tobacco Prevention and Education Program.^{67,68} It will be important to track the results of efforts like the Oregon CCO to better integrate the public health and health care systems.

PART IV: LESSONS LEARNED AND POLICY IMPLICATIONS

Physicians drive the majority of health care treatment decisions and spending, making clinical leadership critical for effective health care reform. In this case study, we examine how new payment models support greater clinical leadership and provide flexibility to offer services that improve outcomes and reduce costs for pediatric patients with asthma. While pediatric asthma has many distinct attributes, payment reform themes that have resonated throughout the Merkin Initiative series are broadly applicable. In this section, we examine some of the challenges of clinical redesign, explore lessons learned, and provide actionable recommendations for policy makers.

We draw several lessons from this case study about how different payment models shift payments from a focus on volume to a focus on improved patient outcomes and efficiency.

Lesson 1: Clinical Leadership Can Drive Health Care Reform

Clinicians and health systems are uniquely positioned to generate ideas based on patient needs and to conceive pragmatic solutions. They are keenly aware of the inefficiencies and distortions created by the existing FFS payment model. They witness firsthand how the current system can fail their patients, and have ideas about how the system can be improved. With increased flexibility that new payment models provide, physicians are better able to offer the care that their patients need to be truly healthy.

The Community Asthma Initiative (CAI) described in Section II illustrates how an idea generated by clinicians and hospitals led to care redesign that better meets community needs. In its pilot phase, the CAI demonstrated the proof of concept needed to pursue sustainable funding. As with the CAI, pilot projects are often supported from a variety of sources, including philanthropy and grant funding. However, the type of funding has important limitations:

- **Not scalable.** Most philanthropic and grant funding is provided on a short-term basis and does not allow for scalability.

- **Inefficient.** Pursuit of grant and philanthropic funding frequently requires extensive time and effort, funding often comes with substantial constraints, and projects are often limited to specific organ systems or conditions. Pilot projects often involve extensive administrative overhead as well as evaluation and reporting costs. Projects funded in this fashion are commonly layered on top of the existing FFS system, and multiple overlapping and poorly coordinated initiatives may exist in the same health care market.
- **Unsustainable.** Because most philanthropic and grant funding is time-limited, care supported through these mechanisms is difficult to sustain. Short-term funding mechanisms may introduce further inefficiency and impede lasting change if critical personnel are lost during funding gaps.

Data collection during the pilot phase is critical. To justify long-term funding, programs must demonstrate better results or lower costs – preferably both. Clinician leadership in implementation, refinement of care redesign, and engagement in new payment models are essential for scalable, sustainable care innovation.

Recommendation: Clinical leadership must develop new clinical programs with a plan for long-term sustainability. Sustainable care redesign requires ongoing funding from public and private payers. For example, providers in Massachusetts can use the prospective pilot bundle payment of \$50 PMPM for high risk asthma patients to deliver enhanced and flexible care to their patients that is not currently reimbursed under FFS. This payment gives providers independence from unsustainable grant funded programs.

Lesson 2: There Must Be a Business Case for Change

The Merkin Initiative case series and the experience of Massachusetts and Arkansas demonstrate that payers (public and commercial plans) play a vital role in health care reform.

Payers must understand that clinicians and facilities run businesses and thus cannot be expected to voluntarily assume losses or assume untenable risk. To engage clinicians and providers in new payment models, payers must make a clear and compelling business case for participation. Payment reforms must be of sufficient magnitude to justify desired investments in staffing and infrastructure. Conversely, clinicians must recognize that payers will not simply pay for more services without confidence that outcomes will really change or expected savings will materialize. Large up-front payments will come with direct financial accountability for overall costs of care.

It is possible to estimate the costs of care redesign and the expected savings. A fundamental shift in payment is not necessarily required to initiate change, and incremental shifts can be an effective way of enabling clinicians to gain experience and confidence with new delivery models. However, there is

FINANCIAL REFORMS IMPACT PRACTICE CHANGES IN ASTHMA

While investments in community services and environmental remediation improve outcomes and reduce costs, for physicians to make changes to their practice, the incentives must be clear and sufficiently large to justify the investment.

Examples of payment changes are:

- In Massachusetts, add-on payments to primary care reform initiative providers are \$12.50 PMPM or \$50 PMPM for high risk asthma cases in the bundled payment pilot, and practices may realistically extend the spectrum of services they provide.
- In Arkansas, an acute care bundle is matched with add-on payments to primary care medical homes averaging \$4 PMPM. In this payment environment, primary care practices may refer patients to outside services.

increased complexity as new models are layered on top of FFS. Given the intricate payment formulas associated with these models, clinicians may struggle to accurately forecast the accompanying payment and the scope of resources available for their patients. Although the transition process can be difficult, payers and clinicians must work together to develop a sustainable financial model for providing population-based health care.

Establishing the right pathway for payment reform is challenging within a mixed payment model and may not reflect the results achieved if only one mechanism is used. Conversely, large payment changes may be simpler to implement but too risky or disruptive for practices. The magnitude of the incentive depends in part on the proportion of patients within specific mechanisms. Incentives may have different implications depending on the setting. For example:

- Some hospitals with consistently **high occupancy** may find it desirable to avoid asthma hospitalizations because the same beds can be filled by higher revenue FFS patients.
- A hospital with consistently **low occupancy** may change little in the face of small incentives because they need to maximize hospital occupancy.

Recommendation: Payers must make a compelling business case for change. The financial incentives for clinicians must be clear and sufficiently large to justify significant investments in practice change. Payment reform must be accompanied by transparent projections of costs and revenues associated with desired practice changes. Payers and providers will need to collaborate to customize incentives to local circumstances that are gradually and iteratively implemented to avoid disruption.

Lesson 3: Technical Challenges of New Payment Models Must Be Overcome

Accurate data is critical to providing efficient, effective health care. Both payers and providers need detailed data on the patients assigned to clinical practices, care utilization patterns, and patient outcomes. When Massachusetts initiated their voluntary multi-payer Patient Centered Medical Home Initiative many provider groups declined to participate because of data challenges in matching patients to participating practices. Payers understandably want evidence that the intervention is cost-effective and in some cases, cost-saving. While CAI performed a preliminary cost analysis their efforts to calculate an accurate ROI was limited by the difficulty obtaining claims data from payers, a process that has taken years. When CAI engaged payers to support their intervention, payers expressed concern the methodology used to calculate the return on investment. When Arkansas engaged clinicians and payers in their state-wide payment reform, the perception that data was reliable was critical for gaining stakeholder support.

Administrative functions consume an excessive proportion of health care resources under FFS payment.⁶⁹ The layering of new payment models on top of FFS may compound that problem. Hybridized payment models in which some care is provided on a FFS basis while other care is provided within bundled payment models adds administrative complexity, at least in the short term. Additionally, hybrid models may blunt intended incentives to provide efficient care.

Successful implementation of new payment models will be technically challenging. Most clinical practices and hospitals lack the requisite expertise and infrastructure to develop and maintain accurate economic models that support population-based medical practice. Uncertainty arising from new payment models adds to the business risk of participating. For example:

- **Data Accuracy.** The perceived fairness of patient attribution models and the accuracy of performance metrics are critical for enduring clinician support for payment reform.
- **Complex technical rules.** Add-on bundle and PCMH payments in Massachusetts vary depending on patient risk, patient attribution to the practice, and whether additional services are provided by providers outside the PCMH panel. Payments are further adjusted for performance on quality metrics.
- **New tracking and data mechanisms.** New payment models require clinicians to track care utilization and quality metrics across providers and settings. Achieving a comprehensive view of patient care presents a major challenge to many providers and facilities because many do not share a single electronic medical record (EMR). Data from payers is particularly critical when care is provided outside of an integrated delivery network.
- **Manage complex accounting.** New payment models may require providers to distribute payments and shared savings across providers and settings.
- **Insurer Consistency:** In the current environment, individual payers are experimenting with APMs with varying rules for eligibility and coverage.

Recommendation: To overcome technical challenges, payers must provide extensive technical assistance to providers and best practices must be shared among all stakeholders. To make reforms attractive to clinicians and providers, payers must create payment models with the right balance of FFS and value-based payments that are transparent and avoid unnecessary complexity.⁷⁰ More collaborative analyses of claims data with providers and payers are needed to assess full costs and cost-effectiveness of new interventions. Given the potential for unintended consequences and financial instability, payers must continuously evaluate the impact of reforms and refine them as needed over time.

EXAMPLE BEST PRACTICES

- Payers will need to invest in development of robust APM mechanisms and provide detailed **data tools for providers** (like the quarterly provider cost and quality reports).
- In the retrospective Arkansas bundle, providers continued billing through a FFS mechanism and **payments were retrospectively reconciled**, minimizing technical challenges.

Lesson 4: To Improve Patient Outcomes Clinicians Must Move Beyond the Medical Care System

The preventable complications of asthma illustrate how many foundations of good health occur in the community, outside of the traditional medical system. The medical system alone cannot address all of the factors at home and in the community that impact the health of pediatric asthma patients.

Local, state, and national government agencies can play a critical role in prevention and improving management of pediatric chronic diseases like asthma. Public health services have not always been well-coordinated or easy to access. They are fragmented and chronically underfunded and becoming more so, particularly as health care costs have continued to rise. While the health care system can extend the spectrum of services to incorporate non-traditional services like CHWs and environmental remediation, in some regions these services may overlap with those already offered by state and federal agencies. Bringing social and public health services into the medical system may undermine the preventive role of public health by further exaggerating the imbalanced funding of medical and public health services.

Furthermore, provision of public health services through the medical system may be counterproductive if they are less efficient and miss opportunities for primary prevention.

Close collaboration between medical and public health services is needed to improve coordination of services, to avoid overlap, and to determine the best use of limited resources. Ideally, the medical system focuses on individual patients, or groups of high-risk patients, while looking for opportunities to support broader system change. There are opportunities for the medical care system to partner with entities relevant to public health to provide the best mix of services, which are tailored to local circumstances. In areas where Accountable Care Organizations (ACOs) are growing, these types of partnerships will be essential to contain costs and improve health outcomes.

Under FFS, physicians and hospitals are paid for treating asthma symptoms, but they receive much less support for preventing asthma and its complications in the first place. As a result, conventional medical care may not be well positioned to efficiently improve population health at a time when investments in public health, prevention, and community services are already very low. A strong and adequately funded public health system is needed to coordinate services across state and federal agencies and to address the social and environmental problems that affect pediatric asthma and other conditions. Because such large changes to the public health system will take time to implement, payment reforms that support targeted community services – and steps by clinicians to implement such services effectively – are likely to be a key part of improving outcomes for high-risk patients. In the absence of more funding, programs such as the CAI that target the highest-risk asthma patients are a step in the right direction to direct medical spending to the most effective community interventions on a targeted basis.

EXAMPLE BEST PRACTICES

- In Massachusetts, the public health department led a broad smoke-free housing initiative in public housing throughout Boston, while CAI **educated families** about the policy, **referred parents** of children with asthma to smoking cessation services through the state Department of Health, and **informed landlords** on the benefits of smoke-free policies. Similarly, CAI referred households with housing code violations, such as mice, to the City of Boston’s Inspectional Services Department to **enforce the state sanitary code**. These households, otherwise, may not have come to the attention of inspectors.
- Providers in Oregon utilized **existing public health infrastructure** through contracts with Coordinated Care Organizations that were paid for through an **enhanced PMPM**. This strategy benefited from economies of scale and lower overhead costs since their intervention was delivered outside of the medical care setting.

Health care, payer, state, and federal silos impede efficient implementation of population based health care models. Public health initiatives have rarely been coordinated with initiatives from private or public payers. There are risks to using APMs to transcend boundaries between medical care and the public health. At present, APMs are not broadly implemented and should not supplant the public health system in delivering public health interventions. Provision of public health interventions through the health care system may result in heterogeneous implementation, especially if public health funding continues to fall.

Recommendation: Public health and community-based interventions, which can be supported at least on a targeted basis through payment reforms, should be considered within the scope of payment and delivery reforms. Patient-centered payments can support greater coordination between medical care and existing public health services (as in Arkansas) or may be used to extend interventions by health

care institutions into the community and (as in Massachusetts). In the long term, broader public health reforms are needed to improve funding and coordination of public services.

Challenges of Implementing Payment Reform

New payment models can give providers financial support to change care in ways that lead to improved outcomes and lower costs, but require clinicians to play a prominent role in shaping these changes in care. Providing better support for providers without adding significantly to costs or placing providers at excessive financial risk is a fundamental challenge in APMs. Insufficient shifts in payment are unlikely to give clinicians the resources they need to produce desired improvements in care and outcomes. Excessive payment reforms may burden providers with untenable risk and lead to unintended consequences, including counterproductive behaviors and financial instability. Providers assume greater financial risk as they gain greater autonomy. Getting the right balance is an empirical question that will require careful ongoing evaluation. Careful attention is required to ensure that providers remain financially stable and avoid unnecessary costs as they transition to new payment models and care delivery strategies.

Payment reforms that support high value care will result in structural changes to the health care system, but they take time to manifest. For example, the DSRIP incents hospitals to prevent admissions by delivering care in lower-cost environments. This means fewer inpatient beds may be needed and community-based facilities may need expansion; staffing changes may also be necessary. Furthermore, the effect of incentives may differ depending on existing local circumstances. Early adopters of new payment models are likely to be providers and facilities that are able to make a compelling business case for participation. Policy makers should not assume that successful voluntary pilots will apply more broadly.

Conclusion

New payment models offer tremendous potential to improve the health care system. Clinicians are ideally poised to lead these changes and introduce innovations that improve efficiency and outcomes. These new models offer greater autonomy to providers to make judgments about which services will best improve the health of the communities they serve. Implementation of these new models is technically challenging and payers will need to offer substantial assistance to clinicians and hospitals.

APMs allow clinicians to offer high value services that are traditionally considered social, community, or public health services. If these services are provided through the traditional health system, they should be implemented in a way that reinforces existing public health services. Reform will be an ongoing process of continuous innovation and refinement. Continuous evaluation is required to quickly identify problems and to efficiently disseminate best practices.

APPENDICES

Appendix A. Detailed Care Redesign of the Community Asthma Initiative

Catalyst for Change

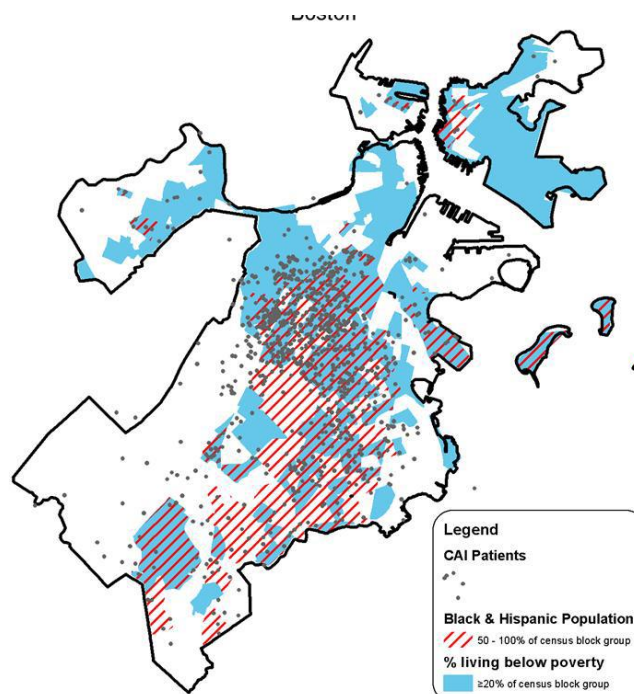
Boston Children's Hospital (Boston Children's) is the largest provider of pediatric primary care in Massachusetts. Asthma prevalence is 16% in the Boston school system, with five schools greater than 24%.⁷¹ As part of the Boston Children's triennial community needs assessment in 2003, asthma was identified by the community as one of four major pediatric health concerns (in addition to mental health, obesity, and injury prevention). The Office of Community Health (i.e. the office that priorities and distributes community benefits funds) at Boston Children's initiated CAI, as part of the hospital's broader community mission of improving the health and well-being of children and families in the local community by addressing health disparities and leveraging and supporting community partnerships to broaden reach and impact.

Care Redesign

The CAI began as a pilot intervention for children who were admitted or came to the emergency department with asthma. The pilot was initially described in *Pediatrics* and was offered to 283 children in four Boston zip codes with high asthma hospitalization rates.¹⁹ The CAI was built on principles from the National Asthma Education and Prevention guidelines and other theoretical models² to provide a comprehensive asthma service that complemented traditional care by offering the following: 1) tailored education and medication adherence counseling, 2) intensive case management and 3) home visits that included environmental assessment, remediation, and supplies.

The pilot demonstrated improved quality of life for patients and families in addition to reduced costs. As described in the *Journal of Asthma*, the CAI program showed a 37% reduction in patients with any hospitalizations in year one, 43% cumulative reduction in year two, and 43% cumulative in year three. The first 102 patients served by the pilot program, as evaluated by hospital administrative data, showed a decrease in patients with any missed school days and parents missed work days. The program saved \$1,780 per patient in the first year, \$2,305 in the second year, and \$1,873 in the third year compared to the comparison baseline.^{19,71}

Figure A1: Map of geographic and demographic distribution of CAI patients



² The theoretical models that the CAI was built on include Healthy People 2020, the Institute of Medicine social-ecological framework, and evidence from other similar programs as described in Appendix G.

THE IMPORTANCE OF THE HOME VISIT

Asthma Education

- Correct misconceptions about asthma control
- Track the child's asthma over time, identify triggers, and understand what it means to have well-controlled asthma.

Assess Health Literacy

- Assess the family's knowledge of asthma basics and the role of medications
- Make an appropriate asthma action plan (AAP)
- Make a pictorial AAP if necessary

Medication Adherence

- Evaluate what medications and devices are in the home and how they are actually being administered
- Demonstrate the proper way to use devices and make suggestions (e.g., as additional spacers, which the CAI can provide right away to the patient)
- Observe how medications are stored and if they are easily accessible
- Check refill dates and discard old medications
- Set up a proper daily medication counter with labels for each day of the week

Using in-patient admission and ED records as a trigger, CAI identified the highest risk children in greatest need for intensive asthma management services. Children were eligible for CAI services if they have had a hospital admission or ED visit in previous 12 months, or a prescription for oral steroids in last 12 months. Alternatively, specialty and primary care providers were also empowered to refer a child to the CAI.

Care redesign can be described in terms of *where* the care is delivered, *who* the care is delivered by, *how* the care decisions are made, and the *data* used to ensure care effectiveness and guide continuous improvement. Extensive engagement is required across all stakeholders to make care transformation come alive, with buy-in from patients, families, and payers.

Once a child is eligible for the program, the family is offered an option to participate. Meeting the family in-person in the hospital or clinic and having a personal hand-off from a

known care provider, whenever possible, helps with acceptance of the program by the parent/guardian. Also, the asthma hospitalization or ED visit is a teachable moment when families seem receptive to additional services, such as home visits. If the family agrees to enroll in the CAI, each child/family is matched with a culturally and linguistically appropriate case manager who coordinates services with the family and primary care provider, and refers to or provides appropriate social services.

Site of Care Reforms

The home visit is a critical component of the CAI, where asthma education is interactive and tailored to the child and families' needs and also addresses living-environment and social factors (see sidebar). The program is designed to follow a child over a 12-month period, with a long first visit followed by shorter follow-up visits depending on the identified issues. The average number of visits is 2.2, with a range from 1 to 10. Follow-up calls are scheduled at 6 and 12 months.

During the CAI's first home visit, they assess asthma triggers, paying particular attention to household and environmental triggers. Figure A2 explains common asthma triggers and how the CAI addresses them.

Figure A2. CAI Home Environmental Assessment¹⁷

TRIGGER	EDUCATION	REMEDIATION
Clutter and dust	How to reduce dust collectors (e.g. clutter, curtains) to create a more “asthma-friendly” home while not alienating the family about their housekeeping	Provide plastic storage bins to help reduce clutter; HEPA vacuum cleaner
Tobacco Smoke	Motivational interviewing to assess family members smoking status and readiness to quit	Advise a smoke free home and car policy
Pests	Provide Integrated Pest Management (IPM) information to residents, landlords and property managers	Provide IPM supplies such as dust mite-proof bedding encasements for mattresses and pillow, covered kitchen trash cans, copper gauze to fill holes, sticky traps, low-toxicity pesticides
Mold and Moisture	Review preventative measures such as drying off damp walls after showering and venting moisture generating sources	Provide a humidity gauge to track humidity and report excess to the landlord
Harsh Cleaning Products	Provide the family with education on “green cleaning”	Provide a green cleaning starter kit with baking soda and white vinegar, empty spray bottles, mops and sponges

Team Approaches to Care

The CAI uses an integrated multidisciplinary team to provide the highest quality care using the most cost effective staffing. The roles, responsibilities, and full time equivalent (FTE) utilized by the CAI are as follows:

- **Program Director/Principal Investigator** (0.4 FTE): Oversees all aspects of the program such as implementation, grant writing, reporting, budgetary management and contracts, and evaluation. Of this, 0.2 FTE focused on the basic clinical care and administration of the program.
- **Clinical Director** (1.0): Provides case management and asthma education, supervises all clinical staff, liaison to hospital to review and discuss cases. Of this effort, 0.75 FTE focuses on basic clinical care and supervision for the program.
- **Community Health Workers** (2.0 FTE): Primary staff responsible for the health education and home visits.
- **Director of Evaluation** (0.25 FTE): Oversees the basic quality improvement evaluation and data management. Additional time is supported by CAI related to grant funding and cost analyses.
- **Program Coordinator** (1.0 FTE): Provides administrative and evaluation support to the CAI.

The CAI provides culturally and linguistically appropriate home visits through CHWs who are members of the underserved racial and ethnic communities in which they work. CHWs are essential members of the health care team and are able to form trusting, nonjudgmental relationships with patients, act as valuable community linkages, mediate between health care providers and families, and act as coaches and advocates for families. CHWs are also less expensive than registered nurses or physicians and can deliver effective results in the most cost effective manner.⁷²

Currently, the two CHWs working in the CAI have a caseload of approximately 150 children per year (which does not account for auxiliary benefits provided to siblings of patients). The two CAI caseworkers speak several languages fluently, including Spanish, Portuguese and Cape Verdean Creole. Close collaboration with the Boston Public Health Commission and other hospital programs in Boston that conduct asthma home visits allows for a fluid referral process so that home visits can be provided by other agencies in Haitian Creole, Mandarin and Cantonese.

Improved Decision Support

CHWs use a series of protocols and decision support tools to standardize data collection, including the Asthma Control Test (ACT), AAP, and a notebook of teaching tools and trigger identification materials. Data is entered on-site using tablet-based Health Insurance Portability and Accountability Act (HIPAA) compliant software called Research Electronic Data Capture (REDCap). The CHWs also communicate with the clinical team through EMR or fax, e-mail, or telephone for urgent issues.

Collecting and Using Data

The CAI evaluation team collects and monitors process indicators (e.g. number of home visits, days to follow-up with primary care, number of patients with AAPs) on a monthly basis and outcome measures every six months (number of ED visits, number of missed school days, etc.).¹⁷

A Culture of Engagement and Education

Engagement and education across the continuum of care redesign helps to sustain high quality care and inspire continuous improvement. This culture funnels throughout the health care system: patients, providers, the local network, and payers as illustrated in the examples below:

- **Patients:** Tailored education and culturally appropriate case management are critical for successful asthma control. Printed materials supplement in-person education.
- **Providers:** The CAI provides a valuable service to primary care practices by reconnecting patients with providers to ensure continuity of care.
- **Local Network:** The CAI contributes to health system change through participation in provider coalitions, advisory boards, regional collaboratives, and public health agencies. For example, the CAI works closely with landlords, the public housing authority and Boston Inspectional Services around housing code violations and facilitates connections with social and public health services when needed to control asthma.⁷³
- **Payers:** The CAI and Boston Children's have engaged payers to identify options for sustainable care delivery.

Clinical Quality, Savings, and Expenditures Data

Through March 2014, the CAI has served 1,264 patients. Of these, 44.8% were Hispanic and 46.5% were African American. Eighty-four percent of patients had one or more environmental triggers, the most common of which included significant clutter (54.3%) and rodents (37.2%). The CAI program cost has been steadily decreasing since FY2009 and was \$2,130 per child in FY2013. However, when taking into account the fact that the CAI intervention has benefits for more than just the child (siblings and parents may also have asthma), the cost per unit drops to \$1,054 (334 total patients and family members in FY2013).^{71,74} Figure A3 shows the latest quality data.

Figure A3. CAI Data through March 31, 2014

VARIABLE MEAN*	BASE	6 MONTHS	12 MONTHS
Number of days with limitation of physical activity	4.21	1.93	2.35
Number of ED visits	0.84	0.36	0.31
Number of hospital admissions	0.70	0.20	0.20
Missed school days	5.73	3.10	3.02
Missed work days	2.42	0.97	1.15

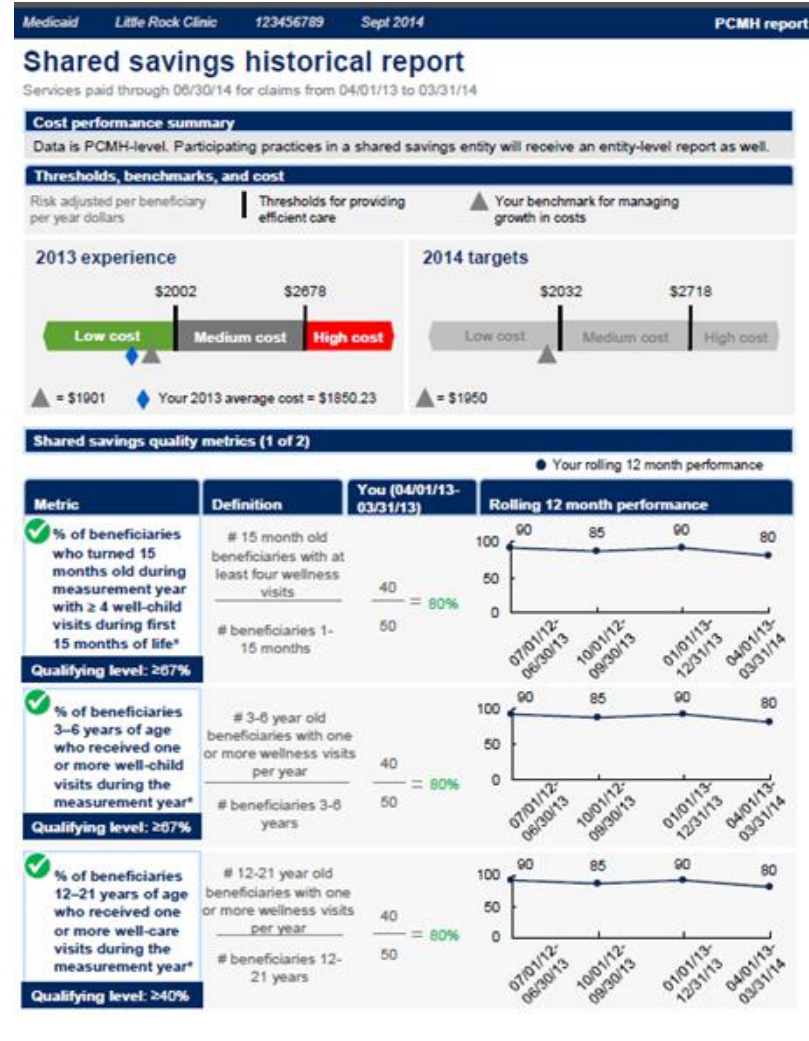
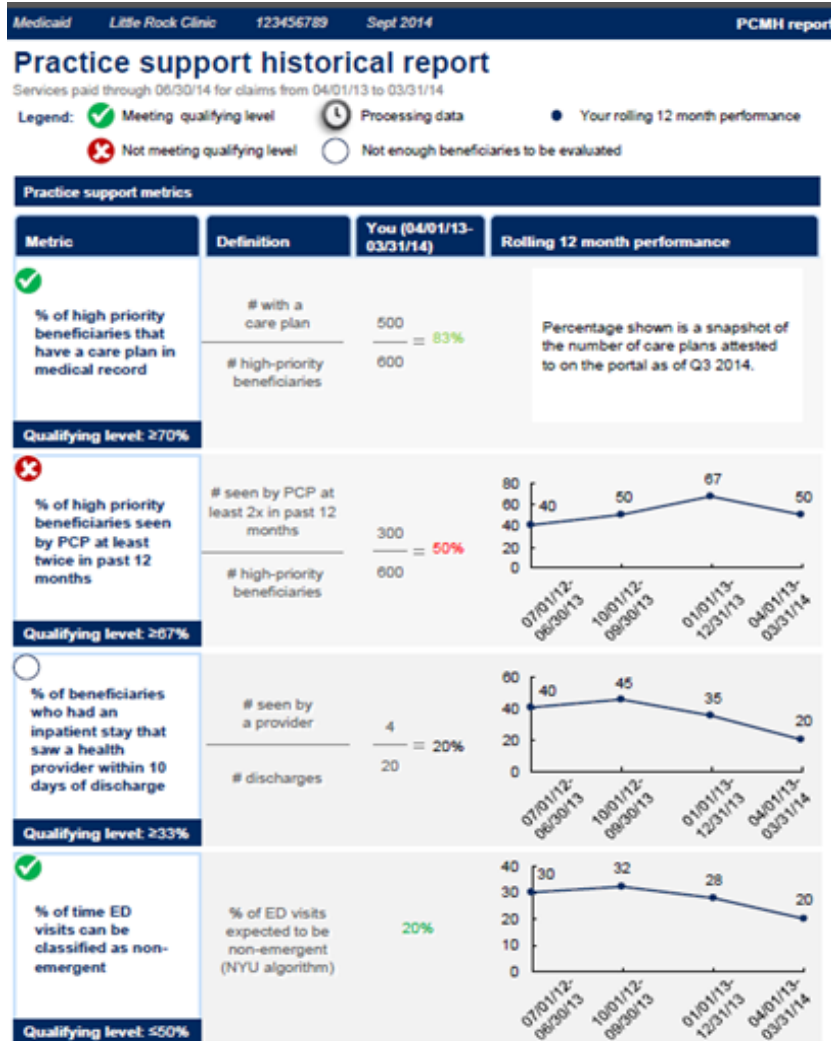
*P-values for all variables were <0.001.

The CAI program cost of \$254,871 was offset by \$349,790 in savings from decreased ED visits and admissions. In addition, the CAI estimates that the program has saved \$43,795 in missed work days and \$47,062 in missed school days.¹⁹

Appendix C. Summary of APII Asthma Bundle⁴³

SAMPLE GRAPHIC	BUNDLE FEATURE	BUNDLE DESIGN
Calendar	Episode Definition	30 days post-initial discharge and includes and relevant readmissions
Inhaler	Trigger	ED or inpatient visit for acute asthma exacerbation preceded by a 30-day all-cause clean period
Hospital	Services Included	<ul style="list-style-type: none"> • All related facility services • Inpatient professional services • ED visits • Observation • Labs, imaging, and diagnostics • Outpatient costs (e.g., counseling, education) • Medications • Select costs for relevant post-acute care
Stop Sign	Exclusion Criteria	<ul style="list-style-type: none"> • Select co-morbid conditions (e.g., cystic fibrosis, alpha1-antitrypsin deficiency, bronchiectasis, lung cancers) • Patients who are intubated or have home oxygen use during episode • ICU admissions greater than 72 hours • Death in hospital during episode • Patient status of “left against medical advice” during episode • Age less than 5 years • Dual eligibility • Third party liabilities • Inconsistent Medicaid eligibility • Exempt PAP (e.g. Federally Qualified Health Center) • Out of state PAP • PAP cannot be identified
Check Mark	Quality Metrics	<ul style="list-style-type: none"> • For reporting only: rate of repeat acute exacerbation within 30 days post-initial discharge • Linked to gain sharing: <ul style="list-style-type: none"> ○ Corticosteroid and/or inhaled corticosteroid usage determined by filled prescription rate for medication within +/- 30 days of trigger start date ○ Percent of episodes where patient visits outpatient physician (for any reason) within 30 days post-initial discharge

Appendix D. Sample APII PCMH Quarterly Report 76



Appendix E. New Jersey DSRIP Pediatric Asthma Metrics⁷⁷

MEASURE COUNT	MEASURE NAME	DSRIP #	NQF #	MEASURE STEWARD	NJ DATA SOURCE	REPORTING ENTITY/ SETTING OF CARE		ELIGIBLE FOR P4P?	REPORTING PERIOD
Project 1 - Hospital-Based Educators Teach Optimal Asthma Care									
1.1	CAC-1: Relievers for inpatient asthma	17	0143	Joint Commission	Chart/ EHR	Hospital/ Care	Inpatient	No	1 st SA = April 2 nd SA = October
1.2	CAC-2: Systemic corticosteroids for inpatient asthma	18	0144	Joint Commission	Chart/ EHR	Hospital/ Care	Inpatient	No	1 st SA = April 2 nd SA = October
1.3	Use of appropriate medications for people with asthma	83	0036	NCQA	MMIS	Department/ Outpatient Care		No	Annual; April
1.4	Medication management for people with asthma — 75%	60	1799	NCQA	MMIS	Department/ Outpatient Care		P4P	Annual; April
1.5	Percent of patients who have visited an ED for asthma in the past six months.	66	Not Found	HRSA	MMIS	Department/ Emergency Department		P4P	1 st SA = October 2 nd SA = April
1.6	Adult asthma admission rate	6	0283	AHRQ	MMIS	Department/ Inpatient Care		P4P	1 st SA = October 2 nd SA = April
1.7	Asthma admission rate	13	Not Found	AHRQ	MMIS	Department/ Inpatient Care		P4P	1 st SA = October 2 nd SA = April
Substitution	Asthma: Pharmacologic therapy for persistent asthma	89	0047	AMA-PCPI	Chart/ EHR	DSRIP Outpatient Care	Network/	P4P Substitution	1 st SA = April 2 nd SA = October
Substitution	Asthma Medication Ratio	90	1800	NCQA	MMIS	Department/ Outpatient Care		P4P Substitution	Annual; April
Project 2 — Pediatric Asthma Case Management and Home Evaluations									
2.1	CAC-1: Relievers for inpatient asthma	17	0143	Joint Commission	Chart/ EHR	Hospital/ Care	Inpatient	No	1 st SA = April 2 nd SA = October
2.2	CAC-2: Systemic corticosteroids for inpatient asthma	18	0144	Joint Commission	Chart/ EHR	Hospital/ Care	Inpatient	No	1 st SA = April 2 nd SA = October
2.3	Use of appropriate medications for people with asthma	83	0036	NCQA	MMIS	Department/ Outpatient Care		No	Annual; April

2.4	Medication management for people with asthma — 75%	60	1799	NCQA	MMIS	Department/ Outpatient Care	P4P	Annual; April
2.5	Percent of patients who have visited an ED for asthma in the past six months.	66	Not Found	HRSA	MMIS	Department/ Emergency Department	P4P	1 st SA = October 2 nd SA = April
2.6	Percent of patients evaluated for environmental triggers other than environmental tobacco smoke (e.g., dust mites, cats, dogs, molds/fungi, cockroaches) either by history of exposure and/or by allergy testing	65	Not Found	HRSA	Chart/ EHR	DSRIP Network/ Outpatient Care	P4P	1 st SA = April 2 nd SA = October
2.7	Asthma admission rate	13	Not Found	AHRQ	MMIS	Hospital/ Care Inpatient	P4P	1 st SA = October 2 nd SA = April
Substitution	Asthma: Pharmacologic therapy for persistent asthma	89	0047	AMA-PCPI	Chart/ EHR	DSRIP Outpatient Care	Network/ P4P Substitution	1 st SA = April 2 nd SA = October
Substitution	Asthma medication ratio	90	1800	NCQA	MMIS	Department/ Outpatient Care	P4P Substitution	Annual; April

Acronyms: Agency for Health care Research and Quality (AHRQ); American Medical Association – Physician Consortium for Performance Improvement (AMA- PCPI); Centers for Medicare & Medicaid Services (CMS); Children’s Asthma Care (CAC); Delivery System Reform Incentive Payment (DSRIP); Electronic Health Record (EHR); Health Resources and Services Administration (HRSA); Medicaid Management Information System (MMIS); National Committee for Quality Assurance (NCQA); Pay for Performance (P4P); Semi-annual (SA)

Appendix F. Suggested Reading of Evidence Based Review of Asthma Interventions

Note: These are only a sampling of the numerous articles out there showing significant asthma related health improvements when asthma education and environmental remediation services are provided.

- Barton, A., Basham, M., Foy, C., Buckingham, K., & Somerville, M. (2007). The Watcombe Housing Study: the short term effect of improving housing conditions on the health of residents. *Journal of Epidemiology and Community Health*. doi:10.1136/jech.2006.048462
- Bryant-Stephens, T., & Li, Y. (2008). Outcomes of a home-based environmental remediation for urban children with asthma. *The Journal of the National Medical Association*, 100(3), 306-316.
- Coffman, J. M., Cabana, M. D., Halpin, H. A., & Yelin, E. H. (2008). Effects of Asthma Education on Children's Use of Acute Care Services: A Meta-analysis. *Pediatrics*, 121(3). doi:10.1542/peds.2007-0113
- Eggleston, P. A., Butz, A., Rand, C., Curtin-Brosnan, J., Kanchanaraksa, S., Swartz, L., Krishnan, J. A. (2005). Home environmental intervention in inner-city asthma: a randomized controlled clinical trial. *Annals of Allergy Asthma & Immunology*. doi:10.1016/S1081-1206(10)61012-5
- Implementing an asthma home visit program: 10 steps to help health plans get started* (EPA 402-K-05-006). (2005). Retrieved from The Environmental Protection Agency website: http://www.epa.gov/asthma/pdfs/implementing_an_asthma_home_visit_program.pdf
- Kercsmar, C. M., Dearborn, D. G., Schluchter, M., Xue, L., Kirchner, H. L., Sobolewski, J., . . . Allan, T. (2006). Reduction in Asthma Morbidity in Children as a Result of Home Remediation Aimed at Moisture Sources. *Environmental Health Perspectives*. doi:10.1289/ehp.8742
- Krieger, J. W., Takaro, T. K., Song, L., & Weaver, M. (2005). The Seattle-King County Healthy Homes Project: A Randomized, Controlled Trial of a Community Health Worker Intervention to Decrease Exposure to Indoor Asthma Triggers. *American Journal of Public Health*. doi:10.2105/AJPH.2004.042994
- McCarthy, D., & Cohen, A. (2013). *The Cincinnati Children's Hospital Medical Center's Asthma Improvement Collaborative: Enhancing quality and coordination of care*. The Commonwealth Fund.
- Morgan, W. J., Crain, E. F., Gruchalla, R. S., O'Connor, G. T., Kattan, M., III, R. E., . . . Mitchell, H. (2004). Results of a Home-Based Environmental Intervention among Urban Children with Asthma. *New England Journal of Medicine*. doi:10.1056/NEJMoa032097
- National Asthma Education and Prevention Program Expert Panel Report (EPR) 3: Guidelines for the Diagnosis and Management of Asthma*. (2007). Retrieved from National Heart, Lung, and Blood Institute (NHLBI), U.S. Department of Health and Human Services website: <http://www.nhlbi.nih.gov/guidelines/asthma/asthsumm.pdf>
- Reducing environmental triggers of asthma in homes of Minnesota children*. (2007). Retrieved from Minnesota Department of Health and U.S. Environmental Protection Agency website: <http://www.health.state.mn.us/asthma/documents/retafullreport0907.pdf>
- Somerville, M. (2000). Housing and health does installing heating in their homes improve the health of children with asthma? *Public Health*. doi:10.1016/S0033-3506(00)00383-8
- Sommer, S., Bhaumik, U., Tsopelas, L., Dickerson, D., Fleegler, E., & Nethersole, S. (2013). Boston Children's Hospital Community Asthma Initiative replication manual: Needs assessment, implementation and evaluation. Boston Children's Hospital.
- Sommer SJ, Queenin LM, Nethersole S, Greenberg J, Bhaumik U, Stillman L, Hoppin P, Chan E, Wilkinson RB, Dickerson DU, Woods ER. Children's Hospital Boston Community Asthma Initiative: Partnerships and Outcomes Advance Policy Change. *Progress in Community Health Partnerships: Research, Education, and Action*, 2011;5.3:327-337.
- Woods ER, Bhaumik U, Sommer SJ, Ziniel SI, Kessler AJ, Chan E, Wilkinson RB, Sesma M, Burack AB, Klements EM, Queenin LM, Dickerson DU, Nethersole S. Community Asthma Initiative: Evaluation of a Quality Improvement Program for Comprehensive Asthma Care. *Pediatrics* 2012;129:465-472.

ACRONYM LIST

ACRONYM	DEFINITION
AAP	asthma action plan
ACO	accountable care organizations
ACT	Asthma Control Test
APII	Arkansas's Payment Improvement Initiative
APM	alternative payment model
ARC	Asthma Regional Council of New England
BPHC	Boston Public Health Commission
CAI	Boston Children's Hospital Community Asthma Initiative
CCO	Coordinated Care Organization
CDC	Centers for Disease Control and Prevention
CHABP	Children's High-risk Asthma Bundled Payment
CHIP	Children's Health Insurance Program
CHW	community health workers
CMMI	Center for Medicare and Medicaid Innovation
CMS	Centers for Medicare & Medicaid Services
CPC	Comprehensive Primary Care
DSRIP	Delivery System Reform Incentive Payment
ED	emergency department
EMR	electronic medical record
EPA	Environmental Protection Agency
FFS	fee-for-service
FTE	full time equivalent
HEPA	high-efficiency particulate absorption
HIPAA	Health Insurance Portability and Accountability Act
HRiA	Health Resources in Action
HRSA	Health Resources and Services Administration
HUD	Department of Housing and Urban Development
MCO	Managed Care Organization
NACP	National Asthma Control Program
NEAIC	New England Asthma Innovations Collaborative
OCH	Boston Children's Hospital Office of Community Health
P4P	pay-for-performance
PAP	Principal Accountable Provider
PCC	Primary Care Clinician
PCMH	patient centered medical home
PCPCH	patient-centered primary care home
PCPRI	Primary Care Payment Reform Initiative
PMPM	per-member per-month
PMPY	per-member per-year
PPHF	Prevention and Public Health Fund
REDCap	Research Electronic Data Capture

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REFERENCES

1. Kellermann AL, Weinick RM. Emergency Departments, Medicaid Costs, and Access to Primary Care — Understanding the Link. *New England Journal of Medicine*. 2012;366(23):2141-2143.
2. *Guidelines for the Diagnosis and Management of Asthma*. National Institutes of Health: National Heart Lung and Blood Institute;2007.
3. Brandt S, Gale S, Tager I. The value of health interventions: evaluating asthma case management using matching. *Applied Economics*. 2011;44(17):2245-2263.
4. Moorman JE AL, Bailey CM, et al. *National Surveillance of Asthma: United States, 2001–2010*. Vital Health Stat: National Center for Health Statistics;2012.
5. Stillman L. *Living with Asthma in New England: Results from the 2006 BRFSS and Call-Back Surveys*. Asthma Regional Council (ARC) of New England;2010.
6. Liu AH, Gilsenan AW, Stanford RH, Lincourt W, Ziemiecki R, Ortega H. Status of asthma control in pediatric primary care: results from the pediatric Asthma Control Characteristics and Prevalence Survey Study (ACCESS). *The Journal of pediatrics*. 2010;157(2):276-281.e273.
7. Schuur JD, Venkatesh AK. The Growing Role of Emergency Departments in Hospital Admissions. *New England Journal of Medicine*. 2012;367(5):391-393.
8. Mehrotra A, Liu H, Adams JL, et al. Comparing Costs and Quality of Care at Retail Clinics With That of Other Medical Settings for 3 Common Illnesses. *Annals of Internal Medicine*. 2009;151(5):321-328.
9. Asthma in the US: Growing every year. *Vital Signs*: Centers for Disease Control and Prevention; May 2011.
10. Harty MBaH, Katie. *Using Medicaid to Advance Community - Based Childhood Asthma Interventions: A Review of Innovative Medicaid Programs in Massachusetts and Opportunities for Expansion under Medicaid Nationwide*. Childhood Asthma Leadership Coalition;February 2013.
11. Barnett SBL, Nurmagambetov TA. Costs of asthma in the United States: 2002-2007. *Journal of Allergy and Clinical Immunology*.127(1):145-152.
12. Szeffler SJ, Zeiger RS, Haselkorn T, et al. Economic burden of impairment in children with severe or difficult-to-treat asthma. *Annals of Allergy, Asthma & Immunology*. 2011;107(2):110-119.e111.
13. Smith DH, Malone DC, Lawson KA, Okamoto LJ, Battista C, Saunders WB. A national estimate of the economic costs of asthma. *American journal of respiratory and critical care medicine*. 1997;156(3 Pt 1):787-793.
14. Pearson WS, Goates SA, Harrykissoon SD, Miller SA. State-Based Medicaid Costs for Pediatric Asthma Emergency Department Visits. *Preventing Chronic Disease*. 2014;11:E108.
15. Barrett MLW, L.M.; Washington, R. *Trends in Pediatric and Adult Hospital Stays for Asthma, 2000–2010: Statistical Brief #169*. Agency for Health Care Policy and Research;2014
16. Douglas McCarthy KM, Jennifer Wrenn. Kaiser Permanente: Bridging the Quality Divide with Integrated Practice, Group Accountability, and Health Information Technology. Located at: Case Study: Organized Health Care Delivery System.
17. Sommer SJB, Urmi; Tsopeles, Lindsay; Dickerson, Deborah U.; Fleegler, Eric W.; Nethersole, Shari; Woods, Elizabeth R. *Community Asthma Initiative Replication Manual: Needs Assessment, Implementation and Evaluation*. Boston Children’s Hospital 2013.
18. Sommer SJ, Queenin LM, Nethersole S, et al. Children's hospital boston community Asthma initiative: partnerships and outcomes advance policy change. *Progress in community health partnerships : research, education, and action*. 2011;5(3):327-335.
19. Bhaumik U, Norris K, Charron G, et al. A cost analysis for a community-based case management intervention program for pediatric asthma. *The Journal of asthma : official journal of the Association for the Care of Asthma*. 2013;50(3):310-317.
20. National Hospital Ambulatory Medical Care Survey: 2011 Emergency Department Summary Tables. CDC, trans2011.
21. Pines JM, Farmer SA, Pimentel L. The Maryland Medicare waiver and emergency care: mixed experiences deserve close scrutiny. *American journal of medical quality : the official journal of the American College of Medical Quality*. 2015;30(2):186-187.
22. *Slides: Community Asthma Initiative (CAI): A Cost Effective Enhanced Care Model*.
23. *2010 Children's Health Insurance Program Reauthorization Act Annual Report*.

24. Gold LS, Smith N, Allen-Ramey FC, Nathan RA, Sullivan SD. Associations of patient outcomes with level of asthma control. *Annals of allergy, asthma & immunology : official publication of the American College of Allergy, Asthma, & Immunology*. 2012;109(4):260-265.e262.
25. Hanania NA, David-Wang A, Kesten S, Chapman KR. Factors associated with emergency department dependence of patients with asthma. *Chest*. 1997;111(2):290-295.
26. Finkelstein JA, Barton MB, Donahue JG, Algatt-Bergstrom P, Markson LE, Platt R. Comparing asthma care for Medicaid and non-Medicaid children in a health maintenance organization. *Archives of pediatrics & adolescent medicine*. 2000;154(6):563-568.
27. *Medicaid Financing: An Overview of the Federal Medicaid Matching Rate (FMAP)*. September 2012.
28. State Health Care Spending on Medicaid: A 50-state study of trends and drivers of cost. <http://www.pewtrusts.org/en/multimedia/data-visualizations/2014/medicaid-spending-growth>.
29. Boben PJ. Medicaid Reform in the 1990s. *Health Care Financing Review*. 2000;22(2):1-5.
30. Cutler DM, McClellan M, Newhouse JP. How does managed care do it? *The Rand journal of economics*. 2000;31(3):526-548.
31. Duggan M, Hayford T. Has the Shift to Managed Care Reduced Medicaid Expenditures? Evidence from State and Local-Level Mandates. *National Bureau of Economic Research Working Paper Series*. 2011;No. 17236.
32. Zuckerman S, Williams AF, Stockley KE. Trends in Medicaid physician fees, 2003-2008. *Health affairs (Project Hope)*. 2009;28(3):w510-519.
33. Medicaid-to-Medicare Fee Index. In: Foundation TKF, ed.
34. Sparer M. Medicaid managed care: Costs, access, and quality of care. *POLICY*. 2012;1:6.
35. AN ACT IMPROVING THE QUALITY OF HEALTH CARE AND REDUCING COSTS THROUGH INCREASED TRANSPARENCY, EFFICIENCY AND INNOVATION. *Chapter 2242012*.
36. Pioneer ACO: Based on CMS Innovation Center Model Participants. In: data.CMS.gov, ed.
37. Massachusetts. <http://www.nashp.org/med-home-states/massachusetts>.
38. London K. Massachusetts Bundled Payment Program In: Economics CfHLA, ed.
39. Comprehensive Primary Care Payment Reform Request for Information (Document #: 13CBEHSCPCPRFI). In: Medicaid EOoHaHSOo, ed August 9, 2012.
40. Kidney R. *State Policy Report # 47: State Payment Reform Initiatives*. National Association of Community Health Centers;2013.
41. Allison A. In: Institution TB, ed.
42. Principal Accountable Provider.
<http://www.paymentinitiative.org/referenceMaterials/Documents/pap.pdf>.
43. Miller PaG, William. Arkansas Payment Improvement Initiative: Asthma Episode Statewide Webinar. May 14, 2014; <http://www.paymentinitiative.org/referenceMaterials/Documents/Asthma%20Webinar%205-2014.pdf>.
44. Patient-Centered Medical Home Provider Manual.
<https://www.medicaid.state.ar.us/InternetSolution/Provider/docs/pcmh.aspx#manual>.
45. *PCMH Report for Q2 2014*. 2014.
46. *PCMH Overview*.
47. McIntyre MG. DSRIP on My Mind: Delivery System Reform Incentive Payment Programs in Medicaid. <http://www.nashpcloud.org/2014-presentations/public/SESSION.4.MCINTYRE.M.pdf>.
48. Medicaid Innovation: Delivery System Reform Incentive Pools
http://medicaidirectors.org/sites/medicaidirectors.org/files/public/medicaid_delivery_system_reform_incentive_pool_1.pdf.
49. Services SoNJDoH. NJ DSRIP Program Funding and Mechanics Protocol Version 1.3 (03.27.2014)
50. Gerrits D. DSRIP CMS letter approving hospitals. In: Harr V, ed: Center for Medicaid and CHIP Services.
51. Gerrits D. Second Hospital Projects Approval. In: Harr V, ed: Center for Medicaid and CHIP Services.
52. Policy Background and Program Development. *Patient-Centered Primary Care Home Program*
<http://www.oregon.gov/oha/pcpch/Pages/policy-development-program-background.aspx>.
53. *Request for Applications for Coordinated Care Organizations (CCOs) # RFA 3402: Appendix F*. Oregon Health Authority;2012.

54. *Oregon Health Plan, Awardee: Oregon Health Authority (Number: 21-W-00013/10 and 11-W-00160/10)*. Centers for Medicare & Medicaid Services; July 5, 2012.
55. Rohrer DL. Brookings CCO Call: Follow-up. In: McStay F, ed.
56. Oregon Health Authority: Coordinated Care Organizations Implementation. <https://cco.health.oregon.gov/Pages/Home.aspx>.
57. Howard SWB, Stephanie L. ; Yoon, Jangho; Luck, Jeff; and Ranit, Claire M. . *Oregon's Coordinated Care Organizations: Unique healthcare delivery model or just managed care by another name?* . June 4, 2014.
58. Galloway I. Using Pay-For-Success To Increase Investment In The Nonmedical Determinants Of Health. *Health Affairs*. 2014;33(11):1897-1904.
59. Health Reform. <https://www.apha.org/topics-and-issues/health-reform>.
60. *Prevention and Public Health Fund (PPHF): Detailed Activities by Agency*. Trust for America's Health; January 22, 2014.
61. Levi J SL, and St. Laurent R. *Investing in America's Health: A State-by-State Look at Public Health Funding and Key Health Facts*. Trust for America's Health; April 2013.
62. Schultz S. *The Impact of Budget Cuts on Public Health*. Washington State Budget and Policy Center; October 21, 2009.
63. Public Health and Health Care: Collaboration and Innovation at the Interfact. *Institute of Medicine*. <http://www.iom.edu/Activities/PublicHealth/PopulationHealthImprovementRT/2015-FEB-05/Videos/Case%20Study%204/20-Nethersole-Video.aspx>; Institute of Medicine; 2015.
64. Oregon Asthma Program. <http://public.health.oregon.gov/PHD/Directory/Pages/program.aspx?pid=49>.
65. Living Well with Chronic Conditions. <http://public.health.oregon.gov/diseasesconditions/chronicdisease/livingwell/Pages/Index.aspx>.
66. Patient Self-Management Collaborative: A key step on the journey toward the patient-centered medical home. In: Association OPC, ed.
67. *The Oregon Asthma Leadership Plan: 2014–2019*. Oregon Health Authority;2014.
68. Tobacco Prevention and Education Program. <http://public.health.oregon.gov/PHD/Directory/Pages/program.aspx?pid=56>.
69. Medicine Io. *Best Care at Lower Cost: The Path to Continuously Learning Health Care in America*. Washington, DC: The National Academies Press; 2013.
70. Health Policy Brief: Reducing Waste in Health Care. *Health Affairs*.
71. Woods ER, Bhaumik U, Sommer SJ, et al. Community Asthma Initiative: Evaluation of a Quality Improvement Program for Comprehensive Asthma Care. *Pediatrics*. 2012.
72. Kangovi S, Mitra N, Grande D, et al. Patient-centered community health worker intervention to improve posthospital outcomes: A randomized clinical trial. *JAMA Internal Medicine*. 2014;174(4):535-543.
73. Somerville MH MC, Boddie-Willis CL, Folkemer DC, and Grossman ER. *Hospital Community Benefits after the ACA: Partnerships for Community Health Improvement*. February 2012.
74. Woods ER. CAI (Community Asthma Initiative) after 8 Years: Quality Improvement Evaluation and Case Presentations.
75. *Quality Strategy for Primary Care Payment Reform Initiative*: MassHealth.
76. Provider Reports. <http://www.paymentinitiative.org/medicalHomes/Pages/Provider-Reports.aspx>.
77. NJ DSRIP Planning Protocol Addendum 1 - Stage 3 Measures Catalogue. Vol v1.01.