

Patient-centered outcomes research to improve asthma outcomes



Ayodola Anise, MHS, and Romana Hasnain-Wynia, PhD, MS Washington, DC

INFORMATION FOR CATEGORY 1 CME CREDIT

Credit can now be obtained, free for a limited time, by reading the review articles in this issue. Please note the following instructions.

Method of Physician Participation in Learning Process: The core material for these activities can be read in this issue of the Journal or online at the JACI Web site: www.jacionline.org. The accompanying tests may only be submitted online at www.jacionline.org. Fax or other copies will not be accepted.

Date of Original Release: December 2016. Credit may be obtained for these courses until November 30, 2017.

Copyright Statement: Copyright © 2016-2017. All rights reserved.

Overall Purpose/Goal: To provide excellent reviews on key aspects of allergic disease to those who research, treat, or manage allergic disease.

Target Audience: Physicians and researchers within the field of allergic disease.

Accreditation/Provider Statements and Credit Designation: The American Academy of Allergy, Asthma & Immunology (AAAAI) is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. The AAAAI designates this journal-based CME activity for a maximum of 1

AMA PRA Category 1 Credit™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

List of Design Committee Members: Ayodola Anise, MHS, and Romana Hasnain-Wynia, PhD, MS

Disclosure of Significant Relationships with Relevant Commercial Companies/Organizations: The authors declare that they have no relevant conflicts of interest.

Activity Objectives:

1. To understand the importance of the guidelines in asthma research.
2. To understand the ongoing studies funded by the Patient-Centered Outcomes Research Institute.

Recognition of Commercial Support: This CME activity has not received external commercial support.

List of CME Exam Authors: Naveen Nannapaneni, MD, Roula Daher, MD, and Elizabeth Secord, MD.

Disclosure of Significant Relationships with Relevant Commercial Companies/Organizations: The exam authors disclosed no relevant financial relationships.

The Patient-Centered Outcomes Research Institute is funding 8 comparative effectiveness research projects to improve patient-centered outcomes for African American and Hispanic/Latino patients with uncontrolled asthma. These projects aim to compare multilevel interventions with known efficacy at the community, home, and health system levels to enhance patient and clinician uptake of the National Heart, Lung, and Blood Institute's National Asthma Education Prevention Program guidelines and improve outcomes. The National Asthma Education Prevention Program guidelines provide clinicians with a range of acceptable approaches for the diagnosis and management of asthma and define general practices that meet the needs of most patients. Yet disparities in asthma care and outcomes remain pervasive for African Americans and Hispanics/Latinos. The National Heart, Lung, and Blood Institute AsthmaNet consortium has identified several top

research priorities for pediatric and adult populations, including a recommendation to examine tailored approaches based on race/ethnicity. In addition, the guidelines emphasize the need for studies that focus on multicomponent interventions recognizing that single interventions are generally ineffective. This article will describe the Patient-Centered Outcomes Research Institute-funded asthma projects and how they are individually and collectively addressing evidence gaps in asthma care by focusing on multicomponent and tailored approaches for improving outcomes and reducing disparities for African American and Hispanic/Latino patients. (*J Allergy Clin Immunol* 2016;138:1503-10.)

Key words: Asthma, Patient-Centered Outcomes Research Institute, comparative effectiveness research, African American, Hispanic/Latino, National Asthma Education and Prevention Program guidelines

From the Addressing Disparities Program, Patient-Centered Outcomes Research Institute.

Received for publication August 10, 2016; revised October 10, 2016; accepted for publication October 14, 2016.

Corresponding author: Ayodola Anise, MHS, Patient-Centered Outcomes Research Institute, 1828 L St, NW, Suite 900, Washington, DC 20036. E-mail: aanise@pcori.org.

The CrossMark symbol notifies online readers when updates have been made to the article such as errata or minor corrections

0091-6749/\$36.00

© 2016 Published by Elsevier Inc. on behalf of the American Academy of Allergy, Asthma & Immunology

<http://dx.doi.org/10.1016/j.jaci.2016.10.003>

Discuss this article on the JACI Journal Club blog: www.jaci-online.blogspot.com.

In June 2013, the Patient-Centered Outcomes Research Institute (PCORI) released a funding announcement entitled, "Treatment options for African Americans and Hispanics/Latinos with uncontrolled asthma," with the goal of supporting comparative effectiveness research (CER) to improve patient-centered outcomes among African American and Hispanic/Latino patients with asthma. The funding announcement specifically stated that PCORI was interested in supporting

Abbreviations used

CER: Comparative effectiveness research
 CHICAGO: Coordinated Healthcare Interventions for Childhood
 Asthma Gaps in Outcomes
 CHW: Community health worker
 ED: Emergency department
 EHR: Electronic health record
 GINA: Global Initiative for Asthma
 ICS: Inhaled corticosteroid
 IT: Information technology
 NAEPP: National Asthma Education Prevention Program
 NHLBI: National Heart, Lung, and Blood Institute
 PCORI: Patient-Centered Outcomes Research Institute

“...studies that focus on reducing adverse outcomes due to poorly controlled asthma in African-American and Hispanic/Latino individuals, populations, and subgroups. More specifically, we seek CER that tests interventions to improve clinician and patient adherence to guidelines produced by the National Asthma Education and Prevention Program (NAEPP) of the National Heart, Lung, and Blood Institute (NHLBI). PCORI’s goal is to fund CER to identify optimal strategies for leveraging the NAEPP evidence-based guidelines to achieve equitable outcomes in asthma care. Studies that assess methods to improve adherence to these evidence-based guidelines coupled with interventions that are tailored to the needs of specific individuals and populations are of particular interest. Recognizing that the guidelines require a multidimensional approach to patient care, we are interested in studies that incorporate interventions at the community, home, and health system levels and that assess combinations of patient-education tools, home-environment interventions, asthma medications, and team-based approaches.”¹

In 2014, asthma affected nearly 24 million Americans and disproportionately affected racial and ethnic minorities.² Asthma is more prevalent and severe among African Americans and Hispanics/Latinos, particularly Puerto Ricans, compared with their white counterparts. The burden of asthma in African Americans and Hispanics/Latinos is accompanied by poor health outcomes and quality of life and high rates of emergency department (ED) visits and hospitalizations. Almost 4 million African Americans (approximately 10%) have asthma.² Hispanic/Latino populations are also disproportionately affected; 3.65 million US Hispanics/Latinos (approximately 7%) have asthma.² African Americans and Hispanic/Latino children have a greater chance of dying from asthma compared with non-Hispanic/Latino whites. In 2014, the asthma-related death rate for African Americans was almost 3 times that of whites.² From 2012-2014, for Hispanic/Latino children, the asthma-related death rate was 2 times that of whites.³ Finally, African American and Hispanic/Latino patients are less likely than their white counterparts to receive guideline-based treatment in accordance with the NAEPP guidelines, which have been available for over 20 years.⁴ These guidelines provide clinicians with a range of acceptable evidence-based approaches for the diagnosis and management of asthma and define general practices that meet the needs of most patients.⁵ However, disparities in asthma care and outcomes remain pervasive.⁶

To address evidence gaps, PCORI is supporting 8 projects that test multicomponent interventions at the community, home, and health system levels to facilitate patient and clinician uptake of the NAEPP guidelines. We describe the projects and how they are addressing evidence gaps in asthma care for African Americans and Hispanics/Latinos.

EVIDENCE GAPS IN ADHERENCE TO THE NAEPP GUIDELINES

Although research shows that adherence to guideline-based care can improve asthma symptoms and outcomes, its use is lacking. Guideline-based care can facilitate improvements in processes and outcomes, but if not tailored to the needs of patients, it is often ineffective. Generally, it tends toward efforts to promote consistency and standardization of clinical decisions based on scientific evidence to improve the quality of care patients receive. However, a single standard of care will likely not work universally for all groups. On the other hand, patient-centered care promotes a level of individualized care that one could argue might lead to greater variability.⁷ Striving for balance of both elements is important.

To this end, the PCORI-funded studies have designed tailored interventions that are geared to enhance guideline-based care. Some of the core questions that these studies seek to address focus on how interventions can be tailored and adapted to foster patient and clinician uptake of guideline-based care and facilitate patient participation in making health care decisions.⁸ These elements align with PCORI’s mission to understand what works best, for whom, and under what circumstances; to address important evidence gaps to inform practice; and to ensure engagement of patients, caregivers, and other stakeholders (eg, clinicians, payers, and health systems) in all the studies it funds.

Adherence to guideline-based care is challenging for multiple reasons.⁹⁻¹³ Clinicians are often not aware of the guidelines, and when they are, many express doubt about their effectiveness. Clinicians have also expressed lack of confidence in the ability of patients to implement their recommendations. These factors, coupled with clinical inertia, general practice barriers, and time constraints, make adherence to guidelines challenging.^{14,15}

Patient factors also influence adherence, particularly for populations at risk for experiencing disparities in care. Both community and individual dynamics, such as poverty, environmental stressors, language barriers, health literacy and numeracy, and other socioeconomic circumstances, play a role.¹⁶ Patient preferences, lack of access to appropriate care, and poor adherence to asthma medications and preventive treatments contribute to increased asthma symptoms and exacerbations, leading to poor outcomes.¹⁷⁻¹⁹

The NAEPP guidelines emphasize multilevel, multicomponent interventions for improving asthma outcomes. These approaches include patient and clinician education, systems-based tactics, such as use of electronic health records (EHRs), and community- and home-based interventions to address potential environmental triggers. For example, the guidelines specifically indicate that patient education should occur in a range of settings, such as clinics, EDs, hospitals, schools, and homes. However, only 60% of patients with asthma receive education on how to recognize symptoms, and less than 35% of patients report having an Asthma Action Plan.²⁰ Additionally, the guidelines stress controlling environmental factors that can cause asthma exacerbations (eg, mold, house dust mite, cockroach, animal dander, or secretory

TABLE I. Characteristics of PCORI-funded asthma CER studies*

Study reference letter	Project title	Principal investigator and organization	Comparators	Population	Study design and sample size
A	Using IT to Improve Access, Communication and Asthma in African American and Hispanic/Latino Adults	Andrea Apter, MD, MSc, MA University of Pennsylvania	Compares patient portal Web-based communication tool of the EHR with and without in-home CHW-led patient training	● African Americans, Hispanics/Latinos ● ≥18 y	● Two-arm RCT ● n = 300
B	Imperial County Asthma Comparative Effectiveness Research Project	John Elder, MPH, PhD San Diego State University Research Foundation	Compares a family and clinic intervention nested within a community intervention Family intervention includes CHW home visits; clinic intervention includes provider training and changes to EHR; and community intervention includes school flag program and health communication campaign.	● Hispanics/Latinos ● 6-17 y	● 2 × 2 factorial RCT ● n = 400
C	Clinic-Based vs. Home-Based Support to Improve Care and Outcomes for Older Asthmatics	Alex Federman, MD Icahn School of Medicine at Mount Sinai	Compares clinic-based support by an asthma care coach, home-based self-management by CHW, and usual care	● African Americans, Hispanics/Latinos ● ≥60 y	● Three-arm RCT ● n = 450
D	The Houston Home-based Integrated Intervention Targeting Better Asthma Control (HIITBAC) for African Americans	Winifred Hamilton, MS, PhD Baylor College of Medicine	Compares enhanced clinic care to a CHW home-based asthma control and environmental intervention	● African Americans ● ≥18 y	● Two-arm RCT ● n = 300
E	The Coordinated Healthcare Interventions for Childhood Asthma Gaps in Outcomes (CHICAGO) Trial	Jerry Krishnan, MD, PhD University of Illinois at Chicago	Compares enhanced ED discharge intervention, enhanced ED discharge intervention combined with a CHW home visit intervention, and usual care	● African Americans, Hispanics/Latinos ● 5-11 y	● Three-arm RCT ● n = 640
F	Guidelines to Practice (G2P): Reducing Asthma Health Disparities through Guideline Implementation	James Stout, MD, MPH Seattle–King County Public Health Department	Compares enhanced clinic care and CHW home visits nested within a health plan and provider education intervention, where patients receive case management and providers receive guideline-based education	● African Americans, Hispanics/Latinos ● 5-75 y	● 2 × 2 factorial RCT ● n = 550
G	Preference and Effectiveness of Symptom-Based Adjustment of Inhaled Corticosteroid Therapy in African American Children	Kaharu Sumino, MD, MPH Washington University in St Louis	Compares symptom-based adjustment of ICSs where parent/patient controls medication use based on daily symptoms to guideline-based adjustment of ICSs	● African Americans ● 6-17 y	● Two-arm RCT ● n = 200
H	Improving Asthma Outcomes Through Stress Management	Stephen J. Teach, MD, MPH Children's Research Institute	Compares IMPACT DC, ²¹ a Washington, DC–based asthma program for urban youth who frequently visit the ED to IMPACT DC and a parental stress management intervention	● African Americans ● 4-12 y	● Two-arm RCT ● n = 250

IMPACT DC, Improving Pediatric Asthma Care in the District of Columbia; IT, information technology; RCT, randomized controlled trial.

*Study information obtained from applications. Study abstracts are available at www.pcori.org/research-results-home.

products), yet among children and caregivers, only half received information regarding home, school, or work triggers.^{5,20}

PATIENT-CENTERED ASTHMA STUDIES TO IMPROVE PATIENT AND CLINICIAN ADHERENCE TO THE NAEPP GUIDELINES

The PCORI studies are randomized controlled trials comparing interventions with proved efficacy. Table I²¹ provides the titles, comparators, populations, and design elements of each study, showing the similarities and differences in the interventions being

tested. All focus on improving patient and provider adherence to the NAEPP guidelines. All are comparative effectiveness trials that compare 2 or more evidence-based interventions. Some trials compare an active intervention with usual care (usual care is specifically defined and measured). The studies emphasize patient-centered and patient-reported outcomes, such as asthma-related quality of life, symptom-free days, and missed work or school days. Clinical outcomes include inhaled corticosteroid (ICS) adherence, lung function, and exacerbations. Asthma control is a key outcome monitored in each study because it is emphasized by the NAEPP guidelines for assessment of asthma severity and

TABLE II. Alignment of study interventions to the NAEPP guidelines

Study reference letter	Study title	Asthma assessment and monitoring	Education for a partnership in care: Clinician education	
		Assessing and monitoring asthma severity, control, and responsiveness	Clinical behaviors	System and clinical decision supports
A	Using IT to Improve Access, Communication and Asthma in African American and Hispanic/Latino Adults	X		
B	Imperial County Asthma Comparative Effectiveness Research Project	X	X	X
C	Clinic-Based vs. Home-Based Support to Improve Care and Outcomes for Older Asthmatics	X		X
D	The Houston Home-based Integrated Intervention Targeting Better Asthma Control (HIIT-BAC) for African Americans	X	X	X
E	The Coordinated Healthcare Interventions for Childhood Asthma Gaps in Outcomes (CHICAGO) Trial	X	X	
F	Guidelines to Practice (G2P): Reducing Asthma Health Disparities through Guideline Implementation	X	X	X
G	Preference and Effectiveness of Symptom-Based Adjustment of Inhaled Corticosteroid Therapy in African American Children	X		
H	Improving Asthma Outcomes Through Stress Management	X		

IT, Information technology.

overall quality of life. If the patient's asthma is controlled, they should have few nighttime awakenings, missed school or work, limitations in physical activities, ED visits, and hospital stays.^{22,23}

Interventions to improve adherence to NAEPP guidelines

Interventions align with approaches and strategies recommended in the NAEPP guidelines and take place in the home, school, or health care setting. They focus on clinician-, patient/caregiver-, and system-level interventions and medication use, incorporating approaches tailored to the target populations. Table II shows the major categories and subcategories of the guidelines the studies are designed to explore. Fig 1 shows how these funded studies address the goal of reducing asthma disparities.

Interventions focused on clinician education

Interventions geared to improving clinician adherence to the guidelines incorporate individual education of doctors, nurses, and others in the clinic (Table II, study reference letters B and D-F). Educating clinicians can promote or reinforce provision of appropriate asthma care by influencing knowledge and attitudes, as well as reducing other practice barriers to implementing the guidelines.⁷ A good example is the Guidelines to Practice (G2P): Reducing Asthma Health Disparities through Guideline Implementation study. This study provides education and skills training for clinicians as one component of the intervention. All clinicians receive training using the Provider Asthma Care Education curriculum, an effective program distributed by the NHLBI developed to improve treatment of asthma.^{24,25} A subset of clinicians participate in small-group case-based learning to review the guidelines. They receive training grounded in patient-centered approaches to help improve asthma outcomes, such as building skills to diagnose and monitor asthma, conducting motivational interviews, and participating in shared decision making. If these strategies are effective, they can be disseminated to improve outcomes and reduce disparities.

Interventions focused on system and clinical decision supports

However, by itself, clinician education might not be enough to improve adherence to guidelines. Knowledge on asthma assessments and treatments is beneficial, but tools to support behavior change are often more critical. As such, system and clinical decision supports that prompt guideline-based care and address the organization and delivery of asthma care are intervention components being tested by several of the funded studies (Table II, study reference letters B-D and F).⁷ These and other tools (eg, audit and feedback, modification to notes, care plans, and orders) that follow recommended care can help to bridge knowledge and changes in behavior that can reduce asthma-related ED visits and inpatient admissions and improve the provision of patient education and asthma action plans.²⁶⁻³⁰ The Imperial County Asthma Comparative Effectiveness Research Project is testing the effectiveness of system-level changes to support clinicians. More specifically, these changes include modifications to staffing and workflow with the addition of asthma educators/case managers in the clinic who support the asthma care team and allowing for documentation of referrals and results of these interactions. The new system will also include asthma care templates that can be tailored to the patients' needs and that provide prompts to support clinician decision making, sharing of educational messages, treatments, and behavioral recommendations for the family.

Patient education in the clinic and ED

The studies recognize that involving patients and facilitating their ability to work in partnership with clinicians is key to improving outcomes. The studies focus on patient education tailored to meet the needs of the individual by respecting their cultural beliefs and integrating components that incorporate a focus on health literacy and asthma knowledge.

In all of the studies, patient education occurs in the clinic or ED as part of the clinical encounter, presenting an opportunity to

Education for a partnership in care: Patient education				Control of environmental factors	Medications
Self-management education in clinic/ office/ED/hospital	Self-management education with home-based interventions	Tools for self-management: Asthma action plan	Tailoring education to needs of individual patient	Inhalant allergens and irritants	Long-term and quick-relief medications
X	X	X	X		
X	X	X	X	X	
X	X	X	X	X	
X	X	X	X	X	
X	X	X	X	X	
X	X	X	X	X	
X		X	X		X
X		X	X	X	

build patient-clinician rapport, provide education to patients, and discuss and agree to a treatment plan (Table II, study reference letters A-H).

The Houston Home-based Integrated Intervention Targeting Better Asthma Control (HITTABC) for African Americans study includes an enhanced clinic component in which clinicians take a detailed history of patients' environmental health, which is recorded in the EHR. They provide patients with a tailored education program focused on self-management, avoidance of asthma triggers, and review of asthma action plans.

The Clinic-Based vs. Home-Based Support to Improve Care and Outcomes for Older Asthmatics study involves in-clinic asthma care coaches who provide care coordination and intense self-management support to address barriers, discuss medication adherence and inhaler techniques, provide patient education, and review asthma action plans.³¹

Another study, the Coordinated Healthcare Interventions for Childhood Asthma Gaps in Outcomes (CHICAGO) Trial, provides patient education in the ED using a tool called the CHICAGO Action Plan after emergency department discharge (CAPE). This tool is used at discharge from the ED to share written information with patients about medication use, symptom recognition, and trigger recognition in an attempt to help facilitate self-management.³²

Patient education in the home: Use of community health workers

Patient education that takes place in the home over a period of time has the ability to address individual needs where patients live and reinforce lessons learned, a very patient-centered approach. The 3 aforementioned studies and the earlier described studies, Guidelines to Practice (G2P): Reducing Asthma Health Disparities through Guideline Implementation and the Imperial County Comparative Effectiveness Research Project, include additional components that involve community health workers (CHWs) who support patients in the home to foster a relationship that bridges

the healthcare system and community (Table II, study reference letters A-F).³³ CHWs build relationships with patients and provide patient education about medication adherence, environmental remediation, and asthma action plans within the context of the person's home.

The Using Information Technology to Improve Access, Communication and Asthma in African American and Hispanic/Latino Adults study compares home visits by CHWs to train patients in use of a patient portal (Table II, study reference letter A).³⁴ The patient portal offers patients Web-based access to clinicians and practices and allows them to make appointments, refill medications, and communicate directly with clinicians. This study links patient education and an existing health system tool (ie, patient portals).

Caregiver education: Use of community wellness coaches

The Improving Asthma Outcomes through Stress Management study uses interventions that target asthma education for children and their caregivers (Table II, study reference letter H). This study uses community wellness coaches to provide culturally tailored stress reduction education and management using mindfulness, relaxation techniques, and meditation to caregivers. The study anticipates that one-on-one psychosocial support will reduce parental/caregiver stress and promote improved management of children's asthma.

Use of long-term control and quick-relief medication

The Preference and Effectiveness of Symptom-Based Adjustment of Inhaled Corticosteroid Therapy in African American Children study focuses on the use of both long-term and quick-relief medications (Table II, study reference letter G). It compares the use of symptom-based adjustment, in which patients control

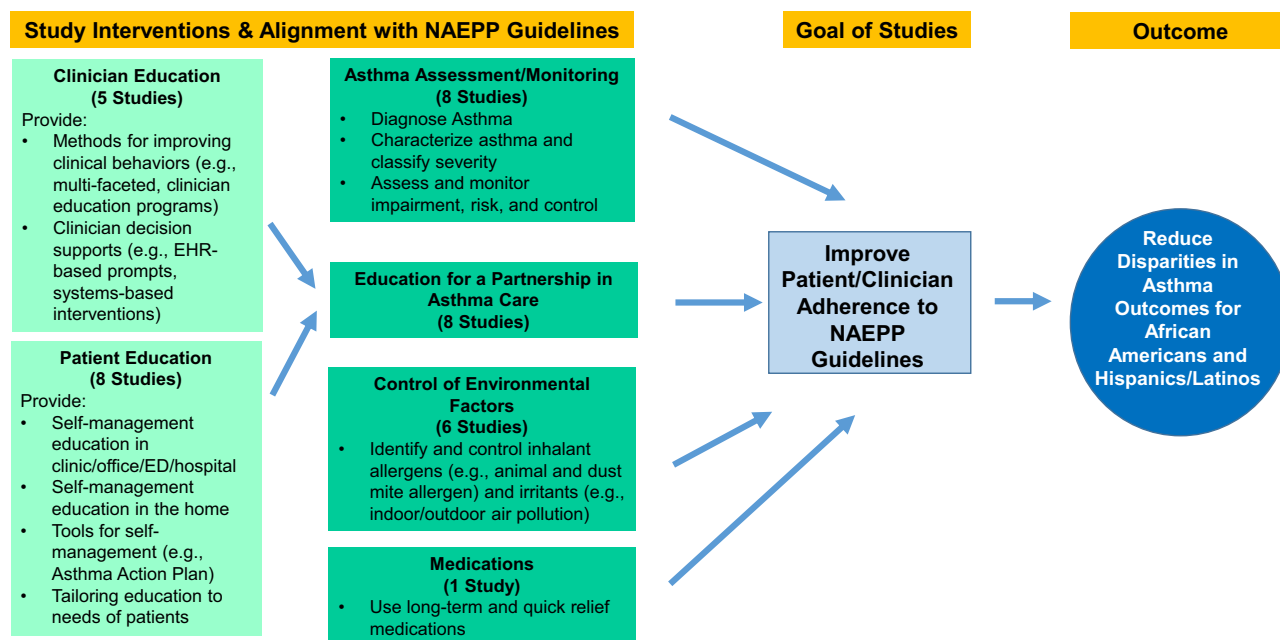


FIG 1. Concept diagram for reducing disparities in asthma outcomes for African Americans and Hispanics/Latinos.

their medication use based on their daily symptoms (ie, patients take their ICSs when they need to take their rescue inhaler) to guideline-based physician adjustment, which is the current recommendation. Another study funded by PCORI through its pragmatic clinical studies funding announcement, the Patient Empowered Strategy to Reduce Asthma Morbidity in Highly Impacted Populations, is also examining this approach but targeting African American and Hispanic/Latino adults between the ages of 18 and 75 years in a large study with sites across the United States and Puerto Rico.

Since the 2007 NAEPP guidelines were published, studies with few racial/ethnic minorities in controlled trial settings have shown that intermittent ICS therapy determined based on asthma symptoms is as effective as daily use of ICSs in managing asthma and exacerbations.³⁵⁻³⁹ These 2 studies are testing an innovative dosing approach recommended by the Global Initiative for Asthma (GINA) and professional societies, and they will be monitoring adherence of patients enrolled in the studies.^{40,41} This patient-centered approach might help facilitate self-management of asthma for children and adults.

EFFECT OF RESEARCH ON HEALTH CARE PRACTICE

These 8 studies are distinct; however, there are several areas of alignment that could have implications for clinical practice. First, these studies are tailoring interventions to help understand what works best, for whom, and under what circumstances. These studies could provide an understanding of strategies to improve both patient and clinician adherence to guidelines and approaches to tailoring interventions that meet the needs of patients.

Second, these studies all have strong patient and other stakeholder (eg, clinicians, health systems, payers, patient advocacy organizations, and professional societies) engagement.

Patient engagement results in interventions that are more relevant to and meet the needs of patients.⁴² These interventions might also be more likely to be implemented in practice because other stakeholders have been actively engaged in the conduct of the studies.

Lastly, several of the studies (Table II, study reference letters C-F) have agreed on common clinical, patient-centered, and patient-reported outcomes that could lead to the aggregation of data and pooling of results. As an illustrative example of alignment, although each individually provides unique tools and methods that could be applied to clinical practice, collectively, these studies will offer insight into what factors and interactions of multilevel and multicomponent interventions work to improve asthma outcomes. Understanding which strategies and combination of strategies (eg, decision tools in the EHR, use of care plans, patient education in the home, and tailored asthma action plans) support care for chronic and complex conditions, such as asthma, could help to reduce disparities.

Since 2007, additional guidelines have been developed or updated to either reinforce concepts in the NAEPP guidelines or establish new guidance.^{40,43-45} Recommendations, such as tailored asthma self-management education, use of asthma action plans, and assessment and management of environmental triggers and allergens align with the 2007 guidelines.⁴³⁻⁴⁵ A 2016 guideline from GINA targets medication, calling for the use of low-dose controller medication plus as-needed reliever medication.⁴⁰ Additionally, the National Heart, Lung, and Blood Advisory Council Asthma Expert Working Group conducted a needs assessment on a potential update to the NAEPP guidelines. One priority topic, similar to that identified by the GINA guidelines, included “adjustable medication dosing in recurrent wheezing and asthma.”⁴⁶ This strategy is being tested by one of the PCORI targeted studies (Table II, study

reference letter G), as well as another recently PCORI-funded pragmatic study.

The working group also identified “the role of remediation of indoor allergens (house dust mites/pets) in asthma management” as an important topic.⁴⁶ Five PCORI studies could add to the scientific evidence base (Table II, study reference letters B-F). They include interventions that take place in the home to potentially mitigate the environmental factors that trigger asthma.

The optimal uptake and use of asthma action plans is recognized as an integral component of high-quality asthma care. However, the working group pointed out that the effectiveness of asthma action plans and best modes of improving their use have not been adequately assessed.⁴⁶ This and other working group-recommended priorities, such as use of CHWs, are key components of several PCORI asthma studies.

There are other calls to action aligned with the overarching goal of improving asthma outcomes, which these funded studies are also directly addressing. For example, the NHLBI’s AsthmaNet consortium identified several top research priorities for pediatric and adult populations, including a recommendation to examine tailored approaches based on race/ethnicity.⁴⁷ The PCORI studies all target African American and/or Hispanic/Latino populations.

CONCLUSION

The 8 research studies funded by PCORI are still underway, with findings expected in the next 2 years. These studies hope to provide insight into the comparative effectiveness of interventions to improve adherence to guidelines and on important outcomes that matter to patients and other stakeholders. The interventions were developed with input of patients, clinicians, and other key stakeholders to address barriers specific to target populations. This engagement and tailoring might result in more relevant interventions and influence the long-term sustainability of any positive health effects. The alignment of interventions with the local environment might also result in their continued use over time.⁴⁸ For example, one study involved local clinics in the adoption of tailored asthma care templates and decision supports to help clinicians assess and record asthma control. These improvements are now being implemented in nonstudy clinics in nearby towns to ensure that all patients with asthma can receive guideline-based care.

Partnerships are taking place between researchers and stakeholders in the individual studies, as well as among all 8 funded asthma research teams. The 8 asthma research teams are collaborating through learning communities, such as the PCORI Asthma Evidence to Action Network and Patient-centered Stakeholder-Engaged Dissemination and Implementation Research Network in Asthma (PoSEiDON-asthma), which might result in a collective effort to continue to address research gaps facing African Americans and Hispanics/Latinos. We have learned that to further leverage collaborations, we should have ensured early alignment among all studies for capturing the same outcomes and for evaluating their influence through a comprehensive framework, such as Reach, Effectiveness, Adoption, Implementation, Maintenance (REAIM).

The NAEPP guidelines and others place strong emphasis on multifaceted approaches for patient and clinician education and environmental control, highlighting that single interventions are generally ineffective.^{5,9} The PCORI studies have the potential to identify interventions that can influence health care practice,

improve outcomes, and reduce disparities. The intersection of guideline-based and patient-centered care can hopefully be achieved.

We thank Dionna Atkinson for her assistance with project coordination and administrative support.

What do we know?

- Asthma interventions being tested have efficacy for the general population.
- Research gaps in the following areas are being addressed:
 - improving patient and clinician adherence to the NAEPP guidelines;
 - adjustable medication dosing for recurrent wheezing and asthma; and
 - the role of remediation of indoor allergens (house dust mites/pets) in asthma management.

What is still unknown?*

- The comparative effectiveness of asthma interventions being tested for African American and Hispanic/Latino populations
- How effective the PCORI-funded asthma studies will be at reducing disparities for African Americans and Hispanics/Latinos
- The similarities and differences between the study sample and those who were eligible but chose not to participate
- The potential for tailored asthma interventions to be adopted in different settings based on available resources and level of expertise and commitment of those delivering the interventions
- The most effective combination of asthma intervention components for improving patient-centered outcomes
- The ability for the asthma interventions to be delivered with fidelity at the setting level
- The long-term sustainability of positive health effects resulting from the asthma intervention
- The long-term sustainability of interventions taking place in patients’ homes, clinics, and health systems after research funding is no longer available

REFERENCES

1. PCORI funding announcement: treatment options for African Americans and Hispanics/Latinos with uncontrolled asthma. 2013. Available at: <http://www.pcori.org/assets/2013/06/PCORI-PFA-Asthma-061813.pdf>. Accessed June 1, 2016.
2. Centers for Disease Control and Prevention. Most recent asthma data. 2016. Available at: http://www.cdc.gov/asthma/most_recent_data.htm. Accessed June 1, 2016.
3. US Department of Health and Human Services Office of Minority Health. Asthma and Hispanic Americans. 2016. Available at: <http://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=60>. Accessed October 7, 2016.
4. US Environmental Protection Agency. President’s Task Force on Environmental Health Risks and Safety Risks to Children: coordinated federal action plan to

*The topics listed might be addressed when results of PCORI-funded studies are available.

†Based on the Reach, Effectiveness, Adoption, Implementation, Maintenance (REAIM) Framework.⁴⁸

- reduce racial and ethnic asthma disparities. 2012. Available at: http://epa.gov/childrenstaskforce/actionplan_one_pager.pdf. Accessed July 22, 2016.
5. National Heart, Lung, and Blood Institute. National Asthma Education and Prevention Program Expert Panel Report 3: guidelines for the diagnosis and management of asthma full report. 2007. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/17983880>. Accessed June 1, 2016.
 6. Canino G, McQuaid EL, Rand CS. Addressing asthma health disparities: a multi-level challenge. *J Allergy Clin Immunol* 2009;123:1209-17.
 7. Woolf SH, Grol R, Hutchinson A, Eccles M, Grimshaw J. Clinical guidelines: potential benefits, limitations, and harms of clinical guidelines. *BMJ* 1999;318:527-30.
 8. Hasnain-Wynia R. Is evidence-based medicine patient-centered and is patient-centered care evidence-based? *Health Serv Res* 2006;41:1-8.
 9. Szeffler SJ, Gergen PJ, Mitchell H, Morgan W. Achieving asthma control in the inner city: do the National Institutes of Health Asthma Guidelines really work? *J Allergy Clin Immunol* 2010;125:521-6.
 10. Akinbami LJ, Moorman JE, Bailey C, Zahran HS, King M, Johnson CA, et al. Trends in asthma prevalence, health care use, and mortality in the United States, 2001-2010. 2012; no. 94. Available at: <http://www.cdc.gov/nchs/products/databriefs/db94.htm>. Accessed July 1, 2016.
 11. Cabana MD, Ebel BE, Cooper-Patrick L, Powe NR, Rubin HR, Rand CS. Barriers pediatricians face when using asthma practice guidelines. *Arch Pediatr Adolesc Med* 2000;154:685-93.
 12. Diette GB, Skinner EA, Markson LE, Algatt-Bergstrom P, Nguyen TT, Clark RD, et al. Consistency of care with national guidelines for children with asthma in managed care. *J Pediatr* 2001;138:59-64.
 13. Finkelstein JA, Lozano P, Shulruff R, Inui TS, Soumerai SB, Ng M, et al. Self-reported physician practices for children with asthma: are national guidelines followed? *Pediatrics* 2000;106:886-96.
 14. Wisnivesky JP, Lorenzo J, Lyn-Cook R, Newman T, Aponte A, Kiefer E, et al. Barriers to adherence to asthma management guidelines among inner-city primary care providers. *Ann Allergy Asthma Immunol* 2008;101:264-70.
 15. Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud PA, et al. Why don't physicians follow clinical practice guidelines? *JAMA* 1999;282:1458-65.
 16. James T, Fine M. Monitoring asthma control using claims data and patient-reported outcomes measures. *Pharm Ther* 2008;33:454-66.
 17. Bender BG. Overcoming barriers to nonadherence in asthma treatment. *J Allergy Clin Immunol* 2002;109:S54-9.
 18. Brown RW, Cappelletti CS. Reaching beyond disparity: Safely improving asthma control in the at-risk African-American population. *J Natl Med Assoc* 2013;105:138-49.
 19. Nelson KA, Zorc JJ. Management of acute asthma. *Adolesc Med State Art Rev* 2010;21:21-33, vii.
 20. Centers for Disease Control and Prevention (CDC). Vital signs: Asthma prevalence, disease characteristics, and self-management education: United States, 2001-2009. *MMWR Morb Mortal Wkly Rep* 2011;60:547-52.
 21. Teach SJ, Crain EF, Quint DM, Hylan ML, Joseph JG. Improved asthma outcomes in a high-morbidity pediatric population: results of an emergency department-based randomized clinical trial. *Arch Pediatr Adolesc Med* 2006;160:535-41.
 22. Wechsler ME. Managing asthma in primary care: putting new guideline recommendations into context. *Mayo Clin Proc* 2009;84:707-17.
 23. National Institutes of Health/National Heart, Lung, and Blood Institute. Asthma & physical activity in the school: making a difference. NIH publication no. 12-3651. Originally Printed 1995. Revised April 2012. Available at: https://www.nhlbi.nih.gov/files/docs/public/lung/phy_asth.pdf. Accessed July 22, 2016.
 24. University of Michigan. Physician Asthma Care Education (PACE). Available at: <https://cmcd.sph.umich.edu/research-program-areas/physician-asthma-care-education-pace/>. Accessed July 30, 2016.
 25. National Institutes of Health/National Heart, Lung, and Blood Institute. Physician Asthma Care Education (PACE). Available at: <http://www.nhlbi.nih.gov/health-pro/resources/lung/physician-asthma-care-education/>. Accessed July 30, 2016.
 26. Bracha Y, Brottman G, Carlson A. Physicians, guidelines, and cognitive tasks. *Eval Health Prof* 2011;34:309-35.
 27. Okelo S. Interventions to modify health care provider adherence. *AHRQ* 2013. Available at: http://www.ncbi.nlm.nih.gov/books/NBK144097/pdf/Bookshelf_NBK144097.pdf. Accessed July 22, 2016.
 28. Bell LM, Grundmeier R, Localio R, Zorc J, Fiks AG, Zhang X, et al. Electronic health record-based decision support to improve asthma care: a cluster-randomized trial. *Pediatrics* 2010;125:e770-7.
 29. Fathima M, Peiris D, Naik-Panvelkar P, Saini B, Armour CL. Effectiveness of computerized clinical decision support systems for asthma and chronic obstructive pulmonary disease in primary care: a systematic review. *BMC Pulm Med* 2014;14:189.
 30. Matiz LA, Robbins-Milne L, Krause MC, Peretz PJ, Rausch JC. Evaluating the impact of information technology tools to support the asthma medical home. *Clin Pediatr (Phila)* 2016;55:165-70.
 31. Federman AD, Martynenko M, O'Connor R, Kannry J, Karp A, Lurio J, et al. Rationale and design of a comparative effectiveness trial of home- and clinic-based self-management support coaching for older adults with asthma. *Contemp Clin Trials* 2015;44:103-11.
 32. Erwin K, Martin MA, Flippin T, Norell S, Shadlyn A, Yang J, et al. Engaging stakeholders to design a comparative effectiveness trial in children with uncontrolled asthma. *J Comp Eff Res* 2016;5:17-30.
 33. American Public Health Association. Community health workers. 2016. Available at: <https://www.apha.org/apha-communities/member-sections/community-health-workers>. Accessed June 1, 2016.
 34. Apter AJ, Bryant-Stephens T, Morales KH, Wan F, Hardy S, Reed-Wells S, et al. Using IT to improve access, communication, and asthma in African American and Hispanic/Latino adults: rationale, design, and methods of a randomized controlled trial. *Contemp Clin Trials* 2015;44:119-28.
 35. Travers J, Marsh S, Williams M, Weatherall M, Caldwell B, Shirtcliffe P, et al. External validity of randomised controlled trials in asthma: to whom do the results of the trials apply? *Thorax* 2007;62:219-23.
 36. Herland K, Akselsen JP, Skjongsberg OH, Bjermer L. How representative are clinical study patients with asthma or COPD for a larger "real life" population of patients with obstructive lung disease? *Respir Med* 2005;99:11-9.
 37. Boushey HA, Sorkness CA, King TS, Sullivan SD, Fahy JV, Lazarus SC, et al. Daily versus as-needed corticosteroids for mild persistent asthma. *N Engl J Med* 2005;352:1519-28.
 38. O'Byrne PM, Bisgaard H, Godard PP, Pistolesi M, Palmqvist M, Zhu Y, et al. Budesonide/formoterol combination therapy as both maintenance and reliever medication in asthma. *Am J Respir Crit Care Med* 2005;171:129-36.
 39. Rabe KF, Atienza T, Magyar P, Larsson P, Jorup C, Lalloo UG. Effect of budesonide in combination with formoterol for reliever therapy in asthma exacerbations: a randomised controlled, double-blind study. *Lancet* 2006;368:744-53.
 40. Global Initiative for Asthma. Global strategy for asthma management and prevention. Global Initiative for Asthma 2016. Available at: <http://ginasthma.org/2016-gina-report-global-strategy-for-asthma-management-and-prevention/>. Accessed August 1, 2016.
 41. Dinakar C, Oppenheimer J, Portnoy J, Bacharier LB, Li J, Kercsmar CM, et al. Management of acute loss of asthma control in the yellow zone: a practice parameter. *Ann Allergy, Asthma Immunol* 2014;113:143-59.
 42. Fleurence R, Selby JV, Odom-Walker K, Hunt G, Meltzer D, Slutsky JR, et al. How the Patient-Centered Outcomes Research Institute is engaging patients and others in shaping its research agenda. *Health Aff (Millwood)* 2013;32:393-400.
 43. Agency for Healthcare Research and Quality. Guideline summary: environmental management of pediatric asthma. Guidelines for health care providers. 2005. Available at: <https://www.guideline.gov/summaries/summary/10019/environmental-management-of-pediatric-asthma-guidelines-for-health-care-providers>. Accessed August 1, 2016.
 44. Sveum R, Bergstrom J, Brottman G, Hanson M, Heiman M, Johns K, et al. Institute for Clinical Systems Improvement. Diagnosis and management of asthma. Updated 2012. Available at: https://www.icsi.org/_asset/rsjvnd/asthma.pdf. Accessed August 1, 2016.
 45. Agency for Healthcare Research and Quality. Best evidence statement (BEST). Culturally sensitive asthma education 2013. Available at: <https://www.guideline.gov/summaries/summary/46462/best-evidence-statement-best-culturally-sensitive-asthma-education>. Accessed August 1, 2016.
 46. National Heart, Lung, and Blood Advisory Council Asthma Expert Working Group. Draft needs assessment report for potential update of the Expert Panel Report-3(2007): guidelines for the diagnosis and management of asthma. 2015. Available at: http://www.nhlbi.nih.gov/sites/www.nhlbi.nih.gov/files/NHLBAC_Asthma-WG-Report-2015%5B1%5D.pdf. Accessed August 1, 2016.
 47. Sutherland ER, Busse WW. Designing clinical trials to address the needs of childhood and adult asthma: the National Heart, Lung, and Blood Institute's AsthmaNet. *J Allergy Clin Immunol* 2014;133:34-8.e1.
 48. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health* 1999;89:1322-7.