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The Effectiveness of Asthma Education Approaches for Children: Group Versus Individual Education

Abeer Alatawi*

School of Health in Social Science, University of Edinburgh, UK

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***Corresponding author :** Abeer Alatawi, School of Health in Social Science, University of Edinburgh, UK

Abstract

Objective: Childhood asthma is a common and potentially life-threatening condition and a leading cause of child admission to acute care and emergency services. The importance of educational methods for children and their parents about appropriate asthma management has been highlighted in many studies, but little is known about the effectiveness of educational methods. This study aims to evaluate the effectiveness of group education intervention on asthma in secondary care settings compared with face-to-face education for children (under 18) and their parents. Specifically, it assesses the number of emergency visits, hospital admissions, school absences, quality of life, mortality and cost to provide best evidence for future clinical research and practice.

Data sources: MEDLINE, CINHAL, PsycINFO, EMBASE, Web of Science, and SCOPUS databases.

Study selections: 15 RCTs identified and their methodological quality assessed using JBI-MAStRI checklist.

Results: 15 of 927 studies included in the final review (with reviewer consensus) indicated a significant reduction in number of emergency visits and hospital admissions among those receiving face-to-face. Two studies highlighted the mean number of school absences; one study measured QoL of asthmatic children and their parents, four calculated the health cost of education and none considered mortality rates.

Conclusion: Face-to-face education significantly reduces asthmatic children's emergency visits and hospital admissions.

Keywords : Asthma; Group Education; Individual Education; Children; Systematic Review

Introduction

Despite several decades of advancement in the control and management of asthma, it remains a common worldwide health and socio-economic problem [1]. Statistically, an estimated 300 million are currently asthmatic globally [2]. Depending on the geographical region, the causes of childhood asthma are attributable to the adoption of Western lifestyle and urbanization [3]; and low rates of diagnosis in places such as Africa, the Indian Subcontinent and the Eastern Mediterranean. There are a number of efforts by way of research to track the dramatic changes in asthma incidences over time and place [4-6]. Across the board, the outcome of these studies is that asthma is particularly pronounced among children and adolescents. Asthma also imposes a significant burden on health related to quality of life (QoL). Asthma symptoms can be strongly linked with increased risk of emergency room (ER) visits, hospitalization, school absenteeism and absence from work. Asthma has a greater impact on the loss of productivity of children and adolescences [7].

It also has psychological impacts on the lives of sufferers, including depression, social withdrawal and increased levels of anxiety [8]. For instance, survey data in the US showed that children with asthma were more likely to experience limitations in their daily activities than other children with chronic illness [8]. In addition, around 136,000 adolescents in the US who experience asthma symptoms miss one or more days of school per month. Further, nearly 158,000 younger children (aged 0-11) are reported to limit their physical activities because of their asthmatic condition [9]. Moreover, data indicated that the parents of a child with asthma usually experience stress and anxiety because of their child's illness [10]. Finally, a survey conducted by the National Asthma Campaign in the UK found that three-quarters of children reported missing school due to their asthma, and that it affected their activities [11]. Childhood asthma therefore has a serious impact on patient's health and QoL.

Patient education has been an important intervention in all fields of nursing for decades, with benefits for both patients and nurses. Education aims to provide suitable information that not only increases patients' knowledge related to their health [12], but also helps them to take a more active role in the care management of their own situation [13,14]. In general, patient education is a process by which health practitioners and others transfer the

necessary information to patients so as to improve their health status or alter the health behaviour [15]. Patient education in asthma self-management has emerged as a therapeutic intervention to help patients to manage and understand asthma, and hopefully to become active, self-efficacious participants in their asthma care [16]. Additionally, through appropriate education, asthmatic patients and their families can acquire the necessary knowledge, skills and confidence as well as engaging in particular behaviour to control or reduce the impact of disease, and collaborate with health care providers in order to be active partners in the treatment [17]. Asthma education therefore assist the patient to manage the disease in terms of improving asthma patients' knowledge, controlling episodes of asthma, preventing acute and chronic complications, improving QoL, and maintaining or improving health behaviours [18,19].

Although there are contradictory findings about the impact of asthma education [20-22] a large body of evidence shows that asthma education has a positive impact on improving patient's knowledge and QoL, lifestyle behaviour and self-care [23], reduced utilization of health resources [24,25] and smoking cessation [26]. An effective asthma education programme improves the knowledge of patients and their families concerning the basics of asthma care, and also enhances their daily lives and enhances their adaption to coping with chronic disease. Even though asthma management activities are widely advocated, research shows that patients still perceive such tasks to be onerous and difficult [27]. On the other hand, even with acknowledged multidisciplinary educational interventions programmes, sometimes their effects on patient's lifestyle and QoL are hard to measure [10]. Many quantitative studies and reviews have been published discussing outcomes of standardized asthma care and asthma education programmes in various settings [28,29]. Children may receive asthma education that can be facilitated at health care centres, in the community, and in the hospital, which can be delivered in an individualized format, small group or formal follow-up. Generally speaking, the formats of asthmatic education programme are changeable, but the objective remains the same - to help people with asthma to effectively deal with their disease. However, there is still no clear effective approach of education intervention in clinical area.

Objective

To analyse the effectiveness of group asthma education compared to individual patient education in reducing emergency department visits.

Method of Study Selection

The author screened the title and abstract of each citation identified through the search strategy to determine possible eligibility for inclusion. The author then obtained the complete article of each citation identified as eligible or possibly eligible. Two reviewers independently assessed each article to determine study eligibility. Disagreement was settled by consensus. Randomized controlled trials (RCTs) were considered in this systematic review. Their content included asthma management, self-monitoring skills, avoidance of triggers, control medications, inhaler use and written action plan. The intervention was delivered either face-to-face or in-group sessions run by nurses for asthmatic children and adolescents (aged 2-18) and their parents. We excluded the studies that did not include asthma as a specific respiratory disease, or any studies that had no participants with pulmonary standard educational interventions (for either individuals or groups), or which did not report on any outcomes of interest.

Educational interventions for asthma are usually organised to be flexible and variable, but the included studies in this systematic review had large discrepancies in terms of duration time and teaching method. For instance, the longest duration time of group education was six hours [30], and the shortest was twenty minutes for individual education [24]. However, another study had an average duration time of 140 minutes [22]. Additionally, different teaching methods were used by studies included in this systematic review, particularly between individual and group education methods. According to [30], educators used handouts and teaching models to deliver individual education, but for group education, they adopted flip charts, patient visits and white boards/posters as preferred teaching methods. Some also used videos [31].

Data Collection and Analysis

Data Sources: A systematic search was made of electronic databases, including MEDLINE, CINHAL, EMBASE, Web of Science, SCOPUS (Elsevier), and Cochrane Database of Systematic Reviews (CDSR). Additional studies were identified through a hand-search of the reference lists and bibliographies of all potential studies. Unpublished articles were also searched for by scanning abstracts of electronic thesis and conference papers. Finally, consultation was made with experts to identify articles pending publication [32].

Data Extraction and Management: This systematic review undertook a meta-analysis, and extracted data was then entered into the Cochrane Collaboration Software Review Manager (Revman5.1) in order to determine the effectiveness of the intervention. Heterogeneity between combined studies was assessed using standard Chi-square. Subgroups were also analysed. Where statistical pooling was inappropriate, findings were explained in narrative form [14].

Assessment of Methodological Quality: The JBI-MAStARI critical appraisal tool for randomised controlled trials/ pseudo randomised trials was used to assess the methodological quality of studies using 10 questions answerable by "yes", "no" or "unclear". A total score of more than five "yes" responses indicates high quality, and a score below this indicates poor quality design. Two independent reviewers assessed the selected studies for methodological validity prior to inclusion criteria for this review. Generally, the quality of the included studies was high, with a quality score of 7 for five studies, a moderate quality score of 6 for three studies, and a score of 5 for other studies. Studies were assessed for selection bias by determining whether selection was truly random. Performance bias was understood as systematic differences between groups in the care provided, or exposure to factors other than the interventions of interest. Attrition bias was reduced when the outcomes of withdrawn participants were

described and included in the analysis. Detection bias was reduced when the assessment of the outcomes was blinded, and groups were treated identically except for the named intervention, and outcomes are measured in the same way for all groups [33]. Overall, the majority of studies included were at moderate risk of bias.

Results

Results of the Search: The databases yielded 927 primary studies, of which 507 were not relevant, while 420 were identified as being potentially relevant. From the 420 studies, 356 were excluded because they did not report on continuous asthma educational as an intervention. Thus, 64 studies were reviewed. A total of 42 studies were consequently excluded because they did not address the research question after a close reading of the full text, leaving 20 studies. Following review, 20 studies were assessed for their quality, and 5 were subsequently excluded, as they did not meet inclusion criteria. Thus, a final selection of 15 studies was included.

Included Studies: Out of the 15 included trials, two were group education intervention RCTs and thirteen were individual asthma education RCTs. The results suggested that children who received face-to-face education programme are significantly less likely to require emergency care. Notably, more than half of the individual intervention studies considered the number of emergency department visits essential in evaluating the educational intervention. In all 15 included trials, asthma education was an aspect of the care provided by healthcare professionals. In this review, individual education when compared with group education did have a significant impact on reducing the emergency attendance for asthmatic children and their parents. Thirteen studies included in this review were individual studies. One of these studies [22] found that individual education is better than group-based in improving asthma-related QoL. However, two included studies stated that group education outperformed individual education. Group education is also thought to be less costly than individual education [30].

However, [31] examined individual and group approaches. They found that patients in both settings (individual- and group-based) were equal, and neither exhibited any significant improvement in QoL. Tow studies found that both educational programmes (individual- and group-based) have a significant impact in reducing the number of emergency department visits [30,31]. The unique finding of [31] is that group and individual education are equally effective when using a consistent curriculum systematically delivered over a defined time frame. A study affirmed that each type of asthma education helps improve patient outcomes [24]. Self-management practices were the only dimension in which group-based learning was found to lead to slightly better self-care outcomes than individual-based. However, the literature review found that group-based asthmatic education programmes do not meet the personal requirements of the patients [34].

Such learning was found to be beneficial when there were issues of time limitations and need for diverse learning [35]. This review found that the group-based RCTs relied mainly on data of emergency visits and hospital admission. Now these are largely quantity-based information which does not provide a further insight to patient's lifestyle or their capability to manage the asthmatic condition. Such information could be helpful to find out the rate of asthmatic patient attendance in the hospital. These studies could be helpful in providing a foundation for qualitative studies targeting patient's lifestyle, knowledge and cost of healthcare, therefore it can be safely concluded that individual education programmes are more effective in measuring QoL and cost outcomes than group-based programmes. One recommendation which arises from this is that individual education should be considered in the cases where the paediatric patients' daily lifestyles and psychological well-being is significantly affected due to the asthmatic episodes. Similarly, those hospitals incurring greater costs of continual care for asthmatic patients should consider promoting public health of the asthmatic children on the basis of one-on-one education programmes. The results of this review include the following outcomes.

Outcomes

The Number of Emergency Department Visits

One of the outcomes of this review is that attendance in the emergency department is an important indicator of poor management of asthmatic condition [36]. In the 15 included RCTs, which comprised two group education and 13 individual asthma education interventions, both group and individual formats used similar tools of measuring, such as medical records/ charts to ascertain attendance in emergency department, to evaluate the effectiveness of the asthma education programme. The included study results suggest that children who received face-to-face education programme are significantly less likely to require emergency care. Notably, more than half of the individual intervention studies considered the number of emergency department visits a key indicator in evaluating the success of educational intervention.

It is argued that asthma education in general reduced the number of emergency department visits [36]. In all 15 included trials, asthma education was an aspect of the care provided by healthcare professionals. However, a recent review of asthma management in this age group omitted the importance of such approaches or vaguely recognised the need to provide education to patients and their parents, without justifying the benefits of individualised versus group-based approaches [37]. This systematic review and meta-analysis provides validity for a meta-analysis conducted by [36], which concluded that paediatric asthma education interventions reduced the number of hospitalisations and emergency department visits due to asthma. The author' conclusions seem appropriate, but are only generalizable for low-income children in the US. Because of the lack of a quality assessment, the reliability of the evidence cannot be verified and applied in different countries. In addition, they did not determine the type and amount of asthma education to offer, and who should receive it.

Hospital Admission

Hospital admission is another indicator of evaluating the

outcome for asthmatic education programme. However, none of the previous systematic reviews featured RCTs about asthma education specifically in hospital settings in order to evaluate the hospital admissions after educational interventions. One recent systematic review by [38] found inconsistent evidence for home-based asthma educational interventions compared to standard care, education delivered outside of the home or a less intensive educational intervention delivered at home. All included studies indicated that there was a statistically significant reduction in hospital admissions for asthmatic children. Out of the 15 included RCTs, 11 used hospital admission data as the measurement tool to assess the effectiveness of their intervention programme. It is interesting to note that one of the group-based studies and 8 out of 13 individual studies in this review used these measurement tools. The results for hospital admission are similar to the data on emergency visits, implying that group-based education programmes are more effective in evaluating the outcome of their studies through data based on emergency visits and hospital admission. The results for individual-based programmes are robust, but one-on-one education intervention studies do not reflect a similarly strong prevalence of these measurement tools as compared to group-based intervention methods.

School Absence

Some of the included studies in this review identified that school absence is an important indicator of the functional severity of the asthmatic child. It is important to note that few RCTs identified the number of school absences in their studies. However, it was found that data on number of days missed at school is a factor in QoL evaluation for asthmatic patients [39]. In this review, the study found only one individual-based study [40], which directly emphasised collecting data on school absence. The findings of this review on school absence evaluation indicate that individual studies are more inclined to collect data on the number of school days missed as compared to the group-based education intervention. It is also significant to note that no systematic review indicated school absences as an outcome in their studies, which needs to be considered in future research.

Quality of Life

QoL is an important secondary indicator of clinical outcomes of asthmatic education provided to patients [41]. Very few studies contributed data to this outcome, and interpreting this apparent lack of findings is problematic [39]. One of the 15 RCTs undertook measures to evaluate patient QoL after the end of the education programme based on individual one-to-one asthma education [22]. This study utilised questionnaire form of collecting data in order to analyse the manner in which asthmatic conditions were disrupting daily activities, including attending school. This leads to an inference that individual programmes are more effective in evaluating the outcomes in psychological terms when compared to group-based programmes. However, it leads to further questions such as whether evaluating the QoL of the patient after the intervention is more conducive when the intervention is face-to-face. Similarly, in a group education programme, what factors provide a barrier to measuring QoL of the paediatric patients or patient's parents following intervention? Most of the studies that evaluated QoL were undertaken in community settings. A systematic review by [42] stated that there remains uncertainty as to the long-term affect of education on other markers of asthma morbidity such as QoL, symptoms and lung function.

Mortality

Mortality is the measure of the number of deaths (usually per 1000 persons) in a population due to an illness [2]. It was found that this factor provides an essential indicator to examine the effectiveness of the education intervention programme [2], and it is also observed that the mortality rate of asthmatic children in hospitals is between 0.4-12%. Patients die outside the hospital, usually as a result of respiratory failure, and many of such deaths have been reported concerning patients who received inadequate treatment or poor education. However, asthmatic paediatric patients admitted to ICU often die from infection (sepsis). After the review, no RCTs investigated the mortality rate for asthmatic children using face-to-face or group education. However, one study in home settings indicated the number of deaths for asthmatic children in the home [43]. It is arguable that with the incorporation of individual or group-based approach, demonstration of asthma mortality rate in hospital would determine the effectiveness of educational methods. Nevertheless, RCTs are needed to help make a valid inference.

Cost

The purpose of the asthmatic education programme is to reduce the asthmatic burden, including cost. Further, we realised that cost of care for the asthmatic patient is a direct indicator of the success of the education programme in educating the patient and their caregivers/parents about management of the condition, prevention of the trigger factors and medication. Therefore, a comprehensive education programme would endeavour to include the estimation of cost while measuring the outcome of the intervention. The study aimed to find out whether the selected RCTs utilised this important indicator in evaluating their intervention programmes. Experts who have reviewed the cost-effectiveness of asthma education programs identify the need for the use of standardized approaches to study design and cost-benefit analysis [44-45]. Evidence of the cost-effectiveness of individual education compared to group education is imprecise and prevents meta-analysis of this outcome, in confirmation of [44] (conclusion that although some studies may have been conducted looking at costs and cost effectiveness, the author failed to provide data on the conclusions for those who do have data, thus the findings cannot be used in meta-analysis [45].

Less than a third (n=4) of the RCTs used cost as an outcome measure to assess the effectiveness of education programme. Similar to the findings of measuring QoL, three individual RCTs and one group RCT included measurement of the outcome of the education programme by examining hospital records for incurred costs of care for asthmatic patients. The included studies, which extracted data on asthmatic costs, were [23,26,31,46] all of them utilised hospital archives as the measurement tool. Similar to the findings on QoL, the results favour face-to-face education programmes over group

education programmes. The possible reason behind this could be the clarity of decisive figures that could be obtained to estimate healthcare expenditure for individual patients.

Conclusion

Evidence from this systematic review of clinical trials supports the conclusion that face-to-face education is a more frequently deployed in developed countries for educating asthmatic children. This approach helps in early recognition of poor asthma control. Thus nurses, who latently play a vital role in educating asthmatic patients and their families in acute asthma due to their front-line role, should instate appropriate formal methods of asthma education in asthma care and be able to identify effective approaches to improve health outcomes. Despite the paucity of studies on asthma education with particular regard to hospital settings, the findings are impressive; instituting face-to-face education in asthma care reduced health care utilisation (exhibited in substantial savings for hospitals in terms of provision of direct care and financially) and improved healthcare outcomes for asthmatic children and their parents. This implies that face-to-face education in acute asthma care is the best deployment of education for asthmatic children, and as well as being the most cost-effective method for health organisations. However, the optimum intensity of individual education was not ascertained.

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