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Research paper

Changes in asthma self-management knowledge in inner city adolescents following developmentally sensitive self-management training

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ABSTRACT

Objective: To evaluate efficacy of a developmentally sensitive curriculum for improving asthma self-management knowledge, attitude, and self-efficacy in adolescents.

Methods: Forty-two inner-city adolescents (ages 16–20) participated in a 12 hour asthma self-management training program. Self-management knowledge, attitude toward asthma, and asthma-related self-efficacy were measured using short-answer tests before and after training. T-Tests were used to evaluate impact and effect sizes were calculated.

Results: Mean pretest knowledge was 21.37/46 points; mean posttest was 36.33/46 points. Change from pre- to posttest was highly significant ($t = 10.34$; $p < 0.0001$), with a large effect size ($d = 1.68$). Females improved more than males (18.66 ± 8.58 vs. 12.29 ± 8.13 , $p = 0.039$). Greatest effects were seen in awareness of long-term consequences of uncontrolled asthma ($d = 2.04$), ability to recognize symptoms of life-threatening asthma ($d = 1.61$), correctly monitor symptoms ($d = 1.49$), and tell if asthma was uncontrolled ($d = 1.39$). Asthma self-efficacy also improved significantly ($p = 0.017$), particularly confidence in ability to correctly manage asthma, however improvements in attitude did not achieve statistical significance.

Conclusion: Developmentally appropriate training is effective in increasing critical self-management knowledge and self-efficacy in inner city adolescents, particularly females.

Practice implications: Providers should screen carefully for symptoms and educate using developmentally appropriate training materials on ways to correctly monitor and manage symptom.

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1. Introduction

Asthma self-management is a major determinant of asthma control and has been identified as a key area for intervention by the Expert Panel Report 3 (EPR-3) and Asthma Outcomes Workshop [1–3]. Even at its most basic level, self-management is a complex process, requiring that individuals first recognize symptoms, know how to manage symptoms, and then actually engage in specific behaviors to prevent, monitor, manage acute symptoms, and communicate about asthma needs effectively with a variety of people [4]. This can be challenging for patients of any age, and more so for younger ages [5]. Prior data indicate that adolescents and young adults in particular often do not manage their asthma properly [1,6,7] and have subsequently poorer asthma control than

younger children who are often more closely supervised by parents [8,9].

Many factors contribute towards patterns of chronically suboptimal self-management. Adolescents often do not recognize symptoms of asthma and may intentionally or unintentionally normalize over time, thus becoming progressively less aware of usual and recurring symptoms [7,10,11]. Lack of knowledge or misperceptions may lead them to ignore symptoms or delay taking medications based on beliefs that “toughing it out” can strengthen the lungs, or that using rescue medication is addictive [12–14]. Beliefs such as these affect subsequent self-management decisions of when and how to treat, which in turn affects asthma control.

Given that asthma outcomes are heavily driven by self-management behaviors, interventions targeting self-management are urgently needed. Yet, the majority of programs for inner-city adolescents have focused on adherence [15–18], modification of social and environmental factors [19,20] or addressing healthcare access [21–23]. Fewer efforts have been directed towards reducing asthma morbidity by promoting adequate asthma knowledge and

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self-management [15,24–26]. These studies demonstrated small to moderate post-intervention increases in asthma knowledge, but few described theoretical grounding or systematic approaches to program development [5,15]. There is evidence that theory-based interventions may be more effective than interventions developed without explicit theoretical grounding, particularly when combined with developmentally appropriate teaching strategies [5,27,28]. Thus, based on our prior research and existing literature [4,7,10,29–32], we designed a theoretically grounded, developmentally sensitive, and comprehensive educational self-management training curriculum (*Let's Talk About Asthma!*) for adolescents [33,34]. The curriculum was developed with the understanding that (a) programs targeting adolescents unique developmental needs have greater efficacy, and (b) programs emphasizing problem solving skill and self-management training have been shown more effective than education alone [35,36].

The specific aim of this study was to evaluate the efficacy of the training curriculum for improving asthma knowledge and self-management problem solving skills in inner city adolescents (aged 16–20 years) who received 12 hours of intensive self-management training using the new curriculum. We hypothesized that following training adolescents would demonstrate significant improvement in asthma knowledge and self-management problem solving skills.

2. Study methods

2.1. Curriculum development: Let's talk about asthma!

Let's Talk About Asthma! is a theoretically derived, guideline-based [2] educational curriculum, written at sixth grade (11–12 year old) reading level. It provides in-depth asthma education and self-management training using a humorous, cartoon-style presentation format. The curriculum was developed through a three-step process [33]. First, we conducted a concept analysis and developed an operational definition of adolescent asthma self-management to identify core content [4]. The resulting four domains of self-management—prevention, monitoring, acute symptom management, and communication—served as the conceptual framework for the curriculum, and subsequent topic areas. Next, we conducted a qualitative study to explore adolescents' perceptions of asthma self-management and rationales underlying behaviors [10]. A total of 42 in-depth qualitative interviews were conducted with adolescents and their parents. Knowledge gained from these interviews was used to identify common ways of thinking and develop targeted educational strategies. Lastly, after developing preliminary manuals, we iteratively revised materials based on qualitative feedback from four adolescent-reviewers.

The final curriculum contained four interactive learning modules (30 to 45 min each), including: (1) pathology and prevention of asthma; (2) monitoring of asthma symptoms; (3) management of asthma symptoms; and (4) communication and psychosocial issues [33]. Details of training strategies are published in the *Let's Talk About Asthma! Instructor's Guide* [34]. Briefly, each session included interactive case studies that emphasized problem solving skills and application of learned content to specific asthma situations. [37]. Training techniques focused on problem-based-learning and teach-back methodology (in which the student learns and then teaches key content back to the instructor and peers), to increase comprehension and retention of information [38,39]. Self-management skills (e.g. inhaler techniques, use of peak flow meters and spacers, decision making during simulated asthma attacks, assessments of asthma control,

management of acute symptoms) were first modeled by the trainer then practiced by peer leaders until fluency was achieved.

2.2. Study design overview

This study was based on a subset of adolescents who participated in a larger multi-site clinical trial, Peer-led Asthma Self-Management Program for Adolescents (PLASMA), as “peer leaders.” Description of full study methodology is published elsewhere [29]. The Institutional Review Board of the affiliated University reviewed and approved the study. Informed consent was obtained from parents and adolescents. Demographic and asthma related information was collected at time of enrollment. A total of 42 peer leaders underwent a 12 hour asthma self-management training session using the curriculum described above. Content was delivered over two to three days, generally but not always consecutively. Peer leaders received training and underwent formal written assessment of asthma knowledge and self-management skills prior to and immediately following training.

2.3. Setting and sample

Participants were recruited to serve as PLASMA peer leaders from three U.S. cities: Memphis, TN; Baltimore, MD; and Buffalo, NY. Peer leaders were recommended by school nurses, teachers, or healthcare providers, and were purposefully sampled for having well-managed asthma and leadership experience or potential. Fourteen peer leaders were needed for each site, thus target sample size was 42.

Eligibility criteria for peer leaders were: (1) age between 16 and 20 years; (2) written nomination from school teachers/nurses or healthcare providers for candidates' exemplary asthma self-management, leadership, and emotional intelligence; (3) physician-diagnosed asthma that has required health service use (preventive or acute) within 12 months prior to recruitment; (4) persistent asthma as defined by National Heart Lung & Blood Institute (NHLBI) guidelines [2]; (5) no other chronic conditions requiring daily medication (e.g., diabetes, cancer, arthritis, etc.) and no severe mental illness (e.g., bipolar disorder, schizophrenia) or behavioral issues (e.g., criminal history) reported by parents or guardians; (6) primary residence located in the participating inner cities; and (7) ability to understand spoken and written English.

2.4. Training implementation

Peer leader training was delivered over 2–3 days (12 hours total) using the curriculum described above [33]. Peer leader training occurred 1 week prior to delivery of the main PLASMA intervention, with a 40 min review session prior to the main camp. Peer leader training sessions were conducted in small group format (5–14 adolescents per group) and utilized diverse adult trainers to enhance generalizability. Trainers (n = 3) included: (1) a certified asthma educator, (2) a pediatric nurse practitioner/researcher, and (3) an actively practicing family nurse practitioner. Two of the trainers were co-developers of the curriculum, and jointly provided the third trainer approximately 6 hours of training prior to program delivery. Each adult trainer conducted training sessions using the *Let's Talk About Asthma!* standardized manual [34], which delineated specific content and strategies for delivering interactive didactic sessions, group discussions, hands-on demonstrations, and role-play. Training was delivered in 4 sessions: (1) pathology and prevention of asthma; (2) monitoring of asthma symptoms; (3) management of asthma symptoms; and (4) communication and psychosocial issues

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