Original Article

Developing and Implementing a Citywide Asthma Action Plan: A Community Collaborative Partnership

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Objectives: Asthma affects 1 in 10 children in the United States, with higher prevalence among children living in poverty. Organizations in San Antonio, Texas, partnered to design and implement a uniform, citywide asthma action plan to improve asthma management capacity in schools.

Methods: The asthma action plan template was modified from that of the Global Initiative for Asthma. School personnel were trained in symptom recognition, actions to take, and use of equipment before the asthma action plan implementation. The annual Asthma Action Plan Summit was organized as a forum for school nurses, healthcare providers, and members of the community to exchange ideas and strategies on implementation, as well as to revise the plan.

Results: The asthma action plan was implemented in all 16 local school districts. Feedback received from school nurses suggests that the citywide asthma action plan resulted in improved asthma management and student health at schools.

Conclusions: The evidence in this study suggests that community organizations can successfully collaborate to implement a citywide health initiative similar to the asthma action plan.

Key Words: asthma action plan, school, asthma, children, education

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In the United States, 7 million (10%) children have reported asthma; the prevalence is higher among children who live in households below the poverty line.[1] In 2011, 515,540 (8%) children (0–17 years old) in Texas currently reported having asthma.[2] Nationally, childhood asthma resulted in approximately 10.5 million missed school days, 640,000 emergency department visits, 157,000 hospitalizations, and 185 deaths per year.[3] In 2011, almost 9000 Texas children younger than 14 years were hospitalized for asthma.[2]

National guidelines recommend that every individual with asthma have a written asthma management plan or asthma action plan.[4] An asthma action plan provides individualized self-management recommendations, including actions to control asthma on a daily basis, actions to treat asthma symptoms, and when to seek medical care. Asthma self-management education has been shown to improve health outcomes for children with asthma.[5] One study showed better health outcomes in children who received both self-management education and an asthma action plan as compared with education alone.[6] The asthma action plan can be based on peak flow readings, asthma symptoms, or both. One systematic review showed that children who received a symptom-based asthma action plan had a lower risk of acute care visits for asthma compared with those who received a peak flow–based plan.[7] Despite national recommendations, fewer than 50% of children have been provided with a written asthma management plan.[1] In addition, school personnel often lack clear written instructions for how and when to administer asthma medications at school, and school nurses may lack the

Key Points

- Community organizations can collaborate to successfully implement a citywide asthma action plan.
- Community organizations successfully developed and implemented a citywide asthma action plan that has been adopted by all of the public school districts in a large metropolitan area.
- Community organizations provided an effective tool to improve asthma management in the school setting.

skills to assess the needs of a child with asthma. We describe the partnership, the process of developing and implementing the asthma action plan, and evaluation results.

In 2013, the population of San Antonio, Texas was more than 1.4 million, making it the seventh largest city in the United States.[8] Compared with the US population, San Antonio has a greater proportion of households in which a language other than English is spoken at home (45% vs 21% nationally) and a greater percentage of people living below the poverty level (20% vs 15%).[8]

The San Antonio Independent School District (SAISD) is centrally located in the city and has the third largest student population of the 16 public school districts within San Antonio. It is the 13th largest of Texas' 1265 school districts. The SAISD boundary encompasses 79 mi^2 in central Bexar County, with a total population of 315,714 San Antonio residents. SAISD serves approximately 55,000 students (91% Hispanic, 93% economically disadvantaged).

School nurses and school health coordinators who were members of the South Texas Asthma Coalition (STAC) identified a need for better communication between healthcare providers and school personnel concerning the management of asthma among children. Although each of the 16 independent school districts in San Antonio had a standard school medication administration form, these forms often did not provide enough specific guidance and direction for the care of children with asthma. In addition, many school nurses had not been trained to assess children with asthma and administer asthma medications. Several community physicians expressed their frustration with the complexity of existing school medication administration forms and the fact that each school district had a different form. Based on these needs, Steps to a Healthier San Antonio teamed up with SAISD and STAC to create a uniform, citywide asthma action plan program to help students manage their asthma while at school.

Methods

The Asthma Action Plan

The STAC asthma action plan is based on national (National Heart, Lung, and Blood Institute) and international guidelines; the original template was developed by the Global Initiative for Asthma (GINA).[9] Simple drawings illustrate common asthma symptoms, provide a visual reminder, and make the plan more understandable for low-literacy users. The template was edited by STAC members based on input from school nurses and practicing physicians. Additions to the original GINA template included recommendations about when to call 9-1-1, recommendations for air quality alert days, and a section addressing permission to self-carry and self-administer medication at school. A Spanish-language version was developed in tandem with the English-language version based on the GINA Spanish language template. Minor changes in wording were made to adapt to local Spanish language use. The asthma action plan components include daily prevention medicines, medicines to be taken before exercise, and instructions for managing asthma symptoms. The asthma action plan is completed by each student's primary care provider (or specialist) and copies are kept on file with the school nurse and by the family (Fig. 1).

Implementation Process

The STAC working group collaborated with Steps to a Healthier San Antonio to implement the asthma action plan in SAISD during the 2005–2006 academic year. In advance of implementation, school nurses attended a full-day conference during which they received didactic information and hands-on training in clinical assessment, asthma equipment (including medication delivery devices), and the asthma action plan to guide clinical care. All of the attendees received sample inhalers, holding chambers (spacers), and other health equipment for their schools. Subsequent half-day training workshops were held annually.

The STAC working group developed a process to distribute print copies of the asthma action plan to schools for distribution to individual families of children with asthma. In addition, a physician member of the workgroup delivered print copies to medical offices and provided one-to-one training to clinicians in how to complete the asthma action plan.

Following implementation, school nurses identified problems with asthma action plans that were filled out incorrectly or were difficult to read because of poor handwriting. Beginning in 2008, written instructions for completing the asthma action plan were developed and distributed to healthcare providers of children with asthma attending the public schools. In that same year, a pediatric pulmonologist with expertise in computer programming developed an interactive electronic version of the asthma action plan, which was subsequently made available to healthcare providers. Additional information about the asthma action plan was given to healthcare providers and the public via school and state health department Web site postings, e-mail notices to San Antonio Pediatric Society members, an oral presentation at a local pediatric society meeting, and an article published in the county medical society magazine.

The Asthma Action Plan Summit was developed as an annual forum for school nurses, healthcare providers, and members of the community. The summit facilitated communication among individuals and community organizations striving to improve the health of children with asthma and simultaneously increasing a sense of mutual support among school nurses and other healthcare providers. The first annual summit in 2007 was attended by 25 individuals, representing 8 of the 16 San Antonio school districts, as well as medical consultants for school districts and community physicians. The group agreed upon a uniform asthma action plan that initially was adopted by 13 of the city's 16 school districts. Each subsequent summit focused on dissemination of new information about asthma management, pertinent revisions to the asthma action plan, and new initiatives

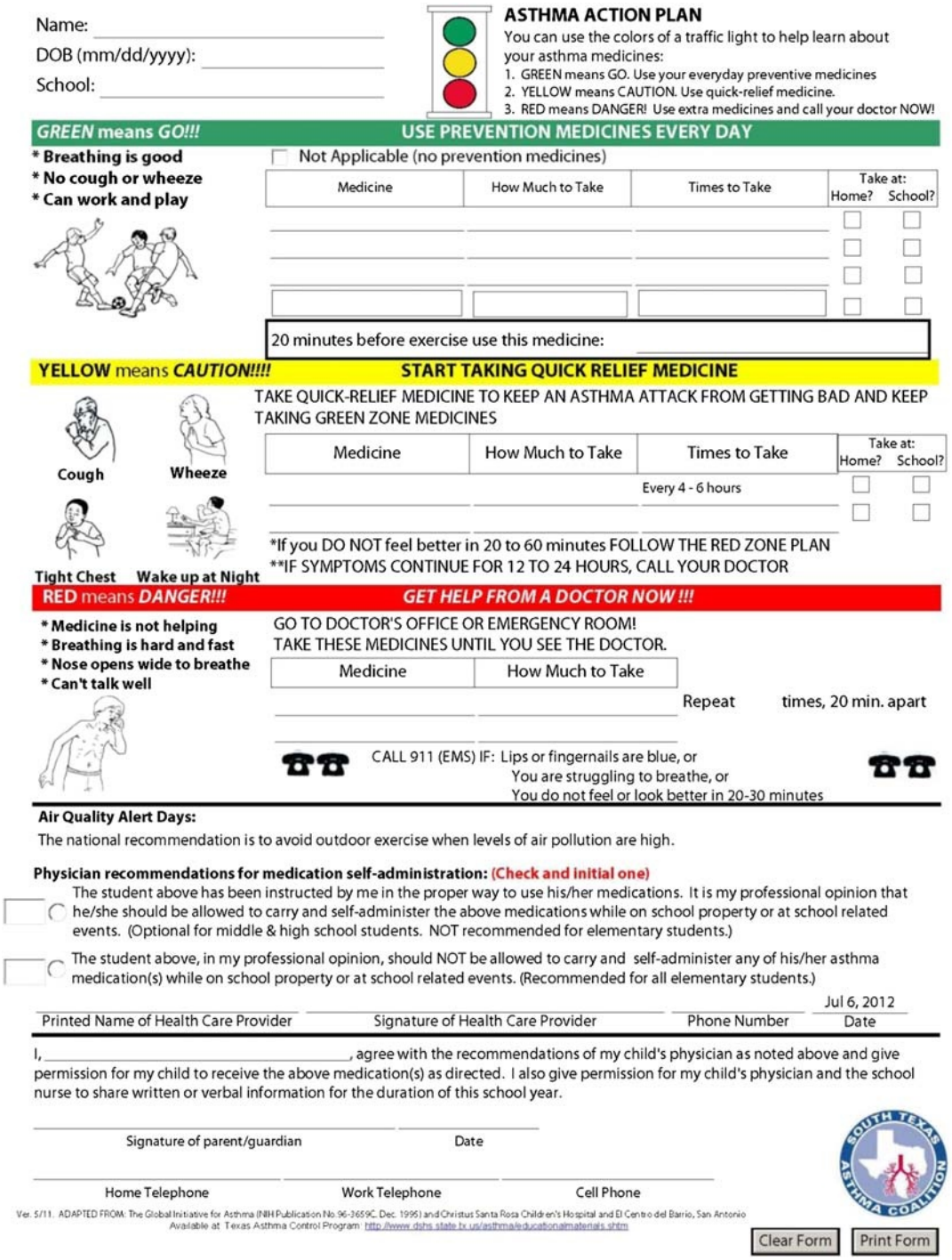

Fig. 1. **South Texas Asthma Coalition asthma action plan template.**

to improve the health of children with asthma. For example, the goal of the 2009 summit was to develop an Air Quality Health Alert Day plan for area school districts.

Evaluation

Attendance at the summits was used as an indicator to measure community involvement in decision making, and records on the distribution of the asthma action plan were used to measure the number of students reached by this effort. We distributed a survey to school nurse coordinators to evaluate the impact of the asthma action plan on asthma management in the school setting and on student health (Fig. 2). The evaluation was reviewed by the institutional review board (IRB) of the University of Texas Health Science Center-San Antonio. We requested

Total no. asthma plans distributed this academic year:
Total no. asthma plans returned (completed) this academic year:
Asthma action plans improved my ability to manage symptoms of asthma: Strongly agree Agree Disagree Strongly disagree
Asthma action plans improved level of communication with healthcare providers: Strongly agree Agree Disagree Strongly disagree
Having asthma action plans has benefited students in the following ways (check all that apply): Improved attendance More aware of warning signs Improved compliance Better asthma control Less nurse office visits No benefits observed
Percentage of students that have a spacer:

Fig. 2. Asthma action plan survey (December 2007).

IRB review of this project as a program evaluation (nonresearch). The IRB ruled that this project was not regulated research as defined by Department of Health and Human Services regulations at 45 CFR 46 and Food and Drug Administration regulations at 21 CFR 56.

Results

The Asthma Action Plan Summits were well attended by representatives from a wide variety of community organizations. A total of 8 to 11 school districts were represented at each of the annual summits. In 2011, 44 attendees included representatives from 8 school districts as well as 20 community organizations or healthcare facilities.

The asthma action plan was distributed to students in a single district (SAISD) for the first 2 years of the project. Dissemination quickly spread to include 13 school districts in 2007 and by 2009, all 16 school districts (Fig. 3). Approximately 3500 asthma action plans were distributed in the SAISD in 2005. There was a subsequent rapid increase in the number of plans distributed to schools and to physicians' offices. Each year, we elected to print approximately 17% of the plans in Spanish. Overall, 23% of the asthma action plans distributed to offices and 15% of those distributed to schools were the Spanish-language version. Over time, more school districts decided to print the asthma action plan themselves, and more physicians used the electronic version, resulting in a decrease in the total number of asthma action plans distributed. For instance, in 2010, zero asthma action plans were distributed to practices because large numbers of asthma action plans had been distributed to practices in the previous year. Most of these practices had copies on hand and did not request print copies in 2010.

Representatives from 12 of the 17 area school districts surveyed responded to a questionnaire in autumn 2007. According to the respondents, 5670 asthma action plans were distributed in the 2007–2008 school year and 3032 asthma action plans (53%) were completed and returned. A similar survey was used in 2008–2009. Based on results from 9 districts that reported in both academic years, the percentage of distributed asthma action plans that were completed and returned increased from 53% in 2007–2008 to 71% in 2008–2009.

Of the 12 nurse coordinators surveyed in 2007, 6 strongly agreed and 5 agreed that keeping asthma action plans on file for students improved the nurse's ability to manage symptoms in those students. When asked about the benefits of the asthma action plan for students, 10 nurse coordinators responded that the students demonstrated improved compliance, 8 agreed that students were better able to control their asthma and were more aware of the asthma warning signs, 5 noticed there were fewer visits to the school clinic, and 4 agreed that students had improved attendance; 3 respondents observed no benefits.

The asthma action plan has been highlighted as a success story by the National Association of County and City Health Officials as well as the Centers for Disease Control and Prevention. The National Association of County and City Health Officials featured the asthma action plan in its publication, *Building Healthy Communities: Lessons Learned from CDC's Steps Program*. The Environmental Protection Agency presented an award to STAC for the asthma action plan project at the annual meeting of American College of Chest Physicians in November 2007.

Discussion

Despite national recommendations that all patients with asthma have an asthma action plan[4] and evidence for the effectiveness of an asthma action plan as part of a comprehensive asthma self-management to improve health outcomes,[5–7] fewer than 50% of children with asthma actually have a written asthma action plan.[1]

Based on responses from school nurses as well as the number of plans distributed and completed, the asthma action plan implementation was a success. School nurses reported that the asthma action plan improved management of asthma in the school setting and improved student health outcomes; the number and proportion of completed asthma action plans increased over time and eventually included all school districts in a large metropolitan area.

There are some limitations to this project and the evaluation. Citywide implementation of an asthma action plan requires

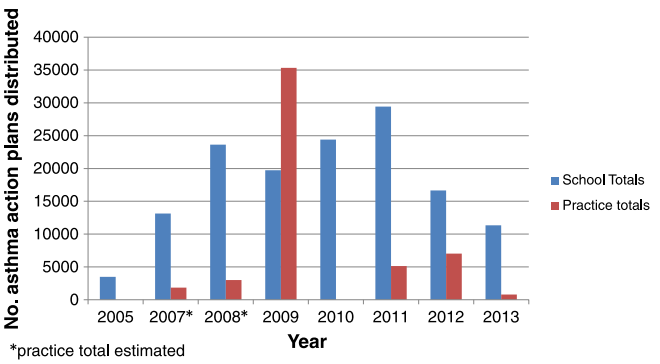

Fig. 3. Asthma action plan distribution to schools and practices by year.

- Identify specific community need and design tailored intervention
- Involve different types of community stakeholders (who are committed to a common goal)
- Provide skills training as an essential component
- Leverage available local resources
- Reassess regularly and make revisions/adjustments made based on local needs (Implementation is a dynamic process)

Fig. 4. Lessons learned.

several components, including training for both school nurses and community physicians and, therefore, has been a lengthy and somewhat costly endeavor. Full implementation took several years to accomplish and ongoing training and funding are necessary to sustain the project. Some healthcare providers continue to be unwilling or unable to complete an accurate asthma action plan for their patients. Although electronic copies are more legible and less expensive to disseminate, some physicians prefer the paper version because of lack of color printers or lack of integration of the asthma action plan into electronic health records. To address this issue, one major hospital system incorporated the citywide asthma action plan as a document template within the electronic health record. Another limitation is the limited amount of data that are available to prove program effectiveness. The authors did not have individual or school-level data on asthma symptoms, emergency department visits, or hospitalizations; as such, the authors were unable to compare asthma morbidity pre- and postasthma action plan implementation.

Nevertheless, the asthma action plan implementation did have a valuable impact on the field of school-based asthma interventions as an example of successful implementation of a community-based intervention. The lessons learned may be helpful to other communities that seek to implement a similar intervention (Fig. 4).

Conclusions

A collaboration of community organizations was able to respond to an identified community need, successfully develop and implement a citywide asthma action plan that has been adopted by all of the public school districts in a large metropolitan area, and provide an effective tool to improve asthma management in the school setting.

References

1. Centers for Disease Control and Prevention. Vital signs: asthma prevalence, disease characteristics, and self-management education: United States, 2001–2009. *MMWR Morb Mortal Wkly Rep* 2011;60:547–552.
2. Texas Asthma Control Program. http://www.dshs.state.tx.us/asthma. Accessed March 26, 2014.
3. Akinbami LJ, Moorman JE, Liu X. *Asthma Prevalence, Health Care Use, and Mortality: United States, 2005–2009*. National Health Statistics rep no. 32. National Center for Health Statistics: Hyattsville, MD; 2011.
4. National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma*. NIH Publication no. 07–4051. Bethesda, MD: National Heart, Lung, and Blood Institute; 2007.
5. Wolf FM, Guevara JP, Grum CM, et al. Educational interventions for asthma in children. *Cochrane Database Syst Rev* 2003;1:CD000326.
6. Agrawal SK, Singh M, Mathew JL, et al. Efficacy of an individualized written home-management plan in the control of moderate persistent asthma: a randomized, controlled trial. *Acta Paediatr* 2005;94:1742–1746.
7. Zemek RL, Bhogal SK, Ducharme FM. Systematic review of randomized controlled trials examining written action plans in children: what is the plan? *Arch Pediatr Adolesc Med* 2008;162:157–163.
8. US Census Bureau. State and County Quick Facts, 2012. http://www.census.gov. Accessed April 7, 2015.
9. Global Initiative for Asthma. *What You and Your Family Can Do About Asthma*. NIH publication no. 96-3659C. Bethesda, MD: National Heart, Lung, and Blood Institute; 1995.