

Using public policy to improve outcomes for asthmatic children in schools

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School-based services to improve asthma management need to be accompanied by public policies that can help sustain services, scale effective interventions, create greater equity across schools, and improve outcomes for children. Several national organizations, including the Centers for Disease Control and Prevention, have recommended specific public policies the adoption of which in school settings can improve asthma outcomes for children. Although many states and school districts have adopted some of these policies, adoption is not universal, and implementation is not always successful, leaving inequities in children's access to asthma services and supports. These issues can be addressed by changing public policy. Policy change is a complex process, but it is one that will benefit from greater involvement by asthma experts, including the researchers who generate the knowledge base on what services, supports, and policies have the best outcomes for children. Asthma experts can participate in the policy process by helping to build awareness of the need for school-based asthma policy, estimating the costs associated with policy options and with inaction, advocating for the selection of specific policies, assisting in implementation (including providing feedback), conducting the research that can evaluate the effectiveness of implementation, and ultimately providing information back into the policy process to allow for improvements to the policies. (*J Allergy Clin Immunol* 2014;134:1238-44.)

Key words: *Asthma, children, school, public policy*

Recent publications on childhood asthma from 2010 through 2014 have highlighted methods of prevention, new tools to detect asthma, and strategies for the prevention of asthma exacerbations in evolution.¹⁻⁵ Many of the strategies identified in these articles can be implemented in a school setting, where the management of asthma benefits from access to children with asthma, the presence of a school nurse, and the potential for more comprehensive programs and services than many children would otherwise access. In fact, schools are a uniquely critical point of care for children with asthma because they not only can provide direct care to help manage asthma but also can help to coordinate care across parents, children, providers, and school staff.⁶ Schools also have an

Abbreviations used

AAFA: Allergy and Asthma Foundation of America
ALA: American Lung Association
CDC: Centers for Disease Control and Prevention

incentive to provide support to students with asthma because uncontrolled asthma can decrease attendance, which is related to academic achievement.⁷

However, school-based programs face many challenges, from the resources needed to implement them to the variability of school environments and related services and supports.^{6,8} For this reason, the programs can be difficult to take to scale. An alternative to scaling school-based interventions through new programs and services is to pursue public policy changes at the school district or state level.⁹ Researchers and health care providers can lend a credible voice to help move policy forward, particularly at the local and state levels, by providing data or expert testimony. Although federal legislation also plays a role in school health services, many of the recommended policy changes are at the state and local levels.¹⁰⁻¹² This article is designed to inform the reader of recommended policies and to make the policy process more accessible to researchers whose expertise on childhood asthma can become a catalyst for policy change.

UNDERSTANDING THE POLICY OPTIONS

Many schools that have attempted pediatric asthma programs have difficulty implementing and sustaining them for many reasons, including limited financial resources, human capital (eg, nurses and office staff), and time and a lack of proper communication between health care providers and parents.^{9,13} In a comprehensive review of school-based screening and asthma programs, major obstacles were present for each approach a school might take.¹³

Programs that focus on medical care in schools, including access to a rescue inhaler, can be difficult to adopt and sustain, relying on the engagement of many different and busy persons, from school nurses to providers to parents.¹⁴ Programs focused on building students' self-treatment skills have a different set of obstacles, such as the Building Bridges program currently in the Denver Public Schools, which includes both asthma management plans with access to medical care and skill development for students and their families.⁷ These types of multilayer interventions tend to depend on funding sources external to the schools, which is often unsustainable and difficult to scale, leading to inequities across schools in the level of services and supports to students with asthma.¹⁵ Additionally, lower-income schools tend to have difficulty sustaining interventions, even when funding is available, because of the frequent restructuring that results from efforts to address low

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TABLE I. Recommended policies to improve asthma management and care in schools^{10,11}

Problem	Recommended policies (and the percentage of states adopting them, where known)
1. Inadequate access to asthma/allergy medication in school	• Physician's written instructions for medication on file (90%) • Students' rights to self-carry/self-administer asthma/anaphylaxis medication (100%) • Medication policies that provide resources, guidelines, and parameters (98%)
2. Inadequate documentation of student asthma/allergy information	• Identify and maintain records for students with chronic conditions (71%) • Update health records regularly (75%) • Maintain asthma/allergy incident reports (43%) • Maintain a health history form for each student • Identify/track all students with asthma diagnosis
3. Inadequate asthma management plans	• Standard emergency protocols for asthma/anaphylaxis (47%) • Explicit asthma/anaphylaxis management programs with policies, procedures, and resources • Use of an asthma action plan for all students with asthma
4. Inadequate health services capacity	• Nurse-to-student ratio of 1:750 or better (16%) • One full-time nurse per school • Case management for students with chronic conditions
5. Inadequate awareness/knowledge among school staff, parents, students, and community members	• Asthma education for school personnel, including emergency response • Asthma education for students, including self-management • State funding for staff training on asthma/allergy programs, policies, and procedures (63% of states have programs that address asthma) • Inclusion of asthma/allergy in the health curriculum for all students
6. Poor IAQ	• IAQ management policies (including HVAC; HEPA filters; carpeting; pesticide use; dampness; mold; maintenance and repairs, cleaning; and integrated pest management [22%]) • Periodic inspections (including HVAC system [59%]) • State funding/resources for technical IAQ assistance to schools • Use of integrated pest management (IPM) techniques/banning of pesticides inside schools when students are present
7. Poor outdoor air quality	• Notification of parents of upcoming pesticide applications (53%) • Prohibition of smoking/tobacco in school buildings, buses, and school-related functions and on school grounds • Health education curriculum includes tobacco use prevention component • Limiting bus idling time; implementing/promoting diesel school bus engine retrofitting program • Tobacco use cessation services to students • Funding/activities for faculty/staff on tobacco use cessation

HEPA, High-efficiency particulate air; HVAC, heating, ventilation, and air conditioning; IAQ, indoor air quality.

academic performance issues. Adding to this dynamic, even streamlined interventions that have external funding must compete with the many demands schools face, often ending up low on the priority list.

Public policy is a tool to address these inequities and can help prioritize asthma in schools. Changing public policy to improve asthma management and outcomes for children is not a new concept.⁹ Mississippi has had a comprehensive school asthma law since 1972 that allows for the self-administration of medication by students with written authorization from health care providers and parents.¹⁶ Since then, all states and school districts have passed school-based asthma policies.¹⁷

Policymakers and advocates at all levels who are interested in expanding public policies related to school-based asthma care can turn to the lists of policy recommendations for schools and states generated by the American Lung Association (ALA),¹⁰ the Allergy and Asthma Foundation of America (AAFA),¹¹ and the Centers for Disease Control and Prevention (CDC).¹² The policies cover medication and treatment, awareness, and the school environment.¹¹ The ALA identifies policies that also identify ways that schools can and should engage community support, how to leverage appropriate school health services, the types of education that students and staff need, and how to ensure safe and enjoyable physical activity for students with asthma.¹⁰

Table I^{10,11} explores a variety of policies that affect the school environment, as recommended by the ALA and AAFA, policies that, if implemented widely, would decrease disparities in access to care. However, these policy recommendations have not solved the problem of inequitable access to asthma services in schools because they are not consistently adopted or equally enforced across the country. According to the AAFA, of the 18 policies they recommend, states have currently adopted anywhere from 4 to 12.¹¹

The regulatory landscape is uneven at best and inequitable in many ways. For example, one recommendation is for schools to use at least 1 nurse per 750 students, but as of 2013, only 8 (16%) states require or recommend this policy at a state level.¹¹ Furthermore, only 45% of public schools have a full-time nurse on site, 30% have a part-time nurse, and 25% have no nurse at all.¹⁸ These wide disparities existing across states and school districts have prompted policymaking efforts, such as the Student-to-School Nurse Ratio Improvement Act of 2013, which calls for the provision of competitive demonstration grants through the US Department of Education.¹⁹

Recommended policies are being adopted, and some states and schools are addressing the multiple issues identified in the policy list above, leading them to implement comprehensive programs that address education and awareness, as well as asthma management. For example, the CDC has funded several successful

interventions at the school district level that have combined programming with policy change. In North Carolina the Charlotte-Mecklenburg Schools district, the 23rd largest school district in the country, with 167 public schools serving 132,000 students, partnered with the Mecklenburg County Health Department to implement an Asthma Education Program, which included the development of school health teams involving school nurses in providing clinical support, case management, and education for students; developing action plans; coordinating indoor air quality initiatives; and launching a school-based service providing respiratory therapists to care for students with asthma in school.²⁰ In addition to programmatic interventions, the district adopted policies to improve asthma outcomes, such as mandating that school wellness policies include an asthma component; prohibiting smoking; prohibiting bus idling; maintaining service policies that address environmental issues, including environmental triggers for asthma; performing monthly building inspections for condensation, mold, pests, and other asthma triggers; designating and training emergency first responders; and creating a self-carry medication policy.

Although formal evaluations of all aspects of the intervention have not been conducted, the school district has seen positive outcomes related to some of the programs that were implemented in response to the district-wide policies. For example, 90% of at-risk students receiving case management from the 2009 to 2012 school year had an asthma action plan in place, 95% had quick-relief medications at school, and 83% had an asthma control test administered. Additionally, 95% of case-managed students reported overall improvements in health, and 99% reported improved quality of life. Among students who needed to make personal changes, 53.3% improved their academic performance, 67% improved their behavior, and 35% improved their attendance rate.²¹

Other school districts receiving CDC funding, including the Los Angeles Unified School District and the Pasadena Unified School District, have also shown positive results in student outcomes by strengthening asthma-related programs and services combined with the adoption of multiple asthma-related policies.^{22,23}

As the examples above demonstrate, comprehensive public policy interventions are one of the critical tools for the management and treatment of asthma in schools. However, they are not the solution alone; the examples also highlight the need for direct services that accompany the policy changes.⁶

School district-level policy change is not the only mechanism to address asthma in schools. State-level policy change can have broader reach and become an impetus for school district policy change. For example, Hester et al²⁴ evaluated 3 statewide asthma programs in Louisiana, Indiana, and Utah. They found that despite differences in local context, state asthma programs could help school districts to improve and sustain effective interventions by using surveillance data to identify asthma trends and address disparities, facilitate connections between schools and community stakeholders, form state-level connections, adopt school asthma policies, translate policies into action, provide resources and information to schools and school districts, and monitor and evaluate implementation. As part of this effort, the Louisiana Asthma Management and Prevention program's approach to supporting the adoption of school district asthma policies was successful in expanding the focus on indoor and outdoor air quality, such as prohibiting school buses and delivery trucks from idling outside of schools.

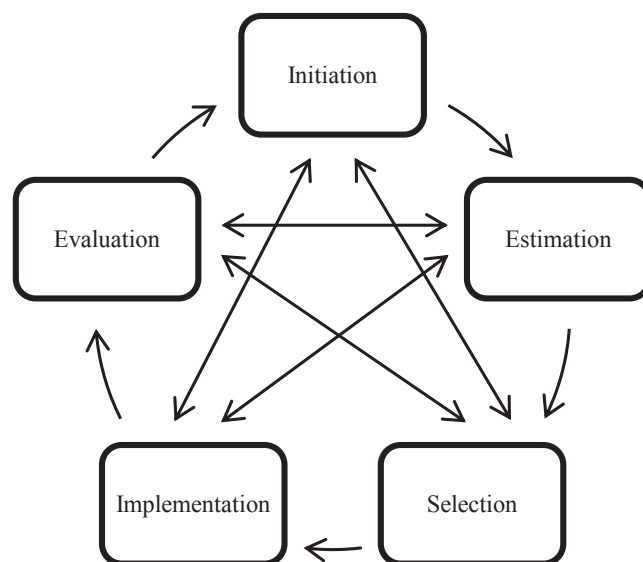


FIG 1. Stages of the policy process.

As can be seen, there are clear and aligned expectations from the CDC, ALA, and AAFA on the policy options that can improve asthma outcomes for students, as well as many examples of school districts and states accompanying programming with public policy change. The question is not whether public policy should be leveraged to improve asthma outcomes for children but rather how to expand the adoption of public policy solutions.

CHANGING PUBLIC POLICY

If the argument can be made for why public policy changes are critical to creating equity in students' access to asthma care and management, the next step is to identify how to pass public policy. Although changing public policy is quite different than designing and implementing a new clinical program, there are a set of practices associated with policy change that are well documented, not unlike how evidence has been established to understand how to best design new interventions.

The evidence helping to understand how to change policy comes from a variety of frameworks that seek to explain how policy change happens. Some frameworks have prioritized the stages of the policy process, helping us understand how policy change progresses over time.²⁵ Although other policy theorists have argued this staged progression is too linear to be useful,²⁶ the clear descriptions of the process can help those new to engaging in policy advocacy to understand what must occur for policy to change, even if it might not happen in a linear and prescriptive order. Fig 1 shows both the linear cycle and the more chaotic and dynamic nature of policy change. Other frameworks that can contribute to understanding how to advance public policy focus on such things as timing when the moment is ripe for a policy to be selected²⁷ or the actors involved and how they relate to one another.²⁸ These frameworks can be combined to help simplify the messiness of changing public policy and supply evidence for how an advocate for change can engage.

Initiation: Identifying the problem

The initiation stage is at the beginning of when problems are recognized but is also an ongoing cycle of problem

reidentification as new issues emerge. It is when advocates and policymakers are throwing around loosely formulated ideas but have not yet solidified the thinking or built coalitions to take action.²⁵ Each state and school district will have its own context and complexity of interests and opportunities related to asthma in schools. Without attention to the context of the problem in a given state, a problem might never move from being recognized to prioritized.

During this stage, stakeholders will need to leverage existing data to talk about why additional asthma policy is warranted. For example, in partnership with state public health departments, advocates can leverage surveillance data about asthma prevalence and management to help with problem identification.²⁴ They can identify inequities across the state, highlighting variability in levels of need and availability of services. Not unlike designing a clinical program, crafting the right policy solutions benefits from assessing the evidence of the problem and the potential for a public policy to have a positive effect on the problem.

Estimation: Examining policy options in depth

This stage of the policy process is more technical in nature than the others. Here, policy options are assessed across the risks, costs, and benefits.²⁵ Some refer to it as the design stage of policymaking in which stakeholders go through a deliberate process of identifying which policy solutions can realize their goals.²⁹ Although many policies are passed that do not go through this type of rigorous consideration, much as a clinical program based on evidence is preferable to a program based on past experience alone, so too is a policy based on evidence preferable to a policy based on best ideas and intuition about what will work.

As Table 1 highlights, groups such as the ALA and AAFA have already provided advocates with an analysis of policy solutions that might help address asthma in a school setting. The estimation that is likely to be unique to each state or school district is the assessment of the costs and benefits of implementation of the policy option or options in that jurisdiction. A state that already has an adequate student/nurse ratio might have lower costs for implementing a policy requiring case management for students with chronic conditions compared with a state with a higher ratio of students to nurses.

Often, policies with lower costs are easier to pass, but care should be taken not to prioritize low-cost policies in a context in which they are not likely to be implemented successfully. For example, a relatively low-cost policy is the students' rights to carry and administer asthma/anaphylaxis medication. In a jurisdiction in which students face barriers to accessing care, such as a lack of insurance coverage, language barriers, or health care workforce inadequacies, giving students the right to carry a medication they cannot access might do little to solve the problem.

Although much of the estimation work has been done by the ALA and AAFA, policymakers in each state or at the school district and local levels need to be familiar with the knowledge base about why the proposed policy options are the right options, what the evidence is to support them, and what the costs associated with implementation might be. It is also important to highlight the costs of inaction (ie, of not adopting policies related to asthma in schools). Estimation of both the costs of action and those of inaction will benefit from the expertise that asthma researchers already have from years of studies exploring what

types of services and supports matter most to improve children's asthma outcomes. The involvement of asthma experts in the policy process will help both with the estimation stage and the selection stage in which expert information is debated and discussed.

Selection: The politics of policy passage

The third stage is the one we hear about most often in the media. Politics are an unavoidable part of this stage, and unfortunately, many policies are passed that are not based on a thoughtful estimation of the potential benefits and costs.²⁵ In fact, there is an increasing recognition that poorly designed policy is often due to limited information and knowledge or to politics trumping evidence.³⁰ During the selection of a policy, decision makers are motivated by many things, from personal experience to constituent stories to pressure and education from professional lobbyists and advocates. Policymakers can also face pressure not to impose additional unfunded mandates on school districts.

Effective advocacy at this stage benefits from understanding the context and timing in which the policy needs to be passed. For example, is there a specific time of year when the school board considers proposals that have fiscal implications or makes changes to policies related to school health services? Are there specific committees in the state legislature that will be the first to vote on a bill and might therefore need to be educated before being presented with the bill? Who are the groups that have a direct and also indirect interest in the issue that need to be recruited to support (or at least not oppose) the policy?

At this point in the policy process, it is critical to be prepared to take action quickly when a window of opportunity arises. These policy windows can happen abruptly, the result of a high-visibility incident, such as a student dying from the school staff's failure to respond to a severe asthma attack,³¹ or something less dramatic, such as a student being taken to the hospital in an ambulance because of out-of-control asthma. Policy windows can also happen slowly, the result of persistent attention to the issue and sufficient flexibility in the resources available to consider adding a new priority.²⁷ Over time, policymakers and other stakeholders can gradually change their beliefs about a policy in response to new information and experiences.³² This policy-oriented learning can benefit from thoughtful design work highlighted in the estimation stage, but more than research is needed. Policymakers and others need to have opportunities that will expose them to new information and experiences. Then, when a window of opportunity arises (either because of slow growth or a sudden incident), quick consideration of which policy solutions can be attached to the problem might allow for passage of a policy not previously possible.²⁷

The mix of slow-growth policy windows and the opportunity provided by sudden policy windows emphasizes the importance of engaging a coalition of relevant stakeholders on the issue. Advocacy coalitions are groups of stakeholders with a common set of values and a willingness to prioritize and engage in policy advocacy around shared solutions.²⁸ A strong coalition is not developed overnight. They can be very difficult to convene and sustain over the amount of time it might take for a significant policy change to be implemented. Thus leveraging existing coalitions might be more productive than creating a new coalition. Many states have coalitions that are focused on children's health, whereas others have coalitions convened by their local chapters of

the ALA or a CDC-funded asthma program.²⁷ Some school districts will have highly active parent associations that are prioritizing policies related to children's health. The aforementioned examples of state asthma programs in Louisiana, Indiana, and Utah driving school district policy change²⁴ highlight that state asthma programs might be critical partners when pursuing policy change in school districts. An assessment of the political environment and coalitions that might be interested in childhood asthma is a great first step in creating the base of support needed to change policy.

A coalition approach to improving health outcomes is an established strategy. A well-documented case study exists in the Allies Against Asthma work funded by the Robert Wood Johnson Foundation. Allies Against Asthma was a 5-year effort to bring about policy and system change through 7 community coalitions focused on addressing childhood asthma. Evaluations found that across the coalitions, 89 policies or systems changes were documented, and improvement was seen on 4 metrics related to the number of days with symptoms.³³ As an example, the National Capital Asthma Coalition in Washington includes a variety of asthma stakeholders, such as the ALA, the Department of Health, the Hospital Association, the Howard University College of Medicine, and more than 65 other organizations from different sectors, including health care, government, corporate, environmental advocacy, and community sectors. In addition to implementing successful programs addressing case management, resource management and asthma education, the coalition coordinated the development of the Student Access to Treatment Act of 2007, a Washington, DC, law permitting students with a medication action plan to self-carry and administer asthma or anaphylaxis medications.³⁴ The coalition has since been successful in obtaining funding to train administrators and staff across all DC public schools on the policies and practices they have spearheaded.³⁵

With visibility and understanding of the policy problem, a viable policy solution with evidence behind it, and a strong coalition of stakeholders ready to take action when a policy window opens, there is a good chance a policy will be passed. However, similar to when new clinical programs are funded and then initiated, the real work begins when the policy is being implemented. The implementation phase will help to determine whether the policy is effective at improving childhood asthma management and outcomes.

Implementation: Putting the policy into action

When a policy option is selected, one of its components is the assignment of responsibility for implementation. Implementation includes many components, such as developing rules, regulations, and guidelines for how the policy will be carried out; training or otherwise providing support to ensure implementation; and monitoring of the quality of implementation. Monitoring can come from inside the government but can also come from outside researchers evaluating the effectiveness of the policies. In a resource-strapped environment it is not uncommon to have the monitoring function ignored.

Unfortunately, once the political process has played out during selection and the implementation is delegated to an entity that might or might not have been involved in the original discussions, the potential is quite high for the policy to be implemented in a way that has little in common with how the original policy was

envisioned.²⁵ Specific to asthma, an analysis of policy implementation related to medication access found that although school policies are needed, they are not sufficient to ensure all students have access to medication when needed. For example, many schools in the study faced challenges ensuring that students with asthma had an albuterol inhaler for school use, including difficulty obtaining completed medication order forms and inhalers from parents. The findings are consistent with barriers cited in other literature, including challenges that schools face obtaining asthma action plans from health care professionals and parents, knowledge of asthma management by school personnel, and access to asthma specialists.³⁶ An advocate for the policy can remain involved during implementation, many times through participation on an oversight or advisory committee or other times by observing and providing unsolicited or solicited feedback on the implementation process. An advocate whose background is in clinical asthma care or school-based asthma programs might be uniquely credible and thus influential during implementation. It is not uncommon for a state agency or school district office charged with implementation to have relatively little expertise on the issue. Outside partners can help to fill these gaps.

Having any or all of the recommended policies adopted at the state or school level does not equate to automatic compliance. In fact, in a liability case regarding a child with asthma who died after engaging in a physical education activity at school, the courts ruled that the death was the result of a failure to implement existing safety policies not just by one teacher but by the school as an institution.³⁷ Despite all states in the nation having laws to allow students to self-administer their asthma medication as of 2010,¹⁷ an audit of 5 school districts in Alabama found that although the schools did have the policy, only 14% of elementary students with acute asthma in the 5 school districts had the inhalers available.³⁶

Unfortunately, although problems and policy solutions can be well understood, other factors play a role in implementation and compliance. Specific to asthma, some factors that affect asthma management are outside of the control of schools, where it is the parents' responsibility to provide albuterol or other pharmacotherapy for the child.³⁶ This highlights the need to ensure that resources and the proper education of parents and school-based staff are available.

Evaluation: The outcomes of the policy

Clinical interventions depend on evaluative information to guide ongoing improvement, as do policies. Some policies have an evaluation built into them, but many do not. Surveillance data that were used to understand the problem originally can help in understanding the effect of policies but might be too general to demonstrate a cause-and-effect relationship. For example, the CDC's extensive surveillance data on asthma are used to provide state profiles but not to demonstrate the relationship between specific policies and the outcomes in each state. The reality of much policy evaluation is that it can be difficult without significant resources to establish a cause-and-effect relationship between policy change and health outcomes.³⁸ Studies, such as those by Clark et al,³³ have attempted this by looking for and finding improvements in asthma outcomes for children as a result of policy change. This approach might not be able to show causation but can show an association between children's outcomes and the school districts that adopted specific policies.

Cycling through the stages

Public policy change is not linear. At any time, a problem can be defined and redefined; estimation of solutions might be underway; selection, as well as the political process, might be active; and some mix of implementation and evaluation might have begun. In fact, evaluation itself becomes part of the estimation process because it helps to identify ways that policies are and are not achieving the intended benefits and staying within the estimated costs. Certainly, the stages themselves are a bit of a simplification, but they are also both easily understood and easily remembered,²⁵ allowing for an increased ability to strategize about how to influence public policy.

SUMMARY

School-based asthma interventions are a critical component of meeting the asthma needs of children. Yet clinical programs in schools are difficult to sustain because of the need for outside resources and challenges to scale up to other schools and school districts. This results in an inequity in access to care across schools and throughout the country. Public policy interventions are an opportunity to address these inequities. Policy change at the state and school district levels can target a variety of problems, including addressing inadequate access to medication, documentation of need, use of asthma management plans, health services capacity in schools, and lack of awareness and understanding among parents, school staff, and students, as well as poor indoor and outdoor air quality.

Changing policies to address these problems can take time and will require a coordinated effort among advocates with shared priorities. Furthermore, passage of a policy must be followed by careful attention to how it is implemented, including evaluations of the policy's effect. Researchers with expertise in childhood asthma can fill a critical gap by examining the health outcomes associated with different policy changes, allowing for new knowledge to enter the policy dialogue about which policies work and why they are important for children. Beyond conducting research, asthma experts can become more active participants in the policy process at the state and school district levels, thereby leveraging their credibility and access to information about how to improve children's asthma outcomes. Public policy is a powerful tool. It should be part of how asthma experts consider meeting the needs of students across all school districts and states, and it should be in the research agendas of leading asthma researchers throughout the country.

Key messages

- School-based services to improve asthma management need to be accompanied by public policies that can help to sustain services, create greater equity across schools, and improve outcomes for children.
- Asthma experts can advance policy solutions by engaging in multiple stages of the policy process, not the least of which is engaging in research that can help in estimating which policy solutions are the best fit for a given jurisdiction.

REFERENCES

1. Szefer S. Advances in pediatric asthma in 2009: gaining control of childhood asthma. *J Allergy Clin Immunol* 2010;125:69-78.
2. Szefer S. Advances in pediatric asthma in 2010: addressing the major issues. *J Allergy Clin Immunol* 2011;127:102-15.
3. Szefer S. Advances in pediatric asthma in 2011: moving forward. *J Allergy Clin Immunol* 2012;129:60-8.
4. Szefer S. Advances in pediatric asthma in 2012: moving toward asthma prevention. *J Allergy Clin Immunol* 2014;131:36-46.
5. Szefer S. Advances in pediatric asthma in 2013: coordinating asthma care. *J Allergy Clin Immunol* 2014;133:654-61.
6. Cicutto L. Supporting successful asthma management in schools: the role of asthma care providers. *J Allergy Clin Immunol* 2009;124:390-3.
7. Gsk-clinicalstudyregister.com. GSK clinical study register—study 116794. 2014. Available at: <http://www.gsk-clinicalstudyregister.com/study/116794#ps>. Accessed August 5, 2014.
8. Coffman JM, Cabana MD, Yelin EH. Do school-based asthma education programs improve self-management and health outcomes? *Pediatrics* 2009;124:729-42.
9. Carpenter LM, Lachance L, Wilkin M, Clark NM. Sustaining school-based asthma interventions through policy and practice change. *J Sch Health* 2013;83:859-66.
10. American Lung Association. A National Asthma Public Policy Agenda. Washington (DC): American Lung Association; 2009;1-62.
11. Asthma and Allergy Foundation of America. State honor roll 2013: asthma and allergy policies for schools. Landover (MD): Asthma and Allergy Foundation of America (AAFA); 2013.
12. Centers for Disease Control and Prevention. Strategies for addressing asthma within a coordinated school health program, with updated resources. Atlanta: Centers for Disease Control and Prevention; 2006; 2-3. Available at: www.cdc.gov/HealthyYouth/asthma/pdf/strategies.pdf. Accessed August 5, 2014.
13. Bruzzese J, Evans D, Kattan M. School-based asthma programs. *J Allergy Clin Immunol* 2009;124:195-200.
14. Gerald LB, Redden D, Wittich AR, Hains C, Turner-Henson A, Hemstreet MP, et al. Outcomes for a comprehensive school-based asthma management program. *J Sch Health* 2006;76:291-6.
15. Clark NM, Mitchell HE, Rand CS. Effectiveness of Educational and Behavioral Asthma Interventions. *Pediatrics* 2009;123(suppl):S185-92.
16. Mississippi school safety manual. Jackson (MS): Mississippi Department of Education; 2008.
17. Allergy & Asthma Network. Mothers of Asthmatics. Asthma and allergy medications at school—anaphylaxis medications Available at: <http://www.aanma.org/advocacy/meds-at-school/>. Accessed August 5, 2014.
18. National Association of School Nurses. Caseload assignments Available at: <http://www.nasn.org/PolicyAdvocacy/PositionPapersandReports/NASNPositionStatementsFullView/tabid/462/smid/824/ArticleID/7/Default.aspx>. Accessed August 5, 2014.
19. McCarthy C. H.R.1857—Student-to-School Nurse Ratio Improvement Act of 2013. 1st ed. Washington (DC): US Government Printing Office; 2013. Available at: <https://beta.congress.gov/113/bills/hr1857/BILLS-113hr1857ih.pdf>. Accessed August 5, 2014.
20. Centers for Disease Control and Prevention. CDC's Division of Adolescent and School Health. Charlotte-Mecklenburg County, North Carolina. Creating an Asthma-Friendly School Environment. Atlanta: CDC; 2008;P.1.
21. Agency for Healthcare Research and Quality. School district uses policies and related programs to improve health, behavior, and academic performance of students with asthma and reduce absenteeism. AHRQ Innovations Exchange Available at: <http://www.innovations.ahrq.gov/content.aspx?id=3646>. Accessed August 5, 2014.
22. Working to achieve asthma control Los Angeles, CA. 1st ed. Atlanta: Centers for Disease Control and Prevention; 2009. Available at: http://www.cdc.gov/healthyyouth/stories/pdf/2009/success_09_losangeles.pdf. Accessed August 5, 2014.
23. Asthma management. 1st ed. Pasadena (CA): Pasadena Unified School District; 2013. Available at: http://publichealth.lacounty.gov/mch/asthmacoalition/docs/AR%205141.23_PUSD%20Asthma%20Management%20Policy.pdf. Accessed August 5, 2014.
24. Hester L, Maureen W, Gill S, Disler S, Collins P, Crawford G. Roles of the state asthma program in implementing multicomponent, school-based asthma interventions. *J Sch Health* 2013;83:833-41.
25. Brewer G, DeLeon P. The foundations of policy analysis. 1st ed. Homewood (IL): Dorsey Press; 1983.
26. Sabatier P. Theories of the policy process. 1st ed. Boulder (CO): Westview Press; 2007.
27. Kingdon JW. Agendas, alternatives, and public policies. 2nd ed. New York: Harper Collins; 1995.

28. Sabatier P, Jenkins-Smith H. Policy change and learning. 1st ed. Boulder (CO): Westview Press; 1993.
29. Gilabert P, Lawford-Smith H. Political feasibility: a conceptual exploration. *Political Studies* 2012;60:809-25.
30. Gero J. Design prototypes: a knowledge representation schema for design. *AI Magazine* 1990;11:26.
31. Upton v. Clovis Municipal School District 141 P.3d 1259, 2006 N.M.S.C. 40, 140 N.M. 205 (2006).
32. Sabatier PA, Jenkins-Smith HC. The advocacy coalition framework: an assessment. In: Sabatier PA, editor. *Theories of the policy process*. Boulder (CO): Westview Press; 1999. pp. 117-68.
33. Clark N, Lachance L, Doctor L, Gilmore L, Kelly C, Krieger J, et al. Policy and system change and community coalitions: outcomes from allies against asthma. *Am J Public Health* 2010;100:904-12.
34. Allies Against Asthma: NCAC. 2014. Available at: http://asthma.umich.edu/Allies_coalitions/NCAC.html. Accessed August 5, 2014.
35. Pediatricasthma.org. PediatricAsthma.org: Community coalitions: National Capital Asthma Coalition (NCAC), Washington, DC. 2014. Available at: http://www.pediatricasthma.org/community_coalitions/washington_dc. Accessed August 5, 2014.
36. Gerald J, Stroupe N, McClure L, Wheeler L, Gerald L. Availability of asthma quick relief medication in five Alabama school systems. *Pediatr Allergy Immunol Pulmonol* 2012;25(1):11-6.
37. Kimball-Stanley A, McGlamery JG, Baker T. Liability risks for after-hours use of public school property to reduce obesity: New Mexico. Oakland (CA): National Policy & Legal Analysis Network to Prevent Childhood Obesity; 2009.
38. Hunter D. Public health policy. 1st ed. Cambridge (United Kingdom): Polity Press; 2003.