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Asthma in 10 to 13 Year Olds: Challenges at a Time of Transition

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Abstract

The prevalence of asthma in young people continues to increase. Among those 10 to 13 years of age with asthma, we know less than is desirable about the nature of the disease management tasks they face as youngsters who are approaching adolescence. This paper reviews aspects of asthma management in young people who are at a time of significant transition. They are experiencing physical development including puberty and growth spurts. Their cognitive abilities are enabling more abstract thinking. They are seeking individuation from their parents and are becoming socialized into their peer group. These factors may influence asthma related outcomes such as symptom control, health care use, school attendance and performance. Further, significant sex and gender related differences in outcome exist. Youngsters with asthma around 10 to 13 years of age contend not only with the particular management demands their chronic condition imposes but also the general development challenges associated with maturation. Most asthma management interventions do not account for the challenges faced at this transitional phase and age specific programs are needed.

Introduction

Data concerning the prevalence of asthma in young people continues to create a worrisome picture. The bad news is that between 1995 and 2003 physician diagnosed asthma in the U.S. increased from 3% to 6.2% in middle school children. The good news, however, is that undiagnosed asthma in this group decreased from 12% to 6.2% indicating more clinical

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vigilance in identifying the disease.¹ Although the condition is ubiquitous among those 10 to 13 years of age, we know less than is desirable about the management tasks they face as youngsters who are rapidly approaching adulthood. This paper explores aspects of asthma management in young people who are at a time of significant transition. We will consider a) general developmental issues for children with a chronic condition who are in the 10 to 13 years age range, b) some of the biological transitions they confront at adolescence, c) asthma interventions provided to them to date and d) specific challenges they face that might be incorporated into interventions to help them manage their condition.

Psychological and Social Development in Pre Teens with a Chronic Condition

The mental development of children from younger school age to adolescence, that is, the transition period from about 10 to 13 years of age, has been shown to be considerable.² For many years, studies have illustrated the shift in cognitive abilities at this point in time from more concrete thinking and understanding of phenomena to more abstract thinking.³ Young people living with chronic disease who are moving from simplistic constructs to more complex analytical models of explanation and action will begin to apply these more sophisticated deliberations to their chronic condition.⁴ Thus, children living with chronic illness must contend not only with the particular management demands their chronic condition imposes but also the general developmental challenges associated with maturation. In addition to transitioning to more advanced cognitive abilities, these challenges include individuation (becoming a separate and independent person) and socialization (fitting in with peers and the social environment).⁵

Chronic illness is not thought to affect the basic neuronal maturational mechanisms that underlie abstract thinking capacities.⁵ However, psychosocial processes may be influenced in various ways according to the severity of the chronic condition and the extent of disruption of daily life that accompanies it.⁶ Differences across diseases have been noted. For example, Jacobsen et al.⁷ have suggested that young people with type I diabetes are as psychologically well adjusted as their peers without a chronic condition while Forero et al.⁸ posit that those with asthma appear to feel lonely or depressed more often than their healthy peers. Manworren⁹ has suggested that body image and the development of a sense of a sexual self may be impaired by chronic illnesses in early adolescence, particularly if the condition requires treatments that are distancing to others.

Potential threats to socialization and maturation for those with a chronic illness may include the condition's impact on school attendance and performance.¹⁰ Young people with chronic illness have been shown to miss more school days than their healthy peers due to their health problems.¹¹ Ladd has indicated that one of the best ways for an adolescent to accomplish individuation is through effective peer relationships.¹² Peer attachments, usually formed at school, are the means by which young people garner support that enables them to "break loose" of parents and become independent.¹³ Disrupted school peer relationships because of absenteeism or poor school performance are thought to endanger this process. That being said, studies have found that many youngsters with chronic conditions report excellent peer relationships and some (for example with cancer) believe they have stronger peer acceptance than the average student.¹⁴

During this transitional period, there is development of children's capacity to undertake disease self management tasks along with increased acceptance of responsibility for maintaining their own health.⁴ Studies have demonstrated variations in the ability of young people to engage in self care both within the same age group and across age groups.^{15,16,17,18,19} Taking care of oneself and one's illness has been shown to correlate

directly with a child's concept of self, involvement in activities beyond the home and social economic status.^{19,20} Self care generally increases as children mature but may decrease again in adolescence.^{16,17,19,21,22} Parents and children generally have different perceptions about how much responsibility they each have for the child's chronic condition and the transfer of responsibility from parent to adolescent is an uneven, complex process occurring over several years.²³

Preadolescence for chronically ill children, therefore, is a time of comprehensive change involving cognitive and psychosocial development, as well as, exposure to new social environments. They are transitioning into middle school, forming larger social networks and assuming more responsibility for managing their condition.²⁴ They are also undergoing significant physiological changes.

Biological Transitions at Adolescence Affecting Asthma

Coping with the contingencies of physical development is an issue for middle school aged children with a chronic condition. Puberty and the adolescent growth spurt impose significant caloric and metabolic burden on the child.⁵ In some illnesses, for example, diabetes where growth hormone levels may influence insulin resistance, growth can destabilize a chronic condition.²⁵ Management challenges imposed by physiological changes will also differ by the child's sex. This appears to be a consideration in asthma. It has been noted for some time that in childhood boys have more prevalent asthma than girls and in adolescence the pattern changes with the condition becoming more prevalent in females. Further, after childhood, asthma is also more severe in females.²⁶ Almqvist et al. suggest that both hormonal changes and gender-specific environmental exposures account for these differences.²⁶

Other investigators provide additional sex related explanations including lung development and post pubertal changes. The lung of the female fetus has been shown to mature more rapidly than that of the male²⁷ although on average females have smaller lungs and fewer respiratory bronchioles at birth.²⁸ Female newborns have increased air flow rates compared to males.²⁹ By puberty, however, boys have been shown to have approximately 25% greater lung function than girls of identical height³⁰ and continued growth in lung function after attaining full height is more evident in boys than girls.³¹ Girls' lung function appears to plateau around 16 years of age, boys' continues after 18 years.³²

Watson et al. observed that sex hormones play a prominent role in asthma evident in the gender switch in the disease's prevalence near the time of puberty.³³ Further, girls' increasingly early age at menarche observed in epidemiological studies likely increases their risk of asthma.³⁴ Girls with early onset menarche have higher estrogen concentrations than those with later onset menarche³⁵ and estrogen levels have been associated with the incidence of asthma.³⁶

Tantisira et al.³⁷ suggest that level of airway responsiveness helps to explain the greater prevalence and burden of asthma in post pubertal females. They found that subsequent to the onset of menses, girls had greater airway responsiveness than boys even after adjustment for FEV1 and other potential confounders. In the final models of association, factors related to airway responsiveness including hay fever, respiratory allergy and recent inhaled corticosteroid use were evident only in girls.

Environmental exposures may differ for boys and girls.²⁶ Girls may be more inclined than boys to experiment with cosmetics, fragrances, hair coloring and other female-related potential precipitants of asthma symptoms. They also may be expected to participate more in

family and household tasks that may increase their exposure to irritants such as cleaning products, cooking fumes, dust etc.³⁸

Asthma Interventions for Middle School Students

Although there are several randomized controlled trials (RCT) of programs for older adolescents with asthma^{39,40,41} and for elementary school students^{42,43,44,45} there are far fewer well controlled studies of interventions for early adolescents i.e. middle school students. The majority of intervention studies have involved small numbers of participants and assessments conducted over the short term. To our knowledge, only one has been a large scale RCT.⁴⁶ Programs in the main do not appear to have emphasized the psychosocial and physiological factors discussed here. Table 1 presents descriptions and findings of the available interventions for children at the transitional, middle school stage.

Bruzzese et al. found that a program involving 24 parents and middle school children with the average age of 12.9 years, assessed two months post intervention resulted in early stage adolescents being more responsible in carrying their medicines, taking more preventive steps and awakening less often at night with asthma symptoms.³⁹ Velsor-Freidrich et al.⁴⁷ employed the Open Airways at School Program (OAS)⁴⁴ with 52 children 8 to 13 years old and followed this with monthly nurse practitioner visits. Evaluation showed an increase in children's self efficacy but no significant health outcomes were reported. Shegog et al.⁴⁸ assessed a computer based program with 76 early stage adolescents one week after program completion. They found higher levels of self efficacy but no differences in health outcomes. A study by Guendelman et al.⁴⁹ with 136 middle school students participating in a self management "Health Buddy" program was assessed over three months. They found decreases in activity limitation and fewer urgent calls to the hospital for asthma. Clark et al.⁵⁰ conducted a randomized controlled trial to follow 1292 children 10 to 13 years old for two years who participated at school in either the OAS⁴⁴ or OAS plus the Peer Asthma Action program⁴¹ the latter employing peer educators and designed to enhance the school social environment for asthma management. Original programs were adapted to fit the middle school environment. The investigators found no differences in students' symptoms or quality of life from either program. Self regulation of asthma was improved by OAS plus Peer Asthma Action. Grades were improved by OAS.⁴⁶

The collective results of these efforts do not compare favorably with proven programs for both younger and older students which have illustrated significant outcomes associated with symptom control, health care use and quality of life. Notwithstanding the generally inadequate evaluation designs, small numbers and limited time of assessment, less efficacy may be associated with a lack of emphasis on the transitional tasks faced by this age group. Ayala et al.²⁴ have noted that most asthma interventions have been designed for elementary age children or adults and are not suitable for preadolescents who face important developmental changes with implications for asthma management.

Asthma Management Challenges for 10 to 13 Year Olds

Ayala et al. showed that children with asthma themselves recognize that their transition from elementary to middle school presents physical and psychological challenges to managing their condition.²⁴ They have entered a school environment where support structures are broader and more diffuse. Physical education is more demanding and peer pressure is greater. Studies confirm that they experience a number of changes that may directly affect the management of their disease that deserve consideration in interventions designed to help them. As noted, they are increasingly able to understand more abstract concepts about their condition. They are seeking independence from their parents and integration with their peers. They are physiologically changing in ways that may influence the severity of their

illness. Their sex and gender roles are likely to be factors in the extent and precipitants of their symptoms. Students at this age may begin to manage asthma in “gendered” ways. Williams has suggested that girls are likely to incorporate asthma and its treatment into their social and personal identities and boys are more likely to try to keep the condition out of their personal and social lives.⁵¹

In an RCT with 1292 low income, inner city middle school students, Clark et al. found that the older the female middle school student, the lower her emotional quality of life and higher her body mass index score and level of asthma symptoms.⁵² Boys did not evidence a similar pattern with age. As summarized in Table 2, these investigators also found that middle school boys were more aware of an impending asthma episode than girls and that they were more likely to use medicines on their own. They were also less likely to be bothered when observed taking medicine by their peers. Boys were also likely to report higher levels of autonomy in general regarding their developmental tasks as measured by the Eccles scale^{53,54}. Girls on the other hand reported receiving higher levels of social support in general and specifically from their friends as measure by the MPSS scale⁵⁵. These symptoms and gender differences have, to date, have not been accounted for in asthma management interventions for this age group.

Conclusion

An increasing number of students dealing with the transition from childhood to adolescence also must manage asthma. To date, little is available to help them with their asthma related developmental and management tasks. Programs are needed that address, both in process and content, the challenges they face. These would build on their ability to think conceptually about asthma and how to keep it under control, their move toward independence and healthy separation from their parents. In addition programs must account for the strong influence of their friends and other peers on their management decisions, and differences in both the way asthma is manifest and managed differently by boys and girls. Assessments of more robust programs must involve sufficiently large samples of students and evaluation over time periods long enough to observe changes in symptoms and health care use.

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Table 1

Citation	Program Name	Number of Participants	Evaluation design/length of follow up	Findings
Bruzzese JM, Unikel L, Gallagher R, Evans D, Collard V. Feasibility and impact of a school-based intervention for families of urban adolescents with asthma: Results from a randomized pilot trial. <i>Fam Process</i> . 2008 Mar; 47(1):95–113.	Asthma: It's a Family Affair!	24 families consisting of one student with asthma and the student's primary caregiver	Randomized controlled trial. Created a form that caregivers and students completed in their final sessions asking their opinions about the usefulness of and satisfaction with the intervention and 2 months post-intervention	Two months post-intervention, relative to controls, intervention caregivers reported better problem-solving with children. Intervention students were more responsible for carrying medication, took more prevention steps, and woke fewer nights from asthma.
Guendelman S, Meade K, Benson M, Chen YQ, Samuels S. Improving asthma outcomes and self-management behaviors of inner-city children: A randomized trial of the health buddy interactive device and an asthma diary. <i>Arch Pediatr Adolesc Med</i> . 2002 Feb; 156 (2): 114–20.	The Health Buddy	134 inner-city children aged 8 to 16 years	Randomized controlled trial. 2 follow-up visits at 6 and 12 weeks through nurse interviews and questionnaires	The odds of having any limitation in activity during the 90-day trial were significantly ($P = .03$) lower for children randomized to the Health Buddy. The intervention group also was significantly ($P = .01$) less likely to report peak flow readings in the yellow or red zone or to make urgent calls to the hospital ($P = .05$). Self-care behaviors, which were important correlates of asthma outcomes, also improved far more for the intervention group.
Shegog R, Bartholomew LK, Parcel GS, Sockrider MM, Masse L, Abramson SL. Impact of a computer-assisted education program on factors related to asthma self-management behavior. <i>J Am Med Inform Assoc</i> . 2001 Jan-Feb; 8(1):49–61.	Watch, Discover, Think and Act (WDTA)	76 children, 9 to 13 years old	Prospective pretest posttest randomized intervention trial. Process data collected at the second session and post-test was administered at the third session	Children using the program scored significantly higher ($P < 0.01$) on questions about steps of self-regulation, prevention strategies, and treatment strategies. These children also demonstrated greater self-efficacy ($P < 0.05$) and more efficacy building attribution classification of asthma self-management behaviors ($P < 0.05$) than those children who did not use the program.
Velsor-Friedrich B, Pigott T, Srof B. A practitioner-based asthma intervention program with African American inner-city school children. <i>J Pediatr Health Care</i> . 2005 May-Jun; 19(3):163–71.	Open Airways	52 children, 8- to 13-year-old inner city minority students	Quasi experimental, 12 month post-test	Students in the treatment group scored significantly higher than the control group over time on measures of asthma knowledge, asthma self-efficacy, general self-care practices, and asthma self-care practices. No significant differences were found between the two groups on health outcomes.
Clark, N.M., Dodge, J.A., Shah, S., Valerio, M.A., Awad, D.F., Thomas, L.J. "Understanding of Asthma in Adolescent Girls" presented at the International Conference of the American Thoracic Society in San Francisco, CA, May 18–23, 2007. (Poster)	Open Airways and Peer Asthma Action	1292 low income, African American students 10–13 years old	RCT with follow up at 12 months and 24 months. Two interventions studied.	Both interventions did not show any change in symptoms or quality of life. Change in self-regulation was significant for those receiving Open Airways plus Peer Action for Asthma. Those receiving Open Airways only had a significant increase in GPA.

Table 2

Variable	Male (n=607)	Female (n=576)	<i>p</i> -value
Ever know in advance that an asthma attack is going to start (% yes)	48%	44%	0.09
Often or always take asthma medicine on your own (% yes)	51%	44%	0.07
Never bothers you when other kids see you take your asthma medicine (% never bothers)	86%	80%	0.04
Eccles scale of autonomy* (mean)	2.5	2.4	0.005
MSPSS social support scale**			
Receive overall support (mean)	5.6	5.7	0.002
<i>Family Subscale (mean)</i>	6.1	6.1	0.64
<i>Friends Subscale (mean)</i>	4.7	5.0	<0.001
<i>Special Person Subscale (mean)</i>	5.9	6.0	0.27