

# Open Airways for Schools: Description of a Program Modification

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**Abstract**—The purpose of this paper is to describe the modification of the Open Airways for Schools (OAS) program for use with children age 8-12 years old who had moderate to severe persistent asthma. The modified program (mOAS) was delivered in a location outside of the usual school setting over three sessions as compared to the usual six. Participants in the program demonstrated improved asthma knowledge. These findings were compared with outcomes from the original OAS program and demonstrate that the mOAS program is also effective at increasing children's asthma knowledge. Participants in the intervention group had significantly higher asthma knowledge scores when compared with the control group. ( $F=19.028, p<.001$ ). While the modified program performed well it is not known if it performs equally as well as the original program. Future studies should be done comparing mOAS and OAS in a population of children with moderate to severe asthma to determine if the programs are in fact equal.

**Index Terms**—Asthma, Education, Open Airways for Schools, Pediatric,

## I. INTRODUCTION

Despite medical advances, improved diagnostic measures, and improved treatment, asthma continues to be the most common chronic health issue for children in the United States.<sup>1,2</sup> Poorly managed or untreated asthma can result in increased morbidity, long-term lung dysfunction, and even death. Moreover, asthma morbidity and mortality are disproportionately higher among African American children, especially those who live in inner-city areas.<sup>4-8</sup> Mortality rates associated with asthma for African American children are approximately five times higher than those of white children, and African American children are three times more likely to die from asthma than their white counterparts.<sup>3</sup> Health education programs can reduce morbidity and decrease costs associated with pediatric asthma.<sup>6,13,14</sup> Open Airways for Schools (OAS) is an evidence based education program for children with asthma. However the format of the original OAS program (six 60-minute sessions during school) is often a barrier to implementation, especially in urban environments.

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The structure of the program presents compliance difficulties for many urban families. The focus of this report is on the nature of the modifications made to the OAS program and its effectiveness.

## Importance of Asthma Education

Asthma education is essential to successful self-management.<sup>6,7,11,12</sup> Pediatric asthma education has been associated with increased self efficacy, increased knowledge, decreased symptoms, a decline in asthma related emergency department visits, and fewer hospitalizations and asthma related school absences.<sup>11,15,16</sup>

Various educational approaches exist for providing asthma education. Asthma education programs vary in length, didactic content, and setting. Although evaluation of asthma education programs differs in rigor and content, there is agreement that successful programs should include both verbal and written instruction as well as demonstration of medications and devices.<sup>6,13,15</sup> Coffman and colleagues<sup>17</sup> and Guevara and colleagues<sup>15</sup> conducted a meta-analysis of asthma education programs and found that the most effective programs incorporated critical asthma education content as defined by the National Asthma Education and Prevention Program (NAEPP), required more than one session, and were interactive.

The NAEPP has described minimal objectives for asthma education and recommends that asthma education should be initiated at the time of diagnosis and reinforced at each subsequent visit. The NAEPP guidelines indicate that successful asthma management consists of four components: assessment and monitoring, patient education, trigger control, and pharmacotherapy.<sup>6</sup> Patient education is by far the most critical component of the management quad. Patients may have a correct diagnosis, endure extensive diagnostic evaluations to identify triggers, and have the best medication prescribed. However, if they are not taught to recognize and effectively manage symptoms or how to properly use medications and devices, they may experience repeated exacerbations and negative sequelae associated with chronic airway inflammation (Liu, Med and Feekery, 2001; Yoon, McKenzie, Bauman and Miles, 1993).

## Open Airways for Schools

Open Airways for Schools (OAS) is an asthma education

program that was developed during the 90's by researchers at Columbia University in collaboration with the American Lung Association. This culturally relevant program consists of role-play for new skill rehearsal, storytelling to increase problem solving skills, games that reinforce decision making, artistic activities to encourage expression of personal feelings that pertain to asthma, and physical activity to reinforce symptom management skills. There is a formal training session for program facilitators to ensure program fidelity and decrease teaching variability from group to group. OAS is an interactive group program developed for healthy children with asthma between the ages of 8 and 11 years. OAS is administered during the school day to groups of 8 to 12 children during six, 60-minute interactive sessions. Because caregiver participation can be minimal, the focus of the program is to help children develop necessary skills to recognize asthma symptoms and take appropriate action to manage symptoms even when an adult is not present.<sup>11</sup> The program was designed to take place in the school setting with age-appropriate handouts developed for the children to take to the caregivers. The children were encouraged to take the handouts home and practice their skills with their family members.<sup>11</sup>

In a study of 209 healthy third through fifth grade public school children with a diagnosis of asthma, Evans and colleagues<sup>12</sup> found that school aged children who participated in the OAS program had improved asthma self-management skills (14% vs. 3%  $p=.05$ ) compared to children in the control group. The children also reported improved self-efficacy and quality of life. Additionally the caregivers of the children in the intervention group demonstrated improved asthma management scores when compared to control (16.4 vs. 15.2;  $p=.004$ ). The researchers also found that the intervention group had improved school performance in the areas of math, literacy and science when compared to control. Parents of the intervention group reported that their children had decreased days with symptoms (baseline = 2.9, follow up = 2.3) and decreased use of urgent care services (baseline = 4.3, follow up = 4.0). Evans and colleagues had two data collection times for this study: baseline and one year after the intervention. Because asthma has seasonal variations, the team may have missed critical times when symptoms exacerbated for certain groups. Additionally the children in this study were relatively healthy with only mild asthma symptoms.<sup>12</sup> Nonetheless, the work of Evans and colleagues supports the notion that children who participate in a structured asthma education program demonstrate improved self-management skills and decreased asthma symptoms.<sup>11,12</sup>

Open Airways for Schools addresses all of the educational components suggested by the NAEPP and is therefore an ideal program for educating children about asthma and asthma management. Even so, the program can be challenging for use in today's urban environment. Given the current pressures on inner city schools to have students perform well on state and other standardized tests, school officials are reluctant to relinquish one hour of the school day for activities

that are not considered academic. Gerald and colleagues (2006) reported significant difficulty maintaining program fidelity when health education programs are delivered in the school settings. On the other hand, researchers and clinicians interested in including structured asthma education as part of an intervention or treatment program outside of a school setting need to know that the participants will attend all sessions and the program is effective. Six 1-hour sessions outside of a school setting can present a challenge in terms of attrition.

#### *Modified Open Airways for Schools Program*

The original OAS has six, 60-minute educational lessons and was designed to be delivered in a school environment as part of the child's regular school day. Parents and caregivers are not part of the original educational format. Children are given handouts and homework and are encouraged to teach their parent or caregiver what they have learned about asthma. By doing this they not only educate the adults, but they also are reinforcing what they learned during the sessions. The first lesson addresses basic information and feelings about asthma. The second lesson addresses recognizing and managing asthma symptoms, and the third explores problem solving, medications and symptom severity. Lesson four addresses asthma triggers and symptom control. Lesson five explains how to stay healthy, and lesson six describes how to manage asthma in school. In a pilot study that investigated the effects of asthma education on health outcomes of school age children, the author modified OAS by shortening the program, changing the delivery setting, and including children with more severe disease.

The modified program (mOAS) required parents to bring their child to a hospital outpatient setting for asthma education on a Saturday morning. The program delivery was condensed to three 1½ hour sessions by combining lessons one and two, three and four, and five and six. None of the original OAS content or activities were changed. Sessions were combined so the children stayed longer at each session than in the original program.

In the combined format the first session started with an icebreaker that led into a discussion of "what is asthma?" sharing feelings about asthma, and a deep breathing exercise. The children also learned about "warning signs of asthma." There was a discussion regarding asthma self-management, and role-play of the management steps. At the end of the session, the children were given three handouts. The first was a review of "Belly Breathing" and the other two handouts were "My asthma warning signs..." and the "Asthma self-management plan." Parent information was included about asthma medications that their child was taking.

The second session consisted of a discussion of solving problems with medications, a story and discussion regarding the child's ability to determine the severity of asthma symptoms, and a game that focused on determining the severity of asthma symptoms. There was also a detailed discussion on how to identify asthma triggers. After the

discussion, the children were asked to participate in a role-play activity about how to talk with their parents about triggers and possible solutions. Take-home material included the “five emergency signs”, “what is a peak flow meter,” and a handout on common asthma triggers.

The third session consisted of a 30-minute puppet show designed to facilitate discussion about ways to stay active with asthma. Following the puppet show, children were asked to participate in a game of Simon Says to reinforce the concept that children with asthma can play and have fun. There was also a discussion on “deciding when to go to school” and “making up missed up work.” The children were asked to draw a picture that showed how they felt about themselves. Handouts on “tensing and relaxing” were sent home for parents to review.

The children received a “Certificate of Good Asthma Management” at the end of the program. The author developed an attendance card for the children. Each time the children came to a mOAS session, they were asked to find their attendance card and select a sticker of their choice to place on their attendance card. This was intended to increase the child’s sense of involvement and provide positive reinforcement for coming to the session. The attendance card was maintained in a folder that was kept by the trainer.

### The Study

#### Sample

Inner city children between the ages 8 and 12 years old with moderate to severe persistent asthma (as determined by the Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, Guidelines for Step-wise Management of Asthma)<sup>6</sup> were invited to participate in a study that evaluated the effectiveness of the mOAS program. The children were recruited from school based health centers and a children’s hospital. Thirty-two children were recruited for the study. After obtaining consent and assent the subjects were randomly assigned to an intervention group that received mOAS or a control group that received no education. Seventeen subjects were randomized to the control group and 15 were randomized to the intervention group. Two participants who were randomized to the intervention group were dropped from analysis because they only attended one education session. Both of the parents stated transportation to the intervention site was difficult. Due to funding limitations participants were not reimbursed for travel. Most of the study participants were African American. Details of the sample are described in an earlier publication.<sup>16</sup>

#### Intervention

Participants in the intervention group received asthma education for three consecutive Saturday mornings in an outpatient area of an inner city children’s hospital. Parents dropped the participants off for the 1 ½ hour mOAS sessions and returned to pick them up. Participants in the control and intervention groups completed an asthma knowledge test that is part of the OAS program. The OAS knowledge test

consists of 10-items eight multiple choice and two True False items. The test was completed on enrollment in the study (baseline [T1], three weeks after enrollment (post mOAS [T2]) and six weeks after baseline (three weeks after T2 [T3]). Details of data collection and analysis are described in an earlier publication.

Table 1 Asthma Knowledge Score

Time	Group	Mean Score %
Baseline/T1	Intervention	70
	Control	50
T2	Intervention	80
	Control	50
T3	Intervention	90
	Control	50

Intervention  $n=13$ ; control,  $n=17$

#### Findings

The key findings regarding the relationship between asthma knowledge scores and participation in the mOAS program are summarized on Table 1. Participants in the intervention group had higher asthma knowledge scores when compared with the control group ( $F=19.028, p<.001$ ). Furthermore, asthma knowledge scores remained high after baseline assessment suggesting that the participants in the mOAS program retained and maintained knowledge after the end of the program.

#### EFFECTIVENESS OF THE MODIFIED OAS PROGRAM

Modification of the OAS program proved to be an effective means of delivering guideline-specific asthma education to inner city school age children in an environment outside of school.<sup>16</sup> The modified program resulted in longer sessions; however, the 90-minute sessions were well tolerated by the young participants. There were no behavior problems, and the children were fully engaged and participated throughout the sessions. A short break was provided for the children to stretch, use the restroom, and enjoy a nutritious, nut-free snack provided by the facilitator. Parents liked the longer sessions because they did not have to wait for their children. They were able to drop the children, run errands, and return for them.

Outcome measures for asthma knowledge was collected and analyzed. Subjects who participated in the mOAS program described in this paper had higher scores for asthma knowledge when compared to the control group.<sup>16</sup> These findings demonstrate that the modified version of OAS is effective when used outside of the usual school setting with inner city children who have moderate to severe persistent asthma symptoms.

#### Limitations

The sample size for the study was small and therefore the findings while favorable must be viewed with caution. Both

studies measured variables that reflected asthma knowledge and skill acquisition yet they were not matched. For instance this study used the Asthma Knowledge Test that is part of the OAS program kit to assess asthma knowledge. The original studies used self-report, asthma self-management scores and asthma self-efficacy scores to assess knowledge acquisition. Also the samples in each study were similar but in no way the same. The sample in the original study was much larger and was comprised mostly of healthy children with asthma recruited from urban school settings. This sample was much smaller and had moderate to severe persistent asthma symptoms. The children in this sample were recruited from emergency departments, inpatient units and clinics. mOAS performed well in this small sample of unstable asthmatic children however we do not know if it is equally as effective as the original OAS program. Future studies should include a larger sample of children with asthma who are randomized to either mOAS treatment group, the original OAS treatment group or a control group who receive no formal asthma education. Asthma outcomes measured in the first studies are still relevant today and should be measured in subsequent studies in a consistent manner.

#### Implications

The original version of OAS requires participants to meet for six 1 hour sessions. This may not be feasible for use in outpatient or school settings. Additionally, educational interventions that require frequent participant return can present challenges in terms of program fidelity and participant adherence. Educational interventions should be evidence-based, culturally relevant and validated for use in the target population. The original OAS program meets all of these criteria. The modification of the original program maintains those criteria, and also provides another delivery option for asthma educators who desire an educational program that is evidence based, succinct, and able to be delivered outside of the usual school or healthcare setting. This study shows that the modified program produces comparable asthma outcomes when compared to the original program, so no learning is lost. Use of the modified OAS may prove beneficial when working with populations who are not able to attend frequent education sessions.

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