Caring for Young Children with Asthma: Perspectives from Urban Community Health Centers

Ellen Childs · Margaret A. Laws ·
Mari-Lynn Drainoni · Anjali Nath · Margaret J. Reid ·
Megan Sandel · Robyn T. Cohen

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Abstract Asthma disproportionately affects low-income, minority youth, with notable disparities among children <5 years of age. Understanding the perceptions of urban community health centers (CHCs) regarding treating young children with asthma could improve care for these patients. This study uses data from semi-structured focus groups with staff from eight urban CHCs. Themes emerged in

three domains. Within the parent/family domain, providers noted low rates of follow-up visits, low health literacy, and—for young children specifically—misunderstanding about the diagnosis. At the CHC level, providers needed more staff, space, and comfort with applying the guidelines to infants and young children. CHCs reported asthma registries, population health oversight, and an asthma champion improved care. At the system level, providers wanted improved communication with emergency departments and community outreach programs. Reducing these multi-level barriers may improve care.

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E. Childs (✉) · M.-L. Drainoni
Department of Health Law, Policy and Management, Boston
University School of Public Health, 715 Albany Street Talbot 3W,
Boston, MA 02118, USA
e-mail: echilds@bu.edu

M. A. Laws · M. Sandel · R. T. Cohen
Department of Pediatrics, Boston Medical Center/Boston
University School of Medicine, Boston, MA, USA

M.-L. Drainoni
Section of Infectious Diseases, Department of Medicine, Boston
University, Boston, MA, USA

M.-L. Drainoni
Center for Healthcare Organization and Implementation Research,
ENRM VA Hospital, Bedford, MA, USA

A. Nath
Division of Healthy Homes and Community Supports, Boston
Public Health Commission, Boston, MA, USA

M. J. Reid
Office of Health Equity, Boston Public Health Commission,
Boston, MA, USA

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Black, Latino, and low-income youth suffer a disproportionate burden of asthma in the USA [1, 2]. While the overall prevalence of asthma among US children nationally is 13.0%, the prevalence is 11.7% for white non-Hispanic children, 18.7% among black children, and 12.6% among Latino children [3]. Asthma disparities in Boston, Massachusetts, are particularly pronounced among children under 5 years of age. In 2011, rates of emergency department visits for children under 5 years were 42.1 and 24.3 per 1000 black and Latino children, respectively, compared with 7.5 per 1000 white children [4]. These racial and ethnic disparities in asthma outcomes mirror markers of poverty; blacks and Latinos in Boston are more likely to have incomes below the federal poverty level and have lower educational attainment compared with whites [3]. Similarly, neighborhood disparities in asthma outcomes

also mirror patterns of neighborhood socioeconomic disparities. Neighborhoods with the highest proportions of racial and ethnic minority residents (i.e., Roxbury, North Dorchester, South Dorchester, Mattapan) have the highest percentages of children living in poverty [4]. These neighborhoods also have the highest rates of asthma morbidity among young children [4].

Reasons for asthma disparities are multifactorial and more than just geographic. They include individual-level factors such as genetic susceptibility [5, 6], and family-level factors including patterns of health care utilization [7], maternal depression [8], and language and literacy issues [9]. Factors at the home/environmental level that contribute to asthma disparities include increased exposure to environmental tobacco smoke [10] and the presence of cockroaches, rodents, and mold in substandard housing [11]. At the community level, neighborhood deprivation and community violence are known risk factors for asthma morbidity [12, 13]. Additionally, quality of health care can be an issue in terms of underdiagnosis of asthma [14], provider adherence to guidelines [15, 16], and communication barriers (language, cultural, and otherwise) between providers, patients, and families [17]. Perceived challenges faced by asthma clinicians may be an area for improvement and therefore warrant further investigation.

Because of the asthma disparities for children under 5 years of age described above, this study examines the perspectives of medical providers regarding the scope of problem and factors associated with successes and challenges of managing asthma for children age 0 to 5 in Boston. We report results from focus groups with patient care teams (e.g., physicians, nurses, social workers, care coordinators) in eight community health centers in Boston neighborhoods with the highest rates of asthma morbidity. This investigation was part of a larger NIH-funded needs assessment of pediatric asthma disparities for young, low-income children of color in Boston.

Methods

Study Recruitment and Participants In January 2016, the study team contacted medical directors and/or known asthma champions (physicians, nurses, and/or care coordinators identified as having a leadership role in asthma care) at community health centers (CHCs) in Boston, specifically targeting health centers located within the neighborhoods with the highest rates of emergency department (ED) asthma visits for children age 0

to 5 years [4]. Investigators e-mailed CHCs an invitation to participate in a “needs-assessment focus group with care providers and staff to discuss experiences, challenges, and successes regarding caring for infants and young children with asthma.” Focus groups were held at participating CHCs between January and April 2016. Lunch was provided, but there was no other form of compensation for participation.

Focus Groups Eight focus groups were conducted using a semi-structured interview guide. The focus groups varied between 30 and 50 min. They were co-facilitated by a physician who is a content-expert in pediatric asthma, and an experienced qualitative researcher. The sessions were audio recorded, and a member of the study team took notes. This study was approved by the Boston University Institutional Review Board, with a waiver of documentation of consent.

Interview Guide The focus group interview guide was developed and revised by a multidisciplinary team that included a primary care pediatrician, a pediatric pulmonologist, a certified asthma educator, the director of asthma services from the Boston Public Health Commission, and a qualitative researcher; the interview guide was then reviewed by a health research and policy organization with asthma expertise. The goals of the interview guide were to facilitate discussion about (1) perceived burden of caring for young children with asthma at the CHCs, (2) specific resources and barriers that exist at each CHC to facilitate and/or hinder optimal asthma management, (3) comfort diagnosing and treating asthma in this age group, (4) familiarity with available resources to help families, and (5) a hypothetical wish list to address perceived gaps in asthma care for young children. The interview guide is attached in an [online supplement](#).

Data Analysis Audio recordings from each focus group were professionally transcribed by iTi, Interpreters, and Translators, Inc., of Manchester, CT. The transcripts were analyzed using NVivo qualitative data analysis software (QSR International Pty Ltd., version 10, 2012). Using a grounded theory approach [18], four members of the study team independently open-coded the initial three transcripts to develop conceptual categories of interest and met together to develop a full coding scheme. Three members of the study team independently coded all remaining transcripts using the

coding scheme, and using an iterative process discussed new categories that emerged in the transcripts. During this process, themes were compared across focus group transcripts for alignment. More specified central themes emerged through this iterative process.

Results

Of the 13 CHCs, we invited to participate in focus groups, eight accepted with a total of 77 participants. Focus groups ranged in size from 5 to 20 participants. All focus groups included participants (herein referred to as “providers”) from several disciplines such that all groups included physicians and nurses and some combination of the following: nurse practitioners, social workers, care managers, navigators, community health workers, and health center administrators. Table 1 summarizes the characteristics of the CHCs that participated in our study. We did not record information about the characteristics of individual focus group participants to maintain confidentiality.

Final themes from the providers were grouped into the following three domains: parent/family, within clinic, and system level. Those domains each had central themes that emerged as central barriers to sufficient care (see Table 2 for additional direct quotations related to themes described below):

Parent/Family-Level Themes

Inconsistent Follow-Up—Episodic Sick Care Only Clinical staff report low follow-up rates for young children with asthma, with most visits occurring in the setting of episodic sick care. As one provider noted,

“Families aren’t answering. We schedule the appointment. They don’t come up. They don’t follow up for another appointment. They call us when they need, when it’s an emergency. Like, they don’t have their albuterol, and they need to be seen.”

Clinical staff attribute low attendance at follow-up visits to the resolution of acute asthma symptoms, and caregivers’ lack of recognition of the importance of the follow-up appointment. Physicians and nursing staff report that asthma teaching is more effective during a

non-acute follow-up visit, when the caregiver can focus more on learning about asthma treatment and management. However, there is often low attendance at non-acute visits.

Low Health Literacy/Language Barriers Providers cite low levels of parental health literacy as a barrier to optimal asthma management. This was true for English-speaking families as well as those for whom English is not their first language. Clinicians describe having low confidence that parents of young children understand that child’s asthma diagnosis or treatment, and explain that parents frequently confuse their child’s medications. As one provider explained,

“I think the thing I find challenging is if there’s the children under five... a lot of times they don’t get it. I mean, they need it—parents need teaching... so they can show their kids. That’s the hard part... I feel like they don’t understand it. It has to really be like ‘asthma for dummies,’ you know?”

Providers reported that low health literacy in the parents and a lack of understanding about asthma was often exacerbated by the mixed messages parents receive during health care encounters, as described in the section below. As this provider states,

“And some of it is on us too because I know... I’m often hesitant to diagnose asthma the first couple of times. So, I’ll be like hemming and hawing, and then the families end up a little confused because I don’t have it clear in my mind either.”

Because many patients come in only for sick visits—often in a variety of settings (same-day sick clinic, the ED, etc.)—families encounter multiple distinct providers who give parents different labels for their child’s respiratory illnesses, leading to confusion and lack of comprehension of the seriousness of the asthma diagnosis. This is discussed in greater detail below.

Provider/CHC-Level Themes

Pragmatic Space/Staff Issues Clinicians report needing more staff and more space to provide adequate care to asthma patients. This is particularly true when a child is receiving treatment for an asthma exacerbation which can occupy an examination room for several hours at a time.

Table 1 Characteristics of the patients served by the participating community health centers

CHC	#1	#2	#3	#4	#5	#6	#7	#8
<i>N</i>	<i>N</i> = 15	<i>N</i> = 6	<i>N</i> = 20	<i>N</i> = 8	<i>N</i> = 5	<i>N</i> = 12	<i>N</i> = 6	<i>N</i> = 8
No. of patients served	13,652	63,970	9,087	19,466	27,043	11,339	6,305	4,526
Race/ethnicity								
White (%)	16.3	32.3	2.2	6.3	59.9	4.5	37.0	2.5
Black (%)	45.9	3.6	92.8	43.4	16.7	59.5	48.0	42.6
Latino (%)	62.6	70.0	4.4	41.4	11.3	7.45	32.0	23.5
Asian (%)	1.4	1.1	0.3	0.9	17.4	3.1	2.0	0.1
Preferred language								
Not English	45.1	57.9	33.8	43.2	22.6	39.8	25.0	18.0
Percent with income FPL	89.2	56.9	81.9	57.5	46.3	N/A	N/A	68.78
Insurance								
Medicaid/CHIP (%)	52.0	39.4	62.8	33.4	40.5	23.6	45.0	81.5
Uninsured children (%)	9.8	8.5	3.2	N/A	9.9	2.0	4.0	4.1
Percent of living in public housing	26.0	4.3	N/A	39.7	0	N/A	N/A	0.6
Percent of patients with asthma	5.2	4.2	5.0	12.4	6.9	8.4	8.4	22.6
CHC has asthma champion	Yes	Yes	No	I/P	No	I/P	No	Limited
CHC reports using registries	Yes	Yes	No	Yes	Limited	Yes	No	Yes

Data collected from CHCs directly or from reports to the Department of Public Health or Boston Public Health Commission

N/A not available, I/P in process

“I think we have a lot of patients that come in acutely ill, so then they end up having [nebulizer] treatments and sometimes ending up... in the ER. So that can really have an impact on our session flow... it delays the session. It delays the rooms... And we have other patients that may be waiting.”

Providers state that they want to provide more education, but often lack the time and staff to provide that education during an appointment.

Physician Management—Diagnostic Uncertainty and Application of Guidelines Resulting in Mixed Messages Despite specific recommendations in the National Asthma Education and Prevention Program (NAEPP) guidelines regarding the diagnosis, initiation, and adjustment of therapy for children in the 0–4- and 5–11-year age groups [19], some clinicians report confusion or lack of confidence about executing those guidelines with young children, especially for children under 2 years of age:

Provider 1: “... I think I would shy also away from the diagnosis unless it’s persistent past like four or five.”

Provider 2: “It’s interesting, though, because when you put in the diagnosis coding you put ‘reactive airway [disease],’ it automatically lumps it into ‘asthma.’ Right, it changes it, so even that kind of pushes you... All of our forms for albuterol automatically populate with asthma as opposed to ‘reactive airway,’ so...”

Provider 1: “... All the patient guide material that we now have to use also doesn’t use the terminology correctly. Or not correctly. I don’t know if it’s correctly.”

There are concerns that providers may be documenting asthma symptoms and visit diagnoses in a heterogeneous way (“reactive airway disease,” “wheezing,” “bronchiolitis”) and that there is a reluctance to take the formal step of adding “asthma” to the Problem List of younger children even after multiple visits for recurrent respiratory symptoms. There are concerns that documentation inconsistencies in the electronic medical record do not accurately represent a child’s asthma history, potentially contributing to under-diagnosis and

Table 2 Quotes from focus group participants regarding factors affecting asthma care in young children

Domain	Theme	Examples
Parent/family	1. Low follow-up/episodic sick care only	<p>INTERVIEWER: What would be helpful to optimize the care for children with asthma, age zero to five, at this center?</p> <p>RESPONDENT: If patients came to their appointments.</p> <p>RESPONDENT: That's the top number one.</p> <p>RESPONDENT: Because you cannot give the care if they're not coming.</p> <p>RESPONDENT: I think a lot of the burden that happens too is... the continuity of care. Like, a lot of things get pushed under. People don't do the follow-ups. They're not using their medication right. The parents don't know what medications they're on. It's like, "Oh, that the orange inhaler. That's the, you know, whatever inhaler." And they don't know exactly what the asthma action plan entails, and so that's why we'll keep on seeing kids in the emergency room. And follow-ups aren't happening...</p> <p>INTERVIEWER: Why would you say they're not following through?</p> <p>RESPONDENT: [laughs] Well, a lot of things. I think that either we're not getting the [Specialty Clinic] reports right on time. The families aren't answering. We schedule the appointment. They don't come up. They don't follow up for another appointment. They call us when they need when it's an emergency. Like, they don't have their albuterol, and they need to be seen. But I think if we have more of a scheduled follow-up plan then things will be better, and we would see less ER visits in lots of them.</p>
	2. Low health literacy/language barriers	<p>RESPONDENT: I think more innovative educational materials for the parents, and even educational materials that are geared to the age of the child. You know, we used to get coloring books and, you know, the children, the parents could read the story, and the children could color. We don't get any of those materials anymore. And so being able to have those materials, even if you can put them in the lobby and while they're sitting there they grab the book and the kids color. They can be reading to them. But, you know, I used to find that was really, really informative. The other thing I found with our population is they're visual learners. And so being able to have the right type—even if you have videos or, DVDs that they can watch, educational materials that they can understand at their level—those are really important tools of education.</p> <p>RESPONDENT: I think language accessibility, like having information in Haitian Creole, would be very helpful for a subset of our population... it's just I think the hardest cases are, at least for me, the families who just are not understanding, even when you try to use the Language Line...</p>
Within clinic	3. Pragmatic space/staff issues	<p>INTERVIEWER: So in the last couple of minutes... do you have any other thoughts or suggestions about what might be done better?</p> <p>RESPONDENT: We need more money. [laughter]</p> <p>RESPONDENT: And more staff, more room.</p> <p>RESPONDENT: Can we get into the grant? [laughter]</p> <p>INTERVIEWER: This is the time to say it. [laughter]</p>

Table 2 (continued)

Domain	Theme	Examples
	4. Physician management—diagnostic uncertainty and application of guidelines resulting in mixed messages	<p>RESPONDENT: Another room for patients, another staff member to actually capture the patients when they're here and do teaching. Outreach, so they can follow up...</p> <p>INTERVIEWER: And do you have an electronic medical record that flags asthma?</p> <p>PERSON BEING INTERVIEWED: Mm-hmm.</p> <p>INTERVIEWER: How well does that work?</p> <p>PERSON BEING INTERVIEWED: Well, it works as well as if the provider does the ICD-10. You know? If they do, then it will flag that, but if they don't then it doesn't. So it's, it's up to whatever the providers are putting in. You know? There is a variety...</p> <p>RESPONDENT: Yeah. I think also sometimes it can be confusing because we might—like, typically you're going to see one of these children acutely, and it might not be their own doctor who's seeing them... In any pediatric office, we have a clinic for sick visits. So, maybe I might be seeing someone who's wheezing, and I might use the word "asthma" whereas the family hasn't heard it before, or I might say, "Oh, has anyone said that your child has asthma?" And they say, "No, do you think they do?" And then it's, you kind of have to, "well, I don't know, I have to go through the chart." And that can sometimes be a little bit... difficult. Because you want to have a more in-depth conversation, but there's lots of people who are sick and waiting. And it shouldn't be that way... we should be able to say, stop, you know, yeah, we're going to review your chart, and I think this is the case. But I think sometimes we don't do it in the... ideal way. And I'm just thinking... if it were me and that was my child and someone said, well, "I think they have asthma, okay, use this thing, and we're going to see you back in a couple of days," you know, I'd be like "What? Who?" But I know that's what I've done sometimes. So, I think it's hard sometimes in those acute encounters... It's a little easier when it's your only patient...</p>
	5. Registry/population health oversight	<p>RESPONDENT: We can track things like, you know, percentage of asthma patients that got a flu vaccine, percentage of patients with a defined persistent asthma diagnosis, whether it be mild or moderate, who are on controller medications. That doesn't mean it's happening, but at least they have a prescription for a controller medication, so there's some of that and looking at those reports, you can get some sense of how we're doing, but it doesn't always correlate directly with the reality for the patients.</p>
	6. Having an asthma champion (but not one that is grant-funded)	<p>RESPONDENT: I guess a patient navigator could go on the "wish list." This happens again and again, having been through like renditions of lots of things where we spend a lot of time and you build a great program and you can't fund it anymore and, you know, it's like all these studies that have been going on... I don't think we need another study to show that Care Navigation helps families. It's a complicated, confusing process and asthma is the same thing... Families—not every family, but I would say the majority—need some hand holding and reinforcement and assistance and it's clear that we don't. We'd love to provide it but we're not that good at it because of time constraints... my wish would be: How can we prove</p>

Table 2 (continued)

Domain	Theme	Examples
		<p>that this is needed and should be supported, I guess. Because every time we can educate someone to use their medicine correctly—that will prevent a hospitalization... it's like, you know, financially a boon! So, I mean, this is healthcare in general, but I think that there's ways... maybe it is studies like this that can show this is really—it shouldn't be like an extra perk that somebody has. It should be part of care.</p> <p>INTERVIEWER: Are you all familiar with how to make a referral to Breathe Easy [Boston's housing code violation inspection program]?</p> <p>RESPONDENT: I would say no, for me, because again, usually what I would do is have a care manager be responsible for doing that, so I don't even know the mechanics of it.</p> <p>RESPONDENT: We just, two months ago, maybe, had them come—and I already forgot how to do it because I sort of thought, you know, well, [a nurse] will do that if she sees them or I'll just ask [a Case Manager] to do it. So... in terms of your needs assessment, boy, do we need help with that because this is, I mean, this has been going on for 20 years. People come and go, and grants come and go.</p> <p>RESPONDENT: Certainly, it's been smoother when we've had someone in that capacity to help and it's a big help because... being aware of what's available out there is one thing. You know, getting it activated and following up to make sure the patient is involved or the family is involved is another thing... That's the kind of thing you're not going to be able to do beyond maybe the initial assessment because you just don't have the time.</p>
System level	7. Communication/coordination with other health systems (ERs)	<p>RESPONDENT: I think another thing that would make it easier for us is just if we can get ER reports.</p> <p>RESPONDENT: If we can know that they have been at the ER and if we know they've gone to their pulmonary appointments and things like that.</p> <p>RESPONDENT: If we have all those things available to us before they come in, it makes it so much easier for their care.</p> <p>RESPONDENT: But sometimes you don't know. Sometimes you are still doing detective work trying to figure out what's going on.</p>
	8. Communication/coordination with community outreach programs	<p>INTERVIEWER: Absolutely. Are you able to access the Asthma Home Visiting Program from the Health Commission?</p> <p>RESPONDENT: What, the [Home Inspection Program]?</p> <p>INTERVIEWER: So, there's [the program] which is with inspectional services, but... they also have a home visiting education program.</p> <p>RESPONDENT: I don't know. I'm not sure.</p> <p>INTERVIEWER: OK.</p> <p>RESPONDENT: Something that I can find out. [laughs]</p>

under-treatment. This diagnostic uncertainty can lead to providers giving parents mixed messages about the child's diagnosis of asthma specifically with younger children. As one provider reported,

“For the younger kids... it's sometimes hard for the parents to say ‘Yes, they have asthma.’ Maybe we told them they do maybe have it, we said ‘reactive airway’ or something similar to it, but I

feel like for those younger kids, a lot of the times there's maybe a miscommunication going with the parents. They don't realize that they have asthma."

As noted above, these mixed messages can undermine parents' understanding of the diagnosis and treatment of asthma.

Registry of Asthma Patients/Population Health Oversight Providers in CHCs with some form of an established asthma registry highlight success in tracking patients who have received multiple courses of steroids or are otherwise seen as frequent users of urgent asthma care within the CHC. As one provider reported,

"We review reports every week of any patient who has come into the walk-in clinic and gotten oral steroids. So, we can kind of look back and kind of keep a running tally of how many they've had, and if they go over two in a year then we call them 'high risk asthma' even if they have not been diagnosed with asthma yet, and start calling them to have them come in for a visit."

Having such a registry helps care managers, navigators, and administrators have a higher level of population health oversight and helps to focus care to those who are most at need. Providers at health centers without an asthma registry or tracking system express a desire to have such a system.

Having an Asthma Champion CHCs whose providers report having a strong asthma programs tend to have a designated "asthma champion," often a clinician or case manager who is familiar with the community resources for asthma patients and manages the asthma patient registry. At one site we visited, the asthma champion had recently left, and her absence was felt among the providers, as this provider explained:

"Well, we had this wonderful asthma nurse who was our link to all of that, but so we were really just gearing up to do a nice job... I think a lot of that has fallen now that the position is vacant again. ... I think when that person is not available, these things fall through the cracks."

These positions have historically been supported by time-limited grants or other external funding sources. Clinical staff felt strongly that temporary grant-funded positions for enhanced asthma care may be helpful in

the short term, but can be detrimental once the funding for that position ends and the staff member leaves.

City-Wide, System-Level Themes

Communication and Coordination with Other Health Systems (EDs and Urgent Care) Providers report not receiving reports about ED visits for asthma exacerbations, even when specifically requested. One provider noted a recent situation in which she had not heard back from an ED, stating that

"Two nights ago, I got a call... from mom... The child has asthma, and she had a high fever, breathing heavy... So I sent her. I still haven't got anything from [the hospital]... Even if we send them by ambulance we don't get a note back. Did they get admitted? Did they go home? No, nothing."

Without these reports, providers state they are only able to receive information from patients' caregivers, which reduces the ability for primary care providers to have a complete picture of the asthma symptom burden and health care utilization for a particular patient.

Communication and Coordination with Community Outreach Programs There are several asthma-related community programs in the area, such as home inspections for housing code violations and home-based asthma education programs. However, clinical staff are frequently unfamiliar with the specifics of these programs:

Interviewer: "And do you intersect with any of the systems that are designed to help children that have asthma in the city?"

Provider: "I don't really know about all those programs." [laughs]

In the sites where an asthma champion is part of the care team, the team appears more confident in knowing the available community-based programs and report greater use.

Discussion

This qualitative study of CHC provider perspectives on asthma care for young children highlights perceived

factors associated with asthma management at the parent/family level, provider/CHC level, and system level. The CHC providers emphasized the need for families to follow up for non-urgent asthma management medical visits and a desire for more focused opportunities to provide asthma education. Providers highlight several logistical challenges, including limited exam rooms and staff with competing responsibilities. There was variability among providers regarding knowledge, comfort, and expertise about applying the NAEPP guidelines with young children, which can result in heterogeneous documentation of symptoms and acute respiratory episodes and can increase the potential for families to receive mixed messages about asthma. In terms of population health management, CHCs that maintained an asthma registry reported important benefits, including more frequent interaction with high-risk patients and more opportunities for education sessions. Some sites reported having an asthma champion, often a nurse, case manager, or physician, who was the point person for asthma-related issues. The providers from the clinics with an asthma champion were more likely to report cohesive patient care and knowledge and use of available community-based asthma resources. From the system level, CHC staff wanted improved communication with service providers across the city including hospitals, EDs, community health workers, and inspectional services.

One of the largest challenges described in every focus group was low rates of non-urgent asthma management follow-up visits. Multiple studies echo this theme, demonstrating poor primary care follow-up after an ED visit for asthma, with rates ranging from 12 to 44% [20, 21]. Several providers in the focus groups suggested that some of the gaps in asthma knowledge among families are due to the lack of opportunity to provide asthma education during brief sick-visit encounters or stressful, higher-acuity visits. Previous studies have found that parents and caregivers who bring children in for asthma follow-up are more likely to believe that follow-up is important, value the opportunity to ask questions, consider that their child's asthma is severe, and think that it is important to take daily asthma medications to prevent symptoms [22, 23]. Several studies indicate that parents are less likely to follow-up if they perceive significant logistical barriers including a lack of convenient appointments, a prolonged wait in their primary care office, or transportation barriers [22, 23]. Research has also found that there is also a misconception that follow-

up visits are not needed for asymptomatic children [24]. In this study, in addition to low rates of asthma management follow-up visits, CHC providers identified additional factors previously shown to be associated with worse asthma outcomes: language barriers [25] and low health literacy [26].

When looking at issues associated with optimal asthma management at the provider level, multiple previous studies have suggested that black, Latino, and low-income youth are the least likely to receive medical care that adheres to NAEPP guidelines [27]. These disparities in care include low rates of controller prescriptions, completion of written asthma action plans, and referrals to a specialist for poorly controlled asthma [28, 29]. Fortunately, several studies demonstrate that provider education and training in guideline-adherent care reduces the likelihood that low-income children will require ED or inpatient hospital care [30, 31]. Our study provides more evidence from the providers' own words of their lack of knowledge of the guidelines. Despite there being an entire section of the NAEPP guidelines that focuses on the 0- to 4-year-old age group, many report hesitancy using the asthma label with young children, especially those under age 2. Our study points to providers' awareness that families are receiving mixed messages because of their reluctance to use the asthma label. Promisingly, most providers were enthusiastic about having a content expert come to the clinic for education regarding applying the NAEPP guidelines to young children, which would begin to address our finding that not all the providers have high levels of knowledge and confidence regarding the current asthma guidelines.

Studies have shown that improving practice-level processes can positively affect asthma outcomes. For example, implementing asthma quality improvement initiatives which include provider education and a designated asthma champion within a clinic improves guideline adherence and patient outcomes [32, 33]. In our study, asthma champions were perceived to both improve provider adherence to the asthma guidelines as well promote use of existing support services for families of children with asthma—such as inspections for housing code violations [34] and home-based asthma education [35]. An additional system-level source of concern reported by these providers was that the information from their patients' ED visits do not always get communicated to the primary care physician, limiting the evidence the primary care physician has to diagnose or treat a child's asthma.

Many of the findings of this study—such as the staffing and space to provide education, and the effects of low parental literacy—apply to the care of all urban minority children with asthma. However, other findings are specific to this age range of 0 to 5 years. Medical providers were more hesitant to give an asthma diagnosis to children in this age group (especially those under 3), leading to inconsistent documentation in a patient's medical record and to more mixed messages to parents. While true across all age groups, non-urgent follow-up for asthma management may be even worse for pre-school age children [20]. This may be due to several factors. Older children can take on more responsibility surrounding their asthma care compared to very young children. Because of greater mastery of English in some cases, older children may also be able to help their parents navigate complex medical systems [36].

There are many strengths to this study. We had a broad and diverse representation of Boston's CHCs and many participants in a variety of roles. We employed rigorous qualitative methodology. It should be noted that, given our emphasis on CHCs which serve primarily low-income, urban children of color, our findings may not be generalizable to other patient populations. In addition, the health care landscape of Boston may not be representative of other urban areas. Other limitations to this study are inherent to focus group studies: some participants spoke often, whereas others rarely spoke; often, the people with the highest education level in the room (i.e., the physicians) spoke the most. We attempted to overcome these limitations by using experienced moderators; explicit attempts were made to engage non-physicians to share their thoughts, although the physicians did tend to speak the most. Another limitation is that we are unable to specify the demographics of the participants in each of the focus groups.

In summary, this study provides important insights about provider perspectives of barriers to care and opportunities for success in asthma care for young children in urban CHCs. The implications of this research for urban health care providers include a more dedicated focus on following the NAEPP guidelines, especially for children under age 5; designating an asthma champion at each health center; developing an asthma registry; and improved communication between intersecting systems of care to support children with asthma. Additional research is needed to address the impact of inconsistent documentation of asthma episodes to assess whether parents of young children perceive that they

are receiving mixed messages and the degree to which those mixed messages undermine the ability of providers and families optimally manage early childhood asthma. More research is also needed to understand, document, and incorporate the use of home visits as a patient-centered way to reduce the gaps in care perceived by providers [35]. Findings from this study can inform and improve asthma management interventions within clinical settings for low-income urban families of young children with asthma.

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