

ORIGINAL ARTICLE

Evidence-based asthma education for parents

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Abstract**Purpose.** The purpose of this project was to develop and implement an evidence-based asthma education brochure for parents of pediatric asthma patients.**Design and Methods.** The asthma patients were 4–12 years old. The number of office sick visits, emergency room visits, and hospitalizations related to asthma were evaluated post-education, and then compared with the previous months.**Results.** Although there were no statistically significant results, there were notable trends that apply to asthma practice.**Practice Implications.** As a result of the project, there were positive changes noted within the pediatric clinic related to asthma education, and additional suggestions for future opportunities were made.

Evidence-based practice combines the best research evidence, patient needs, and clinical experience to promote positive outcomes in clinical areas of need (O'Grady, 2010). Healthcare providers are prepared to treat asthma exacerbations; however, the real problem lies in preventing exacerbations and requires better education about medication compliance and control of environmental triggers. The purpose of this project was to develop an evidence-based asthma education brochure and to integrate it into patient visits at a southeast Alabama pediatric clinic that used no written asthma education consistently. Additionally, the purpose was to determine if provision of written asthma education for parents of children with asthma would decrease the number of office sick visits related to asthma.

Asthma, an inflammatory disease of the airways and the most common, chronic childhood illness, has reached epidemic proportions in the United States (Peterson-Sweeney et al., 2007). Moorman and colleagues (2007) estimated the number of children with asthma went from 3.5% in 1980 to 7.5% in 1995. According to the National Health Center for Statistics Summary, the percentage of children with asthma grew to an overwhelming 9.4%, approximately seven million U.S. children, ages 17 and younger, in 2008 (Bloom, Cohen, & Freeman, 2009).

Over the last two decades, evidence has emerged on the pathophysiological details of asthma, a potentially fatal disease. New treatment modalities have been developed, and clear guidelines have been established related to the best pharmacological and nonpharmacological therapy. Those guidelines reinforce the crucial role that education plays in treatment compliance (Clark, Mitchell, & Rand, 2009). Despite improvement in treatment interventions over the last decade, asthma continues to be one of the most common, chronic diseases in the pediatric population and is associated with high rates of morbidity and mortality (Peterson-Sweeney et al., 2007). This red flag indicates that interventions are required to better manage the disease (Clark et al., 2009). There had been reports of a possible plateauing of prevalence over the last few years. Unfortunately, that plateau effect has not been seen in the low socioeconomic and minority areas that seem to be plagued with the highest prevalence (Clark et al., 2009).

BACKGROUND

Bloom and colleagues (2009) reported that, of the seven million children diagnosed with asthma, 21% were African Americans and 12% were of lower socioeconomic backgrounds. According to Cloutier,

Jones, Hinckson, and Wakefield (2008), asthma affects African Americans and Hispanics at disproportionately higher rates than Whites. Disparities within these groups are evident in asthma knowledge, diagnosis, treatment, and compliance (Cloutier et al., 2008). Involvement at various levels is necessary to gain better control of this disease.

Poor patient outcomes have been associated with a lack of patient and parent compliance with the patient's individualized treatment plan. There are a number of possible factors that may play a role in patients' and parents' noncompliance. They include financial and cultural barriers, and parents' and patients' misconception about the disease process and the importance of treatment (Gillissen, 2007). One significant factor that leads to noncompliance and poor outcomes is inadequate education by providers for pediatric patients ages 2–17 and/or parents regarding the diagnosis of asthma and the importance of strict adherence to the treatment plan (Gillissen, 2007).

Many factors play a role in the mortality and morbidity associated with asthma. According to Gillissen (2007), failure to educate asthma patients with the self-management skills needed to decrease exacerbations and poor understanding of the disease process, triggers, and control measures are important factors. Inappropriately prescribed medications and noncompliance with treatment also have an impact on mortality and morbidity (Gillissen, 2007).

The National Institutes of Health (NIH) has recognized that better control is needed for asthma, in both adults and children. Efforts began 20 years ago to better understand this disease and change treatment. The NIH developed the National Asthma Education and Prevention Program. The program's responsibility was to create clinical guidelines for practice and treatment of asthma based on current evidence and clinical expertise (NIH, 2007). The original Expert Panel Review (EPR) Full Report: Guidelines for the Diagnosis and Management of Asthma was released in 1991, updated in 1997, 2002, and again in 2007.

The EPR-3 panel's objectives were to organize and review literature, make recommendations, and update guidelines based on current evidence in hopes of better outcomes related to asthma (NIH, 2007). The expert panel included medical doctors, doctors of philosophy, advanced practice nurses, respiratory therapists, and pharmacists. The EPR-3 panel's four components of asthma management included (a) measures of asthma assessment and monitoring, (b) education for a partnership in

asthma care, (c) control of environmental factors and comorbid conditions that affect asthma, and (d) medications. The EPR-3 guideline pertaining to asthma education provided the basis for this project. Additional review of literature and evidence provided significant support for asthma education. In addition, the review provided direction for an asthma intervention to improve patient outcomes by increasing compliance and decreasing asthma sick visits.

LITERATURE REVIEW

A review of the evidence on the effectiveness of asthma education was completed. Studies were identified by searching multiple databases via EBSCO using a combination of keywords that included *asthma*, *education*, *self-management*, *effectiveness*, *children*, and *pediatric*. The databases searched included Cumulative Index to Nursing and Allied Health Literature, Pubmed, Proquest, and Cochrane Library. Also, searches in the Centers for Disease Control and Prevention (CDC), NIH, and National Heart, Lung and Blood Institute were performed.

Nine studies were reviewed and provided supporting evidence for the project. Two were meta-analyses including 52 randomized, controlled trials involving a total of 8,198 children (Bhagal, Zemek, & Ducharme, 2006; Boyd et al., 2009). Both meta-analyses summarized findings on the effectiveness of various types of asthma education to children and/or parents. Both indicated improved outcomes, specifically with decreased sick visits and emergency room (ER) visits related to asthma (Bhagal et al., 2006; Boyd et al., 2009).

Five studies were individual randomized, controlled trials involving a total of 521 children. Each study considered the effectiveness of various types of asthma education programs that were implemented in various settings. All indicated improved outcomes as measured by symptoms, post-intervention test scores, and decreased sick visits/ER visits (Butz et al., 2005; Farber & Oliveria, 2004; Horner & Fouladi, 2008; La Roche, Martin, Koinis-Mitchell, & Gualdran, 2006; Ng et al., 2008).

The remaining studies used pre- and post-intervention tests and surveys to assess the effectiveness of various asthma education programs that had been implemented in different community settings. Both indicated improved outcomes in asthma measures after the implementation of each asthma education program (Brooten et al., 2008; Patel, Welsh, & Foggs, 2004).

Farber and Oliveria (2004) performed a randomized, controlled clinical trial to determine the effect of an asthma education and management program, implemented as part of the ER visit in an inner-city New Orleans hospital. The study assessed asthma severity utilizing the Asthma Functional Severity Scale, use of controller medications, and the risk of future exacerbations with 56 Medicaid-insured children ages 2–18 years. The study results showed that the program did improve the use of controller medications, but there was no impact on asthma functional severity or future exacerbations.

Brooten and colleagues (2008) used a convenience sample of 72 parents to test the effects of the Healthy Children, Healthy Homes Program using a pre- and post-intervention survey. Data were collected on community perception of severity of asthma, common triggers, asthma misconceptions, and reported behaviors to control asthma. Post-intervention surveys indicated increased awareness of triggers, greater perceptions of asthma susceptibility, and fewer misconceptions regarding asthma, suggesting the Healthy Children, Healthy Homes Program was beneficial as an asthma education program.

With a sample of 221 children, or parents of children, ages 2–8 years old diagnosed with asthma, Butz and colleagues (2005) evaluated a home-based asthma educational program that targeted symptom identification using a randomized, controlled trial. Children or parents were randomly enrolled into either a standard education program or a specific symptom/nebulizer education intervention program. Data were collected from home-visit records and self-report questionnaires. Results indicated that home-based asthma symptom/nebulizer education intervention programs proved to be effective in improving symptom identification and medication use in children.

In a randomized trial of 183 elementary school children, the efficacy of an asthma health education intervention that focused mainly on asthma self-management was compared with an attention-control intervention that focused on several general health promotion topics (Horner & Fouladi, 2008). Trained lay health educators performed both interventions. Asthma knowledge and self-management scores increased significantly post-intervention in the asthma intervention group in comparison with the attention-control group (Horner & Fouladi, 2008).

La Roche and colleagues (2006) compared the effectiveness of the Multi-Family Asthma Group

Treatment (MFA GT) program with the standard asthma psychoeducational intervention. A random sample of 24 African American and Hispanic families with children diagnosed with asthma between the ages of 7 years and 13 years were studied. The sample was evaluated using the Asthma Behavioral Assessment Questionnaire. Results suggested that the MFA GT program was more effective in providing education for asthma management and decreased the number of ER visits for asthma exacerbations than the standard asthma psychoeducational program.

Patel and colleagues (2004) evaluated the impact of a multidisciplinary asthma disease management program developed by a large medical group, Advocate Health Centers in Chicago, in collaboration with the Chicago Asthma Consortium, a citywide asthma advocacy organization. The goal was to focus on patient and provider education by utilizing asthma specialist case manager and office-based asthma nurse educators, and insuring the use of written asthma treatment plans. A sample of 1,119 children ages 4–17 years were assessed using the Asthma Therapy Assessment Questionnaire pre- and 1-year post-program. Findings suggested a reduction in hospital services and ER visits related to asthma (Patel et al., 2004).

The effectiveness of an asthma psychoeducational program that incorporated family therapy into asthma education and intervention was evaluated using a parallel group design. The program included an asthma management part intervention and an emotion management part, and included five detailed sessions of intervention and education. The randomized, controlled study included a sample of 37 (20 in intervention, 17 in control) children, ages 7–12 years, diagnosed with stable asthma, and their parents. Children were evaluated using the exhaled nitric oxide test, spirometry, and a self-constructed five-item scale used to measure patient's adjustment to asthma. Results indicated improvement in nitric oxide and patients' adjustment to asthma scores in the intervention group as compared with the control group, indicating that incorporating family therapy into an asthma group intervention was effective (Ng et al., 2008).

Bhogal and colleagues (2006) performed a meta-analysis of four randomized, controlled trials involving 355 children that compared the effectiveness of written asthma plans, symptom and peak flow based, with each other and with no written asthma plan. Findings suggested that children using the symptom-based written asthma plans had lower risk

for exacerbations that required an acute care visit. Also, findings indicated that children and parents preferred symptom monitoring versus peak flow monitoring. However, there was no group difference in the number of overall exacerbations when using either a written asthma plan or no plan at all.

Boyd and colleagues (2009) completed another meta-analysis to determine if asthma education leads to improved health outcomes. The systematic review included 38 randomized, controlled studies involving 7,843 children. The analysis revealed that after providing education to children, parents, or both, there was a reduced risk of ER visits compared with no education. Fewer office sick visits were also noted after implementation of asthma education (Boyd et al., 2009).

CONCEPTUAL MODEL

The goal of evidence-based practice is to deliver quality care and solve clinical problems creatively by combining the most recent evidence, provider expertise, and patient choices in order to institute practice changes and improve outcomes (Melnyk & Fineout-Overholt, 2011). Therefore, using an evidence-based practice model was fitting since the goals of the project were to integrate evidence-based practice into the clinic, promote change with integration, and improve patient outcomes. The model that best supported the project objectives was the ACE Star Model of Knowledge Transformation. It provides a model for understanding the “nature and characteristics of knowledge” and the cycle in which that knowledge may be applied as evidence-based practice (Stevens, 2004, para. 4). It was specifically developed to guide the integration of evidence-based knowledge into practice (Abbott, Dremsa, Stewart, Mark, & Swift, 2006).

Healthcare providers may not practice with the most current evidence, mainly because of the large amount of research routinely published. Knowledge must be transformed from its beginning stage to one that is applicable in healthcare practice. This model depicts how knowledge can flow from discovery to implementation in daily practice. The purpose of the ACE Star Model is to transform knowledge through a series of steps and incorporate that knowledge into practice in order to improve outcomes. Knowledge transformation is compiling research findings and converting them into evidence-based practice to improve patient outcomes (Stevens, 2004). It is described as a “parsimonious depiction of the relationships between various stages of knowledge

transformation” (Stevens, 2004, para. 4). The ACE Star Model uses a five-point star to depict knowledge transformation: (a) knowledge discovery, (b) evidence summary, (c) translation, (d) integration, and (e) evaluation (Stevens, 2004). The first stage, knowledge discovery, is the generation of knowledge and serves as the cornerstone for all other stages. Knowledge is generated from single studies and various designs.

The second stage, evidence summary, takes findings from several related studies and groups the data together to yield more reliable results and identify potential bias. The most common forms of evidence summaries, systematic reviews and meta-analyses, allow researchers to reduce large amounts of available knowledge into a more manageable amount. It also increases power, reduces bias, establishes generalizability across studies, identifies consistencies and potential inconsistencies in the studies, and increases efficiency (Stevens, 2004). The time between research and clinical integration is decreased if the research is grouped together in the early stages.

Knowledge translation presents the knowledge that has been discovered and summarized in a way that is cost- and time-efficient for the provider, and promotes quality care for the patient. Usually, this knowledge translation is in the form of clinical practice guidelines and may be presented as clinical pathways, algorithms, or protocols (Stevens, 2004).

The EPR-3 asthma guidelines are an example of the third stage of the ACE Star Model, knowledge translation. However, these guidelines were not written without careful consideration of research. The first two stages of the ACE Star Model, knowledge discovery and evidence summary, were utilized first to make the best recommendations and were supported by the most current knowledge and clinician expertise. Knowledge that had been discovered, summarized, and translated into the EPR-3 panel asthma guidelines was integrated into practice at the pediatric clinic. Integration included the development and distribution of a new, simple asthma educational brochure. The evaluation stage lasted 2 months. Data were gathered after the education implementation. Measures included the number of office sick visits, ER visits, and hospitalizations related to asthma in October and November 2010. Data from 2010 were compared with baseline data from October and November 2009 to determine if education impacted those measurable outcomes.

Knowledge integration implements knowledge into practice. Examples include changing policies or

protocols, introducing new materials, or adding new education for staff to utilize. The new asthma education brochure, which was developed based on discovered, summarized, and translated knowledge, was provided to mothers of children with asthma during sick or well visits. The nurse practitioner reviewed information in the brochure and allowed time for questions.

The final stage is evaluation. New practice innovations must be evaluated to ensure the changes are improving outcomes and are making a difference for providers and patients. The asthma brochure was provided for 2 months. The charts of patients whose mothers received education were reviewed for a 2-month period post-education to track for office sick visits, ER visits, and hospitalizations related to asthma, and compared with data from the same 2-month period the previous year. This evaluation assessed outcomes of the project.

METHODS

The purpose of this project was to implement asthma education for parents of children with asthma in a southeast Alabama pediatric clinic that used no formal, written asthma education consistently, and to decrease the number of pediatric office sick visits, ER visits, and hospitalizations related to asthma. The study included the development of a simple, educational brochure that highlighted the important facts about asthma, asthma triggers, tips to control triggers, symptom identification, and medication compliance.

Careful review of the current practice in the clinic revealed that the majority of asthma education was taught to parents by the providers orally, and that providers were not consistently providing written asthma education reinforcement to parents. Most written asthma education in the clinic was distributed by pharmaceutical companies and promoted one drug. The written education material that was available in the clinic was well written and informative, but was very long and could be considered complicated by some parents. There were no written asthma education tools used consistently. Therefore, a simple, trifold educational brochure was developed. It was written at an eighth-grade reading level for easy understanding.

Brochure information was compiled from the CDC and the American Academy of Allergy, Asthma, and Immunology web sites, and included a brief overview of asthma, a list of common asthma triggers such as exposure to smoke, mold, and pet dander, and basic

tips to control triggers. Other sections included common signs of an asthma attack and helpful hints for parents to implement to decrease asthma episodes. The physicians and nurse practitioners in the clinic guided the selection of material and approved the brochure prior to integration.

The sample included mothers of 19 pediatric patients 4–12 years old diagnosed with asthma for a minimum of 1 year. All patients had received care in the clinic for a minimum of 1 year. Patients with or without daily control medication were included. To receive the educational brochure, all mothers spoke English as their primary language and were required to be a biologic or adoptive parent. Parents had to be able to read English. Reading ability was assessed by asking the patient or parent to read aloud one sentence from the educational handout.

Approval was obtained from the institutional review board prior to project implementation. To maintain compliance with the Health Insurance Portability and Accountability Act, only patients receiving care from the project nurse practitioner were included. Mothers provided informed consent before they received education using the asthma brochure.

Education was provided by the nurse practitioner over a 2-month period to mothers during sick or well child visits. Each section heading of the brochure was reviewed with the parent. Parents were allowed at least 10 min to review the brochure and were given the opportunity to ask questions. The same section headings were reviewed with all parents for consistency. Patients' asthma action plans were updated and reviewed with mothers during the office visits. The patients whose mothers received the educational brochure were followed in October and November 2010, and the number of office sick visits, ER visits, and hospitalizations related to the children's asthma were calculated. Data were compared with the same patients' number of office sick visits, ER visits, and hospitalizations in October and November 2009. All data were collected from the pediatric office medical record database and chart review, and included the recipient of the education and demographic information, including race, age, and use of control medication. Each patient was assigned a random number that coincided with their chart number. These chart numbers were listed in a registry and used only to find the number of visits in October and November 2009 and 2010. The registry was used only by the nurse practitioner conducting the project and remained in a locked area at all times when not in

use. Only the random number was used in the Excel evaluation tool. No individually identifiable information was included in the spreadsheet. The number of visits from 2009 and 2010 were entered, compared, and discussed as cumulative findings.

RESULTS

Project demographic variables included pediatric patients' age, gender, race, use of daily control medications, and number of office sick visits related to asthma in October and November 2009 and 2010. Children ranged in ages from 4 years old to 12 years old, with the mean age of a child in the sample being 8 years. The standard deviation was 3.46. Among the 19 children with asthma, 10 were male (53%) and nine were female (47%). The sample included Caucasian (32%) and African American (68%) children. Eighty-four percent of the children used daily control medication.

There was no statistically significant difference in the number of office visits before and after education. However, there were positive trends. There were three pre-education office visits related to asthma in October and November 2009 compared with only one office visit post-education. In addition, two parents called the office to report worsening asthma symptoms post-education, and received instructions and medications per telephone consultation rather than office visits. There were no telephone reports of symptoms for the same months in 2009. There were no ER visits or hospitalizations related to asthma in October and November 2009 or 2010. Children seen in ER visits are usually scheduled a follow-up visit with their local physician, and ER records are sent to the office. However, there is no guarantee that all ER visits were reported each year.

DISCUSSION

There was an overall decrease in office visits related to asthma post-education. Although small, there were three visits in 2009 to one visit in 2010. In addition, there were trends noted between office visits and gender. Improvement was noted in females from pre-education to post-education. Females made more pre-education office visits but had no office visits post-education. Interestingly, it was noted that post-education, two parents, both

Caucasian, called to report worsening asthma symptoms first, rather than immediately scheduling a sick appointment. This was important since the education brochure reinforced specific asthma symptoms and the importance of knowing each child's triggers. This trend could possibly be linked to the education brochure and could be an improvement related to the number of asthma sick visits.

The trends reported here support studies that indicate asthma education to parents positively impacts asthma-related outcomes in children (Kielb, Lin, & Hwang, 2007). In this small sample, there was a decrease in asthma-related sick visits post-education. According to evidence-based literature, disparities in asthma care are prevalent among minorities in this country, resulting in higher rates of mortality and morbidity (Cloutier et al., 2008). More research is needed in this particular population to determine if there are positive trends, statistical significance, and support of current literature.

The ACE Star Model promotes integrating into practice the most recent evidence-based knowledge that has been discovered, summarized, and translated, with the purpose of improving clinical outcomes. Evidence-based asthma knowledge had been discovered, summarized, and translated into the EPR-3 asthma guidelines. Important asthma information related to the disease, triggers, and symptoms was compiled in the education brochure and integrated into use at the pediatric clinic. Although the sample was small, there was a decrease in asthma sick visits post-education, and most importantly, there was an increase in the consistency of provision of written asthma education. More research is needed to validate the literature and demonstrate improved outcomes.

LIMITATIONS

The small sample size did not allow for statistically significant testing to show a difference related to the intervention that was implemented. More data could be collected yielding a larger sample with more statistically relevant results. With a larger sample, chi-square or other sophisticated tests would be helpful in determining significance. Another limitation was that a retrospective chart review was used to compare a prospective intervention.

How might this information affect nursing practice?

This was a practice change project. As a result, the brochure continues to be used by providers in the clinic, increasing the consistency of providing written asthma education. In addition, this asthma project may offer areas of opportunity for education with other diagnoses prevalent within this particular clinic. Plans are for the education tool to be translated into Spanish for the clinic Hispanic population. These findings suggest that more consideration regarding education is needed. Perhaps a collaborative approach among the healthcare providers, parents, schools, and community would make an even more positive impact. Studies suggest that increasing asthma awareness and education within communities may result in better outcomes and less acute episodes when compared with education of patients and parents alone (Chen, Chim, Strunk, & Miller, 2007). More research is needed with a larger sample size so that appropriate statistical tests can be used to validate findings. Larger samples can determine significance of findings that can be used to support current literature and further improve outcomes within this clinic, and possibly other communities.

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