

LDI *Issue Brief*

Volume 9, Number 3
November / December 2003

Leonard Davis Institute of Health Economics

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Self-management education of children with asthma: a meta-analysis

Editor's note: Nearly one in every thirteen children has asthma, making it the most common chronic condition in childhood. For a variety of biological and environmental reasons, the prevalence of childhood asthma has risen dramatically in the past 20 years, with disproportionate effects on low-income populations, minorities, and children living in inner cities. Much of the morbidity associated with childhood asthma, such as activity restrictions, missed school days, and emergency doctor visits, are preventable through appropriate management strategies. This Issue Brief summarizes evidence on the effectiveness of educational programs to improve self-management in children with asthma, and bolsters existing guidelines to include self-management education in the routine care of these patients.

Guidelines encourage educating patients about managing their asthma, but effectiveness in children is unknown

Despite clinical advances in the understanding of asthma and its treatment, morbidity and mortality from asthma continue to rise. In response to this paradox, most experts have emphasized the importance of educating physicians on optimal treatment through clinical guidelines, and educating patients and families about the management of asthma.

- Educational programs aimed at adults with asthma that include self-monitoring, regular medical care, and an asthma action plan have been shown to improve health outcomes, but the effects of such programs for children have been mixed.
- Education of children and families by information transfer alone (i.e., patient handouts) is ineffective. A previously published review in 1992 found that asthma educational programs for children do not affect outcomes, but the review was based on a small number of studies.
- Since the 1992 review, asthma education programs that teach patients skills in self-management have shown some promise. These programs are highly varied. They can be based in clinics, schools, or the community, or on home visits, and consist of individual or group sessions, single or

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multiple sessions, and a variety of educational techniques designed to improve attack management, disease prevention, or social skills development.

- Guevara and colleagues attempted to synthesize all existing evidence to date to determine the effectiveness of these educational programs.

Meta-analysis of studies includes 32 trials and 3,706 children

Meta-analysis is a procedure for combining the results from many different studies. The investigators identified all clinical trials between 1980 and 1998 that tested educational interventions in self-management for children aged 2-18. They identified 45 trials, 32 of which were eligible for the review, based on adequate comparisons with control groups, and reporting of outcomes such as pulmonary function tests, morbidity, or health care utilization.

- The 32 trials included 3,706 children and adolescents with asthma. Most were relatively small randomized controlled trials and enrolled children with severe asthma.
- Fifteen trials enrolled adolescents aged 13-18, and 12 enrolled children aged 2-5; no study reported data by age.
- The educational programs were diverse and targeted children, parents, or both. Most programs used multiple sessions and taught strategies based on self-monitoring of symptoms. Whereas all trials focused on asthma prevention measures (e.g., identification and avoidance of asthma triggers) and/or management of asthma attacks (e.g., use of an asthma action plan), 13 trials incorporated social skills development into the educational strategy.
- Because studies presented outcomes using a variety of different units, the investigators standardized all outcomes in terms of an “effect size.” Significant effects were characterized as modest, moderate, or large.

Educational programs for children with asthma improve lung function, and reduce number of school days missed

This updated review of the evidence indicates that educational interventions to improve self-management of asthma are associated with improvements in a wide range of outcomes.

- Four trials (258 patients) had complete data on measures of lung function. Education was associated with moderate improvement in lung function.
 - Eighteen trials (1,649 patients) had complete data on measures of morbidity. Education was associated with modest reductions in school absences, night disturbances, and days of restricted activity. The beneficial effects of education were more pronounced among trials of moderate-severe asthma than among those of mild-moderate asthma.
 - Nine trials (522 patients) had complete data on patients’ perceptions of self-control over asthma (self-efficacy). Education was associated with
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moderate improvements in perceived self-control, but had no effect on the number or types of symptoms reported.

- Eighteen trials (1,899 patients) had complete data on health care utilization. Education was associated with a modest reduction in emergency department visits, but had no effect on the number of hospitalizations.
- Overall, significant effects on lung function were seen within the first six months, but for measures of morbidity and health care utilization, effects were greater by 12 months.

Results suggest program characteristics that work best

The investigators attempted to assess the characteristics of programs that were associated with better outcomes. However, no studies involved direct comparisons between educational components, and thus the findings remain suggestive.

- Programs that incorporated individual sessions with patients and families had the greatest reductions in morbidity measures, whereas programs that utilized a group format for teaching had the greatest reductions in hospitalizations.
- Programs with a single session had the greatest reduction in morbidity measures, whereas those with multiple sessions had the greatest improvement in self-efficacy and the greatest reduction in number of visits to the emergency department.
- Programs that taught self-monitoring using objective measures of lung function, such peak-flow diaries, rather than symptom tracking, had the greatest improvement in lung function and the greatest improvements in morbidity measures.

POLICY IMPLICATIONS

This systematic review and meta-analysis provides objective evidence to support national and professional guidelines on the use of educational strategies to enhance self-management in children with asthma. It should also encourage payers to provide reimbursement for effective asthma education programs in children.

- Incorporating educational programs for self management into the routine care of children with asthma may significantly improve outcomes. Although selection of a program may depend on cost and availability, efforts should be made to incorporate models that are known to work. Priority should be given to patients with severe asthma, and education should be provided long term to account for changing needs.

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POLICY IMPLICATIONS

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- Successful programs tend to be conceptually-based and multifaceted. Two of the more well-known programs are “Air Wise,” a joint educational program targeting parents, children, and providers and utilizing four one-on-one sessions to individualize a care program, and “Asthma Care Training (ACT),” a group program of five sessions for parents and children that teaches asthma knowledge, environmental control, relaxation skills, and decision-making using a traffic light analogy.
- Future studies should test alternative components of educational programs directly to determine their relative effectiveness. For example, studies should compare strategies aimed at the individual with those aimed at the group, and strategies based on peak flow with those based on symptoms.
- There is not enough evidence to determine the optimal programs at each developmental stage and age. More research is needed to identify effective, developmentally appropriate programs.

This Issue Brief is based on the following articles: J.P. Guevara, F.M. Wolf, C.M. Grum, N.M. Clark. Effects of Educational Interventions for Self Management of Asthma in Children and Adolescents: Systematic Review and Meta-analysis. British Medical Journal, June 14, 2003, vol. 326, pp. 1308-1312; see also F.M. Wolf, J.P. Guevara, C.M. Grum, N.M. Clark, C.J. Cates. Educational Interventions for Asthma in Children (Cochrane Review). In: The Cochrane Library, Issue 2 2003. Oxford: Update Software.

*Published by the Leonard Davis Institute of Health Economics, University of Pennsylvania, 3641 Locust Walk, Philadelphia, PA 19104-6218.
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Leonard Davis Institute
of Health Economics
University of Pennsylvania

Issue Brief



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