



**REVIEW: PEDIATRIC ASTHMA BURDEN & MANAGEMENT**

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**ABSTRACT**

The diagnosis and management of asthma in young children is difficult, since there are many different wheezy phenotypes with varying underlying aetiologies and outcomes. Helpful asthma management approaches are presented to assist the clinician during the treatment. Different guidelines are provided that have useful information for clinicians assessing asthmatic children with recurrent wheezy illnesses. However, there are differences in classification of the disease and treatment protocols. This review discusses the burden of the asthma disease, approaches of asthma management for children, asthma education, asthma self-management and asthma action plans (AAPS), Nursing care in childhood asthma management, the relationship of the literature to the Saudi context. Consistent review of the need for on-going treatment with a particular pharmacological modality is essential, since many children with recurrent wheezing in infancy go into spontaneous remission. It is probable that newer biomarkers of airway inflammation will assist the clinician as to when to initiate and when to continue pharmacological treatment in the future.

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**INTRODUCTION**

Asthma is considered one of the highest-incidence disorders in the world and is becoming more common in both adults and children, with about 300 million people worldwide suffering from it now and 400 million expected to suffer from it in 20 years' time (Gillman & Douglass, 2012). More than 25 million Americans have asthma. This is 7.7 percent of adults and 8.4 percent of children (Asthma and Allergy Foundation of America ). In KSA, the prevalence of asthma in general ranges between 4- 23%. The prevalence of asthma in Riyadh was 10% while in Asser it was 13% (Al Ghobain *et al.*, 2018). The total number of primary health care centre visitors in Saudi Arabia during 2004 was 911,999, of whom 183,718 were aged 5 to14, and 456,551 were aged 15 to 44 (Ministry of Health,2014). Most people who are hospitalized because of asthma are children, or those aged 65 and over (Gillman & Douglass , 2012).This article provides an overview of asthma and reviewed the relevant literature pertaining to paediatric asthma management internationally and in Saudi Arabia. Specifically, areas such as asthma management for children, asthma education, and the role as well as the significance of nurses in the management of childhood asthma were highlighted and its relationship to the Saudi context.

**Asthma management for children**

Paediatric asthma management programs have been used since

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the 1980s for child patients and their parents in order to enhance self-management of the condition. There remains a great deal of interest in refining these interventions to optimise clinical outcomes (Szczepanski *et al.*, 2010). Asthma is not a curable disease; therefore, management strategies are geared towards controlling the disease to reduce the associated morbidity and mortality (GINA, 2016; BTS, 2016).

The purpose of asthma management is to enable patients to improve their knowledge and skills to manage the disease and their daily lives (Labre *et al.*, 2012). Typically, an asthma programme, such as asthma self-management, often involves informing asthmatic patients of certain facts that might or might not be tailored to their individual context (Labre *et al.*, 2012).

Asthma guidelines have been developed to assist health care providers in clinical practice to provide quality asthma care. There are asthma guidelines that address the management of asthma in children that first appeared in the late 1980s (SIGN/BTS, 1989; Woolcock *et al.*, 1989; NHLBI, 1991). The first international guidelines were formulated by the National Heart, Lung, and Blood Institute (NHLBI) in the USA in 1991; the recommendations of the expert panel provided guidelines for asthma management, which were updated in 2008 (NIH Expert Panel Report, 1991). Most recently, GINA (2016) published new evidence for asthma diagnosis and management for children under five-years old.

As mentioned earlier, although asthma is a chronic condition that cannot be cured, it can be controlled with proper diagnosis, education, and management (GINA, 2016).

Therefore, new guidelines for asthma diagnosis and treatment were developed by the asthma experts to help doctors treat asthma more effectively and remain current (NHLBI, 2007). However, two cross-sectional studies conducted to assess the adherence to guidelines amongst health care providers showed such adherence is limited (Yeatts *et al.*, 2003; Bhogal *et al.*, 2010). Doctors' non-adherence can be observed in their inadequate assessment of asthma severity and consequently inadequate treatment, in addition to an increase in hospital admissions and ER attendance (Yeatts *et al.*, 2003; Bhogal *et al.*, 2010). These and other studies illustrate that poor adherence to asthma management guideline recommendations is common and long-standing (Haltermann *et al.*, 2002; Wolfenden *et al.*, 2003; Schmittiel, 2004; Osarogiagbon, Nwaneri & Oviawe, 2010).

It is suggested that existing management strategies in asthma care need to develop more standardized approaches of treatment. Differences in healthcare systems, standards of living, and access to care prevent any easy global solution to the problem. Despite its grave nature and high prevalence, asthma is not a healthcare priority for many nations, although a significant proportion of their populations suffer from the illness (Masoli *et al.*, 2004). In Africa, for example, most governments concentrate their healthcare efforts on insanitary housing and HIV/AIDS treatment and prevention; many governments lack the resources to tackle crisis conditions, *let alone* asthma (Masoli *et al.*, 2004). On the other hand, in the US there are several options available for improving asthma control. Healthy People 2010 is a national initiative to improve overall health, which identified asthma as a significant respiratory illness and established goals for better management of the disease (US Department of Health and Human Services, 2010). Diagnosing, treating and controlling asthma remain challenges for doctors and health care authorities at national and international levels (Yeatts *et al.*, 2003).

Inaccurate assessment of asthma severity by doctors may lead to inappropriate management (Magnoni *et al.*, 2017). In terms of assessing patients with asthma, it is important to have a detailed history of the child, particularly regarding any family history of asthma, hospitalization and previous emergency visits, Intensive Care Unit (ICU) admissions, intubation, and co-morbidities, which are pivotal for effective assessment of the patient (GINA, 2016). The patients are also required to indicate whether they are experiencing the symptoms associated with this disease, which include shortness of breath, coughing and wheezing, a tight chest, or a combination of any of these (NAEPP, 2017).

Management goals for children with asthma tend to be consistent between the different guidelines, but longstanding variations in asthma management practices between countries have been reported (Braido, 2013). Variations in the quality of general practice show that in the lowest performing practices only around a quarter of patients report being able to see their preferred doctor, and only 11 per cent of patients report that they have been told they have a care plan (The King's Fund, 2011).

Moreover, limited research on asthma care has indicated variations in medical care delivery, including nursing care,

which is likely to adversely affect patient outcomes as inconsistent care reflects poor adherence to guidelines (Yeatts *et al.*, 2003; Bhogal *et al.*, 2010). In addition, practice has been shown to vary between doctors (Yeatts *et al.*, 2003; Bhogal *et al.*, 2010). Some cross-sectional studies have been carried out in different countries to audit the treatment of asthma in tertiary institutions as well as to determine doctors' compliance with asthma guidelines and protocols (Okoromah *et al.*, 2006; Ayuk *et al.*, 2010). A number of issues related to health care providers include nurses and doctors, patients, primary health care facilities, and lack of resources, have been recognized as probable challenges to effective guideline adherence in primary health care management (Osarogiagbon, Nwaneri & Oviawe, 2013).

Effective management of asthma requires not only improving guideline-based therapeutic interventions, but also addressing socio-environmental risk factors (Lara *et al.*, 2002). Only a few existing quantitative studies have focused on asthmatic children and adolescents in terms of asthma education, which is central to the psychological, social and behavioural aspects of care (Bush & Saglani, 2010). Those studies reported improved lung function, fewer days with restricted activity, and an increased feeling of self-control as outcomes of educational interventions (Guevara *et al.*, 2003; Wolf *et al.*, 2008). However, no studies have determined the nursing role and factors currently influencing asthma management in developing countries such as Saudi Arabia, in particular, to support internationally endorsed standards of bronchial asthma care.

Although asthma may affect individuals at any age of their lives, this chronic disease has different diagnostic issues due to certain age-specific characteristics. The lack of consensus among different guidelines can be a major challenge to health professionals such as nurses and doctors when adopting particular practices, and it is not practical for busy health teams to follow complex guidelines, as shown in a review by Potter (2010). Therefore, no specific test has been conducted that can confirm a diagnosis of asthma; symptoms and the results of diagnostic tests are the primary indicators that the patient is suffering from the respiratory disorder. However, the Peak Expiratory Flow (PEF, "peak flow") test for lung activities or Forced Expiratory Volume in the first second (FEV<sub>1</sub>) can identify the presence of asthma. In asthma patients, lung function characteristically changes every day, often being worse first thing in the morning and at night. However, very young children may be unable to perform the appropriate diagnostic manoeuvres, and even in older children, lung function may not necessarily be altered at the time of testing.

Proper asthma management results in improved health outcomes for asthmatic children, leading to decreased school absenteeism, decreased economic costs, and improved QoL (NHLBI, 2016). According to GINA (2010), inhaled corticosteroid therapy continues to be the preferred treatment for persistent asthma. Treating childhood asthma involves both preventing symptoms and treating asthma attacks in progress. Most children with persistent asthma use a combination of long-term control medication and quick-relief medication, taken with a hand-held inhaler. Long-term control medications reduce the inflammation in a child's airways that

fundamentally cause the manifestation of symptoms, whereas quick-relief medications such as bronchodilators and Ipratropium (Atrovent) rapidly open swollen airways that are limiting breathing during acute symptoms (i.e. during an asthma attack).

Proper management requires multiple components addressing various aspects of this disease, such as assessing and monitoring asthma severity, education, supporting a partnership in asthma care, control of trigger factors, and pharmacologic therapy (NHLBI, 2016). Recent randomised control trials (RCTs) have indicated that coordinated asthma care, asthma education and consistent clinical practices decrease the severity of asthma and reduce the utilization of ER visits and the number of hospitalizations (Kamps *et al.*, 2004; Seid, 2008; Kuethe *et al.*, 2011). For instance, the incorporation of a single component such as education into an asthma program is not enough to manage this disease; it is also important that children, with the support of their families, adhere to their medication schedule. Therefore, other recent advances in asthma management are needed to understand childhood asthma as a chronic disease.

### **Asthma education**

Patient knowledge plays a major role in asthma treatment and control and has a great effect. However, asthma management also fundamentally depends on the health care facilities, availability of experienced doctors, confidence, education level and tools used patients' behavioural changes, and adherence to management components. Patient education has been an important intervention in all fields of nursing for decades, and it benefits both patients and nurses. In general, patient education is a process by which health practitioners and others transfer the necessary information to patients to improve their health status or alter their health behaviour (Kongstvedt, 2013). Additionally, paediatric asthma nurses' interventions in patient education is key and clearly vital. Encouragement in implementing clear guidelines to manage a chronic disease like asthma is greatly needed to obtain the best results and to enhance the management and control of the disease (Bacharier *et al.*, 2004; Watts, 2009) and it could be stated that nurses have a key role in enhancing patient education, particularly among children with asthma and their parents.

Additionally, through appropriate education, children with asthma and their families can acquire the necessary knowledge, skills and confidence as well as engaging in particular behaviours to control or reduce the impact of the disease, and collaborate with health care providers in order to be an active partner in the treatment (Adams *et al.*, 2004). Other quantitative studies have shown that asthma education can help children and parents to manage the disease in terms of improving their knowledge, controlling episodes of asthma, preventing acute and chronic complications, improving QoL, and maintaining or improving health behaviours (Boulet *et al.*, 2012; Labre *et al.*, 2012).

Randomise Control Trails (RCT) studies on partnerships in asthma care have aimed to identify an effective approach to asthma education and coaching for children and their caregivers (Watson *et al.*, 2009; Swerczek *et al.*, 2013). Watson *et al.* (2009) directed an education programme to the

parents of children aged 3-6, both parents and children for the 7-11 age group and children (without parents) aged 12-16. Each program, led by a nurse educator and a respiratory therapist team, consisted of a group of 6-8 participating families, addressing different asthma management topics, such as medication and triggers. This programme provided parents and children with an opportunity to discuss asthma management, as well as to share their own successes and failures. Fewer Emergency Department (ED) visits were reported, with a 38% reduced likelihood of requiring emergency care, and significant improvements in QoL were reported as a result of the intervention (Watson *et al.*, 2009). Numerous researchers have highlighted the vital role that family dynamics play in the management of chronic illnesses (Hardwick & Bigg, 1997; Barakat & Kazak, 1999; Tieffenberg *et al.*, 2000).

Educational support is often incorporated in asthma management programmes and involves teaching children self-management skills as well as increasing the number of educational opportunities in clinics and schools (NHLBI, 2007). An important aspect of this component is supporting the collaboration between children and their adult caretakers (Alatawi, 2017).

One study evaluated the concerns of 49 General Practitioners (GPs) divided into six groups, from urban and rural areas, regarding the achievement of optimal outcomes in asthma patients and the care delivery challenges they faced (Gibson, 2000). It was reported that education for both patients and professionals such as nurses and doctors was the major priority of all groups. Worldwide, health services may be inadequate in some areas due to the lack of facilities and/or capable health care staff, as shown in assessment surveys (Halterman *et al.*, 2002; Levy, 2016; Stoloff & Boushey, 2006). For example, a cross-sectional survey by Diette *et al.* (2001a) revealed that of 6,672 patients and parents observed in New York, 78% recognized the primary symptoms of asthma, whereas 87% had knowledge of controlling asthma exacerbation. Furthermore, 89% were well provided with accurate guidelines and information by their health care providers. In addition, 80% were handed written leaflets and action plans, and they were very aware about inhaler and peak flow meter (PFM) use (Diette *et al.*, 2001a).

Generally, there is a strong relationship between education and communication in this context, and management conformity could be similar. A qualitative study by Kelo, Martikainen and Eriksson (2013) described the patient education sessions and to explore nurses' empowering and traditional behaviour in the patient education process of children and their families. In the most recent cross-sectional study in Saudi Arabia, a significant effect of asthma education about medication use was reported. Al-Muhsen *et al.* (2015) reported that most patients had poor knowledge about asthma and were using medications improperly, thus suggesting the inefficient application of the management action plan. Unnecessary and frequent visits to the ED for asthma care were associated with poor education about asthma and medication use.

A recent cross-sectional study by Wu *et al.* (2016) revealed a mismatch between parents and providers in how to use

controller medications, such as inhaled steroids. It is recommended that more efforts should be focused on education regarding controller medication use. A number of quantitative studies suggested that paediatric nursing practitioners focus on education quality, which considered a vital instrument for asthma management and control and plays a major role (McQuaid *et al.*, 2003; Butz *et al.*, 2009; Dales *et al.*, 2008). However, a lack of education, knowledge, control and management of the disease and device use have been identified as barriers among asthma patients (McQuaid *et al.*, 2003; Butz *et al.*, 2009; Dales *et al.*, 2008).

The above analysis suggests that there have been many studies conducted among children with asthma and their parents, which have demonstrated the vital importance of educating children and their caregivers. However, asthma management among children in particular has been found to be variable not only in the Middle East or Saudi Arabia specifically, but globally too. This seems to have implications on nursing practice with regard to effective paediatric asthma management, as they are likely to be providing asthma care in a way that may not be consistent with guidelines. Furthermore, there is a lack of nursing asthma research on which future practice could be recommended. This may suggest that there is a wide scope of and a huge potential for nurses in paediatric asthma management.

#### ***Asthma self-management and asthma action plans (AAPs)***

Self-management for children has long been recognised as a key component of national and international asthma management guidelines and it is recommended for both patient education and regular medical review (BTS, 1989; NHLNI, 1991; GINA, 1995). An observational cohort study by Bracken *et al.* (2009) identified the importance of nurse-led asthma self-management in home visits for monitoring children with asthma. Nurse-led assessment can help identify potentially modifiable factors, such as medication issues, including adherence, psychosocial factors, and smoking for poorly controlled symptoms in children with asthma. Effective self-management and treatment compliance is important in achieving good symptom control in asthma. Diagnosing, treating and controlling asthma are still challenges for doctors and health care authorities at national and international levels, as illustrated in a survey by Yeatts *et al.* (2003). A number of controlled trials have been conducted to identify the effectiveness of asthma education and self-management programmes (Zarei, Valizadeh & Bilan, 2013). An RCT showed that effective self-management and an action plan is important in achieving good symptom control in asthma (Gibson *et al.*, 2002).

Similarly, a new survey by Tan *et al.* (2013) highlighted an integrated approach to asthma care focusing on the importance of education and action plans. It shows how education with an action plan can improve asthma management and reduce admissions amongst children. In addition, the results of this study show that AAPs enhanced caregivers' understanding of the disease and increased their symptom recognition and use of appropriate asthma medications for their children with asthma; 97% of parents reported improved confidence in managing asthma and found the education and action plan helpful. A

systematic study conducted to understand how best to promote the sustained use of AAPs recommended that professionals such as nurses and doctors need to develop a more patient-centred, partnership-based approach to the joint development and review of action plans, recognising the experiential asthma knowledge of patients/carers (Ring *et al.*, 2011). The role of nurses here in developing AAPs could be of vital importance, as they can make a significant contribution to paediatric asthma management.

Even though AAPs have been the recommended guideline for years, they have been consistently under-issued by health professionals and under-utilised by patients. Previous studies have explored sub-optimal AAP implementation, but more insight is needed into barriers to their use from the perspective of professionals, patients and primary care teams. A new qualitative study highlighted how professionals infrequently review/update personal asthma action plans (PAAPs) with patients; however, patients with out-dated PAAPs do not value or use these, and professionals observing patients' lack of interest in PAAPs do not discuss them. In addition, patients observing this do not refer to their plans and perceive them to be of little value in asthma self-management (Ring *et al.*, 2015).

Several self-management programs have been developed in order to enhance the self-efficacy of child patients in asthma care. Successful self-management of asthma conditions requires sufficient knowledge of the condition and its treatment, performance of condition management activities and application of the necessary skills to maintain adequate psychosocial functioning; these programs ironically often imply large expenditures of staff time and operational challenges in the short term (Homer *et al.*, 2000). It was found in many quantitative studies that AAPs were one of the less frequently covered areas in asthma management and education, but others have found that AAPs improve communication between health professionals and families (Erikson *et al.*, 2006; Polisena *et al.*, 2007; Braganza & Sharif, 2010). An RCT found that AAPs based on peak flow readings have been shown to improve asthma outcomes (Burkhart *et al.*, 2007). Although clear evidence exists in randomised trials that AAPs improve asthma outcomes, one Cochrane review stated that the trials were small, the results were few and inconsistent, and no firm conclusion could be made regarding the benefits of AAPs in producing the reported outcomes (Toelle & Ram, 2004). However, AAPs are still promoted and embedded in guidelines.

#### ***Nursing care in childhood asthma management***

In recent decades, the management of patients with chronic illnesses such as asthma has become multidisciplinary across the world. Since the mid-1990s, a number of studies have been carried out in healthcare settings to examine the impact of nurse-led programs on patients' outcomes (Kamps, 2004; Kuethe, 2011). A range of healthcare professionals such as doctors, nurses, psychologists, occupational therapists and nutritionists, now carries out essential elements of respiratory patient management. Although much of the care that asthmatic patients receive in primary, secondary and tertiary health care settings is provided by non-specialised nurses, patients in

many countries like the UK and US are seen and managed by asthma nurse specialists. Asthma nurses are engaged in the holistic care of patients with lung diseases, with the aim of maintaining the highest nursing standards, while working in collaboration with other members of a healthcare team and with patients and parents. The nursing role has emerged in asthma care over the last 15 years, and it has been particularly advanced in developed countries.

At the turn of the 20<sup>th</sup> century, Mrs Bedford Fenwick, a nurse, started a movement for nurse registration (Abel-Smith, 1960). The establishment of formal training and the move towards the registration of nurses led to nurse training and education becoming standardised. As the 20<sup>th</sup> century progressed, an increasing proportion of nurses' work was carried out in hospitals where "specialised out-patient departments" allowed nurses to focus on, or specialise in, a particular area of nursing (Abel-Smith, 1960). The actual term 'specialism' in nursing began with Peplau in the 1940s, though the role had existed de facto for many years by then (Peplau, 1965). Specialization in nursing has emerged by nurses developing knowledge and skills in an area through the job process involving work experience, hospital-based training programs and continuing education (Hamric, 2005).

Specialist nurses work in various settings (inpatient and outpatient hospital departments and patients' homes) and, in addition to providing patient care, they are often involved in preventive programmes, notably smoking cessation and patient education (Hamric, 2002). The nurse specialist role has existed in the UK in a discernible and distinctive form since the early 1990s, yet there is still widespread confusion about titles, professional backgrounds, educational requirements, and the extent to which such roles deserve public protection and funding. The NMC (2011) has standards for specialist education and practice enabling a nurse to record qualifications on the NMC register in specialties such as child health nursing. Asthma nurses have an important role in health education, the enhancement of patient self-management, and the management of care. The nursing role and the challenges faced by such nurses have been well described in the literature (Groom, Neary & Wellbeloved, 2001; Coombs & Dillon, 2002), and the current empirical focus is on the evaluation of these nurses to demonstrate the impact on patient and service outcomes (Ball, Kirby & Williams, 2003; Leary & Ridley, 2003). For more than 20 years, the British Thoracic Society (BTS) has recommended that asthma nurse specialists should be attached to all respiratory medicine departments to act as a link between the hospital and the community (Coombs, Chaboyer & Sole, 2007). A systemic review highlighted the success of discharge interventions to reduce paediatric readmission and ED, including a specialized individual with knowledge of the condition, who assumed responsibility for the patient to provide support to the family following discharge (Auger, 2013).

Several studies have examined the role of asthma nurse specialists. It has been shown that they are effective in guiding self-management in asthma patients and in coordinating an integrated care pathway focusing on identification, early intervention and management. For example, a study by Kells *et al.* (2013) showed how the nurse-led educational component

of paediatric hospitalizations includes teaching parents how to keep their children healthy. However, more attention needs to be focused on environmental health as a critical element for the child and parent (Kells *et al.*, 2013). Another study determined the effect of a nurse-initiated asthma management protocol expedited initiation of medications essential for the relief of symptoms of acute asthma in EDs (Qazi *et al.*, 2009). Nurse-initiated care protocols have been found to be beneficial in improving acute asthma care for children aged 1 to 12 years in crowded EDs (Qazi *et al.*, 2010). In addition, a study by Zemek *et al.* (2012) assessed the effectiveness of nurse-initiated administration of oral corticosteroids before doctor assessment for patients with acute asthma exacerbations in paediatric EDs. The results showed that nurse-initiated care protocol for children improved earlier compared to doctor-initiated care children and needed less time to achieve clinical improvement and discharge, with reduced admission rates in children presenting with moderate to severe acute asthma exacerbations (Zemek *et al.*, 2012).

Although mortality rates from asthma internationally have fallen over the years, there have also been other changes that have affected outcomes in asthma. It is difficult to distinguish between the impacts of different factors, but it is advisable that asthma management activities should be planned as an integral part of hospital care and not just opportunistic (GINA, 2016). Achieving this not only requires clear standards to guide the overall organisation of hospitals towards supporting and promoting health promotion activities, but recognition that health promotion (including education) is central to the work of healthcare personnel (Whitehead & Irvine, 2010). In other words, asthma management must be viewed as an important and legitimate role for clinicians, including nurses, and not as a peripheral extra to the standard nursing services required by child asthmatic patients, such as the assessment and administration of nebulizer treatments and the use of inhalers and peak flow meters (Whitehead, 2010).

A recent meta-analysis highlighted the effectiveness of nurse-led programmes for patients with chronic disease and has particularly shown the effects on health-related QoL (Chen *et al.*, 2016). A study by Welsh, Hasan and Li (2011) indicated that children with asthma and their families participating in a self-management program led by a nurse experienced fewer asthma attacks, reduced school absenteeism and fewer ER visits.

It is clear that nurses have the potential to improve the health of asthmatic patients by placing emphasis upon the promotion of health and the control of illness within their clinical practice (Welsh, Hasan & Li, 2011). It is also suggested that implementation of nursing best practice guidelines can result in improved practice and patient outcomes across diverse settings, yet many indicators remained unchanged (Davies, Edwards & Virani, 2008).

Despite a lack of awareness of the impact of health providers' perceptions of asthma management and health care delivery on clinical outcomes, nurse-managed programmes have been shown to significantly reduce total medical costs for chronic diseases such as asthma (Kamps *et al.*, 2004; Gibson, 2009; Nathan, 2006; Wolf *et al.*, 2008; Kuethe *et al.*, 2013).

According to GINA (2016), effective asthma management should involve the good use of medication; asthma self-management education, including inhaler technique assessment; written asthma plans; self-monitoring of symptoms; and regular medical reviews. Nurse-led management is also comparable to management by a paediatrician in achieving disease stability and QoL by reducing the number of emergency room visits and hospital admissions and the costs of outpatient follow-up (Parab *et al.*, 2013).

Nevertheless, most educational interventions, including self-management and self-monitoring by specialised nurses in asthma, are already widely implemented in many (but not all) general practices and hospitals in developed countries and have been proven to be effective for over two decades (Nathan *et al.*, 2006; Wolf, 2008; Gibson, 2009). Moreover, from a health economic perspective, the delegation of this workload from doctors to specialised nurses may lead to financial savings. For instance, in Sweden, the asthma nurse practitioner is responsible for organizing and delivering asthma care to local populations in primary health care centres in a cost-efficient manner (Lindberg *et al.*, 2002).

The increasing number of children with asthma emphasises the importance of the increasing need for adequate asthma management in general and hospital practice. Lack of sufficient time among professionals can be a barrier to providing effective and comprehensive asthma care for patients with asthma. Therefore, nurse-led care can be more efficient than doctor-led care in asthma education (Kamps *et al.*, 2003). However, Kuethe *et al.* (2011) argued that the degree of disease control in stable childhood asthma managed by a respiratory nurse is not inferior to traditional management by primary or secondary care doctors. A study carried nursing intervention in a structured education programme; the results showed an increase in patients' knowledge of asthma, its treatments, and its management post-discharge from hospital (Morice & Wrench, 2001).

#### **Relationship of the literature to the Saudi context**

The prevalence of asthma has increased highly in KSA, reflected in the number of hospitalisations, school absenteeism, morbidity, and mortality in children caused by a lack of knowledge and insufficient education programs about asthma management, and the unavailability of community nursing services in the country to provide asthma management education for young children and their families after discharge (Al Ghobain *et al.*, 2012). Diagnosis is based on clinical assessment using the National Guidelines for Diagnosis and Management of Asthma based on GINA (Saudi Initiative of Asthma [SINA], 2016). However, knowledge and competence with asthma guidelines varies nationwide (Al-Haddad, Nour & Koshak, 2006; Abudahish & Bella, 2007).

Internationally there are many long-standing challenges to the achievement of effective asthma management, including under-diagnosis, poor health facilities, limited treatment choices and poor patient education (Leickly *et al.*, 2005). Such barriers also apply in KSA. For example, whilst national guidelines on asthma diagnosis and management exist, health

professionals lack knowledge of these and thus they are under-used in practice (Coates *et al.*, 1994; Ahmed *et al.*, 2014). However, other issues in KSA also make asthma management more challenging. A shortage of Saudi healthcare professionals means that KSA has long employed doctors and nurses from other countries, and the majority of healthcare professionals in KSA are therefore expatriates. The Saudi Ministry of Health (MoH, 2014) reported that only 38% of the country's health workforce were Saudis. The use of health professionals from other countries contributes to high employee turnover rates and creates additional challenges for asthma management. In particular, foreign professionals usually lack Arabic language skills, which is obviously a barrier during clinical consultations when staff need to communicate with children and parents (Simpson *et al.*, 2006; Aldossary, While & Barriball, 2008). Although interpreters are frequently used in clinical consultations, they may lack any understanding of asthma terminology and/or may not exactly translate the meaning a non-Arabic health professional intended to convey. In many other countries, such as the UK and USA, doctors and nurses provide asthma management services by working collaboratively. Nurses usually have an active role in long-term asthma management and patient education (Bousquet *et al.*, 2007; Zemek *et al.*, 2012), but this is not the case in KSA, where nursing staff typically play a negligible, ad hoc role in asthma management (Al-Moamary *et al.*, 2012). Asthma management in Saudi falls primarily on doctors rather than also being shared with nurses, which reflects the low status of nursing and of nurses more generally in KSA (Bousquet *et al.*, 2007).

In recognition of this medical load and the need to develop asthma care and promote best practice in line with other national and international guidelines, SINA asthma guidelines were introduced in 2009 (Al-Moamary *et al.*, 2012; Zemek *et al.*, 2012). The SINA guidelines highlight the importance of good asthma education (SINA, 2012/2016). Providing asthma education to children and their parents is a key way in which nurses working in KSA can have a more active role in paediatric asthma management. For this to be achieved, more information about the current role of nurses in paediatric asthma management in KSA is needed, as is identification of the actions necessary to enable nurses to take on such an educational role and better support the medical asthma management of children.

Another challenge to providing effective paediatric asthma management in KSA is inadequate awareness of the condition and its management. There is evidence of a need to improve asthma knowledge generally amongst doctors and other health professionals, especially in terms of diagnosis, classification of severity, and management (SINA, 2012/2016). There is also a need to improve asthma knowledge amongst the general population. An estimated 50% of the populations of the major Saudi cities of Riyadh, Jeddah and Dammam do not know the symptoms of asthma (Al-Harbi *et al.*, 2015). Public awareness campaigns regarding asthma, such as its symptoms, medications, and consequences, are urgently required in KSA. Educational initiatives targeted towards parents of children with asthma are especially needed, because parental lack of knowledge is likely to contribute to delays in children

accessing health services and receiving asthma treatment, which may lead to higher paediatric asthma morbidity and mortality rates (Asthma and Allergy Foundation of America, 2015).

Given the lack of asthma knowledge in the country, there is an urgent need to implement and evaluate the effectiveness of asthma education interventions aimed at children and their parents, and their impact, if any, on clinical outcomes. Although the government of Saudi Arabia has committed to improving and developing healthcare to provide good quality care for the population's needs, there is still a low awareness of asthma among the general public (Al-Jahdali *et al.*, 2008). This reflects the status whereby some health care organisations have been lacking in asthma care including equipment and medications (Alhaddad *et al.*, 2006). In addition, it was found that a large number of asthma prescriptions from primary health care centres have no documentation of dosage for the asthma inhalers, which reveals how poor the documentation has been from the prescribers of asthma medicines (Levy *et al.*, 2013). Studies have illustrated that only 35% of the prescriptions were appropriate for preventive therapy, which means the remainder exceeded or fell short of the recommended preventive therapy (i.e. the recommended dosage); furthermore, studies have uncovered insufficient knowledge and competence of asthma guidelines among health care providers in the country (Al-Haddad, Nour&Koshak, 2006; Abudahish& Bella, 2007).

With regard to nursing in Saudi Arabia, the nursing board within the Saudi Commission of Health Specialists (SCFHS; the registration body) set the criteria for registration and licensure in 2003 and developed accreditation standards for training and continuing education programmes. However, a scope of practice has not yet been formalized (Abo-Znadah, 2005), and researchers have focused on the prescriptions of doctors about asthma care in primary health care centres with little attention being paid to nurses (Khoja&AlAnsary, 1998). The nursing workforce in Saudi Arabia relies primarily on migrants who are recruited from different countries, such as the Philippines, India, North America, the UK, South Africa, and other Middle East countries (Tumulty, 2001; Aboul-Enein, 2002). Although all nurses working in Saudi Arabia are required to register with the SCFHS in order to practise and are expected to speak English (Abo-Znadah, 2006), there is no requirement for any knowledge of Arabic, which is the first language spoken by almost all patients. Further, migrant nurses differ greatly in their cultural, religious, and national backgrounds as well as professional skills (Tumulty, 2001).

Many studies of nursing in KSA, as explored in the literature review, have cited the prevailing negative image of nursing and the perceived low status of nurses as two important factors explaining the severe shortage of native Saudi nurses. These themes have been attributed to work-related factors, such as gender-mixing, long working hours, and rotating shifts, which render nursing an unattractive profession for most native Saudis. Some authors have linked the poor image and status to the type and level (diploma) of early nursing programmes (Al-Mutairi, 2015; El-Sanabary, 2003). As hospitals across the country face a shortage of nurses, most Saudi hospitals have chosen the path of importing professional labour to satisfy

their needs. Nevertheless, a nursing turnover of almost 30% a year means that importing nurses has become a constant problem for hospital staff and management (Al-Yami& Watson, 2014).

This creates specific challenges for recruitment and retention of staff and for workforce cohesiveness as well as more fundamental issues affecting standards of health care, including asthma management practices. Currently, the high staff turnover rates across the Saudi Arabian health care network engender a high-stress environment for nurses to work in, which can adversely affect patient health care (Zaghoul *et al.*, 2008). This multifaceted problem needs to be addressed at all levels using a systems approach if the nursing work environment is to be improved to promote quality of health care across Saudi Arabia. This has implications for nurses in Saudi Arabia, where little is known about the actual role or perceived asthma management practice of the nursing profession.

While healthcare provision in Saudi Arabia has improved owing to the government's increased commitment to healthcare development, healthcare institutions have not equally supported the role of nurses. Whereas the literature has identified a few institutional factors that appear as challenges to effective nursing management in general, it has been highlighted that not only has the role of nursing in asthma management been under-researched in general, but there appears to be an over-emphasis on the institutional factors and a lack of consideration for other factors, such as sociocultural or individual factors. This thesis aimed to uncover these hidden factors along with the influencing factors that are deemed important in shaping the roles and perceptions of nursing in general as well as in relation to paediatric asthma management in Saudi Arabia.

Although the Saudi government is trying to meet international standards when it comes to nursing degrees, its task is complicated by the need to improve the intrinsic quality of Saudi nursing *per se* as quickly and expediently as possible, while attempting to reengineer social attitudes towards nursing in Saudi society. One effective tactic in this project is requiring degree-level qualification (rather than diploma-level) for entry into nursing, elevating the profession (and thus its prestige) in Saudi society to improve the attractiveness of the profession as well as the competence of nursing personnel. However, many issues remain to be addressed; for instance, the MoE still does not provide learning programmes for existing nurses with a diploma; one practical issue in this regard is the absolute impossibility at the service level of nurses taking time off from already overstretched nursing staffs to receive training or education.

In addition, the standard of nursing varies according to the education of the head of the nursing faculty overseeing programmes (Alamri, 2011). As the change to a BSc degree level is relatively new for most Saudi nursing departments, nurses with diploma degrees do not have any way of changing their associated degrees to a BSc equivalent. This is something that needs to be undertaken at the policy level as it fundamentally affects the nursing workforce and the professional competence and progress of nurses. Indeed, many



nurses within Saudi Arabia are not currently employable due to the lack of a bridging degree to convert their nursing diploma into a BSc degree (AlMadani, 2015). It is commonly believed that a diploma is a technical and low-level qualification; hence, there is an essential enhancement to the nursing education level to at least a Bachelor of Science Nursing (BSN) level (Aldossary *et al.*, 2008).

An analysis of the literature shows that the nursing role in asthma management can be influenced by a variety of interrelated factors that culminate in the manifestation of poor asthma care. Although the factors have been identified in the literature as causative factors in nursing ability, it should be noted that research exploring the particular role of nurses in care provision in Saudi Arabia is extremely limited, and further research is urgently needed in order to explore this issue in more detail, including research into asthma management to explore why nurses are not involved in managing asthmatic patients in Saudi Arabian hospitals. Despite the lack of data in relation to the nursing role and acknowledgement of these factors as a significant issue in health care, there is anecdotal evidence to suggest the importance of exploring the nursing role for managing asthmatic children in Saudi hospitals (Khoja& Al-Ansary, 1998). For example, nurses have frequently experienced such factors; however, no empirical studies have been conducted to date to identify factors influencing on the role of nurses in paediatric asthma management in Saudi Arabia.

In addition to these contextual challenges to effective paediatric asthma management in KSA, there is a lack of research that could be used by nurses themselves to improve the QoC they provide based on available evidence. Hence, this study explores the phenomenon of the nursing role in the management of asthma and reveals the influence of such factors in depth. In relation to the Saudi Arabian context, no study was found that specifically examined the nursing role in terms of nursing perceptions, and/or any influencing factors that prevent nurses from managing children with asthma. Studies conducted within KSA have tended to investigate asthma control or drug use using quantitative methods such as surveys, but rarely cohort designs (BinSaeed *et al.*, 2014; Al-Anazi *et al.*, 2015). Most Saudi asthma research has focused on the prevalence of asthma among children (Al-Ghamdy *et al.*, 2000; Al Frayh, 2001; Al Ghobain, 2012; Nahhas *et al.*, 2012; Al-Harthi *et al.*, 2017), investigating relationships between asthma and other factors including triggers and symptoms (Hamam *et al.*, 2015; Farchi *et al.*, 2003; Bazzi *et al.*, 2011) and assessment of risk factors (Hijazi, Abalkhail& Seaton, 2000; Al-Dawood, 2001, Alqahtani *et al.*, 2017; Halwani *et al.*, 2015). One systematic review (Alreshidi, 2017) provided an overview about the prevalence of asthma in SA, risk factors, treatment guidelines and its adherence.

## CONCLUSION

This study review explored and reviewed the relevant literature pertaining to paediatric asthma management internationally and in Saudi Arabia. Specifically, areas such as asthma management for children, asthma education, and the role as well as the significance of nurses in the management of

childhood asthma were highlighted and its relationship to the Saudi context.

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