The effectiveness of school-based family asthma educational programs on the quality of life and number of asthma exacerbations of children aged five to 18 years diagnosed with asthma: a systematic review protocol

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Review objective

The objective of this review is to identify the best available quantitative evidence related to the effectiveness of school-based family asthma educational programs on the quality of life and number of asthma exacerbations of children aged five to 18 years with a diagnosis of asthma.

Background

Asthma is a serious public health issue globally and nationally. The World Health Organization (WHO) Global Asthma Report 2014 estimates that 334 million people worldwide currently suffer from asthma.¹ In the United States, asthma currently affects about 25 million people.² Although asthma can occur at any age, it most often begins early in life,³ and is the most common non-communicable disease among children.² Approximately 14% of the world’s children have asthma.¹ In the United States, 7.1 million children have asthma.² Globally, the burden of asthma, measured by disability and premature death, is greatest in children approaching adolescence (ages 10-14).¹ Asthma is also a serious economic concern in primary health care worldwide.⁴ In the United States, the estimated total cost of asthma to society was US$56 billion in 2007, or US$3259 per person.⁴ In 2008 asthma caused 10.5 million missed days from school and 14.2 missed days from work for caregivers.⁵ The estimated total cost of loss of productivity resulting from missed school or work days is US$3.8 billion per year, and premature death US$2.1 billion per year.⁶ Globally, asthma ranks 14th in terms of disability adjusted life years (DALYs), which are the number of years lost to ill health, disability or death attributed to asthma.¹ According to a 2011 European study, the estimated total cost of asthma was €19.3 billion among people aged 15 to 64 years.⁵ A study conducted in the Asia-Pacific region reported that the direct and indirect costs of asthma per person ranged from US$184 in Vietnam to US$1189 in Hong Kong in 2000.⁶ A Canadian study showed that C$184 loss of productivity during
one week was attributed to asthma in 2012.\textsuperscript{6} In Australia, AU$655 million was spent on asthma for 2008-09.\textsuperscript{7}

Asthma is a chronic respiratory disease that affects millions of people of all ethnicities, ages and genders worldwide.\textsuperscript{8} The pathophysiology of asthma is multifaceted, and is characterized by restriction of airflow into and out of the lungs, airway inflammation with increased mucus production, and bronchial hyper-reactivity caused by exposure to environmental irritants and chemicals, often referred to as triggers;\textsuperscript{6} which in some cases are modifiable. Asthma triggers include respiratory infections, weather changes, stress, excitement, exercise and other physical activities, allergic hypersensitivity reactions, food additives, animal dander, dust mites, cockroaches, outdoor and indoor pollutants, certain medications and cigarette smoke.\textsuperscript{2,4} Asthma is characterized by recurrent, episodic, reversible symptoms often referred to as asthma exacerbations, or asthma attacks.\textsuperscript{9} Asthma symptoms include coughing, shortness of breath, chest tightness and wheezing that most frequently occur at night or in the early morning.\textsuperscript{9} Asthma symptoms vary in severity and frequency in affected individuals, and can occur several times a day or week.\textsuperscript{2} Asthma symptoms may be mild, moderate, or severe, and are classified according to presenting symptoms and quantitative measurements of lung function using a peak expiratory flow meter (PEF), or of forced expiratory volume in one second (FEV\textsubscript{1}).\textsuperscript{8} Asthma symptoms can be so severe that, if left untreated, death can occur.\textsuperscript{2}

Exacerbations of asthma symptoms often result in school and work absenteeism, activity intolerance and emergency hospital visits for asthma.\textsuperscript{2} Nocturnal asthma exacerbations frequently cause sleeplessness, which may result in daytime fatigue.\textsuperscript{2} Asthma symptoms can interfere and disrupt activities of daily life, and can have an unfavorable impact on the quality of life for people with the disease, including children and their caregivers.\textsuperscript{3,10} For this review, quality of life represents how well the asthmatic child is able to manage symptoms of the disease and lead a normal healthy life. Caregiver refers to the primary person who takes care of a child with asthma. Family refers to the caregiver and the child.

According to the United States Centers for Disease Control and Prevention (CDC), epidemiologists and clinical researchers concur that the burden of asthma is higher among children compared to adults.\textsuperscript{11} Asthma prevalence in children varies within and across countries.\textsuperscript{12} Asthma disparities also exist along ethnic and racial lines.\textsuperscript{11,12} The International Study of Asthma and Allergies in Childhood (ISAAC) quantified the prevalence of asthma symptoms of children from around the world.\textsuperscript{12} In the United States, non-Hispanic Black and Puerto Rican children have higher asthma prevalence compared to Caucasian children.\textsuperscript{11} Children from the Ivory Coast, Costa Rica and Wales have higher asthma prevalence compared to children from Kenya, Brazil and England respectively.\textsuperscript{12} Indigenous Australians, Aboriginal and Torres Strait Islander Australian children have a higher prevalence of asthma compared to non-Indigenous Australian children.\textsuperscript{13} The international prevalence of asthma prompted governments and communities to create initiatives and strategies to address this public health issue.

The global burden of asthma led to the development of the Global Initiative for Asthma (GINA).\textsuperscript{14} Formed in 1993, in collaboration with the National Heart, Lung, and Blood Institute, National Institutes of Health, United States of America and the WHO, GINA’s goals include working with healthcare providers and public health officials worldwide to reduce asthma prevalence, morbidity and mortality.\textsuperscript{14} In an effort to increase public awareness of the global burden of asthma, GINA created World Asthma Day, which is held annually on the first Tuesday in May.\textsuperscript{14} The burden of asthma in the United States fostered the creation of the National Asthma Education and Prevention Program (NAEPP).\textsuperscript{15} This
program is designed to raise awareness about asthma and the major public health concern it poses to society. In addition to conducting asthma prevention activities, NAEPP collaborates with other stakeholders to develop asthma educational programs for minority populations who are disproportionately affected by asthma. The program believes that adequate control of asthma, through modern treatment and educational programs, can be reinforced by the development of partnerships with caregivers, schools and healthcare providers. The NAEPP Expert Panel Report 3, Guidelines for the Diagnosis and Management of Asthma (EPR-3), has a provision that specifies that asthma education programs for children should include their caregivers. Caregivers’ involvement is crucial for achieving the goals of asthma management in children, which supports the interest of GINA and NAEPP to include caregivers in school-based asthma education programs for children. The guidelines recommend education for asthma management should occur at all points of care, including schools. According to the EPR-3, schools are ideal locations to facilitate asthma education programs because they provide access to large numbers of children in an environment in which they are accustomed to learning. The long term effects of these approaches are improved healthcare practices, reduced mortality and morbidity, and reduced costs of asthma care.

Although there is no cure for asthma, research evidence has demonstrated that asthma symptoms can be well-controlled with the appropriate medications, adherence to treatment, avoidance of asthma triggers, and education about disease management. Research studies that have investigated the effectiveness of school-based asthma education programs that have included caregivers have demonstrated beneficial effects of these programs on the quality of life and disease management of children with asthma versus no school-based family asthma education programs.

A randomized controlled trial (RCT) conducted by Clark et al. that included 835 children and their parents examined the effects of comprehensive school-based asthma education programs on symptoms, grades and school absences, and parents’ asthma management practices. The interventions consisted of six components for children, their parents, classmates and school personnel. One of the six components included “Open Airways for Schools” disease management training for children, which also included handouts and homework for the parents. One of the five interventions for the parents included school fairs with asthma care questions and answers sessions to discuss the frequency and type of asthma symptoms of their children. Results of this study demonstrated that 24 months post intervention, children from the intervention groups had better disease management, which included improved control of daytime and nighttime symptoms, and reduced absences from school and work related to asthma exacerbations, compared to the children from the control group.

In another study, Bruzzese et al. conducted a pilot RCT that included 24 families. Each family consisted of an asthmatic child and a caregiver. The study examined the effects of a two-month, school-based asthma education program. The interventions consisted of six interactive 75-minute group sessions for students, held once a week for six weeks, and five 90-minute group sessions for caregivers, held once a week. The student sessions were led by a developmental psychologist, and one of the lesson topics included prevention and management of asthma. The group sessions for caregivers were led by a clinical psychologist, and one of the lesson topics included asthma self-management of their children. The interventions resulted in positive short term changes in family relations and an overall improved health status for the children. Intervention students took more prevention steps, were more responsible with medications, and had less nights awake related to asthma symptoms.
A review of literature revealed previous systematic reviews have been conducted that examined similar topics of the effectiveness of school-based asthma education programs.\textsuperscript{17,18} No systematic reviews were found that specifically examined the effectiveness of school-based family asthma education programs on quality of life and the number of asthma exacerbations of children diagnosed with asthma. A search of the literature revealed that studies conducted with caregiver involvement were limited. Therefore this review will synthesize the research evidence to determine the effectiveness of school-based asthma education programs within a familial context.

**Keywords**

asthma; asthma education programs; asthma symptoms; caregiver; children; family; school-based

**Inclusion criteria**

**Types of participants**

This review will consider studies that include children, five to 18 years of age, of any gender, race, or ethnicity with a clinical diagnosis of asthma, who has participated in school-based asthma education programs that include their caregivers. Studies that include children younger than age five and older than age 18, with respiratory diseases other than asthma, who have not participated in school-based asthma education programs that include their caregivers will be excluded.

**Types of intervention(s)**

This review will consider studies that evaluate the effectiveness of school-based family asthma education interventions on the quality of life and number of asthma exacerbations of children with asthma compared to absence of school-based family asthma education programs.

**Types of outcomes**

This review will consider studies that include the following outcome measures: primary outcomes of quality of life and asthma exacerbations, and secondary outcomes of absences from school or work, physical activity intolerance, and emergency hospital visits as a result of asthma exacerbations. Quality of life can be measured by a valid and reliable tool such as the Pediatric Asthma Quality of Life Questionnaire.\textsuperscript{21} The number of asthma exacerbations can be measured by valid and reliable tools such as the ISAAC questionnaire (questions 1-8 relate to asthma)\textsuperscript{12} and the Childhood Asthma Control Test (C-ACT).\textsuperscript{22} A subjective measure, such as an asthma diary that includes peak expiratory flow meter readings, can be used for quantitative analysis of variance (ANOVA). This review will also consider valid and reliable measures of outcomes used in the studies for inclusion.

**Types of studies**

The quantitative component of the review will first consider randomized controlled trials. Other research designs such as non-randomized controlled trials, quasi-experimental studies, before and after studies, prospective and retrospective cohort studies, case control studies and analytical cross sectional studies will be considered for inclusion to identify and synthesize the best available evidence related to the effectiveness of school-based family asthma educational programs on quality of life and number of asthma exacerbations of children aged five to 18 years with asthma.
Search strategy

The search strategy aims to find both published and unpublished studies. A three-step search strategy will be utilized in this review. An initial limited search of MEDLINE and CINAHL will be undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe article. A second search using all identified keywords and index terms will then be undertaken across all included databases. Thirdly, the reference list of all identified reports and articles will be searched for additional studies. Studies published in English will be considered for inclusion in this review. Studies published from inception of the database through to the current date of review will be considered for inclusion in this review.

The databases to be searched include:

PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Excerpta Medica Databases (EMBASE), ProQuest Central, Education Resources Information Center (ERIC), and Cochrane Central Register of Controlled Trials (CENTRAL).

The search for unpublished studies will include:

ProQuest Dissertations and Thesis Database, Google Scholar, ClinicalTrials.gov, Virginia Henderson International Nursing Library, New York Academy of Medicine, and World Allergy Organization will be searched for research currently underway but not yet published.

Assessment of methodological quality

Papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (Appendix I). Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data extraction

Data will be extracted from papers included in the review using the standardized data extraction tool from JBI-MAStARI (Appendix II). The data extracted will include specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objectives. When articles are found to have missing or incomplete data that is relevant to the research objective, the authors will be contacted in an effort to obtain the necessary information. If missing or incomplete data cannot be collected, those articles will then be excluded from the review.

Data synthesis

Quantitative data will, where possible, be pooled in statistical meta-analysis using JBI-MAStARI. All results will be subject to double data entry. Effect sizes expressed as weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed statistically using the standard Chi-square and also explored using subgroup analysis based on the different study designs included in this review. Where statistical pooling is not possible the findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

Conflicts of interest

The authors have no conflicts of interest to declare.
Acknowledgements

This review will partially fulfill degree requirements for successful completion of the Doctor of Nursing Practice Program at Pace University, College of Health Professions, for HW, FS-I, DC and RU.
References


Appendix I: Appraisal instruments

MAStARI appraisal instrument

**JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial**

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<td>1. Was the assignment to treatment groups truly random?</td>
<td>Yes</td>
<td>No</td>
<td>Unclear</td>
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<td>2. Were participants blinded to treatment allocation?</td>
<td>Yes</td>
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<td>3. Was allocation to treatment groups concealed from the allocator?</td>
<td>Yes</td>
<td>No</td>
<td>Unclear</td>
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<td>4. Were the outcomes of people who withdrew described and included in the analysis?</td>
<td>Yes</td>
<td>No</td>
<td>Unclear</td>
<td>Not Applicable</td>
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<td>5. Were those assessing outcomes blind to the treatment allocation?</td>
<td>Yes</td>
<td>No</td>
<td>Unclear</td>
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<td>6. Were the control and treatment groups comparable at entry?</td>
<td>Yes</td>
<td>No</td>
<td>Unclear</td>
<td>Not Applicable</td>
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<td>7. Were groups treated identically other than for the named interventions?</td>
<td>Yes</td>
<td>No</td>
<td>Unclear</td>
<td>Not Applicable</td>
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<td>8. Were outcomes measured in the same way for all groups?</td>
<td>Yes</td>
<td>No</td>
<td>Unclear</td>
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<td>9. Were outcomes measured in a reliable way?</td>
<td>Yes</td>
<td>No</td>
<td>Unclear</td>
<td>Not Applicable</td>
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<td>10. Was appropriate statistical analysis used?</td>
<td>Yes</td>
<td>No</td>
<td>Unclear</td>
<td>Not Applicable</td>
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Overall appraisal: Include [ ] Exclude [ ] Seek further info. [ ]

Comments (Including reason for exclusion)
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doi: 10.11124/jbisrir-2015-2335
# JBI Critical Appraisal Checklist for Descriptive / Case Series

**Reviewer**  
**Date**

**Author**  
**Year**  
**Record Number**

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**Comments (Including reason for exclusion)**

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**doi:** 10.11124/jbisrir-2015-2335

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# JBI Critical Appraisal Checklist for Comparable Cohort/Case Control

Reviewer: ___________________________ Date: ___________________________
Author: ___________________________ Year: ___________ Record Number: ___________

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<td>1. Is sample representative of patients in the population as a whole?</td>
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<td>2. Are the patients at a similar point in the course of their condition/illness?</td>
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<td>3. Has bias been minimised in relation to selection of cases and of controls?</td>
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<td>4. Are confounding factors identified and strategies to deal with them stated?</td>
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<td>5. Are outcomes assessed using objective criteria?</td>
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<td>7. Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>8. Were outcomes measured in a reliable way?</td>
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Overall appraisal: Include □ Exclude □ Seek further info. □

Comments (Including reason for exclusion)
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Appendix II: Data extraction instruments

MAStARI data extraction instrument

**JBI Data Extraction Form for Experimental / Observational Studies**

Reviewer ___________________________ Date ___________________________

Author ___________________________ Year ___________________________

Journal ___________________________ Record Number ___________________

**Study Method**

RCT ☐ Quasi-RCT ☐ Longitudinal ☐

Retrospective ☐ Observational ☐ Other ☐

**Participants**

Setting 

Population 

**Sample size**

Group A ___________________________ Group B ___________________________

**Interventions**

Intervention A 

Intervention B 

Authors Conclusions: 

Reviewers Conclusions: 

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### Study results

#### Dichotomous data

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#### Continuous data

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