School of Health and Society

A SELF-MANAGEMENT PROGRAM FOR ADULTS WITH ASTHMA IN SAUDI ARABIA

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List of Abbreviations

The abbreviation	Its meaning
ASMEP	Asthma Self-Management Education Program
GINA	Global Initiative for Asthma
US	United States
KSA	Kingdom of Saudi Arabia
WHO	World Health Organisation
SNG	Saudi National Guidelines
SINA	Saudi Initiative for Asthma
BSN	Bachelor of Science in Nursing
EBP	Evidence Based Practice
AEPs	Asthma Education Programs
MOH	Saudi Ministry of Health
NMC	Nursing and Midwifery Council
ISAAC	International Study of Asthma and Allergies in Childhood
PAMP	Pediatric Asthma Management Protocol
NAECB	National Asthma Educator Certification Board
SSRC	Saudi Society for Respiratory Care
CEA	Certified Educator on Asthma
STS	Saudi Thoracic Society
PCPs	Primary Care Providers
HADS	Hospital Anxiety and Depression Score
DTA	Difficult to Treat Asthma
ED	Emergency
CINAHL	Cumulativ h Literature
CRD	Centre for Reviews and Dissemination
CASP	Critical Appraisal Skill Program
ICS	Inhaled Corticosteroid Therapy
AAP	Asthma Action Plan
MAMMA	Multidisciplinary Approach to Management of Maternal Asthma
PACP	Pharmacy Asthma Care Program
QOL	Quality of Life
ACQ	Asthma Control Questionnaire
AQL	Asthma Quality of Life
CTE	Consumption Tobacco Education
PEF	Peak Expiratory Flow
FVC	Forced Vital Capacity
SAMBRA	Supporting Asthma Self-Management Behaviors in Aging Adults
ZRM	Zurich Resource Model

EMR	Electronic Medical Record
PCP	Primary Care Provider
ACS	Asthma Control Score
AAA	Adolescent Asthma Action
ACT	Asthma Control Test
AKQ	Asthma Knowledge Questionnaire
ASMQ	Asthma Self-Management Questionnaire
PAM	Patient Activation Measure
SPSS	Statistical Package of Social Science
NGOs	Non-Governmental Organisations
KFCH	King Fahad Central Hospital
MARS	Medication Adherence Report Scale
RTs	respiratory therapists
PACP	Pharmacy Asthma Care Program
PEFR	Peak Expiratory Flow Meter
FVC	Forced Vital Capacity

Abstract:

Introduction

Globally, asthma is one of the major non-communicable diseases. Across the world, there are approximately 235 million people with asthma; including approximately 4% of the adult population in Saudi Arabia. Asthma patients within the rural areas of Saudi Arabia such as Jizan face additional challenges in relation to accessing asthma treatment including; lack of health professional expertise, low numbers of hospitals and distance from hospitals. The Saudi Initiative for Asthma (SINA) guidelines recommend asthma education but there is little evidence of how these guidelines should be translated into practice and patients within the region have a low awareness of available support and low levels of education preventing benefit from any asthma education. A systematic review highlighted no studies relating to educating adult asthmatics had taken place in Saudi Arabia, but provided guidance on effective programs and methods that had been implemented elsewhere. Therefore, this study aimed to develop and implement an asthma self-management adult program that was relevant to the Saudi context and culture. The program was evaluated to determine its impact on asthma control, patient self-management, asthma knowledge, and emergency department visits. Participant views were sought on how the program had worked in practice.

Methods

An Asthma Self-Management Education Program (ASMEP) was developed using evidence from a systematic review, theoretical constructs and collaboration with health professional and patient stakeholders. The intervention involved a two day program supplemented by a booklet, delivered by nurses to gender segregated groups. An explanatory sequential complementary mixed method design was employed for evaluation. The quantitative element used a quasi-experimental pretest-postest design. A range of validated questionnaires were used to collect data before the intervention and at 3 months after the intervention for an intervention and control group and at 6 months for the intervention group to see if intervention effects were maintained. Demographic variables analysis was conducted to provide comparisons with respect to age, gender, education, and employment. Semi-structured interviews were conducted with eight patients to gain the patient's perspective on the barriers and facilitators of the intervention.

Thematic analysis used to extract themes, sub-themes, and keywords for determining the common patterns in data.

Findings

A total of 125 patients participated in the study, including 62 patients in the intervention group and 63 in the control group. Quantitative data analysis revealed that the asthma educational program (ASMEP) improved asthma knowledge, patient activation, asthma control, and asthma self-management in the intervention group, although there were some demographic variations. There were significantly lower number of visits by patients to the emergency department after accessing the education.

The findings of the qualitative component documented and uncovered the different facilitators and barriers which affected the implementation and effectiveness of the educational program in the Saudi Arabia. Patients valued the program, and the role played by hospital staff in promoting it, but more expertise is needed to improve and expand delivery.

Conclusion:

The thesis provides a unique and original evidence base on which educational resources in Saudi Arabia can be prepared, used and evaluated to improve the quality of care provided to patients suffering with Asthma. The study has discussed the theoretical and practical contributions which increased the novelty in this study. The results of this study are confirmed through the support of social-cognitive theory.

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CHAPTER I: RESEARCH INTRODUCTION

1.1. OVERVIEW

This thesis provides an original evidence-based study of adult patients' experience in self-managing asthma in Jizan, Saudi Arabia. It develops an Asthma Self-Management Education Program (ASMEP) and examines how this can improve individuals' knowledge, skills and confidence to self-manage asthma and decrease their emergency visits to hospitals. The study was first conceived and developed while the researcher was working in several hospitals in Jizan, as a nurse providing care for patients with different degrees of asthma, many of whom had travelled long distances to be treated. The environmental situation in Jizan namely smoke, dust and climate variability exacerbate asthma symptoms. The geography of the area also makes it difficult for some patients to attend the emergency department for treatment. Patients used to come to hospital for nurses to deal with their asthmatic attacks. Now, with this program, sufferers will be better prepared to manage their asthma while they are at home.

Although there are national guidelines for asthma in Saudi Arabia (Saudi Initiative for Asthma, SINA, 2016), there is no guidance or training on patient education for asthma. Furthermore, nurses in Saudi Arabia originate from different countries which vary in their nursing preparation, with their approaches to patient education therefore lacking standardization. As well as developing a program, this thesis is also concerned with upgrading the knowledge and practice of nurses by engaging them in developing and delivering the training program. It provides a unique and original evidence base on which educational resources in Saudi Arabia can be prepared, used and evaluated to improve the quality of care provided to patients suffering with asthma. To put this study in context, this chapter presents an overview of asthma first in global terms, then in Saudi Arabia in particular. It also highlights the healthcare delivery system and professional and regulatory bodies in Saudi Arabia.

1.2. BACKGROUND

Asthma is one of the major non-communicable diseases. It is a chronic disease of the air passages of the lungs which inflames and narrows them. According to Global Initiative for Asthma (GINA, 2004) the estimated number of individuals suffering from asthma in the world

was 300 million in 2004. Projections suggest, with increased urbanization, this may reach 400 million by 2025. According to the World Health Organistaion (WHO,2016), there were 383000 deaths due to asthma in 2015, with most deaths in older adults. Figures for Saudi Arabia from 2013 suggest that asthma was prevalent in 4.05% of the adult population. Of these, 76.7% experienced an asthmatic attack and 61.6% visited emergency departments as a result of asthma symptoms in 2012 (Moradi-Lakeh *et al.,* 2015). Asthma was less prevalent in the older population, maybe indicating people younger than 65 years were more affected by the disease or less able to self-manage. More recent figures suggest asthma incidence has nearly trebled. One recent study found that physician-diagnosed asthma in Saudi Arabia increased to 11.3%, indeed more 18.2% when including cases of wheezes with no signs of cold (which could have been classified as asthma) (Al Ghobain *et al.,* 2018). Of these, 5.6% have had asthmatic attacks in the previous 12 months and other symptoms such as attacks of coughing (43%), shortness of breath (31%), and feeling tightness when breathing (33%) (WHO, 2016). Meanwhile, a 2019 study of 1009 patients found 30.1% suffered with asthma, with higher asthma control reported by males and those with higher education (Hamdan *et al.* 2019). Patients with asthma who are not diagnosed and managed appropriately can cause a substantial burden to individuals and their families, and more than 80% of asthma deaths occur in low and lower-middle income countries (WHO, 2016).

1.3. FACTORS INFLUENCING ASTHMA IN SAUDI ARABIA

The incidence and severity of asthma can be influenced by different factors including infections, air pollutants, inhaled allergens, weather changes, chemicals, living in disadvantaged areas, occupational hazards, drugs, smoking, levels of exercise, educational status, economic status, emotional stress and certain foods (Saudi MoH, 2000; Al-Ghamdi *et al.,* 2008; Al-Jahdali, 2019). Cities at sea level have been known to increase the likelihood of acquiring asthma (Al-Ghamdi *et al.,* 2008). This is particularly relevant to areas like Jizan in Kingdom of Saudi Arabia (KSA) (the focus of this study), which consists of highly populated plains, along with coastal and mountain areas that are characterized by a hot and humid climate which aggravates asthma. In fact, more than 25% of the total asthma prevalence in Saudi Arabia is found in Jizan (Basudan *et al.,* 2019). A study found a significantly higher percentage of students living in mountain areas

had more than 12 attacks of wheezing in the last year compared to those who lived in plain and coastal areas (Hasnain *et al.,* 2015).

Jizan is also a peripheral area in the South of KSA and lacks resources. Particularly in remote areas, patients sometimes struggle to access services in hospitals. The program developed in this thesis thus has additional value to these patients, as it will through education, training and confidence building in self-management skills make it easier for them to control their asthma at home and reduce hospital attendance. Asthma has been related to the genetics of the Saudi Arabian people. This increases the likelihood of acquiring the disease at an early age, as it was found to be common in people from different age groups, including children. (Hijazi *et al*., 1998). This was confirmed in more recent research where asthma prevalence in children was related to genetic factors and the nature of the area where people lived (Basudan *et al.,2019)*.

Education is important in controlling asthma, hence the Saudi Initiative for Asthma (SINA) guidelines. Asthma complications are less frequent in individuals with higher education, which highlights the importance of knowledge and education in managing asthma (Moradi-Lakeh *et al.,* 2015). Despite this the majority of patients suffering with asthma in Saudi Arabia were found to lack the necessary knowledge that is required to control the disease and enable them to achieve a good quality standard of living (Al-Zahrani *et al.,* 2015). In this study, deficient knowledge from both patients themselves and their families, alongside confusion of patients as to what an asthma complication is and how to manage it, were found to have aggravated adverse effects.

1.4. ASTHMA EDUCATION

It has been known for some time that the occurrence of asthmatic attacks increases when nurses are unable to provide the appropriate health education within the remit of care (Cortes *et al.,* 2004). There is also evidence of successful and effective self-management programs implemented in other nations, such as Australia, that focused on the important role education can play in decreasing asthmatic symptoms and consequently reducing doctor visits (Battersby *et al.,* 2010). Murray, & O'Neill, (2018) identified that education provided by nurses to patients suffering with asthma should focus on enabling these patients to effectively perform breathing

exercises and enhance their awareness of how to avoid triggers of asthma attacks (Murray, & O'Neill, 2018). Adequate knowledge of asthma management skills was found to be a major beneficial factor towards long-term positive outcomes (Klok, *et al*., 2015).

A study in Saudi Arabia found that improper use of inhalers and other devices by patients due to a lack of knowledge were associated with uncontrollable asthmatic attacks and more frequent visits to hospital emergency departments (Al-Jahdali *et al.,* 2013). Understanding and educating people in how best to use their inhalers was a crucial element in the overall cycle of treatment, as such education was found to effectively decrease the incidence and/or the severity of asthmatic attacks in patients (Moradi-Lakeh *et al.,* 2015). Additional evidence nevertheless found that nurses in KSA lacked the required skills to provide education to patients. Their poor communication at times, in addition to managing excessive workloads, created a barrier that prevent them from genuinely understanding patient needs (Almalki *et al.,* 2012; Attar, 2014).

More recently, to make information more accessible to patients, new forms of technology have been developed to aid in the structure and design of healthcare education provided by professionals to patients (Schuermans, et al., 2018). For example, approximately 20% of all smartphone owners in the United States (US) possess new web-based applications (Apps) that provide immediate access to health information for asthma (and many other) patients (Fox, & Duggan, 2012). Modern technology was also found to be effective in decreasing the prevalence of asthma symptoms and/or improving asthma management through access to nursing personnel (Aziz *et al.,* 2012). Such technology-based solutions were initially considered for this study but discounted based on the experience of the researcher. Not all patients in Jizan would be prepared to use this technology. Moreover, the literature review (Chapter 2) identified no other studies of asthma patient education within Saudi Arabia regardless of how the education was delivered. The study by Aziz *et al.* (2012) has documented the role of nurses to manage their own asthma though asthma educational programs but they found that the guidelines of asthma education were not very effective for them; this element needed further exploration.

1.5. SAUDI INITIATIVE FOR ASTHMA (SINA)

One of the landmark developments for asthma in KSA was SINA. This was introduced by the Saudi Thoracic Society (STS) in 2009. The government of KSA has implemented various new SINA strategies to improve asthmatic patients' health status. These provide up-to-date guidelines for healthcare workers on how best to manage patients with asthma (Alzahrani *et al.,* 2018). These guidelines provide a clear pathway for the diagnosis and management of asthma, focusing on the high need for education for both nurses and patients in Saudi Arabia (SINA, 2016). SINA was originally developed in 2008 by Saudi experts with long outstanding experience and honourable academic backgrounds regarding their field. While developing SINA, these experts used local literature, latest evidence and knowledge about current KSA setting (Al-Moamary *et al.,* 2009). SINA placed greater emphasis on understanding clinical presentation, epidemiology, pathophysiology and medications (Al-Moamary *et al.,* 2016). According to (Hsu *et al.,* 2018), there is an emphasis in the guidelines on the need for education and understanding of the epidemiology, pathophysiology, medications and clinical presentation

SINA discusses the development of patient-doctor partnerships, self-management, and control of precipitating factors (Hsu *et al.,* 2018), but does not provide guidance on how health professionals should implement patient education. The most common barrier to adherence of the SINA (2016) was lack of awareness and patient non-compliance (Alotabi, 2012). The expectation is that implementing guidelines for treating asthma via a patient self-management education program will lead to better asthma control and decrease patient utilization of the healthcare system (Hsu *et al*., 2018).

The researcher having worked as a nurse in Saudi Arabia had extensive experience of communicating with nurses from different cultural backgrounds. It is not clear from the evidence if a nurse's cultural background served as a barrier, or whether expatriate nurses already worked differently to effectively educate and support asthmatic patients. The increasing prevalence of asthma and Saudi context, experience in practice and lack of an evidence base for asthma education in Saudi Arabia led to the development of this study.

1.6. AIMS AND OBJECTIVES

The aim of the study was to develop and test the impact of a patients' self-management education program on adult patients managing of asthma in Saudi Arabia. The program was developed with nurses and other health professionals in Jizan to ensure its relevance to the Saudi context, to encourage them to own and shape the program, and to also help sustain and embed program delivery in the future.

1.7. OBJECTIVES

The following objectives were addressed during the study:

- To develop a self-management education program (ASMEP) for adult asthma patients in Saudi Arabia
- To train nurses, respiratory therapists and other health professionals to deliver the asthma education program
- To examine the impact of the health education program on asthma control, patient self-management, asthma knowledge, compliance with medication and consequently reducing visits to emergency departments
- To explore the concept of patient activation within the management of asthma in a Saudi Arabian context
- To explore the barriers and facilitators to the implementation of the education program

1.8. THE KINGDOM OF SAUDI ARABIA

Figure 1.1 Kingdom of Saudi Arabia (Map)

According to *The World Fact Book* 2017, the Kingdom of Saudi Arabia came into being in 1932. Abdulaziz Al Saud was first founder of Arab state. Al Saud, the Royal Saudi family, rule the country, with key administrative functions and governorates usually headed off by Royal family members. The Saudi Kingdom is located in the Middle East diaspora, among other Arabic countries such as UAE, Oman, Yemen, Egypt and Syria (Figure 1.1).

Having total population of about 31.7 million people and area of about 2.24million square kilometres makes Saudi Arabia the largest country in the Middle East (according to UN estimations in 2015). The composition of the Saudi population is 13.9 million females, 3.3 million of which are expatriates, and 17.8 million males, over 7 million of which are expatriates (MoH Annual Statistical Report, 2015). Saudi Arabia observed a significant growth in its population over last few years. Based on this increasing growth rate the Saudi population is expected to increase to 47million by 2020. Viewing this expansion, the Saudi government has started to think about providing high quality healthcare services to its citizens (Almalki *et al.,* 2011). Demographic characteristics of population in KSA are shown in Table 1.1.

Table 1.1 Demographic characteristics of the Saudi population

Gender	Saudi citizens	Expatriates	Total
Male	10,614,813	7,076815	17,691,628
Female	10,515,147	3,314,643	13829840
Total **	21130010	10391458	31,521,468

The annual growth rate of population is 2.7%. The average age of Saudi population is about 27.2 years. The distribution of Saudi population in terms of age is shown in Table 1.2. In 1970, life expectancy of the Saudi population was 52 years. That had increased to 75.3 years by 2015, mainly due to noticeable improvements in healthcare as well as social services (MoH Annual Statistical Report 2015).

Table 1.2 Age Distribution of Saudi population in 2015

Age category	Percentage
Under 5	10.1%
6-14 years	29.12%
15-64 years	67.95%
65+ years	2.93%

1.9. THE JIZAN AREA OF SAUDI ARABIA

The Jizan areas have a mixture of mountains, forest and plains. Jizan is a town which is located on tropical Red-Sea, on West of the Abha, south-western Saudi Arabia. The total area that Jizan covers is about 40,000 $km^{2,}$ including about 5,000 cities and villages and 100 islands, Jizan is also an important seaport of the Red Sea and runs parallel to the Red Sea for about 300 km (200 miles), just north of Yemen (Arabnews, 2019). In Jizan, the weather during winter is mild while during summer is very hot, with an average temperature of 23-25 Celsius throughout the year. During the summer season, the province remains windy with winds of average 25 kilometres per hour. However, average rainfall per year is 45 to 100 mm (Arabnews, 2019).

Archaeological sites in Jizan are large in number, belonging to different cultural eras varying from Neolithic to Paleolithic and from initial Islamic period to current century, there are also a large number of petroglyphs, mining sites, ancient inscriptions and early Islamic antiquities in Jizan such as watch towers, castles, ports and mosques. Historical cities located in the Jizan region include Qalaat Alasilki, Jabal Jahfan, Upper Jizan, Asir cityand, Qalaat Abi Arish (headquarters of former Turkish rulers). After Al Bahah, Jazan (also spelled as Jizan; romanized: Jizan; Arabic: جيزان) is the second region in Saudi Arabia and is also the smallest in size. The total area that it covers is of about 11,671 km², with 1,567,547 populations according to 2017 census. In terms of population, this region has the greatest density in KSA. Jizan is capital of the kingdom with Muhammad bin Nasser bin Abdulaziz as current Governor (Arabnews, 2019).

There are three parts of this region:

- Alhazoun forest district, consisting of forest which is broken by rich pasture.
- Al-Sarawat mountains inland of about 3,000 m in height.
- The plains that are recognised for cultivation of best coffee beans, fruit (plums, citrus varieties, papayas, mangoes, grapes, bananas and apples) and grain crops (wheat, millet and barley) (Arabnews, 2019).

On highlands, the climate is quite similar to wetter climate in Asir. Coastal areas of Jazan are parts of Tihamah which is hottest region in kingdom, where average temperature in July is 104 °F (40 °C) while in January it is about 88 °F (31°C). In coastal lagoons, the high humidity makes the overall climate less bearable as compare to what climate would be there otherwise. Moreover, rainfall in region is very low (less than 3 inches (75 mm) per year). The place where Sabya region is located is between the beach and the mountains (Arabnews, 2019). More recently, continuous air strikes originating from KSA in relation to the Yemeni civil war have increased the CO2 and air pollution that exacerbate asthma in Jizan. Due to Saudi military movement there is more smoke and air pollution as well as consumption of oil and gas in Jizan (Yemni civil war, 2015). Therefore, number of asthma patients have been increased in jizan, Saudi Arabia. Geographically patients in Jizan face challenges as there are a number of

mountainous areas and patients find it hard to travel from these regions, as the hospitals are limited or far away from patient's homes.

1.10. HEALTH SERVICES AND NURSING IN SAUDI ARABIA

Since 2014, the Saudi MOH (Ministry of Health) started to focus on improving healthcare services. The Ministry of Interior (Security Forces Hospitals), Ministry of National Guard (National Guard Health Affairs) and the Ministry of Defence and Aviation are three other ministries that are also providing health services in the country, with the cooperation of MOH-governed Council of Health Services (Ministry of Health KSA, 2014). Due to limited health personnel and resources and the increasing frequency and prevalence of inhalant(asthma and allergies the MOH depends heavily on recruiting nursing and medical staff from outside the country and also encourages private sector to make investments in healthcare facilities (Fielden, 2012).

As the main responsible body, the MOH is charged with governing the entire Saudi healthcare sector and has positioned several managers to monitor and control healthcare facilities across the country, along with educating nursing staff (MOH Annual Statistical Report, 2015). Since education is the main priority of the MOH, in cooperation with the WHO, in 1958 it opened the first nursing educational institute in Saudi Arabia in Riyadh (Aldosh, 2015). After the introduction of a Bachelor of Nursing Program by the Ministry of Education at King-Saud University in 1976, a number of nursing educational institutes opened throughout the Saudi nation (Hala *et al*., 2016). These nursing educational institutes introduced various diplomas, including Bachelor, PhD and master's Programs related to nursing. It was a step towards making Saudi government self-sufficient in terms of producing its own nursing workforce.

The modern Saudi nursing workforce is composed of many ethnicities and nationalities, out of which 45% were Saudi nurses while rest were from 20 different nationalities (MOH, 2019). The Ministry of Health reported a significant increase in numbers of total nurses from 172,483 to 185,693 during 2015-2017 (MoH Annual Statistical Report, 2015), out of which 36.7% nurses were from Saudi Arabia (Ministry of Health KSA, 2017). Moreover, about 102,379 nurses were working in hospitals under MOH authority, 44,985 in private hospitals and 38,119 in other government organizations. The table below shows the composition of the entire Saudi nursing

workforce for the year of 2017: the Saudi nursing workforce contains 73.4% (136855) female nurses out of which 52% (70907) were working in hospitals under the MOH, 22% (29849) were in other government organizations. The rest (27%, 36099) were in private sector hospitals.

Table 1.3 The nursing workforce in Saudi Arabia in 2017

Health sector	Number	Saudi Nurses (%)
Ministry of Health	102379	55.3%
Other governmental health sectors	38119	20.3%
Private Hospitals	44985	24.4%
Total **	185,693	100%

(Ministry of Health KSA 2017)

The contribution of the non-Saudi (expatriate) nurse workforce to Saudi healthcare system is also quite significant. But the heavy dependency of the Saudi government on expatriate nurses leads the majority of the Saudi nurses to leave the profession (Baumann *et al.,* 2010). The profession is thus currently facing severe staff shortage issue due to lower recruitment of nurses from Saudi nationals. Resultantly, the Saudi government cannot benefit from those Saudi nationals who are well-qualified and have specialised work experience and might provide specialised training like asthma self-management educational training. The nursing profession in Saudi Arabia has been facing staff shortages for the last ten years. There are many reasons due to which nursing profession in Saudi cannot attract Saudi females and males towards this profession, including shift schedule, social perception about nurses, management decisions and salaries (Al-Ahmadi, 2002).

1.11. NURSING EDUCATION IN SAUDI ARABIA

Over the last 25 years, the MOH has regulated and controlled Saudi colleges to meet the ever-increasing demand for nursing or other health-related professionals. The KSA currently has nineteen junior health institutes and twenty-four health colleges that provide diplomas in a variety of fields including nursing. In the Saudi system, there are a large number of different specialist nursing domains such as midwifery, paediatric, psychiatry, surgical and medical.

Moreover, there are a wide range of opportunities for specialisation and also to get experience in other areas such as orthopaedic, critical care and ophthalmic.

The Saudi government established a Bachelor of Science in Nursing (a professional nursing program) in 1976, with the intention to improve the nursing profession and to also enhance number of qualified nurses (Ministry of Health KSA, 2014).The Ministry of Higher Education controls and monitors this program. Its awards Nurse Specialists. However, other degrees and diplomas such as *Technical Specialists* and *Technical Nurses* are provided by some other institutions. *Nurse Consultants* or *Senior Specialists* is the title which is awarded to nurses with post-graduate qualifications (Aldossary *et al.,* 2008).

Although nursing education is available for the public in KSA, the country is still facing a shortage of nurses (Alamri *et al.,* 2015). Because of local cultural and social factors there is low interest amongst Saudi females to undertake nursing education and the government is currently encouraging female nurse enrolment in education to fulfill the skill shortage in the country (Halabi, & de-Beer, 2018). There is lack of collaboration between nursing association of KSA and nurses that would increase skill gap in the labor market. There is also lack of standards of nursing practices in the country which creates a barrier to develop staff education plans for their further development (Cruz *et al.,* 2019; Labrague *et al.,* 2018; Zakari *et al.,* 2017; Hibbert *et al.,* 2017). To join the nursing profession, the MOH formally announced additional entry requirements in 2005 and made it necessary for nursing candidates to have a Bachelor of Science degree in Nursing. This was a step to equalise entry standards in Saudi Arabia with international entry standards, with intention of improving nursing expertise and care quality and also providing evidence-based practice to nurses (Ministry of Health KSA, 2014). In 1999, the International Council of Nurses approved these standards and announced research-based practice was important for achieving high quality nursing care in the Saudi health sector. After aligning Saudi and international standards, it was expected that Saudi nurses must now also provide evidence-based care to asthmatic patients, asthma self-management education included.

The Nursing Board of KSA has been working with the Commission for Health Specialists to introduce nursing standardization which also include the nurse's personal development and planning that would help to reduce the shortage of advanced nurse skills in the country (Nazik,

2012). There is need for a paradigm shift in nurse's education and training to deliver effective health care in the KSA because currently nurses have only clinical skills which is not enough to deliver quality services to the community (Tumala *et al.,* 2019; Aboshaiqah & Qasim, 2018). Nurse's education must move forward. Having key skills such as leadership, management education, services quality, and emotional intelligence that would improve the overall nurse's contribution to the health care of KSA. There is also needed to move forward continuous a development plan for all nursing staff to fulfil their advanced nursing professional needs that would lead to better patient care (Alghamdi *et al.,* 2019; Al-Dossary, 2018). The program described and evaluated in this thesis was developed and delivered with local nurses and contributes to their continuing professional development needs.

1.12. ASTHMA EDUCATION

Within the field of asthma education, it has been widely known in disease prevention and control that implementing new educational strategies, by nurses with patients, will provide information that will enhance and develop patients' care skills to enable them to have an active role in self-managing their condition (McGhan *et al*., 2016; Al-Sheyab *et al.,* 2018; Suresh, 2013). In relation to providing patient education in Saudi Arabia, Asthma Education Programs (AEPs) which aim to help patients recognize disease symptoms, follow treatment plans, control environmental triggers and self-manage these symptoms have been recommended (Alotabi, 2016). Suresh (2013) highlighted that structured health education programs, given to the right participants in the right settings, improve health behaviours, social support and health internality. However, it is unclear from the limited research carried out if asthma education programs across Saudi Arabia exist, and if patients receive a certain level of education to help them understand their condition, whether or how this helps the patient better self-manage their condition.

The literature reveals (discussed further in Chapter 2) that Saudi Arabia faces many challenges, including: unavailability of specialized staff, limited health facilities in rural areas where many patients live, increased unscheduled visits to hospital because of patients inability to control their asthma, limited educational programs, limited professionals skills and effective delivery of educational programs, and lower knowledge and motivation to control their asthma (Al-Zahrani *et al.,* 2015; WHO, 2016; Moradi-Lakeh *et al.,* 2015). Moreover, some studies highlighted that

asthma patients have no awareness about asthma educational programs in Saudi Arabia (Al-Momamry *et al., 2012;* Alotabi, 2012). There are number of issues to consider before Saudi Arabia is ready to adopt and translate best practices of developed countries. Nationally, it is important to formulate a comprehensive strategy for Saudi Arabia regarding how health management stakeholders can improve the number of educational programs, study content and its delivery method, involvement and activation of patients, patient confidence to self-manage asthma, and resilience at community level.

1.13. POTENTIAL IMPLICATIONS

Guidelines and programs for asthma self-management have been developed and regularly evaluated in several countries throughout the world (Tousman *et al.,* 2007; SINA, 2016). However, though this topic has been well-researched throughout the world, it has not been well studied and applied in Saudi Arabia. Furthermore, there has been no development of policy within Saudi Arabia, because of a lack of fundamental research evidence to support or inform asthma guidelines. There is a need for a study to bridge this gap and raise awareness of key issues regarding asthma control within Saudi Arabia. In response, this study develops and tests the impact of a culturally specific self-management education program for adults with asthma in Saudi Arabia.

The potential implication of this could be to:

- Generate a deeper understanding of asthma self-management and education programs developed to enable patients to self-care for their asthma
- Provide a strong evidence base on which to build and evaluate (pre and post basic education programs) for asthmatic patients.
- Develop and embed updated care guidelines for asthma self-management in terms of effective assessment and management of patients, recommendations for practice and services
- Improve the knowledge and skills of local health professionals by involving them in the creation and delivery of the program.

- Provide a research foundation from which future research can be conducted to extend evidence-based practice for asthma patient care in Saudi Arabia
- To contribute to the theoretical knowledge of the impact of culture on asthma self-management and the nursing role in Saudi Arabia

1.14. CONCLUSION

Worldwide, asthma is one of the major non-communicable diseases with more than two million people living with the condition. In Saudi Arabia, asthma is prevalent in the adult population, although problems are less common in older people (over 65 years) and those with higher education, potentially highlighting the importance of knowledge and education in managing asthma. Patients in Jizan struggle to attend hospital due to the geography of the region. Patients' lack of awareness of complications, triggers and how best to manage their condition is the most common barrier to adherence to asthma guidelines in Saudi Arabia and their ability to self-manage their asthma. The SINA guidelines (2016) are useful but there is little evidence of how they are translated if at all into practice, and there is lack guidance on how best to embed the guidelines into patient education programs. In addition, nurses in Saudi Arabia lack the necessary knowledge and skills to educate patients in asthma self-management and adult educational programs often do not exist. Coupled with an overworked, multi-national nursing workforce who may struggle to communicate with Saudi nationals, meeting the needs of adults with asthma is problematic and complex. All these factors reinforce the need for focused adult asthma education programs that translate the national guidelines into practice. They also underline the need to work with and train nurses to embrace asthma education to facilitate and encourage better patient self-management at home.

CHAPTER 2: ASTHMA EDUCATION PROGRAMS – CURRENT EVIDENCE: SYSTEMATIC REVIEW

2.1. INTRODUCTION

The focus of this study is to develop, implement and examine the impact of a self-managed education program for patients with asthma in Saudi Arabia. To inform and direct the study a systematic review of relevant literature was conducted, to expose the gaps in literature of asthma education in the current context and to also provide evidence on best practice education methods. The evidence was searched, selected and analyzed according to pre-determined robust criteria. These were:

- Examine the quality of evidence on asthma education and self-education programs and interventions
- Identify evidence of nurses providing asthma education
- Identify potential educational resources and methods that could be used by nurses and patients in Saudi Arabia.

The review was conducted in line with systematic review guidance (Maltby, 2010; Brandeau *et al*., 2005) and comprised four stages:

- Searching for evidence
- Selecting studies for review
- Quality assessment, data extraction and analysing studies according to pre-determined criteria (e.g. critical appraisal skill program (CASP)).
- Synthesizing the evidence

The review sought to include all studies where nurses and/or health professionals provide asthma education. The aim was to answer the question: What are the most effective methods of asthma education to improve knowledge, self-control and/or compliance to medication and treatment regimen among adult asthmatic patients?

2.2. SYSTEMATIC VS NARRATIVE REVIEW

Ferrari (2015) highlighted that there are two types of major reviews: narrative/non-systematic and systematic. Adam et al. (2015) stated that narrative reviews are more focused on summary, understanding of new topics and areas, and avoid duplications in the reporting of findings. Systemic reviews provide a critical review of literature, potential research gaps and future directions, flaws in previous literature findings and methodology, and synthesize the research data (Adam *et al.,* 2015; Ferrari, 2015). Based on these points, present study has selected the systematic review because it has more benefits and scope as compared to narrative review. Table 2.1 is taken from the study of Ferrari (2015) with the purpose of summarizing the difference between systematic and narrative reviews based on purpose, use, and limitations.

Table 2.1 Difference between narrative AND SYSTEMATIC reviews

Description	Narrative reviews	Systematic review
Purpose	The objective of narrative review is to explain and appreciate previous studies but the selection procedures of selection of previous studies are not properly defined.	The systematic review has well defined research question(s), inclusion and exclusion criteria. This review aims to critically review the literature with the purpose of synthesizing the

		research data.
Use	The narrative review has generic data and appraisal of previous literature. It can provide justifications for future studies, but it also has lack of knowledge about recent interventions.	The systematic review selects, evaluates, and synthesizes the existing specific literature as per the proposed objectives of study. It has clear assumptions, rationales, methods, and findings. It can offer a comprehensive report regarding what is known and what is missing in existing literature.
Limitation	It has found that narrative review has low level of planning and assumption therefore evaluation and selection bases are not clear in studies. The data/findings are not reproduceable.	The scope of systematic review is just limited to search terms, proposed objectives, and inclusion exclusion criteria. The reader usually needs to reformulate the questions which are not investigated in the main questions.

2.3. SEARCHING THE EVIDENCE

The search followed a well-designed systematic search strategy approaching a wide range of databases and search engines with aim-directed specific keywords and selection criteria developed by the researcher in consultation with their academic supervisor. The keywords were devised from either the researcher's experience or from those key words found in similar studies. Comprehensive searches were then undertaken on databases using the period 2007-2017, and then updated to include relevant studies published in 2018. The researcher accessed several databases that contained a large volume of articles pertaining to the study topic and mainly used resources that had advanced searching and filtering capacity (see table 2.2 for the detail of databases).

Table 2.2 Selected data bases

No	Data Bases
1	National library of Medicine (MEDLINE) VIA ovidSP
2	Cumulative Index of nursing and Allied (CINAHL)
3	Cochrane Library
4	Pubmed
5	Science Direct
6	Google scholar searching

These were selected due to their coverage of health-related content. Once the electronic searches were complete and a list of included studies compiled, the reference lists were scanned for further studies. As English is the formal language within Saudi Arabia for research and practice, this review was restricted to papers published in English.

2.4. KEY WORDS USED IN THE SEARCH

The search strategy utilized the Centre for Reviews and Dissemination (CRD) guidance for undertaking systematic reviews (Tacconelli, 2010). Keywords were identified by examining potentially relevant papers for appropriate terminology and a thesaurus search was performed according to the PICOS framework (Population, Intervention, Comparison, Outcomes, and Study design) (CRD, 2009). Boolean logic (OR) was employed to retrieve studies that may have used alternative words and/or combinations of key terms. These PICOS elements were then combined with Boolean logic (AND) to restrict to the topic of interest and identify studies which met the required parameters (Table 2.3).

Table 2.3 Key words based on PICOS

PICOS	Study Focus	Key Terms
Population	Adult asthmatic patients	Adult Patients, Asthma, Community Residents, In-Patients
Intervention	Asthma education	Education Program, Educational Intervention, Health Teaching, Coaching, Self-Management asthma.
Comparison		Control, Intervention or no intervention
Outcomes	Factors that impact asthma patients' experience	Knowledge of asthma, self-control, self-management, compliance with medication and treatment regimen, emergency room visits.
Study Design		Experimental studies, systematic reviews, RCTs, non-intervention studies and quasi-experimental

Using the PICOS framework as a guide, the review question was framed as:

What are the most effective methods of asthma education (I) to improve the knowledge, self-control or compliance to medication and treatment regimen (O) among adult asthmatic patients (P) when measured before and after implementation (education program) (C)?

2.5. SELECTING STUDIES FOR THE REVIEW

Both exclusion and inclusion criteria were determined from, and also built upon, the study's aims, discussions with supervisors, as well as the initial search for literature. To begin with, the studies were included on the basis of the abstract and title. Later, the full text of each study was inspected for type of respondents, study design, outcome measures and kind of interventions. When the abstract and title was insufficient to make a decision, full papers were obtained and reviewed for detailed evaluation against the set inclusion criteria. Both library Inter-Library Loan services and visits to the database in the University of Salford were used to obtain full text articles. Figure 2.1 presents the PRISMA flow that shows how various studies were passed through different review stages and finally included in literature review.

2.5.1. Inclusion criteria

2.5.1.1. Types of studies:

The review included all intervention studies on education for the self-management of asthma in adults published in the last 11 years (between 2007 to 2018). Due to the limited resources for translation the review included studies which were published in English only. Initially, the intention was to include only those studies where the intervention was delivered by nurses, but this was expanded to include all healthcare professionals found to have employed an effective intervention method.

2.5.1.2. Types of participants:

The review sought to include studies with adult asthma patients between 16 and 64 years, as this is the age where asthma is prevalent in Saudi Arabia (Moradi-Lakeh*et al.,* 2015).

2.5.1.3. Types of interventions:

The interventions were any asthma self-management education program that would enhance patients' knowledge and skills to self-manage asthma either in hospital or community settings.

These programs should be designed to provide patients with information on how to use such devices to manage asthma or to improve the patients' knowledge regarding the management of their asthma (e.g. making accurate assessments and taking their medication at home).

2.5.1.4. Types of outcomes examined in this review

The outcomes were selected as those which reflect self-management and care for asthmatic patients. This included outcomes such as patients' knowledge and experience in managing their asthmatic attacks or symptoms independently or emergency department visits.

2.5.2. Exclusion criteria

Studies were excluded from the review if they were:

- Published in a language other than English.
- Book, book chapter or unpublished literature
- Conducted on participants less than 16 years
- Published before 2007

2.6. Limitations of this systematic review

Although the objective of this systematic review is to critically review the literature with the purpose of synthesizing the research data and obtain evidence to help design the intervention there are some limitations which must be noted. Table 2.4 summarizes these.

Table 2.4 limitations of systematic review

	Limitation description
Population	The selected studies had adult populations and most of studies were undertaken in developed nations. The selected studies for systematic review have high number of studies from developed countries where level of employee awareness and education, health facilities, and health challenges are different from developing countries. There are only two studies selected from Arab country (i.e. Egypt). The evidence within these studies may have limited applicability for KSA.
Searching process	The systematic literature search is around these key terms such as adult patients, asthma, community residents, and in-patients and only six databases were searched. It is possible that some studies were missed through the searching process. The studies are selected from reputable international databases whereas national databases of Arab countries

	were not searched to more specifically bring the relevant literature.
Comparison	The systematic review comparison is just limited to three stages: control, intervention or no intervention.
Outcomes	There are specific outcomes are the focus of systematic review such as Knowledge of asthma, self-control, self-management, compliance with medication and treatment regimen, emergency room visits.
Period	The selected studies have covered the period of 2007 to 2018. Earlier studies may have been missed, but it is hoped these were contained in the systematic reviews located. Studies located between completion of the systematic review and submission of the thesis are summarised later in the chapter rather than as part of the review.

2.7. Results of search

A total of 1450 articles were retrieved from the six database sources. The article list was checked for any duplications and reduced to 957 based on the titles and abstracts (when compared with the inclusion/exclusion criteria). Of these, 653 studies were excluded—321 not relevant, 243 not adult focused, 54 not in English and 35 in critical literature review (see Figure 2.1). There were 304 articles fully subjected for reading and review which, when screened according to the inclusion/exclusion criteria, 281 research papers were then excluded because these papers did not meet the specific objectives of current study. 16 articles were discounted because they included comorbidities and other health-related conditions in the study; 11 had a research subject other than the adult patient; and one was a case study. A total of 24 studies were selected for inclusion and subjected to quality appraisal including one study obtained in the updated 2018 search and deemed of interest to the current study (24 selected articles-see figure 2-1 below for PRISMA diagram).. The entire process was guided by an expert nurse researcher in conducting systematic reviews to ensure reliable and comprehensive results.

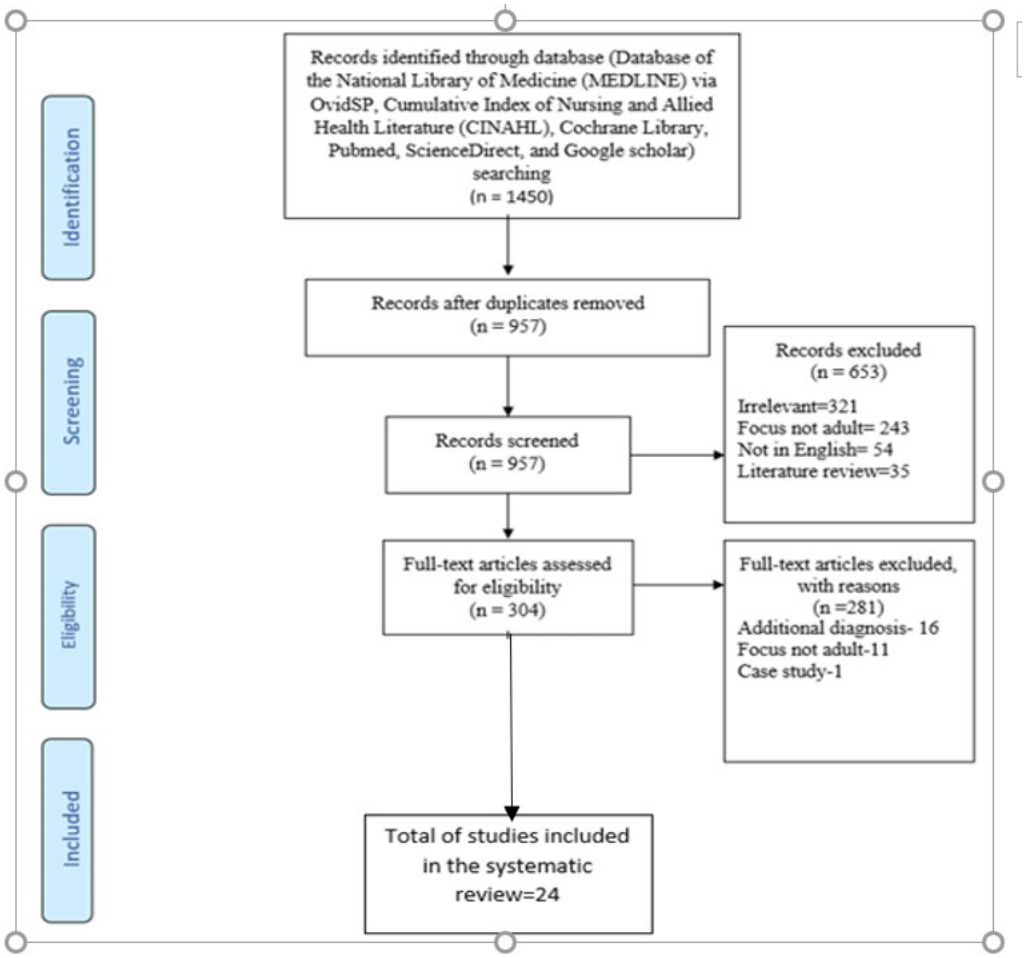

Figure 2.2 Flow diagram for the selection of studies included in a systematic review

2.8. DATA EXTRACTION

A data extraction sheet was prepared to ensure consistency in the information obtained from the articles (CRD, 2009). The data extraction sheet contains columns that have to be filled with the following information: author, year published, research design, sample size, comparison group, intervention information, outcome measures and limitations of the study.

2.9. THE APPRAISAL OF STUDY QUALITY

In terms of critical appraisal, research evidence is systematically examined to assess relevance, results and validity of the study prior to use (Hill & Spittlehouse, 2003). There are three main components of the critical appraisal process including evaluation for validity, applicability of study findings to international or national population, and reliability of its research design (Facchiano and Snyder, 2012, Smith *et al.,* 2011). Instead of judging the quality of research design, Melnyk and Fineout-Overholt (2011) included an evaluation of the quality of evidence-based clinical practice in the process of critical appraisal. According to Parahoo (2006), the methods that are used to synthesise and evaluate a study's findings should also be included in a systematic review. For quality appraisal, the developed instruments generally share some fundamental assessment criteria including conducting the research ethically, considering relevancy while developing policy or practice, using rigorous and appropriate methods and coherence and clarity of reporting (Cohen & Crabtree, 2008). Assessing the study quality in terms of reliability and validity enables the organizations and researchers to support best research evidence for practice (Facchiano & Snyder, 2012). For this purpose, it is important to evaluate the limitations, weaknesses and strengths of the studies being reviewed.

2.10. QUALITY ASSESSMENT AND ANALYSING STUDIES ACCORDING TO DETERMINED CRITERIA

A critical appraisal skill program (CASP, 2016) tool was used to assess the quality of all included studies. Initially, 43 studies were evaluated using the CASP tool. Of these, 24 were included in the final review after applying the inclusion and exclusion criteria. All the included studies had a score between 7-9 out of 10 questions answered with "yes" in the quality appraisal

and were consequently considered to be suitable for this study. The quality assessment scores are presented in table 2-5. The most common weaknesses in the included studies were related to sampling issues that in turn limited the generalizability of results.

Table 2.5 Major Findings of Included Systematic Studies (n=4)

Study	Key Findings
1.Villa-Roel *et al., (2016)*	**Design:** Systematic review **Sample:** 5 studies, 825 participants **Key Findings**: ED-directed educational interventions in which the target of study was patients or providers which increased the chance of having office follow-up visits with Primary Care Physicians after asthma exacerbations. Their effects on health-related outcomes (e.g. admissions and relapse) are still unclear.
2.Pinnock H, *et al.*, (2015).	**Design:** Systematic review **Sample:** 8 electronic data bases **Key Findings:** The data in this study was collected with respect to process measures, asthma control (patient reported control questionnaire, symptom-free days, days off work/school), and use of health services (emergency attendance, admissions, unscheduled consultation.
3.Freita *et al.*, (2013).	**Design:** Systematic Review **Sample**: 13 studies; 906 participants **Key Findings:** The outcomes measured included: asthma symptoms, quality of life, lung function, and number of acute exacerbations. Eleven studies conducted comparison of breathing exercise with inactive control, and two with asthma education control groups. All eight studies in which quality of life was evaluated reported improvement in this outcome. An improvement in the number of acute exacerbations was found out by the only research which assessed this outcome. Six out of seven researches showed paramount differences favouring breathing exercises for symptoms of asthma. Effect on the functioning of lungs was more variable with no difference found in five out of the eleven studies which evaluated the result, whereas the other six showed important differences for this outcome when breathing exercises were favoured.
4.Press , *et al*., (2012).	**Design:** Systematic review **Sample:** 24 articles **Key Findings:** Education dispensed by healthcare professionals was effective in enhanced outcome for minority patients with asthma.

Study details	Aims	Intervention	Self-control/ compliance	Quality of life	Emergency Visits	Other findings
1.Villa-Roel *et al.,* (2016) Canada Meta-analysis; systematic review 5 studies, 825 participants	Evaluate whether ED-directed educational intervention enhance office-follow up with primary care provider upon ED discharge for acute asthma.	ED-directed educational intervention, Phone call in post-ED situation to the patient for arranging a follow up appointment.		Positive outcomes involved improvement in quality of life	ED-directed educational interventions focused patients or providers enhance the chance of office-follow up visit with PCPs upon asthma exacerbation	
2.Pinnock H, *et al*., (2015) UK systematic review involving total of 18 studies	In this research a systematic review of studies was conducted to report the delivery of self-management intervention in populations suffering from asthma within routine clinical care.	School-based intervention; self-management support interventions; one-to-one education; group education; individualized education.	There is overwhelmingly positive and extensive evidence of RCT for the efficacy of self-management		Significant improvement in morbidity and mortality	Interventions were described by six studies which were focused on educating patients. In these studies, process was improved by targeting professionals (n=2), but there was not clinically significant impact on clinical outcomes. Some process measures were improved under 'targeting patients' (n = 6), but there was inconsistent effect of clinical outcomes. Targeting the organization (n = 3) also enhanced the process measures but there was little impact on clinical outcomes. Interventions which expressly addressed professional, patient, and organizational elements (n = 7) highlighted the most consistent betterment in process and clinical outcomes.
3.Freitas *et al.*, (2013). Brazil Randomized controlled trials 13 studies; 906 participants	To assess evidence of effectiveness of breathing exercises in management of patients suffering from asthma.	breathing exercises; three main groups	43	Overall betterment in asthma symptoms, quality of life, and number of exacerbations		Six of the eleven studies which evaluated the lung function showed a prominent difference favouring breathing exercise.
4.Press *et al.*,	Systematic review of studies for	Community				The most widely reported post-

Table 2.7 Summary table of effectiveness evidence (Systematic reviews)

Table 2.5 summarizes the four systematic reviews. The first study of Villa-Roel (*et al*. 2015) conducted a systematic review. The objective of their study was evaluating whether ED directed educational interventions enhanced office follow-ups with primary care providers (PCPs) upon ED discharge in cases of acute asthma. There were five studies involved in the research of Villa-Roel *et al*. (2015). Two were conducted in the US (n = 2) and three were conducted in Canada (n = 3) between 2001 and 2013. Two studies involved a post-ED phone call to patients reminding/helping them to arrange a follow-up appointment with PCP at their office. Two studies highlighted a short course of oral corticosteroids (50 mg/day prednisone for 5 days) and transportation vouchers; two studies involved faxed letters with tailored suggestions to PCP office of patient, and one study provided asthma action plan (AAP) at ED discharge. In all the studies, the effectiveness of educational interventions was evaluated compared to usual care. Usual care generally involved medication prescription and discharge instructions at the discretion of treating emergency physicians. However, in two studies there was provision of printed educational material concerning asthma, compliance as standard care, and medication use. In this review evidence was provided to support consideration of ED-directed educational interventions (targeting providers or adult patients) as effective strategies for increasing the office-follow up visits with primary care providers after asthma exacerbations. However, no evidence was provided that such interventions were useful to improve other health-related outcomes such as admissions or relapses.

The authors highlighted the significance of skills training and health system commitment for patient education programs supported by regular reviews, professionals, and continuous assessment of implementation effectiveness. Pinnock *et al.* (2015) categorized the chosen studies primarily in terms of professional training, patient education, and an entire systems approach. None of the studies related to professional training mentioned interventions, but mainly the whole systems approach and patient education mentioned the intervention, measure, and outcome of intervention.

Freitas *et al.* (2013) conducted the third systematic review study listed. The primary objective of the study was evaluating the evidence for effectiveness of breathing exercises in patient management of those suffering from asthma. Their research included the randomized control trials of patients undertaking breathing exercises compared with control group who were given asthma education and no control group. The review involved a total of 13 studies in which the number of participants comprised 906 patients. Trials were distinct from each other

with respect to number of participants enrolled, breathing exercises performed, outcomes reported, duration and number of sessions completed, and statistical presentation of data. Outcomes measured comprised asthma symptoms, quality of life, number of acute exacerbations and lung function. In eleven studies the breathing exercise was compared with inactive control and two with the control group involving asthma education. All the eight studies which evaluated the quality of life reported a significant improvement in this outcome. There was only one study which observed improvement in the number of acute exacerbations.

This heterogeneity may be traced to different studies using different methodological instruments. For example, there was difference in duration of the intervention between Sodhi (2009) and Vempati (2009) (45 minutes for 8 weeks compared to 4 hours for 2 weeks respectively). Impact on the functioning of lungs was more variable with no difference being found in 5 out of 11 studies in which this outcome was evaluated, whereas the other 6 studies showed a significant difference for the outcome as they favoured the breathing exercises. Capnography was evaluated in two studies (Grammatopoulou, 2011; Holloway, 2007). There were not any significant differences found in the study of Holloway (2007) between control groups and interventions regarding end-tidal carbon dioxide. However, better results were found with respect to values for relaxed rate of breathing over a 10-minutes period in intervention group compared to control group as $P < 0.001$ at 6- and 12- month post-baseline assessments. In Grammatopoulou's (2011) study an increased end trial $CO_2$was shown in the intervention group compared to the control group as $P = 0.002$ and 0.003 for 1- and 6- month post-baseline assessment respectively; $P < 0.0001$ for 2-month post-baseline assessment. Decreased respiratory rate was found in intervention group compared to the control group ($P < 0.0001$).

Two studies involved 194 participants in which this outcome was assessed (Thomas, 2003; Thomas, 2009). Both studies also involved a follow up period of 1 and 6 months respectively. Thomas (2003) found out that compared to the control group a significant statistical improvement ($P = 0.018$) was found in overall asthma quality of life (AQLQ) scores in the intervention group after 1 month. After 6 months, the intervention group was better than the control group only in terms of improvement in activities domain of AQLQ ($P = 0.018$). However, in a study by Thomas (2009), no significant difference between groups was found in four subdomains of AQLA as 1-month assessment. However, the 6 months assessment

found that the intervention group significantly improved compared to the control group with respect to activities (P = 0.01), symptoms (P = 0.01), and emotions (P = 0.05) domains. However, improvement was not found in environment domain (P = 0.40).

The study by Thomas (2009) also involved the assessment of Hospital Anxiety & Depression Score (HADS). In this study significant reductions were found in HADS in both groups after 1 month of intervention, with no significant differences found between the groups. In a 6-month assessment, significant differences between groups were found favouring the intervention group for Depression score (P = 0.03) and Anxiety score (P = 0.02). In both the studies 194 participants who were asthma patients were involved. In both studies assessment of symptoms was made at baseline 1 month and 6 months after intervention. In a study by Thomas (2003), the difference between groups favouring intervention was statistically significant for 6 months assessment (P = 0.01), whereas in study by Thomas (2009) no difference between groups was noted for ACQ whereas a statistically significant difference was found in the intervention group at 6 months assessment for the Nijmegen Questionnaire (P = 0.005).

Press *et al.* (2012) conducted a systematic review in which 24 articles were involved. The population of study comprised African American (n = 14), Latino/a (n = 4), Asian Americans (n = 1), and combination of the above (n = 5). However, no study was conducted in the context of Saudi Arabia specifically or the Arab region in general. The post-intervention outcome most commonly reported was usage of healthcare resources followed by self-management skills and symptom control, but none of the studies involved evaluation of program content which is a major focus in the current thesis. The most common type of intervention studied was patient education. Even though less than half were culturally tailored, education which was language appropriate was found to be specifically successful. The majority of interventions were education based (n = 15); 3 were defined by the author of three studies; 5 were culturally tailored; and 2 by their review. A comparison group was not included in any of the CTW studies. In 3 studies the African American population was taken into account, 1 study focused entirely on Latino community, and 1 study involved language appropriate education for different Asian population. Improved outcomes were found in four consumption tobacco education (CTE) interventions. The other ten educational interventions were not particularly culturally tailored but in them the majority of the population comprised non-White participants (i.e. Afro-Americans), although one did involve a majority Latino

population. All except one of these ten studies were conducted specifically in the hospital setting compared to the CTE interventions which were mainly outpatient based. There was at least one successful component of all the interventions. Different studies found similar outcomes (e.g. hospitalization, ED visits). However, meta-analysis was not conducted as interventions were found to be too heterogeneous in nature to provide for a valid conclusion. There was variance of intervention in terms of design, setting, and follow up. For example, four studies employed pharmacists, whereas others employed asthma educators, nurses, and some other multiple education sessions. Different lessons can be derived by comparing the various elements studied.

These four systematic reviews took place with respect to Asthma education and it also shows the effectiveness of such a program in controlling asthma (Table 2.5). The outcomes measured in the studies included reducing emergency visits, quality of life, medication compliance, and knowledge increase. However, none of the studies in the four systematic review involved and assessed the during and post program employee motivation of PAM. This is the chief focus in the current study for identifying the activation of the patient during and after program delivery. Furthermore, one study (Freitas *et al.* 2013) involved intervention as well as non-intervention studies, but this thesis only involves intervention studies for systematic review.

Moreover, it is also significant to emphasize that although the results of the research carried out by Freitas *et al.* (2013) was consistent with the results showed by two existing systematic reviews (Zhong *et al,.* 2017; Drummond *et al.* 2017), there were methodological differences found among two other studies. Douglas and Osman (2000) involved two cross-over studies and one study which was conducted with children who were admitted to hospital involving acute severe asthma. Ram (2003) included six studies in which breathing exercise techniques were not involved. However, the current thesis involves one of these techniques (the Papworth method) (Holloway, & West, 2007).

Furthermore, most of the systematic review included developed countries which are significantly different regarding patient education compared to developing countries. They are also different regarding program delivery and organizational setting. The review conducted by Press *et al*. (2012) involved Asian Americans (n = 1). However, none of the studies involved an Arab population. Since the primary aim of the current research is determining the best asthma educational program for Saudi Arabia, it is therefore imperative

to understand the local setting and culture of the organization to ensure effective program delivery. The majority of the interventions were based on education (n = 15), whereas 5 were culturally tailored. The focus of 3 studies was on Afro-American population, 1 study focused on Latin population, and one study involved language appropriate education for different Asian populations. Again, however, none of the studies involved Arab population.

Improved outcomes were found in four culturally tailored studies. The remaining 10 educational interventions were not particularly culturally tailored but did involve a majority of non-White participants (usually Afro-American participants.) However, at least one study involved a Latino population. It has also been found that none of the studies expressly highlighted the material and content development of a program, but they possessed sufficient information concerning the delivery and intervention because other authors also highlighted that there was issue of quality material and information as related to a health education program. Therefore, the current thesis attempted to provide information on development and evaluation of content of delivery program from the point of view of patients.

None of the selected studies explicitly highlighted the content and material development of the program, although information about the intervention and delivery was highlighted. Issues with the quality of information and materials for the different health education programs were identified from the patient comments and experiences. Therefore, the content and quality of the education intervention is important. Tables 2.6 and 2.7 provide summaries of the intervention and educational interventions for the remaining 20 studies.

Table 2.6 Summary of included intervention

Author year	Aim	Design/Sample	Intervention	Findings	Quality
5.Mishra *et al.* (2017) USA	To evaluate the impact of an outpatient adult asthma education program in an inner-city hospital caring for patients with low socioeconomic and educational status	One group pre/post experimental study **231** patients	Asthma education program	Asthma education played an important role in decreasing number of patients requiring ER visits and hospital admissions	8
6.Mohamed-Ali, & Elmaati, (2016) Egypt	To investigate the effect of implementing a self-management program to improve asthma knowledge and inhaler technique among adult with asthma	One group, pre/post-test, quasi-experimental research design **75** Patients	Education program on the nature of disease as well as using medication and devices to alleviate asthma. Printed material and physical demonstration and video demonstration of different inhaler technique devices were also considered.	The total percentage score of asthma knowledge increased scientifically from 58.3% to 90% per intervention The study revealed that nearly almost half of the asthma patients claimed to know how to use inhalation devices correctly, though more than two thirds of participants had poor inhaler technique pre educational intervention. Participants using an accurate demonstrated poorer technique compared to C those using a pMD or hand inhaler (prefilled dry powder inhaler).	7
7.Steurer-Stey *et al.* (2015) Switzerland	To investigate the effect of disease-unspecific motivational training on self-management adherence in addition to	Randomized controlled trial.	All patients followed an asthma-specific education.	Both groups showed excellent adherence to self-monitoring over three months [27 patients (90.0%) in intervention and 25 patients (83.3%) in control group.	7

Author year	Aim	Design/Sample	Intervention	Findings	Quality
	asthma-specific patient education	**30** experimental **30** control	The intervention group participated in the Zurich Resource Model (ZRM®) training (www. zrm.ch) that is based on cognitive-behavioural theory Individual education		
8.Boulet *et al.* (2015) Canada	To demonstrate the benefits of an educational program offered at the site of primary care (Family Medicine Clinics- FMC) by trained asthma educators on patient outcomes and healthcare use	One-year pre-post intervention study Three follow-up visits 6 weeks, 6 months, and one year **124;** Patients (41 males and 83 females)	Asthma self-management education programs Education on asthma and its control, environmental control, use of an action plan, adherence to medication, inhaler technique, and spirometry.	The intervention increased asthma knowledge and improved medication adherence. The number of unscheduled visits for respiratory problems fell from 137 to 33 (P < 0.0001), the number of antibiotic treatments from 112 to 33 (P Z 0.0002), and the number of oral corticosteroids treatments from 26 to 8 (NS).	7
9.Federman *et al.* (2015) USA	To compare the effectiveness of a home- and clinic-based asthma care coordination and self-management support program to improve quality of care and asthma related outcomes for older adults with poorly controlled asthma	RCT, Pragmatic patient-randomized trial **425** patients 60 years and older	Multi-component asthma self-management support intervention The intervention has 4 core elements: (1) clinical decision support tools (2) a screening tool to identify patients' specific barriers to asthma control, (3) targeted "mini" interventions and (4) repeated follow up	Improve self-management and generalization of the program over health organisations	8
10.Lim *et et al.* (2014).	The aim was to evaluate an intervention that incorporated regular patient self-monitoring	randomized controlled trial	Multidisciplinary, pharmacist-led intervention that included asthma education, monitoring, feedback, and follow-up as integral components of	MAMMA trials have shown effective education by a pharmacist–led multidisciplinary team can improve asthma control during pregnancy.	8

Author year	Aim	Design/Sample	Intervention	Findings	Quality
Australia	and a multidisciplinary health professional approach to asthma management (Multidisciplinary Approach to Management of Maternal Asthma [MAMMA]).	60 pregnant women Observed at baseline, 3 and 6 months after the intervention	the monthly intervention. (face to face visits, small group)	The ACQ score in the intervention group (n = 29) decreased by a mean ± SD of 0.46 ± 1.05 at 3 months and 0.89 ± 0.98 at 6 months. The control group (n = 29) had a mean decrease of 0.15 ± 0.63 at 3 months and 0.18 ± 0.73 at 6 months. The difference between groups, adjusting for baseline, was −0.22 (95% CI, −0.54 to 0.10) at 3 months and −0.60 (95% CI, −0.85 to −0.36) at 6 months. The difference at 6 months was statistically significant ($P < .001$) and clinically significant (> 0.5).	
11.Raju *et al.* (2012) USA	This study tested the effectiveness of Asthma Action Plan (AAP) implementation by phone to improve asthma control.	A prospective cohort study design **48** patients with asthma from	telephone-based interventions - care insurance plan	Improve self-management Asthma management using the Asthma control score and Action Plan by phone is a feasible strategy that is acceptable to patients and can improve asthma control without the need for an office visit After the implementation of asthma education program, it is found that Seven of nine (78%) initially uncontrolled patients were controlled, for a total of 40 (83%) patients controlled by the end of the study. It is found that after the implementation of asthma educational plan, the asthma control status improved as number of patients who can control increased from 33 to 40. On the other, it has found that number of uncontrolled asthma patients have been reduced from 9 to 2 in the end of asthma education program.	7
12.Poureslam *et al.* (2012). China	To explore the effectiveness of different formats of culturally relevant information and its impact on asthma patients' self-	Participatory approach to test knowledge using different approaches	Asthma self-management education programs	The results suggest that short, simple, culturally, and linguistically appropriate interventions can promote knowledge gain about asthma and improve inhaler use that can be sustained over the short term.	8

Author year	Aim	Design/Sample	Intervention	Findings	Quality
	management within the Punjabi, Mandarin, and Cantonese communities	A total of **92** physician-diagnosed adult asthma patients (47 Chinese and 45 Punjabi	Content in educational videos a pictorial pamphlet	Knowledge of asthma symptoms, inhaler use, and understanding of physician's instructions improved significantly from pre-test to 3 months post-intervention follow-up among all participants. Participants performed significantly better at follow-up than they did at baseline assessment, with the most notable improvements observed in the group that watched both community and knowledge videos	
13.Chen *et al.* (2010) China	This study was developed to investigate the effects of a self-efficacy intervention on (a) the self-care behaviours of adult asthma patients and (b) the self-efficacy of adult asthmatic patients	RCT-The study used a pre-test/post-test experimental design. **60** Patients (30 in each group)	Asthma self-management education programs Self-efficacy intervention program Experimental group participants received the self-efficacy intervention program, which included watching a 15- to 20-minute DVD, received a healthcare booklet on self-efficacy for adult asthmatic patients, were asked to share their illness experience with support groups, and received medical follow-ups by telephone.	Significant improvement in the self-care behaviours of patients who received self-efficacy intervention in terms of medication adherence (p= .008), self-monitoring (p= .000), avoidance of antigens (p= .001), regular follow-up visits (p = .000), and regular exercise (p = .016) The program improved participant self-efficacy in terms of both asthma attack prevention (p = .030) and management during asthma attacks (p = .017).	7
14.Tousman *et al.* (2007)	To improve asthma knowledge and self-efficacy and to assess effects in patients with	Randomized controlled behavioural trial	Asthma self-management education programs	Intervention patients had more improvement in AQLQ scores at 5 months, but this difference was not sustained. For the entire period, AQLQ scores improved by a clinically important difference from 4.1 to a mean of 5.1 in both groups (P < .001) with no difference	7

Author year	Aim	Design/Sample	Intervention	Findings	Quality
USA	depressive symptoms.	**21** patients	Intervention patients made a contract to adopt a behaviour to improve asthma and received a workbook, weekly reinforcements for 12 weeks, and frequent follow-up visits	between groups (P = .91). Thirty-one percent of patients had an ED visit, and 9% were hospitalized, with no differences between groups	
15.Angelini *et al*. (2009) Brazil	To evaluate the understanding of asthma and the clinical improvement in patients with moderate or severe persistent asthma prior to and after their participation in an educational program presented during the routine outpatient visits.	Prospective pilot study **164** patients	Asthma educational program The educational program consisted of lectures, with visual aids (posters), presented to groups of 7-10 patients.	The educational intervention significantly increased the understanding of the disease ($p < 0.001$), greater clinical improvement ($p < 0.05$) with a decrease in the use of oral corticosteroids, along with fewer visits to the emergency room and fewer days missed from work or school Results reveal that mean number of adverse events (use of oral corticosteroids and days missed from work or school, visits to the emergency room, or a combination of the two), based on the analysis of the month preceding each visit, decreased significantly between Visit1 and V Visit 2 (5.06 ± 0.44 vs. 3.19 ± 0.34; $p < 0.05$). This number remained stable between Visit 2 and Visit 3 but showed yet another significant reduction between Visit 3 and Visit 4 (from 3.86 ± 0.39 to 2.27 ± 0.47; $p < 0.05$)	7
16.Huang *et al*. (2009) Taiwan	This paper is a report of a trial to examine the effectiveness of individualized self-care education programs in older adults with moderate-to-severe asthma.	Randomized controlled trial **148** patients randomly assigned tone of three groups: usual care, individualized education, or individualized education with peak	individualized self-care education with asthma Patients in this group received individualized education alone for 6 months. This program was provided by a nurse who had 6 years of experience in chest and emergency care of older adults and who telephoned patients once a week for 6 months	Higher asthma self-care competence scores (F = 334Æ06 and 481Æ37, P < 0Æ001) and asthma self-care and self-efficacy scores (F = 104Æ08 and 68Æ42, P < 0Æ001) than patients in the usual care group. In addition, patients who received individualized education with peak flow monitoring had statistically significantly higher asthma self-care behaviour and self-efficacy scores (P < 0Æ001) and asthma control indicators (P = 0Æ025) than the education alone group. No differences were found among the three groups in unscheduled health service usage	8

Author year	Aim	Design/Sample	Intervention	Findings	Quality
		flow monitoring, and followed for 6 months.			
17.Janson *et al.* (2009). USA	To study the effect of self-management education on long-term adherence to inhaled corticosteroid (ICS) therapy and markers of asthma control.	Prospective, randomized controlled trial **84** adult patients randomized to individualized self-management education, including self-monitoring of symptoms and peak flow or usual care with self-monitoring alone.	Individualized self-management education, including self-monitoring of symptoms and peak flow or usual care with self-monitoring alone	Participants randomized to the self-management intervention maintained consistently higher ICS adherence levels and showed 9-fold greater odds, of more than 60% adherence to the prescribed dose compared with control subjects at the end of the intervention (P = .02) and maintained 3-fold greater odds of higher than 60% adherence at the end of the study. Perceived control of asthma improved (P = .006), night-time awakenings decreased (P = .03), and inhaled β-agonist use decreased (P = .01) in intervention participants compared with control subjects.	8
18.Armour *et al.* (2007) Australia	The impact of the Pharmacy Asthma Care Program (PACP) on asthma control was assessed using a multi-site randomised intervention versus control repeated measures study design.	Multi-site randomised intervention versus control repeated measures design **186** Patients	Asthma self-management education programs Pharmacy Asthma Care Program (PACP)	Improved asthma knowledge improved asthma control improved adherence to preventer medication decreased mean daily dose of reliever medication Improved quality of life	8
19. Kritikos *et al.* (2007) Australia	This study aimed to compare the effects of two small-group asthma education interventions (one delivered by	Pilot study.	Asthma Education in the community	The results of this study demonstrate that community pharmacist-led asthma education that focuses on the proper use of asthma medication, delivered to small groups of people with asthma, appears to be more effective than usual care in improving asthma	8

Author year	Aim	Design/Sample	Intervention	Findings	Quality
	specially trained pharmacists (group A) and one delivered by a pharmacist researcher trained as an asthma educator (group B) with usual care provided by community pharmacists (group C) on clinical and humanistic outcomes for people with asthma.	48 patients assigned to 3 groups	The intervention program delivered to small groups of participants (5–8) in groups A and B was a single interactive session of 150 mins duration focusing on the proper use of asthma medication.	severity/control, inhaler technique, and asthma knowledge	
20.Tousman *et al.* (2011) USA	The purpose of the research was to develop, implement, and evaluate a new adult asthma self-management program with a multidisciplinary perspective.	Pilot project	asthma self-management program Learner-centred teaching techniques such as interactive communication and social support were utilized to help participants practice self-management behaviours including problem-solving and goal setting	Statistically significant and clinically relevant improvements for each subscale as well as total QOL were found. (a) an increase in the weekly mean frequency of PEF measurement, $t(19) = 4.848$, $p < .001$, (b) a decrease in a weekly mean frequency of reliever medication use $t(19) = 3.545$, $p = .002$]	5
21.Elbanna *et al.* (2017) Egypt	To improve bronchial asthma control in all patients in family health care units.	Post-test study 84 adults	Bronchial asthma educational program (short term intervention)	The educational intervention significantly improved the level of asthma knowledge and level of asthma control ($p < 0.001$), has led to fewer visits to the emergency room, hospitalization and referral to specialist ($p < 0.001$).	8
22. Patel *et al.* (2017) USA	To evaluate a telephone-based self-regulation intervention that emphasized African American women's management of asthma in a series of 6 sessions	RCT 422 women assigned to experimental and control groups	telephone-based self-regulation intervention Information package to evaluate a telephone-based self-regulation intervention that emphasized African American women's management of	Patients in the intervention group had significant gains in self-regulation of their asthma, noticing changes to their asthma during their menstrual cycle. Work should address significant comorbidities and psychosocial issues alongside asthma management to improve asthma outcomes in the long term and when having premenstrual syndrome.	8

Author year	Aim	Design/Sample	Intervention	Findings	Quality
			asthma in a series of 6 sessions Patients were assessed at baseline and 2 years later.	They also had significant reductions in daytime symptoms, asthma-related hospitalization, and improved asthma control.	
23. Schuermans (2018) Belgium	Evaluates whether a single educational session could improve asthma control. Assessed by Asthma Control Test score as well as knowledge of the inhaler device, knowledge of medication and inhalation technique.	prospective single blinded randomized controlled trial **160** adults	Single standardized, educational intervention Single standardized, educational intervention, performed by a respiratory nurse specialist (basic information about asthma treatment and instructions on inhalation technique for about 10min)	In the intervention group the educational session resulted in a significantly higher proportion of well controlled asthma patients. Improvements in knowledge of medication, knowledge of device, and inhalation technique in the intervention group	7
24.Speck (2016) USA	To develop and assess the feasibility of an electronic asthma self-management program for young African American adults	Pre-post intervention study **44** adults	Asthma self-management program (6-week Breathe Michigan Program)	A total of 89% of enrolled subjects completed the 6-week intervention with 77% were available for evaluation at 3 months. The program was helpful. 97% would recommend it to others. Asthma control as measured by the Asthma Control Test improved from 16.1 to 19.3, and asthma quality of life as measured by the Mini Asthma Quality of Life Questionnaire improved from 4.0 to 5.1	7

Table 2.7 Summary of education interventions

Author/Year	Education type	Content of education	Teaching method	Delivery setting	Delivered by	Instructional contact time
5.Mishra *et al.* (2017)	Asthma education program (personalized and structured education)	Written education material, basic definition of asthma, disease management and control, medications pictures and descriptions, use of inhalers and role of peak flow, and environmental control and trigger	Personalized (one to-one)	Inner city community hospital	Two on-site certified asthma educators, bilingual (English and Spanish) respiratory therapist and a clinical pharmacist	2 x 30-minute sessions
6.Mohamed-Ali and Elmaati (2016)	The educational interventions	Disease etiology, pathophysiology, investigations, medications and use of inhaler devices, treatment, and prognosis and folklores. colored brochures that contained pictures for different inhaler devices and correct technique for each one for their personal study at home	Face to face lectures, physical demonstration and video demonstration, brochure	Hospital	Nursing staff and internal medicine staff	2 x 50 minutes sessions
7.Steurer-Stey *et al.* (2015)	All patients followed an asthma-specific education. Zurich Resource Model (ZRM) training is used to	The modules addressed three main dimensions: (1) Knowledge (pathophysiology of asthma, benefits and side effects of drugs); (2) Skills (inhalation technique, self-monitoring with peak expiratory flow (PEF) and symptom diaries); (3) Behavior (interpretation of	Patients attended a two-day, group-based training and two refresher sessions	At the Centre for Interdisciplinary Patient Education of the University Hospital of Zurich, Switzerland	Experienced asthma trainers	Two-day, training + two refresher sessions of 2h after 4 and 12 weeks

Author/Year	Education type	Content of education	Teaching method	Delivery setting	Delivered by	Instructional contact time
	see the patient activation after education delivery.	self-monitoring and appropriate action in case of asthma deterioration based on a written action plan that used a traffic light scheme to indicate a stable situation or worsening). Used Zurich Resource Model (ZRM®) training (www. zrm.ch) that is based on cognitive-behavioral theory.				
8.Boulet *et al.* (2015)	Asthma self-management education programs	Asthma control, smoking habits, environmental control, use of an action plan, patient knowledge and understanding of the disease (pathophysiology, medication, exacerbations), adherence to medication, inhalator technique, and spirometry	Four visits at the clinic Each patient demonstrated inhaler technique with placebo devices of each type of inhaler they were using. They were asked to use their inhalers as they normally did at home.	Family medicine clinic	Physician and asthma educator	1-h + assessment Of technique at each visit
9.Federman *et al.* (2015	Multi-component asthma self-management support intervention	The intervention has 4 core elements: (1) clinical decision support tools; (2) a screening tool to identify patients' specific barriers to asthma control; (3) targeted "mini" interventions; and (4) repeated follow up	Locally introducing new asthma-focused clinician decision support and patient self-management support modifications in the Epic electronic health record	Home self-management, primary care, usual care	Physician and asthma nurse educator	The coaches also participate in 90-minute monthly continuing education meetings
10.Lim *et al.* (2014)	Multidisciplinary, pharmacist-led intervention	Asthma education session, Medication management review and Asthma and	Face to face visits	Home	Family physician, pharmacist, asthma educator and	Monthly follow up by pharmacist for an hourly session to assess their

Author/Year	Education type	Content of education	Teaching method	Delivery setting	Delivered by	Instructional contact time
		Health Pregnancy Brochure"			midwives	asthma control
11.Raju *et al.* (2012)	Telephone-based interventions - care insurance plan	Dietary counseling, weight management, smoking cessation, management of chronic conditions such as heart disease and hypertension, medication compliance, and improving quality of life with asthma to improve asthma control.	Telephone intervention to improve asthma control.	university-based family medicine residency clinic	Health system by health provider Family medicine students	N/A
12.Poureslami *et al.* (2012)	Asthma self-management education programs (Community educational)	Watching education videos or reading educational pamphlets. Patients received education on asthma self-management via videos and pamphlet and outcomes, including their knowledge of asthma triggers (environmental-related and behavioral-related triggers) and symptoms; inhaler use skills and patient-reported medication adherence were measured	Group 1 viewed a physician-led knowledge video, Group 2 viewed the patient-generated community video, and Group 3 viewed both the knowledge and community videos	Community center, facilitators, immigrant serving agency, university -based pulmonary medicine clinic	Physician	1-month educational intervention
13.Chen *et al.* (2010)	Asthma self-management education programs	Booklet included healthcare knowledge and medication advice for adult asthmatic patients. Related explanations and illustrations were used to make reading and understanding easy for	Experimental group participants received the self-efficacy intervention program, which included watching a 15- to 20-minute DVD, received a healthcare booklet on self-efficacy for adult asthmatic	Chest medicine division of a medical center in Kaohsiung	Health professionals invited included chest internal physicians, head nurses, and respiratory management head	Unclear

Author/Year	Education type	Content of education	Teaching method	Delivery setting	Delivered by	Instructional contact time
	(Self-Efficacy Intervention Program)	patients. Illness experience sharing with a support group was conducted using 45-minute sessions.	patients, were asked to share their illness experience with support groups, and received medical follow-ups by telephone.		nurses	
14.Tousman *et al.* (2007)	Asthma self-management education programs (individualized intervention)	Consisted of lectures, with visual aids (posters), presented to groups of 7 to 10 patients.	One-on-one sessions included assessment, self-efficacy-enhancing strategies, and evaluation. The first 1-h lecture, presented to patients prior to the medical visit, covered the pathophysiology of asthma and environmental control, focusing on conceptual information regarding asthma and its triggering factors, respectively. The second 1-h lecture, presented to patients after the medical visit, provided information regarding pharmacological treatment, including training in the inhalation technique	HOPE School of Nursing & Infection Control Nurse, Fujian Provincial Hospital, China	The intervention was delivered by the first author. Nurse Graduate Student	The program was divided into two 1-h lectures presented before and after medical visits, totaling 2 h of duration. Intervention patients made a contract to adopt a behavior to improve asthma and received a workbook, weekly reinforcements for 12 weeks, and frequent follow-up visits
15.Angelini *et al.* (2009)	Asthma educational program	The educational program consisted of lectures, with visual aids (posters).Lectures divided into: pathophysiology; environmental control; and treatment, including training in the inhalation technique. Program includes education, self-monitoring, regular	Programs are presented to small groups, over long periods, by trained educators using verbal, written, visual or aural resources to impart knowledge. They also include training in management based on self-monitoring and on an individualized, written action plan, combined with regular	Asthma outpatient clinic	Health provider	Being under outpatient follow-up treatment for a minimum of 2 years; and being under regular pharmacological treatment (with an inhaled corticosteroid and a long-acting bronchodilator) for a

Author/Year	Education type	Content of education	Teaching method	Delivery setting	Delivered by	Instructional contact time
		evaluations and management using written action plans	medical appointments.			minimum of 3 months
16.Huang *et al.* (2009)	Individualized self-care education with asthma	Also, the educational brochure was designed with colored pictures, step-by-step instructions, and used few words with big characters.	The first 1-h lecture, presented to patients prior to the medical visit, covered the pathophysiology of asthma and environmental control, focusing on conceptual information regarding asthma and its triggering factors, respectively. The second 1-h lecture, presented to patients after the medical visit, provided information regarding pharmacological treatment, including training in the inhalation technique	Chest and emergency care ward	By Nurses	Individualized education with peak flow monitoring, and followed for 6 months Through follow-up telephone calls, the nurse addressed the concerns of patients and family members, monitored patients' progress, and collaborated with physicians to modify therapies.
17.Janson *et al.* (2009)	Individualized self-management education with asthma	Personalized components Including self-monitoring of symptoms and peak flow or usual care with self-monitoring alone. Also, education Consisted of standardized components regarding asthma facts and medication action.	The key components of the 30-minute intervention were asthma information, assessment and correction of inhaler technique; an individualized action plan based on self-monitoring data; and environmental control strategies for relevant allergen and irritant exposures. The intervention was personalized based on pulmonary function, allergen skin test reactivity, and inhaler technique and reinforced at 2-week intervals. The intervention was delivered in 3 identical 30-minute visits after randomization. Control participants attended the same	Large metropolitan community clinics	A trained advanced practice nurse who certified asthma educator	The 4-week intervention period of biweekly visits

Author/Year	Education type	Content of education	Teaching method	Delivery setting	Delivered by	Instructional contact time
			number of visits, focusing on data collection only			
18.Armour *et al.* (2007)	Asthma self-management education programs (Pharmacy Asthma Care program (PACP))	Asthma education group manual and were trained on risk assessment, pathophysiology of asthma, asthma medications, the NAC six-step asthma management plan, patient education, goal setting, adherence assessment, spirometry.	Compatible with the spirometer software to be used in the study, ability to attend training sessions and a minimum of two pharmacists on duty at any one time Use of a reliever medication .3 times a week over the previous 4 weeks. N Waking at night or morning with cough/chest tightness on at least one occasion over the previous 4 weeks. N Time off work/study because of asthma over the previous 4 weeks. N Symptoms of asthma (cough, breathlessness, wheeze, etc.) at least once a week over the previous 4 weeks	Quality Care Pharmacy Program (QCPP) accredited pharmacies	Qualified respiratory scientists	An ongoing cycle of assessment, goal setting, monitoring and review) to 191 patients over 6 months, while control pharmacies gave their usual care to 205 control patients. Both groups administered questionnaires and conducted spirometry testing at baseline and 6 months later. The main outcome measure was asthma severity/control status.
19.Kritikos *et al.* (2007)	Asthma Education in the community	The session covered asthma, its management, asthma medication, inhaler use, and relevant written information	The intervention program delivered to small groups of participants (5–8)	The South East Sydney Area in Australia: Community	Specially trained pharmacists and community pharmacists	Interactive session of 150 mints duration focusing on the proper use of asthma medication
20.Tousman *et al.* (2011)	Asthma self-management program	Consisted of interactive discussions, problem-solving, social support and a behavior modification procedure.	Intervention group were put into 1 of 3 groups for the weekly program (2 hours once a week for 7 weeks meetings, Divided into 2 specific components: individual status	Health care professional	Certified asthma educator, a clinical nurse specialist occupational therapy, physician assistant and research	Two months after the completion of the program, the 21 participants in the intervention groups were invited to attend a data collection session. Sixteen of the participants in the

Author/Year	Education type	Content of education	Teaching method	Delivery setting	Delivered by	Instructional contact time
			report (60 minutes) and discussion topic (60 minutes). Modification procedure consisted of homework assignments in which participants were asked to self-monitor and record asthma specific behaviors (including peak expiratory flow, avoidance/removal of asthma triggers, and controller medication adherence) and general lifestyle behaviors (including drinking water, practicing relaxation, washing hands and exercising)		psychologist	intervention group were able to attend, and the same surveys were read ministered. Paired t tests were computed between their baseline data (before the program) and the 2-month follow-up.
21.Elbanna *et al.* (2017)	Bronchial asthma educational program (short term intervention)	Education sessions for every patients group includes: Basic knowledge about bronchial asthma; Well controlled bronchial asthma criteria and the patient's present level of control; Function of medication in bronchial asthma control; When and how to deal with worsening bronchial asthma; When and where to seek medical care; Measures to minimize exposure to asthma triggers; The appropriate use of metered dose inhaler with spacer and the accurate use Peak expiratory flow meter	Group sessions for each group	At 7 accredited family health care units at Mansoura district	Family physicians	February 2016 to July 2016 followed up every two weeks for3 months and at the end of the 3 months we assessed their level of knowledge post education by post education questionnaire.

Author/Year	Education type	Content of education	Teaching method	Delivery setting	Delivered by	Instructional contact time
		(PEFR).				
22.Patel *et al.* (2017)	Telephone-based self-regulation intervention	Asthma education kit, including a program workbook, asthma symptom diaries, a peak flow meter with instructions, and asthma resources.	The first month of the intervention was devoted to self-observation. Participants were instructed on how to use a daily asthma diary. During the observation month, they received weekly postcards to remind them to complete asthma diaries and a mid-month telephone call from the health educator.	University of Michigan Health System Asthma Registry.	Trained health educators	Telephone-based self-regulation intervention that emphasized African American women's management of asthma in a series of 6 sessions Patients were assessed at baseline and 2 years later
23.Schuermans (2018)	Single standardized, educational intervention	Knowledge of medication, knowledge of inhaler device and inhalation technique	Intervention group consisted of basic information about asthma treatment and instructions on inhalation technique for about 10min	University Hospital	Respiratory nurse specialist	Basic information about asthma treatment and in-structions on inhalation technique for about 10min.
24.Speck (2018)	Asthma self-management intervention program (6-week Breathe Michigan Program)	Topics related to asthma control, asthma triggers, symptom monitoring, and proper medication technique	During the program, participants watched 5 educational videos Each video was 2- 5 minutes in length After the 2-week period, participants had the option of Continuing to record in the asthma diary if they wished.	Primary care and pulmonary practices	Health care providers	The Breath Michigan program was completed over a period of 6 weeks. Approximately every 3 days, participants were asked to log in to website and complete a specific assignment. These assignments included choosing problems related to asthma for their situation, identifying barriers to optimal care, and receiving tailored messages of support

Author/Year	Education type	Content of education	Teaching method	Delivery setting	Delivered by	Instructional contact time
						to overcome barriers

2.11. SUMMARY OF EDUCATION INTERVENTIONS

The interventions that have been used to educate adults with asthma are summarised in Table 2-6 and 2-7. Data was extracted to identify evidence on the content of programs, how they were taught, for how long and by whom. The first study (Misha *et al.,* 2017) has shown the topics covered by programs included written education material, basic definition of asthma, disease management and control, medications pictures and descriptions, use of inhalers and role of peak flow, and environmental control and trigger. The asthma educators included two on-site certified asthma educators, a bilingual (English and Spanish) respiratory therapist and a clinical pharmacist. The education was administered in the patient's preferred language with help of interpreter services, if required. Translator phone services are available. The education sessions consisted of a personalized (one to-one) 30-minute sessions within asthma educator. Documentation in the electronic medical record (EMR) followed a structured asthma education note. This captured data including demographics, Asthma Control Test (ACT) score, medications, adherence with medications, and asthma action plan. The education sessions usually followed the visit to the pulmonologist. On-site spirometry was performed as per the discretion of the physician.

Ali-Mohamed and Elmaati (2016) conducted an experimental study in Egypt introducing a program on the nature of asthma and using the common devices used to manage the disease. The educational interventions were designed and prepared by the researchers after reviewing the literature. The educational interventions involved notes on general knowledge of disease aetiology, pathophysiology, investigations, medications and use of inhaler devices, treatment, and prognosis and folklores. In addition, the subjects also had a physical demonstration and video demonstration of different inhaler technique devices. The subjects were also given coloured brochures that contained pictures for different inhaler devices and correct technique for each one for their personal study at home.

Steurer-Stey *et al.* (2015) conducted a randomized controlled trial of 60 patients to determine the specific impact of the addition of disease non-specific motivational training to asthma specific patient education on patient self-management and adherence. Patients with partially controlled asthma were randomized into two groups of asthma education, one including the Zurich Resource Model (ZRM) motivational training and one without the inclusion of the ZRM training. ARM training consisted of the development of action-oriented personal goals

and use of appropriate resources to achieve and practice those goals in patients' daily lives (Steurer-Stey *et al.,* 2015).

Boulet *et al.* (2015) intervention included an initial assessment of the patient's educational needs and a spirometry, which was followed with patient visits at 4-6 weeks, 4-6 months, and one year. At each visit, expiratory flows, asthma control criteria, general asthma knowledge, medication use and adherence, and healthcare use were assessed. The intervention based with the primary care provider resulted in significant improvement in patient asthma outcomes, supporting a reduction in both unscheduled visits and inappropriate use of medications.

Another study of asthma self-management conducted by Federman *et al.* (2015) supported these positive results in a population of older adult (over 60) asthma patients who typically experience greater challenges to health and asthma maintenance (Federman *et al.,* 2015; Mindlis, Martynenko, O'Conner, Wisnivesky, Wolf, & Federman, 2016). Federman *et al*. reported on the development of a multi component self-management support intervention with input from multiple stakeholders, which included the state department of health, patients, academic organizations, community-based organizations, and advocacy groups using a randomized controlled trial of 425 participants aged 60 and over. The intervention utilized care coaches to conduct initial screenings and follow-up with patients. The program was termed Supporting Asthma Self-Management Behaviours in Aging Adults (SAMBRA).

As with the study by Boulet *et al*. (2015), the initial screening in the Federman *et al.* (2015) study was used to identify specific barriers to asthma control and self-management experienced by the individual patients. From this screening the patient and coach determined appropriate actions to address each barrier. The intervention focused on efficiency, flexibility, shared decision making, goal setting, communication, and continuous reinforcement and support. In addition, asthma-specific electronic health record enhancements, which included asthma severity assessment, clinical decision support, and patient-tailored action plan, were introduced for participating clinical practices. Patients were followed for one year.

The results of the program developed by Federman *et al.* (2015) were reported by Mindlis et al. (2016) using sub-domains of asthma medication, medication adherence, peak flow meter, prioritizing illness and managing multiple medications, emotional triggers of asthma, cognitive impairment, and environmental exposures. Results showed the SAMBRA to be

effective in identifying the barriers to self-management for older adults, which supported the use of evidence-based strategies to support older adult patients with low health literacy to improve their understanding and outcomes (Mindlis *et al.,* 2016).

Other programs were also used and were effective to enable women to control asthma while they were pregnant (Lim *et al.,* 2014). Through the multidisciplinary program provided mainly through pharmacy department using education, monitoring, feedback and follow-ups, women in the study were more able to manage their asthmatic symptoms during pregnancy. The Multidisciplinary Approach to Management of Maternal Asthma (MAMMA) intervention will embrace a collaborative approach involving the participant's family physician, pharmacist and asthma educator. Asthma education, monitoring, feedback and follow-up are integral components of the monthly intervention. Every month, participants in the intervention group will be contacted by the trial's nominated pharmacist for an hourly session to assess their asthma control by administrating the Asthma Control Questionnaire (ACQ) and a short data collection form which inquiries about oral corticosteroid use, asthma related hospital admissions, days off work and preventer to reliever use ratio.

In a quasi-experimental study of 48 patients with asthma, Raju *et al.* (2012) examined the effectiveness of the Asthma Control Score (ACS) and the Asthma Action Plan (AAP) conducted over the phone for assessing patient self-management of asthma. Raju *et al.* (2012) concluded from the results of the study that ACS and AAP by phone is a feasible and effective strategy for managing Asthma symptoms. In addition, they have concluded that ACS and AAP by phone was acceptable to patients and resulted in improved asthma control without the need for extra office visits.

Using learner-centred teaching techniques (e.g., interactive communication and social support) in small groups, Tousman *et al*. (2007) conducted a quasi-experimental research study to support self-management behaviours and goal setting among asthma patients. Specifically, the participants in the small groups for the study were asked to practice self-management techniques such as peak expiratory flow monitoring, avoidance or asthma triggers, and medication adherence, as well as general lifestyle behaviours such as drinking more water, practicing relaxation, washing hands, and exercising. The results reported by Tousman *et al*. provided evidence of enhanced knowledge acquisition and positive behavioural changes in the participating patients.

Among the studies that explored clinician-based interventions, Angelini *et al.* (2009) conducted a prospective pilot study of 164 adult asthma patients who participated in a clinician provided asthma education program. The program, which was offered at routine outpatient visits, incorporated a series of three lectures, including information on pathophysiology, environmental control, and treatment of asthma. The program also included inhalation technique training. Angelini *et al.* (2009) reported a progressive, long-term knowledge level increase among participants in addition to clinical improvement.

A Taiwan study by Huang *et al.(2009)* pointed out that introducing additional parts beside education can also help patients to self-manage their asthma. This study recruited adult patients in three groups (Control received usual care, intervention I used individualized education, and intervention II used individualized education with peak flow monitoring).

Building on general self-management programs, several self-management programs were conducted using an individualized method. The addition of individualized education generally supported positive patient outcomes, particularly in adherence to self-management goals (Huang *et al.,* 2009). This level of education was particularly helpful with older adult patients (Huang *et al.,* 2009). This program was delivered by nurses.

In another randomized controlled trial, Janson *et al*. (2009) included a sample of 95 adults who were given individualized self-management education that included self-monitoring of symptoms and peak flow or usual care with self-monitoring alone. The 30-minute individualized self-management intervention included asthma information, assessment, and correction of inhaler technique, development of an individualized action plan based on self-monitoring data, and environmental control strategies for relevant asthma triggers. The individualization of the program was based on patient pulmonary function, allergen skill test reactivity, and inhaler technique and was reinforced at two-week intervals. Results indicated that treatment group participants showed evidence of consistency in adherence (measured by medication level), a 9-fold increase in odds of more than 60% adherence to the prescribed medication dose compared to the control group post intervention (p=02), and a 3-fold increase in odds of higher than 60% adherence at the end of the study. In addition, participants' perception of control of asthma symptoms improved, nighttime awakening decreased, and inhaled beta-agonist use decreased in the intervention group compared with the control.

Armour *et al*. (2007) conducted a multi-site randomized study of intervention versus control using repeated measures. A sample of 50 Australian pharmacies were included in the study, which included 186 control patients and 165 intervention patients. For the intervention, the pharmacies implemented the PACP, an ongoing cycle of assessments, patient goal setting, monitoring, and reviews (Armour *et al.,* 2007). To provide the intervention, pharmacists received training on asthma risk assessment, asthma pathophysiology, asthma medications, the NAC sex-step asthma management plan, patient education, goal setting, adherence assessment, spirometry (training given by qualified respiratory scientists), and the PACP protocol during a 2-day workshop (Armour *et al.,* 2007).

Findings of the study supported the conclusion that Kritikos *et al.* (2007) pharmacist-delivered asthma care programs, which were based on national guidelines, improved asthma control (Armour *et al.,* 2007). This study aimed to compare the effects of two small-group asthma education interventions (one delivered by specially trained pharmacists (group A) and one delivered by a pharmacist researcher trained as an asthma educator (group B), with usual care provided by community pharmacists (group C) on clinical and humanistic outcomes for people with asthma. The intervention program delivered to small groups of participants (5–8) in groups A and B was a single interactive session of 150 mins duration, focusing on the proper use of asthma medication. The results of this study demonstrate that community pharmacist-led asthma education that focuses on the appropriate use of asthma medication, delivered to small groups of people with asthma, appears to be more effective than usual care in improving asthma severity/control, inhaler technique and asthma knowledge.

Tousman *et al.* (2011) designed and implemented a structured a program and techniques to maximize self-management skills. Each of the seven 2-hour meetings were divided into 2 specific components: individual status report (60 minutes) and discussion topic (60 minutes). The only exception to this structure was during week 1, when participants filled out the pre-course surveys and described their history of coping with asthma.

Elbanna *et al.* (2017) conducted the Bronchial asthma educational program (short term intervention) where each of the sessions was delivered by family physicians. This study heavily influenced the ASMEP developed as part of this thesis.

The intervention is based on WBF, grounded in social cognitive theory and principles of self-regulation (Elbanna *et al.,* 2017). Adapted from WBF the intervention was culturally

responsive to the specific needs of African American women. Culture-related influences on asthma management were integrated into each counselling session. The program was delivered by trained health educators through a series of six telephone counselling sessions (30–45 minutes in duration, 2 weeks apart) thirteen 13 to participants randomized to the intervention (n=212). Health educators had master's level training in public health or social work and identified as African American. The content of the intervention reinforced priority messages supported by the NAEPP guidelines for asthma. Seventeen All participants assigned to the intervention were mailed an asthma education kit, including a program workbook, asthma symptom diaries, a peak flow meter with instructions, and asthma resources by the health educator. They have increased their awareness with respect to the use of asthma devices as well as ware about the asthma symports and their consequences.

Seeking to increase patient follow-up visits with their primary care providers (PCPs) after emergency visits for acute asthma exacerbations, research has been done to examine the effect of Emergency Department (ED) directed education interventions (Patel *et al.,* 2017). Patel,*et al.,(2017)* studied 422 women and used a telephone-based self-regulation intervention to manage asthma among African American women over six sessions. This study showed that the intervention was influential and deceased patients' visits to the emergency departments with higher patients' satisfaction with their ability to manage their asthma. Other two studies in two different countries (Brazil and Egypt) also approached patients in the emergency department who received education on how to self-manage asthma (Angelini *et al.,* 2009, Elbanna *et al.,* 2017). These studies reported that educating patients about their asthma sharply increased the knowledge and decreased their visits to the emergency department as well as the outpatient clinics.

The Egyptian study by Elbanna *et et al.(2017)* used a short course of oral corticosteroids and transportation vouchers to support attendance at the follow-up appointment. The other Brazilian study of Angelini *et al.(2009)* introduced and intervention that included lectures and visual aids presented to groups. In both of the studies educational programs were effective compared to usual care and these programs were provided as discharge instructions and medication prescription at the discretion of the treating emergency physician.

Lastly, Schuermans (2018) examined the effectiveness of a single standardized, educational intervention delivered by a respiratory nurse specialist, using a prospective single blinded randomized controlled trial of 160 adults with asthma. The 10-minute education provided to

the intervention group consisted of basic information about asthma treatment and instructions on inhalation technique. This additional education was not offered to the control group. In both groups ACT scores, knowledge of medication, knowledge of inhaler device and inhalation technique were assessed at baseline and after three months. Asthma was considered well-controlled when the ACT score exceeded 19. Findings showed that the single 10-minute, educational session provided by a respiratory nurse substantially improved asthma control based on the ACT score after three months.

Finally, Speck (2016) conducted the asthma self-management intervention program (6-week Breathe Michigan Program) which targeted topics related to asthma control, asthma triggers, symptom monitoring, and proper medication technique. During the program, participants watched five educational videos, each video was 2-5 minutes in length and after the 2-week period, participants had the option of continuing to record in the asthma diary if they wished delivered by primary care and pulmonary practices. It is found that they have improved their knowledge with respect to asthma control, asthma triggers, symptom monitoring, and proper medication technique due to these educational videos.

Table 2.8 Outcome of education

Author/Year Outcomes measured (and measures)	**Quality of life and Patient motivation**	**Emergency visits**	**Asthma Control**	**Asthma knowledge**	**Inhaler technique Medication compliance**
5.Mishra *et al. (*2017) Asthma Control Test Emergency Room Visits Hospital admission Pulmonary clinic visit		A significant decrease in the number of patients requiring ER visits as compared to pre education period [pre education (n = 94) and post education (n = 60); p = 0.0005, 95% CI] a significant decrease in the average number of ER visits per patient/year [0.91 (pre education) to 0.61 (post education) (p = 0.04, 95% CI)	Improved asthma control as assessed by the ACT score Asthma control as per ACT score ≥ 20 improved with education (p = 0.0001) with an increase in clinic visits (p = 0.0185) Asthma education had a statistically significant (p = 0.0001, 95% CI) effect on the number of asthmatics with ACT score ≥ 20 (n = 20, 15.8% before education, versus n = 44, 34.9% after education)		
6.Mohamed-Ali and Elmaati (2016) Asthma knowledge questionnaire Inhaler technique Inhaler medication				The total percentage score of asthma knowledge increased significantly from 58.3% to 90% per intervention	The respondents respectively had good technique pre intervention which increase post intervention to 81.1%, 70%, and 88.9% respectively had demonstrated good technique The study revealed that nearly half of the asthma patients

Author/Year Outcomes measured (and measures)	**Quality of life and Patient motivation**	**Emergency visits**	**Asthma Control**	**Asthma knowledge**	**Inhaler technique Medication compliance**
					claimed to know how to use inhalation devices correctly in spite of more than two-thirds of participants having poor inhaler technique pre-educational intervention and participants using an accurate demonstrated poorer technique compared to those using a pMD or hand inhaler (prefilled dry powder inhaler).
7.Steurer-Stey *et al.* (2015) Adherence self-monitoring Adherence to personal action plan Patient report self-efficacy (general perceived self-efficacy scale) Volitional Components Inventory			Both groups showed excellent adherence to self-monitoring over three months [27 patients (90.0%) in intervention and 25 patients (83.3%) in control group, adjusted odds ratio: 1.28 (0.24–6.78), P=0.78)].		
8.Boulet *et al.* (2015) Forced expiratory volume Asthma control test Asthma knowledge Adherence to medication Healthcare use Medication use		The number of unscheduled visits for respiratory problems went from 137 to 33 (P < 0.0001), No change in ED OR hospitalization This education improved patients' inner motivation to be in control in both	Increase from 48% to 78% in asthma control	A progressive increase in knowledge from 35 questions to 45 p value, less than 0.0001	At the start of the study, only one patient showed good inhaler an improvement in inhaler technique and medication adherence technique whereas at one-year follow-up, 76 patients showed good inhaler technique (P < 0.0001). Conversely, the technique required correction in 101 patients at baseline and only in 41 patients after one-year follow-up (P < 0.0001).

Author/Year Outcomes measured (and measures)	Quality of life and Patient motivation	Emergency visits	Asthma Control	Asthma knowledge	Inhaler technique Medication compliance
		groups and prompted patients to better adherence, making the detection of an additional effect difficult. (need another bcolum, patient motivation) This intervention resulted in a marked improvement of asthma control; patient more motivated to improve their asthma control.			the number of antibiotic treatments from 112 to 33 (P Z 0.0002), and the number of oral corticosteroids treatments from 26 to 8 (NS)
9.Federman *et al.* (2015) - Study not yet completed			Asthma control test, Asthma quality of life Q	Asthma self-management behaviors including controller Medication adherence Inhaler technique, and environmental triggers	
10.Lim *et al.* (2014) - Study not yet completed			Asthma Control Q, Oral corticosteroid use, Asthma exacerbations patient	Hospital admission, Day of work, Preventer to reliver ratio, Adverse pregnancy event	

Author/Year Outcomes measured (and measures)	Quality of life and Patient motivation	Emergency visits	Asthma Control	Asthma knowledge	Inhaler technique Medication compliance
11.Raju *et al.* (2012) Asthma Control Score Asthma action plan			Of 48 patients, 42 (87.5%) were reached by phone. On initial assessment, 33 (69%) were controlled. After implementation of the new AAP by phone, seven of nine (78%) initially uncontrolled patients were controlled, for a total of 40 (83%) patients controlled by the end of the study. Asthma management using the Asthma Control Score and AAP by phone is a feasible strategy that is acceptable to patients and can improve asthma control without the need for an office visit. Improving control from 69% to 83% including unreachable patients as "uncontrolled" is a clinically significant achievement. Further, for a majority of patients with uncontrolled asthma (seven/nine), it only took 1–2 months for their asthma to be controlled. The remaining two were not able to fill their medications.		
12.Poureslami *et al.* (2012) Proper use of inhaler Knowledge of asthma				Participants' knowledge of asthma symptoms improved over time in all four study groups (CI ¼ 0.83 0.53, F-statistics ¼ 9.44, df ¼ 1 and 72, p=.009)	Proper use of inhalers improved significantly among all experimental groups over time (confidence interval (CI) ¼ 1.79 0.52, F-statistics ¼ 45.60, df ¼ 1

Author/Year Outcomes measured (and measures)	Quality of life and Patient motivation	Emergency visits	Asthma Control	Asthma knowledge	Inhaler technique Medication compliance
symptoms Knowledge of asthma triggers Knowledge of factors that could make asthma worse Understanding physician instruction on medication use				Knowledge about factors that could make asthma worse were no statistically significant differences across the four study groups in terms of improvement of participants' knowledge about factors (e.g., triggers) that could make asthma worse (CI ¼ 0.40 0.80, F-statistics ¼ 1.56, df ¼ 3 and 72, p ¼ .21), when we stratified the analyses based on ethnic group, Punjabi patients' knowledge about factors that could make asthma worse improved significantly during the intervention period compared to Chinese patients (CI ¼ 1.81 1.162, F-statistics ¼ 9.34, df ¼ 1 and 76, p < .01)	and 71, p < .001) (Tables 2 and 3); with females showing greater improvements compared to male patients (CI ¼ 0.77 0.72, F-statistics ¼ 4.45, df ¼ 1 and 71, p ¼ .04). interventions can promote knowledge gain about asthma and improve inhaler use that can be sustained over the short term. Patients' understanding of physicians' instructions on how to follow their treatment regimen and regular use of inhalers (self-reported inhaler adherence) improved significantly in all participants over time (CI ¼ 0.37 0.2193, F-statistics ¼ 11.12, df ¼1 and 71, p < .01)
13.Chen *et al.* (2010) self-care behavior scale Self-efficacy scale	was a significant improvement in the self-care behaviors of patients who received self-efficacy intervention in terms of medication adherence (p= .008), self-monitoring (p= .000), avoidance of antigens (p= .001), regular follow-up visits (p = .000), and regular exercise (p				

Author/Year Outcomes measured (and measures)	Quality of life and Patient motivation	Emergency visits	Asthma Control	Asthma knowledge	Inhaler technique Medication compliance
	= .016); program improved participant self-efficacy in terms of both asthma attack prevention (p = .030) and management during asthma attacks (p = .017)				
14.Tousman *et al.* (2007) Asthma knowledge assessment QOL survey Nursing assessment Self-management form	Statistically significant and clinically relevant improvements for each sub scale as well astotalQOLwerefound.Therewasa0.8improvementinself-reported activities limitations, t (19)=3.519,p=.002;a1		participants had significant knowledge improvements as measured by both the quiz,t(19)=7.768,p<.001,and the schemas, t(19) = 3.702, p = .002. participants believed that, with the new knowledge that they had gained during the course, they would be better able to communicate effectively with healthcare professionals regarding their asthma.		an increase in the weekly mean frequency of PEF measurement, t(19) = 4.848, p < .001, a decrease in a weekly mean frequency of reliever medication use t(19) = 3.545, p = .002]
15.Angelini *et al.* (2009) clinical improvement evaluation knowledge questionnaire medication checklist educational class				The results show that the knowledge acquired by this group at each visit was similar to that acquired by the group as a whole (the 120 patients), and no significant difference was observed between the subgroup and the group as a whole regarding the variables analyzed. The educational intervention	Greater clinical improvement (p < 0.05) with a decrease in the use of oral corticosteroids

Author/Year Outcomes measured (and measures)	Quality of life and Patient motivation	Emergency visits	Asthma Control	Asthma knowledge	Inhaler technique Medication compliance
				significantly increased the understanding of the disease (p < 0.001), There were no significant differences in gender, age or level of education between the pt who completed the education program, approximately half of the patients (52,43.3%)	
16.Huang *et al.* (2007) asthma Self-Care Agency scale Asthma Self-Efficacy Scale Asthma Self-Care Behavior Scale, respectively. lung function measure by spirometry asthma control test unscheduled health service usage and changes in medication	Higher asthma self-care competence scores (F = 334Æ06 and 481Æ37, P < 0Æ001) and asthma self-care and self-efficacy scores (F = 104Æ08 and 68Æ42, P < 0Æ001) than patients in the usual care group. Self-efficacy among the three groups was shown by ANCOVA to be statistically significantly different (F = 68 Æ42, P < 0Æ001); education alone and usual care differed statistically significantly (P < 0Æ001), and education plus PFM	No statistically significant differences were found among the three groups	Patients who received the education plus PMF intervention reported statistically significantly higher asthma control indicator scores than the education alone group (P < 0Æ05) asthma control indicators (P = 0Æ025) than the education alone group.		patients who received individualized education with peak flow monitoring had statistically significantly higher asthma self-care behavior and self-efficacy scores (P < 0Æ001) and Statistically significant differences among groups were shown by ANCOVA (F =5 Æ78, 9Æ92, and 13Æ70, P < 0Æ001) for pre bronchodilation FEV1, FVC and both FEV1/FVC at 6 months. decreased statistically Signiant more than that for the other two groups (P =0 Æ033) (Table 3). In addition, the dosage of medication taken by the three groups was not statistically significant (P > 0Æ05).

Author/Year Outcomes measured (and measures)	Quality of life and Patient motivation	Emergency visits	Asthma Control	Asthma knowledge	Inhaler technique Medication compliance
	differed statistically significantly from education alone (P < 0Æ001) at 6 months. Self-care behaviors among the three groups changed statistically significantly over time (Table 2) as demonstrated by ANCOVA (F = 104Æ08, P < 0Æ001).				
17.Janson *et al.* (2009). inhaled corticosteroid (ICS) therapy perceived control of asthma. Electronic peak flowmeter Electronic medication monitor			Perceived control of asthma improved (P = .006), nighttime awakenings decreased (P = .03), and inhaled β-agonist use decreased (P = .01) in intervention participants compared with control subjects		Participants randomized to the self-management intervention maintained consistently higher inhaled corticosteroid (ICS) adherence levels and showed 9-fold greater odds of more than 60% adherence to the prescribed dose compared with control subjects at the end of the intervention (P = .02) and maintained 3-fold greater odds of higher than 60% adherence at the end of the study. Improves clinical markers of asthma control.
18.Armour *et al.,*			The proportion of intervention		There were no significant changes

Author/Year Outcomes measured (and measures)	Quality of life and Patient motivation	Emergency visits	Asthma Control	Asthma knowledge	Inhaler technique Medication compliance
(2007) Brief Medication Questionnaire Spirometry's tests			patients who were classified as having severe asthma declined significantly from 87.9% to 52.7% (p,0.001)		in spirometric parameters over the course of the study in either percentage predicted FEV1 or FEV1/FV. Pharmacists achieved a quality grade of A, B or C in 85% of spirometry measurements; any measurements below grade C were excluded from the analysis. Improved adherence to preventer medication but decreased mean daily dose of reliever medication. an improvement in the risk of non-adherence to medications (indicated by a lower Brief Medication Questionnaire regimen score) (p=0.04) and a decrease in the mean daily dose of the reliever medication salbutamol (p=0.03)
19.Kritikos *et al.* (2007) Asthma severity control test Asthma education on asthma control. Medication adherence report scale	The impact of asthma on quality of life was modest for each group on entry into the study. There was a significant decrease in mean total AQOL scores over time in group A (p = 0.03) and group B (p = 0.003), indicating an		There were significant changes in the proportion of subjects in each severity/control category over time in group A (p = 0.003) and group B (p = 0.001) but not in group C. The difference in change from baseline between the three groups was significant at 6 weeks (p = 0.05) and at 12 weeks (p = 0.02).	There was a statistically significant but equal increase in the median asthma knowledge scores in group A (p < 0.001) and in group B (p < 0.001) immediately after the education. he results of this study demonstrate that community pharmacist-led asthma education	There was a significant improvement in group A (p =0.004) and in group B (p =0.004) immediately after the education, which was not statistically different (p = 0.78). There was a significant improvement both in group A (p < 0.001) and in group B (p = 0.002) immediately after the

Author/Year Outcomes measured (and measures)	**Quality of life and Patient motivation**	**Emergency visits**	**Asthma Control**	**Asthma knowledge**	**Inhaler technique Medication compliance**
Meter dose inhaler Dry powder inhaler technique Asthma-Related Quality of Life	improvement in quality of life, which was significantly different at 12 weeks ($p = 0.02$). At 12 weeks, group B had a significantly lower mean AQOL score compared to group C ($p = 0.02$).			appears to be more effective than usual care in improving on asthma knowledge	education that was not statistically different ($p > 0.5$). The results of this study demonstrate that community pharmacist-led asthma education appears to be more effective than usual care in improving inhaler technique high MARS scores were reported at baseline. Although there were significant improvements in mean MARS scores over time in group A ($p < 0.001$) and group B ($p = 0.03$), there were no differences between the three groups at 12 weeks ($p = 0.52$). The results of this study demonstrate that community pharmacist-led asthma education that focuses on the proper use of asthma medication, delivered to small groups of people with asthma,
20.Tousman *et al.,* (2011) Knowledge -based measurement Psychological measurement QOL Patient activation Mini asthma QOL Asthma self-efficacy	Intervention patients had more improvement in AQLQ scores at 5 months, but this difference was not sustained. For the entire period, AQLQ scores improved by a clinically important difference from 4.6			Participants had significant knowledge improvements as measured by both the quiz, $t(19) = 7.768$, $p < .001$, and the schemas, $t(19) = 3.702$, $p = .002$.	

Author/Year Outcomes measured (and measures)	Quality of life and Patient motivation	Emergency visits	Asthma Control	Asthma knowledge	Inhaler technique Medication compliance
skills	to a mean of 5.1 in both groups (P < .001) with no difference between groups (P = .91) Patient activation was in pretest 39 and posttest 43, (P value <.001) Self-Efficacy improved from 2.5 to 2.0				
21.Elbanna *et al.* (2017) asthma control questioners degree of knowledge questioners			The educational intervention significantly improved the level of asthma control (p < 0.001),	The educational intervention A highly significantly improvement in degree of knowledge post education than pre education (p < 0.001) has led to fewer visits to the emergency room, hospitalization and referral to specialist (p < 0.001	
22.Patel *et al.* (2017) asthma control test Asthma Quality of Life questionnaire Health Care Use asthma action plan	Compared with the control group, those who completed the full intervention (6 sessions) had significant gains in self-regulation of their asthma (B estimate, 0.73; 95%		Significant reductions between baseline and 24-month follow-up on daytime symptoms (P < .05), asthma control (P < .01), unscheduled physician visits (P < .05), and scheduled physician visits (P < .01) They also had significant reductions		intervention (6 sessions) had significant improvements in noticing changes related to their asthma during their menstrual cycle (B estimate, 1.42; 95% CI, 0.69–2.15; P < .001) and when having premenstrual syndrome (B estimate, 1.70; 95% CI, 0.67–2.72; P < .001)

Author/Year Outcomes measured (and measures)	Quality of life and Patient motivation	Emergency visits	Asthma Control	Asthma knowledge	Inhaler technique Medication compliance
self-regulation ability items from the Zimmerman scale	CI, 0.17–1.30; P < .01) averaged during 24 months when adjusted for baseline measures		in daytime symptoms asthma-related hospitalization, and improved asthma control.		
23.Schuemans (2018) asthma control test knowledge of medication (Aerosol Drug Management Improvement Team (ADMIT) guidelines)			In the intervention group the educational session resulted in a significantly higher proportion of well controlled Asthma patients. With an ACT>19 (43% versus 77%) (p < 0.001) after three months		Improvements in knowledge of device, and inhalation technique in the intervention group With inhalation technique (p=0.004) observed improvements in knowledge of medication (p < 0.001), knowledge of device (p < 0.001)
24.Speck (2016) Asthma quality of life (AQLQ) Asthma control Test (ACT)	Asthma quality of life as measured by the Mini Asthma Quality of Life Questionnaire improved from 4.0 to 5.1		The program was helpful, and 97% would recommend it to others. Asthma control as measured by the Asthma Control Test improved from 16.1 to 19.3,	The program was helpful for increasing their asthma acceptance and overall knowledge	

2.12. OUTCOMES (EFFECTS) OF THE EDUCATION PROGRAMS

The existing asthma education programs have measured a wide range of outcomes to determine their effectiveness (Table 2.8). This includes quality of life, reducing emergency patient visits, inhaler technique, medication compliance, asthma knowledge, and patient motivation. Although twelve studies have asked questions about daily exercise, diet plan, medication schedule, meeting with doctors for analysing whether these studies have brought any changes in patients' quality of lives (Armour *et al.,* 2007; 2018; Mohamed-Ali, & Elmaati, 2016 ; Speck, 2016 ; Federman *et al.,* 2015; Lim *et al.,* 2014; Tousman *et al.,* 2007; Tousman *et al.,* 2010; Steurer-Stey *et al.,* 2015; Raju, 2012). However, only nine studies have highlighted that the asthma educational programs have brought positive changes in the quality of patients' lives (Armour *et al.,* 2007; 2018; Mohamed-Ali, & Elmaati, 2016; Speck, 2016; Federman *et al.,* 2015; Lim *et al.,* 2014; Tousman *et al.,* 2007; Tousman, *et al.,* 2010). Eleven studies did not provide any information regarding whether researchers' educational programs have brought any changes in the quality of patient's life or not (Angelini *et al.,* 2009; Boulet *et al.,* 2015; Chen *et al.,* 2010; Elbanna *et al.,* 2017; Huang *et al.,* 2009; Janson *et al.,* 2009; Kritikos *et al.,* 2007; Mishra *et al.,* 2017; Poureslami *et al.,* 2012; Patel *et al.,* 2017; Schuermans, 2018).

Eleven studies indicated that their asthma knowledge (i.e. symptoms, knowledge, medication, diet, exercises, stress management, and medical follow-up) has improved after attending an educational program on Asthma (Armour *et al.,* 2007; Angelini *et al.,*2009; Boulet *et al.,* 2015; Chen *et al.,* 2010; Kritikos *et al.,* 2007 ;Huang *et al.,* 2009; Mohamed-Ali, & Elmaati, 2016; Speck, 2016 ; Tousman *et al.,* 2007; Poureslami *et al.,* 2012). However, only four studies have indicated that patient's knowledge is very much improved and therefore patients were very satisfied and highly motivated to self-manage Asthma (Speck, 2016; Federman *et al.,* 2015; Lim *et al.,* 2014). Also, studies have been conducted in developed countries but there is a gap in evidence to identify how much these patients were motivated to control their asthma by themselves (Angelini *et al.,* 2009; Chen *et al.,* 2010; Elbanna *et al.,*2017; Mohamed-Ali ,& Elmaati, 2016; Federman *et al.,* 2015; Tousman *et al.,* 2007; Mishra *et al.,* 2017; Boulet *et al.,* 2015; Patel *et al.,* 2017; Janson, *et al.,* 2009). Some of the educational programs did not bring any improvement in the Asthma knowledge among the patients (Federman *et al.,* 2015; Raju *et al.,* 2012). These studies did not reveal why the patients showed limited knowledge even after the delivery of educational program (Federman *et al.,*

2015; Raju *et al.,* 2012). There needs to be an analysis of whether the educational program content and delivery method and was effective for all the patients to enable them to improve their level of information, knowledge, and motivation to improve their Asthma (Federman *et al.,* 2015; Raju *et al.,* 2012). Finally no study measured the full range of outcomes proposed in this thesis.

2.13. DELIVERY OF ASTHMA EDUCATIONAL PROGRAM

Eleven studies showed that after the effective delivery of Asthma educational program, unscheduled or average emergency patients visit to hospital are decreased in all patients (Angelini *et al*., 2009; Boulet *et al.,* 2015; Chen *et al.,* 2010; Elbanna *et al.,* 2017; Mohamed-Ali, & Elmaati, 2016; Mishra *et al.,* 2017; Federman *et al.,* 2015; Tousman *et al.,* 2007; Patel *et al.,* 2017; Janson, *et al.,* 2009). While three studies have showed that there is no impact of these educational programs with the reduce in emergency visits among the patients (Federman *et al.,* 2015; Lim, *et al.,* 2014). Five studies have showed that after the end of asthma educational programs the patient's compliance to medication improve among all the targeted patients (Armour *et al.,* 2007; Boulet *et al.,* 2015; Tousman, *et al.,* 2011). Four studies have showed that there is no changes patient compliance to medication after the delivery of this program (Federman *et al.,* 2015; Lim *et al.,* 2014; Tousman *et al.,* 2007). Twelve studies did not provide any information regarding whether their educational programs can create enough awareness about to improve the patient's compliance towards their medication on regular bases (Angelini *et al.,* 2009; Chen *et al.,* 2010; Kritikos *et al.,* 2007;Elbanna *et al.,* 2017;Mishra *et al.,* 2017;Mohamed-Ali & Elmaati, 2016; Raju *et al.,* 2012; Speck, 2016; Tousman *et al.,* 2011; Patel *et al.,* 2017; Poureslami *et al.,* 2012; Janson *et al.,* 2009).

The findings of five papers revealed about the way these self-management programs brought a significant improvement in asthma control by the use of inhalers amongst all patients (Boulet *et al*., 2015; Speck, 2016; Elmaati *et al.,* 2016). Whereas only a single research study has revealed that these self-management programs have reduced the use of inhaler, but the analyst did not reveal the number of asthma patients which have left the use of inhaler and which type of techniques they selected to control and manage their asthma (Janson *et al*., 2009). Although, there were no details to determine that whether all the asthma patients left the use of inhaler and what alternative action plan and strategy they selected to self-manage their asthma. Furthermore, 14 research studies did not deliver enough information with

respect to the enhancement in the use of inhaler after the deliverance of study content to the patients (Armour *et al*., 2007; Angelini *et al*., 2009; Kritikos, *et al*., 2007; Elbanna, 2017; Chen *et al.,* 2010; Federman *et al.,* 2015; Lim *et al*., 2014; Mishra *et al*., 2017; Raju, 2012; Poureslami *et al*., 2012; Janson, *et al.,* 2009; Tousman *et al*., 2007; Patel *et al*., 2017; Tousman *et al*., 2011).

The current literature has exposed that the behavioural aspects of patients are very essential, and these aspects cannot be overlooked particularly when the aim of self-management program is to enhance the skills of patients for appropriate self-management of asthma (Boulet *et al*., 2015; Federman *et al*., 2015; Poureslami *et al*., 2012; Tousman *et al*., 2007; Chen *et al*., 2010). Although, no details have been found regarding the degree of patient activation, patient determination and patient attitude to control Asthma. It is a very difficult task to evaluate these elements by utilizing the quantitative data analysis thus it is more beneficial to carry out qualitative analysis so that the health management and researchers can comprehend these problems in a wider framework and according to the perspective of various patients. Five research studies have examined the scheduled and emergency visits after education (Boulet *et al*., 2015; Lim *et al*., 2014; Mishra *et al*., 2017; Tousmans *et al.,* 2007, Angelini, *et al.,* 2009) four of these revealed that after the successful delivery of the asthma educational program the average emergency and scheduled patients visits to hospital have decreased (Boulet *et al*., 2015; 2007, Angelini *et al*., 2009; Mishra *et al*., 2017). Boulet *et al*. (2015) stated a significant decrease in the number of emergency visits due to self-management program on asthma, he reported that the number fallen from 137 to 33. Lim (2014) stated that the education has no impact on the patient visits and Tousmans *et al*. (2007) reported the frequency in visits after the intervention but he found no significant disparities among groups, proposing that there is no effect of intervention on emergency visits.

2.14. TRANSFERRING KNOWLEDGE TO SAUDI ARABIA

A total of 19 studies were carried out in developed countries where the culture and environment are conducive to implementing an asthma education program. These factors include patient awareness, professional and patient knowledge, supportive culture, specialized staff (eg. radiologist, pharmacist, allergist, respiratory therapists and experienced respiratory nurses), health and medical professional support, utilization level of technology for getting support and the frequency of instructive program (Boulet *et al*., 2015; Kritikos *et*

al., 2007; Armour *et al.*, 2007; Steurer-Stey *et al*., 2015, Lim *et al*., 2014; Raju, 2012; Tousman,*et al*., 2011; Federman *et al*., 2015; Patel *et al*., 2017; Mishra *et al*., 2017; Janson *et al*., 2009). These factors are not in place in Saudi Arabia, where, it is also known that asthma awareness, knowledge regarding the support of health professionals and asthma symptoms is limited within Arab countries (Elbanna *et al.,* 2017; Mohamed-Ali & Elmaati, 2016). Consequently, it is not feasible to develop an educational program without bearing in mind the hospital, environmental, patient and other difficulties particularly in the context of Arab nations. Four studies have been carried out in developing countries; which led to a decreased number of asthma patients, frequent educational programs, reduced emergency visits to hospitals and the restricted environmental problems like allergies, dust and hot weather (Poureslami *et al*., 2012; Huang *et al*., 209; Angelini *et al*., 2009; Chen *et al*., 2010). There is a greater number of patients and restricted patient knowledge and educational programs on chronic respiratory diseases in Arab countries; only two research studies were found which have been carried out in the context of a country that has Arabic as a state language (Elbanna *et al*., 2017; Mohamed-Ali & Elmaati, 2016). Both studies showed the number of unscheduled visits reduced and there was an increase in asthma knowledge among patients. Moreover, these research studies have also revealed that were restricted environmental challenges along with health issues to control and manage Asthma in Egypt. Both studies are carried out in an Arab country which demonstrated that the asthma self-management program proved very effective since these sessions have enhanced the asthma knowledge (i.e. asthma risks, action plan, asthma symptoms and medication) along with a decrease in the unscheduled visits of asthma patients to hospitals (Elbanna, 2017; Mohamed-Ali & Elmaati, 2016). Literature relating to Saudi Arabia demonstrated that there are less frequent educational programs, limited health facilities, limited awareness and education among the patients regarding the self-management of Asthma particularly in rural areas (Al-Ghamdi *et al*., 2008; Moradi-Lakeh *et al.* 2015; WHO, 2016). Furthermore, no research has been carried out in Saudi Arabia to evaluate and deliver an asthma self-management program.

Patient motivation and activation to self-manage their asthma condition during and the after the program is a considerable factor to consider develop and to deliver asthma education program. Only three studies highlighted patient activation as an outcome of asthma education program: Tousman *et al.,* (2011) indicated a significant increase in patient activation, $F(1, 42) = 15.96$, $P < .001$; Boulet *et al.,* (2015) suggested a patient was more motivated to improve their asthma control; Young (2017) discussed motivation to engaging asthma self-care

behaviours. However, no study examined why patients were active and how patient activation and motivation could be improved. Young (2017) suggested that the patient activation is based on the organizational factors, professional and patient. In this study this would include the local culture impact on organizational, professional and individual patient behaviour towards the health education program. No study examined how to increase the patient's knowledge to improve motivation and activation during and after the education program.

Most of studies identified that patients have limited knowledge, the level of motivation among patient was low, limited awareness and knowledge among asthma after the delivery of these educational programs (Boulet *et al*., 2015; Kritikos *et al*., 2007; Armour *et al.*, 2007; Steurer-Stey *et al*., 2015, Lim *et al*., 2014; Raju, 2012; Tousman *et al*., 2011). The onus throughout seems to be that it is the patients lack intention to self-manage their asthma and their inability to make the most of and benefit from the education program. However, these studies did not measure the effectiveness of the education program content and the relevance to the patient. Study content must be developed with the help of health professionals; it should be interactive as well as motivational to increase patient's awareness as well as self-management of asthma (Boulet *et al.,* 2015; Holley *et al.* 2017). It is important to explore whether the delivery and study content itself is relevant and of the sufficient education level to engage and increase the knowledge and motivation of the patient as well as manage the asthma level. Future research needs to include examining the effectiveness of study content using both statistical and qualitative research methods. Tousman *et al.* (2011) identified that the professionals who deliver the program can motivate the patient and they can also increase patient activation through effective program delivery. Therefore, in Saudi Arabia for the program to be delivered effectively nurses may need to be trained how best to deliver the asthma education program.

Current research evidence is based predominantly on quantitative methods which means there is only one reality the programs works or doesn't without really explain what works for whom when and how. There is no evidence whether the asthma program leader is experienced or not; whether the environment to deliver the study content is conducive to learning; whether the delivery of study content is appropriate (or too long and boring for patients); whether the study content is understandable and motivational for all patients; whether there are interactive communication sessions to understand the patient needs then plan the delivery of educational program according. These types of aspects cannot be

uncovered through quantitative methods so it may be more suitable to include a qualitative element to a study to explore the more subjective elements of the education program and intervention.

SINA clearly elaborates on how to control and self-manage the precipitating factors of asthma and how to develop a doctor-patient partnership. In SINA the recommended asthma treatment approaches involve controlling the disease through Asthma Control Test utilization for adjustment and initiation of the asthma treatment (Al-Moamary *et al.,* 2019). SINA guidelines cover asthma treatment for both adults and children, with particular attention to younger children of 5 years or less (Al-Moamary *et al.,* 2012; Moufag *et al.,* 2012). The Saudi Thoracic Society (STS) is committed towards a long-term improvement plan which promotes best practice for respiratory diseases. As an extension of STS, SINA (Saudi Initiative for Asthma) was launched under special attention of non-asthma specialists such as general practice and primary care physicians (Al Moamary *et al.,* 2012; Al-Jahdali *et al.,* 2019; Yousef *et al.,* 2015; Kosoy *et al.,* 2019). The Saudi Allergy Asthma and Immunology Society's contribution towards this update is significant. After receiving a comprehensive set of updates from the previous version 2016, (Kosoy *et al.,* 2019). SINA now emphasises more personalised approaches, evidence-based information and updates about treatment, getting better understanding about disease heterogeneity, immunotherapy role in management and integration of biologic agent related recommendations. Recent evidence, new medications and new indications regarding existing medications were also added to medication appendix for the upgrade (Kosoy *et al.,* 2019).

The Kingdom of Saudi Arabia is experiencing high numbers of allergies, severe sandstorms, a higher utilization of dairy products and restricted exercise habits due to hot weather all of which contribute to an increased number of asthma patients (Al-Ghamdi *et al.,* 2008; WHO, 2016; Moradi-Lakeh *et al.,* 2015). Furthermore, these studies also revealed that SINA's asthma institutional program, limited hospital facilities and specialized staff in rural areas provide a challenge for asthma patients (Al-Ghamdi *et al.,* 2008; WHO, 2016; Moradi-Lakeh *et al.,* 2015). Educational programs and published study content must be motivational and interactive to involve all the asthma patients and enhance their self- confidence to control their asthma without regular hospital visits in Saudi Arabia. Moreover, some recent studies have pointed out that there is restricted education and communication in several respects—patients to doctor, patient to patient, patient to hospital, Ministry of Health (MOH) to Asthma

patients. As a result, patients face severe asthma control issues (Moradi-Lakeh *et al.,* 2015; WHO, 2016; Hamdan *et al.,* 2019).

Since the completion of this systematic review and the development of the ASMEP programme described in this thesis, a number of studies have been published which are relevant to this work. For example, Kouri *et al.* (2019) has provided evidence and recommendations relating to the compliance of medication and a proper medication plan. Ali *et al. (*2019) have demonstrated that group education and discussion have increased asthma control and post intervention test scores as well decreased the use of systemic corticosteroids. Haouichat *et al.* (2019) have found that a lack of medical insurance and long-term duration of asthma are some of important factors which decrease the patient motivation and control on asthma. Studies have showed that patient demotivation is one of the major reasons to lose control in relation to asthma but few studies have investigated this issue in-depth (Ali *et al.* 2019; Haouichat *et al.* 2019).

2.15. CONCLUSION

Self-management asthma education programs, the primary goal of which is to educate patients to effectively manage their asthma health, demonstrated significant improvement in patient asthma outcomes. Improvement included enhanced knowledge and understanding, self-efficacy, positive self-care behavioural changes (such a medication adherence, inhaler use, self-monitoring of triggers, regular follow-up visit, and regular exercise), and supported reduction in both unscheduled visits and inappropriate use of medications (Boulet *et al.,* 2015; Chen *et al.,* 2010; Federman *et al.,* 2015; Mindlis *et al.,* 2016; Poureslami *et al.,* 2012; Tousman *et al.,* 2007).

The positive aspects of the different interventions included in this review, the effectiveness of small group asthma discussion explored by two studies (Kritikos *et al.,* 2007; Tousman *et al.,* 2011), were consistent with previous studies in demonstrating the value of a small group asthma education programs for adults (Zhong*, et al*., 2017; Osman, 2000). Although evidence suggests that both small group and individual delivery formats can improve patient health outcomes (e.g., reduction in emergency department and hospital visits), small-group education can be more effective for certain outcomes (e.g., improvement in inhaler technique) with the added benefit of being simpler and more cost-effective than individualized education.

Positive outcomes were more significant with clinician and or physician-based education and management programs, which improved patient outcomes (such as quality of life, asthma symptoms, reduced acute exacerbations, improved knowledge level, and general clinical improvement) related to the intervention, despite varied materials and support services (Angelini *et al.,* 2009; Damon, & Tardif, 2015; Feitas *et al.,* 2013; Press *et al.,* 2012). Clinician delivered educational intervention also was shown to be effective at improving health outcomes for minority patients with asthma, with greater success evidenced with those incorporating culturally tailored, language-appropriate education (Press *et al.,* 2012). In particular the use of team-based specialty clinics and long-term follow-up after acute care visits were noted to show promise for this sub-group of asthma patients (Press *et al.,* 2012). Clinician-based education programs can be further supported through ED directed education at discharge, which has been shown to support increased patient follow-up with their PCPs after emergency visit for acute asthma exacerbations (Villa-Roel *et al.,* 2016).

In summary, it is well known that patient-centred asthma self-management education is effective at producing improved patient outcomes through education and training. Given the evidence from this review specific to the benefits of small group and individualized programs, emergency and pharmacy programs, and clinician-based programs, recommendations can be made for the incorporation of asthma education in Saudi Arabia. From the results of this systematic review, a patient-centred, culturally congruent, small group asthma self-management education programs led by health care professionals, such as nurses or other clinicians, is highly recommended to support improved outcomes among asthma patients in Saudi Arabia.

CHAPTER 3: THEORETICAL FRAMEWORK

3.1. INTRODUCTION

In the previous chapter (2) selected articles were systematically reviewed to identify the gap in the literature that this research fills, as well as to identify a suitable approach for designing the asthma self-management intervention. In this section, a conceptual framework is constructed on the basis of a systematic review of findings and theoretical literature. This framework is used to design and evaluate the self-management intervention described in this thesis.

The studies within the systematic review have assessed the effectiveness of existing asthma educational programs by measuring a wide range of outcomes, while also noting their potential positive impact on quality of asthmatic patients' lives. Concepts which were highlighted in the studies were self-efficacy, self-management and social cognition. Few studied the concept of patient activation and although culture was highlighted as important, programs were not designed with Arab culture in mind. This chapter examines these concepts in more detail.

3.2. SELF-EFFICACY

There is high mortality rate and high prevalence of chronic disease and it is the fourth leading reason of death across the globe (Global Initiative for Chronic Obstructive Lung Disease, 2017). Chronic diseases only become worse with time, so the aim of treatment is not to come up with cure but to effectively manage the disease (Araújo *et al.,* 2012). Self-efficacy is considered a key feature of effective symptom management in patients with chronic disease (Armour *et al.,* 2007). It is highly correlated with overall functioning of patients who find themselves hospitalized (Axelsson, & Lötvall, 2012), along with life standards (Bodenheimer, 2002) and the five-year rate of survival among patients of chronic disease (Bonomi *et al.,* 1996). Self-efficacy denotes a person's confidence in managing their chronic disease on their own. The key to self-efficacy is confidence i.e. the person feels confident enough in dealing with their disease to take medicines on time and also make lifestyle

changes which help better manage the disease (Riehm *et al.,* 2016). Self-efficacy for asthma patients represents the extent to which a person is confident in dealing with asthmatic attacks and caring for themselves at home (Lorig, 2003).

3.3. BANDURA'S SOCIAL COGNITIVE THEORY AND SELF-EFFICACY

Self-efficacy has been acknowledged by learning theory for over three decades (Bandura, 2001). It was regarded as a component of social cognitive theory and was targeted widely by behavioural programs as enhanced self-efficacy has been related with improvements in minimizing asthmatic attacks, enhanced levels of physical activity, and medication adherence (Holley *et al.* 2017). Self-efficacy is associated with the beliefs of people in their ability and confidence to change events which influence their lives; it is also regarded as a core belief which derives reflective motivation for self-management of asthma (Bandura, 2010). Self-efficacy represents the beliefs of a person about how capable they are in performing behaviours which are essential for bringing about a desired result (Bandura, 1986). The social cognitive theory of behavioural change suggests that the individual's view of self-efficacy represents the extent whereby the individual considers themselves to be capable of dealing with their disease (Curran, 2014). It is therefore crucial to strengthen self-efficacy in people with chronic diseases whose life may improve by changing their lifestyle (Deane *et al*., 2017).

Measuring self-efficacy is useful following health-education interventions to ascertain any changes as a result of the intervention. The elements significant for self-efficacy can vary between clinical groups. Previous research with a sample suffering from heart conditions found out that there was association between lower self-efficacy and greater consequences arising from the illness (Agarwal *et al.,* 2013). Other research has found that higher self-efficacy has a positive effect on blood sugar and blood pressure (Chien *et al*. 2016). Increased self-efficacy also results in reduced hospitalization rates, enhanced life quality and positive results for health (Khoshkesht *et al*., 2015). In contrast, patients who had a low level of self-efficacy failed to maintain their physical exercise levels upon completion of a respiratory rehabilitation program (Zhang, *et al*. 2016). Self-efficacy skills lead to the ability to change lifestyles and also enables the person to better monitor their illness (Emme *et al*., 2014; Zhang *et al*., 2016).

According to Bandura, self-efficacy is regarded as a judgment of people about their capabilities for organizing and executing a different course of actions needed for attaining different types of performances (Bandura, 1986). Self-efficacy represents the confidence level of person in respect of whether they can complete a particular task or action. Bandura (1986) observed that the ability of an individual to learn from their observations and interactions and modify their behaviour accordingly depends on different personal capabilities (i.e. levels of self-efficacy). However, the self-efficacy of an individual may differ according to the difficulty level of the new behaviour (magnitude), learning from past experience (generality) and expectation level (strength).

Therefore, the outcome of the individual's interaction for improving self-efficacy is dependent on their capacity to create thoughts symbolizing the environment (symbolizing capability), learning from experiences of other people (vicarious capability), anticipating behaviour (forethought capability), altering standards and self-regulation (self-regulatory capability), and engage in self-reflection (self-reflective capability) (Bandura, 1986). The correct measurement of this construct is important. Furthermore, the utility of valid instruments with regard to local culture is considered essential (Serrano *et al.,* 2019).

Previous studies identified self-efficacy as the chief element in explaining the variance in health-related life standards and depression (Lee *et al*., 2014). However, patients of chronic disease have reported relatively low self-efficacy levels (Tülüce, & Kutlutürkan, 2018). Therefore, understanding the characteristics of patients with low self-efficacy levels and screening them could represent critical step towards the provision of suitable intervention which leads towards highly effective health outcomes.

Self-efficacy in chronic disease patients is relatively low when the disease severity becomes worse (Sani *et al*., 2015) and there is low social support level (Kim & Yong, 2005) along with low knowledge of disease (Fan, & Lv, 2016). Self-efficacy is also related to different coping strategies in stressful situations. In people who regard themselves as unable to cope, their health declines quicker than it should (Bandura, 1986). The characteristics of patients including gender, age, education level, marital status and period since diagnosis also significantly correlate with self-efficacy levels (Lavoie *et al.*, 2008). The relationship between these variables also varied with variance in type of chronic disease (Lisspers *et al.,* 2010; Fan, & Lv, 2016; Lavoie *et al*., 2008).

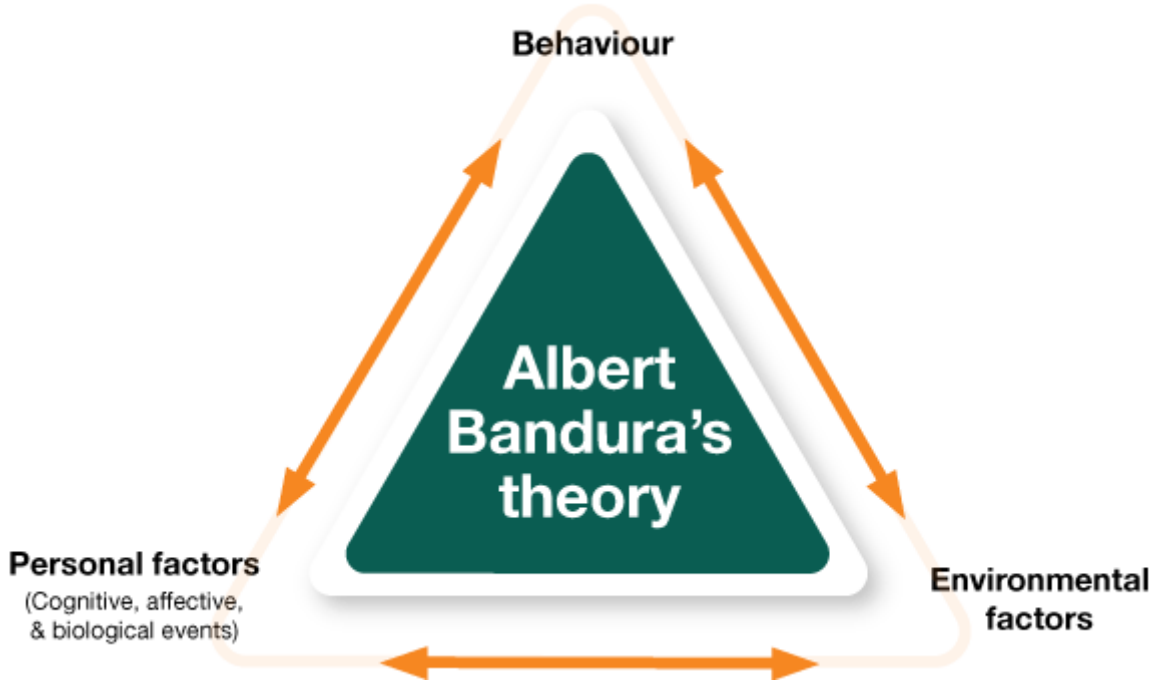

Figure 3.3 Social cognitive theory (Bandura, 1986)

Self-efficacy, derived from Bandura's Socio-Cognitive theory, refers to individuals' belief about their capability to successfully perform the intended action (Bandura 1986). A large body of literature has suggested a positive association between self-efficacy and self-management behaviours, highlighting the significance of self-efficacy in the initiation and maintenance of behavioural changes (Mada, 2015). Patients encounter various barriers in the trajectory of asthma self-management. The Sociocognitive Model asserts that self-efficacy, which could be enhanced by knowledge and decision-making skills, can predict patients' commitment and persistence in carrying out the targeted behaviours, especially in face of barriers (see figure 3.1) (Bandura, 1986). Those who perceive higher levels of self-management barriers are more likely to exhibit an undermined self-efficacy (Melnyk *et al*., 2011; Memish *et al*., 1990).

The self-management concept develops when one becomes aware about the significance of self-care for the chronic disease one has. The healthcare providers in this regard must share the information regarding chronic disease with the patient (Martynenko *et al.,* 2016). Factors which influence self-management involve self-care at the individual cognitive level, and include the psychological, physical, cultural, and social factors (Morisky *et al*., 2009). The concept of self-management is aligned with that of self-care and involves the associated concepts of self-monitoring of disease and symptom management. These concepts are then

mediated by self-efficacy (Straus, 2011). Moreover, Lorig (2011) observed that Albert Bandura introduced the term self-management. Generally, the significance of self-management is that it prepares the people with chronic diseases to manage their health-care plan actively. The concept of self-management is discussed in greater detail below. The following figure 3.2 applies Bandura's social cognitive theory in the context of an asthma education program:

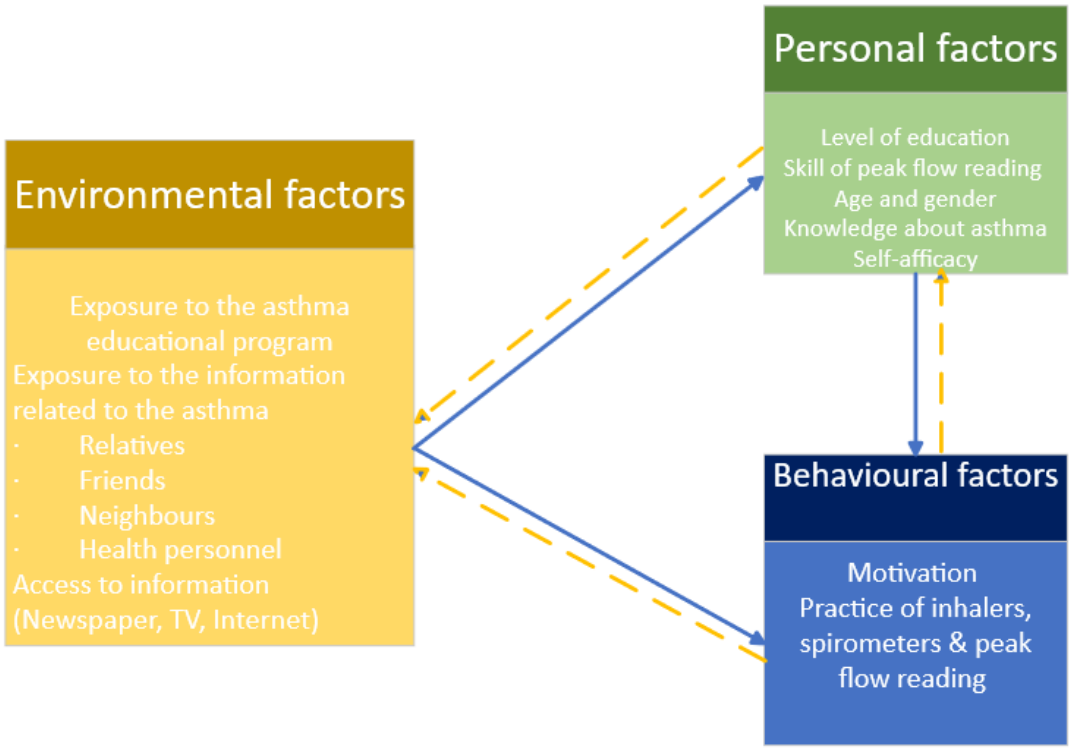

Figure 3.4 Social cognitive theory: Developed on the basis of Bandura's social cognitive theory as applied to an asthma education program

Social cognitive theory is applied increasingly within the concept of self-management of asthma. It is derived from Bandura (2005), developed from psychological studies which investigated behaviours among adults. The theory highlights how adult behaviours develop and how their behaviours are modified through modelling and reinforcement (Adenzato *et al*., 2012). The theory was refined by Bandura (1986) when he renamed it as social cognitive theory. The name of the theory was modified due to its significant social effect on behaviour. In short, as per social cognitive theory, human behaviour is the result of environmental and human interactions (Deane *et al.,* 2017). Therefore, human behaviour depends on how the interaction among individuals takes place within the specified environment. For example, for

developing good behaviour of self-management, it is vital for people who have asthma that they understand the manner of interacting with their surrounding environment (Agarwal *et al*., 2013).

It is argued by Bandura (1986) that new behaviours are embraced by human beings due to two expectations. These expectations include the efficacy and the outcome. In the instance of asthma, the expectancy of the outcome is that people with asthma have expectations when they engage with certain practices (Serrano-Ibáñez *et al*., 2019). However, expectancy of outcome is not sufficient for activating self-management practices among such people. Employing Bandura's theory, the reason underlying this is the lack of efficacy expectancy (self-efficacy) which facilitates adopting the practices related to self-management (Keller *et al*., 2018). This expectancy explains why some people are unable to embrace good practices of self-management despite the knowledge of its positive results (Lu *et al*., 2011).

3.4. SELF-MANAGEMENT

Efficient self-management involves monitoring the illness so that behavioural, cognitive and emotional strategies can be developed and employed for maintaining a satisfactory quality of life (Riehm *et al.,* 2016). Self-efficacy is the core element in self-management which empowers the person to gain control of their disease. Self-efficacy represents the confidence and belief of a person about their capabilities for producing given attainments in a given situation (Kashian & Mirzaei, 2019). Perception of being powerless regarding illness may interfere with coping mechanisms and lifestyle changes. Therefore, raising self-efficacy is a key goal of educational intervention for persons who develop chronic illnesses (Lorig & Holman, 2003). Self-efficacy is regarded as a framework for a broad range of studies in the area where self-efficacy has been regarded as modifiable through self-management interventions (Lorig *et al.,* 2003; Lorig *et al.,* 2009).

The evidence in the systematic review (Chapter 2) showed that the self-efficacy of patients to manage chronic diseases was improved and enhanced by education programs aimed at self-management (Lorig, 2003). This was also evident in other studies conducted on chronic health conditions over the years, which showed that self-management programs were crucial in enhancing the status of health and that they also lowered the cost of healthcare (Gibson *et al.,* 2002; Glasgow *et al.,* 1997; Murray *et al*., 2017). There are different ways to enhance self-efficacy. These include: mastering the skill by patients to set action plans for self-

management of asthma; modelling – whereby the patients learn from existing patients (i.e. self-help groups); reinterpreting the symptoms whereby behaviour is influenced by their belief regarding disease; social persuasion whereby patients learn from healthcare professionals or even from friends and family (Lorig & Holman, 2003; Lorig, 2003).

Lavoie (2008) observed that a low level of self-efficacy within asthma patients was associated with poor performance in controlling asthma and poor quality of life. Therefore, self-efficacy techniques should be incorporated in education about asthma and self-management programs (Alessi & Petry, 2014). The implications of self-efficacy theory regarding educating patients about asthma involve the belief that: increased capabilities will give asthmatic patients strong commitment (Kidd, 2018); verbally persuading increases the chances of engagement towards achieving goals (Brenk-Franz *et al.* 2015); confidence is increased whenever people see others are succeeding at goals; attaching importance to attending group sessions (Duan *et al.,* 2018). Such concepts can generate positive outcomes about self-management programs. Therefore, self-efficacy is also being considered as an integral part of the conceptual framework of this research and the intervention which it has developed.

Any patient who is suffering from asthma likely requires better self-management of the disease. For example, it is important to educate the patient about the self-management of asthma so that the patient can control an attack by taking right medicines (Keller *et al.,* 2018). If the symptoms of asthma are controlled in time, there will be fewer exacerbations faced by patient and the cost of healthcare will also be lower (Dyer, 2013). Further, better self-management will increase the quality of life of sufferers. The emphasis of education on self-management of asthma should be on monitoring the symptoms and controlling them as soon as they appear (Miller, 2016). The educator should utilize a collaborative approach which encourages patients to take responsibility of their own care (Graffigna *et al*., 2017).

It has been identified from the systematic review that written action plans are also recommended in the guidelines. These involve particular treatments and actions for responding to the changes which arise in the symptoms, particularly for the patients who are suffering from moderate to severe asthma. Different types of health professionals can be successful educators of asthma, including the respiratory therapists (RTs), physicians, nurses, and pharmacists (Tzeng & Marcus-Pierson, 2017). The most significant aspect of the provider-patient relationship is that both should have the communication-based partnership in

which the provider continuously encourages the patient to participate in the session. This partnership can be enhanced when the goals, concerns and preferences of the patient are included in the treatment (Gruman *et al*., 2010). The partnership of different professionals can improve patient outcomes through diversity of professional knowledge and skills they can offer (Simmons*, et al*., 2014).

The role of education towards self-management is strongly established and not really arguable. Instead, the challenge exists in the identification of the right strategies and models which have the effect of fully engaging the patients in disease management (Lee *et al.,* 2019). There exists persuasive evidence that the significant features of asthma education are: partnership between patient and provider, writing a plan of action which informs the patient about the pattern to follow for managing the disease, and identification of the activation factors which trigger the asthma attack so that the patient can monitor and control them (Troya *et al.,* 2019). Dickens *et al.* (2014) also observed that the activation, knowledge of patient and confidence levels are the key features in managing the health condition. It is possible to understand the healthcare levels among adult populations by exploring the elements associated with activation along with patients' functional problems (Chang *et al*. 2018).

Efficient self-management thus involves monitoring the illness so that behavioural, cognitive, and emotional strategies can be developed and employed for maintaining a satisfactory quality of life (Riehm *et al.,* 2016). Self-efficacy is the core element in self-management which empowers the person to gain control of their disease, in a way that enable the long-term self-management of the problem. Self-efficacy represents the confidence and belief of a person regarding their capabilities for producing given attainments in given situation (Ohlendorf *et al.,* 2015).

3.5. PATIENT ACTIVATION AND MOTIVATION

The term patient activation refers to an individual` knowledge, confidence and ability to manage their health condition (Hibbard *et al*., 2008). The higher the patient activation the better will be the health outcomes and treatment compliance (Alegría *et al.,* 2008; Alexander *et al.,* 2012; Courtenay, 2000; Craig*, et al.,* 2007; Cresswell, 2003; Crotty, 1998). Crotty (1998) considered patient activation as the "blockbuster drug of the century".

Patient Cantered Outcomes Research Institute established in 2010 under Affordable Care Act – primarily focuses on determining the ways through which patient activation can be improved, and patient involvement in managing their health condition and making health-related decision can be increased (Gao *et al.,* 2013; Grischott *et al*., 2019).

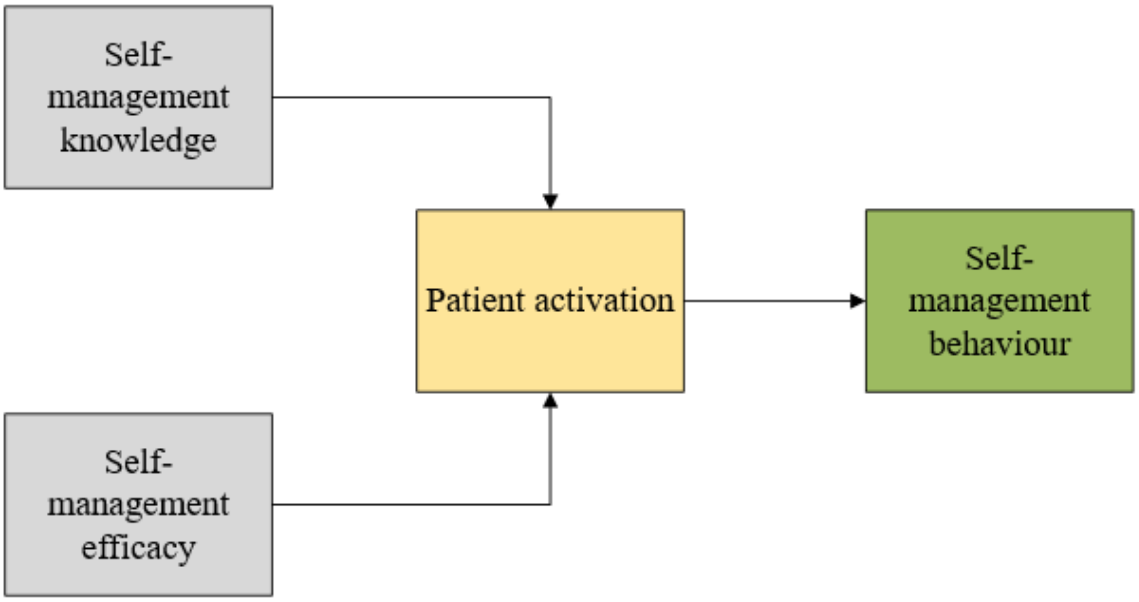

Figure 3.5 The relation of self-efficacy, patient activation and self-management (Do et al., 2015)

Patient activation is closely aligned with the concept of self-efficacy as it also relates not only to the confidence of a person in managing their health, but also adds in knowledge and ability to help patients better manage their condition (see figure 3.3) (Do *et al*., 2015). In addition to patient activation, the self-management model also includes advice and information, self-management, shared decision-making and personalised care (Ellis *et al.*, 2014). Patient activation can also cover a patient's readiness to control a disease as well as its symptoms. Patient activation focuses on explaining patients` skills and knowledge and activates them to put these into play when the patients feel a sense of confidence and/or already have the required knowledge (Quinn *et al*., 2018).

Patient activation has strong and direct association with positive self-perception, which should lead the asthmatic patients towards self-management (Hibbard and Mahoney 2010). In fact, patient activation is the most important element that ensures the effectiveness and success of any educational program as it improves individuals' self-efficacy and self-concept as good self-manager (Shah *et al*., 2014). Asthmatic patients can demonstrate patient

activation by acquiring confidence in the skills and knowledge required for managing asthma symptoms, applying their knowledge and using appropriate devices (Hibbard, 2010). Patients who show lower activation levels are not actively involved in self-management activities or healthy lifestyles, do not generally seek support (only when needed) and show little interest in following physicians' advice and orders (Jiggins, 2016). Resultantly, there is a higher frequency among patients with less patient activation to make more visits to the emergency department (ED), to remain hospitalised for longer and/or to be re-admitted again and again after they are first discharged (Kinney *et al.,* 2007).

Contrary to that, in case of high level of patient activation, people tend to participate in healthy activities, demonstrate higher satisfaction with healthcare services, are less likely to be hospitalised and enjoy improved clinical outcomes (Kinney *et al.,* 2007). Thus, it is important to tailor services designed for initiating and activating the patient roles, to appropriately support the asthmatic patients in terms of meeting their needs, particularly in terms of using devices appropriately and self-managing their symptoms (Hibbard, 2010). The figure 3.4 below represents the self-management model along with patient activation:

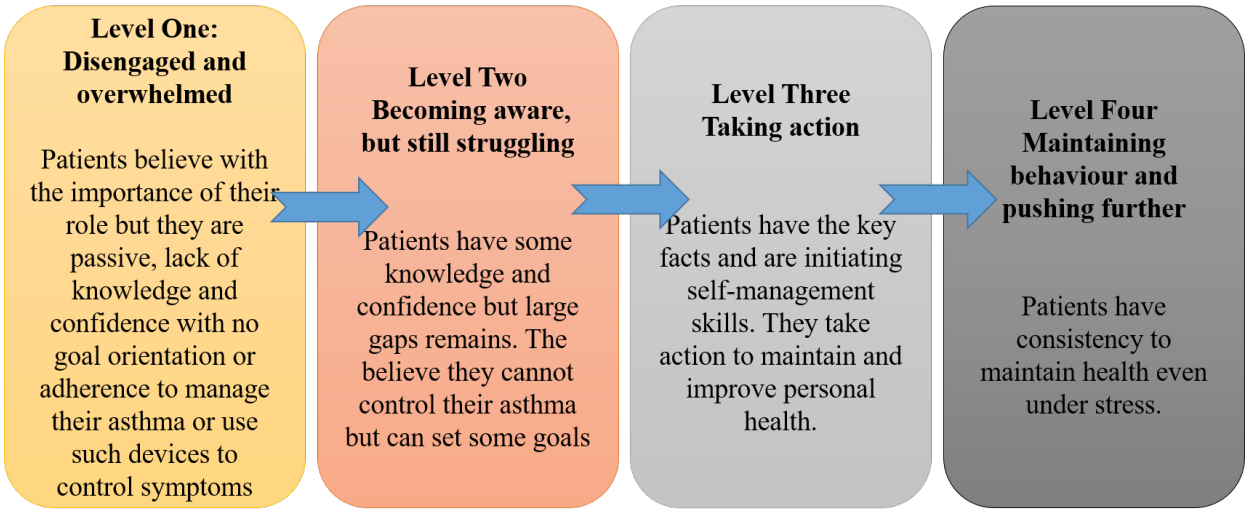

Figure 3.6 Self-management model and patient activation (Hibbard & Green, 2011)

With help of education, this model starts working by transferring the patient from the stage when they believe that their role is important but cannot be exercised due to lack of knowledge, to the stage where they show consistent behaviour in terms of applying their acquired skills and maintaining their health condition even in stressful circumstances. Therefore, the education program of this research (outlined in chapter 4) would not offer any

external reward or punishment for patients to motivate them to attend the program. Instead, different means of encouraging intrinsic motivation will be followed. These are:

1) Intrinsic regulation (because of the pleasure they feel) during the asthma program. Therefore, there is need to offer very pleasure and comfortable environment for the patient during the program that would encourage them to sit and to learn about the self-management of their asthma.

(2) Identified regulation (because they perceive a healthy lifestyle as very important and thus highly value it to treat the illness of asthma). Therefore, the focus of this research is also to emphasise the importance of asthma education for the patient and the program would also include the consequences and self-management role to treat the illness, that would in turn improve patient knowledge regarding the disease. Accordingly, the level of learning can intrinsically motivate the patient to pay their full attention to learn new self-management skills. Additionally, the new skills and knowledge would encourage them towards efficient self-management. As has been stated above, culture is an integral part that trained professionals must recognise for effective delivery of program. Role of gender in patient education in program development and delivery is being considered in program development that would increase the effectiveness of the asthma education program. Therefore, a consideration of the cultural context and development of the appropriate contents and material of the program can intrinsically motivate the patient, meaning the intrinsic motivation of patient toward learning and self-management would increase the outcomes of the program.

(3) Integrated regulation (as they have highly internalised the importance of healthful activities and healthy lifestyle and thus have integrated them into their own value system so as to improve their own quality of life through treating asthma illness). There is a need to educate patients on how self-management can improve their quality of life. Therefore, the conceptual framework would consider the major activities of asthma education so as to improve the healthy lifestyle of patients. This in turn could improve their motivation level for self-management. But there is also need to the consider how much the patient believes in themselves to be able to treat their asthma through self-management, that is self-efficacy. Additionally, extrinsic motivation tools are important as well. For example, the patient being allowed to take used devices home for their use in future additional, along with a pleasant room environment and free food being offered to the patient professional during the program.

3.6. PATIENT ACTIVATION RESEARCH

Previous studies indicate that both patients' socioeconomic and demographic characteristics bring variation in patient activation (Cunningham *et al.,* 2008; Hibbard *et al*., 2008). It has been observed that activation level amongst immigrants, ethnic and racial minorities, people with less education and lower incomes, is worse in terms of self-management ability as compared with others (Hibbard *et al.,* 2007; Hibbard *et al*., 2008). Patient activation also has an association with health-insurance coverage. Hibbard *et al.* (2008) observed lower level of activation amongst patients with Medicare compared with patients with private health insurance.

According to Kukla (2013), there are some contextual factors that also need to be considered in developing self-management educational programs for the patient. These factors included the patient characteristics and health care setting as shown in figure 3.5 below. Similarly, Jerant *et al.* (2014) also took contextual factors into consideration as the most important attributes of patient activation. The environment where patients obtain healthcare is known as contextual factors (Cook *et al.,* 2008). Hibbard *et al*. (2008) focuses on two kinds of contextual factors: community characteristics and site of common source of healthcare (Hibbard *et al*., 2008). Site of common source of healthcare like hospital ED (emergency department) or physician`s office, reflects the association between patients and physicians, and has been shown to strongly influence patient activation (Alexander *et al*., 2012).

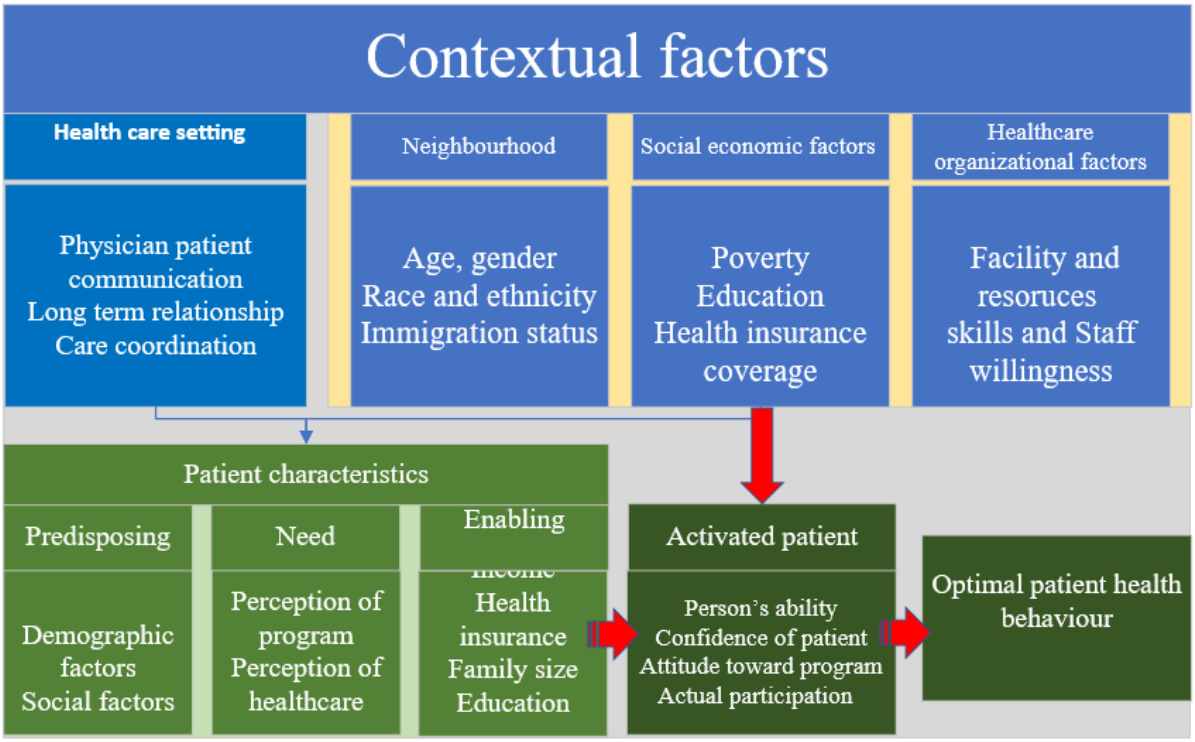

Figure 3.7 Adopted from Chen, et al., 2014) and applied to Asthma education program

The sustainability of patient's involvement and activation towards their care depends on continuous and long-term relations with a physician (Hibbard *et al*., 2007). Patient activation can be associated with primary care settings where there is good communication and trust between patients and physicians. This is one of the important contextual factors. Although not being delivered in primary care, the intervention is being delivered in a setting that patients visit routinely so there are opportunities to build-up long term communication and trust, along with co-ordinated care.

Community characteristics are considered as the second most important contextual factor. Hibbard (2008) observed that patient activation significantly improves at societal or community level. Moreover, community characteristics are considered as important element of individuals' health (Williams *et al.,* 2009). There are many studies (such as Hart, 1998; Hijazi, *et al*., 1998; Cook, 2008, Lee, 2009) that have associated community characteristics and healthcare resources with healthcare utilization and access, including healthcare disparities (Haung *et al.,* 2009; Jansan *et al*., 2009) and mental health treatment (Cook *et al*., 2008; Lee, 2009). Chronic care practices strongly emphasised on patient centeredness with the aim of overcoming the challenges and issues of increasing frequency of various chronic diseases like asthma. This model is widely used while redesigning the practices to bring

improvement in quality of treatment for chronically ill patients (Wahabi *et al.,* 2012; Wagner *et al.,* 1998).

Self-management support such as setting collaborative goals, proactive care plan, follow-up and problem solving is the main focal point of chronic diseases practice (Cully *et al.,* 2019). However, in organisational contexts, financial support and leadership vision (Wagner *et al.,* 2013), along with motivation and organisational culture (Cully *et al.,* 2019), are essential for integration of chronic disease practices into a system. This research design program for group delivery through different professionals that create a teaching environment to improve the learning of the patient from the program.

3.7. CULTURAL FACTORS AND PATIENT SELF-MANAGEMENT

As noted above, previous studies indicate that both patients' socioeconomic and demographic characteristics bring variation in patient activation (Cunningham *et al.,* 2011; Hibbard *et al*., 2008). One of the elements lacking from the models above is that of culture, however. The cultural context of Saudi Arabia is quite different to areas where the concept of patient activation has been previously studied. However, understanding the cultural elements influencing the behaviour of patients' motivation and self-efficacy towards the healthcare education is also significant (Gao *et al*. 2013). Different complex elements hinder the progress and ultimately affect the outcomes for patient's health (Gao *et al.,* 2014). One such factor involves the culture – a feature which when addressed properly can result in benefit for the patient because it directly influences patient behaviour and motivation (Chang *et al.,* 2018; Grischott *et al.,* 2019; Wasley *et al*., 2019), self-efficacy of patients (Joboshi & Oka, 2017; Slovinec *et al.,* 2014), patient activation (Waterman *et al.,* 2015; Hatch *et al*., 2015; Knittle *et al.,* 2015) . However, this question of how culture influences the education of asthma patients must be explored in-line with different associated factors which make this issue significant. Therefore, this research considers culture, in particular elements of Saudi culture, as core concerns of the patient self-management education program.

Culturally particular chronic disease interventions have been designed and assessed among different groups of racial and ethnic backgrounds including Afro-Americans (Utz *et al.,* 2008; Collins-McNeil *et al.,* 2012), Chinese-Americans (Sun *et al.,* 2012), Mexican and Latino Americans (Vincent *et al*. 2007; Rosal *et al.* 2011), and Hawaiian Asian Pacific Islanders (Tomioka *et al.* 2012). Findings show that culturally tailored interventions are useful in

enhancing health outcomes (Tomioka *et al*. 2012; Collins-McNeil *et al*., 2012) and enhancing the engagement in healthy behaviours (Vincent *et al*., 2007; Collins-McNeil *et al.,* 2012; Tomioka *et al*., 2012). However, the programs which have been previously developed with cultural aspects in mind are still limited due to insufficient insight into Saudi Arabian culture. To address this gap, the designed intervention will take these elements into account and the research will seek to understand the barriers and facilitators of implementing the asthma education program in the context of Saudi Arabia.

3.8. RELIGION

Religion is one of the factors which has a strong influence in Saudi culture and Islam is generally perceived as shaping the identities of Muslims. Muslim patients usually respond to health issues in the context of their beliefs and regard matters of life and death as tests from Allah (Rassool, 2000). In the context of this high level of religiosity, Muslims treat diseases with patience, considering them to be a test from Allah (Al-Krenawi & Graham, 1999). These kind of beliefs could impact on how participants interact with or benefit from the program. For example, men with asthma in such cultures, could be reluctant to attend programs with doctors under their misbelief that the disease is a test. It can viewed as a misbelief because Quran encourages patients to use all means to treat their illnesses and get help from doctors (Galdas *et al*. 2007).

Culture which based on the local religion is recognized as an influential element which can influence the way nurses communicate with patients (Janson *et al*., 2009). Therefore, there is a need to train the nurses or professionals religion beliefs to deliver the educational program effectively and there is also need consider patient religion belief about disease an illness. Janson *et al*., 2009) argued that the experience of the patient suffering from a particular illness is not just limited to the biomedical effect of that illness. Instead, a person who is a patient of some illness spends little time being a patient. This finding led towards a developed approach for understanding the patient's perspective towards his illness. Building on such a tradition, Conrad (1987) observed that the sociological research concerning the illness experience must take into account the everyday life of people who live with the illness. It must be based on systematically collected and analyzed data from sufficient variety and number of people suffering from an illness. Such a perspective is helpful in constructing the meaning of illness, the social organization of the world around sufferer, and strategies used for adaptation.

Therefore, the selection of the professionals and training of the professionals to deliver the program should also take the local cultural context into account. Many studies in the systematic review chapter have revealed that asthma knowledge, asthma awareness and level of patients' motivation remain low even after attending asthma education programs. These studies appeared to blame patients for paying less attention or being unable to yield maximum and positive outcomes through these programs. These studies, however, did not focus on the effectiveness and usefulness of the study content or examine why patient outcomes did not improve. In this regard, the current study critically evaluates the educational program itself by collecting participants' views to determine whether delivery as well as study content has sufficient knowledge to improve patients' level of motivation and knowledge necessary to engage them in managing their asthma condition. The professionals delivering the educational programs could be the key activation and motivation factor. Thus, having trained nurses and professionals who are familiar with the religious and cultural beliefs of the patients to deliver the asthma educational program is very important.

3.9. GENDER CONSIDERATIONS FOR INTERVENTION

'Gender' represents the constructed roles in society and the attributes and behaviours which a culture recognizes for men and women (Saunders & Peerson, 2009). Moreover, it is also intertwined with the problems related with social roles that belong to men or women in their social contexts, governed by the beliefs and values they possess (WHO, 2010). Gender represents the socio-cultural factor which has effect on the health-related behaviours for management of chronic diseases like asthma through the active role in society (Sobralske, 2006; Courtenay, 2000). This is evident from another study conducted in another Arab country, Jordan, where the majority of patients preferred that their care should be provided by nurses of same gender (Ahmad & Alasad, 2007).

Gender in Saudi Arabia is likely to be a problem when it comes to patient treatment. Saudi Arabia is a conservative Muslim country which strictly adheres to patriarchal norms as women lack the social opportunities which men have (e.g. men would have more opportunities to attend group sessions of self-management of asthma compared to women) (Social Institutions & Gender Index, 2009). The patriarchal model in a society like that of Saudi Arabia furthers the division of labour among men and women which can be influential on the division of educators and the ones that are being educated (Courtenay, 2000). Nevertheless, when the professional of the same gender is unavailable, it is acceptable for a

professional from the opposite gender to provide care and help to patients since the premise is to effectively manage the health issue. Connell (2000) found out that elements such as culture, social class and individual experience are influential and have an impact on the construction of such identities. Therefore, the delivery of the program will take this into account and males and females will be taught separately (males by male instructors and females by female instructors). Furthermore, the outcomes of the education program will also be compared in term of male and female.

Regarding the needs of patients, as mentioned in the first chapter, the lifestyle and environment of sufferers may also be different. This specifies the need for healthcare and the way such needs are met. Examples in this regard include diet, environment, and potential difference of language. For example, the environment in Jizan in Kingdom of Saudi Arabia is different from the one in other places or countries as it has dust and mud which can aggravate asthma (Hijazi *et al.,* 1998; Al-Ghamdi *et al.,* 2008). Remote areas are marked with air pollution as they are frequently in receipt of winds which continuously spread dust. Additionally, many people in remote areas are also breeders of livestock, who process dairy products. They live in small huts and tents and use coal, mud and wood for heating purposes. All these can trigger asthma attacks among those who have the condition. Rural living can also act as barrier against asthma patients in terms of access to health services.

These environmental elements are also accompanied by food and diet which are different in Jizan and can also trigger asthma. For example, some people could be allergic to common foods such as sesame seeds, peanuts, eggs and dairy products, that are commonly being utilized in Kingdom of Saudi Arabia and as such these can also trigger asthmatic attack. The factor which underpins all these factors is illiteracy and lack of education in Jizan about asthma, as the most effective means of avoiding triggers is to exclude the foods which trigger allergic reactions (Al-Ghamdi *et al*., 2008). Knowledge of patients, understanding, and adherence to nutritional regimes are being established as elements which can lower the asthmatic episodes (Huang *et al*., 2009; Saudi Initiative for Asthma, 2016). It shows that environment factors are different in different areas of Saudi Arabia and in the world, which suggests that there is not specific or universal form of the program which can be delivered in Saudi Arabia. It means there is need to put much consideration of the environmental factor to develop the asthma education program for Saudi Arabia. The existence of all such factors would suggest the need for education package which fits well with cultural principles, for

alleviating the problems and allowing people for self-managing the symptoms or disease while being at home. Since the majority of patients in areas are illiterate, education may need to be dispensed through direct verbal communication alongside other strategies taken from the systematic review. However, this is not directly addressed in the intervention outlined in Chapter 4.

Before preparing any education program it is vital that the importance of self-management is highlighted first. The most common topics and healthcare needs of patients regarding self-management are associated with asthma control criteria, expiratory flows, general knowledge of asthma, usage of medication, and adherence and healthcare (Gibeon, 2015). Tousman, (2011) also added topics such as illness prioritizing and management of multiple medications, cognitive impairment, emotional triggers and environmental elements. Moreover, the study conducted by Tousman *et al.* (2011) included other problems such as trigger avoidance and changes in general lifestyle (e.g. drinking sufficient water, exercise, hygiene, etc.). However, all such needs may differ with differences in attitude, cultural values, and beliefs of patients.

In Saudi Arabia, the communication between nurse and patient could be influenced by geographical or cultural aspects when care for patients is provided. The relationship between the two in Saudi Arabia is acknowledged as significant and patients prefer being cared by nurses of same gender. With females, husbands prefer staying with their wives when they are in receipt of care at clinics (O'Brien, 2003). As part of Saudi culture, people in Jizan are likely to hold such beliefs and their cultural and social values need be respected while providing healthcare services.

Nevertheless, culture plays a significant role in how the self-management education can be provided to patients and how it can be made relevant to them. Additionally, the program success requires the availability of patients who can self-care for asthma and the availability of facilities to educate the patients about the need and significance of self-management of asthma. Both the patient and provision of facilities in Saudi Arabia need be assessed in the light of the Saudi culture to effectively reach out to patients and bring awareness about the need and significance of self-management of asthma. The hospitals in Jizan are meeting the healthcare needs of a huge population. There is also a substantial difference in the ability of people to access hospital care and to attend programs imparting healthcare education. This is so because some people need help for attending the programs in hospitals whereas some need that such programs be delivered at home by nursing professionals or through printed material.

However, the environmental factors and the health status of the patient could be a barrier in the patient's way to attend the hospital for treatment or for any healthcare program. This highlights the significance of self-management of asthma symptoms.

It is not the biology but local culture that dictates which illness is stigmatised, which is non-stigmatised, which is considered disability and which is not, along with which is contestable (ailment having questionable existence) and which is definite (illness that can be unquestionably recognised among medical professionals) (Wasley *et al.,* 2018). Both individual personality and culture significantly contribute to development of illness experience (Joboshi & Oka, 2017). In case of some individuals, long-term illnesses may lead to shrink their world with more defined boundaries. In such cases, the individuals develop their beliefs on basis of their culture and their attitudes towards treatment of illness (Slovinec *et al.,* 2014; Jerant *et al*., 2014). Geographically, Jizan represents a huge area and sometimes patients travel far to reach the healthcare facility. The area also possesses the high altitude and is quite cold with dust coming up with wind. This adds into the struggle of people in accessing such services and as such self-management of asthma is a useful option for them.

From this, it is obvious that individuals' behaviour has a strong and direct association with level of their self-efficacy and motivation. That is why it is essential to include patient cultural background and activation (as a way of motivating the patient) in any theoretical framework (see Figure 3.6 in below).

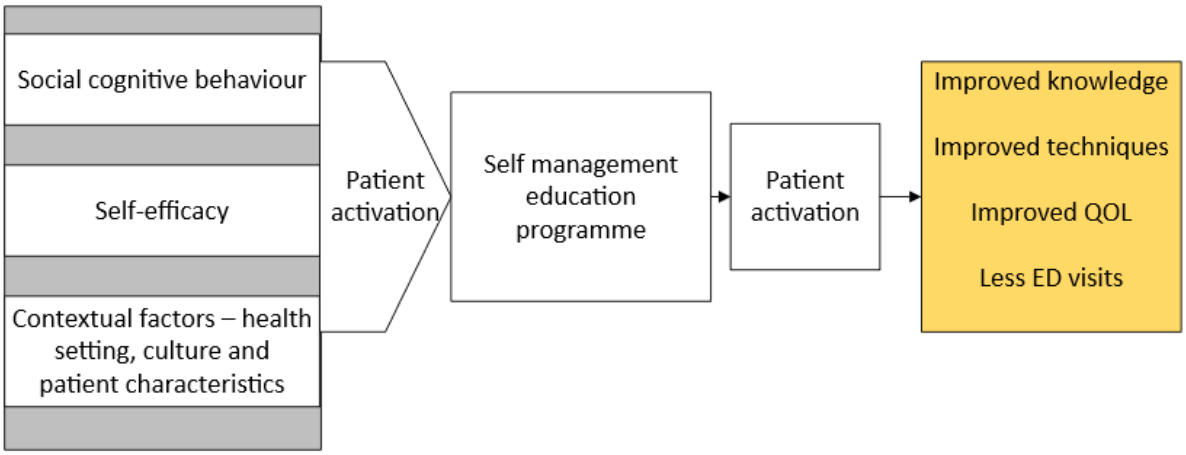

Figure 3.8 Theoretical framework

Figure 3.6 is the theoretical framework which presents how social cognitive behaviour, self-efficacy, patient activation and its outcomes are interlinked. Self-efficacy is recognized as a major element in self-controlling and managing the chronic diseases (Lorig *et al.* 2001). Self-efficacy is described as a person's confidence in self-managing his/her chronic diseases. It represents the positive view of humans because it creates encouragement to learn those skills which may helpful to self-manage the chronic disease and improve the patient's QOL (Lorig, et al. 2001). According to Wagner *et al.* (2001), high-levels of patient self-efficacy and patient motivation can improve the control of chronic diseases. Self-efficacy may be described as beliefs of an individual regarding how capable she or he is in performing behaviours which are essential obtaining the desired outcomes (Bandura, 1997). Self-Cognitive theory (SCT) highlighted that human learning and motivation can increase the level of information and knowledge that are helpful to perform effectively in worse conditions (Bandura, 1997). Another study has revealed that patient self-efficacy can increase the activation, knowledge, and confidence with the purpose to bring the change in behaviour (Hibbard, *et al.,* 2004). Studies have shown that patients feel more comfortable learning about asthma in their local language and experts use words and gestures that are easy to understand and enhance the knowledge; age, gender, education, ethnicity, patient perception, patient behaviour, patient motivation, and local culture are some of the important factors which can influence the patient activation and patient control on asthma (Chang *et al.,* 2018; Grischott *et al.,* 2019; Knittle *et al.,* 2015; Wasley *et al*., 2019; Waterman *et al.,* 2015). According to Lorig *et al.* (2005), patient self-efficacy creates a motivation to acquire those skills which can bring the positive improvement in their health as well as routine lifestyle. Schnell-Hoehn *et al.* (2009) argued that patient education, self-efficacy, and activation are interlinked, and these factors are also helpful to create a plan which can improve the patients QOL. Therefore, it is important to ensure the program takes these factors into account and the evaluation investigates these influences and outcomes.

3.10. CONCLUSION

This study aims to develop an effective asthma educational program for the state of Saudi Arabia. However, the majority of existing research relates to industrial (developed) countries (Armour *et al*., 2007; Kritikos *et al*., 2007) and focuses on educational interventions to develop patient awareness and knowledge, using specialists (such as radiologist, allergist, specialised respiratory therapist and nurses) to deliver the training. However, the level of

environmental challenges, asthma awareness, asthma knowledge and healthcare facilities vary amongst different communities, societies and cultures and these factors are different in Saudi Arabia to the countries where previous research has taken place. It has been observed that there is lack of health healthcare professionals' support and awareness and knowledge regarding asthma symptoms in Arab countries (Mohamed-Ali & Elmaati, 2016; Elbanna, 2017; Al-Ghamdi *et al*., 2008; Moradi-Lakeh *et al.,* 2015). It has been shown that self-efficacy and patient activation are key to improving self-management. Thus, it is important to take all these factors and challenges into account when developing and delivering an asthma education program for Saudi Arabia.

CHAPTER 4: THE DEVELOPMENT OF ASTHMA SELF-MANAGEMENT EDUCATION PROGRAM (ASMEP)

4.1. INTRODUCTION

For a number of decades, it has been shown that education on self-management is important for any patient with a chronic health condition (Bodenheimer *et al.* 2002). Asthma education in particular is essential for controlling symptoms that ultimately culminate in a better quality of life, a lower risk of death from an attack and reduced morbidity. This in turn should significantly reduce the number of visits to the doctor, due to fewer health-related incidents, and thus alleviate the burden on health facilities especially when provided by health workers at the point of care. Patients in the early stages of developing the disease are more prone to acting carelessly and provoking their condition. Accordingly, they need education and practical demonstrations on how to manage their symptoms and to avoid inflammation of the

pulmonary tissues. Patients with moderate to severe asthma are advised to have a written action plan for responding to any changes in their symptoms.

This chapter presents the development of a culturally relevant asthma self-management education program (ASMEP), that aims to change patients' knowledge, behaviour and self-efficacy regarding their asthma. This includes an expectation that the program will also improve patients' ability to take medication and to use self-management devices while at home. It was clear from the systematic review (chapter 2) that educating patients to manage their condition could be effective and feasible to enable patients to self-manage while at home, although this has not yet been done in a Saudi Arabian context. This chapter uses the findings of the systematic review (chapter 2), the theoretical concepts (chapter 3), combined with guidance in the field (Saudi Initiative for Asthma SINA, 2012; British Thoracic Society, 2012) and input from stakeholders (patients and healthcare professionals) to develop a culturally-relevant self-management education program. The steps of the development are described in this chapter. The program was piloted and implemented in Jizan, Saudi Arabia (chapter 5) and evaluated for its impact on patients (discussed in chapters 6 and 7).

The program is an important step in a country where respiratory problems are commonplace, with more than two million residents being treated for the condition (Redell *et al.*, 2015). It also affects the whole society and the healthcare system directly. The importance of this program, from the researcher's perspective, comes from the increasing prevalence of the disease over the past three decades, as a result of socioeconomic status, numbers of siblings, lack of knowledge about and hesitance in using new drugs, dietary habits, modernisation and allergen causes such as sandstorms, tobacco and pets (Moradi-Lakeh *et al*., 2015). The program is expected to target and work with those in the Saudi population who have suffered from asthma for a long time, in order to help them manage their asthma at home. In brief the program comprises a 2-day intervention, delivered in a group format, separately to men and women. Participants were given a booklet, education about their asthma and opportunities to practice using devices, opportunities to develop a personalised asthma plan and opportunities to ask questions, too (See appendix 1). A group of professionals were selected to deliver the intervention and were trained by the researcher prior to the intervention delivery and were observed during delivery to ensure intervention fidelity. The group of professionals included both male and female health professionals selected for their experience, role, knowledge, and willingness to participate in ASEMP. Figure 4.1 below shows the process and elements of

design and delivery. The development was iterative, with some elements occurring around the same time, due to constraints around study time, visiting the hospital site and requirements for PhD progression. The figure 4.1. highlights the development of ASMEP. This figure indicates that intially literature and existing sources (systematic review, SINA, and Asthma UK) are reviewed with the purpose to find what is already available and what are the potential areas for this study. Afterwards, health professionals and a small number of patients are approached with the purpose to find the local challenges for self-management of asthma and what is required through current educational program. After taking help from existing and primary sources, the researcher was able to prepare a draft booklet and program. Finally the researcher has implemented this program and deleivered the training to male and female groups.

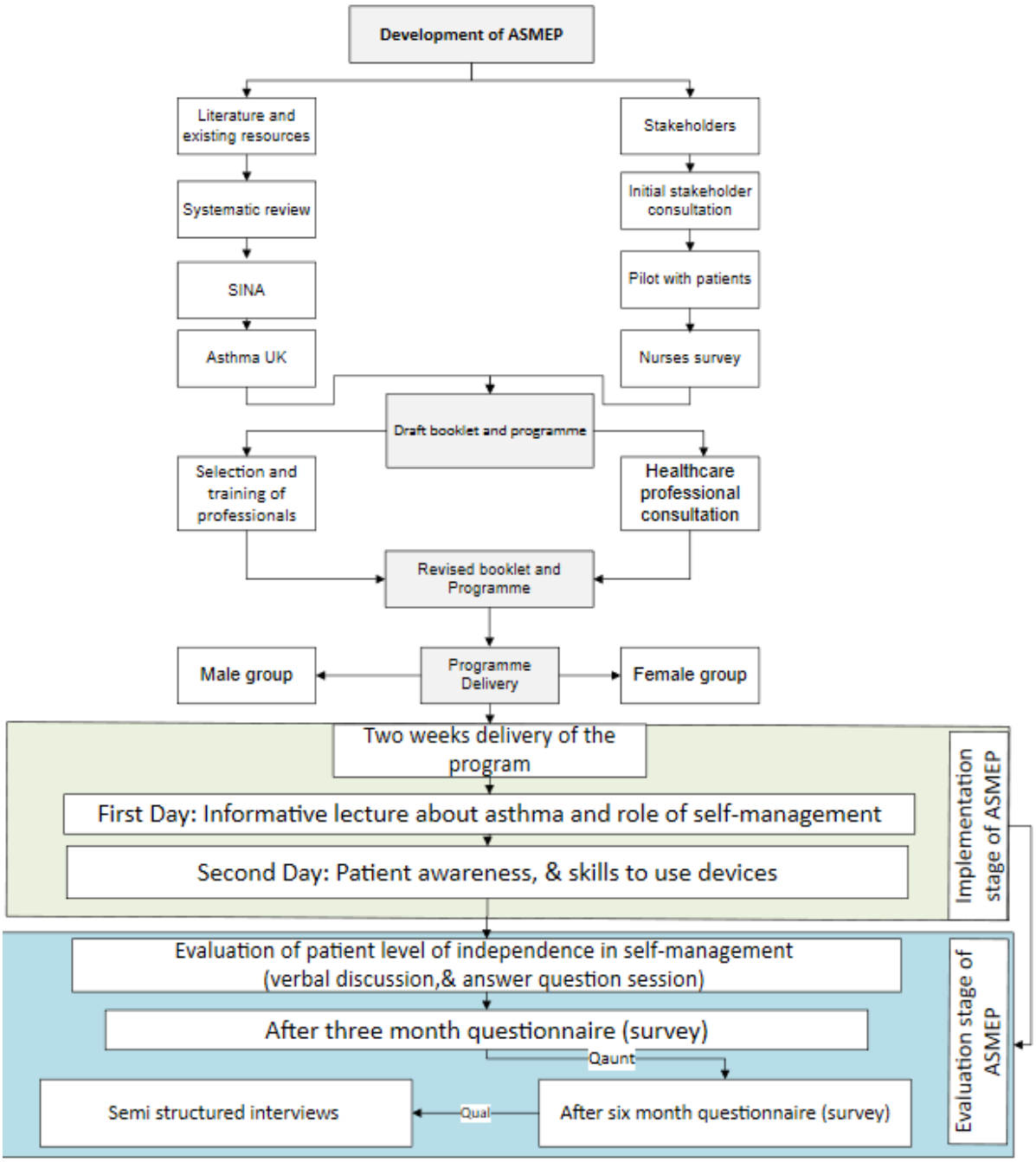

Figure 4.9 Development of ASMEP

4.2. INCORPORATING SYSTEMATIC REVIEW EVIDENCE

The first stage of intervention development was the systematic review. This was undertaken to identify research gaps in relation to asthma management programmes and provide evidence on effective methods, programmes and programme development and delivery. It was shown in studies in the systematic review (Chapter 2) that referring to previous literature and theory would be helpful in developing a more comprehensive program to improve knowledge and skills of patients with different ages and levels of educations (Ali & Abou-Elmaati, 2016). The evidence showed that self-management education programs are effective in helping patients with asthma self-manage their symptoms through acquiring knowledge and self-efficacy (Boulet *et al*., 2015; Federman *et al*., 2016). Study content should be interactive as well as motivational to increase patient's awareness as well as self-management of asthma (Boulet *et al.,* 2015). Positive self-management behaviours such as medication adherence, inhaler use, self-monitoring of triggers, regular follow-up visits and regular exercise were also found effective in a number of studies (Chen *et al*., 2010; Poureslami *et al.,* 2012; Tousman *et al*., 2007), thereby supporting a reduction in both unscheduled visits and the inappropriate use of medications by these patients (Boulet *et al*., 2015). It is essential, therefore, that the program provides education in an appropriate way to achieve these outcomes. Culturally and linguistically appropriate interventions can be more influential in promoting knowledge gain about asthma and improving inhaler use that can be sustained (Poureslami *et al.,* 2012). A group education method delivered separately for males and females incorporates the evidence on group learning as well as adhering to local culture. As noted in (Chapter 3), it is essential that cultural elements are incorporated into the program. The program development considered the local cultural, social, language and professional context to develop effective education program for the patient. The number of days of the program have been decided on the basis of requirement of the education, with 2 day considered sufficient to deliver the required important education for the asthma patient (see appendix 1 for the detail of ASMEP). Appropriate outcome measures to test the effectiveness of the intervention were highlighted in a range of studies in the systematic review (see Table 2.7), and these were piloted with a group of patients attending the asthma clinic at King Fahd hospital (see Chapter 5).

4.3. INCORPORATING STAKEHOLDER PERSPECTIVES

Recent studies have suggested that study content should be developed with the help of health professionals (Hill *et al.,* 2013). For ASMEP this element was undertaken in four different ways; initial consultation, survey of nursing staff, discussions and piloting the measures with patients. A final consultation with health professionals.

4.3.1. Initial staff consultation

Initial discussions were held with seven internal stakeholders who included consultants and experts, ranging from nurses, doctors and public health specialists through to respiratory therapists in the field serving and treating patients. These professionals were accessed through the hospital's administrative department. Several meetings were held, starting with informal sessions with nurses, which lasted for two weeks. These collected data about the type of patients and services available in their local unit (King Fahad Central Hospital). These professionals have provided care for this group of patients in a real setting for a long time and were aware of these patients' needs.The purpose of these initial discussions was to gain details of the local context in relation to current asthma education, number of patients, health facilities, patient challenges, and health professionals challenges, so that the intervention would be feasible to deliver and meet the needs of the local context. In addition, this initial discussion proved useful in locating appropriate professionals who would be willing to support and participate in the ASMEP intervention programme. These professionals were asked about existing asthma education programs, the role of the hospital, health professionals and SINA, and how they are increasing the asthma awareness in local community. It was found that there were low numbers of health professionals with expertise in asthma. This has led to increased challenges for asthma patients especially in rural areas because health professionals prefer to work and live in urban areas. They suggested that the SINA guidance was helpful but had not been converted into practice. Finally, it was determined that most patients in rural areas are uneducated and needed special attention and guidance to help self-manage their asthma.

4.3.2. Nurses views

As nurses have spent a lot of time with patients, they are able to provide information regarding the challenges for asthma patients. A survey was developed on the base of SINA guidance, Asthma UK guidance and group discussion with the above stakeholders. This survey (see appendix 22) was distributed to 48 nurses to identify the needs of their asthma patients and identify their views on the gaps and advantages of delivering asthma education in Saudi Arabia.

The nurses were asked about their prior experience with asthma education programs, their content and who delivered them. The previous experiences, information about asthma content, and existing methods and techniques are helpful to understand the local wording and content which may useful to develop ASEMP. They were asked about their patient's demographics to help identify the type of patients who may receive the training. The nurses were asked about their experiences in emergency department. The survey was returned by 21 nurses The nurses suggested that most of the patients are uneducated and had a low level of information about asthma control therefore they made regular visits to the hospital emergency department which increased difficulties for staff especially where they have low specialist numbers. They suggested that asthma patients would be more comfortable with a program delivered in the local language as most patients are un-educated therefore program content delivery in another language may negatively influence the effectiveness of ASMEP. These results highlighted the main problems faced by staff dealing with asthma in Saudi Arabia. These views on the gaps and issues with asthma education in Saudi Arabia, were incorporated into the development of the program and how it was delivered.

4.4. INCORPORATING GUIDANCE FROM SINA AND ASTHMA UK

SINA guidance was consulted to understand the prevalence of asthma in the local conext and the guidance and resources provided in the Saudi context. Of particular interest was any guidance where there were limited experts or for patients in rural areas. Guidance in Saudi Arabia for self-management recommends patient-doctor affiliation and a personalised written plan (Saudi Initiative for Asthma (SINA), 2016). Such self-assessment plans have been implemented in several countries including KSA (recommended by SINA) and the UK (for example using resources provided by Asthma UK).

Recently, asthma education has been considered an integral part of SINA and it is recommended to provide patients with the necessary knowledge and skills to self-manage the condition and its symptoms (Saudi initiative for Asthma 2016). The training of program providers on communication skills such as interactive dialogue has also been recommended by SINA, as it has been shown that well-structured asthma education can increase the quality of life, reduce health costs and decrease the utilisation of healthcare resources. This notion is also consistent with findings highlighting that patients are four times less likely to have asthma attacks that need emergency hospital treatment, if they follow asthma recommendations. This clearly shows that a self-management program would reduce costs and decrease the use of hospital resources. However, SINA does not provide guidance on how to covert the content of asthma education into practice (Al-Moamary *et al.,* 2019); hence the need to develop a program in line with evidence from research, that incorporates the principles of SINA and is relevant for those living and working within Saudi Arabia.

In contrast to SINA, Asthma UK provides a wide range of resources that can be used to educate adult patients. The asthma diagnostic devices and PAM motivational tools have been adopted from the asthma UK. Additionally, the ASMEP program was developed on the basis of UK asthma education because asthma UK provide significant knowledge about patient activation and patient behaviour; therefore, asthma UK provide quality information to develop the program to well manage the patient behaviour on the basis of the different social factors, while SINA provide rich information that can help include the local cultural and organizational perspective necessary for successful program development, implementation and evaluation. In summary as SINA does not provide recommendations on how to implement asthma education, the resources from Asthma UK were used, as these provide evidence on best practice (although in a Western context). Both SINA and Asthma UK guidance was used to develop the booklet but the asthma diagnostic devices and PAM motivational tools were based on the guidance from Asthma UK.

4.5. PROPOSED INTERVENTION

Using the evidence from the sources listed above, a program was proposed by the researcher. It included individualised asthma management instructions and was patient-centered, culturally tailored, language appropriate and clinician-led. The format used was to be based on small group discussion sessions over two days and led by the researcher. It would be complemented by a booklet. All program materials and content were created and delivered in Arabic (see appendix 1).

The objectives of the asthma education program were:

- To equip patients with knowledge of the disease in terms of causes, symptoms and medications used for the management of asthma;
- To help patients identify possible strategies to avoid these triggers, whenever needed and where possible;
- To enhance patients' ability and adherence in using medications and increasing knowledge related to the importance of medical therapy;
- To help patients avoid or control environmental factors that may worsen their symptoms;
- To increase the self-confidence of patients and encourage disease self-management accompanied by social interaction with healthcare professionals or self-help groups.

The first two objectives being achieved through acquiring knowledge on the disease and its possible treatments provided by the clinical nurse specialists for patients and newly diagnosed patients. Possible strategies to avoid triggers will also be included within the first day's activity list. The other two objectives will be achieved by patients practising using such devices and demonstrating how to take medication. The Saudi Initiative for Asthma is the framework within which the program was designed and applied, in order to suit the culture of KSA and create a flexible solution to meeting patients' individual needs (SINA, 2012).

Patients will be made aware of the skills required to avoid or deal with asthmatic attacks while at home. This will be achieved through objectives three and four, above. The last two objectives (five and six) are concerned with enabling patients to control external factors that

might influence their condition and achieving a level at which they are able to control triggers and communicate with health professionals and others to help manage the situation.

4.6. HEALTHCARE PROFESSIONAL CONSULTATION

Once the program had been drafted, it was presented, via interview, to a group of health professionals in the selected hospital (see table 4.1). This step was undertaken to assure that the intervention was developed and designed in a way that could meet all patients' needs and suit all educational levels. Based on their experience with this group of patients the group were asked to read and comment on the intervention to make sure the content met patients' needs and that the proposed delivery method was feasible. The variation of the professional experiences helped to develop a more focused and comprehensive intervention to be provided mainly by nurses and possibly with the collaboration of other health care professionals. Details of participants and interviews are shown in the table below.

Table 4.4. Demographics of participants and interviews

Specialty/Position	Number	Gender	Place of work	Years of experience	Length of interview/Min
Head nurse	2	M and F	King Fahad Central Hospital; Home visit department and respiratory therapy department	6-8 Y	60
Nurses enrolled in doctorate programs	2	F	Chest Hospital Jizan MOH	5-7 Y	90
Public health specialist	1	M	Jizan Health Region	12 Y	44
Family medicine doctor	1	M	Jizan Health Region	9 Y	35
Respiratory Therapists	1	M	Public Health Department at Jizan Health	10 Y	56

With the diversity and different specialties and experiences of the participants, the interviews provided valued feedback from different perspectives. These were then incorporated into the intervention package. Using a multi-professional, highly experienced group provided confidence that patients' needs would be met by the intervention, and that the nature of the intervention that would suit this group of patients. After these discussions some intervention content was changed to make it simpler for the participants. Furthermore, specific devices to use within the intervention were selected. The devices were selected on the basis of the brand, patient familiarity and characteristics.

The program was designed to suit the characteristics of patients, which were expected to differ between patients themselves for example age, gender, educational level and ability to attend the program. Therefore, a variety of teaching strategies were considered to deliver the program's sessions. For example, active sessions with direct communication make-up the main strategy in this regard and will be conducted for patients attending respiratory clinics at King Fahad Central Hospital, the setting of the study. Furthermore, these active sessions were conducted with both male and female presenters, to satisfy patients' preferences (Franks, 2016, Ahmad & Alasad, 2007). The participants in this verification part were also asked about common characteristics of patients who attend the hospital such as age, gender, education and cultural background to help select the most appropriate team members to deliver the intervention.

4.7. SELECTION OF THE PROFESSIONALS DELIVERING THE INTERVENTION

As mentioned by Tousman *et al*. (2010), the professionals who deliver the program are a major motivation and activation factor in changing patient's behaviour. It is therefore essential to select the professionals who will deliver the program with great care and specific inclusion and exclusion criteria were employed (see table 4.1). The majority of education programs in the systematic review were delivered by a variety of health care professionals such as nurses, respiratory therapists, doctors, clinicians and pharmacists (Armour *et al.,* 2007; Angelini *et al.,* 2009). However, within these studies it was also shown that nurses would have an important role in helping patients with asthma as they stay longer with patients than other professionals (Huang *et al.,* 2009). Therefore, the program that was implemented at King Fahad Central Hospital, for this research, recruited mainly nurses with other professionals from different departments, in order to widen the knowledge base of

patients and benefit from different specialties. As the program would involve multiple presenters from different professions, it was a concern for the researcher that it might be delivered differently. This was clearly highlighted in the systematic review (Kritikos *et al.* 2007). Therefore, it was crucial to provide training for these professionals prior to the program, in order to achieve standardised levels and reliability between presenters. It was also necessary to recruit Saudi professionals who hold similar attitudes and spoke the same language (Arabic) as patients, and who were also sensitive to their cultural beliefs and values. They also had to have experience in the field (asthma self-management), in order to educate patients better and demonstrate required knowledge and skills to enable patients to self-manage their asthma and achieve the aim of this study.

Table 4.2 Inclusion and exclusion for selecting nurses to deliver training

Inclusion	**Exclusion**
Saudi Nurses with two years nursing experience or more	Less than two-year experience
Nurses with a BSc qualification.	Less than bachelor's degree
Experience adult diagnosed with asthma	From any other department of hospital
Native Arabic	From other language background
Both male and female	Gender specific

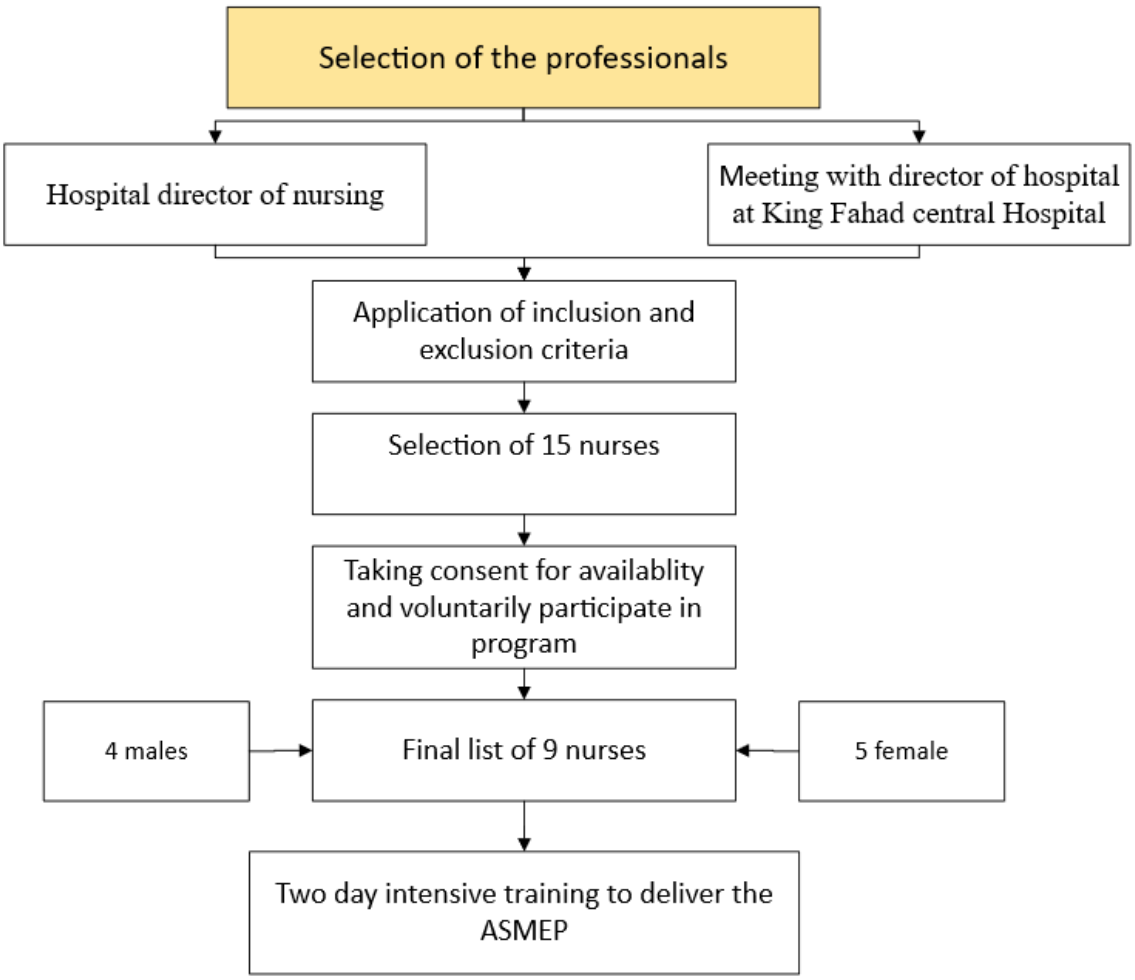

Figure 4.10 Selection process of the professionals

The selection of professionals involved a meeting with heads of department at King Fahad Central Hospital, which is the main referral hospital in the Jizan region. During this meeting, the research aim was explained, to provide a context to enable them to select appropriate staff to teach the program. Professionals had to be Saudi nationals, in order to understand patients' cultural beliefs and values, but they also had to have a bachelor's degree in nursing and at least two years' experience dealing with patients suffering with asthma. This is because qualified professionals are more likely to have an appropriate educational background as well as more experience working on specialist wards. Furthermore, they needed to be familiar with signs, symptoms and treatment options. These criteria were also set to ensure that the trainers would feel comfortable when working within their specialty and educating patients. It has been identified that culture is considerable factors in chronic diseases educational programs and the role of gender especially is one of the major factors of the studied local culture. Free gathering and teaching of males and females in one place is not permitted.

Therefore, both males and females have been selected and trained them to deliver the program. Additionally, the language of the content and language proficiency of the professionals was also considered, with only Arabic-speaking native professionals being selected for the delivery of ASMEP.

A total of nine nurses (5 females, 4 male) who met the criteria were recruited. Two of the male nurses had 5 years' experience working as a qualified nurse holding a master's degree. Two held a bachelor's degree, while the female nurses had 3 years' experience in working with adult diagnosed with asthma. One of the female nurses held a master's and 4 had bachelor's degrees. Most of the selected nurses worked in the emergency department and are therefore familiar with the routine issues and challenges of asthma patients. The professionals were provided with training sessions by the researcher, to ensure they delivered the program properly and adequately. As professional interaction and communication is one the major factors in delivering ASMEP effectively, two days were spent training the health professionals to deliver the ASMEP program. During the training the researcher explained the aim and objective with relation to role of the asthma education in improving patient self-management. Additionally, the role of professional and patient communication has been discussed, meaning all the important issues and different strategies were presented to help successfully deliver the planned ASMEP. The staff experience of asthma patients and discussions of the challenges faced by the nursing staff during routine practice in emergency department helped to make further refinements to the educational content for the ASMEP program before it was delivered

4.8. MOTIVATING THE PATIENTS

It was considered essential that ASMEP motivated the patients to self-manage their condition. An autonomous supportive healthcare setting is one that provides warm and empathic interpersonal care climate, supportive for patients' competence and sense of self-sufficiency, and also facilitates the internalization of effective self-management leading to permanent changes in behaviour and autonomous motivation (Schwarzer *et al*., 2015). Autonomous motivation and controlled motivation are different from each other. Accordingly, different motivation approaches have been employed to intrinsically and extrinsically motivate the patient. To improve autonomous levels of motivation, the researcher tried to motivate the patient through providing rich information about the role of self-management to treat the asthma because healthy activities start from within an

individual. People engage in these activities for internal reasons such as (1) intrinsic regulation (because of pleasure they feel) during the asthma program, (2) identified regulation (because they perceive healthy lifestyle very important and thus highly value it to treat the illness of asthma) or (3) integrated regulation (as they have highly internalised the importance of healthy activities and healthy lifestyle thus have integrated them into their own value system so as to improve their own quality of life through treating asthma illness).

The overall program was divided into two parts: the first part of the program (first day) was focused on the consequences of asthma and the role of self-management in treating the disease. The major objectives of this part of the program were to improve the knowledge of the patient. In turn this would help improve their interest because learning can also intrinsically motivate patients to improve their quality of life by treating asthma effectively. The second day of the training focused on teaching how to use the devices and aimed to discuss individual patients needs. This was also an important learning experience that could also potentially improve the patients' intrinsic motivation level.

Attempts were made to motivate patients through extrinsic or controlled means. Controlled motivation means that people engage in healthy activities for some external reasons like (1) external regulation (to avoid punishment, get some reward, comply with societal pressure) or (2) introjected regulation (because they need to show something or to avoid shame or guilt). Therefore, the specific time and duration of the program was designed to control the environment and a pleasant environment was offered to improve the overall delivery of the program and to improve the learning of the patients.

The main hall of King Fahad central hospital was selected to deliver the program because it was very large and comfortable. Free food was offered to the patients and professionals to increase their respect of the program. Finally, patients were able to take the devices they had used home with them after completion of the ASMEP. Therefore, the controlled motivation factor should improve patient interest during the program while the learning of the patient should prove helpful in achieving long-term educational advantages for the asthma patient and long-term behavioural change too. The focus of this program thus considers how long-term motivation can be affected through the self-determination of patient toward the program. Controlled motivation factors such as a pleasant environment, free food and free devices like inhalers also proved quite useful in focusing patient attention during the program and also retaining the required numbers in the program. By the end of this program, patients with

chronic asthma should have acquired knowledge that activates their role and enables them to use strategies to self-manage their condition and be confident in carrying them out.

4.9. PROGRAMME OVERVIEW AND DELIVERY

The program itself was delivered over two full days in the King Fahad Centre, by trained professionals (doctors, nurses, and respiratory therapists) using the Arabic language, the mother language of participants. Separate gender arrangements were also used, in line with local culture and to improve the confidence of patients and professionals by facilitating two-way communication to increase their motivation level during the program.

During the program, the multi-disciplinary team members provided information/documentation about the nature of the disease to guide patients to understand their asthma, including what can aggravate symptoms. There were opportunities for patients to learn and demonstrate their needs and to use different types of inhalers and other devices, to show how they work and how they are able to use them accordingly. The clinicians supported the patients by providing them with demonstrations on self-management equipment to include inhaler, spacer, and nebulizer use; breathing exercises; and made culturally specific + PAM incorporating) educational information within small group clinic sessions and as needed on a per patient basis.

The session aimed to help patients to learn how to build or join an asthma support team or self-help group, as well as teaching how and when to take medications. An action plan for patients was provided to assist them in self-managing asthma attacks. This plan is individualised to the patient's underlying asthma severity and treatment. It is further characterised by being both orally presented as well as documented in a written plan. It informs participants about:

- When and how to use and modify medications to control worsening asthma
- How to access health professionals when asthma worsens

The following table 4.3 provides an overview of the two-day course content and where it was derived from.

Table 4.3 Delivery of 2 days course

Target Output Presenter	**Session Components/aim/Material**	**Time**
Day One		
Understanding Asthma and possible patient practices GP DR…….	Demonstration of asthma characteristics, using models and visual aids. Will support shared decision-making by supporting patient knowledge and understanding best practices – and why these practices are used. (***Materials gathered primarily of ASMEP***	9 -10 AM
Understanding the nature of asthma; triggers and worsening symptoms and asthma effect on activities of daily living GP DR…….	Explanation of the importance of understanding the impact of asthma on one's activities of daily living. Identification of asthma triggers as well as trigger avoidance techniques and other prophylactic treatments ***(Supporting materials of ASMEP)***	10-10:30 AM
Coffee Breakfast (30 Minutes)		
Asthma and pregnancy GP DR……	Understanding pregnant women practices to manage asthma and keep their pregnancy safe. ***Material gathered primarily of ASMEP***	11-11:30 AM
Understanding the importance of asthma self-management Specialised Nurse Mr/s…….	Presenting figures and case reports about visiting emergency departments as well as re-admissions. Showing the costs of hospital treatment and risk of travel with the availability of other possible self-management services. (***Material gathered primarily of ASMEP)***	11:30 AM-12 PM
Managing an attack Shared session Emergency nurse and respiratory nurse	Support shared decision making by supporting patient knowledge and understanding of practices. How to recognize and prevent asthma complications. How to anticipate serious exacerbation and to respond to and manage asthmatic attacks. ***Material gathered primarily of ASMEP and emergency plan in KFCH)***	12-1 PM

Understanding patients' possible response to asthmatic attacks Emergency Nurse Mr/s…… ***With conclusion of day one***	This session provides patients with potential activities and responses, if their asthma gets worse. Through this session, patients are provided symptoms diaries to record the effectiveness of their self-management to avoid asthma attack and asthma deterioration of asthma consequences.	1-2 PM
Lunchtime 2-3 PM		
Day 2		
Action Plan: training on managing asthma control; peak flow reading, taking medication, using inhalers and other devices Respiratory therapist Mr/s…….	Supporting patients' knowledge base to understand and acquire skills that enable them to assess their condition and make their decision to select activities and practices to use their medication and devices to manage their asthma. This includes a demonstration on these activities by offering a real situation for performing activities, using virtual devices along with teaching and visual materials. ***(Material gathered primarily of ASMEP and the help desk at King Fahad Central Hospital)***	9-10:30 AM
Coffee Break (30 Minutes)		
Patient gendered group discussion	Shared training and application through small group discussions and individual meetings with patients	11-11:30 AM
Gender-segregated small group discussions	Agree a gender-segregated group discussion showing shared fears, concerns and difficulties for multi-disciplinary support teamwork (nurse leader/clinician/respiratory therapist), to manage and train this group of patients.	11 AM-12 PM
Evaluation of patients' level of independence in being able to self-manage their asthma Shared session Specialized nurse and respiratory therapist	Use of Patient Activation Measure (PAM) to measure and appropriately gauge patients' progress and confidence in asthma self-management skills and to assess further education needs, in order to build a more effective program through each section of self-management educational development. Nurse leader asks each participant to describe current self-management and answer questions regarding knowledge base. This allows the nurse leader to provide required knowledge and understanding to patients and discuss personal decision-making in self-management.	12-2 PM
Lunchtime 2-3 PM		
Program Ends		

4.10. SUMMARY OF THE CHAPTER

This chapter has detailed the development of a culturally relevant self-management education program that aims to change patients' knowledge, behaviour and self-efficacy to help them self-manage their asthma. The program is expected to improve patients' ability to take medication and to use self-management devices while at home. This program was developed in terms of content, delivery and teaching strategies based on findings from a comprehensive systematic review, national guidance (UK and Saudi Arabia) as well as in partnership and collaboration with patient and professional stakeholders. The program was designed to be provided to a group of patients with asthma (experimental group) by nurses and other care professionals. As part of the development phase, cultural and local issues were considered like gender and religion as well as patients' characteristics like educational level. Appropriate training was provided to nurses and health professionals who were selected to deliver the program to assure both the quality and accuracy of the program. The next chapter (methodology) explains how patients who received this program were evaluated and compared with another group who have not received the program (control group) to enable the researcher to decide whether the program was effective and feasible to deliver.

CHAPTER 5: RESEARCH METHODOLOGY

5.1. INTRODUCTION

This chapter presents a detailed overview of the study methodology, providing a brief justification for the application of different techniques and methods. The study adopted a quasi-experimental design using sequential mixed methods to collect data from participants. The methodological approach builds on concepts drawn from the systematic review conducted in chapter 2, such as those developed in the Egyptian study (Ali-Mohammed & Elmaati, 2016). Justification for the research design is presented, describing the epistemological, methodological and philosophical approach. It was important to consider the value of both quantitative and qualitative approaches and integrate these methods to realise the aims of the study. With the study being focused on Saudi Arabia, it was crucial to consider cultural and ethical issues pertaining to both nurses and patients involved in the research while structuring the methods to foster and maximise participant recruitment and quality data collection.

A detailed plan describes the process of the research: research procedures, the population and sample, data collection methods, quantitative questionnaire characteristics, instrument translation, the pilot study, data management and the data analysis phase. Within the qualitative phase, the study context and sample description generate a deeper understanding from which to explain and analyse patients' perspectives gathered from face-to-face interviews. Methods to achieve trustworthiness and credibility of both data and qualitative data analysis are summarised. The educational intervention program was developed using theory and results of a systematic review and determined through stakeholder consultation

with nurses and other health professionals and is described in full detail in chapter 4. The outcome measures were piloted with patients, providing feedback about patient needs that were also incorporated into the intervention design. The pilot phase is described as part of this chapter.

5.1.1. Aims and objectives

The aim of this study was to develop and test the impact of a self-management education program in Saudi adults with asthma. This was achieved through the development and implementation of a bespoke, culturally sensitive education program, delivered by trained nurses and other clinicians, to examine the impact on patient outcomes.

Five objectives guided the study aim:

- To develop a self-management education program (ASMEP) for adult asthma patients in Saudi Arabia.
- To train nurses, respiratory therapists and other health professionals to deliver the asthma education program.
- To examine the impact of the health education program on asthma control, patient self-management, asthma knowledge, compliance with medication and consequently reducing visits to emergency departments.
- To explore the concept of patient activation with regards the management of asthma in a Saudi Arabian context.
- To explore the barriers and facilitators to the implementation of the education program.

5.2. PHILOSOPHICAL PERSPECTIVE

The research process was guided by the researcher's assumptions on patients' knowledge and experiences to manage their health problems in their context (Crotty, 1998). An underpinning assumption was that asthma is common worldwide, including in Saudi Arabia, and associated with a variety of risk factors like smoking, diet, and possibly lack of knowledge (Al-Zahrani *et al.,* 2015; Moradi-Lakeh *et al.,* 2015). Nursing policies highlighted the wholeness and

comprehensiveness of professional nursing care. Embedded in that was educating patients on their medical condition (Aldosh, 2015). Patients in the reviewed studies (chapter 2) showed their need for information on how to manage their asthma and use such devices to control its symptoms. Culture or beliefs and values towards caring for patients with asthma in Saudi Arabia needs to be taken into account when educating patients (Leininger & McFarland, 2002). For example, prior to contacting a trained clinician, patients' may first consult religious people to help reduce asthma symptoms by using herbs and remedies. Another important issue is nurses' ability to access and communicate with patients for training, especially when care providers are from opposite gender.

Prior to developing a plan for collecting data, it was necessary to understand the nature of the problem, along with the philosophical perspective which dictates understanding the ontological and epistemological properties of the reality and how the researcher would be involved in this situation. This reflection on philosophical ideas may influence the selected methodology and methods to research patients with asthma and provide a suitable context for the study (Appleton & King 1997; Guba & Lincoln, 2005).

Interpretivism and positivism are the major epistemological philosophical paradigms used in nursing research and need to be examined to understand which perspective helps to explain or characterise the patients' perspective on their asthma management (Crotty, 1998). Each of these paradigms have different assumptions on how the patients' perspective can be discovered and examined. For example, positivists state that reality exists regardless of our consciousness, and research thus just tries to discover and measure it (Avramidis & Smith, 1999). Within this assumption, evidence on patients' experiences and beliefs in self-managing asthma can be measured deductively through accurate quantitative, valid and reliable measurement as well as formal statistical testing (Tinley & Kinney, 2007). Conversely, interpretivism claims that social reality is something not found but instead created and socially constructed. The researcher within this paradigm attempts to draw and interpret patients' opinions, attitudes and beliefs on self-managing asthma and building evidence through direct interaction. In this paradigm the qualitative method is used to examine and explore individuals' experiences, in order to build and develop an in-depth understanding of patients' opinions, attitudes and beliefs on asthma self-management (Monti & Tingen, 1999).

Combining these paradigms is not always advocated. Purists especially argue that epistemological assumptions should not be combined (Onwuegbuzie & Leech, 2005). Others, suggest using such paradigms might depend on the situation and the nature of the study (Guba & Lincoln 2005). Such pragmatists contradict others and combine the available methods that stem from different paradigms with different ontological and epistemological assumptions to bring together a more comprehensive evidence base (Tashakkori & Teddlie, 1998). With the need to be more flexible and more pragmatic in approaching patients in asthma clinics, realism would allow the integration of both positivism and interpretivism, to obtain different types of data from patients and to achieve different levels of evidence from interaction with patients and possibly nurses (Williams, 1999).

Realism is a paradigm in which the researcher can interact with the actual situation, where in reality a patient with asthma visits a respiratory clinic and the nurses provide the necessary care within health guidelines. The paradigm assumes that patients as individuals cannot be separated from their context or society (hospitals or homes) (Wainwright 1997; Monti & Tingen, 1999; Littlejohn 2003). Realism is flexible in achieving comprehensive research outcomes regardless of philosophical or methodological orientation, but it is also compatible with pragmatism, in that both paradigms claim that the research aim should drive the whole study (Wainwright, 1997). Therefore, the paradigm of realism enables the researcher to move forward and be more flexible, using individual theories as tools to be applied to day-to-day life towards the wholeness of evidence and explanation of reality (Roth, 1969; Onwuegbuzie & Leech, 2005). From these underpinning assumptions, the strength of mixing methods becomes clear in terms of obtaining the necessary depth and breadth of information from patients regarding their experience of asthma self-management in both empirical and qualitative senses.

5.3. RESEARCH METHODS

Understanding the epistemological stance of reality and how the researcher is involved in the research process may clarify and justify combining methods and provide a context for the study (Freshwater, 2005; Guba & Lincoln, 2005). Combined or mixed methods research incorporates and inter-relates quantitative and qualitative approaches in a single study. This method is considered a third main research paradigm, adding an attractive alternative to using quantitative or qualitative research alone (Creswel *et al.,* 2003).

Three different research methods might be used to obtain data within the three paradigms; quantitative, qualitative and mixed methods. Each of these methods is utilised for a particular form of research, as they all help to attain the overarching targets and objectives of the research (Saunders *et al.,* 2009). Quantitative research generally involves statistical analyses and developing a framework on the basis of statistical results, it is usually related with a positivist stance or belief that reality can be observed or measured through objective means. Most commonly it conducts the testing of an existing hypothesis and as such the approach taken is deductive. The aim of quantitative research is to draw results which can be generally applied and therefore the sample size is usually large in such research. It is the dominant paradigm in health research (Andrew *et al.,* 2009). And the gold standard is viewed as the randomized controlled trial due to the strength in it's design which seeks to reduce bias (Riley *et al.,* 2015). However, conducting a randomized trial in a routine care setting is not always feasible or practical (Riley *et al.,* 2015). Furthermore, the deductive approach is not suitable for generating hypotheses about why and how things happen or explain complex cultural or social phenomena. Qualitative research involves conceptual frameworks and non-statistical analyses such as thematic analysis. It is used for understanding human behaviour, experiences, and attitudes; often by conducting an interview with the person(s) in question. In Kew *et al*. (2017), qualitative research was used for investigating individual behaviour, as well as different attitudes and experiences through interviews. The inductive approach helps to establish an innovative model or theory (Saunders *et al.,* 2009; Andrew *et al.,* 2015). The effect of mixed methods is to combine both these approaches.

The importance and application of mixed methods have been gaining increased popularity in academic research (Murphy & Dingwall, 2003, Kinn & Curzio, 2005). Research by Kinn and Curzio (2005), for instance, found that 25% of the studies reviewed discussed the value of combining methods to minimise the disadvantages and maximise the advantages of individual methods. With the current study, a combined mixed method approach was utilised to collect data from participants. It was presumed that this combination would allow for clearer comprehension of different possible concepts and specifics (Creswell, 2007; Saunders *et al*., 2009). This study will adopt this method of research to determine whether the self-management education makes a difference (using sequential mixed method design) with quantitative questionnaires before and after the intervention. This is then followed by qualitative part to see how the patients experience the intervention. Sandelowski (2000) argued that combined methods are adopted for three main purposes:

Table 5.1 Justification for triangulation

Number	Description
1	Triangulation - to seek legalisation, corresponding results from different methods and convergent validation, as in instrument translation.
2	Complementary - to elaborate, clarify and further illustrate the results of one method as compared with the results from another method.
3	Development - to use the results of one method to build or develop the other method, where development includes sampling, implementation and measurement decisions.

(Source: Sandelowski, 2000)

The most widely accepted definition of mixed methods research is research that *'focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or a series of studies'* (Tariq & Woodman, 2013, p.2). Central to the definition is the use of both quantitative and qualitative methods in one study (or a series of connected studies) (Maltby *et al*., 2014). Separate quantitative and qualitative studies addressing the same research question independently would not be considered as mixed methods because there would be no integration of approaches at the design, analysis or presentation stage (Brandeau *et al*., 2005).

5.3.1. Justification for mixed methods

There are important reasons to use mixed methods, such as for complementarity, development, initiation, expansion and triangulation (Brandeau *et a*l., 2005). Complementarity in particular is major advantage of the mixed method because it enables data obtained by one method to illustrate results from another. In this study, the quantitative component will demonstrate the effectiveness of ASMEP, while semi-structured interviews with a sub-group of those surveyed may allow us to explore barriers, issues and enablers of the program. According to previous studies, semi-structured interviews are more appropriate and flexible method especially when researcher aims to explore rich insights, and they also mentioned the appropriate sample for in-depth interview is 20 to 30 participants (Aslam *et*

al., 2018a; Muqadas *et al.,* 2017). This in turn will help us to understand why the program was effective and thus improve patient self-management in Saudi Arabia.

There are two distinct levels for mixed method design: the basic design and the advanced design. The basic design includes three sub-types: the convergent; explanatory sequential; and exploratory sequential. For this study, the basic explanatory sequential design was used as data from the questionnaires (pre and post intervention). It was then explained by subsequent qualitative interviews, which investigated and measured potential evidence to answer the main question. This is how the specific research strategy was adopted (see Figure 5.1 below). This design was expected to provide solid evidence and help develop a focused program to enhance patients' ability to know about and self-manage their asthma.

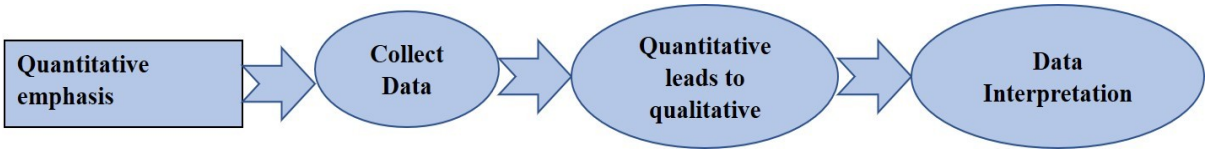

Figure 5.11 Explanatory Sequential Design (Adapted from Creswell 2013).

Mixed method research designs are classified in terms of time and dominance as follows (Sandelowski, 2000; Creswell *et al.* 2003):

Table 5.2 Guidelines for mixed method

Number	Description
1	Dominance (equal status or dominant status);
2	QUAL and qual both stand for 'qualitative research';
3	QUAN and quan both stand for 'quantitative research';
4	Capital letters denote priority or increased weight;
5	Lowercase letters denote lower priority or weight;
6	A plus sign (+) indicates the concurrent collection of data;
7	An arrow (→) represents a sequential collection of data.

Mixed method designs can be classified according to these domains, the matrix in the table 5.3 includes nine specific mixed method designs

Table 5.3 Mixed methods designs

	Concurrent	Sequential
	QUAL+QUAN (Equal status)	QUAL→QUAN

Dominance		QUAN→QUAL
	QUAL+ quan (Dominant status) QUAN+qual	QUAL→quan qual→QUAN **QUAN→qual** quan→QUAL
For example: QUAN→qual is a dominant status, sequential design where the overall study is primarily quantitative but is followed by a qualitative phase.		

The current study adopted the explanatory sequential complementary design (**QUAN → qual**), in which the quantitative approach was dominant and followed by a qualitative counterpart to obtain patients' views on the intervention. The quantitative part was a quasi-experimental design where pre-test post-test comparative design was applied. This was chosen because it allowed comparing measures of improvement in two groups (intervention and control groups) based on pre- and post-test scores that highlight the impact of the intervention for patients. The qualitative part was planned to assist understanding patients' preferences to help improving and developing a more focused intervention the second part implied qualitative interviews to draw more in-depth data about their views on the program and the progress of the intervention.

The strength of this design lies in its nature, as it allows the researcher to obtain data through clear and separate stages. It is also the most straightforward design to apply and helps the researcher report results more easily, because the investigator is required to wait for one phase to be completed before starting another. In short, the aim of the quantitative part is to examine the effectiveness of the self-managed education of patients with asthma in KSA on their ability to control their symptoms', while the qualitative part explores perceptions of the program and also provides detailed information regarding the success and failure of the effectiveness of ASMEP. In both the quantitative and qualitative parts, it is essential that the researcher ensures that the methods and tools used are as rigorous as possible. For the

quantitative element, these should focus on strategies that seek to maintain objectivity and reduce bias and are valid and reliable, and in the qualitative component ensuring that there is rigour in explaining how decisions and interpretations have been made. This is not always referred to as validity and reliability in qualitative research, but the concepts are the same (Long & Johnson, 2000).

5.4. PHASES OF THE STUDY:

The study will be conducted over three stages, two pre-study phases (I and II), then the main study phase in terms of experiment and pre-post evaluation (phase III). Table 5.4 explains the phases of this study.

Table 5.4 Three phases of the study

Numbe r	Desicription
1	Phase 1: Interevistion develpmetn (see chapter 4)
2	Phase II: Instrument preparation and pilot • Instrument Development • Instrument translation • Pilot study
3	• Phase III: Data collection • Quasi-experimental study with pre-post evaluation • Qualitative face-to-face interviews

- **Phase I: Intervention development**

The intervention for this study was an asthma self-management educational program (ASMEP). The program was designed to provide patients with the optimum level of knowledge and skills that may enable them to self-manage their asthma independently and avoid any further complications that might prompt with the disease or its treatment. The researcher developed and verified the intervention from the literature and theory and in collaboration with a group of nursing and other professionals who provide care for patients with asthma in Saudi Arabia. The researcher worked with specialised professionals to design the program which was delivered with staff to patients over two days (details provided in previous chapter 4). The purpose of intervention development is to create the support of health professionals for asthma self-management. The purpose of intervention development is

to engage health professionals so that researcher can understand the challenges of asthma patients and design the ASMEP as per asthma patients need.

- **Phase II: Instrument preparation and pilot**

According to Long & Johnson (2000, P.31) *"validity depends largely on sampling and careful construction of the instrument and refers to the degree to which the entirety of the phenomenon under investigation is addressed"*. Therefore the instrument prepation phase is most important for this study. The instrument preparation phase was achieved through instrument development, instrument translation and the pilot study to make sure the instrument was ready for use. Data was collected using four main instruments related to asthma: Asthma Control Test, Asthma Self-Management Questionnaire, the Asthma Knowledge Questionnaire (Al-Motlaq & Sellick, 2011). These were used to assess increases in patient knowledge related to asthma and asthma self-management, and the Patient Activation Measure (PAM) instrument. These four tests are individually used by many of the previous studies (i.e. Nathan *et al.,* 2004; Lababidi *et al.,* 2008; Mancuso *et al.,* 2009; Al-Anazi *et al*., 2014), therefore present study has used these tests with the purpose of determining appropriate educational content for asthma program. The review of the literature exposed a lack of evidence on the motivation of patient pre and post chronic disease education programs. This research also examines patient motivation in a specific cultural context. Demographic questions to obtain information on age, gender, education level, and years since diagnosis with asthma, as well as information on recent asthma related events such as acute episodes, visits to the hospital emergency room for acute episodes, and medication used for asthma, were created.

5.4.1. Asthma Control Test

The Asthma Control Test (ACT) is a 5-point Likert scale measuring the extent to which asthma was controlled within the last 4 weeks. Patients were asked to rate five statements with scores ranged from 1-5. Lower scores indicated less control of the disease and those with score of 19 or less were rated by specialists as asthma is not controlled as well as it could be (Nathan *et al.,* 2004). The questionnaire is to be self-administered and completed by patients. The internal consistency reliability of the 5-item ACT scale was 0.84 (Nathan *et al.,* 2004). An Arabic version of this questionnaire was validated (See appendix 12 for more detail). The internal consistency reliability of this 5-item ACT survey was alpha =0.92

(Lababidi *et al.,* 2008). This version of the questionnaire was therefore used in the study. According to Lababidi *et al.* (2008), ACT can determine how frequently patients are visting to health professionals and it can also determine the paitent actual control on asthma. This study therefore employed this test to determine how frequently asthma patients are visiting in Jizan hosptial and this test also helped to determine the need of unscheduled visits (Lababidi *et al.,* 2008).

5.4.2. Asthma Self-Management Questionnaire

The 16-item Asthma Self-Management Questionnaire (ASMQ) measures knowledge of preventive strategies, using devices like inhalers and knowledge about how to use medications (Andrews *et al.,* 2014). The questionnaire generates a score of 1 for each item. The total of 16 answers is then multiplied by 100 to give a score range from 0 to 100, with higher scores indicating more correct responses and a higher level of knowledge. The ASMQ was validated with the Cronbach α correlation after 12 months of a trial to increase walking and exercise for patients with asthma (0.05). The mean (SD) within-patient change between enrolment and 12-month ASMQ scores was 8 (15) ($P < .001$) (Mancuso *et al.,* 2009). This tool has been translated previously to enable use in Saudi Arabia, increasing the validity of patients' responses when they understand items properly (AI *et al.,* 2017). Early in 2007, this questionnaire was tested for reliability. The final 24-item questionnaire had a reliability of .69, which is just shy of the preferred reliability of .70 (Schaffer & Yarandi, 2007).

5.4.3. Asthma Knowledge Questionnaire

The Asthma Knowledge Questionnaire is an instrument developed to measure the level of asthma knowledge among asthma patients. It uses a maximum test score of 32. The questionnaire was further validated to include 17 questions with responses of True, False, Do Not Know. The purposes were to measure three main areas; 1) areas of understanding regarding the nature of the disease, including myths and beliefs regarding asthma; 2) knowledge about AKQ covering the general concepts of the disease; 3) knowledge about the associated medications, asthma attacks, disease risk factors, aspects of asthma, as well as other factors like anxiety, recognition of the symptoms, physical limitations and depression and psychiatric problems. The questionnaire was developed by Al Motlaq & Sellick (2011) and then translated to Arabic language for use in the Saudi Arabian population (Al-Anazi *et al*., 2014). According to the authors, the questionnaire was developed based on items in the Newcastle Asthma Knowledge Questionnaire and supplemented with items from other

instruments (Fitzclarence, & Henry, 1990). The resultant Asthma Knowledge Questionnaire was reported to demonstrate high reliability and validity scores (AlMotlaq & Sellick 2011).

5.4.4. Patient Activation Measure (PAM)

According to Hibbard *et al.* (2004), the Patient Activation Measure (PAM) is a valid, highly reliable, unidimensional, probabilistic Guttman-like scale that reflects a developmental model of activation. The model highlights that patient activation involves four stages; (a) belief in the importance of the patient role; (b) confidence and knowledge to take action; (c) action taken to maintain and improve personal health; and (d) consistency in maintaining health, even under stress. Strong psychometric properties of this instrument support its use with individual patients to tailor the intervention and assess resultant patient changes. The instrument has a total of 22 items: 2 items for stage 1 (believes patient role is important), 10 items for stage 2 (confidence and knowledge to take action), 6 items for stage 3 (taking action), and 4 items for stage 4 (staying the course under stress). The questionnaire has demonstrated strong reliability and validity measures (Hibbard *et al.,* 2004). For the purposes of this study, stage 2 of this instrument (10 items) was considered appropriate. Hibbard *et al.* (2004) argued that patient knowledge can enhance patient confidience to take appropratie action against the disease. The study has selected stage 2 because it can determine how much awareness and knowledge asthma patients have and how much they are determined to take appropate action based on their knowledge and confidence. The current study used the 10 item-based PAM questionnaire which is from Insignia Health in the UK who gave permission to use the PAM questionnaire and recommended this version (Please see appendix 16). The version of this questionarrier was translated to Arabic language, the native language of participants. This was important to avoid any misunderstandings due to language barriers and therefore assure further validity and reliability of the instrument.

5.5. INSTRUMENT TRANSLATION

The main spoken language in Saudi Arabia is Arabic. Therefore, the researcher used Arabic versions of questionnaires where available and translated the remainder from English to Arabic. (Patient Activation Measure). Some patients are educated and able to understand English while the majority of patients are able to easily express their thoughts in their native language (i.e. Arabic). According to Van-Nes *et al.* (2010), native language can create frankness and closeness as well as able to bring local culture and language meanings.

Therefore, present study has used the questionairre in the native language of patients and the researcher. Translation of instruments is important to influence their reliability and validity and therefore it was necessary to give much attention to this step to achieve the concept of "equivalence". Chang *et al.* (2010) proposed a set of steps to ensure equivalence of translated instruments, which were employed here. This part of the study presented the process of developing and examining an Arabic version of the study instrument (Patient Activation Measure), with attention paid to semantic/conceptual equivalence of its components to those in the original English version. It was crucial to consider the terminology in Saudi Arabia in order to assure that all components will be interpreted correctly and therefore verify internal validity and reliability of the concepts in this measure. The role of translating and validating instruments in overcoming language barriers was also shown in previous studies (Johansson *et al.,* 2010; AI *et al.,* 2017). It was also important to follow a specific model of translation to establish the conceptual equivalence of the Arabic version of the study instrument.

5.5.1. Brislin's Model of Translation

Though there is always a certain and unavoidable amount inconsistency in translation and transliteration processes, translation aims at achieving similarity in meanings between different languages. For example, the translation model proposed by Brislin (1970) is considered most appropriate for cross-cultural studies (Jones, 2001). Brislin's Model is a well-known method of validating and preparing reliable instruments to suit cross-cultural research (Jones *et al.*, 2001). Therefore, this model was considered convenient for this part of study to guide the translation process and establish an accurate and conceptually equivalent translated instrument. The translation process involved translating the questionnaire from its original and source language (SL) (English) to the target language (TL) (Arabic) by two independent bilingual translators. The Arabic version was then back translated to the English language by other independent bilingual translators without accessing the original version. If any difference or discrepancy in the meaning between the two versions (original and back translated) is found, re-translation is considered until the congruence of meaning has been achieved.

According to this Brislin's model, the researcher recruited two or more bilingual people for the translation of the qualitative study text, including interview transcripts and filed notes from non-English (source language) into English (target language). In Brislin's Model (1970, 1980), the original version of Patient Activation Model was forward translated into Arabic by

two independent bilingual translators. These two Arabic versions were then merged in one through comparison, to reach congruence in terms of meaning with the original English version. Another two independent translators were chosen and blindly translated the Arabic version back to English. These translators used to work in the nursing development unit in the Jizan hospital and were involved in teaching nursing in Saudi college using the English language. Again, the two back-translated English versions were then compared with each other to produce another draft of English back-translated version. This should be congruent with the original version in terms of meaning, to ensure conceptual equivalence of translation. Brislin (1970, 1980) stated that the other bilingual person who also participates in process of translation will translate the transcripts and documents back to the source language from the target language. Finally, both versions being compared to check out equivalence and accuracy of the translation. Remaining discrepancies detected during translation process were finally negotiated between both bilingual persons.

According to many authors (Glasper *et a*l., 2016; Holloway *et a*l., 2010; Priest *et al.,* 2010), there are some stages that are commonly involved in translation process. First is determination of context or relevance. Second is forward translation of study instruments. Third is backward translation. Fourth is examining translated meanings in both target and source languages. Fifth is revisiting the process as a whole to attain similar interpretations. Similarly, Paley (2017) used a four-points scale approach for translation to ensure relevancy in content: technical (data collection method is comparable), semantic (likeness of meaning), criterion (consistency between translated terms and each cultural norms) and conceptual equivalence/cultural equivalence (having relevance and similarity in meaning in both cultures) (see also Beck, 2006). Recently, Press (2012) developed a strategy for translation and transliteration to check out any equivalency in source words with respect to Standard English words. In case any equivalency appears, researcher should use English phrases or words while translating the interviews. However, quotes are to be used in cases where source phrases or words are either difficult to interpret or translate or have no direct equivalent.

Based on these translation and transliteration approaches and processes, along with authors' insights and experience, two main translation and transliteration strategies might be recommended in qualitative study. First, while conducting interviews in source (original) language, verbatim (word for word) should be properly transcribed and emotional expressions, annotations and pauses should be included in same source language (Crabtree,

2008). Later on, translate each transcript into English (target language). According to Lyons *et al.* (2018), if transcripts are checked and rechecked during synthesis and analysis against translated explanations and interpretations, more creditability will be added to study findings. Second, transcribe only key issues or themes that may appear during translation process (Crabtree, 2008). This approach is considered as time saving and involves less transcribing (Selby *et al.,* 2015).

5.5.2. Iterative process of translation

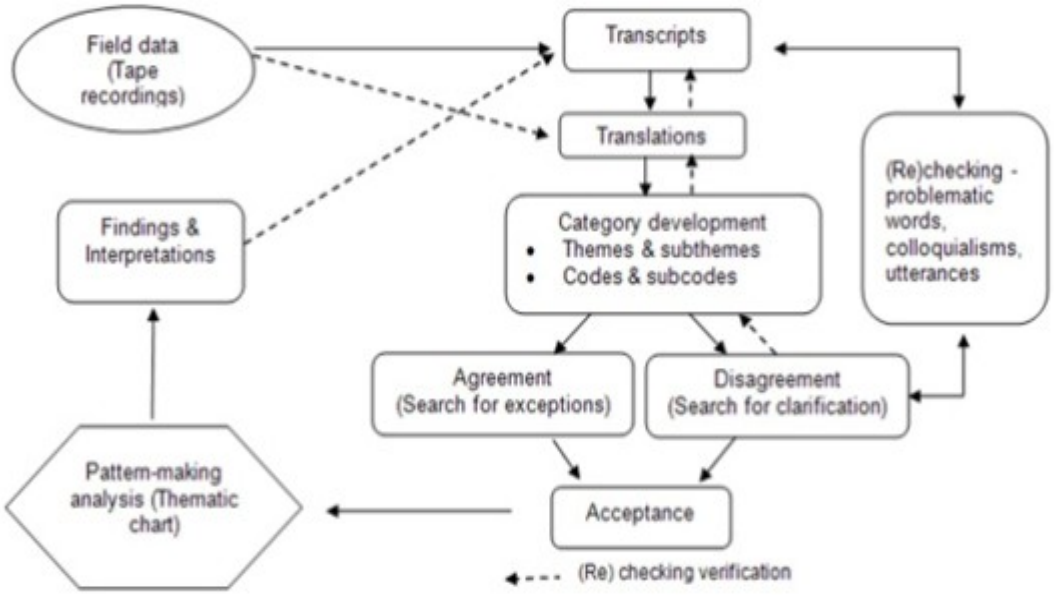

Figure 5.2 Iterative process of translation (Regmi et al., 2010).

According to Brislin (1986), it is good practice to employ two bilingual competent translators having familiarity with research, one for forward translation and other for backward translation without seeing the original text. Many authors (Cox *et al*., 2012) described translation as a daunting process because it not only consumes lots of time but is also very expensive and may be beyond the abilities of many novice/student researchers. Moreover, Strauss *et al.* (2015) considered it ideal to translate minimal transcripts into original (non-English) language unless there appears a problem while sample transcripts are being translated. In cases of research studies that have sufficient resources, the World Health Organization (WHO, 2010) suggested to use a review panel comprised of experts in research domain, members of targeted population and bilingual people to refine and filter the translations and assess congruence and equivalence.

5.5.3. Translating instruments in the current study

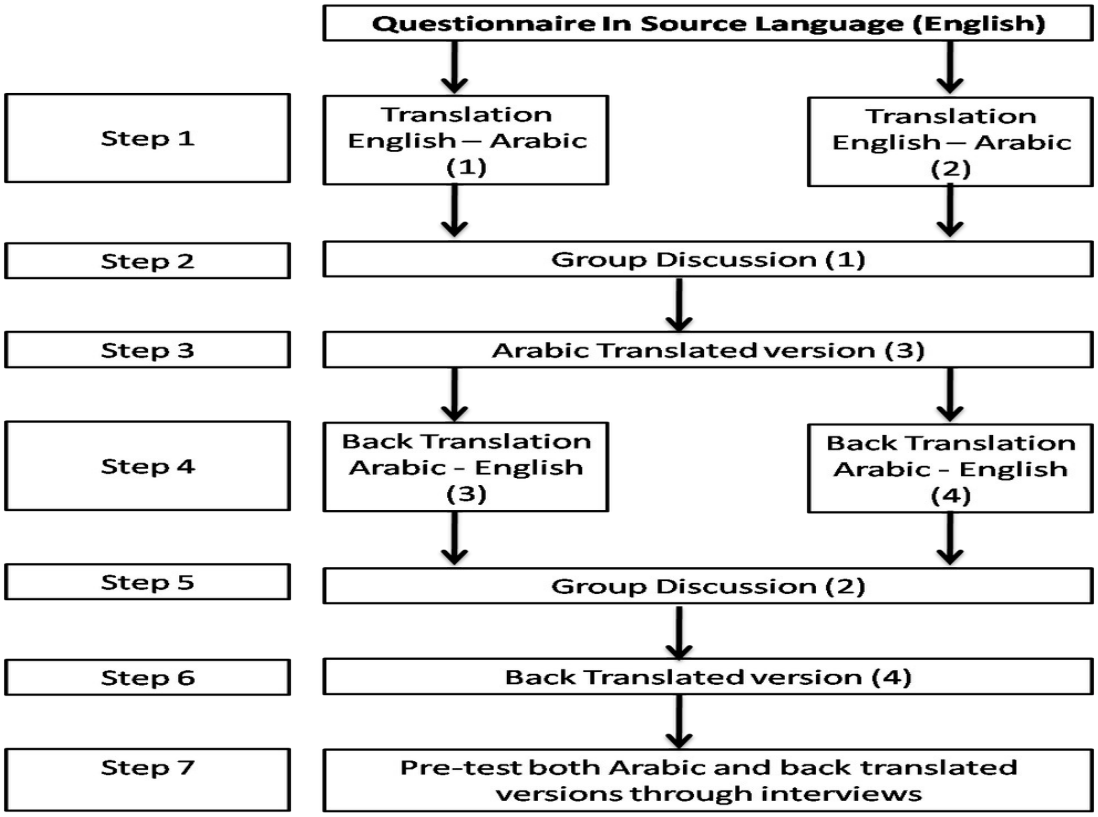

Figure 5.3 Translation procedure

Once the conceptual equivalence was achieved and the translation process finished, a group of nurses in Saudi Arabia who work with asthmatic patients and are fluent in both languages were involved. Their job was to reconcile the original and back translated versions to remove any discrepancies and identify any items that may not have been translated appropriately to obtain the required data (figure 5.2 & 5.3).

The researcher was careful to produce a more understandable version in the context of Saudi Arabia which required providing the translators with instructions on the concepts in the original version of the instrument in order to strengthen the conceptual equivalence of the forward translation and avoid any ambiguities. It was also important to inform translators to use the natural and simple language used by either nurses or patients in Saudi Arabia to avoid any misunderstanding that may result from using technical terms. Table 5.5 shows and an overview of the origins and expertise of the translators (appendix 12-18).

Table 5.5 Origin and specialties of translators

Translator	Country of Origin	Place of residence	Specialty/Field
Translator 1	Saudi Arabia	Saudi Arabia	Nursing
Translator 2	Saudi Arabia	Saudi Arabia	Doctor
Back Translator 3	Saudi Arabia	Saudi Arabia	Nursing
Back Translator 4	Saudi Arabia	Saudi Arabia	Doctor

5.5.4. Verifying translation (health professionals)

The next step was to verify the Arabic version as well as the back-translated versions for discrepancies in terms of meaning, readability and the extent to which the instrument would be feasible and accepted by patients in Saudi Arabia (Bonomi *et al.,* 1996). For this, questionnaire items were assessed for clarity and meaning to assure that patients' needs will be determined properly to ascertain that the content of the intervention will meet these needs. This process involved two groups: nurses and patients.

Nurses were also asked to comment on the back-translated English versions and highlighted any dissimilarities and discrepancies between original and back-translated versions. The reviewed versions of the questionnaires and the intervention were structured to suit the cultural norms in Saudi Arabia and help patients to answer the questions within the contest of their own cultural beliefs and attitudes. Appendices (24) show the final versions of the questionnaires used for patients in the main study after these nurses' comments were introduced. Details regarding the intervention and its pilot were presented in chapter 4.

Patients who were attending asthma clinics at Jizan hospital in Saudi Arabia (20) also received the translated questionnaires and were asked to comment on their understanding and responses on these questionnaires. These groups were selected based on the assumption that they have similar characteristics to the participants in the main study. Nurses' and patients' responses were consistent, and both provided valuable comments which were then inserted into the questionnaires prior to the main study.

5.6. PILOT STUDY

A pilot study was conducted to highlight unexpected problems that might arise during the main study. Van-Teijlingen *et al.* (2001) have argued that a pilot study is helpful to determine whether the respondents can understand the wording of questionnaire or what improvements are required to improve the questionnaire This included testing the instruments for poor wording, ambiguity, missing words, inappropriate response options, unclear instructions, the time required to complete the questionnaires by participants, in addition to testing the instrument reliability. Responses to the questionnaires were also used to provide an initial perspective and overview of patients' needs and were thus used to focus the intervention (Chapter 4) to meet these needs. Therefore, present study has used the pilot study for determine the ease/difficulty in questionnaires as per the views of some selected respondents.

The pilot study was carried out in King Fahd Central Hospital (KFCH), a hospital located in the centre of Jizan in the South West of KSA during September 2017. The respiratory clinic of KFCH was selected to select lists of patients and conduct this study. A meeting was held with nurses who worked in the clinics, to explain the purpose of the study and to help the researcher to access patients in clinics. The questionnaires (described above) were distributed to 21 patients who were selected from the attendees list in respiratory clinic. These patients were selected with the support of hospital staff as well as the willingness of asthma patients to provide data. The researcher was physcially present at the respiratory clinic and asked patients if they would be willing to participate by describing the objectives of this study. Patients, in addition to answering questions, were also asked to rate the clarity and readability of questions. Whilst patients completed the questionnaires, during the clinic, the researcher was available to observe and assess the time needed for filling the questionnaires and was available in case any participant needed any explanation or clarification. Patients' responses were entered into Statistical Package of Social Science (SPSS) software for descriptive data analysis. This data was excluded from the main study data analysis.

5.6.1. Pilot findings

A total of 21 patients participated (9 males and 12 females), middle aged between 26 and 50 years, married (11), hold high-school or less degrees (12), and not working (14). Responses to the *Asthma Control Test* clearly showed that patients were struggling to control their asthma. Only one patient answered with "None of the time" on the item "how much of the time did your asthma keep you from getting as much as done at work, school or at home".

More than a third answered with “Most of the time” (38.1%). “All of the time” was 14.29%. Regarding symptoms of asthma, more than 95% of patients experienced symptoms like shortness of breath, wheezes and coughing. More than 40% experienced these symptoms 3-6 times a week and third of them had these symptoms at least once a day. When patients were asked to rate their ability to control their symptoms, 42.86% of patients said they could not properly control symptoms and 42.85% were either poorly controlling (33.33%) or not controlling these symptoms at all (9.52%).

On the *16-item Asthma self-management questionnaire*, patients showed their lack of knowledge about most aspects of self-managing their asthma. For example, more than half of them go to the emergency room at the first sign of symptoms, with 14.29% suggesting they don’t know what to do. They were also not aware of the proper use of medications. More than half of them believed that the distribution of prescribed doses of medications is not an issue once the patient is taking the total dose in the day. One third of patients do not know how use Peak-Flow meter (33.33%) and more than 55% do not know the benefits of using this peak-flow every day. There were also 38.10% who do not know how asthma can be cured. More than 60% call doctors when they had symptoms of asthma.

On the *Asthma Knowledge Questionnaire*, the majority of participants (59%) gave positive responses (true), while only 14% gave false responses and 26% didn’t know the answer. Patients answered with “don’t know” on some questionnaires with different percentages. For example, more than half do not know how some medications could aggravate asthma and how the effect of inhaled medications may disappear quickly and enter the circulation system or even have side-effects. More than third of patients also did not know whether they can do sports and nearly one-fourth did not know if inhaled medications can cause addiction. Patients’ response was required to tick on “True” and “False” might too indicate that some of them do not know the right answer.

On the *Patient Activation Measure*, the average score for the 17 items was 2.82 with a standard deviation of .361. This suggests that average scores range from 2.46 to 3.81, indicating that there was a general tendency to agree to the 17 items listed. The average scores ranged between 2.62 and 3.05, indicating a significant tendency of agreement. On average, the vast majority of participants (>70%) agreed that they have active role in managing their asthma and they can initiate discussion on their status even they were not asked to do so.

Patients' responses on these items indicated that they were confident to manage asthma and they know about how medications and their actions effect the condition. However, these responses were not consistent with responses in the other questionnaires, such as the Asthma Knowledge Questionnaire, where half of them said that they do not know how medications could aggravate asthma and they were also not sure how long the effect of medications would last. This suggests that patients may be willing to have an active role in managing their asthma if they were well prepared to do so through proper and focused education.

To summarize, the results of the questionnaires showed that patients with asthma surveyed lack knowledge on how to manage their asthma and use medications properly. They also showed their confidence to have an important role in their capacity to self-manage the disease. This suggests that education may fill the gap and provide the necessary knowledge and consequently activate their role to work properly in managing the disease and its complications. This provided confidence in developing the intervention.

No major difficulties were encountered during the pilot study. Some amendments of some words in the Arabic versions of the questionnaires were suggested by patients and nurses and added to the last version of the questionnaires.

5.6.2. Phase III: Data collection

This part of study involved a group of patients split into two groups: experimental, to whom the intervention was provided, and a control group. Routine care was provided to those in the control group, and once the data collection phase was complete, this group was offered the resources from the intervention. Routine care includes advice in the correct use of inhaler or nebulizer or peak flow meter. A pre-test (using the questionnaires described above) was conducted for both groups before the intervention was delivered to assess their level of prior knowledge. Once the pre-test was completed, the intervention group was enrolled in the self-management asthma education program (2 days) described in Chapter 4. The post-test was given to both groups 3 months after the program was finished and the post test was also given at 6 months for the intervention group, to see if any effects were maintained. The researcher and a group of nurses and other health professionals who attended the training sessions were those who were responsible for the education program delivery.

Qualitative face to face interviews

Qualitative interviews took place 3 months after the intervention. The interviews are conducted from both intervention and control groups. A reply slip was included with the post-tests offering patients an opportunity to take part in the interviews.

After the post-test, a list of patients who agreed to be interviewed was created. A group of patients from different age groups (males and females) were selected and invited for interview. Different age groups of males and females were selected to gather unique and appropriate data which is helpful to generalize the results to larger population in Saudi Arabia. They were expected to provide more in-depth data on their knowledge on asthma as well as facilitators and barriers to independent device use. Patients were also asked to comment on the program and their comments were thereafter used to further understand and improve the program. Interviews commenced after the second post-test results were analysed (6 months after the intervention), in order to better understand any evident changes in the participant scores in knowledge and Patient Activation Measure. The overall aim of these interviews was to improve the quality of the program content. Therefore, a total of eight patients were recruited for this part of study to help the researcher to improve and produce accreditable program for delivery by health agencies in Jizan.

5.7. STUDY SETTING

The study was carried out in King Fahd Central Hospital (KFCH), a hospital located in the centre of Jizan in the South West of KSA.

Figure 5.5 King Fahad Central Hospital – Jizan – KSA

The hospital is well equipped with capacity of 500 beds. It is a referral centre for more than 14 general hospitals and many primary healthcare centres that provide health services for

more than 1 million people in the Jizan province (see figure 5.6). There are 13 medical departments, one is the respiratory therapy department, which is branched into seven sub-specialties two of these are respiratory therapy for home care and rehabilitation for respiratory treatment.

5.8. PARTICIPANTS AND SAMPLE SIZE

All patients who were older than 18 years and attending KFCH for their asthma at the time of the study were eligible. There were no restrictions with respect to demographic characteristics such as gender, education, residence and religion. Patients included needed to be able to understand and speak Arabic language and be resident in KSA for the period of the study (Saudi and Non-Saudi) and also available during the study period (Table 5.7).

Table 5.7 Inclusion/Exclusion Criteria for patients

Inclusion Criteria
• Patients diagnosed with any type of asthma with or without co-morbidities • Those who are resident in KSA for the duration of the study • Aged 18 years or over • Able to attend the education program • Able to speak and understand Arabic
Exclusion Criteria
• Diagnosed but not resident in KSA • Those unable to commit to completing the whole of the education program • Those who are not able to understand or self-care their asthma

There were approximately 8110 asthma patients attending KFCH for treatment, from this target population participants for the study were selected to take part using an appropriate sampling technique to represent the entire population (Saunders *et al.,* 2009). If the sample is selected without bias and is representative of the wider population then the larger the sample the more accurate the results of a study. However, time and resources often restrict sample size, so it is essential smaller samples which are more manageable remain representative of the target population.

A power calculation using the statistical software package G*Power, version 3.1.7, with a two-tailed t-test, a power of 0.8 (80%), an effect size of 0.5, and a 0.05 level of significance was used to identify an appropriate sample size. On the basis of the G*power calculation there were 140 patients required to ensure the study was adequately powered. For practical

reasons (including availability of clinics and the willingness and availability of the patients during the study recruitment time and potential drop out) a sample size of 125 was considered for this as potentially adequate as in a similar study (Tousman *et al.* 2011). Rather than sending an invitation to all 8110 of the patients at the time of the study, a convenient consecutive sample of patients who attended the clinic at the time of study were approached until the target number (125) was reached.

5.9. RECRUITMENT AND ASSIGNMENT METHOD

It was necessary and important to involve nurses in all stages of the study, from accessing patients to the stage of delivering the education program. Therefore, patients to whom the questionnaire was administered and who were recruited for interviews were identified through nurses and the departmental nursing officers within the selected hospital. Nursing officers at the beginning were recruited and contacted by letter to seek their agreement for the researcher to access and recruit patients for all phases of the study. They were also provided with all study documents as well as a copy of the local ethical approval from University of Salford and the hospital itself. Details on target patients were obtained from the individual clinics to which the questionnaire was distributed, which included: the total number of patients that attend the clinic; number of male and female patients; and history of the disease (if applicable). This enabled the researcher to monitor and clarify responses according to personal characteristics, as well as creating a study coding system for the questionnaires distributed in each ward in the hospital.

The sample for this study is not truly ramdomized and the researcher used informal stratified sampling based on region as well as asthma patients age and gender to avoid bias. Patients were selected by consideration of their demographic characteristics (i.e. region, age and gender) to ensure the equality of asthma patients characteristics between groups. Selecting by region was important because Jizan has different geographical features such as mountains and islands who are difficult to identify and engage. The allocation of asthma patients within demographic groups can provide more rich and unique data as per age, gender, level of education, marital status and employment status of asthma patients. Asthma patients were asked to complete the agreement regarding no objection in exchanging information related to their asthma history as well as participating voluntarily in this study. Those patients who agreed to take part in the study were asked to sign a consent form. They

were then given the questionnaires (pre-test) to fill in at their convenience either at the clinic or even at home and return it in hand to a nursing officer or via the standard postal service. Patients were provided with the information sheet and an invitation (see appendix 25) to take part in the study in the clinics when they attended their scheduled appointment with a doctor. The researcher of this study was present at the clinic with the purpose of observing and increasing his knowledge of the asthma patients. Those who agreed (n=125) completed the pre-test and had the chance to be selected for the intervention or control groups. Patients were selected by consideration of their demographic characteristics (region, age, and gender) so as to ensure the equality of patients' characteristics between groups.

5.10. ETHICAL CONSIDERATIONS

Ethical principles guide the standards of research behaviour and moral choice within a research study, along with the relationship between the researcher and the participants (Arnab, 2013). Within this study ethical considerations influenced access to the delivery of the ASEMP program, in addition to the recruitment, measuring and storage of personal and identifiable data throughout the study (Loymans *et al*., 2014). These guiding ethical considerations were also influenced by the content of the research and the professional code of ethics of the researcher and nurses involved (MoH, 2012). A participant information sheet documenting confidentiality, harm, privacy and risk was developed to ensure those involved in the study were fully informed. Alongside asking questions this enabled the researcher to ensure as far as possible that participants had made an informed decision to be involved in the study.

Each participant who agreed to be involved was given a detailed explanation of the study and opportunities were provided for them to ask questions. Furthermore, the respect and dignity of each participant, together with the right to self-determination, was observed. Once agreement was reached each person was required to sign a consent form (Appendices 4-5). It was further explained to the participants that once they have agreed to participate in the study, they were equally free to withdraw their participation at any time, without any recourse. The control group who were not provided with the intervention (ASMEP) during the course of the study but were offered the intervention after the data collection phases, as it was considered unethical to not provide equality of care.

All data from participants was kept confidential in a password protected cabinet accessed only by researcher. Corresponding codes and pseudonyms were used to replace the name of the patients where they were mentioned in the research. Only the researcher held the file containing codes matching names. Following publication, all data is to be saved for five years, then appropriately disposed of.

5.11. ETHICAL APPROVAL

Ethical approval was obtained from the Salford University and the Saudi MOH prior to the study commencing. It is mandatory that any person who wishes to perform research or requires personal data from any hospital in the KSA must obtain ethical approval from the ethics committee of the MOH. Therefore, before starting the research, an application was given to the MOH, consisting of short summary of the target sample and region. The MOH committee accepted the application on the condition that the University of Salford had also provided the ethical approval (appendix 2 &9).

The University of Salford consists of a Committee for Health and Social Care Research and Innovation Committee, along with the PGR College of Health and Social Care Research Ethics Committee. These committees have been made responsible for all staff and postgraduate research students research ethics approval. Several changes were made to the proposal at the start, between April and October 2017, before the final draft was developed. It was suggested in the recommendations that there was a need to explain the intervention framework and particular timetable of the program, as well as the possible advantages for the society. With these issues addressed approval was agreed in the meeting that took place on October 19, 2017 (appendix 9).

5.12. DATA COLLECTION

Quantitative data was collected by means of four questionnaires (Arabic version)– Asthma Control Test, Asthma Knowledge Questionnaire, Asthma Self-Knowledge Questionnaire, and Patient Activation Measure (PAM). Authors' permission was obtained to translate and use questionnaires or use those are already translated (see appendix 11). An information sheet with researcher's contact details was delivered to patients prior to their asthma clinic to read. Those who agreed to take part in the study were asked to sign a consent form. They were then given the questionnaires (pre-test) to fill in at their convenience either at the clinic or even at

home and return it in hand to a nursing officer or via the standard postal service. They were reminded by the researcher in each stage that they would need to complete the questionnaire after 3 months for the next stage. The post-test surveys included a question regarding the number (if any) of Emergency Department (ED) visits during the 6 months before and after the test and the data was discussed and clarified during the patient interview. However, due to the small sample size for interviews, this did not provide confirmation across the study. Future studies could cross check with hospital data for this verification.

The researcher worked closely with the nursing team and the nursing officer in the selected hospital to assist in distributing and collecting the completed questionnaires and conducting interviews. Questionnaires were delivered to the nursing team who in turn helped to administer them to patients in the clinic. They also worked to return the completed questionnaires to an assigned point in each area in a sealed anonymous envelope to make sure that patients' identity remained confidential. While questionnaires were identifiable to the researcher, anonymity of participants was achieved through agreed research codes maintained on the master participant list.

The questionnaire pack was delivered and completed questionnaires collected from patients either via nursing managers or by post. Each participant received a package which included:

- Cover letter inviting patients to take part in the study (Appendix 25)
- Information sheet explaining the aims of the study and what participation would involve if they chose to take part in completing the questionnaire or agreeing to take part in an interview (Appendix 4&5).
- A reply slip inviting the patient for the face-to-face interviews (Appendix 25)
- A copy of the questionnaire (Arabic (appendix 12-16 & English) (Appendix 19)
- Addressed stamped return envelope

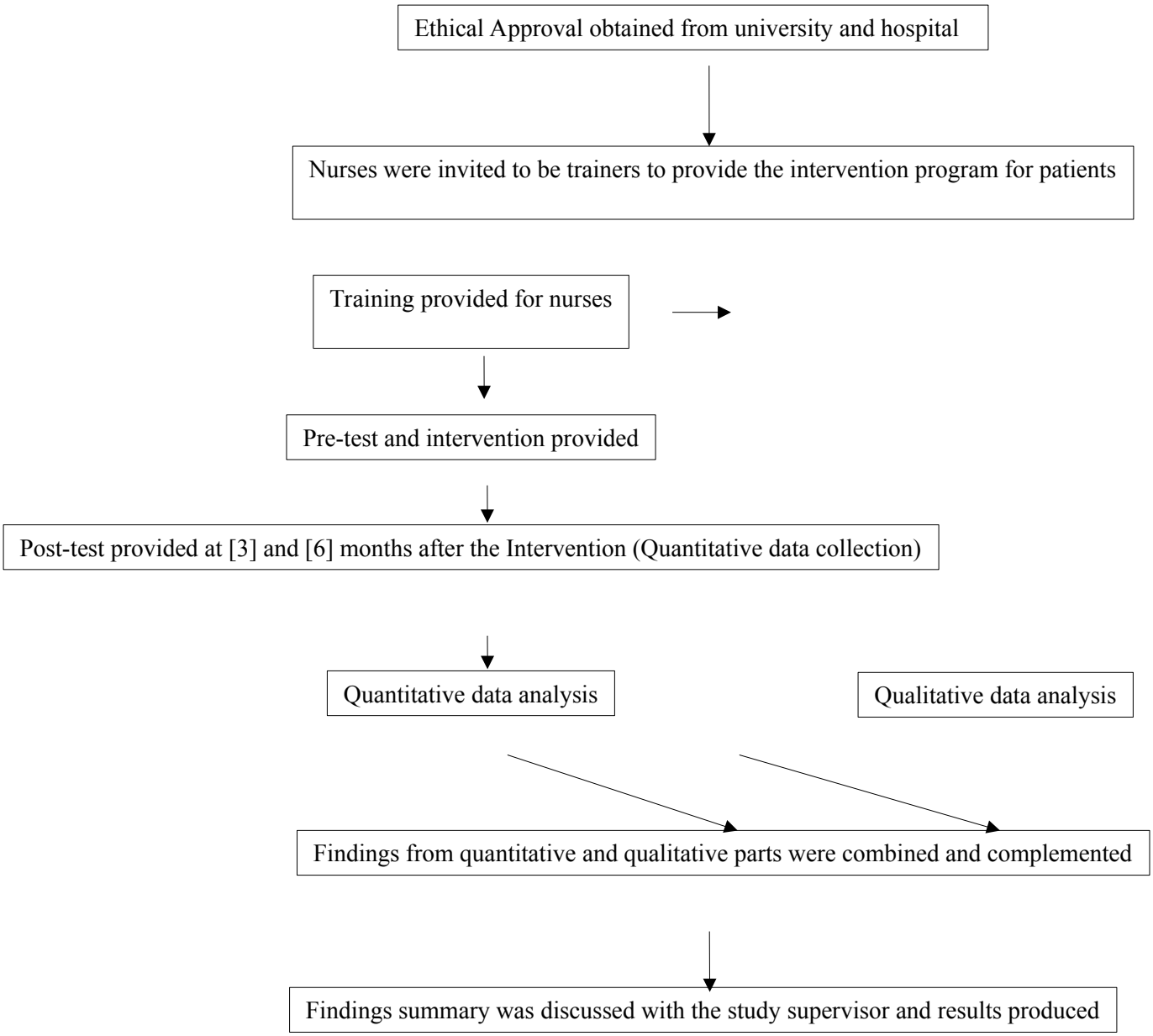

Figure 5.6 Pathway for the progression of the study

The researcher's contact details were provided on the information sheet to offer patients' a chance to ring if they had any questions prior to completing a questionnaire. A telephone follow-up reminder was also considered and performed in a small number of cases by the nursing manager and nurses in the individual clinics to all patients who have not replied within two weeks after the questionnaire had been distributed. Reminders in research were shown as an efficient method of increasing the response rate (Parker & Dewey, 2000).

For the interview phase, patients were selected from those who agreed and had returned the reply slip with the returned questionnaires responses. Participants invited to be interviewed were selected from the list with reference to demographic characteristics to gather a sample of patients from different demographic groups (Von-Bothmer and Fridlund, 2005). Von-Bothmer and Fridlund (2005) have argued that demographic features can offer more unique and different data which may helpful to overcome the issues related to selected partcipants. The selected patients were then contacted by the researcher to arrange an appropriate time and place for their interview. Participants, prior to commencing the interview, were reminded by the researcher that their participation was completely voluntary and that they were able, and had the right to, withdraw from the interview at any time, even during the interview if they felt uncomfortable without giving any reason. In addition to signing a consent form, they were also offered prior to the interview an opportunity to ask any questions of the study so they were as far as possible fully informed prior to taking part.

5.13. DATA ANALYSIS

Quantitative data analysis summarises the numerical data into statistical inferences that have indications and meaning applicable to clinical practice (Polit & Beck, 2008). The data analysis process focused on the study aims as well as the key concepts that emerged from the systematic review, following a sequential design going through two phases: phase 1 quantitative data analysis for both pre-test and post-test (3 and 6 months), phase 2 qualitative data analysis. Data phase two was used to gather patients' views on the program so the aim was not to use it to triangulate with quantitative data. Rather, the qualitative data was used as a complementary set of data to enable developing and improving the program and generate deeper and more robust evidence(Sandelowski, 2000; Creswell *et al.,* 2003).

5.14. QUANTITATIVE DATA ANALYSIS

Quantitative data was entered into the Statistical Package for the Social Science (SPSS*16) software for analysis and cleared and filtered for any outliers or missing data (Hair *et al.,* 2006). The data was entered by the researcher and verified by a statistician in the University of Salford to ensure data was entered correctly to allow for accurate results. The questionnaire included different types of data: categorical and continuous. Therefore, different tests needed to be applied to manage the data. For example, t-test and ANOVA

were used to analyse continuous data and Chi-Square to manage categorical data. Data analysis started with a logical sequence going from descriptive statistics and moving towards inferential statistics. Quantitative data analysis was applied to, and compared with, the pre-test scores of those in the post-test 1 (after three months) and post-test 2 (after 6 months). Within this stage, the data analysis process followed three stages: descriptive statistics, statistical analysis, and correlation.

5.15. RECRUITMENT AND TEST

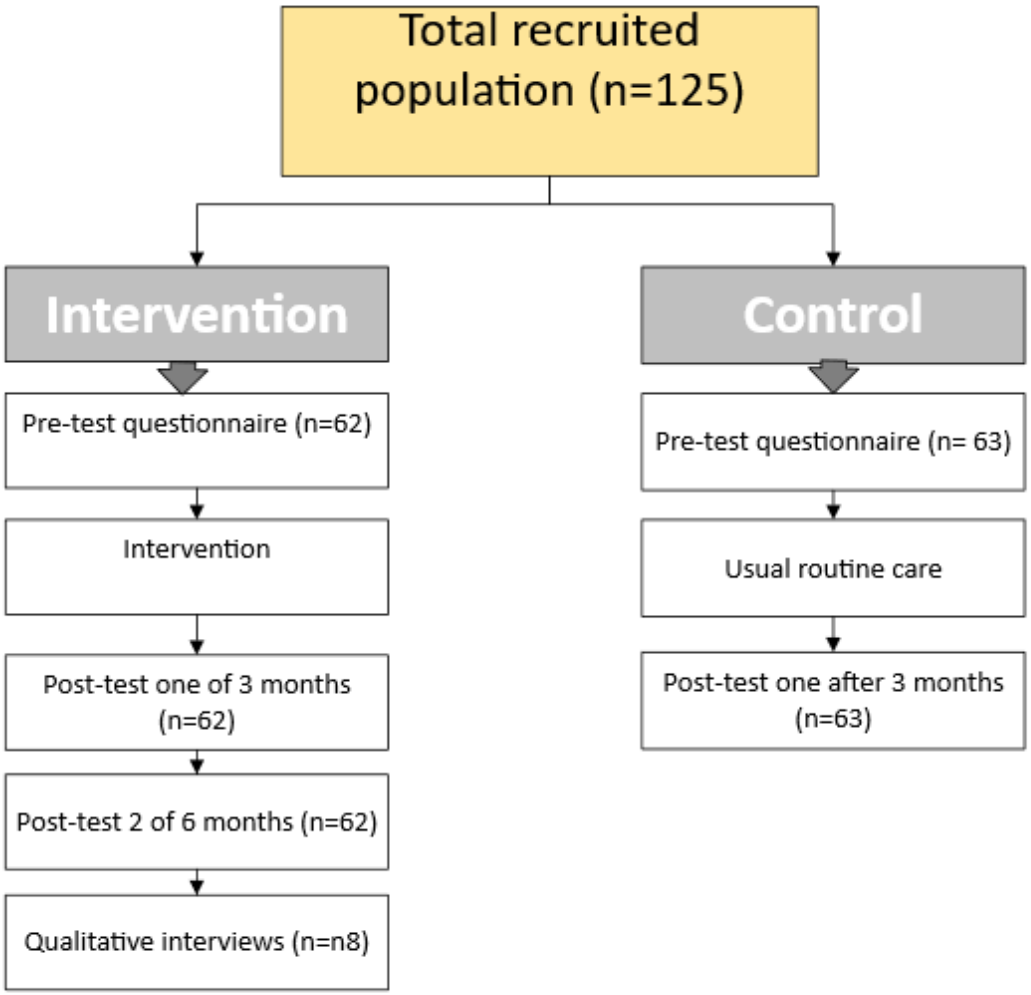

Figure 5.7 Recruitment and test

5.15.1. Stage one: Descriptive statistics

The descriptive statistics of all items was conducted in order to establish normality of variables. Data (categorical and continuous) is to be presented as means, standard deviations, percentages, so as to provide an overview of patients' demographic characteristics and distribution. Means, standard deviations and percentages will be used to describe the distribution of demographics over the study groups (intervention vs. control), as well as the study stages (pre-test and post-test). It is also crucial to examine the homogeneity of the sample prior to starting the program, assuming that there is no significant differences between groups in the study (control and intervention) regarding the variables under investigation. This categorical data either demographic variables or those questions with closed answers (such as yes/no or male/female) are cross-tabulated and presented in a suitable way either in tables or graphs. Comparisons between categorical variables were analysed using a chi-squared test. Continuous data is presented by means and standard deviation.

Descriptive statistics of mean, standard deviation and range were calculated on the demographic data collected and frequency statistics calculated to present descriptive data on any categorical demographic data and recent event data. Descriptive data will be presented in terms of the pre and post test scores for each group (intervention and control).

5.15.2. Stage two: Data exploration and inferential statistics

The number of emergency visits were measured with the help of these questions: required number of emergency visit per 6 months, required hospitalization for patients, average number of emergency visit per month, average number of admissions per month, and number of patient visit emergency more than 1 time.

This part was conducted to compare variables and test hypotheses in the study:

The study is designed to test five null hypotheses:

- **H_{1a}:** *There is no significant difference between males and females in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*
- **H_{1b}:** *There is no significant difference between age groups in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*

- **H_{1c}:** *There is no significant difference between single and married patients in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*
- **H_{1d}:** *There is no significant difference between education categories in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*
- **H_{1e}:** *There is no significant difference between employment status categories in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*

In the first stage, demographic characteristics such as gender, age and education, in addition to Patient Activation Measure (PAM), were presented at the pre-test stage. Once the post-test data have been collected, data was analyzed to reveal significant changes in the score data (on all measures). Within this stage of data analysis, both categorical and continuous data from patients' responses were compared using suitable statistical tests. These tests were determined based on the shape of data (normality of distribution). For normally distributed data, t-test and Analysis of Variance (ANOVA) were used to compare data according to the type of variables; t-test to compare the variable between two groups like males and females and ANOVA for more than two groups such as comparing patients' scores between three or more age groups. The Tukey's method is appropriate because it can able to compare all the possible groups with each other using ANOVA. Tukey's method is extensively used by previous studies when researchers are interested to know about comparison regarding group pairings (Forest, 2019). A paired sample *t*-test analysis was used to identify any knowledge improvement and changes in PAM scores of the intervention and control groups from pre-test to post-test.

5.16. QUALITATIVE DATA ANALYSIS

Qualitative data from the interviews was analysed following a thematic framework (Miles *et al.,* 1994). All transcripts were checked for any missing or errors in words or sentences, achieved through immersing in the data, by reading the transcripts and listening to recordings and then clearing data for analysis. The qualitative data of eight semi structured interview were transcribed and thematic analysis performed to identify and expose the different themes

emerging from the data. Pseudonyms were attached to quotes to protect patients' identity; each quote was named, and the gender identified.

Themes for analysis were identified by drawing on the knowledge gained from the literature, the researcher's observations, alongside exploring conceptual and theoretical notions to interrogate the data (Braun & Clarke, 2006; Javadi & Zarea, 2016). Thematic analysis is a common method performed to identify common meanings, patterns, codes, ideas and keywords (Braun & Clarke, 2006). The present study followed a thematic analysis approach, with the researcher identifying key terms and sub-themes based on the commonly repeated words used by respondents during their interviews (Javadi & Zarea, 2016; Rayan *et al*., 2003). In addition, interview transcripts were read and re-read to understand the meaning of the words in context and pick-up additional themes exposed by individuals. An advantage of thematic analysis is that it is a flexible method, where researchers can repeat the same process until satisfied that the process of data interrogation has been exhausted.

Thematic analysis reveals various key words and sub-themes for explanation during the interpretation of interviews (Rubin & Rubin, 2011). The responses from patients have been gathered under subthemes and the transcription of similar or common patterns completed. Two Interviews were coded and checked by an independent researcher to agree the final framework and any discrepancies in the themes, to ensure the framework applied across all interviews was trustworthy and an accurate representation of the data. Three core themes emerged with 12 codes or sub-themes, these formed the analytical framework.

5.16.1. Data integration and presentation

Data from both quantitative and qualitative studies was combined and complemented to used data from one phase (qualitative) to change or improve subsequent phases (quantitative) (Sandelowski, 2000; Creswell *et al.,* 2003); Within the complementary phase, different findings were also exposed separately within the two different phases to add to achieving the purpose of the study. For example, something useful gleaned from interviews was not necessarily measured in the questionnaire, such as the participants feedback and perceptions of the intervention itself and how it was delivered.

5.17. SUMMARY

A culturally sensitive self-management education program was developed and implemented to improve the asthma patients' knowledge, behaviour and self-efficacy to provide them with the skills to help better self-manage their asthma. The program was expected to improve patients' ability to take medication and to use self-management devices while at home. The program content, delivery and teaching strategies were developed based on findings from a comprehensive systematic review with partnership and collaboration from healthcare professionals working with the target group of patients and national guidance. It was designed to be provided for a group of patients with asthma (experimental group) by nurses and other care professionals. Appropriate training was provided to nurses and health professionals who were selected to deliver the program to assure quality and accuracy of the program. A set of tools were selected to measure the outcomes of the programme. These were selected from knowledge gained from the systematic review and their availability in Arabic. One measure was translated, using accepted principles into Arabic. The measures were piloted to ensure relevance for the study context, and to provide patient feedback as part of the intervention development.

This chapter (methodology) explained how patients who received this program were evaluated compared with a patient group who have not receive the program (control group), to determine whether the program was effective at improving asthma self-management and feasible to deliver to the asthma patient cohort. Mixed methods were used to achieve the study objectives and generate reliable evidence on patient experience in managing their asthma and whether self-management education could improve their ability to control such asthmatic symptoms.

Chapters six and seven present the study findings and the evidence of the effectiveness of the co-produced education intervention for Saudi asthma patients.

CHAPTER 6: PATIENTS' EXPERIENCE, KNOWLEDGE AND MANAGEMENT OF ASTHMA: QUANTITATIVE RESULTS

6.1. INTRODUCTION

This chapter presents the findings of data analysis from the quantitative part of the study. The quantitative part tested the impact of a self-management education program involving Saudi adults with asthma. Patients' level of knowledge and skills were evaluated and tested three times: before program (pre-test), three months after program (post-test I), and six months after program (post-test II). The first part of the chapter sets out the demographic characteristics of the participants. Then the responses of patients from two groups (control and intervention) across the three program stages are presented. Data analysis was performed using SPSS version 16. Statistical tests were selected based on the type of data. In this chapter, the findings are presented to answer the main question of the research regarding the impact of a culturally specific patients' self-management education program in Saudi adults with asthma.

6.2. DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

A total of one hundred and twenty-five (125) patients were enrolled in the study and completed the pre-tests. Of these, 63 (50.4%) were in the control group and 62 (49.6%) in the intervention group (Table 6-1). Frequencies and percentages were used to summarize demographic data. Of these, 56 males (39.1%) and 69 females (61.9%) were distributed in the groups. The majority of patients fell between the age of 26 - 50 years, representing 68% of the sample. The majority (67.2%) were married. 47.2% had high-school or less education, 37.6% had undergraduate education, while only 15.2% had postgraduate education. 40.8%were unemployed. 31.2% 10.4% were retired. 10.4% were self-employed and only 7.2% were looking for work.

Table 6.1 shows the similarities and differences in demographics across the two groups. Groups were equivalent in some areas, but not others, particularly in relation to post-graduate education. In the intervention group, males and females were approximately equal in sample size, 44.8% and 55.2%, respectively. The age of the majority of patients (64.5%) fell between

26 and 50 years. Married patients 71% were more than singles 29%. Patients in the intervention group were more educated than those in the control group. That is, 43.5% of them had at least undergraduate education. Regarding employment, 35.5% were unemployed, while 30.6% were employed. Self-employed patients represented 12.9%, while 11.3% were looking for work, and 9.7% were retired (Table 6-1). Although there were some demographic differences between the control and intervention groups, tables 6.3 and 6.6. show that at baseline or pre-test patients levels of knowledge and control of asthma were similar across the groups.

Table 6.5 Patients' Demographic Characteristics across groups

Demographics	Stage one (Pre-test) n = 125		
	Control (n = 63)	**Intervention (n = 62)**	**Total n (%)**
Gender			
Female	39 (61.9%)	30 (48.4%)	69 (55.2%)
Male	24 (38.1%)	32 (51.6%)	56 (44.8%)
Age Group			
18-25	9 (14.3%)	17 (27.4%)	26 (20.1%)
26-35	23 (36.5%)	22 (35.5%)	45 (36%)
36-50	22 (34.9%)	18 (29.0%)	40 (32%)
51-65	9 (14.3%)	5 (8.1%)	14 (11.2%)
Marital Status			
Single	23 (36.5%)	18 (29.0%)	41 (32.8%)
Married	40 (63.5%)	44 (71.0%)	84 (67.2%)
Education			
High-school or less	39 (61.9%)	20 (32.3%)	59 (47.2%)
Undergraduate level	20 (31.7%)	27 (43.5%)	47 (37.6%)
Postgraduate level	4 (6.3%)	15 (24.2%)	19 (15.2%)
Employment Status			
Employed	20 (31.7%)	19 (30.6%)	39 (31.2%)
Unemployed	29 (46.0%)	22 (35.5%)	51 (40.8%)
Self-employed	5 (7.9%)	8 (12.9%)	13 (10.4%)
Retired	7 (11.1%)	6 (9.7%)	13 (10.4%)
Looking for work	2 (3.2%)	7 (11.3%)	9 (7.2%)

6.3. DESCRIPTIVE SUMMARY: PATIENTS' RESPONSES ACROSS STUDY STAGES

Descriptive statistics are presented for all items and questions patients responded to in the questionnaire, broken down by program stage and patient group. Frequencies, percentages,

mean and standard deviation where applicable are used to summarize responses. The instruments used in this study comprised four questionnaires: Asthma Control Test (ACT), Asthma Self-management (ASMQ), Asthma Knowledge (AKQ) and Patient Activation Measurement (PAM), individually analysed and presented. Mean plots were created to compare mean scores of each patient group across program stages.

6.3.1. Patients experience of controlling their asthma

Patients experience of controlling their asthma was tested using the Asthma Control Test. This included five questions that were measured on 5-point Likert scale. Frequencies, percentages, means and standard deviations were calculated for each patient group across program stages and reported in Table 6-2.

Across all patients in the study, the asthma control mean score was 15.9, with a standard deviation of 3.846, ranging from 8 to 25. This indicates that, on average, patients in the pre-test stage had uncontrolled asthma. The three top items rated by patients were: “During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?” (Mean = 3.59, SD = 1.14); “How would you rate your asthma control during the past 4 weeks? (Mean = 3.56, SD = 1.07); and “During the past 4 weeks, how often have you had shortness of breath?” (Mean = 3.52, SD = 1.10). The least rated item was “In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?” (Mean = 3.06, SD = 1.23). Patients’ responses on the individual items are presented in the Table 6-2

Table 6.6 Frequency and independency of asthma control

Description	N	Min	Max	Mean	SD
1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?	125	1	5	3.06	1.269
2. During the past 4 weeks, how often have you had shortness of breath?	125	1	5	3.52	1.102
3.During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?	125	1	5	3.59	1.135
4.During the past 4 weeks, how often have you used a rescue inhaler or nebulizer (such as albuterol)?	125	1	5	3.49	1.259

5.How would you rate your asthma control during the past 4 weeks?	125	1	5	3.56	1.086

There was no improvement regarding asthma control in the control group responses over the program stages (Table 6-3). There was however an obvious positive change in the intervention group responses across program stages as mean scores increased over time. This change is statistically tested later in the chapter analysis. Table 6-3 below shows the asthma control test (ACT) score descriptive summary.

Table 6.7 Asthma Control Test (ACT) Score Descriptive Summary

Program Stage	**Patient Group**	**Responses Scale**					**Statistics**	
		1	**2**	**3**	**4**	**5**		
1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much done a t work, school or at home?								
		All of the time	**Most of the time**	**Some of the time**	**A little of the time**	**None of the time**	**Mean**	**SD**
Pre-test	Control	16 (25.4)	7 (11.1)	16 (25.4)	17 (27.0)	7 (11.1)	2.87	1.362
	Intervention	16 (25.8)	18 (29.0)	11 (17.7)	13 (21.0)	4 (6.5)	2.53	1.264
Post-test I	Control	12 (19.0)	12 (19.0)	14 (22.2)	16 (25.4)	9 (14.3)	2.97	1.344
	Intervention	17 (27.0)	18 (29.0)	19 (30.6)	15 (24.2)	10 (16.1)	3.27	1.058
Post-test II	Intervention	1 (1.6)	6 (9.7)	20 (32.3)	20 (32.3)	15 (24.2)	3.68	1.004
2. During the past 4 weeks, how often have you had shortness of breath?								
		More than once a day	**Once a day**	**3 to 6 times a week**	**Once or twice a week**	**Not at all**	**Mean**	**SD**
Pre-test	Control	4 (6.3)	6 (9.5)	17 (27.0)	28 (44.4)	8 (12.7)	3.48	1.045
	Intervention	9 (14.5)	7 (11.3)	20 (32.3)	22 (35.5)	4 (6.5)	3.08	1.149
Post-test I	Control	5 (7.9)	6 (9.5)	25 (39.7)	20 (31.7)	7 (11.1)	3.29	1.054
	Intervention	1 (1.6)	9 (14.5)	10 (16.1)	29 (46.8)	13 (21.0)	3.71	1.014
Post-test II	Intervention	1 (1.6)	4 (6.5)	11 (17.7)	20 (32.3)	26 (41.9)	4.06	1.006
3. During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, and chest tightness or pain) wake you up at night or earlier than usual in the morning?								
		4 or more nights a week	**2 or 3 nights a week**	**Once a week**	**Once or twice**	**Not at all**	**Mean**	**SD**
Pre-test	Control	5 (7.9)	10 (15.9)	16 (25.4)	17 (27.0)	15 (23.8)	3.43	1.241
	Intervention	3 (4.9)	13 (21.3)	16 (26.2)	21 (34.4)	8 (13.1)	3.30	1.101
Post-test I	Control	3 (4.8)	16 (25.4)	14 (22.2)	16 (25.4)	14 (22.2)	3.35	1.220
	Intervention	2 (3.2)	5 (8.1)	18 (29.0)	23 (37.1)	14 (22.6)	3.68	1.021
Post-test II	Intervention	-	1 (1.6)	13 (21.0)	21 (33.9)	27 (43.5)	4.19	0.827
4. During the past 4 weeks, how often have you rescue inhaler or nebulizer (such as albuterol)?								
		3 or more times per	**1 or 2 times per**	**2 or 3 times per week**	**Once a week or**	**Not at all**	**Mean**	**SD**

Program Stage	Patient Group	Responses Scale					Statistics	
		1	2	3	4	5		
		day	day		less			
Pre-test	Control	4 (6.3)	17 (27.0)	20 (31.7)	6 (9.5)	16 (25.4)	3.21	1.272
	Intervention	7 (11.7)	7 (11.7)	17 (28.3)	15 (25.0)	14 (23.3)	3.37	1.288
Post-test I	Control	8 (12.7)	18 (28.6)	12 (19.0)	5 (7.9)	20 (31.7)	3.17	1.465
	Intervention	1 (1.6)	7 (11.3)	17 (27.4)	21 (33.9)	16 (25.8)	3.71	1.030
Post-test II	Intervention	2 (3.2)	2 (3.2)	12 (19.4)	23 (37.1)	23 (37.1)	4.02	1.000
5. How would you rate your asthma control during the past 4 weeks?								
		Not controlled at all	Poorly controlled	Somewhat controlled	Well controlled	Completely controlled	Mean	SD
Pre-test	Control	3 (4.8)	7 (11.1)	24 (38.1)	14 (22.2)	15 (23.8)	3.49	1.120
	Intervention	3 (4.8)	14 (22.6)	20 (32.3)	14 (22.6)	11 (17.7)	3.26	1.144
Post-test I	Control	4 (6.3)	15 (23.8)	24 (38.1)	11 (17.5)	9 (14.3)	3.10	1.118
	Intervention	-	4 (6.5)	20 (32.3)	27 (43.5)	11 (17.7)	3.73	.833
Post-test II	Intervention	-	1 (1.6)	11 (17.7)	22 (35.5)	28 (45.2)	4.24	.803

6.4. PATIENTS SELF-MANAGEMENT OF THEIR ASTHMA

Self-management knowledge was tested using the Asthma Self-management Questionnaire (ASMQ). The questionnaire included 16 questions on which patients were asked to choose the letter that corresponds to their answers. Patients' asthma self-management was measured by counting the number of correct responses made by patients to 16 questions. Patients in all stages of the study have shown a low level of knowledge on this scale before the intervention (Mean = 21.13, SD = 14.12), which increased in the post I intervention (Mean = 59.79, SD = 17.8). The table 6.4 below also shows changes and details on means of this scale over the three stages of study.

Table 6.8Changes on ASMQ over study stages

Program Stage	Mean	N	Std. Deviation
Pre-test (control)	181310	63	14.11686
Pre-test (Intervention)	21.387	62	13.2153
Post-test I (Control)	18.3712	63	12.82645
Post-test I (Intervention)	59.7917	62	17.80331
Post-test II Control)	18.221	63	15.1246
Post-test II (Intervention)	85.0000	62	12.29708
Total	40.2644	125	30.21593

Regarding the distribution of patients' scores on this scale it was clear from the skewness (0.536) and kurtosis (-0.955) that data on this scale does not follow a normal distribution (Figure 6.1).

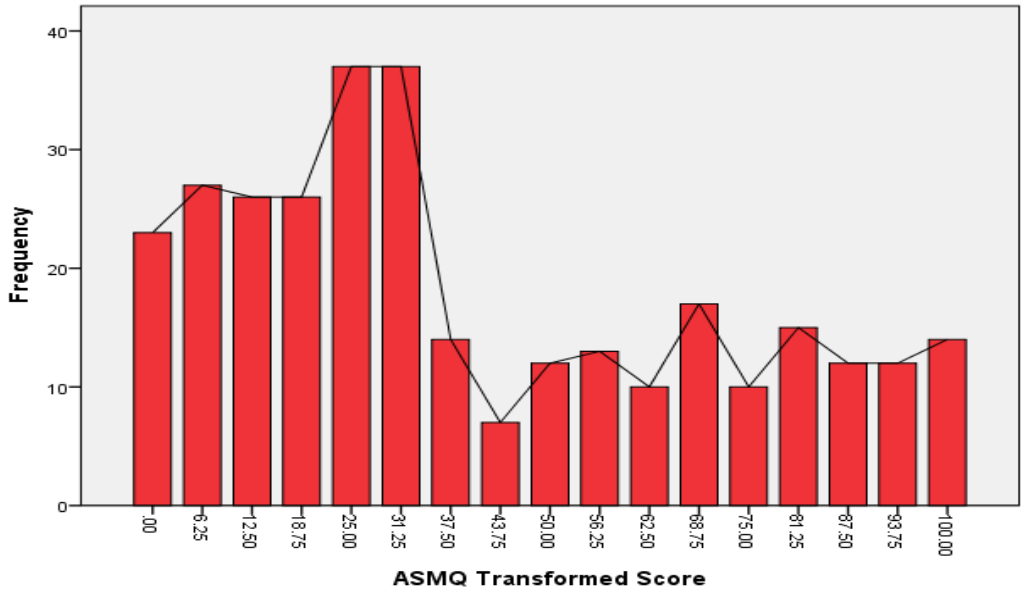

Figure 6.12 Frequency of responses in ASMQ

Frequencies and percentages of patients giving incorrect, correct and unknown responses are calculated in the control and intervention groups across program stages and reported in Tables 6.5 & 6-6. Bar charts with 95% Confidence Interval are created and plotted in Figure 6.1, where ASMQ raw score is plotted on the x-axis and percentages plotted on the y-axis. ASMQ raw score measures the number of correct responses obtained from patients recruited in the control and intervention groups across program stages. The reported figures reveal that the number of correct responses in the control groups ranged between 0 and 10 in either of the program stages. Similarly, number of correct responses by the intervention group patients in the pre-test stage ranged between 0 and 10. However, this range increased for the intervention group in post-test I stage from 3 to 16, while it increased in post-test II stage from 9 to 16.

The table 6.5 presented the summary of correct and incorrect responses based on three indications such as ✓= Correct Responses, ✘= Incorrect Responses, DK = I don't Know.

Table 6.9 ASMQ Summary of Correct and Incorrect Responses by Recruited Patients

	Pre-test						Post-test I						Post-test II		
	Control			Intervention			Control			Intervention			Intervention		
Question	**✘**	**✓**	**DK**	**✘**	**✓**	**DK**	**✘**	**✓**	**DK**	**✘**	**✓**	**DK**	**✘**	**✓**	**DK**
1. You know information about to prevent asthma flare-ups (i.e. medicine, emergency visit, don't know).	32 (50.8)	11 (17.5)	20 (31.7)	38 (61.3)	7 (11.3)	17 (27.4)	44 (69.8)	3 (4.8)	16 (25.4)	19 (30.6)	43 (69.4)	0 (0.0)	6 (9.7)	56 (90.3)	0 (0.0)
2. You took the prescribed two puffs using inhaler two times within a day.	42 (66.7)	7 (11.1)	14 (22.2)	44 (71.0)	10 (16.1)	8 (12.9)	37 (58.7)	8 (12.7)	18 (28.6)	37 (59.7)	24 (38.7)	1 (1.6)	24 (38.7)	38 (61.3)	0 (0.0)
3. if you not having asthma symptoms then do you avoid triggers or doses of medicine.	27 (42.9)	14 (22.2)	22 (34.9)	37 (59.7)	10 (16.1)	15 (24.2)	36 (57.1)	8 (12.7)	19 (30.2)	18 (29.0)	44 (71.0)	0 (0.0)	3 (4.8)	58 (93.5)	1 (1.6)
4. You know about the maintenance medicines.	39 (61.9)	10 (15.9)	14 (22.2)	32 (51.6)	13 (21.0)	17 (27.4)	38 (60.3)	12 (19.0)	13 (20.6)	33 (53.2)	29 (46.8)	0 (0.0)	11 (17.7)	51 (82.3)	0 (0.0)
5. You are aware about correct way to use a peak flow meter.	39 (61.9)	11 (17.5)	13 (20.6)	41 (66.1)	17 (27.4)	4 (6.5)	38 (60.3)	8 (12.7)	17 (27.0)	25 (40.3)	37 (59.7)	0 (0.0)	12 (19.4)	50 (80.6)	0 (0.0)
6. You are aware about rescue medicines.	17 (27.0)	21 (33.3)	25 (39.7)	29 (46.8)	21 (33.9)	12 (19.4)	21 (33.3)	22 (34.9)	20 (31.7)	22 (35.5)	40 (64.5)	0 (0.0)	9 (14.5)	53 (85.5)	0 (0.0)
7. You are aware about the correct way to use inhaler (i.e. inhale quickly, inhale slowly, or inhale several times)	31 (49.2)	21 (33.3)	11 (17.5)	40 (64.5)	15 (24.2)	7 (11.3)	34 (54.0)	18 (28.6)	11 (17.5)	11 (17.7)	51 (82.3)	0 (0.0)	1 (1.6)	60 (96.8)	1 (1.6)
8. You know the use inhaler such as quickly or slowly.	36 (57.1)	9 (14.3)	18 (28.6)	28 (45.2)	24 (38.7)	10 (16.1)	40 (63.5)	12 (19.0)	11 (17.5)	16 (25.8)	45 (72.6)	1 (1.6)	2 (3.2)	59 (95.2)	1 (1.6)
9. If you are having symptoms and don't know why the first thing you should do is	39 (61.9)	8 (12.7)	16 (25.4)	48 (77.4)	11 (17.7)	3 (4.8)	40 (63.5)	7 (11.1)	16 (25.4)	31 (50.0)	30 (48.4)	1 (1.6)	9 (14.5)	53 (85.5)	0 (0.0)
10. You are taking more rescue medicines than prescribed	29 (46.0)	6 (9.5)	28 (44.4)	36 (58.1)	16 (25.8)	10 (16.1)	36 (57.1)	3 (4.8)	24 (38.1)	36 (58.1)	26 (41.9)	0 (0.0)	28 (45.2)	32 (51.6)	2 (3.2)
11. You are aware about the benefits of	37	9	17	40	15	7	31	7	25	35	27	0	17	45	0

	Pre-test						Post-test I						Post-test II		
	Control			Intervention			Control			Intervention			Intervention		
Question	✘	✓	**DK**	✘	✓	**DK**	✘	✓	**DK**	✘	✓	**DK**	✘	✓	**DK**
using a peak flow meter with a day.	(58.7)	(14.3)	(27.0)	(64.5)	(24.2)	(11.3)	(49.2)	(11.1)	(39.7)	(56.5)	(43.5)	(0.0)	(27.4)	(72.6)	(0.0)
12. You have the proper knowledge about useful exercises.	30 (47.6)	18 (28.6)	15 (23.8)	42 (67.7)	15 (24.2)	5 (8.1)	29 (46.0)	18 (28.6)	16 (25.4)	26 (41.9)	36 (58.1)	0 (0.0)	17 (27.4)	45 (72.6)	0 (0.0)
13. You have information about how asthma can be cured by	43 (68.3)	3 (4.8)	17 (27.0)	45 (72.6)	8 (12.9)	9 (14.5)	45 (71.4)	7 (11.1)	11 (17.5)	39 (62.9)	22 (35.5)	1 (1.6)	8 (12.9)	53 (85.5)	1 (1.6)
14. You have information about Asthma flare – ups	29 (46.0)	18 (28.6)	16 (25.4)	41 (66.1)	15 (24.2)	6 (9.7)	36 (57.1)	15 (23.8)	12 (19.0)	17 (27.4)	44 (71.0)	1 (1.6)	5 (8.1)	57 (91.9)	0 (0.0)
15. You have been prescribed a seven – day course of steroid pills	27 (42.9)	18 (28.6)	18 (28.6)	39 (62.9)	13 (21.0)	10 (16.1)	26 (41.3)	14 (22.2)	23 (36.5)	22 (35.5)	40 (64.5)	0 (0.0)	7 (11.3)	55 (88.7)	0 (0.0)
16. You know about which food, drink, or stress management strategy can useful to control your asthma.	31 (49.2)	13 (20.6)	19 (30.2)	38 (61.3)	16 (25.8)	8 (12.9)	25 (39.7)	22 (34.9)	16 (25.4)	19 (30.6)	43 (69.4)	0 (0.0)	5 (8.1)	57 (91.9)	0 (0.0)

✓= Correct Responses, ✘= Incorrect Responses, DK = I don't Know

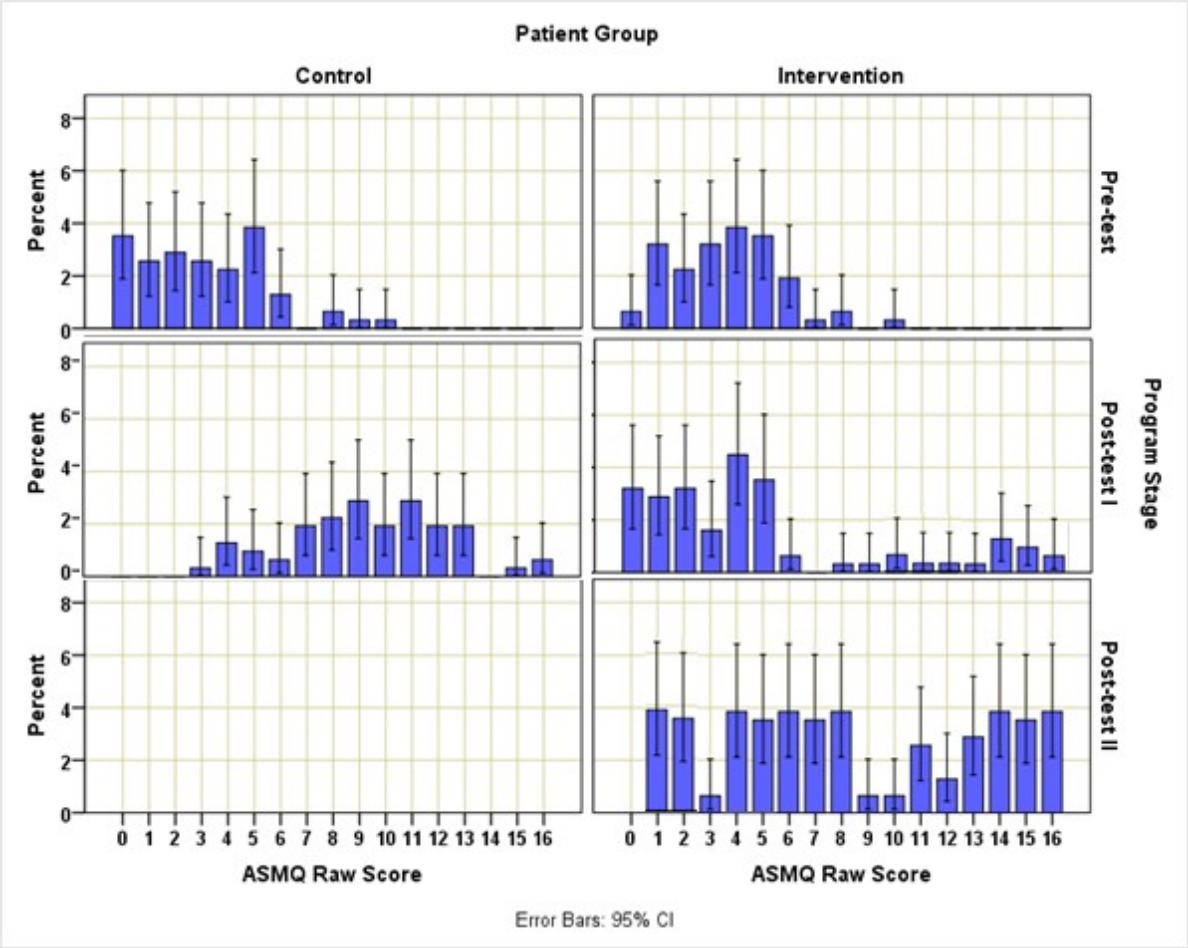

Figure 6.13 ASMQ Correct Responses to 16 Questions (Control and Intervention Groups)

6.5. PATIENTS KNOWLEDGE OF THEIR ASTHMA

Patients were assessed in terms of their knowledge about their asthma by answering 17 questions in the Asthma Knowledge Questionnaire (AKQ). Their responses were then assessed in terms of correctness. In Table 6.6, the number of incorrect, correct and unknown answers are reported in terms of frequencies and percentages for each patient group across program stages. The bar charts plotted in Figure 6.2 shows the number of correct responses by patients in the control and intervention groups across program stages. It can be seen that the number of correct responses in the control group across program stages is the almost the same. However, it is different in the intervention group. There were slight increases in post-test I, then significant increases in post-test II stages as shown in figure 6.2.

Table 6.10 AKQ Summary of Correct and Incorrect Responses by Recruited Patients

	Pre-test						Post-test I						Post-test II		
	Control			Intervention			Control			Intervention			Intervention		
Questions	✘	✓	**DK**	✘	✓	**DK**	✘	✓	**DK**	✘	✓	**DK**	✘	✓	**DK**
1. Is asthma an inflammatory disease of the airway?	5 (7.9)	49 (77.8)	9 (14.3)	9 (14.5)	45 (72.6)	8 (12.9)	6 (9.5)	53 (84.1)	4 (6.3)	4 (6.5)	58 (93.5)	0 (0.0)	2 (3.2)	60 (96.8)	0 (0.0)
2. Is asthma a contagious disease?	15 (23.8)	31 (49.2)	17 (27.0)	12 (19.4)	30 (48.4)	20 (32.3)	15 (23.8)	45 (71.4)	3 (4.8)	4 (6.5)	58 (93.5)	0 (0.0)	0 (0.0)	62 (100.0)	0 (0.0)
3. Is asthma a hereditary disease?	9 (14.3)	44 (69.8)	10 (15.9)	11 (17.7)	36 (58.1)	15 (24.2)	12 (19.0)	43 (68.3)	8 (12.7)	15 (24.2)	46 (74.2)	1 (1.6)	3 (4.8)	59 (95.2)	0 (0.0)
4. Does asthma inflammation cause constriction in the airways?	9 (14.3)	45 (71.4)	9 (14.3)	18 (29.0)	33 (53.2)	11 (17.7)	7 (11.3)	54 (87.1)	1 (1.6)	12 (19.4)	50 (80.6)	0 (0.0)	4 (6.5)	58 (93.5)	0 (0.0)
5. Are there symptoms such as coughing, wheezing dyspnoea, chest tightness in asthmatic patients?	16 (25.4)	39 (61.9)	8 (12.7)	13 (21.0)	38 (61.3)	11 (17.7)	12 (19.0)	50 (79.4)	1 (1.6)	10 (16.1)	52 (83.9)	0 (0.0)	1 (1.6)	61 (98.4)	0 (0.0)
6. Do aspirin, some rheumatism drugs, and some antihypertensive drugs cause asthma symptoms?	5 (7.9)	37 (58.7)	21 (33.3)	9 (14.5)	31 (50.0)	22 (35.5)	6 (9.5)	34 (54.0)	23 (36.5)	18 (29.0)	43 (69.4)	1 (1.6)	6 (9.7)	56 (90.3)	0 (0.0)
7. Is asthma a disease that cannot be treated which continues throughout one's life?	23 (36.5)	25 (39.7)	15 (23.8)	19 (30.6)	26 (41.9)	17 (27.4)	22 (34.9)	26 (41.3)	15 (23.8)	29 (46.8)	33 (53.2)	0 (0.0)	25 (40.3)	37 (59.7)	0 (0.0)
8. Should asthmatic patients use the prophylactic treatment regularly even if they feel well?	13 (20.6)	30 (47.6)	20 (31.7)	15 (24.2)	31 (50.0)	16 (25.8)	19 (30.2)	36 (57.1)	8 (12.7)	17 (27.4)	45 (72.6)	0 (0.0)	6 (9.7)	56 (90.3)	0 (0.0)
9. If an asthmatic patient does not use the treatment regularly, do asthma	17 (27.0)	35 (55.6)	11 (17.5)	16 (25.8)	34 (54.8)	12 (19.4)	15 (23.8)	43 (68.3)	5 (7.9)	23 (37.1)	38 (61.3)	1 (1.6)	15 (24.2)	46 (74.2)	1 (1.6)

	Pre-test						Post-test I						Post-test II		
	Control			Intervention			Control			Intervention			Intervention		
Questions	✘	✓	DK	✘	✓	DK	✘	✓	DK	✘	✓	DK	✘	✓	DK
attacks threaten life?															
10. Are inhaled medications the most effective delivery method for treatment of asthma?	15 (23.8)	36 (57.1)	12 (19.0)	16 (25.8)	36 (58.1)	10 (16.1)	14 (22.2)	34 (54.0)	15 (23.8)	26 (41.9)	36 (58.1)	0 (0.0)	10 (16.1)	52 (83.9)	0 (0.0)
11. Do inhaled drugs reach the airways directly?	11 (17.5)	37 (58.7)	15 (23.8)	21 (33.9)	24 (38.7)	17 (27.4)	12 (19.0)	38 (60.3)	13 (20.6)	17 (27.4)	45 (72.6)	0 (0.0)	10 (16.4)	51 (83.6)	0 (0.0)
12. Do the effects of inhaled drugs disappear quickly and enter the circulation system in every small amounts?	18 (28.6)	24 (38.1)	21 (33.3)	25 (40.3)	19 (30.6)	18 (29.0)	18 (28.6)	23 (36.5)	22 (34.9)	18 (29.0)	43 (69.4)	1 (1.6)	16 (26.2)	45 (73.8)	0 (0.0)
13. Are there any harmful side effects of inhaled medications?	22 (34.9)	14 (22.2)	27 (42.9)	19 (30.6)	19 (30.6)	24 (38.7)	22 (34.9)	18 (28.6)	23 (36.5)	31 (50.0)	30 (48.4)	1 (1.6)	15 (24.2)	47 (75.8)	0 (0.0)
14. Do inhaled medications cause addiction?	21 (33.9)	20 (32.3)	21 (33.9)	23 (37.1)	17 (27.4)	22 (35.5)	20 (32.3)	28 (45.2)	14 (22.6)	21 (33.9)	41 (66.1)	0 (0.0)	13 (21.0)	49 (79.0)	0 (0.0)
15. Can asthmatic patients do sports?	14 (22.2)	40 (63.5)	9 (14.3)	13 (21.3)	34 (55.7)	14 (23.0)	8 (12.7)	42 (66.7)	13 (20.6)	23 (37.1)	38 (61.3)	1 (1.6)	15 (24.2)	46 (74.2)	1 (1.6)
16. Can asthmatic patients become pregnant?	8 (12.7)	44 (69.8)	11 (17.5)	13 (21.0)	34 (54.8)	15 (24.2)	7 (11.1)	48 (76.2)	8 (12.7)	14 (22.6)	47 (75.8)	1 (1.6)	6 (9.7)	55 (88.7)	1 (1.6)
17. Could asthma be completely controlled with continuous and regular treatment and can the patient continue normal life?	10 (15.9)	35 (55.6)	18 (28.6)	12 (19.4)	33 (53.2)	17 (27.4)	13 (20.6)	41 (65.1)	9 (14.3)	15 (24.2)	47 (75.8)	0 (0.0)	8 (12.9)	53 (85.5)	1 (1.6)

✓= *Correct Responses,* ✘= *Incorrect Responses, DK = I don't Know*

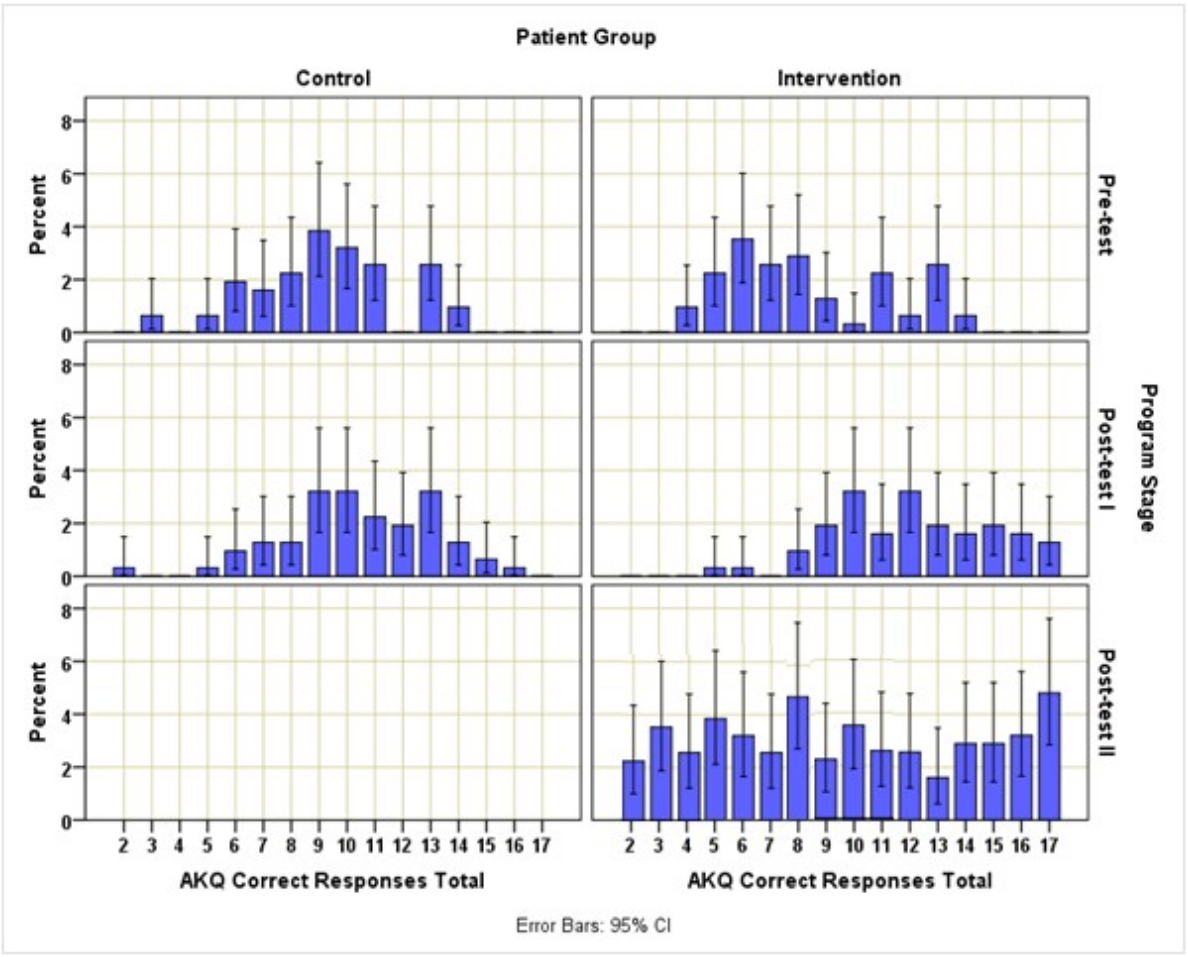

Figure 6.14 AKQ Correct Responses to 17 Questions (Control and Intervention Groups)

6.6. PATIENTS ACTIVATION IN RELATION TO CONTROLLING THEIR ASTHMA

Patient activation was measured by 10 questions that were answered on a 5-point Likert scale. This included zero for "Not Applicable", 1 for "Strongly Disagree", 2 for "Disagree", 3 for "Agree", and 4 for "Strongly Agree". In the analysis, the score "zero" is removed as it will make results misleading (Allen & Seaman, 2007). Means and standard deviations for individual items are calculated and reported in Table 6.7. The mean score values for the 10 questions and overall mean score reported in the table and plotted in Figure 6.4 reveal that mean scores of control groups' patients across program stages stay the same. Mean scores of the control group in the pre-test stage ranged between 2.55 and 3.02, and mean scores of control group in the post-test I stage from 2.65 to 2.97. In comparison the mean scores for the intervention group in the pre-test stage ranged between 2.22 and 3.03, in the post-test I stage between 2.95 and 3.29, while in the post-test II stage they ranged between 3.42 and 3.73.

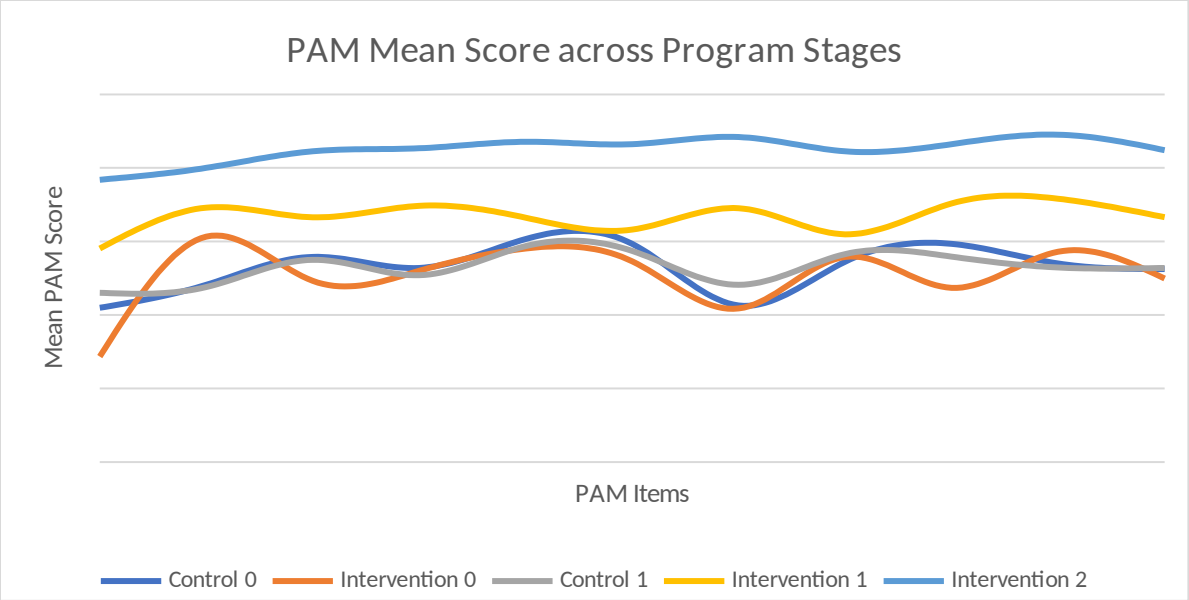

Figure 6.15 PAM Mean Scores (Control and Intervention Groups)

Table 6.11 Descriptive Summary PAM Questionnaire Items (Control and Intervention Groups)

Questions	Pre-test				Post-test I				Post-test II	
	Control		Intervention		Control		Intervention		Intervention	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1. When all is said and done, I am the person who is responsible for taking care of my health.	2.55	.953	2.22	1.166	2.65	.953	2.95	.756	3.42	.641
2. Taking an active role in my own health care is the most important thing that affects my health.	2.70	.782	3.03	.789	2.69	.681	3.23	.643	3.50	.565
3. I know what each of my prescribed medications do.	2.89	.588	2.73	.700	2.88	.662	3.16	.663	3.61	.523
4. I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.	2.82	.646	2.80	.840	2.77	.668	3.24	.619	3.63	.520
5. I am confident that I can tell a doctor concerns I have even when he or she does not ask.	3.02	.532	2.95	.798	2.97	.478	3.16	.632	3.68	.536
6. I am confident that I can follow through on medical treatments I may need to do at home.	2.98	.596	2.86	.840	2.94	.508	3.08	.731	3.66	.571
7. I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising.	2.56	.880	2.54	.867	2.70	.760	3.23	.556	3.71	.492
8. I know how to prevent problems with my health.	2.86	.712	2.89	.724	2.91	.601	3.05	.612	3.61	.583
9. I am confident I can figure out solutions when new problems arise with my health.	2.98	.833	2.68	.848	2.90	.742	3.26	.626	3.66	.571
10. I am confident that I can maintain lifestyle changes, like eating right and exercising, even during times of stress.	2.85	.899	2.93	.923	2.82	.820	3.29	.637	3.73	.548
PAM Total Mean	2.81	.303	2.75	.417	2.82	.338	3.16	.377	3.62	.419

6.7. COMPARING PATIENTS' RESPONSES BETWEEN GROUPS

This part of the study presents comparisons of patients results before and after the intervention has been delivered.

6.7.1. Pre-test stage: Control vs. intervention groups

Analysing study variables in the pre-test stage of the program, no significant difference was found between Control and Intervention groups of patients in terms of asthma control, self-management, knowledge, and patient activation. Two-independent t-test samples were performed to find significant differences between both groups. The test results are reported in Table 6.8 as well as descriptive statistics of study variables. It is easy to observe that the figures of scores in both groups seem similar. This confirms the findings of the t-tests where no significant differences were found between Control and Intervention groups in the pre-test stage.

Table 6.12 Descriptive Statistics of Study Variables across Groups in the Pre-test Stage

Study Variables	Patient Group	Mean	SD	Skew	Kurt	Min	Max	t Test
Patient's Control	Control	16.48	3.995	.790	.046	10.00	25.00	1.614 (.109)
	Intervention	15.37	3.650	.472	.412	8.00	25.00	
Self-management	Control	19.54	15.164	.596	.030	.00	62.50	-1.281 (.203)
	Intervention	22.78	13.007	.470	.313	.00	62.50	
Knowledge	Control	9.29	2.618	-.161	-.227	3.00	14.00	1.804 (.074)
	Intervention	8.39	2.944	.442	-1.058	4.00	14.00	
Patient Activation	Control	34.98	3.999	-.238	-.011	25.70	43.40	.698 (.487)
	Intervention	34.34	6.085	1.106	3.804	24.30	60.00	

6.7.2. Post-test I Stage: Control vs. Intervention Groups

Two-independent samples t-tests were performed on the four study variables to find whether there were significant differences between the control and intervention groups in the second stage of the program (post-test I). The tests revealed that there was a significant difference between the control and intervention groups in terms of asthma control, self-management, knowledge and patient activation (p-value < .05 as reported in Table 6.9).

The descriptive statistics for each group reported in Table 6.9 show that patients in the intervention group had significantly higher mean score values than patients in the control

group, which indicates the efficacy of the patients' self-management education program. That is, the asthma control test mean score has increased from M = 15.87 for the control group and to M = 18.10 for the intervention group. This can be viewed as an improvement from no control over asthma to partial control. Similarly, patients in the intervention group had significantly higher mean score of asthma self-management (ASMQ) than patients in the control group; M = 18.25 and M = 58.57, respectively. Table 6.9 shows the dissimilarity between the control and intervention groups score distributions. It can be seen obviously that the intervention group scores are significantly higher than scores in the control group. That is, patients in the intervention group seem to have more asthma self-management than patients in the control group.

Patients' knowledge about asthma was measured by the number of correct responses to 17 questions. The mean number of correct responses by patients in the intervention group (M = 12.10) was significantly higher than the mean number of correct responses by patients in the control group (M = 10.41) (see table 5-10), indicating that patients in the intervention group seem more knowledgeable about asthma than patients in the control group. Calculated PAM score was used to measure patient activation and summarized in table 6.10. The t-test revealed that the mean PAM score for patients in the intervention group (M = 40.50) was significantly higher than that for patients in the control group (M = 35.09). Table 6.10 shows that patients in the intervention group had higher PAM score values than patients in the control group. This can be confirmed by the minimum and maximum score values indicated in Table 5-10 for both groups of patients. That is, patients in the control group had PAM scores ranging from 24.30 to 45.20, while patients in the intervention group had PAM scores ranging from 29.70 to 60.00.

Table 6.13 Descriptive Statistics of Study Variables across Groups in the Post-test I Stage

Study Variables	Patient Group	Mean	SD	Skew	Kurt	Min	Max	t Test
Control	Control	15.87	4.682	.480	-.460	7.00	25.00	-2.997 (.003)
	Intervention	18.10	3.524	-.087	-.595	10.00	25.00	
Self-management	Control	18.25	13.105	.379	-.124	.00	56.25	-13.900 (.000)
	Intervention	58.57	18.775	-.067	-.310	18.75	100.00	
Knowledge	Control	10.41	2.722	-.417	.325	2.00	16.00	-3.386 (.001)
	Intervention	12.10	2.838	-.084	-.510	5.00	17.00	
Patient Activation	Control	35.09	4.495	-.226	-.144	24.30	45.20	-5.338 (.000)
	Intervention	40.50	6.609	1.005	.987	29.70	60.00	

6.7.3. Study variables change within intervention group across program stages

A one-way ANOVA was performed to test whether there is a significant change over time in the intervention group in terms of their asthma control, self-management, knowledge and patient activation. The test revealed a significant change across program stages, p-values for the four study variables were below $\alpha = .05$, reported in Table 6-10. Post hoc multiple comparisons analysis revealed that mean scores of all study variables in the post-test I stage were significantly higher than mean scores in the pre-test stage. Moreover, mean scores in the post-test II stage were significantly higher than mean scores in the pre-test and post-test I stages.

Table 6.14 Change within Intervention Group across Program Stages

Study Variables	**Intervention Group Descriptive**						**ANOVA Statistics**	
	Pre-test		**Post-test I**		**Post-test II**			
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**F**	**p-value**
Control	15.37	3.650	18.10	3.524	20.19	3.478	28.750	< .510
Self-management	22.78	13.007	58.57	18.775	82.86	16.897	210.476	< .521
Knowledge	8.39	2.944	12.10	2.838	14.40	2.426	75.795	< .563
Patient Activation	2.75	.417	3.16	.377	3.62	.419	72.176	< .595

6.7.4. Age differences in intervention group across program stages

A two-way ANOVA was performed to compare mean differences between groups of ages and program stages. Results for the four study variables are reported in Table 6-11. For asthma control, there was a main significant effect of age group on ACT mean score in all program stages, $p < .05$. Multiple comparison tests of age groups revealed that patients of 18-25 years had significantly lower mean ACT score than patients of 26-35 and 36-50 years.

Table 6.15 ANOVA Results and Descriptive Statistics for ACT Score (Intervention Group by Age Group and Program Stage)

	Pre-test			Post-test I			Post-test II		
Age Group	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
18-25	13.06	3.010	17	16.24	3.545	17	18.53	4.185	17
26-35	15.86	3.241	22	18.50	3.349	22	20.36	3.140	22
36-50	17.00	3.430	18	19.61	2.873	18	21.50	2.915	18
51-65	15.20	5.070	5	17.20	4.266	5	20.40	2.608	5

Source	**SS**	**df**	**MS**	**F**
Program Stage	538.296	2	269.148	23.688*
Age Group	321.492	3	107.164	9.432*
Program Stage * Age Group	9.078	6	1.513	.133
Error	1976.995	174	11.362	

*Note: R^2 = .348, adj. R^2 = .307, * p < .05*

6.8. EMERGENCY VISIT PRE AND POST EDUCATION PROGRAM

Table 6.12 Pre and post ASMEP Emergency visit for intervention group

Outcomes	Pre education (n=62)	Post education (n=62)	p-value
Required number of emergency visit per 6 months	98	64	0.0006
Required hospitalization for patients	45	28	0.0055
Average number of emergency visit per month	0.88 ± 1.648	0.61 ± 1.401	0.601
Average number of admissions per month	0.34 ± 0.87	0.19 ± 0.70	0.512
Number of patient visit emergency more than 1 time	72	29	0.801

Table 6.12 provides details regarding emergency visits before and after ASMEP for the intervention group; as reduction in emergency visit is one of the major indicators of the effectiveness of education interventions for asthma patients. As shown in above table there

were 98 visits to emergency prior to education but during the post education program period of six months there was a significant decrease in emergency visits down to 64 with p=0.0006. Moreover, there is a decrease in required hospitalization for this group of patients from (pre test 45 to post test 28) with p value= 0.0055. The number of patients visiting the emergency department more than once also reduced, from 72 before education to 29 post education, with p value = 0.801. However, the analysis also revealed that the change in the average number of emergency visit per months, average number of admissions per month, and number of patients visiting emergency department more than once are not statistically significant because the p value is greater than five percent which is not acceptable.

6.8. COMPARING VARIABLES BETWEEN PATIENTS' DEMOGRAPHIC GROUPS

This part presents how patients' scores differed with their demographic characteristics. Prior to comparing variables, it was necessary to test data normality in order to choose the appropriate statistical test.

6.8.1. TESTING NORMALITY

Normality is one of the essential assumptions for drawing reliable inferences about the population of data under study (Pearson, et al., 2009). Normality assumptions can be tested in SPSS by the Shapiro-Wilk test and by also examining histograms. Normality exists when tests are not significant, p-value > .05. Examining the p-values in Table 6.11, it can be concluded that the distribution of the four study variables are not normal in the pre-test stage, p-value < .05. In the control post-test I stage, Control and Self-Management are not normally distributed (p-value < .05), while Knowledge and Activation seem to be normally distributed (p-value > .05). In the intervention post-test I stage, only Activation is found to have normal distribution, p > .05. Finally, in the intervention post-test II stage, none of the variables was found to have a normal distribution, p < .05. For instance, asthma control is highly positively skewed in the pre-test and control post-test I stages, sku = .679 and .543, respectively. Findings of testing normality indicate that there is a general deviation from normality in all distributions. This suggests that the researcher should use non-parametric statistical techniques in testing hypotheses and drawing inferences.

6.9. RESEARCH HYPOTHESIS TESTING

This section is going to answer the research questions. Each research question relates to a specific area of study.

Research Question 1: Is there a significant difference between demographic categories (sex, age, marital status, education, and employment status) in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages?

In order to answer this question, the following hypotheses should be statistically tested.

- *H1a: There is no significant difference between males and females in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*
- *H1b: There is no significant difference between age groups in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*
- *H1c: There is no significant difference between single and married patients in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*
- *H1d: There is no significant difference between education categories in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*
- *H1e: There is no significant difference between employment status categories in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.*

Research Question 2: Is there a significant difference between three stages of program: pre-test, post-test I, and post-test II in terms of study variables: asthma Control, Self-Management, Knowledge, and Activation?

- *Hypothesis H2a: There is no significant difference between three stages of program: pre-test, post-test I, and post-test II in terms of study variables: asthma Control, Self-Management, Knowledge, and Activation.*

Research Question 3: Is there a significant difference between patient activation levels in terms of study variables across program stages?

- *Hypothesis H3a: There is no significant difference between patient activation levels in terms of study variables across program stages?*

6.9.1. Testing Hypothesis

Testing H1a: There is no significant difference between males and females in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.

The Mann-Whitney test was used to compare differences between males and females in terms of study variables across tests and program stages, to see if the results are affected by gender. The Mann-Whitney test statistic U and significance (p-value), with mean rank for male and female groups of patients. The tests revealed significant differences between males and females in Asthma Control scores in the control and intervention groups of the post-test I program stage (p-value < .05). In the control group post-test, I, females had higher mean rank than male (FMR = 37.14 v MMR = 26.79), indicating that females had better control over asthma than males. However, in the intervention group post-test I, males had higher mean rank than females (MMR = 35.66v FMR = 25.98), indicating that males had better control over asthma than females. One significant difference was found between males and females in terms of Patient Activation in the intervention post-test I, p-value = .043. That is, males had higher mean rank (MR = 35.36) than females (MR = 26.25), indicating that males were more activated than females.

Testing H1b: There is no significant difference between age groups in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.

This hypothesis is tested by running the Kruskal-Wallis test (Douglass *et al.,* 1992) to determine if there are statistically significant differences between the four age groups on each of the four study variables (whether the results are affected by age). Boxplots are used to graphically illustrate the distributions of the study variables in age groups across the program stages. A significant difference was found between age groups on Asthma Control at the pre-test stage (p-value < .001). Post-hoc multiple comparisons tests were used to find significantly different pairs of age groups at the pre-test stage. The findings of the post-hoc analysis revealed that young patients (18-25 years) had significantly lower mean ranks of Asthma Control (or poorer asthma control) than other patients in the pre-test stage (p < .0083), when using the Bonferroni correction of the p-value. A significant difference was

also found between age groups on Asthma Knowledge at the pre-test stage (p-value < .01). Post-hoc analysis revealed that young patients (18-25 years) had significantly lower mean rank (or lower knowledge) than patients aged 26-35 and 36-50 years (p < .0083). Again, using the Bonferroni correction for p-value this means that older patients have more asthma knowledge as compared with younger patients.

Testing H1c: There is no significant difference between single and married patients in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.

The Mann-Whitney test was used to compare differences between single and married patients (Bramon-Bosch *et al.,* 2000) on the four study variables at the program stages. A significant difference was found in asthma control and knowledge between single and married patients in the pre-test stage (p-value < .05). The mean rank of asthma control for married patients (MR = 60.12) was significantly higher than the mean rank for single patients (MR = 41.93), thereby indicating that married patients had better control over asthma than single patients in the pre-test stage. Similarly, married patients had higher mean rank (better) asthma knowledge (MR = 58.81) than single patients (MR = 44.51) in the pre-test stage. No other significant differences were found.

Testing H1d: There is no significant difference between education categories in terms of study variables (Control, Self-Management, and Knowledge) across program stages.

The Kruskal-Wallis test was used to test this hypothesis. The findings included the following significant differences:

- Asthma Control distribution was different between education categories in all program stages.
- Self-management distribution was different between education categories in the intervention post-test I and intervention post-test II.
- Asthma knowledge distribution was different between education categories in the pre-test, intervention post-test I and intervention post-test II.
- Patient Activation distribution was different between education categories in the pre-test, intervention post-test I and intervention post-test II.

- In the pre-test stage, patients with an undergraduate level of education had significantly higher control over asthma than patients with high-school or less and also postgraduate education. Patients with postgraduate level of education nevertheless had significantly more knowledge than other patients. Patients with undergraduate level of education had significantly higher activation levels than other patients.
- In the control post-test I stage, patients with undergraduate education had significantly better control over asthma than patients with high-school or less education.
- In the intervention post-test I, patients with undergraduate education had better control over asthma, better self-management and higher activation levels than others. Patients with undergraduate education had better knowledge than patients with high school or less

Testing H1e: There is no significant difference between employment status categories in terms of study variables (Control, Self-Management, Knowledge, and Activation) across program stages.

This hypothesis which determines whether employment status makes a difference, can be tested by running Kruskal-Wallis test (Beyer *et al.,* 2010). The tests revealed that for asthma control, self-management and patient activation there was no significant differences between employment status categories in any of the program stages. However, there was a significant difference between employment status categories in asthma knowledge at the intervention post-test I and II (p-value < .05). For these two differences, post-hoc multiple comparisons tests were performed to find significant differences between pairs of employment status categories. The post-hoc tests revealed that in both stages post-test I and II (intervention groups), employed patients had significantly higher mean rank (or were more knowledgeable) than self-employed patients (p-value < .005), using the Bonferroni correction of the p-value (Table 6-12).

Table 6.16 Summary of the quantitative results in context of effectiveness of ASMEP on the base of personal factors

Test	Self-management factors/variables		

Gender		Male higher	Female higher
Pretest	Control over asthma		✓
Post-test	Patient activation	✓	
Age group:		Young patients (higher)	Older patient (higher)
Pre-test	Asthma Control		✓
Post-test	Asthma Control		✓
Pretest	Asthma knowledge	✓	
Post	Asthma knowledge		✓
Marital status		Married (higher level)	Single (higher level)
Pre-test	Asthma Control	✓	
Post test		✓	
Pre-test	Patient activation	✓	
Post test		✓	
Pre-test	Asthma knowledge		✓
Post test		✓	
Education level		Undergraduate level (higher outcomes)	Postgraduate level of education (higher outcomes)
Pretest	Asthma control	✓	
Pretest	Asthma knowledge		✓
Post test			✓
Pretest	Self-management	✓	
Post test			✓
Employment status		Non employed/self employed	Employed
Pretest	Asthma control		
Post test			✓
Pretest	Asthma knowledge		
Post test			✓
Pretest	Self-Management		
Post test			✓

Research Question 2: *Is there a significant difference between three stages of program: pre-test, post-test I, and post-test II in terms of study variables: asthma Control, Self-Management, Knowledge, and Activation?*

Testing H2a: *There is no significant difference between three stages of program: pre-test, post-test I, and post-test II in terms of study variables: asthma Control, Self-Management, Knowledge, and Activation***.**

To answer this research question, this hypothesis should be tested: H_2: *There is no significant difference between program stages: pre-test, post-test I, and post-test II in terms of asthma control, asthma self-management, asthma knowledge, and patient activation*.

The Kruskal-Wallis test was used to test whether there are significant differences between program stages (pre and post intervention and at 6 months) on the study variables. Findings reveal that there are significant differences between program stages in terms of asthma control, asthma self-management, asthma knowledge and patient activation. As mentioned earlier, the Kruskal-Wallis test does not reveal which groups are significantly different. Therefore, post-hoc analysis is essential.

6.10. POST-HOC MULTIPLE COMPARISONS

The Mann-Whitney test was used to run post-hoc multiple comparisons between program stages on study variables. Test is significant at $\alpha = .0083$, using the Bonferroni correction for the p-value. The tests revealed that there was no significant difference between pre-test stage and post-test I (control) stage in terms of asthma control, self-management and patient activation, p-value > .05. Patients in post-test I (control) were significantly more knowledgeable than patients in the pre-test stage (p-value < .001). All findings are reported in Table 6.11. The results show that intervention had a significant effect on patients' attitudes and knowledge as mean ranks for the four study variables were higher in the intervention groups than in the pre-test or control groups.

Research Question 3: *Is there a significant difference between patient activation levels in terms of study variables across program stages?*

Testing H3a: There is no significant difference between patient activation levels in terms of study variables across program stages?

The results reported in Table 6.11 show the tests were significant between patient activation levels for the intervention groups of patients in the post-test I and II stages only (p-value < .05). Moreover, Table 6.12 summarizes the whole quantitative result with respect to the personal factors of patients. In the pre-test stage, no significant difference was found between patient activation levels. There was only one level of patient activation in the control group at the post-test I stage. Post-hoc analysis was performed for patient activation levels in the post-test I and II stages (intervention groups). Post-hoc multiple comparisons tests revealed that

patients categorized as patient activation level one had significantly lower control over asthma, lower self-management, and poorer knowledge about asthma than patients categorized as patient activation level two and three.

To conclude, the findings in this part shows that patients, prior to the intervention, were not able to control asthma. They also showed their low level of self-management of asthma as well as knowledge and skills that may enable them to control asthma, as most responders selected the options of "wrong" and "Don't know". Patients achieved much higher scores after the intervention at both points in time. This suggests that the education program was very effective in helping patients to acquire knowledge and skills necessary to control asthma.

There were some differences across demographic groups. Males showed lower scores on the Asthma Control questionnaire prior to the program, yet higher scores than females after the program. On the other hand, It was found that married patients were more knowledgeable and willing to control their asthma compared to those who are unmarried. However, there were no differences found in married and unmarried patients with respect to patient activation and self-management of asthma. This perhaps suggests males were more likely to benefit from the program than females. Patients' responses also differed with their age, with less knowledge and lower control of asthma among the younger population. The differences between gender and age groups may also been seen as to highlight that such interventions must be developed to suit all groups and perhaps even provided separately to meet their individual needs. Findings from part two of the study, qualitative patients' interviews, presented in the next chapter, will provide further evidence on these issues that can help to improve the future development of the program.

6.11. SUMMARY OF THE CHAPTER

To conclude, patients in the study demonstrated higher level of knowledge and skills to manage their asthma after the education program. Patients in the control group showed no improvement on asthma control, asthma knowledge, asthma self-management and patient activation questionnaires over the stages of the study. However, the level of those in the intervention group improved sharply after the intervention and over the stages of the study (stage I and stage II).

Patients' scores differed according their demographic characteristics—i.e. gender, age, marital status, education and employment. For example, female patients in the pre-test stage had better control over asthma than males, however males showed better control than females after the intervention. Asthma control decreased with age, as younger patients had worse control over asthma than older patients. Regarding marital status, married patients had more knowledge and better control over asthma than single patients. Further, patients' scores on all scales also differed between education level groups over all stages with those with undergraduate education achieving the highest scores. Furthermore, although employment was not a factor that may influence patients scores before the intervention, it was clear that scores on the knowledge questionnaire differed significantly with reference to employment status. There are significant differences between program stages in terms of asthma control, asthma self-management, asthma knowledge and patient activation. To understand these differences, it is important to explore the patient's subjective experiences of the education program and how it could be improved to meet their needs. This is the focus of the next chapter.

Table 6.17 Summary of the key findings of the study

Asthma control

- Asthma was uncontrolled in the pre-test stage for both groups and improved in stage I and II after the program for the intervention group
- Asthma control differed with demographic variables. For example, males had better control than females.

Asthma self-management

- Patients in the intervention group who did not display knowledge on asthma self-manage before the intervention showed clear improvement after the intervention and over all stages of the study.

Asthma knowledge

- Patients' scores on asthma knowledge were similar in both groups before the intervention, however those in the intervention group display increasing knowledge and skills after the program.

Activation

- Patients were better able to be involved in controlling asthma using knowledge and skills they received from the education program.

Emergency visits

- Patients who attended the education program significantly reduced their emergency department visits and need for hospitalisation over a 6 month period.

CHAPTER 7: ASTHMA PATIENT PERCEPTIONS OF THE PROGRAM

7.1. INTRODUCTION

This chapter analyses and discusses the semi-structured interviews with participants. Interviews were recorded on audio devices and transcribed, to enable the researcher to repeatedly listen to and read conversations, to build up keywords, themes and sub-themes, as well as to connect ideas and understand precise meanings. Research codes were applied to interview transcripts to ensure participant anonymity and confidentiality. The master list of codes and names known only to the researcher was stored on an encrypted file and password-protected computer. Thematic analysis was used to interrogate the interview transcripts and generate themes that informed the findings (Clarke, & Braun, 2018).

The aim of the study was to determine the effectiveness, challenges and enablers which foster the uptake and impact of the Asthma educational program on KSA asthma patients and their ability to self-management their condition. This chapter presents the findings from the asthma program participants who agreed to discuss and share their experiences in an interview. Patients were invited to take part in an interview to share their perceptions and feedback from the asthma educational program. All people (n=62) exposed to the intervention and who completed a questionnaire were invited to an interview and could agree by returning a reply slip. The plan was to use a stratified sampling method to purposely select people to interview spanning different demographic groups (such as age, gender, level of education, marital status and employment), in order to gather different perceptions. From the 62 people only 15 returned the reply slips agreeing to interview. These people were contacted by the researcher

and a reminder sent for some, but only eight people agreed to be interviewed (Table 7.1). Fortunately, the sample did span different demographic groups, with five male and four female, three self-employed, three employed and two looking for work or unemployed. This was more a fortunate coincidence than as a result of using the planned sampling method, however. The majority of patients were married, which is not unexpected in the Saudi culture. Half of them were only educated to undergraduate level.

Table 7.18 Demographic features of participants

Res Code.	Sex	Age Group	Marital status	Education	Employment status
A.	Male	24	Unmarried	High school	Unemployed
B.	Male	36	Unmarried	Undergraduate	Looking for work
C.	Male	39	Married	Graduate	Employed
D.	Female	41	Married	Postgraduate	Self-employed
E.	Female	43	Married	Undergraduate	Employed
F.	Male	45	Married	Undergraduate	Employed
G.	Female	47	Married	Undergraduate	Self-employed
H.	Male	52	Married	High school	Self-employed

7.1 THEMES IDENTIFICATION PROCESS

Themes for analysis were identified by drawing on the knowledge gained from the literature, the researcher's observations, alongside exploring conceptual and theoretical notions to interrogate the data (Braun & Clarke, 2006; Javadi & Zarea, 2016). Thematic analysis is a common method performed to identify common meanings, patterns, codes, ideas and keywords (Braun & Clarke, 2006). The present study followed a thematic analysis approach, with the researcher identifying key terms and sub-themes based on the commonly repeated words used by respondents during their interviews (Javadi & Zarea, 2016; Ryan & Bernard, 2003). In addition, interview transcripts were read and re-read to understand the meaning of the words in context and pick-up additional themes exposed by individuals. An advantage of thematic analysis is that it is a flexible method, where researchers can repeat the same process until satisfied that the process of data interrogation has been exhausted.

Thematic analysis reveals various key words and sub-themes for explanation during the interpretation of interviews (Rubin & Rubin, 2011). The responses from patients have been

gathered under subthemes and the transcription of similar or common patterns completed. Two Interviews were coded and checked by an independent researcher to agree the final framework and any discrepancies in the themes, to ensure the framework applied across all interviews was trustworthy and an accurate representation of the data. The author of this study has reported all the common pattern identified in the interviews data. Sometimes, interviews have shared similar data which are also reported. For example, many respondents have shared that they were unaware about the usefulness of ASMEP, so this study reported that most of interviewees/participants are agreed that they have limited information about asthma self-management program. In this chapter, patient perception means all those experiences which they have received before ASMEP and after the delivery of ASMEP. Patients are more likely to share their positive and negative experiences based on their perception that is developed based on received health service quality. Three core themes emerged with 12 codes or sub-themes; these formed the analytical framework. 56 keywords explain the themes and sub-themes.

Three core themes emerged from the data (Table 7-2). In this chapter, each theme is discussed alongside examples from the data:

1. Asthma program facilitators
2. Challenges of the asthma program
3. Asthma program effectiveness

Table 7.19 Core themes and sub-themes – Asthma patient perceptions of the program

Core Theme	Codes	Keywords
Theme 1. Asthma program facilitators *Definition* Positive facets that facilitate the self-management asthma program in Saudi Arabia	1a) Role of hospitals	Publish material, available facilities, hospital provide guidelines Use of digital database, awareness about ASMEP, support of the hospital
	1b) Role of professionals	Role of management, structured medical follow up, role of expert on the educational program, role of specialized nurses, role of specialized doctors
	1c) Materials and content	Quality of content, arranging information sessions, content delivery method, study content
Theme 2. Challenges of the asthma program *Definition:* Factors which affect the management and organisation of the program and negatively influence the effectiveness of the education	2a) Lack of experience of specialized staff	Lower level of professional commitment, few staff members, lower level of experience, one expert for each program, lack of skills, lack of confidence, lack of motivation, staff commitment
	2b) Time and place	Lower level of care, lack of time for each patient, accessibility, more travelling and expenses, more patients
	2c) Interactive communication	Lack of two-way communication, lack of effective communication with each patient, high number of participants
	2d) Patient motivation	Community perception, patient willingness, patient previous knowledge, patient perception, patient motivation
Theme 3. Asthma program effectiveness	3a) Knowledge and awareness	Medication, consistency in - optimal inhaler use, treatment decision, appropriate knowledge and awareness, experts counselling, consequences, increase resilience, increase knowledge, patient awareness, negative

Definition: Evaluation of self-management program to increase and enhance knowledge and awareness among asthma patients and improve asthma control.	3b) Action plan	Learning from other experiences, self-encouragement, patient self-efficacy, structured medial follow-up, medicine planning, patients follow up, committed to take medication, scheduled doctor or nurse visit, self-care behavior
	3c) Enhanced social learning	Social learning, social responsibility, increase health awareness, social resilience, social circle

7.2. THEME 1: ASTHMA PROGRAM FACILITATORS

This theme draws together positive facets that facilitate the self-management asthma program in Saudi Arabia. The asthma program facilitators are based on the patient's intention to participate in the program, confidence, motivation, study material, as well as professional counselling and support of local hospitals. In Saudi Arabia it is mandatory for asthma health professionals such as radiologists, respiratory therapists, specialized nurses, pharmacists and allergists to refer and promote educational programs to their patients, in an attempt to reduce the level of emergency visits and enhance their information regarding health, diet, proper treatment, exercise and negative consequences of asthma. The interviews and its elaboration have been synthesised to show how the professionals, material and hospitals are playing a positive part in handling and managing asthma.

- 1a) Role of hospitals
- 1b) Role of professionals
- 1c) Materials and content

7.2.1. Role of hospitals

The role of hospitals is important because they have direct contact with asthma patients. This provides an opportunity to refer patients to attend an asthma educational program for the purpose of increasing their level of education as well as developing self-management skills and understanding ways to better control asthma themselves. The supportive behaviour of the hospital management was crucial to the success of the education program and uptake by asthma patients. Hospitals were actively involved in sharing educational and study material. This includes guidelines to control asthma promptly, as well as promoting attendance at the asthma program, seen as being essential for the patient's well-being.

"*I am suffering from chronic respiratory disease (asthma) from many years despite being in the health profession. Being in this profession means that I have all type of resources to deal with this disease like hospital and experts support. Moreover, I have a complete plan which makes me feel blessed. My doctor suggested I attend an educational workshop on this disease, and I acted upon his recommendation by completing the registration process. Published material was distributed by hospital management in*

which they highlighted the complete guideline to deal with various symptoms of asthma." (Pt C)

Hospital management cooperated with ASMEP to develop an educational workshop offering facilities like multimedia, sitting arrangements and other things useful to the organizers of the program and patients. The IT department of hospitals had a digital database of their asthma patients. The program organizers sent information direct to asthma patients using this database.

"According to my perspective the role of doctor and the hospital management is very important in bringing the patients in these types of programs and its success depends upon their support, without their coordination approaching maximum number of patients is very difficult." (Pt B)

"*My personal doctor who works in local hospital has several times provided me published material which contained complete guidelines about the consequences, symptoms and action plans to handle Asthma." (Pt C)*

Patients shared that their personal doctor made it clear that they must attend the educational workshops in order to receive more information about their disease. This motivated them to visit and take part in the program. It also reinforced that they must follow a well-organized and well-structured medical action plan as their asthma was at its worst stage at that point. With the patient's permission, their doctor referred them to experts who told them about the role of ASMEP in conducting asthma educational programs and how the ASMEP and hospitals were creating awareness among asthma patients by working together. Published material advertising the program was distributed by doctors at the behest of their hospital and the ASMEP. The published material has complete details regarding the asthma symptoms, consequences, medications plan, diet plan and other required information which increased the level of patient's knowledge about asthma.

"*My doctor informed me about the program and motivated me to attend the program by pointing out the benefits of the program and gave me an invitation of the program. The program was very informative as the expert told us about the various symptoms, causes and consequences of asthma as well as its treatment." (Pt G)*

"*The role of ASMEP and the local hospital is very important in identifying the presence of patients, their number as well as motivational support for patients and their coordination is very important and effective." (Pt B)*

The asthma patients agreed that the published material provided by the hospital was very informative and precise. Information about their disease—like its symptoms, possible treatments and consequences—enabled them respond to an emergency even when they didn't get an appointment with their doctors. Despite information about the program being administered in clinics, by the hospital and doctors, most patients highlighted that they were otherwise unaware of the benefits or availability of the ASMEP educational program.

To increase awareness staff involved in the educational program made a phone call to many of the patients informing them about the location, presence and timings of the program and described how ASMEP and hospital management were working together to organize the educational sessions. Patients noted they had received calls from the organizers of the asthma program, in which they told them about information sessions and invited them to attend, in addition to them to share this information in their respective social circles. The majority of participants appreciated the role that health professionals and hospital management played because they tried to ensure that the maximum number of asthma patients should attend asthma education program because it can decrease the level of work overload as well as asthma patients visit to the emergency department.

"*A female staff member of the asthma educational management program contacted me and asked me about my personal information to complete the registration process and later on another person called to invite me to the program. She informed me about the scheduled time and dates. I put an appearance in that self-management program and was highly satisfied with the quality of information delivered. The experts informed me about the venues of their future sessions and how I can influence the people of my social circle to attend these educational sessions" (Pt A)*

The patients were motivated to notify others regarding the benefits of the educational sessions and how the community can benefit from the information. Respondents also shared that this program enabled them to develop skills in order to minimize the severity level of their asthma. Participants shared how they invited other asthma patients from

their social circle because it can create awareness and support at community level against the asthma.

7.2.2. Role of professionals

Patients highlighted the constructive part played by hospital management, specialized doctors, experts of the informational sessions and the hospital nurses in motivating, facilitating, informing and helping them in order to attend the self-management program.

"*During my periodic visits to the urban area hospital, the doctor told me about the educational program being arranged by mutual coordination of ASMEP and hospital management once in every two months." (Pt F)*

Patients shared that their personal doctors and specialist nurses advised them to attend these educational programs regularly if they want to manage and control their asthma effectively. They also informed them about the possible benefits of their presence in these programs.

"*My prior information about the educational program was very limited, but while I was attending a specialized nurse for my routine check-up and medical follow-up she told me how hospital management and ASMEP are working together and making efforts to create awareness among the masses by conducting two-day educational sessions as well as creating awareness about self-management of asthma."(Pt B)*

There was a negative perception towards the program within the community, due to a lack of awareness and understanding. Fortunately, patients valued the advice from the medical professional over the community view and attended the program. Patients revealed that their health professionals informed them about the two-day education program on asthma and how it can benefit by reducing patients visit to hospital and help self-manage their asthma without any support. Patients agreed that health professionals played a motivational role in helping them to attend the ASMEP.

"*I took the counsel of my friends for this educational program but the perception of community about this program is not very positive and some people even haven't heard about these informational sessions. Nevertheless, when I asked my personal doctor about these programs, he strongly motivated me to attend this program. By the grace of God, I attended this program and would like to participate again. In my point of view, to create*

better perception about the program among the community members and patients the doctors and hospital management should play their part." (Pt G)

Patients were happy that ASMEP and hospital management were making joint efforts to create awareness among people about the program. The professional which presents the session discuss all the symptoms, treatment and consequences of asthma and their behaviour is friendly. The information they gathered from the program enabled them to create their own action plan against asthma. Moreover, they took on the role of educating others in their local community and social circle to promote the value of such educational programs.

"*It is our responsibility to aid the hospital management, nurses, ASMEP experts and staff of program by creating awareness among the local community." (Pt E)*

The data also revealed how the experts trained in the asthma educational program enhanced the consciousness among the patients by preparing an action plan capable of tackling chronic respiratory disease. It was found that health professionals agreed that they are socially, professionally, and morally responsible for sharing the information about ASMEP because it can save the resources of public hospitals as well as create the motivation and skills at individual level. Furthermore, hospital management played an important role to ensure the proper arrangements that can enhance the comfort for asthma patients during the educational workshop.

"*A radiologist has increased my knowledge about ASMEP and provided me published material to enhance the information, motivation and awareness about the informational sessions of this program. The specialized doctor also informed me how the hospital management cooperates with ASMEP by providing facilities like sitting arrangements, empty space and multimedia." (Pt A)*

7.2.3. Materials and content

The published material distributed by ASMEP contained reports and material so that the patients can make a follow-up plan to cope with the disease. The patients agreed that the published material was very supportive and helped them to create a personal action plan against the disease. They spoke briefly about the benefits of published material as it enhanced their knowledge, motivation level, confidence and awareness about the asthma program.

"*I am very pleased by the quality of content delivered by the expert and inspired by the way he used simple and plain examples in very easy words...The content shared in the session was very informative and rich as it enhanced my knowledge about the disease and influenced me to get aware of asthma and control it." (Pt A)*

"*I attended the educational program which increased my awareness about the disease and published material was also distributed during the sessions. Furthermore, my nurse too provided me study material written in our local language on the behalf of hospital so that I can prepare an action plan against the causes of Asthma." (Pt B)*

"*I participated in all the informational sessions of the program and I think that the published material distributed in the program is very helpful…the expert was very friendly and gave many useful examples during the presentation." (Pt G)*

The patients found the educational sessions very helpful as it enhanced their knowledge about the consequences of asthma, enabled them to create action plans, increased awareness level and motivated them to get complete medical follow-up as well as decrease the factors causing Asthma. Participants are agreed that they have obtained more awareness and knowledge about self-management of asthma from ASEMP. Participants have shared that how the presenter gave the examples which enhanced their awareness and knowledge about how they can manage asthma without any support.

However, there were recommendations from patients on how to improve the quality of the program. Negative feedback included the sessions being too long, along with the need to make the content, which for some was too descriptive, more interesting. Using more focused videos and different media to change the delivery of the information and make it more interesting would have been better, particularly when they were expected to sit for hours listening to one presenter.

"*...but I found the quality unsatisfactory and the length of content too long. To catch the attention of patients the presenter must add some video messages as well as make the published material more precise and shorter." (Pt G)*

"To enhance the focus and motivation level of patients and presenters there should be more than one expert presenter and they should add some video messages, image and audio clips and some other similar features to improve the quality of content delivered in the educational program." (Pt A)

"*The study material was too descriptive and the session too long, although attending the two-days informational session enhanced my knowledge about the asthma self-management program. I believe they should enhance the quality of the shared content by adding eye-catching visuals and audio clips." (Pt C)*

These ideas can be used to inform the education program roll out and development in the future.

7.3. THEME 2: CHALLENGES OF THE ASTHMA PROGRAM

Previous chapters highlighted many obstacles in the success of asthma education programs and the barriers that influence patient's uptake of a self-management program. This theme collates the key factors which directly affected the management and organisation of this program and negatively influenced patient uptake of the education. This included four key sub-themes:

- 2a) Lack of experience of specialized staff
- 2b) Time and place
- 2c) Interactive communication
- 2d) Patient motivation

7.3.1. Lack of experience of specialized staff

A prominent factor which negatively influenced the asthma educational programs was the lack of specialized staff, lower professional commitment level, lack of experience and motivation, in addition to only one professional handling the entire educational session.

"*I noticed that a single professional in each informational session cannot cope with all the patients that participate in the session and want to discuss their case with the expert to get some help. The communications between the presenter and patients is weak because there is very limited time to cover all the details about the program and other study material". (Pt B)*

There was a lack of specialized professionals which limited discussion of the asthma program during the sessions. The number of assistants available to offer advice was low, and those available lacked the knowledge and were often nervous when offering expert

advice. They often would not divert from the set program, which did not instil confidence in patients.

"*I found that the main causes of the negative influence of these programs is lower experience level, lack of expert commitment and poor performance level of staff. This is why the constructive handling of all the patients is a problem in this program." (Pt B)*

"The staff members lack knowledge about the disease; therefore, when I asked her a question related to my health, he advised me to ask the trainer, yet the trainer did not have enough time to answer all the queries of patients separately." (Pt G)

"*The expert is just confined to pass on the content and pays no heed to the stories and needs of all the participants. I noticed that the staff and expert are not full- motivated and their experience level is low, and these are the points which effect the success of this program. For increasing the knowledge of participants, the expert must be communicative." (Pt C)*

The education session lacked interaction, the opportunity for people to share their experiences and talk to each other. Most of the participants agreed that a lack of professional experience and limited time created challenges as they could not discuss their difficulties at individual level. This reflected on the inexperience of the education trainer and their inability to divert from the program plan they had been taught to deliver. Sharing and peer support is known to be educational and therapeutic if managed well within an education program. People learn from others and this element of teaching would have improved the course but needs to be managed by experienced and specialised staff. They have suggested that presenter should have more time and experience so that he/she can help us to prepare the counter strategy as per their experiences about asthma.

"*By sharing experiences with each other we can learn more about our disease but unfortunately experts and staff members paid no heed to this and were more focused on just pouring out study content which ultimately led to low motivation level among some patients. The educational sessions should be frequent so that awareness against chronic disease can be spread effectively among the masses." (Pt G)*

Advice for course organisers was to employ more people with the experience to deliver and advise patients on real life asthma control, making the program more pertinent and answering patient queries so they receive the education and information they need.

"*ASMEP should train and hire more staff in order to make this program run effectively because the current staff cannot perform its work properly and manage all the patients with their questions about the disease." (Pt A)*

"*I believe that staff members should be properly motivated and trained so that they show commitment in sharing information and help the patients by enhancing awareness about the disease. The staff lack expertise and confidence because the program was recently launched by ASMEP and they hired inexperienced people." (Pt B)*

"*Opportunity to attend such programs is very limited and still the management of the hospital tell us that the staff of these educational sessions are not properly trained and specialized and they cannot conduct frequent programs in the rural areas of the country. The experts of the program cannot handle effectively all the patients which participate." (Pt I)*

In general patients complained that the total number of pharmacists, registered respiratory therapists, specialized nurses, radiologists and allergists available to advise them locally outside of the education program was very low. A lack of available appointments and inability to talk to an expert contributes to them getting into critical situations.

7.3.2. Time and place

Time to deliver the program and cover all aspects of asthma education was a challenge, with staff focusing only on the extensive study content and prolonged case studies. The number of people attending the course made it impractical to schedule time for interactive communication between the presenter and patients.

"*The number of patients which attend the sessions are increasing exponentially and the members of staff cannot handle all of them carefully. Moreover, there is very limited time to do all the case studies and discuss study content due to which interactive communication between presenter and patients is very difficult." (Pt B)*

Many patients were motivated by staff members of local hospitals to attend asthma self-management programs. However, at the beginning few patients showed a willingness to participate, as the program schedule was during working hours and the program venues were far away, creating problems for people to attend. The more people heard about how good the programs were the more effort people made to attend.

"*There is no educational program held by ASMEP and local hospital near my living area but I was facilitated by a friend who offered me pick and drop service to attend an educational session on self-management and am very glad that I attended that informational session as it enhanced my prior knowledge about the symptoms and causes of asthma and how asthma can prove fatal for one's life if ignored for a long time without a proper treatment." (Pt E)*

"*I think that these programs must be held in all the local hospitals to facilitate more people. Travelling to destination places situated faraway from our homes is one of the major drawbacks of this educational program as it cost me a lot of money and I have to spent a lot of time and energy." (Pt A)*

The venue of the program was located quite near my home, so I participated happily in the sessions." (Pt B)

The study revealed that several people suffered because the locations where these educational programs are based were far away from their home and travelling cost them much time and money. They argued that ASMEP should hold these programs in the local hospitals so that more patients can visit the program. Although for some people even travelling to the hospital was too expensive so an alternative local delivery method must be considered too.

"*My income is very low, and I cannot attend the hospital and these programs regularly. Moreover, there is deficiency of specialized staff and facilities in our area. I am enduring the agony of asthma from many years and it is not possible for me to frequently visit the doctor. Furthermore, every time I call them for an appointment the representative tells me about the patient rush in the hospital and appointments are offered for forthcoming months." (Pt J)*

"*Fortunately, I found that a two-days informational session is being arranged at my nearest public hospital. The program cost is less, and it had no effect on me as my*

financial position is strong and am willing to attend the program as it would enhance my knowledge, awareness and tolerance against the disease." (Pt B)

"Unfortunately, such programs are not frequent, and every person of the community is not aware of the benefits of this program." (Pt A)

The education programs need to be increased and delivered accessible rural locations to meet the needs of the high number of asthma patients. Local people need to be trained to deliver accessible low-cost programs. Alternatively, online education can also be considered as an option to overcome the issue of geography and where people live being a barrier.

7.3.3. Interactive communication

A lack of communication between the educators and patients on the program hindered the effectiveness of the learning.

"*I want to interact with the session expert about my asthma but as the number of patients attending the session is high and he had to complete the study content in a limited time, I couldn't get a chance to communicate properly and this problem is one of the major drawbacks of the program. I suggest that ASMEP should make a through plan to cope with this problem so that everyone has a chance to put his case in front of the professional." (Pt A)*

"*Our presenter cannot listen to our cases due to the shortage of time and it is difficult for him to handle all the patients which come to attend the session and want to narrate their stories to him for help. Experts are given a very short time to complete all the process like delivering the study content and case studies due to which there is lack of communication between the presenter and the patients. I believe that Interactive communication can increase the awareness, effectiveness and benefits of the self-management program." (Pt B)*

Patients described how the course content could be improved to schedule enhanced two-way communication between participants and the expert of the self-management program.

"*I think for two-way interaction the content delivered by the expert should be interactive and they should discuss different cases of asthma with varying intensity so that patients can judge their level of Asthma." (Pt D)*

"Interactive communication should be enhanced in order to make these sessions more fruitful as it can help the staff to get familiarise with a variety of disease types. Following such a design would increase their skill and confidence…I was lucky to find an opportunity to discuss my case with the expert and other patients during the sessions." (Pt A)

"I talked to other patients in the session and we discussed about diverse levels of asthma, it enhanced our knowledge as we learnt many things from each other's experience." (Pt C)

Time to discuss personal issues relevant to asthma management would have embedded the learning and made it more relevant to the individual.

"*The informational sessions in our rural area are very few and far between, Therefore, when they announced that ASMEP is conducting an educational program a lot of patients rushed in to join the session to get benefitted from the information. Unluckily, I and many other participants didn't get a chance to discuss our personal case with the expert and we couldn't complete our action plan to resist Asthma." (Pt D)*

More frequent sessions with pre-allotted time to talk about their own issues with asthma management would be much more effective.

7.3.4. Patient motivation

Patients were reluctant and sceptical over attending a self-management program. Before attending the informational session, the level of motivation and awareness among the patients about the symptoms, treatment and consequences of asthma was limited.

"Lack of motivation, skill and experience are prominent challenges that negatively influence the perception of this program among patients…I am glad that my doctor suggested to me to attend the program as it gave me a chance to discuss various symptoms of the disease with many patients and it enhanced my level of awareness and motivation as my knowledge about symptoms, treatment and consequences was very limited before attending the program." (Pt A)

Program educators need to build on the positive experience of patients who have accessed the program, maybe through testimonials or videos to capture patient experiences. This will influence patients who are reluctant to attend in the first instance and help to overcome this initial barrier to access the course.

"*It is true that this self-management program had increased my skill and knowledge about asthma, helped me in preparing a medical follow-up schedule, which teams are encouraging for me, suggested me various techniques to minimize the effects of this disease, building up healthy habits and encouraged me to keep a check on the causes of asthma. After witnessing the benefits of this program, I showed more interest in regular participation." (Pt B)*

Patients insisted that doctors and hospitals should play a positive role in increasing awareness about the program and building up positive approach among community members and patients. They should promote the program to patients so they will know what asthma is and motivate them to keep a check on the causes of asthma. Patients themselves were positively encouraging others to attend based on their own experience and the impact the course had had on their asthma management.

"*I suggested many people of my community to take part in such programs as they were not aware of the benefits. To increase awareness and create a best action plan against these chronic diseases the hospitals, doctors, patients, community and the health department should play their positive role." (Pt H)*

7.4. ASTHMA PROGRAM EFFECTIVENESS

The third theme draws out the perceptions of patients as to whether the self-management program on asthma was effective. The study revealed that social support, action plan, awareness and knowledge are the most prominent factors which enhance the effectiveness of these informational sessions. Continuous interaction with doctors, motivation, encouragement, commitment and attending the educational sessions can help the patients to overcome coughing, wheezing, chest tightness and shortness of breath. To enable the patients to overcome these symptoms and to increase their knowledge regarding asthma ASMEP and local hospitals should increase the number of such educational sessions available to people. Three key sub-themes emerged to support the effective

- 3a) Knowledge and awareness
- 3b) Better action plans
- 3c) Enhanced social learning

7.4.1. Knowledge and awareness

Patients described the benefits of the education program. In particular, it increased their knowledge and awareness of asthma management and enabled them to discuss issues and understand how to keep themselves healthy. The program increased their morale and helped them in understanding the appropriate treatment plans like deciding the optimal use of an inhaler for smooth breathing.

"*I am glad that my family doctor had suggested me this program as it had enhanced my knowledge about the causes, consequences and treatment of the asthma and it gave me an opportunity to interact with other patients and discuss how they try keep themselves healthy." (Pt A)*

"*The information I got from this program enabled me to handle frustration, pain, fatigue, shortness of breath, intense cough, wheezing and the exercise which can prove helpful in improving flexibility, strength and forbearance against pain and frustration. The information delivered during the sessions enhanced the awareness of the patients regarding severe consequences and optimal use of medication like inhaler, relaxation and rest methods as well as breathing techniques." (Pt D)*

"I want to indicate the things which I learnt from this program. I got more conscious of breathing techniques, relaxation and rest methods as well as the moderate level of medication. It increased my awareness about certain exercises which are fruitful in improving strength, flexibility and tolerance against pain and frustration during asthma. Now I am more committed to take my medicine regularly and frequently visit my doctor for a through medical examination." (Pt F)

The self-management program enabled the patients to create better action plans as their awareness level increased. The patient's knowledge enhanced about the types of exercise which can help them maintain healthy lives, improve flexing, and also endurance against pain and frustration during asthma. Patients mentioned that the information enhanced their awareness about breathing techniques, suitable levels of motivation, health experts support as well as rest and relaxation methods to manage frustration and depression.

"*I am very happy that I participated in this program as it increased my knowledge and I was able to make a medication follow-up for me and I regularized my use of inhaler as recommended by the doctor. My tolerance level against asthma enhanced as the program expert suggested to me many fruitful techniques to overcome the disease." (Pt A)*

The study revealed that the patients who attended these programs were more tolerant to high levels of asthma as they were better educated about the disease. Patients recognised this and recommended these educational programs to many of their social network friends so that the knowledge, support, awareness and encouragement about asthma can be enhanced to the wider community. Advocating the benefits of a program by patients themselves reinforces the positive impact the program had on them

"I am connected with a lot of people who are suffering from chronic respiratory disease and I informed them about the session and invited them to attend the program so that we can work out a joint better plan for our proper diet and exercise." (Pt B)

"I have suggested this kind of programs to my social circle so that the knowledge and study content can enhance their awareness and encourage them to get better treatment of asthma." (Pt D)

7.4.2. Better action plan

The education program also better equipped patients to develop a good strategy and action plan against the disease.

"*I am suffering from chronic respiratory disease (asthma) from many years despite being in the health profession. Being in this profession means that I have all type of resources to deal with this disease like hospital and experts support. Moreover, I have a complete action plan which makes me feel blessed…My confidence and motivation increased as I learnt many tricks to handle emergency situations, consequences and negative effects of asthma." (Pt C)*

The respondents said that this program informed them about severity of asthma and how important is it to work out an action plan.

"*Asthma self-management program enabled me to increase my knowledge about the various consequences of the disease and how important it is for me to prepare a*

thorough schedule for frequent medical follow-ups. Now I am fully dedicated for optimal use of an inhaler and I had prepared my action plan against the disease." (Pt B)

Even though program venues were far away still the patients recommended others to attend.

"I suggested my friends to attend this program so that they can also make a better action plan against asthma." (Pt A)

Frequently attending the educational programs and being in continuous touch with their personal doctors enabled the patients to detect the nature of their disease and the immediate treatments they require to cope with these symptoms. The patients who attended the program frequently were more encouraged and self-efficient and reduced their number of visits to public hospitals as they felt confident to self-manage their asthma.

"*Luckily, I participated in the informational session of education program and was able to create a thorough medical follow-up. Public hospitals are always filled up with patients and appointments were given for upcoming months, but this program enabled me to judge my condition without putting a financial strain over me. My tolerance and motivation against fighting asthma had uplifted due to the increase in knowledge about the disease." (Pt E)*

"*The program information enabled me to create a better medical follow-up against frustration, wheezing, fatigue, shortness of breath and chest pain. I learnt many fruitful techniques to handle Asthma and this program encouraged me work out a better action plan." (Pt A)*

7.4.3. Enhanced social learning

Doctors and medical experts are concerned about enhancing knowledge and creating awareness among the community and society to decrease the chances of people getting ill. The patients advocate their role in society to control their respiratory disease.

"*I believe that the role of doctors and hospital is very positive and important in social learning, bringing a greater number of patients and enhancing awareness of the society by suggesting the patients of asthma to attend this program. Certainly, by attending*

these programs we can create more tolerance against such chronic respiratory diseases." (Pt C)

"*Majority of people suffer in this disease because of sandstorms, allergies and increased use of junk food, less exercise and tough professional life. To spend a healthy life, it had become compulsory to get more knowledge about the disease, socially support these programs and interactively communicate with each other. ASMEP and hospital managements are playing their part to spread awareness and as a member of social society it our duty to play our constructive part in controlling these chronic respiratory diseases." (Pt A)*

The study revealed that the self-management program also helped to increase society learning regarding asthma and how this disease increases through allergies, sandstorms, less exercise and more use of dairy products and junk food in daily life.

The organizers invited patients to spread the news in their local community. The participants of the program were more motivated and had enhanced knowledge about the disease so they helped to increase awareness in the society by guiding their friends and family.

"*I suggested my friends to attend these sessions too, cause the professional told me that there are very few people who know about this program and its effectiveness in controlling asthma." (Pt F)*

I also recommended many members of my local society to visit these educational programs." (Pt A)

7.5. CONCLUSION

The patient feedback and experiences highlighted the role played by the professional and hospitals in sharing and creating informational resources to improve knowledge and awareness about self-management of asthma. The course materials about the causes of asthma, appropriate levels of medication, rest and relaxation methods, negative consequence of chronic respiratory diseases, treatment decisions, new treatments, breathing techniques and the exercises which can be helpful in managing frustration and depression during asthma, were considered valuable and useful to patients. Information was helpful in enhancing levels of knowledge and awareness about the negative

consequences and effects of asthma, along with what chronic respiratory diseases are. Moreover, it also motivated the patients to plan medical follow-ups and prepare better action plans against managing asthma. The study revealed that these informational resources enabled the patients to control a symptom.

There were recommendations for the planning and delivery of education sessions in the future. They need to be accessible to rural locations, delivered by experts who know how to answer questions and manage patient frustrations, and allow time for patients to ask questions and talk to each other. There is a wider role for such education courses in developing the social learning of society and the wider community to healthy eating and exercise as well as symptom control to avoid complications.

Key Findings:

- Hospital and personal doctors are instrumental in supporting an asthma education program and uptake of the program is increased if they promote it direct to a patient.
- The course content and materials were found to be very useful to patients prior to and when attending the program to provide appropriate information on how to manage their condition better.
- A more interactive program with peer support and sharing of experiences alongside videos and more interesting course media would enhance patient learning.
- Ensure the people delivering the education program are experienced in asthma management and have sufficient knowledge and confidence to answer patient questions.
- Time needs to be provided in the program to ensure action plans are developed. The value of an asthma action plan was evident, and patients felt more confident in managing their own condition as a result of having a plan in place.
- Local people need to be trained to deliver accessible low-cost programs, or maybe consider online education to overcome the issue of geography and where people live being a barrier.
- Interactive two-way communication will enable patients to voice their issues during the program and receive immediate information to meet their needs by the education expert. It is important to facilitate time for peer support and patient-to-patient discussion.

- Enhancing the profile and advantages of the programs to patients through patient testimonials and videos of patient experiences would encourage more people to attend courses in the first place.
- The ASMEP increases knowledge, awareness, motivation to self-manage the asthma and improved asthma control.
- The program facilitates an opportunity for the patient to develop an action plan against asthma and improve planning on what to do if the condition becomes worse, how to avoid situations which make the asthma worse, and the confidence to be able to reduce symptoms.
- The program effectiveness is spread by word of mouth by patients who have benefitted from the program which is influencing and increasing the social learning in the society regarding disease control and management.

The next chapter discusses both the key qualitative and quantitative findings alongside the current evidence base to expose the new knowledge that can be gleaned from this in-depth study

CHAPTER 8: DISCUSSION

8.1. AIMS AND OBJECTIVES

The aim of this study was to develop and test the impact of a patients' self-management education program in Saudi adults with asthma. The program was developed with health professionals in Jizan to ensure its relevance to the Saudi context and to also enable them to deliver the program in the future.

8.2. OBJECTIVES

The following objectives were addressed during the study:

- To develop a self-management education program (ASMEP) for adult asthma patients in KSA;
- To train nurses, respiratory therapists and other health professionals to deliver the asthma education program;
- To examine the impact of the health education resource on asthma control, patient self-management, asthma knowledge, compliance with medication and consequently reducing visits to emergency departments;
- To explore the concept of patient activation within the management of asthma in a Saudi Arabian context;
- To explore the barriers and facilitators to the implementation of the education program;

8.3. INTRODUCTION

This study engaged health professionals and patients to co-create an evidence based self-management intervention for the purpose of improving asthma knowledge and

awareness, along with patient activation control and self-management for adult asthma patients in Saudi Arabia. This study employed a mixed method approach, with both quantitative and qualitative elements, to analyse the effectiveness of the program and also explore patients' understanding about their asthma and the impact of the program. Data was collected from a control group of patients who were suffering from Asthma, as well as those who participated in the Asthma Self-Management Education program (ASMEP). Outcomes were measured using a range of standardised questionnaires translated into Arabic—Asthma Control Test (ACT), Asthma Self-management (ASMQ), Asthma Knowledge (AKQ) and Patient Activation Measurement (PAM). Improvements in scores in the intervention group in comparison to the control group were discovered. In the quantitative part of the study patients' knowledge and awareness were tested at three different stages—pre-program, post-program I (i.e. three months following training) and post-program II (i.e. six following months training). The findings revealed that patients had low levels of knowledge and asthma control prior to the program. It was also found that knowledge, self-management and activation significantly improved after the program for the intervention group. This suggests that the program had a positive impact on the patients. Several statistical tests were used to understand the influence of various demographic features (i.e. age, gender, employment, education, and marital status) on asthma control, self-management for asthma, knowledge and awareness, and patient activation. Findings revealed that age, gender, employment, education and marital status has a significant impact on asthma control, self-management for asthma, knowledge and awareness, and patient activation. The details of these impacts are thoroughly discussed below.

Using qualitative methods, the study further illustrates how the asthma self-management educational program is enhancing knowledge, awareness, motivation and planning among the patients in Saudi Arabia. The qualitative component also uncovered the role of hospitals, specialized doctors and staff in enhancing the awareness, participation and motivation of patients to attend the program.

According to Mohamed-Ali and Elmaati (2016) and Riehm *et al.* (2016), asthma education programs not only increase asthma knowledge (asthma medication, asthma risks, asthma symptoms, action plans) but also reduce patients' unscheduled visits to healthcare facilities. Eslami *et al.* (2017) have also highlighted various health and environmental challenges that healthcare facilities are facing in managing asthma.

However, few studies have been conducted in Saudi Arabia. This study concurs with these authors and has also identified a lack of educational programs (through the systematic review), insufficient healthcare facilities, large number of asthmatic patients and poor asthma knowledge and awareness as major issues in asthma self-management, particularly in the rural Arab area of Jizan, thus providing an evidence base for asthma self-management programs in Saudi Arabia. In the light of these findings, practical recommendations with the purpose of bringing more awareness and understanding to the stakeholders of health organizations in KSA have also been provided. Jizan is the second smallest portion/region of KSA which is located near the southern seacoast. It is a rural area which is located north side of Yemen and there is high tension between both boarders (Yemeni and KSA) (Yemni civil war, 2015). The continuous air strikes from KSA has increased the issues for Jizan as there is more smoke and air pollution due to Saudi military movement as well as consumption of oil and gas (Yemni civil war, 2015). Asthma patients in Jizan also face challenges due to the mountain location, making travel difficult for patients especially with limited or distant hospitals. According to local health professionals, the number of asthma patients is high in Jizan whilst the number of health professionals and asthma educational programs are low.

The primary objective of self-management educational programs is to enable the patients to effectively manage and control their health condition, particularly in the case of asthma by using various program elements. This study systematically reviewed the results of 24 studies on self-management educational programs and revealed that such programs significantly improved the asthma patient`s outcomes (Boulet *et al.*, 2015; Federman *et al*., 2015); increased self-efficacy (Chen *et al.,* 2010), positive self-management behavioural changes like inhaler use, medication adherence, regular exercise and follow-up visits and self-monitoring the triggers (Chen *et al.,* 2010; Poureslami *et al.,* 2012; Tousman *et al.,* 2007) and understanding and knowledge (Chen *et al.,* 2010; Poureslami *et al.,* 2012; Tousman *et al.,* 2007), in addition to reductions in both inappropriate usage of medications and unscheduled visits (Boulet *et al.,* 2015). It was also observed that such self-management programs facilitate in identifying hurdles to self-management and developing strategies that can improve understanding and health literacy (Federman *et al.,* 2015). However, no study on self-management examined all these elements, nor did any studies take place in the Saudi Arabian context, which highlights the unique contribution of this research. The individuals with asthma can better take care of themselves if they regularly visit their doctors and have attended

asthma self-management education programs. Patients should be able to resolve this issue for themselves and also have better self-encouragement in this regard. However, the individuals with asthma who have insufficient financial resources, narrow social network, less usage of advance technology to capture information (Jain *et al.,* 2019) and less accessibility to specialized staff and hospitals are not well-aware about negative consequences and side effects of asthma (Boyd *et al.,* 2012).

This study found that the developed asthma educational program was effective and ensured that maximum most asthma patients attend the program they have improvement in medical compliance, quality of life, less emergency visits and asthma knowledge. However, it is not enough to simply test the effectiveness of the ASMEP. Instead, this research is also seeking to explore and develop a practical asthma educational framework for Saudi Arabia. For this reason, this chapter discusses the qualitative and quantitative results together to propose a better asthma education program for Saudi Arabia. The overall structure of this chapter is based on the theoretical framework of this research which was developed in chapter 3. The recognition of the central role of the patient in better management of chronic diseases is important for facilitating the better quality of life and better health outcomes. As such, factors which influence the ability of the patient to deal with the challenges of diseases are being increasingly explored in research (Eslami *et al.* 2017). Self-efficacy is a key element in managing chronic diseases. Self-efficacy describes the confidence of the person to manage their chronic diseases on their own. It represents the positive view of someone about themselves in the sense that they can proactively manage their disease (Lorig, *et al.* 2001). Therefore, self-efficacy is taken as starting point of this chapter.

8.4. SELF-EFFICACY AND SOCIAL COGNITIVE THEORY

In populations with chronic illness, effective interaction amid patients and clinicians depends on the active involvement of patients in their own healthcare (Wagner *et al*., 2001). Expanding on the self-efficacy concept, it is viewed as the judgement of a patient towards their own capability to achieve a desired goal (Bandura, 1982). Furthermore, patient activation quite prominently reflects the involvement of a patient in their own healthcare. Basically, patient activation is a development process whereby progression is needed from an important belief of a patient's role to possess the knowledge and confidence that is needed to take action, change the behaviour and sustain the changes (Hibbard, Stockard, Mahoney and Tusler, 2004). It has been evident from previous

research that patient activation and self-efficacy in a disease management context are quite strong predictors of a range of psychological and clinical outcomes in patients who have chronic illness with various diagnosis (Bodenheimer *et al.*, 2002; Han, Lee, Lee & Park, 2003). For example, for diabetes, the baseline self-efficacy and improvement with the passage of time were linked to the positive health impacts and increase of adherence to a healthy lifestyle (Lorig, Ritter & Jacquez, 2005). There is also an association between high levels of self-motivation in diabetes care and maintained dietary changes in blood glucose testing (Shigaki *et al.,* 2010). Populations with cardiovascular conditions and higher activation have less frequent visits to primary healthcare providers (Donald *et al.,* 2010) and their adherence is greater towards the medical regiments and restrictive diets. In turn this also reduces the number of admissions in the hospital (Schnell-Hoehn, Naimak and Tate, 2009). Moreover, patients with firm confidence levels in themselves are capable of managing the symptoms of multiple sclerosis (Stepleman *et al.,* 2010), colostomy (Simmons, Smith, Bobb and Liles, 2007) and arthritis (Osborne, Wilson, Lorig and McColl, 2007).

Self-Cognitive theory (SCT) tends to explain what causes human behaviours, as well as how humans learn. Bandura (1986) differentiates SCT from other related theories on human behaviour in the sense that it emphasizes physical and environmental factors as major contributors to developing human behaviour, acquiring knowledge and learning. By including self-beliefs during its evolution, social-cognitive theory further explains how humans learn and interact during learning processes. Additionally, it identifies major causes contributing to human behaviour along with explaining how adults learn. According to Bandura (1986; 1997), high self-efficacy results in improved performance and better outcomes in any behaviour, given activity or task (Zhang *et al.,* 2015). Alteration in perception of individuals about self-efficacy leads them to modify their behaviours (Zhang *et al.,* 2015). Moreover, the relevant literature reveals that only a few studies have incorporated self-efficacy concepts into patients' education on asthma self-management (Huang *et al.,* 2009; Alotaibi, 2015; Damon & Tardif, 2015).

Patient learning, from a behaviourist perspective, is a process in which information transmits to learner from teacher. Such learning could be highly effective if patients have appropriate information to better manage their health-related problems. Therefore, it is important for patients to acquire and learn supportive information for their different behavioural responses towards asthmatic attacks and different behaviour toward

ASMEP. To what extent the patients are confident that they can self-care and deal with asthmatic attacks properly at home is called self-efficacy (Lorig 2003). As self-efficacy is a crucial part of SCT that has been extensively targeted by different behavioural programs. High self-efficacy results in reducing asthmatic attacks, increasing adherence to medication by patients and improving physical activities (Holley *et al.,* 2017). A major concern of self-efficacy is individuals' level of confidence and their ability to alter the events that influence their lives. Self-efficacy is viewed as a key belief that can drive reflective motivation towards asthma self-management (Bandura 2010). This means that self-efficacy is related to patient motivation and self-management, which is the major focus of this research to develop a motivation rich ASMEP for Saudi Arabi to activate the patient toward long term asthma self-management. As self-efficacy is regarded as a component of social cognitive theory and was targeted widely by behavioural programs, enhanced self-efficacy has been related with improvements in minimizing the asthmatic attacks, enhanced level of physical activity and medication adherence (Holley *et al.,* 2017). Self-efficacy is associated with the beliefs of people in their ability and confidence for changing events which influence their lives. It is also regarded as a core belief which derives reflective motivation for self-management of asthma (Bandura 2010). Therefore, the development of the ASMEP in this research focussed on a range of personal factors relevant to Saudi Arabia that would be helpful to develop the best framework asthma self-management programs in the future.

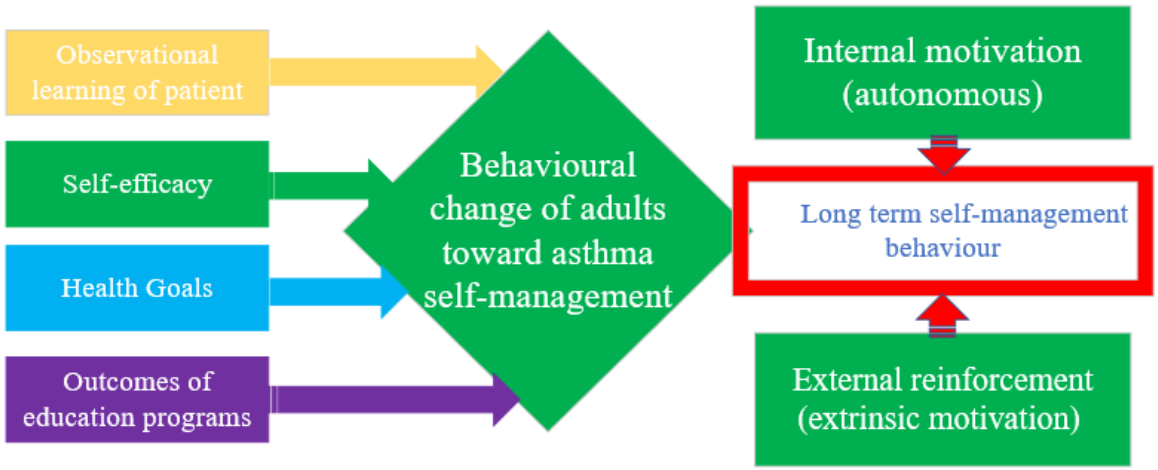

Figure 8.16 Role of self-efficacy to change long term patient behaviour toward asthma self-managed (developed on the base of Mullins, Abdulhalim, & Lavallee, 2012 Dinwiddie, Gaskin, Chan, Norrington, & McCleary, 2013; Bandura, 1997).

According to the above figure 8.1, self-efficacy plays a vital role in the behaviour change of adults in relation to their individual asthma self-management behaviour. Increased self-efficacy would further lead towards long term behaviour change but there are some internal and external motivation factor those needed to be considered to improve the long term self-management behaviour (Mullins *et al.,* 2012). As shown in figure 8.1 above internal motivation comes through the quality of the education program which provides intrinsic motivation to the patient that comes from the program itself while extrinsic motivation related to the external rewards and punishment attachment with the program (Mullins *et al.,* 2012). It was found difficult to recruit patients; therefore, some intrinsic and extrinsic reward have been offered to encourage them. Moreover, they were reluctant to become involved in the decision-making process, if they realize that they have insufficient experience and knowledge to do this. It is also reported that physicians in many cases might have insufficient time, motivation, resources, perception about need and skills to provide asthma education, specifically in basic care settings (Riehm *et al.,* 2016). During the development of ASMEP, it was found that staff had limited skills in asthma education, hence the need to train those delivering the program. Furthermore, the qualitative study results revealed that the staff delivering the program had limited knowledge despite the training prior to delivery. There are many studies which suggest that the effectiveness of the chronic diseases patient educational program outcomes is based on patient activation (Lee *et al.,* 2014; Lee *et al.,* 2015; Tülüce & Kutlutürkan, 2018; Daniali *et al.,* 2017). Therefore, there is a need to understand how patient activation can be increased through developing an effective educational program.

Self-efficacy represents a one person-related element, that has an effect on how people act and change their behaviour. It is therefore crucial to strengthen self-efficacy in people who have chronic diseases and are in need of changing their lifestyle. Self-efficacy represents the beliefs of a person about how capable they are in performing behaviours which are essential for bringing about a desired result (Bandura, 1997). Morbidity and mortality of chronic-disease epidemic, in addition to chief adverse economic, social, and health results, require high quality clinical care as well as effective self-management (Eslami *et al.* 2017). This skill formulates the potential of changing the lifestyle and is also helpful in monitoring the long-term illness (Fan & Lv, 2016). Efficient self-management needs the capacity of monitoring the illness so that behavioural, cognitive and emotional strategies can be developed and employed for maintaining a satisfactory quality (Riehm *et al.,* 2016). According to the social cognitive

theory of Bandura (1997), there are three major factors included. Namely, environmental factors, personal factors and behavioural factors. In addition, it also highlighted by Lubetkin *et al.* (2010) that important links exist between higher education level and patient activation (Lubetkin *et al.,* 2010), as well as in regard to younger age and private insurance (Hibbard and Cunningham, 2008). This type of relationship is outlined in studies containing healthy populations where income is higher, education is higher and self-rated general health is also higher in terms of patient activation (Hibbard & Cunningham, 2008; Lubetkin *et al.,* 2010). Private insurance possession and younger age also positively correlate with higher activation levels in the general population (Hibbard & Cunningham, 2008).

This study found that personal factors did affect the effectiveness of ASMEP because patients' scores differed according their demographic characteristics—gender, age, marital status, education and employment. For example, it was found that female patients in the pre-test stage had better control over asthma than males do but males showed better control than females after the intervention. Asthma control decreased with age, with younger patients having better control over asthma than older patients. Regarding marital status, married patients had more knowledge and better control over asthma than single patients. Further, patients' scores on all scales also differed between education level groups over all stages. Those with undergraduate education generally achieved higher scores. Furthermore, although employment was not a factor that seemed to influence patients scores before the intervention, it was clear that scores on the knowledge questionnaire differed with employment status. Overall, quantitative results of personal factors related to the personal factors are presented in table 8.1 below.

Table 8.20 Personal factors impact on patient self-management behaviour

Test	**Self-management factors/variables**	**Personal characteristic on the base of self-cognitive theory (self-efficacy)**	
Gender		Male higher	Female higher
Pretest	Control over asthma		✓
Post-test	Patient activation	✓	
Age group:		Young patients (higher)	Older patient (higher)
Pre-test	Asthma Control		✓
Post-test	Asthma Control		✓
Pretest	Asthma knowledge	✓	

Post	Asthma knowledge		✓
Marital status		Married (higher level)	Sigle (higher level)
Pre-test	Asthma Control	✓	
Post test		✓	
Pre-test	Patient activation	✓	
Post test		✓	
Pre-test	Asthma knowledge		✓
Post test		✓	
Education level		Undergraduate level (higher outcomes)	Postgraduate level of education (higher outcomes)
Pretest	Asthma control	✓	
Post test			
Pretest	Asthma knowledge		✓
Post test			✓
Pretest	Self-management	✓	
Post test			✓
Employment status		Non employed/self employed	Employed
Pretest	Asthma control		
Post test			✓
Pretest	Asthma knowledge		
Post test			✓
Pretest	Self-Management		
Post test			✓

The findings show that males showed good intent and motivation to control asthma at post-program I. On the other hand, females obtained higher scores and were more active in controlling their asthma at post-program II stage in the intervention group. The study results reveal that there are no differences found in married and unmarried patients with respect to patient activation for asthma self-control. In post-program-I stage, patients who have undergraduate education had more effective asthma control, self-management and patient activation. On the other hand, patients who have high school certificate and post-graduate level degree had poor results with respect to controlling asthma, self-management and patient activation. This suggests that there is a need for earlier education, for example within educational institutions so that more people can access the relevant knowledge and thus enhance their level of motivation to overcome this disease. Overall results demonstrated that the program was effective for all areas (knowledge, awareness, control and activation) for the intervention group. The literature suggests

placing a central role on patients who are involved in acquiring the care is needed. Moreover, numerous studies have observed predictors of activation in patients who were chronically ill. Previously, studies were focused on determining the positive links amid patient activation in chronically ill patients and two major variable sets: Patient factors including specific demographic characteristics of patient and their emotional functioning as well. Factors such as higher emotional functioning (Mosen *et al.,* 2007), higher self-rating of general health (Hibbard & Cunningham, 2008; Lubetkin, Lu & Gold, 2010; Stepleman *et al.,* 2010), and lower status of depression (Skolasky, Mackenzie, Wegener & Riley, 2008; Stepleman *et al.,* 2010) are positively linked to patient activation, although emotional function wasn't examined in this study.

The interviews added further illustration to these results. For example, most respondents confirmed that their level of motivation, self-efficacy, previous knowledge, self-confidence is very limited about the symptoms, consequences, exercise, compliance with medication and treatment of Asthma. At the end of the educational program, they reported that this program is very effective because it increased the level of activation by helping them to prepare a complete action plan against this disease. Therefore, after attending this program, they are more motivated and showed higher level of intention about treatments, exercise, healthy diet, consistency in medication. A particularly interesting finding was that they want to support others in community. They have recommended that they must inform and motivate other patients in their social circles so that we can create a greater patient activation at community or country level.

8.5. ASTHMA CONTROL

Using quantitative study techniques, the study analysed whether asthma patients received any major improvements or positive experiences before and after the educational program. With the help of statistical techniques, this study has discussed the results by comparing control group and intervention group results. On the other hand, the mean scores of patients in the intervention group have increased over the over pre-test, post-test I and post-test II stages. In the context of demographic features, the study has used Mann-Whitney test to measure the differences between male and females with respect to asthma control. Findings show that males showed good intent to control asthma at post-program I. On the other hand, females have obtained higher scores and were more active in controlling their asthma at the post-program II stage. One reason could be that females

were more active and motivated to overcome their asthma because they have family responsibility. Further, the researcher has used Post-hoc multiple comparisons test to measure the differences among various age group ranges. The results reveal that the patients who fall in the age group of 18-25 performed poorly with respect to controlling the level of their asthma. On the other hand, those patients who fall in the older age groups (i.e. 26-35 years and 36-50 years) were more effective in controlling their level of asthma as compared to the young patients (i.e. 18-25 years). Further research is needed to find out why the younger patients are not very motivated in KSA and how the level of motivation, awareness and engagement of patients in asthma education program could be enhanced in the future.

Mann-Whitney tests were used to measure the difference between unmarried and married patients with respect to asthma control. It was found that married patients have greater intention to control their asthma as compared to those who are unmarried. Post-hoc multiple comparisons tests also measured differences in the context of education (high school, undergraduate level and post-graduate level). There were differences in relation to education levels and control across all study levels, with undergraduates having better control than all other categories in post-test 1. The study has performed Kruskal-Wallis and Post-hoc multiple comparisons tests to find the impact of employment status (i.e. employee in organization and self-employed) on asthma control over the various stages. There are no significant differences found with respect to various employment status and its impact on asthma control. Also, the study has used one-way ANOVA test with the purpose to check the asthma improvements of the patients of intervention group over the program stages. Results show that the means scores were higher at the post-program II as compared to the stages of pre-program and post-program I. Therefore, it can conclude that the intervention group members have more asthma control at the stage of post-program II.

Using qualitative methods, this study has uncovered the influence of educational program resources on asthma control and consequently reducing visits to emergency departments. As one of the participants mentioned that "*I am suffering from chronic respiratory disease (asthma) from many years despite being in the health profession. Being in this profession means that I have all type of resources to deal with this disease like hospital and experts support moreover, I have a complete action plan which make me feel lucky…My confidence and motivation increased as I learnt many tricks to handle*

emergency situations, consequences and negative effects of asthma." (Pt C). At the same time quantitative results also shows the reduction in emergency visits. As reduction in emergency visit is on the major indicator of the effectiveness of the education intervention for the asthma patient therefore, it was important to collect information from participants as to the frequency of their attendance at emergency departments, before and after the education program, 62 patients completed this information.

As shown in above table 6.12 that there were 98 visits of the patient emergency but during the post education program period of six there were significant decreased in the emergency visit up to 64 with p=0.0006. Moreover, there is decrease in required hospitalization for patient from (pre education 45 to post education 28) with p value= 0.0055 and number of patient visit emergency was more than 72 before education that was reduced to 29 with p value = 0.801. Therefore, it shows that the ASMEP has significant impact on the reduction of emergency visit. Initially, respondents have showed very low level of knowledge regarding how they can control their asthma without visiting to doctors or hospitals.

During interviews, patients have shared that they never know about these types of programs otherwise they would be more able to control their asthma instead of visiting and spending their resources (i.e. money, time, travelling, medication, tension) in hospitals. It has been found that the study content and asthma program has increased the awareness about what type of exercises are helpful to improve flexibility, strength and endurance which are very important elements to control the level of asthma. Based on this program, participants have learnt how they can control their asthma by using medications, different breathing techniques, along with rest and relaxation methods. They have also learnt about health professionals support, new treatments, as well as about managing depression and frustration. Findings reveal that the asthma program proved useful to help patients understand what asthma is actually is, which persons/teams are supportive to control asthma, prepare the schedule for asthma medication, high self-encouragement and motivation to reduce the causes of asthma, applying different suggested technique to minimize this disease, and continuously building the healthy habits. After this program, patients get awareness about severe consequence and appropriate level of medication such as optimal inhaler use, breathing techniques, rest and relaxation methods which proved helpful to control asthma.

Both qualitative and quantitative studies have showed that there is low level of knowledge about how patients can control asthma before attending the educational program. But after the end of this program, they significantly improved their knowledge about how they can manage and control asthma. Analysis of the different variables suggests that demographics need to be taken into account when addressing asthma control in the future. There is a need to find a way better way of targeting females, singles, those without an undergraduate degree and those under 25 as these groups benefited less from the intervention than other groups. Therefore, it is recommended to arrange some motivational sessions among schools, colleges, and universities so that unmarried, younger patients can enhance the level of their knowledge to control the level of asthma. Patients in the qualitative study recommended that the health ministry and education department must work in collaboration to control and manage these chronic diseases at every level. The study also found those who were employed by organisations are better able to control their Asthma. The qualitative study suggested that they are more knowledgeable, active and willing to take advice from their colleagues and communities. On the other hand, patients who have their own business performed poorly with respect to asthma control. Therefore, it is recommended to focus efforts on those individuals who are self-employed, with proper consideration given to their limited knowledge, time and intention to learn about health issues. Previous studies found that awareness about asthma management and asthma principles positively influences asthma control levels and lifestyle in both men and women (Alessi & Petry, 2014). A recent study has highlighted that the expectation is that implementing guidelines for treating asthma via a patient self-management education program lead to better asthma control and decrease patient utilization of the healthcare system (Hsu *et al*., 2018). On the other hand, previous studies have revealed that there is restricted education and communication in several respects—patients to doctor, patient to patient, patient to hospital, Ministry of Health (MOH) to Asthma patients. As a result, patients face severe asthma control issues (Moradi-Lakeh *et al.,* 2015; WHO, 2016; Hamdan *et al.,* 2019). Ali *et al. (*2019) revealed that group education and discussion have increased asthma control and post intervention test scores as well decreased the use of systemic corticosteroids.

8.6. IMPACT ON SELF-MANAGEMENT

The primary objective of a self-management educational program is to enable the patients to effectively manage and control their health condition. The present study employed the Asthma Self-management (ASMQ) questionnaire to obtain information related to asthma flare-ups, use of inhalers, use of medicines, awareness about symptoms and action plan, exercise, and any other help. The Kruskal-Wallis test analysis showed that there are significant differences among program stages in terms of asthma self-management. The number of correct responses is higher among patients in intervention group as compared to the control group. For example, respondents in the intervention group have showed high knowledge on self-management especially on post-program I and post program II stages. On the other hand, respondents in the control group showed very low scores, with it being found that there was no significant increase with respect to asthma self-management. The results highlighted that the patients in intervention group scored highly, thus indicating they can manage the level of their asthma effectively as compared to patients in the control group.

In the context of demographic features, the Mann-Whitney test suggested no significant differences between males and females, ages or marital status with respect to Asthma self-management. Self-employed individuals have limited knowledge about the Asthma self-management. Findings revealed that asthma self-management scores were different in different education categories for the intervention group at both post-tests. While patients who have high school certificate and post-graduate level degree showed very poor scores with respect to control asthma, self-management, and patient activation. For example, in post-program-I stage, patients who have undergraduate education performed more effectively with respect to self-management of asthma.

In a qualitative study, the main factors of asthma management education participants took on board included use of proper medication and treatment, exercises, optimal and comprehensive information, proper management as well as action plan and medical follow-ups on a regular base. As one participant mentioned:

"*The program information enabled me to create a better medical follow-up against frustration, wheezing, fatigue, shortness of breath and chest pain. I learnt many fruitful techniques to handle Asthma and this program encouraged me work out a better action plan." (Pt A).*

Those patients who attended ASMEP were able to create a proper self-management plan or action plan against asthma. Many respondents have shared that they are continuously interacting with nurses with the purpose of creating an asthma self-management plan without visiting doctors. Therefore, these respondents displayed greater levels of motivation to overcome shortness of breath, wheezing, coughing, and chest tightness. Some participants also said that the self-management education program increased the level of their skills so they can minimize the intensity level of their asthma, especially when they are facing severe situations.

8.7. ASTHMA KNOWLEDGE

The Asthma Knowledge Questionnaire provided information about the symptoms of the disease, type of treatment, type of medication and its effectiveness, negative effects of medication, type of effective sports, routine activities and its impact on this disease. The findings revealed that the patients scores remained the same for those in the control group but significantly increased at post program-I and post program-II for the intervention group. In the context of demographic features, it has been found that there is no difference in the male and female scores in the context of asthma knowledge over the all program stages. While it has found that asthma knowledge scores were different in terms of education categories over the program stages. Those patients who have an undergraduate level degree had better knowledge than patients with just high school qualifications. Overall, young patients (18 to 25 years) performed very poorly with respect to knowledge about asthma. Married patients are more willing to control asthma and also showed greater intention to get asthma knowledge during the various stages of this educational program. One of the possible causes is that married patients may have more responsibility with respect to managing their health for family reasons. On the other hand, single patients were found to be poorly motivated to control their asthma. They also displayed lower intention to get more knowledge about asthma.

Using semi-structured interviews, it was observed that initially most of patients have limited awareness and knowledge about asthma, but the educational program has brought significant changes and the knowledge of patients had improved at the end of this program. It was also found that there are more patients in rural areas who have lower level of facilties, expert support and knowledge about asthma self-management. Community and social support are not very active about chronic disease management.

Even though SINA is trying to develop awareness, the author of present study found that most patients did not have knowledge and awareness about the role and functions of SINA in the context of asthma control. It is important to find out the factors behind this and how KSA health departments can enhance asthma knowledge at individual, group, family, organizational, social and community level. There is a need to involve more and more people in asthma educational programs with the support of hospital staff, government and other stakeholders. It can create more social support, social awareness, social knowledge, social perception and social resilience for chronic diseases. Patients also suggested that they have limited use of technology and due to language barriers, it is hard for them to get more information as well as creating a social connection with more knowledgeable persons in KSA.

Young patients in particular were found to have low level of awareness and knowledge about the symptoms of disease, type of treatment, type of medication and its effectiveness, negative effects of medication, type of effective sports, routine activities and its impact on this disease. In interviews, many young patients have shared that the one of reasons is that there are very few programs related asthma management, especially in schools, colleges, universities and hospitals. Therefore, they are more likely to end up attending emergency departments because they have limited information regarding how they can handle a severe situation. It is imperative that educational programs must be increased, especially in those locations where there are a greater number of patients and there are very limited facilities (i.e. rural hospitals and health centers). The level of knowledge related to asthma self-management also needs to improve in these places.

8.8. PERSONAL FACTORS IN PATIENT ACTIVATION

Both qualitative and quantitative studies have revealed that males are not as active compared with females in the context of patient motivation, self-efficacy, confidence and level of confidence. Therefore, it is important to find out how health professionals, the government of KSA and SINA can take steps to enhance the level of male patients' engagement. It is the responsibility of KSA health department that they must search for different ways that can enhance the male patients' engagement and motivation to overcome this disease. The care and motivation from family members can create a difference in males. Furthermore, patients who have high school certificate and post-

graduate level degree showed very poor result with respect to controlling asthma, self-management and patient activation. Here there is a great need to conduct educational programs in educational institutions so that more people can get the knowledge and enhance their level of motivation to overcome this disease.

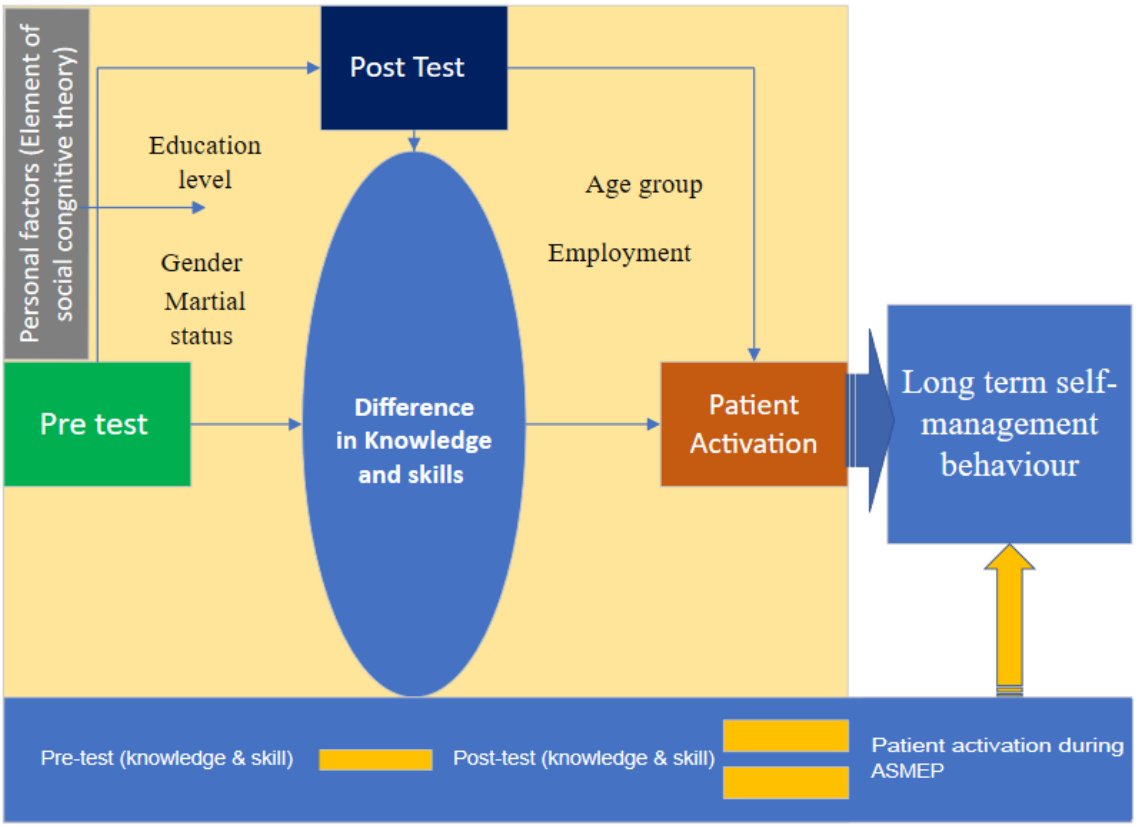

Figure 8.17 Personal factors (self-cognitive theory element) relation with patient activation

The table 8.2 presents a summary of the overall findings. There were a number of demographic differences. The outcomes of this study revealed that patient activation is higher among male patients at post-test stage whereas there was no improvement among female patients. Older patients have knowledge and skills at pre-test and post stages but skills in the young are not are not improved after ASEMP. Results reveal that patient activation and asthma knowledge were higher among married patientsand there was no improvement in patient activation among single patients between pre-test and post-test stages. Self-management was higher at pretest among undergraduate level students while asthma knowledge & skills improved among post graduate students after attending the ASMEP. It is found that asthma knowledge was not improved in undergraduate level students. Finally, asthma knowledge and self-management skills found more improved in those patients who are self-employed.

Getting stakeholders on board and co-creating the ASMEP program with the staff and patients of the hospital where the intervention took place took significant time during this PhD study. However, it is hoped that this overcame potential barriers to the program and contributed to the improved outcomes that were seen. Sometimes, patients hesitate to participate in educational programs even when such programs are available at minimal or no cost, mainly because of a lack of motivation or time, difficulty in assessing such facilities or simply because they perceive that such interventions are not important or necessary for them (Daniali *et al.,* 2017). It was also found difficult to recruit patients; therefore, some intrinsic and extrinsic reward have been offered to encourage them. Moreover, they were reluctant to become involved in the decision-making process, if they realize that they have insufficient experience and knowledge to do this. It is also reported that physicians in many cases might have insufficient time, motivation, resources, perception about need and skills to provide asthma education, specifically in basic care settings (Riehm *et al.,* 2016). During the development of ASMEP, it was found that staff had limited skills in asthma education, hence the need to train those delivering the program. Furthermore, the qualitative study results did reveal that the staff delivering the program had limited knowledge despite the training prior to delivery. There are many studies which suggest that the effectiveness of the chronic diseases patient educational program outcomes is based on patient activation (Lee *et al.,* 2014; Lee *et al.,* 2015; Tülüce & Kutlutürkan, 2018; Daniali *et al.,* 2017). Therefore, there is a need to understand how patient activation can be increased through developing an effective educational program.

Previous studies explored and investigated the PAM post education program and its impact on the long-term self-management behaviour of the patient. However, it is also important to identify patient activation during the ASMEP. Accordingly, the above figure 8.2 shows that personal factors impact on patient activation during the program. Additionally, it has synthesized that researcher tried to develop the understanding on the patient activation during the educational program which is the difference in pre-test knowledge and skills and post-test knowledge and skill is equal to the patient activation during the educational program. It has been identified that there is a difference in knowledge and skills of the patient on the basis of their personal factors like employment, education, gender and marital status. According to literature, patient activation differs with every patient's socioeconomic and demographic characteristics (Cunningham *et al.,* 2011; Hibbard *et al.,* 2008). Factors such as less attachment with

education, lower income individuals, racial and ethnic minorities, worse self-reported health and immigrants are less active in comparison with their counterparts (Hibbard *et al.,* 2007; Hibbard *et al.,* 2008). Such patient activation factors are categorized according to their disposition (demographic factors), enabling factors (income, health insurance, education, and other socio-economic factors) and need (health status). These are mentioned in the Andersen Behavioural Model (1968, 1995). However, the researcher also investigated that in case of the low patient activation we cannot blame the patient only as the researcher identified that there is a need to understand the local culture, personal factors of the patient, professional factors and other organizational factors in order to develop an effective educational program to improve patient activation during and after the program. These factors are further discussed in this chapter.

To accomplish the study objectives, asthma patients were targeted if they feel willing to attend educational sessions on controlling asthma and share their personal experiences of the program. Normality tests have been conducted and it has been found that the data is normal for conducting further statistical procedures. With the help of quantitative methods, the current study has conducted tests on the patient's extent towards knowledge and awareness by employing three stages. These are: pre-program, post-program I (after 3 months of training) and post-program II (after six months of training). Additionally, there were two groups of patients selected by the researcher (control group and intervention group). Numerous statistical tests were conducted in order to find out the impact of demographic features (gender, employment, age, marital status, and education) on asthma self-management, asthma control, awareness and knowledge, and patient activation. At first, the Mann-Whitney test was employed for measuring difference between genders. According to the findings, males were more focused on asthma control at post-program I. On the contrary, females scored much higher in asthma control at post-program II. Further, males were better at self-efficacy, self-determination, medical follow-up, self-motivation, self-confidence and planned dietary control. However, as far as self-management for asthma, awareness and knowledge is concerned, no difference was observed. Secondly, post-hoc multiple comparison tests were employed for measuring differences in age groups. Findings showed that patients ranging from 18-25 age group showed poor performance in asthma control. On the contrary, however, patients from (26-35 and 36-50) were quite effective as compared with the younger group.

Thirdly, the Mann-Whitney test was employed for measuring differences between marital status of patients. Married patients were found to be much more knowledgeable and showed a strong intention of controlling their asthma as compared with unmarried. Still, there are no differences as far as patient activation and asthma self-management is concerned. Fourthly, Post-hoc multiple comparisons tests were employed for measuring differences in educational context of patients including high school, undergraduate, and post-graduate. In pre-test stage, patients with undergraduate degrees were more effective in their asthma control as compared with patients who have high school certificate or postgraduate degree. Further, undergraduate patients were also very effective as a member of control group. Additionally, in post-program I, undergraduate patients were effective for asthma control, patient activation and self-management. Undergraduate patients were more knowledgeable as compared with high school patients. Fifthly, Kruskal-Wallis and Post-hoc multiple comparison tests were employed for measuring the impact of employment status (self-employed or employee in an organization) in terms of asthma control, knowledge and awareness, self-management and patient activation on numerous stages. In post-program I and II, findings showed that patients who are employed are quite effective and more knowledgeable from self-employed patients. Moreover, there were no differences found in the status of employment on remaining variables (patient activation and asthma control self-management). Further, a one-way ANOVA test was also employed for verifying improvements of intervention group as the program proceeds. Outcomes demonstrate the mean scores to be higher in post-program II in comparison with pre-program and post-program I. Thus, intervention group members are more controlled in terms of asthma control, knowledge and awareness and patient activation at the post-program II stage. As far as the age difference and its impact on intervention group is concerned, patient in the age groups ranging from 26–35 and 36-50 were quite effective in pre-program, post-program I and post-program II. These results are in line with previous research and theory that demographic and enabling factors lead to differences.

A few outcomes were quite interesting and important observations were made during quantitative analysis. Firstly, males' scores were low in the Asthma Control Questionnaire (ACQ) as compared to females in the pre-program stage. On the contrary, males performed extremely well on asthma control at post-program stage II. This suggests that males have extracted more benefits from this program and that they have been able to take interest in taking control of their asthma as compared with females.

Secondly, patients who are young (18 to 25 years old) performed extremely poorly for asthma control and did not display a high desire for this. In addition, males were more inclined towards self-efficacy, self-determination, self-motivation, medical follow-up and planned eating schedule.

However, there is no difference when it comes to asthma self-management, awareness and knowledge. Thus, it is suggested that training programs should be conducted for enhancing awareness, knowledge, self-efficacy and motivation to control asthma among KSA young patients. Thirdly, married patients were more interested in asthma control and showed strong intentions to acquire knowledge about asthma during various stages of this educational program. One of the reasons could be because of the huge responsibilities of married patients in terms of their health management and earning for a longer time period with purpose of taking care of their family as well. On the other hand, unmarried patients were quite poor in motivation to control their asthma and their intention for acquiring knowledge was also quite low. Thus, it is imperative that motivational sessions should be arranged among schools, colleges and universities for enhancing their knowledge level and motivation to overcome diseases that are chronic. Fourthly, patients having high school certificate and post graduate degree were extremely poor in asthma control, patient activation and self-management. According to the statistics, it was quite clear that there is no proper education or awareness among students from KSA universities.

Thus, the health ministry and education department must collaborate for controlling and managing chronic diseases right from the beginning. As far as long-term conditions of management are concerned, high activation scores are positively associated with the treatment and condition monitoring adherence, as well as getting regular care linked to one condition (Greene & Hibbard, 2012; Rogvi *et al.,* 2012; Schiøtz *et al.,* 2012; Druss *et al.,* 2010; Lorig *et al.,* 2010; Rask *et al.,* 2009; Remmers *et al.,* 2009; Becker & Roblin, 2008; Hibbard & Tusler, 2007; Mosen *et al.,* 2007; Ellins & Coulter, 2005; Hibbard *et al.,* 2005; Hibbard *et al.,* 2004). Where mostly, studies are related with controlling the severity of illness and sociodemographic factors, findings are deemed true for patients having different conditions and backgrounds, including ethnically diverse and disadvantaged groups with less access to healthcare (Ryvicker *et al.,* 2012; Gerber *et al.,* 2011; Kansagara *et al.,* 2011; Lubetkin *et al.,* 2010; Alegría *et al.,* 2009; Rask *et al.,* 2009; Hibbard *et al.,* 2008).

Patients who are employed by organizations are far better in asthma control, awareness, knowledge, patient activation and self-management. The reasons behind this could include more knowledgeability, activeness and getting advice from social communities and colleagues. Conversely, patients who are self-employed did not perform well on asthma control, knowledge and awareness, self-management and patient activation. Employed Patients who are highly activated are more likely to have clinical indicators in normal range which includes blood sugar levels (Alc), body mass index (BMI), cholesterol and blood pressure (Greene & Hibbard, 2012; Rogvi *et al.,* 2012; Terry *et al.,* 2011; Remmers *et al.,* 2009; Saft *et al.,* 2008; Skolasky *et al.,* 2008).

According to the findings of this study more focus should be given to self-employed patients because of their limited knowledge, intention and time to learn about issues that they face in terms of their health. It can be claimed that with the incorporation of this educational program, the patient's condition of health is significantly improved after stage I and stage II. Females did not obtain as much benefit from the program as males. As the researcher trained the nurses to the deliver the program, there would also be gender difference in getting trained or giving training. This could have been due to differences in training, as the training was segregated and males and females were trained by different staff members, though other factors could have come into play in relation to learning to because the researcher could not involve themselves in the female training because it was not allowed for men to freely participate in it.

Thus, it must be examined how females acquire maximum benefits from this program so that they can engage themselves and achieve control over their asthma in the initial stages. The inclusion of the families of patients proved to be very helpful for creating a social influence and high care level to help females to overcome their diseases. For the intervention group, mostly the patients do not have an adequate level of information regarding self-management and knowledge about asthma at the pre-stage; however, their knowledge improves significantly at the later stages. Finally, with the incorporation of this type of program, the skills are improved among patients and therefore they are quite active and highly motivated for controlling asthma. There was a study which observed disadvantaged diabetic patient for almost six months in time. It found that highly activated patients are more likely to perform foot checks, exercise regularly and obtain eye examinations as compared to low-activated patients. This study found that females are more activated to the available expertise to control their diabetes (Rask *et al.,* 2009).

Further, there was another study which examined the patient's adherence to physical therapy regimes after surgery on their spine. The findings also showed that highly activated female patients are more inclined to adhere as compared with males and to engage in physical therapy as compared with low activated patients (Skolasky *et al.,* 2008). As these studies are not being conducted in Saudi Arabia, there would nevertheless be a difference of context which could be the major reason for the difference in results.

The study has examined the effect of asthma education resources on asthma control, patient self-management, asthma knowledge, compliance with medication and consequently reducing visits to emergency departments. Results have indicated that asthma education played very important role in controlling symptoms that ultimately negatively influence the quality of life, minimizing the chances of sudden death from an attack and reduced its intense effect, which significantly reduces the number of scheduled and emergency patient visits to the doctor and in turn alleviates the burden on health facilities especially when provided by health workers at the point of care. It has been found that the asthma patients' scores in post program stages were higher compared with pre-program stages. Accordingly, it is highlighted that the asthma education was effective and increased confidence to manage and control asthma. The existing literature also indicated that verbal asthma education is the most significant and effective because it can offer the necessary knowledge to increase confidence and patient activation towards disease self-management and reducing complications. The analysis of both qualitative and quantitative studies results has highlighted that asthma the educational program has raised the knowledge and skills level of patients, meaning they are better able to control their asthma through medical compliance as well as the use of inhaler, spirometry, and peek flow meter. It has found that the patients who are male, undergraduate, married and/or employees are more motivated and activated on post program stages as compared with other patients. It was found that these demographic categories showed high knowledge and skills, meaning they obtained high scores in self-managing and controlling the asthma without health professionals support.

8.9. EXTERNAL FACTORS OF PATIENT ACTIVATION AND SELF-MANAGEMENT BEHAVIOUR

Jerant *et al.* (2011) modelled contextual factors as crucial ones for patient activation. Basically, contextual factors are referred to the environment in which patients receive

healthcare (Cook *et al.,* 2013). Specifically, the focus is on the two types of contextual factors (Hibbard *et al.,* 2008): site of usual source of care and community characteristics. Site of usual source of care, such as the physician's office or emergency department of a hospital, reflects the link between patients and physicians ultimately having a significant impact on patient activation (Alexander *et al.,* 2012). In this study the hospital location where the patients routinely attended clinics was selected as a place to hold the education. This was familiar to the patients as it was the usual site of care.

The continuous relationship with the physician is crucial for sustaining patient's activation and involvement in care (Haggerty *et al.,* 2003). The primary healthcare setting, whereby care is regularly delivered, and illness is diagnosed links to the higher level of patient activation, as compared to the emergency departments of other sites of care, for several reasons. With primary healthcare, a better environment is provided for improving communication between patients and physicians, cultivating trust in patients and sustaining patient activation in the healthcare setting (Alexander *et al.,* 2012). Moreover, primary healthcare also plays a vital role in the continuity of care and its coordination as well, such as suggesting specialist visits or appropriate healthcare services to patients. In the integrated healthcare model, coordinated primary healthcare and specialty care for health treatment is advocated, which is considered as a fundamental clinical feature for improving healthcare (Agency for Healthcare Research and Quality, 2013; SAMHSA-HRSA Center for Integrated Health Solutions (Samhsa-Hrsa, 2013).

Community characteristics is the second contextual factor mentioned. Hibbard (2009) observed that improving patient activation at community level is quite important. Moreover, community characteristics are demonstrated as a crucial element of people's health (White, Haas & Williams, 2009; Williams *et al.,* 2012). There is a strong link between community healthcare resources and population characteristics with access to healthcare (Benjamins, Kirby & Bond Huie, 2004; Davidson *et al.,* 2004; Dinwiddie, Gaskin *et al.,* 2013; Gaskin *et al.,* 2012a, 2012b; Ludwig *et al.,* 2012; Ory *et al.,* 2003), in addition to mental health care (Cook *et al.,* 2013; Lee, 2009) and health care disparities (Gaskin *et al.,* 2012a, 2012b; Kim *et al.,* 2013). The qualitative aspect of this study showed that those in rural areas had less access to healthcare, however patients themselves formed a community and began to share information with each other following the session.

There is difference in cultural and organizational factors to be considered to improve the patient activation. Patient education is another crucial element and it requires nurse's role as a basic right towards healthcare. Role of nurse in terms of patient education is impacted by several factors such as readiness, motivation, understanding the role of teacher and various environmental factors (Grischott *et al.,* 2018). Therefore, the sensitivity of nurses towards the religion, values, language, cultural and socioeconomic factors is quite evident (Wasley *et al.,* 2017). Cultural care is referred to as the ethical obligations of nurses and holistic care that links to awareness of nurses about the cultural values of patients. For these reasons, as shown in Chapter 4, great care was taken in selecting the nurses and healthcare professionals to deliver the training. However, regardless of the emphasis laid on culture-based education in nursing, there are still some issues (Joboshi & Oka, 2017). Even though it is considered feasible to use native and adapted patterns of culture for establishing patient education in nursing practice, there are still certain challenges in providing training to patients (Sari & Osman, 2015).

According to many studies, educational training courses significantly contribute in raising the awareness level about air pollutants, infections, weather changes, inhaled allergens, chemicals, occupational hazards, living in deprived areas, smoking, drugs, importance of exercise, emotional stress, economic status, educational status and foods that may cause chronic diseases like asthma. The focus of current studies is to investigate why the percentage of wheezing attacks in residents of mountain areas in previous year was 12 times higher than those living in coastal and plain areas (Mahnashi *et al.,* 2019). Moreoever, the persons having higher education have been found to have a lower level of the asthma. This indicates that education and knowledge play significant role in managing asthma (Moradi-Lakeh *et al.,* 2015). It is important for well-educated healthcare professionals to better communicate with those suffering from Asthma and recognize each asthma patient as an individual. Such patients should be provided with the information they need and want and reinforce spoken words with the passage of time or by some other methods. Additionally, the individuals with asthma should be provided with written treatment plans and specific advice regarding self-management. These elements were incorporated into the program by providing training to the staff delivering the program; providing one to one education as appropriate and by providing written material and plans as resources for patients to use following the session. The optimal management of asthma requires the individuals with asthma to better understand the

disease and its nature, what peculiarities and basic treatments are related to their own cases, how to control it and what self-management skills they should learn in this regard.

The basic element of asthma management guidelines is self-management education which should include self-monitoring, provision of required information and written management plan and medical review on regular basis (Waterman *et al.,* 2015). However, it is challenging task to implement such kinds of management. The discussion also includes how to improve and ensure effective communication and how to tailor management and build patient partnerships to facilitate self-management, adherence and behavioural change. It is important to arrange training programs for health professionals who are responsible to provide education and guide self-management so that they can maintain and acquire the necessary skills needed to deliver this kind of education. There exist multiple methods through which provision of such training becomes possible and also facilitate to achievement of relevant competency. Often, the patients with asthma have poor management skills and knowledge about asthma. These people can better control their asthma if they are provided with self-management skills and asthma knowledge through effective self-management training programs (Knittle *et al.*, 2015). Well-educated healthcare professionals and specialist aerologists should conduct healthcare education on asthma (Schwarzer *et al.,* 2015). The key aspect of such education is enabling the people with asthma (both men and women) to appropriately react whenever they encounter an asthma attack. Awareness about asthma management and asthma principles positively influences asthma control levels and lifestyle in both men and women (Alessi & Petry, 2014). The major focus of all self-management educational training programs is identifying new evaluation techniques and treatments to overcome problems like fatigue (Kidd, 2018), frustration (Brenk *et al.,* 2015), isolation and pain (Eslami *et al.,* 2017), appropriate exercise to improve and maintain strength (Fan & Lv, 2016), endurance and flexibility (Kashian & Mirzaei, 2019), using medication appropriately (Khoshkesht *et al.,* 2015), effectively communicating with health professionals (Chien *et al.,* 2016), family and friends (Zhang *et al.,* 2016), better breathing methods (Emme *et al.,* 2014), managing depression (Willis, 2016), healthy eating and drinking habits (Bal Özkaptan & Kapucu, 2016), better relaxation techniques, evaluating new treatments and making appropriate health related decisions (Tsai *et al.,* 2018). Asthma self-management primarily requires better understanding about the underlying situation, knowing triggers (such as weather changes, viral infections,

exercise, allergens, cigarette smoke), recognizing signs or symptoms and instant treatment with first aid medications (Bal Özkaptan & Kapucu, 2016).

Previously provided asthma self-management educational programs reported variable effects mainly because of differences in methods and content of training, economic (Lee *et al.,* 2014), psychological and educational background of patient (Tülüce & Kutlutürkan, 2018), inclusion of different shared-decision strategies and ability of educators to influence motivation and behaviour of patients (Lee *et al.,* 2014). However, it is evidently proved that the provision of quality interventions enables the self-management educational programs to bring quality improvements in most of asthma outcomes and in devotion to therapy (Lee *et al.,* 2015). There are many factors that cause this limitation, including organizational or structural problems, non-integration of education about asthma into current physician's practices and patient's barriers to participate in such educational programs (Tülüce & Kutlutürkan, 2018).

8.10. PATIENT ACTIVATION

The ability and willingness of patients to take care of their own health and healthcare is called patient activation. It relates to the extent of patient's participation or engagement in certain behaviours related to health (Adenzato *et al.,* 2012). Prior studies of patients having hypertension in a primary healthcare setting suggest there is a link between patient activation and patient outcomes, where low activated patients are more likely to have a smoking habit, have higher body mass index, and less likely to have glycated haemoglobin targets and cholesterol (Deane *et al.,* 2017). More importantly, linking patient activation is not limited to just clinical and economic outcomes, but also with the patient's experiences as well, and high levels of activation have more positive care experiences for patients (Greene *et al.,* 2013; Alexander *et al.,* 2012; Maeng *et al.,* 2012; AARP, 2009; Mosen *et al.,* 2007; Glasgow *et al.,* 2005; Hibbard *et al.,* 2004). Patients with high activation levels and chronic diseases showed high quality of interpersonal exchanges with doctors, greater control out of office and fairness as well as compared to patients with low activation levels (Alexander *et al.,* 2012). Highly activated patients certainly show better experiences of care as compared with less-activated patients at the time of seeing the same doctor (Greene *et al.,* 2013). This could lead to the illustration that patients who are highly activated possess confidence and skills that shape productive

interactions with clinicians that can adapt to get their healthcare providers to respond to their needs (Agarwal *et al.,* 2013).

Patient activation relates to engagement in preventive treatment, behaviours and healthy behaviours. Indications from empirical studies are that motivated people are more likely to attend periodical check-ups, screenings and immunisations. They are also more likely to engage themselves in healthy behaviours (Greene & Hibbard, 2012; Hibbard *et al.,* 2005; Hibbard *et al.,* 2004) or regular exercise (Tabrizi *et al.,* 2010; Fowles *et al.,* 2009; Salyers *et al.,* 2009; Becker & Roblin, 2008; Hibbard *et al.,* 2008; Hibbard & Tusler, 2007; Hibbard *et al.,* 2007; Mosen *et al.,* 2007) as compared with people who are at lower levels on the activation scale. Conversely, patients who are less activated are less likely to have questions prepared for their doctor-patient sessions or to gather information about treatment guidelines for their condition (Fowles *et al.,* 2009; Rogvi *et al.,* 2012). Their likelihood is almost two or three times in terms of fulfilling unmet needs that delays the medical care as compared to patients with high level of patient activation even after the income, education and medical care control are considered (Hibbard & Cunningham, 2008).

Patient activation is also linked to health outcomes among the patients who are healthy and who are possessing different kinds of physical health conditions as well. Such conditions include asthma, diabetes, chronic obstructive pulmonary disease (COPD), multiple sclerosis, HIV, congestive heart failure, arthritis, hypertension, osteoporosis, cardiovascular disease, chronic pain, cancer, Parkinson's disease and multiple long-term conditions (Marshall *et al.,* 2013; Rogvi *et al.,* 2012; Stepleman *et al.,* 2010; Remmers *et al.,* 2009; Saft *et al.,* 2008; Mosen *et al.,* 2007). Moreover, patient activation is highly associated with outcomes of patients suffering from health disorders like post-traumatic stress disorder, depression, anxiety, bipolar disorder, and schizophrenia (Cabassa *et al.,* 2013; Kukla *et al.,* 2013; Druss *et al.,* 2010; Green *et al.,* 2010; Salyers *et al.,* 2009). In this group, high scores on activation are strongly linked to the positive attitudes towards recovery, high level of hope, positive self-management of illness, less mental health symptoms, consistent adherence towards medical regiments and healthy coping strategies. Further, patient activation is associated with lower levels of substance abuse (Kukla *et al.,* 2013; Green *et al.,* 2010; Salyers *et al.,* 2009). Accordingly, it is necessary to focus more on patient activation in developing an asthma education program for Saudi Arabia. It has been discussed above that personal factors play their vital role in asthma

education outcomes but there is also other factors. These will be discussed later in this chapter. As it has been identified that there was low patient activation during the ASMEP, therefore, there is a need to improve the patient activation.

8.11. IS IT POSSIBLE TO INCREASE PATIENT ACTIVATION?

There are certain programs that illustrate the capability of raising patient activation scores. Their focus is particularly on the gain of new skills or achieving mastery and encouraging health ownership, often with the use of peer support, changes occurring in the patient's social environment, educational classes and health coaching (Keller *et al.,* 2018). For instance, a program that is aimed towards increasing patient activation by attending a clinic in United States where people are on low incomes (Ioannidis *et al.,* 2013). The focus of the program is on the patient teaching about the ways they can draw up and prioritize questions that relate to healthcare concerns and treatments before they get to a meeting with a healthcare professional (Ioannidis *et al.,* 2013). The evaluation of this program was a part of a randomized controlled trial and the findings showed that the intervention group patients had spiked-up their patient activation scores (Ioannidis *et al.,* 2013). Additionally, there were more questions asked during doctor-patient meetings and decision aids were more likely used as compared with those who did not receive intervention (Deem *et al.,* 2011). Effective programs for raising patient activation levels have certain common factors. Majorly, the focus was put on the building of confidence and skill development. There are certain patients who play a totally absent role when it comes to the self-control of their health and they become ineffective due to the lack of confidence or skills (Lu *et al.,* 2011). With the increase in patient activation levels, the sense of control over health increases and the sense of empowerment to act also heightens (Villarreal *et al.,* 2014). The use of strategies is also considered as one of the significant factors in raising activation level of patients that stimulated autonomous motivation. Such programs mainly assume the perspective of the individual and encourage individuals to make choices and to form self-initiative behaviour (Burgess *et al.,* 2007). By doing this, individuals are guided to achieve confidence, mastery and problem-solving skills (Ryan & Deci, 2000). One important thing here is that not every intervention is effective enough to help in engaging patients. The interest of less activated patients on their health is less and it is normally passive to their health issues, which means that the probability of taking advantage of any program of is highly unlikely (Smith *et al.,* 2013). As noted earlier intrinsic and extrinsic motivation means

were used to activate the patient during and post ASMEP. Therefore, it is necessary to use both intrinsic and extrinsic motivational factors that would activate the patient to attend the educational program, as the learning from the program will improve the long-term behaviour towards the long-term self-management of asthma.

Interventions are effective when they are focused on an individual's activation level. For instance, coaching attempts that are tailored to fulfil the needs of patients are quite helpful in increasing their PAM level (Javor *et al.,* 2016). Research shows individuals with low activation levels witness failure to self-manage and should therefore be encouraged to move towards success with slow steps (Menning *et al.,* 2017). A successful experience helps a lot in motivation just like a failed experience is highly demotivating. A coaching approach that is tailored mainly helps in building skills, confidence and motivation (Dunne *et al.,* 2017). There are numerous studies that show patients' level of activation increases with tailored coaching, whereby outcomes are improved to such a huge level as compared to the patients who are coached in a regular manner (Lawson *et al.,* 2013; Shively *et al.,* 2013; Hibbard *et al.,* 2009). Although ASMEP sought to provide one-to-one support for participants, this was not focussed around coaching. Furthermore, it was noted by respondents in the qualitative study that time was limited for the one-to-one element. This could therefore be improved in future developments of ASMEP. Similarly, identifying intervention's effectiveness with an important element so that their overall impact and who they helped can be determined, regardless of their level of activation. There are wide range of settings in which intervention programs are implemented, which include the workplace (Terry *et al.,* 2011), primary healthcare setting and hospitals ((Deen *et al.,* 2011; Parchman *et al.,* 2010), community (Lorig & Alvarez, 2011; Druss *et al.,* 2010; Frosch *et al.,* 2010; Lorig *et al.,* 2010; Qualis Health, 2009), and internet (Solomon *et al.,* 2012). But it has been identified through qualitative data collection that local culture, professionals' skills, language, environment, length of the program and content of the program play vial role to improve the patient knowledge on asthma that can in turn increase the patient activation and motivation.

Patient activation is quite rare concept in relation to asthma education, that is quite capable of capturing skills, confidence and knowledge of patients in managing their health as well as healthcare along with the chance of putting these into action. It is not quite like health literacy or stages of change and it does not see sociodemographic

factors as essential to engagement. Additionally, for capturing the underlying element of human behaviour, it is quite connected to people having or not having health problems. More importantly, patient activation is guided by PAM, which is a robust measure linked to the range of populations. Factors such as health behaviours, cost of delivering care and clinical outcomes are linked to the patient activation scores. Further, patient's activation level is also increased with the help of designed interventions that are appropriate. The following section highlights the practical situation in this regard. Therefore, there is a need to consider the overall picture of patient activation and motivation to further develop an asthma educational program for Saudi Arabia as shown in the framework below. Figure 8.3 uses the results and learning obtained during this study to provide a framework for implementing asthma education in Saudi Arabia in the future.

8.12. IMPLEMENTATION FRAMEWORK

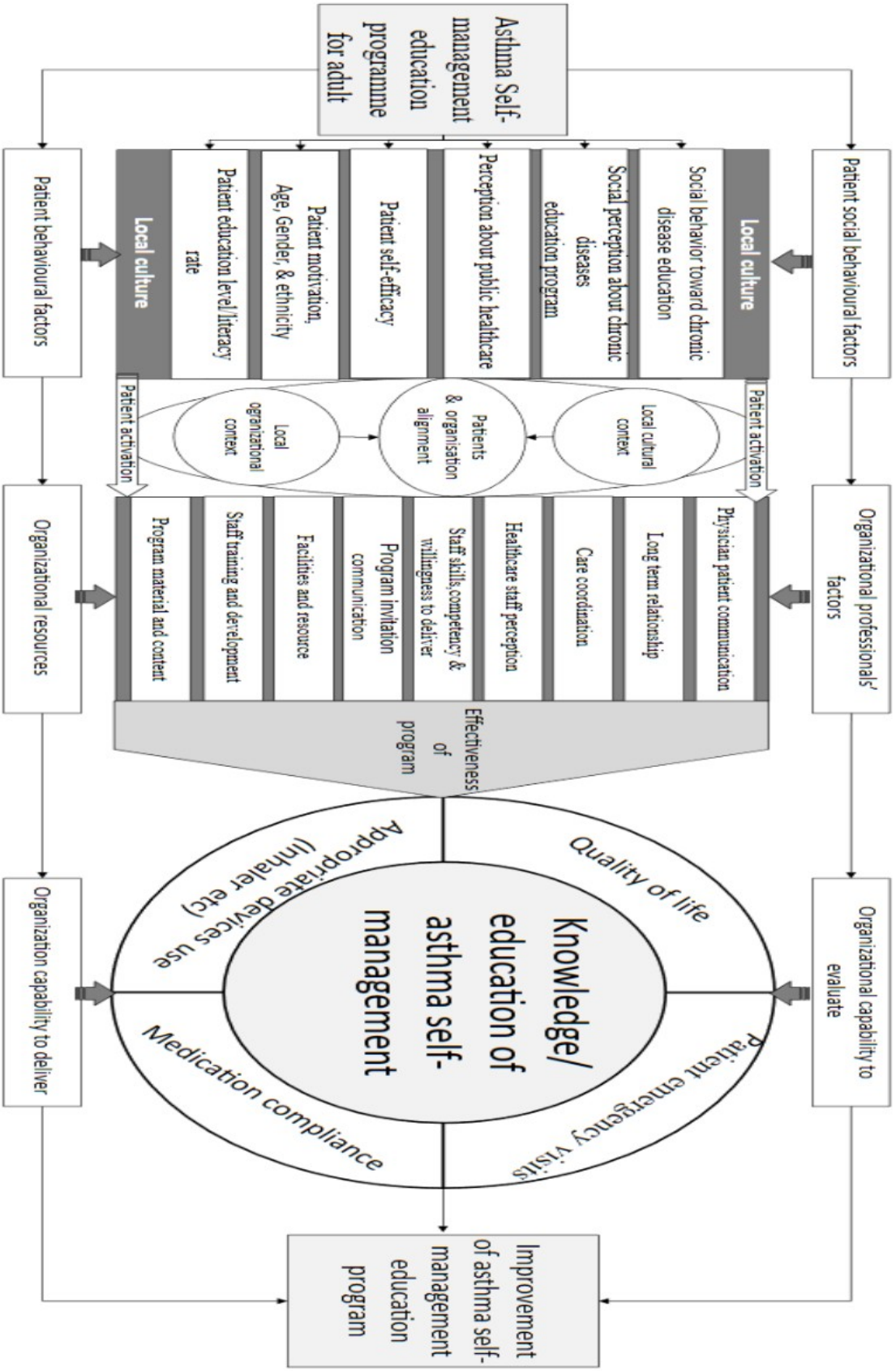

Figure 8.18 Implementation framework

It has been identified that asthma education programs are limited especially in the rural areas in KSA where there are high number of patients and low levels of awareness about how they can manage their asthma without visiting hospitals. Although SINA is undertaking efforts to increase the number of programs, there are limited resources which make it hard to provide training. This includes experts, staff who can provide seminars, digital records of asthma patients, suitable locations for training and a strategy to attract the maximum number of patients. The government of Saudi is very rich, and it is their responsibility to support and attract experts who could organise and provide this type of trainings across KSA. Initially, they could hire the experts from other countries to train local medical staff. They could give attractive packages such as high salaries to those who have certifications from developed countries. These types of skilled people could provide training within medical colleges regarding study content, effective delivery methods, using interactive sessions, and practical training experiences.

The personal factors affecting results included age, gender, education, ethnicity, patient perception, patient behaviour, patient motivation, and local culture. Local language, local support, social and religious values are helpful to enhance patient's motivation. Patients feel more comfortable, enthusiastic, and eager to learn when they are learning through local language and experts which tried to use those words, gestures, and postures that are easy to understand and enhance the knowledge. The patients were inspired and motivated following the usefulness of asthma education; therefore, they have recommended this program to their social network of friends so that the knowledge, support, awareness and encouragement about asthma can be enhanced at individual, organizational, and at societal level.

This way of content delivery has also proved helpful to enhance staff knowledge and skills with respect to the management and control of asthma. The involvement of hospital staff proved useful to enhance patient self-efficacy. This is based on core beliefs with respect to patient ability, confidence and action for taking those optimal actions which can improve the quality of life. Furthermore, these staff now have skills which can be used to deliver asthma education in the future. There are nevertheless some major challenges which undermined the effectiveness of the asthma educational program (ASMEP). This included a lack of experience in the staff delivering the content, so they were unable to deliver the content with confidence and belief. As a result, not all the patients were able to get the same level of outcomes from this program. Social cognitive

theory also highlighted that education and training can build the core belief. This can include improving patient self-determination for self-management of asthma. Although the study content was effective for patient motivation and activation, some patients complained that the content is too long and boring. Nevertheless, the study found the content of asthma education program proved helpful to activate most of the patients as it has created a better medical follow-up, technique to manage frustration, and use of inhaler to control the wheezing, fatigue, shortness of breath. The post program stage showed that asthma educational program enhanced patient activation and motivation to take medicine regularly and frequently visit doctors for a thorough medical examination.

The asthma education program has developed a strong positive perception, such as cognitive, emotional and behaviour actions, with the belief that they can self-control and self-manage asthma. Findings reveal that the asthma educational program has increased the patient self-efficacy because when patients have learned the symptoms as well as knowledge about medication and stress management techniques, they are then better able to control the worse conditions (i.e. severe attacks) without visiting the emergency departments of local hospitals. Ultimately, it can be argued that positive self-perception and efficacy are helpful to take those optimal courses of actions which can reduce the chances of asthma attack such as medical compliance, exercise and diet control, along with proper techniques to use inhaler for asthma control and management.

The framework (figure 8.3) highlights the factors (i.e. patient behaviour factors, organizational resources and organizational capacity) which can improve the level of patient's information, level of motivation and knowledge, patient self-efficacy, and patient quality of life. This framework has been constructed based on Bandura's social cognitive theory. This theory has three elements such as personal, environmental, behaviour, but the meanings and implications of this theory are different in the context of asthma self-management educational program. Self-Cognitive theory is helpful to promote those human actions which can increase the level of information and knowledge that are very helpful to perform effectively in worse conditions. The asthma educational program is helpful to enhance patient self-efficacy by improving their skills and capabilities to enhance patient activation for asthma management and control. This study has used the elements (i.e. personal, behavioural, and environmental) of social cognitive theory because it is helpful to develop an asthma educational framework that can provide guidance to improve patient`s skills and knowledge, the knowledge and skills can

activate the patient for medical compliance, use of inhaler and management of the worse conditions such as asthma attack etc.

The organizational resources included the physical patient communication, program invitation, good relationship, care coordination, staff training and skills improvement, program material and content. The asthma educational program expert has tried to use all the organizational resources and support which can increase the participation, motivation, and confidence of patients with respect to asthma educational program. It has found that nurses, doctors, and management of hospitals have played important role in motivating and inviting patients to attend the asthma educational program. The asthma patients frequently attend scheduled visits with nurses and doctors but were not previously aware of the role and benefits of asthma educational program. Some patients have complained that the frequency, place, and support of asthma program expert is not up to standard as most people in society are unaware the benefits of asthma educational program. The doctors, nurses, and management of hospitals played an important role in sharing the benefits and existence of the program to asthma patients. They also contacted patients by phone to encourage participation in this program. The researcher initially trained the nurses and other staff to deliver the training because they have good contact and relationship with the patients and should be able to deliver the study content more efficiently and effectively.

A number of challenges negatively influenced the effectiveness of the educational program. For example, low level of specialized staff, low level of expertise, lack of professional commitment, and one expert for handling each program. Nevertheless, it was found that the asthma educational program is an effective step to create more education, awareness, confidence as well as reduce emergency and regular visits. However, at present there are insufficient numbers of programs in KSA and these are not accessible for every patient especially in the rural areas. Therefore, it is recommended that these types of educational programs must be conducted in higher numbers so that people may build awareness and action plans against asthma. Figure 8.3 provides a framework to help implement such programmes in KSA.

In the light of this study's results, it is recommended to conduct more training programs that can enhance the level of awareness, knowledge, motivation, and self-efficacy to control asthma among young patients in the KSA. Care needs to be taken to incorporate approaches that will address the needs of certain demographic groups (young, single,

less educated and self-employed). The government of KSA and SINA could also target the school, colleges, and universities for educational program on asthma because it is found young patients have very limited knowledge about asthma self-management. It was also found that patients who have high school certificate and post-graduate level degree scored very poorly with respect to control of asthma, self-management, and patient activation. Therefore, the health ministry and education department must collaborate to control and manage these chronic diseases at very initial level. If they will conduct more programs in educational intuitions, then it can create a greater impact on society. it is recommended to focus on those individuals who are self-employed, because they have limited knowledge, time, and intention to learn about health issues. Finally, females did not get the maximum benefits from this educational program as compared to males. Therefore, it is important to find out how females can be better engaged and active to control their asthma at initial stages. It is effective to engage patient families so that they can create a social influence and a high level of care so that females too can overcome this disease.

8.13. BARRIERS TO IMPLEMENTATION

Although the educational program did improve outcomes in the intervention group some patients have highlighted that the study content delivery is not very interactive as well as lengthy. Most patients reported that the education program session is loaded with study content and staff members have a lack of skills. Consequently, they could not address questions appropriately. Furthermore, interviewees have suggested that there was insufficient time in the program as well as a high number of patients to cover the lengthy case studies and other study content and provide sufficient communication between patients and presenter. Therefore, patients have recommended that the educational programs must be more interactive so that they can share their stories and learn from each other. As per patients' point of view, these types of educational programs cannot enhance knowledge without knowing the needs and stories of every patient. Therefore, there should me more time allotted to ask relevant questions which may help to create a better action plan against asthma.

Participants have also highlighted that the lack of two-way communication is one of the most significant barriers of the educational program. They suggested that presentation and study contents must be designed so that they enhance the involvement and

motivation of patients. Most respondents had a lack of awareness about asthma education programs until their hospital informed about the benefits of ASMEP educational program. Therefore, there is a suggestion to conduct more seminars in those rural areas where level of Asthma knowledge and awareness is very low and patient numbers are high. During interviews, some of the better educated respondents suggested that most hospitals have under-qualified staff because they are more dependent on foreign medical workers who are charging higher salaries, but their numbers are also very low especially when the number of patients is increasing all over the KSA. Moreover, they complained that there are low numbers of allergist, radiologist, pharmacist, specialized respiratory nurses and registered respiratory therapist, meaning patients are unable to take their appointments and cannot communicate properly, which has in turn increased more critical situations. Patients have experienced and shared that there are not enough facilities in local hospitals (i.e. specialized staff and timely appointment as well treatment) which can rescue the patients at a severe level. During severe asthma attacks, respondents have experienced limited specialized staff and doctors, whose rounds for check-up are very limited for single patients. Patients have suggested to conduct more educational programs in different areas so that they can enhance the knowledge of community regarding how they can control their level of asthma without visiting to hospitals. Respondents mostly agreed that a higher number of asthma educational programs could generate knowledge and awareness about self-management of Asthma.

8.14. FACILITATORS TO IMPLEMENTATION

The facilities in hospitals (i.e. support of hospital, published study material, enhancing awareness about the role of ASMEP, available facilities, use of digital data base, hospital guidelines and role in program invitation), professionals counselling with patients (i.e. recommendation to attend Asthma educational program), and study material on asthma are the main facilitators which improved patient's awareness, knowledge, self-management and patient activation to control Asthma. For example, it has been found that some patients have received the call from hospital staff in which staff invited them to come for asthma educational program by confirming the patient personal information, presence, timing, availability and the location of the educational program. Also, most respondents were happy that the hospital management is very supportive and shared published material including guidelines to overcome asthma at an early stage. They have

revealed that hospital management created their initial motivation to attend the educational program on asthma. With the help of hospital staff, ASMEP distributed material and reports so that more patients may know about the causes and symptoms of asthma, along with what can happen if they cannot do structured medical follow-ups. Participants suggested that health professionals (doctors, nurses, hospital staff) explained the benefits of an asthma education program which motivated them to attend. They are happy that their family doctors, health professionals, and medical experts are more conscious about creating awareness in society so that they can create learning, resilience and action against diseases by increasing awareness and knowledge.

Participants of this study appreciate the coordination, support, communication and help to arrange the educational program in local hospitals. Due to their combined efforts, patients can attend the educational program and increased the level of awareness in the context of preparing a self-management plan against this disease. The majority of respondents have mentioned how study content shared by ASMEP and hospitals can increase their level of motivation, awareness, knowledge, and confidence. Some patients are satisfied with the study material, content quality, method of delivery during Asthma program.

Respondents have shared how access to reading material and attending educational programs on asthma have increased their knowledge and awareness about what type of exercises are helpful to improve flexibility, strength and endurance against the frustration and pain of asthma. Based on this program, participants are more aware of the appropriate level of medications, breathing techniques, rest and relaxation methods, health professionals support about new treatments as well as managing depression and frustration in severe asthma attacks. This program has improved awareness regarding how asthma can increase through sandstorm and allergies, more use of junk foods and dairy products, and less exercises chances due to tough schedules in managing personal and professional lives. Respondents have suggested that there is a need that professionals (i.e. allergist, radiologist, pharmacist, specialized respiratory nurses, and registered respiratory therapist) should motivate and ensure that their patients must prepare a structured medical follow-up. As per patients' perceptions, spending a few days on educational program can bring major improvements and decrease the number of emergency visits as well as enhance patient's knowledge regarding negative consequences, proper treatment, health, diet and exercise.

8.15. SUMMARY

Overall, this study has achieved its original aim and objectives. A self-management education program was developed for adult asthma patients in Saudi Arabia and health professionals were trained to deliver the program. To evaluate the impact of the program a mixed methods approach was used. Both qualitative and quantitative studies have shown patients have a very low initial level of knowledge about asthma self-management (i.e. proper treatment, medicine, daily exercise, relaxation methods, breathing technique). However, after attending the educational program and at post-program-II stage patients in the intervention group showed that they can easily manage their asthma, demonstrating the positive effects of the program. However, there were differences in effectiveness for some groups including the young, single, less educated, female and self-employed. During the interviews, respondents provided evidence of the program facilitators and were happy that the program has saved their resources and can help them manage their asthma better in the future. The future development of asthma education programs in Saudi Arabia needs to consider ways to better motivate and activate these groups. For example, engaging the self-employed community so that they can create resilience at individual and community level. Furthermore, educational institutions, ministry of health, hospitals, and health professionals should arrange educational programs in schools, colleges, and university to create awareness about how people can control their asthma without visiting hospitals.

8.16. CONTRIBUTIONS TO KNOWLEDGE

This study has made the following contributions to knowledge:

1. Based on a systematic review of evidence, guidance and relevant theory a self-management education program was developed that was culturally relevant for the Saudi Arabian context. This is the first program of its kind in KSA.
2. A mixed methods approach has been employed to explore the effectiveness of the program itself. This would also be helpful to develop the same program in future.
3. Co-design with professionals and patients to deliver an education program in education setting to improve patient self-management behaviour.

4. First exploration of patient activation during the asthma education program which is the most interesting original aspect of this study.
5. Research framework provides a comprehensive understanding for both planning, development and evaluation of asthma education program in SA.

- Provide a strong evidence base on which to build and evaluate (pre and post basic education programs) for asthmatic patients in Saudi Arabia.

- Recommendations for practice and services in a Saudi context.

- Provide a research baseline on which further future research can be conducted to develop evidence-based practice for patients with asthma in Saudi Arabia

- Use of cultural perspectives to contribute to the theoretical knowledge of the impact of culture on the nursing role and asthma self-management in Saudi Arabia.

CHAPTER 9: CONCLUSION AND RECOMMENDATIONS

8.1. CONCLUSION

The study aimed to develop and evaluate the impact of a patient self-management education program on Saudi adults with asthma. The challenges of asthma are different in developed and developing countries with respect to levels of awareness and knowledge through health education, as well as in terms of health management support and also the internal environment of a country. Saudi Arabia is a country where there are many challenges with respect to environmental and health management. The consumption of oil and use of heavy transport in Saudi Arabia increases smoke, CO2 and temperature which negatively the environment by reducing the level of rainfall and raising the level of hot weather and dust. Combined, this can create breathing issues as well as negatively impacting on the quality of life of those with asthma.

Self-management is a recognized way of helping patients with asthma. Although there is research available regarding education for self-management and the Ministry of Health of Saudi Arabia has developed guidance (SINA) for asthma which recommends asthma education, there is limited research and guidance available to help Saudi health professionals educate patients in the self-management of their asthma. Furthermore, there are no resources which focus specifically on the Saudi context. Patients' experience and the role of different stakeholders with respect to conduct and support asthma educational program is underexplored in terms of Arab culture.

Using systematic review methods, this study examined the evidence for self-management education programs to help develop an appropriate method of education for the Saudi context. Because of the willingness and availability of the participants, a small group of 8 participants format was selected and following consultation with a wide range of stakeholders a program was developed based on theoretical perspectives, Saudi and UK guidance and research evidence. To evaluate the program a mixed methods design was selected. Evidence from the systematic review was also used to help select appropriate outcome measures (asthma knowledge, control, self-efficacy and patient activation). Outcomes were measured in a control and intervention group pre and post intervention and in the intervention group 6 months following the intervention. A qualitative component also helped to understand these issues in wider context and as per the views of different patients as well as in terms of the local context.

The initial objectives of this study were to develop an asthma educational program as well as train nurses and respiratory therapists to deal with adult asthma patients in KSA. Asthma educational program content developed by SINA and other experts was reviewed, but although good study material is provided by SINA, they did not provide guidance on how to provide this education for self-management of patients, hence the need to develop asthma educational program. Building on experience of nursing in different hospitals in Saudi Arabia, the researcher involved and trained hospital staff (i.e. nurses and respiratory therapists for asthma educational program training) in understanding the local context, developing content and delivering the asthma educational program. The success of asthma program is strongly connected with the interest of patients, hospital support, educational environmental and other major factors. The contents of asthma educational program was developed after full consideration of all these factors.

The researcher involved and trained local nurses and respiratory therapists because they have direct contact with patients and would be more confident and willing to participate because they already know the program experts and staff. A total of 9 male and female nurses were selected to deliver the intense two-day educational program training. These nurses had high levels of qualification and exhibited significant interest in learning the contents of these program by interactive discussion. As a result of participation, the staff involved increased their information and knowledge about patients' knowledge, control, activation and self-management. An overriding objective of this research is to provide enough material and content so that these nurses can conduct a successful educational program to educate their patients in the future as well as for the purposes of the study. The ultimate goal of the asthma educational program was to manage asthma at home though a proper action plan, medical compliance as well as device use (i.e. inhaler, spirometry and peek flow meter).

A number of challenges were identified which had the potential to undermine the effectiveness of the asthma educational program. For example, it was found that health professionals like nurses, doctors and hospital administration staff delivering the training had limited experience and struggled to deliver the sessions in an interactive way to address the specific needs of adult patients during the program. Patients wanted the program to occur more frequently. Moreover, the location and time of asthma educational program was not appropriate for every patient. Most patients have suggested

that the program material was too long and boring. Consequently, it is better in future to design study contents so that they are interactive in nature and address the specific needs of each patient. The number of participants in the asthma educational program was also found to be too high to provide care and specific time for each patient. Lack of professional skills, motivation, confidence and commitment are some of important barriers which were found to negatively influence the efforts of asthma education for adult patients.

The results of this study are confirmed through the support of social-cognitive theory. The patients are so inspired and motivated due to usefulness of asthma education; therefore, they have recommended this program to their social network friends so that the knowledge, support, awareness and encouragement about asthma can be enhanced at individual, organizational, and at societal level.The present study has discussed how hospitals, health professionals, SINA, and ministry of health can play important role with the purpose to enhance the support and awareness about ASMEP. Findings indicated that the health professional and hospitals must involve in sharing and creating informational resources so that knowledge about ASMEP can enhance which ultimately leads to decrease emergency visits. The program developed in this thesis thus has additional value to these patients, as it will through education, training and confidence building in self-management skills make it easier for them to control their asthma at home and reduce hospital attendance. Asthma has been related to the genetics of the Saudi Arabian people. The thesis provides a unique and original evidence base on which educational resources in Saudi Arabia can be prepared, used and evaluated to improve the quality of care provided to patients suffering with Asthma.

8.2. CONTRIBUTION AND ORIGINALITY OF STUDY

The systematic review indicated that most previous studies were conducted in developed countries. They also primarily employed quantitative methods which are unable to understand the influence of asthma educational programs on cognitive, emotional, behavioural, environmental, cultural, social and motivational aspects. Furthermore, the sample size as well as the limited focus on patient motivation, activation and the study content itself are some of aspects which have been ignored by previous studies. There is not a single study found which comprehensively discussed the significance of an asthma education program and those factors which can undermine the effectiveness of program with respect to patient knowledge,

activation, motivation, control and self-management, environmental and local context of Saudi Arabia. Moreover, the author of this study did not find single study which used both a mixed method approach and design to evaluate the content of asthma educational programs specifically in the context of an Arab nation. The study involved the design of the asthma educational program, trained the hospital staff, conducted the educational session through hospital staff, increased the intrinsic (i.e. content delivery and learning) and extrinsic motivation (i.e. food, excellent environment and free inhaler device) to comprehensively evaluate the patient activation with respect to asthma management and control. Most of the previous studies did not explore the challenges with respect to patient motivation and study content but this study has highlighted issues with respect to program experts, program content, skills of training staff and other specific challenges. Therefore, this study provides a comprehensive baseline of evidence for developing asthma self-management education in Saudi Arabia.

A further original factor of this study is the implementation framework which has been constructed with the help of both qualitative and quantitative study results. The framework was constructed based on various unique factors such as patient behavioural factors, organizational resources and organizational capacity to deliver the asthma education. The results of behavioural factors, organizational resources and organizational capacity have been logically supported with the help of Bandura's social cognitive theory. Although this theory has personal, environmental and behavioural factors which are useful to support the findings of this study, the meanings and implications of this theory have been rarely applied and used in the context of asthma educational program in both developed and developing countries. The major objective of social-cognitive theory is analysing the importance of various human actions which can decrease the level of uncertainty as well as improve patients' ability to manage their conditions. There is lack of research available which explored regarding asthma education: partnership between patient and provider, writing a plan of action which informs the patient about the pattern to follow for managing the disease, and identification of the activation factors which trigger the asthma attack so that the patient can monitor and control them (Troya *et al.,* 2019). The objective and findings of this study conformed with the objective of social-cognitive theory because they demonstrated how an asthma educational program enhanced the knowledge and skills with respect to the environmental and other causes of asthma, rest and relaxation methods, negative consequence of chronic respiratory diseases, appropriate level of medication and medication compliance, treatment choices

and decisions, herbal and other new treatments, breathing and stress management techniques and the appropriate exercises which can be helpful in managing frustration and depression. As a result, the scheduled and unscheduled visits of patients have decreased. In turn, this provides direction to hospital staff and management about the effectiveness of asthma educational program in the specific local context of Saudi Arabia.

The personal and behavioural factors of social-cognitive theory included age, gender, education, ethnicity, patient perception, patient behaviour, patient motivation, expert commitment and experience, and local culture. It was found that male, mature patients, married, employed and qualified patients showed more motivation and activation to control their asthma. As per the results of the systematic review, extant literature did not explain importance of an asthma educational program with respect to demographic features and what initiatives must be taken to improve the level of asthma control with respect to targeted sample features. The implmentation framework from this study has addressed this potential gap and provides guidance with respect to demographic features as well as those related to the specific local context of an Arab culture. Previous studies have suggested that it is important to investigate the demographic factors of patient with respect to asthma motivation and activation (Ali *et al.,* 2019; Haouichat *et al.,* 2019). The educational experts 'native language skills (i.e. awareness about symbols, gestures, postures), knowledge about environmental issues, local identity and respect, and use of social and religious knowledge, increased the patient's involvement, comfort, motivation and intention to learn from the asthma education program. Al-Moamary *et al.* (2019) argued that asthma treatment requires to create doctor-patient services co-creation which may helpful to prepare the better self-management plan for asthma self-control in Saudi Arabia. The patients are so inspired and motivated due to the usefulness of asthma education. As a result, they have recommended this program to their social network friends so that the knowledge, support, awareness and encouragement about asthma can be enhanced at individual, organizational *and* societal level. The overall results indicated that the asthma educational program increased positive self-perception and efficacy. They are helpful in guiding patients to take those optimal courses of actions which can reduce the chances of asthma attack such as medical compliance, exercise and diet control, and proper inhaler-use techniques for asthma control and management.

The research framework has included organizational resources such as physical patient communication, program invitation, good relationship, care coordination, staff training and skills improvement, program material and content. The social-cognitive theory indicated that the environment, interactive communication, relationship and engagement, coordination and collaboration, are some of the factors which can enhance the motivation as well as the ability to manage the worse conditions. It was found that nurses, doctors and management of hospitals have played an important role in terms of motivating and inviting patients to attend the asthma educational program. Asthma patients frequently attend scheduled visits with nurses and doctors, yet they are not very aware the role and benefits of asthma educational program at early stage. The content delivered to hospital staff also proved helpful in that it enhanced their knowledge and skills with respect to the management and control of asthma. The existing literature has reported that physicians in many cases might have insufficient time, motivation, resources, perception about need and skills to provide asthma education, specifically in less developed areas (Riehm *et al.,* 2016; Al-Moamary *et al.,* 2019). The involvement of hospital staff also proved useful to enhance patient self-efficacy, which is based on core beliefs with respect to patient ability, confidence and action for taking those optimal actions which can improve the quality of life. It was found that the program expert has tried to use all the organizational resources and support which can increase the participation, motivation and confidence of patients with respect to motivation, self-efficacy, positive perception, knowledge and skills, ability to control and mange asthma. The quantitative results have indicated that most patients have achieved high scores with respect to increased knowledge and skills. Consequently, their scheduled and emergency visits decreased and their quality of life increased due to the asthma educational program.

8.3. RECOMMENDATIONS

8.3.1. Recommendations for practice

- ✓ It has been found that young patients (i.e. 18 to 25 years age) have very poor knowledge with respect to asthma knowledge and control at post program stages. The government, ministry of health and health professionals must take immediate action to engage and enhance young patient activation for asthma management and control.

- ✓ Findings reveal that those patients who have a post-graduate degree demonstrated very poor knowledge with respect to asthma control. These findings show that colleges and universities are not involved in educating people with respect to symptoms, consequences and risks of asthma. The KSA government, ministry of health and SINA should design educational programs for colleges and universities to remedy this.
- ✓ Results of post program stages showed that compared to females, males could not get the same benefits from asthma educational programs. It is important therefore to improve patient activation and motivation by involving the social influence of their family members (i.e. wife, mother, father and children's).
- ✓ The outcomes of this study indicated that mature patients who married, as well as those who are employed, have more social interactions and awareness about asthma. However, unmarried and self-employed have demonstrated poor knowledge with respect to asthma control and management. Therefore, it is important to target the young as well as the self-employed to minimize asthma problems in young adult patients.
- ✓ Results have indicated that there is no proper mechanism developed with respect to asthma educational program experts and staff training. SINA and ministry of health have to coordinate and collaborate for training of asthma educational experts so that patients' motivation and activation can be enhanced during the asthma educational program.
- ✓ It was found that travelling distances, location and number of asthma educational programs are very low in rural areas of KSA. Resultantly, patients' emergency visits increased. The hospital management, SINA and ministry of health have to invest in the training of staff and in the number of asthma educational programs too so that patient's knowledge and skills can increase with respect to asthma control and self-management.
- ✓ Although patient motivation and activation has been analysed at pre-program and post program stages, there is no mechanism to analyse how much the study content itself played a role in enhancing the patient activation and motivation during the training program. Such a mechanism needs to be developed.
- ✓ Findings of pre-program stage indicated that patients are not well aware about benefits and the role of asthma educational program for enhancing knowledge and skills. It is found that their social network has lower level of information

about the purposes of the asthma educational program. Therefore, SINA, hospital management, and ministry of health must involve social actors, celebrities and experienced trainers to educate the rural areas community especially, where challenges are high for asthma patients.

- ✓ There is no specific tool applied to evaluate the intrinsic and extrinsic motivation of program experts and patients during the asthma educational program. Without analysing the intrinsic and extrinsic motivation of both trainer and trainee, it is not possible to understand challenges and maximize the benefits of asthma education in the context of an Arab culture.
- ✓ Some patients have suggested that the motivation, commitment and experience of asthma educational program experts and staff was not appropriate because they did not address the specific patient needs through interactive discussion or by involving patients. Therefore, the future asthma educational programs must be designed so as to have maximum time duration and to address the patient queries individually and comprehensively.
- ✓ Asthma educational programs must be designed after considering the cultural aspects, social aspects, local context, values and beliefs of patients. These aspects can enhance the acceptability, motivation, activation and benefits of asthma education.

8.3.2. Recommendations for policy makers (MoH)

This study has highlighted the implications of asthma education with respect to patient activation, hospital staff training, content development and evaluation, patient motivation, patient knowledge, patient control, and patient self-management. The use of mixed method approach and stages of program are designed based on cross sectional horizon which can generate common method variables. Furthermore, the study has been conducted in a specific geographic location. It is possible that other geographical areas with Saudi are facing same type of challenges. Therefore, this study helpful for the policy maker to answer how PAM and patient behaviour can be improved through the asthma education program in MoH and this research is also helpful to understand the major issues in different contexts like hospital setting, environment, professional and patient context and required trainings for the professionals. Therefore, the following major strategical recommendations have been made for policy maker in the field of public health care.

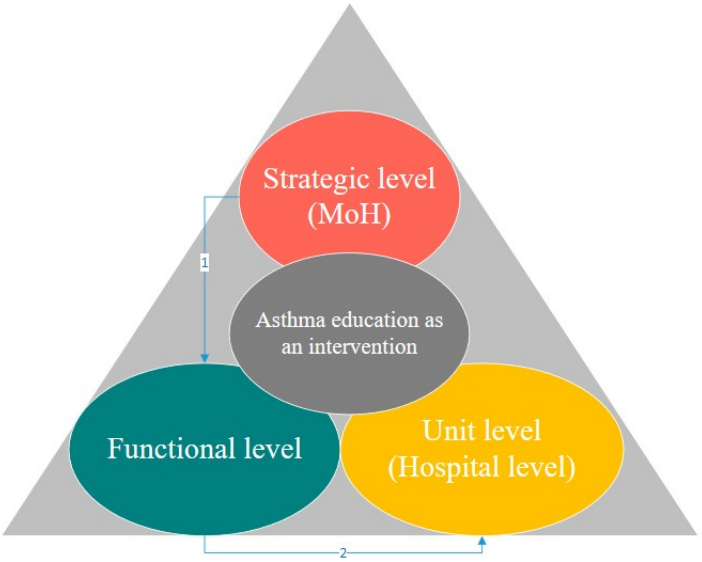

Figure 9.19 Policies level for implementation of asthma education as an intervention in MoH Saudi Arabia

As it has been shown in figure 9.1 above, it would be useful to assign specific budget to introduce an education program for asthma patient in Saudi Arabia. This requires top level (MoH) strategic level polices that can be implemented across the whole public health sector. Moreover, there is also need for functional level polices like health education to offer patient education programs to train the professionals for the delivery of asthma education. Because it was found that the training staff have not enough experience with respect to the design of the asthma educational program, strategies are needed to engage the patients, increase intrinsic and extrinsic motivation during asthma program, and train the hospital staff for asthma education delivery to patients.

There is lack of research support available with respect to developing individual asthma educational programs, its contents, educational program expert and staff training in Saudi Arabia at functional level of the MoH. The involvement of the researcher is helpful to explore the challenges, as well as to use their extensive experience to get relevant data to meet the proposed objectives of this study. It was also found that the hospital staff like leadership and management of the hospital do not have motivation to arrange such educational program. Therefore, at functional strategy the MoH should also activate the administration and management to support the such educational programs. The researcher's university (University of Salford) has provided some professional certificates for the professionals who participate in the program that bring considerable motivation of the staff. Building on this, the HRM department of the MoD

should offer policies for the learning and awarding the staff that would activate the staff to participate in such programs.

8.4. RECOMMENDATION FOR FUTURE RESEARCH

- In future studies make sure that there is no involvement of researcher if they have intention to check the validity of constructed research framework with the purpose to enhance the generalizability, confirmability, transferability, and credibility of the asthma educational program outcomes. Instead, it is recommended that future studies try to ensure that the role of researcher is neutral so that the implications of social cognitive theory as well as the validity of constructed research framework can be analysed using the statistical tests and instruments. Finally, it was found that the lack of interactive communication, lack of information about patient needs during the design and delivery of contents, low level of program expert confidence and commitment, lack of expert and staff experience with respect to address the need of patients are major limitations which must be addressed in future studies.
- There is no instrument available or designed which can evaluate the patient activation and motivation during the asthma educational program. These are some of the main limitations which may directly or indirectly influence the results of this study.
- In future, multiple geographical areas and future studies time horizon must be based on a longitudinal study so that the common method variance cannot influence the validity of results and these results can cover more insights with respect to multiple geographical locations within Saudi Arabia.
- This research utilised a social constructionist paradigm with mix methods that limits the scope for qualitative data collection. Therefore, in future social constructionist research there is a need to use the qualitative research method and relativist ontological position to explore the different social, cultural and organizational factors that can help to develop further understanding about a culturally embedded program for Saudi Arabia. On the hand, future researcher can take positivist epistemological and realist ontological positions for this research to test the role of professional education, qualification and hospital setting with the patient activation during the asthma education program.

8.5. LIMITATIONS

As contribution and significance of the study have been discussed above but there are some limitations of this study as following,

1. Study conducted in one hospital in one region in Saudi which is why it cannot be generalized for the whole country
2. Small scale qualitative study in comparison to quantitative study so mix method has its own limitation.
3. Lack of post-test II for control group so there is need to conduct study at large scale to more rigorously identify the effectiveness of the program
4. Focus of the qualitative study on barriers and facilitators to implementation and lack of time to explore the features around the reasons for some of the quantitative results. Therefore, the qualitative study could not explore the issues beyond the box of the quantitative study.
5. Lack of infrastructure for asthma education in KSA, necessitating the development of all resources before conducting the intervention that could bring better result. At the moment there is not any infrastructure to deliver asthma education program.
6. Lack of qualified staff to deliver the intervention therefore, staff being trained only for this program.
7. Unclear whether the lower scores for women was the result of different trainers or other factors. Because of the limitation of local culture, the researcher was not able to observe female professional and patients.

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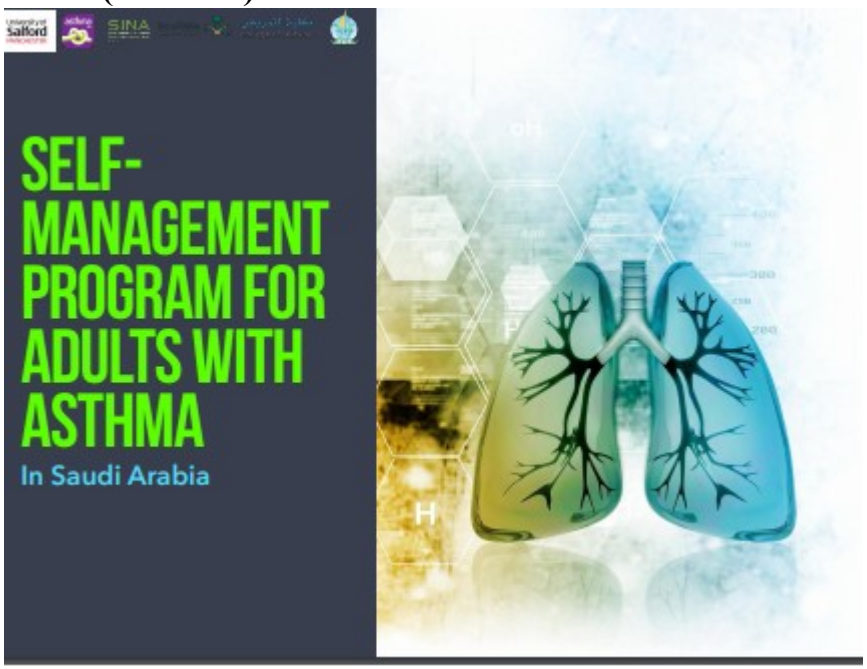
APPENDICES

10.1. APPENDIX 1: ASTHMA SELF-MANAGEMENT EDUCATION PROGRAM (ASMEP)



Self-Management program for adults With asthma in Saudi Arabia

The program is part of doctorate program approved by the University of Salford and applied in King Fahad Central Hospital
Jizan - Saudi Arabia

Program leader: Mr Hamad Dallah
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3-18/09/2018

This booklet was developed based on the Saudi Initiative for Asthma (SINA) and the Asthma UK guidance. It has been adapted to consider the cultural background in Saudi Arabia to be applied in Jizan region

Dear Reader

You are reading this booklet because you have been diagnosed with asthma. You will not only be reading this booklet, but the researcher and health care professionals involved in this study will work collaboratively through a workshop, to help you understand the nature of asthma as well as the measures you can take to control your symptoms. We hope to be able to help you by giving the information you need and answering all questions you have. We would say to you that the more information and knowledge you have about asthma, the more confidence you have to control your symptoms yourself while at home.

Do not worry, you are not the only one who live with asthma. According to the WHO report in 2008, there were more 200 million people around the world who suffer with asthma and deal with these symptoms. Although, it is a serious disease and causes many hospitalisations each year, many patients are now living normally with asthma and have some knowledge and experience on how to manage the disease. As you are the only one who can understand what you need for your asthma, you are the only one who can choose the way to control the symptoms. Although medications are the first choice to control asthma, working with nurses and health professionals to develop an asthma action plan is also a high priority and will help you to get positive results and enable you to manage your own care and prevent hospitalisation.

This guide will further explain the information and advice your doctors have given to you. However, you need to remember that this guide will not replace your doctor's role in assessing and prescribing you the appropriate medications.

Introduction

how common is asthma worldwide and in Saudi Arabia?

According to the World Health Organisation (2016), asthma is common over the world and is recognised as one of the major non-communicable diseases with 235 million people currently suffering from asthma and the disease was responsible for more than 380,000 adult deaths worldwide in 2015. **Patients with asthma are not always diagnosed or even treated properly which results in a more substantial burden to individuals and their families** (WHO, 2016). Asthma affects patients, their families, and the community as a whole in terms of lost work, poor quality of life, frequent emergency department (ED) visits, hospitalizations, and sometimes death. More than 80% of asthma deaths occur in low and lower-middle income countries.

Asthma is common in Saudi Arabia and has increased in recent years affecting more than 2 million Saudis (Saudi initiative for Asthma 2016). One research study showed that in 2012 4% of adults in Saudi Arabia were suffering from asthma and of these 76.7% experienced asthmatic attack and 61.6% visited emergency department because of their asthma (Moradi-Lakeh *et al.* 2015, Saudi initiative for Asthma 2016). The dust and pollutants in

Saudi Arabia may make people more liable to have asthmatic problems. According to the Saudi Ministry of Health (2000) and other researchers (Al-Ghamdi et al., 2008) this means that further research is needed as well as programmes to help control people's asthma. The **Saudi Initiative for Asthma has developed guidance for managing asthma at a national level, and part of this guidance is to develop education programmes to help people manage their own asthma, this booklet and education programme are part of this national policy.**

The nature of asthma

Asthma is a common long-term disease affecting about five million people in the UK. Asthma is worse in people that have very sensitive airways and become inflamed and tighten when these people breathe in anything that irritates them. It is a chronic condition of inflammation of airways which makes these airways sensitive to irritation, injury or infection. With asthma you may develop mucus production in your airways which is a protective measure for these airways. Defensive cells flow to the irritated areas, bringing extra fluids which creates swelling which with spasm of surrounding muscles cause the airways to be narrowed and obstructed.

Your body has a dramatic and protective response to blocked and obstructive response as the major airways, when blocked, will create symptoms that are easy to feel and consequently start coughing attempting to clear the airways or for you to take action to protect or treat the problem. Patients may also develop chest tightness and wheezing which may consequently make it difficult to breathe. With asthma, certain things trigger the muscles around your airways to tighten, making your airways narrower. With narrow airways, it's harder to breathe air in and out of your lungs.

The small airways deep within the lungs are often the main source of the most severe asthmatic attacks with no obvious signs of early asthma symptoms. If these signs were not recognised and left untreated it will then develop to more severe and frequent asthmatic attacks which may be more difficult and need prompt management and self-management.

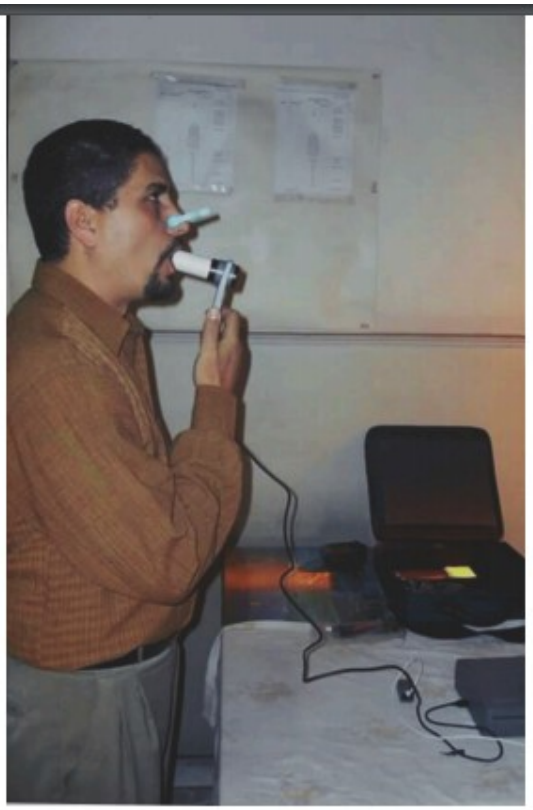
Self-management requires skills on how to use such devices such as the ***Spirometer***, the machine used by doctors or specialists to measure lung function. This spirometer often indicates the inflammation and the obstruction in the small airways before you may observe any symptoms which may help either doctors or patients themselves to prevent or manage such severe and serious attacks which may limit such activities. Such limitations may create permanent structural and functional changes in lungs and their function.

This may show the importance of treating symptoms and inflammations earlier through self-caring which may help patients to avoid any further complications and ultimately improve their quality of life.

Why me?

The exact cause of asthma is still unknown but persons and family's history of allergies might increase the risk of developing asthma. Acid reflux with asthma may also cause the stomach contents to regurgitate to the esophagus or the mouth and irritate the airways and cause asthma. You might be having one of the following triggers for exacerbation or flare-ups of asthma:

- **Allergies** – exposure to both indoor and outdoor allergens (things that you are allergic to)
- **Cigarette smoke** –either directly or indirectly through being around other smokers (passive smoking).
- **Dirty air** – pollutants, perfumes, solvents, soaps, and other air irritants.
- **Infections** – colds, flu, sore throats, and sinus infections.
- **Heartburn** – gastro-esophageal reflux.
- **Weather** – dry wind, cool air, sudden weather changes
- **Exercise** and other activities that make you breathe harder
- **Strong emotions** that can cause a change in breathing and a change in airway muscles
- **Some medications** – including aspirin and beta-blockers



How can I diagnose and monitor asthma with this program

This program will provide you with the necessary information you need about symptoms and possible actions to manage these symptoms or when to contact professionals. With this program you will be able to recognize and manage symptoms. You will also be able to present these symptoms, if you need further help, to nurses or other professionals so they will be able to help you and provide you with information you need. For example, they may need to know your asthma history and factors that may aggregate asthma like smoking or environmental factors. Nurses may also need to know whether anyone else in the family has any allergy or has been diagnosed with asthma. This information may either help you solve the problem or know when to visit a health professional for a physical examination for your respiratory system. They may also use other devices such as spirometry to make sure your lungs are working properly (simple and painless test).

Spirometry

Spirometry (measuring breath), is a test in which you breathe into a mouthpiece that is connected to a small device called spirometer. This instrument will measure the amount of air and how fast you breathe in and out, so it is used to diagnose asthma. Spirometry is necessary to confirm airflow obstruction, assess severity and demonstrates significant reversibility. It may help identify other diagnoses, for example, upper airway obstruction. However, normal spirometry, including a failure to show reversibility, does not rule out the diagnosis of asthma as it can be normal with the patient still being symptomatic. Therefore, forced expiratory volume one second (FEV 1) may be helpful in this situation.

Forced Expiratory Volume in the first second (FEV1) is another test you may need to either use or know about. This test measures the maximum amount of air you can force out of your lungs in a single second. Your result with this test may be compared to a result of another person with similar characteristics; race, height, weight, and age. For example, if it is greater than 80% of what is expected and you have never been tested before, it is considered normal and you may keep going with your self-care. If less than 80%, it indicates some airway obstruction which may require further investigation and you may call your doctor or nurse in this situation. This test should be repeated periodically to help your doctor better determine your normal, best lung function

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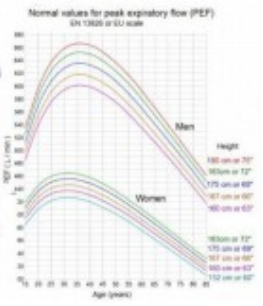
The Peak Expiratory Flow Meter



With this inexpensive tool you can monitor the improvement or worsening of all pulmonary infections and asthma!

Forced Expiratory Volume (FEV 1).

Peak Flow is a portable, personal measure of how hard you can breathe air out (exhale.) This measure can help you managing asthma while at home. First you establish your 'personal best' (the best you can exhale when you are completely without asthma symptoms).

Peak Flow Meter

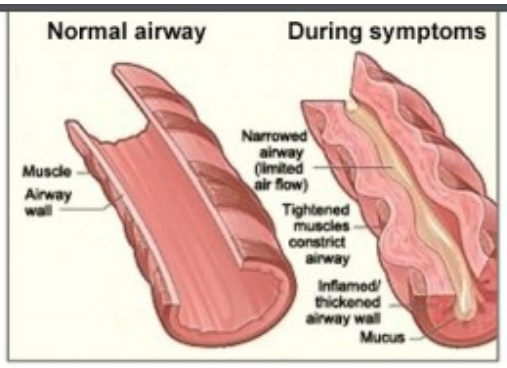
This test (if checked every day at same time) it will be able to show you if you are close to your personal best. If you have any inflammation in your airways you will not be able to push air out very well, so if the Peak Flow is lower than expected, you probably have inflammation that has not yet caused any coughing or wheezing symptoms. This is the best time to do something to treat your asthma before it gets worse.

Asthma in Pregnancy

Asthma affects 4%-8% of all pregnant women. Pregnant women might be of higher risk of asthmatic attacks than men. Any woman who has asthma while pregnant should be assessed and monitored for her level of asthma symptom severity at each prenatal visit. It is not only her, it is the baby as well and they (woman and baby) have to be treated and controlled together. It is well known that poorly controlled asthma during pregnancy may affect the developing baby by decreasing the flow of blood and oxygen to the placenta. Patients should also be aware that the medications used for asthma control may also affect their babies so even medications are safe to use during pregnancy, the lowest possible dose that provides good control should be used for treatment. Asthma flares should be taken seriously and treated promptly.

Importance of asthma self-management and managing attacks

It is evidenced that most people with asthma and manage it correctly can control their symptoms and lead normal lives. With asthma, your airways are very sensitive when air is coming in and out of lungs. The first step in managing asthma is the proper diagnosis which may lead to more focused treatment.



Diagnosis of asthma

Clinical assessment is considered for the diagnosis of asthma as there is no gold standard diagnostic test for the disease. This includes a detailed patient's history and physical examination as well as spirometry with reversibility testing to support the diagnosis (Saudi initiative for Asthma 2016). Patients may experience episodic attacks like cough, breathlessness, wheezing, and nocturnal symptoms (Al *et al.* 2017). However, patients could be asymptomatic between attacks with conditions accompany these attacks like rhino sinusitis and gastroesophageal reflux disease (GERD).

Relevant questions for diagnosis:

- Does the patient or his/her family have a history of asthma or other atopic conditions, such as eczema or allergic rhinitis?
- Does the patient have recurrent attacks of wheezing?
- Does the patient have a troublesome cough at night?
- Does the patient wheeze or cough after exercise?
- Does the patient experience wheezing, chest tightness, or cough after exposure to pollens, dust, feathered or furry animals, exercise, viral infection, or environmental smoke?
- Does the patient experience worsening of symptoms after taking aspirin/nonsteroidal inflammatory medication or use of B-blockers?
- Does the patient's cold "go to the chest" or take more than 10 days to clear up?
- Are symptoms improved by appropriate asthma treatment?
- Are there any features suggestive of occupational asthma

Physical examination

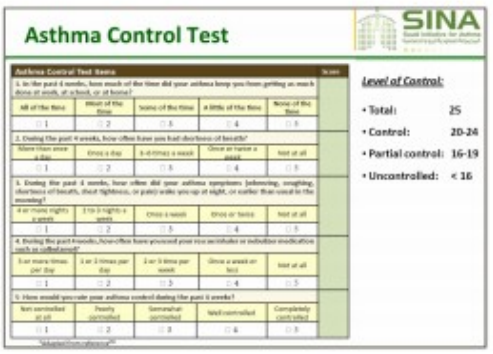
Although the chest might be normal during physical examination bilateral expiratory wheezing might be present and be suggestive of a diagnosis of asthma. Other allergic manifestations, such as atopic dermatitis and/or eczema, also support the diagnosis of allergic asthma. The presence of a localized wheeze, crackles, stridor, clubbing, or heart murmurs should suggest alternative diagnoses for asthma. Asthmatic attacks should also be assessed for normal breathing between the attacks.

Assessment of asthma control

The principles of optimal asthma management should consist initially of an assessment of asthma control. This assessment will clarify the extent to which asthma can be controlled by either medications or devices. Through this assessment, the disease will be classified as controlled, partially controlled, or uncontrolled. Several pieces of information are necessary to determine whether asthma can be controlled. This includes previous history of near fatal asthma, medications taken by patients, and heavy use of nebulizers and number of visits to emergency departments. Parallel to this information, patients should also be assessed for severity of acute attacks through pulse oximetry and peak expiratory flow (PEF). Further, patients might also be assessed for their ability to complete sentences in a single breath as well as their silent chest and weak respiratory effort.

Assessment when control is not achieved

- Medications and doses currently used
- Patient's adherence and correct technique in using devices
- Selection of the appropriate device and appropriate prescription of spacer with metered dose inhaler (MDI) device
- Problems and difficulties faced by the patient taking the medications (e.g., cost, time, and lack of perceived need)
- Patient's concerns about asthma medications.



Asthma Control Test

Asthma severity was historically used as the entry point to determine the management strategy. This trend has been replaced by the concept of asthma control (Nathan *et al.* 2004). Asthma control is a reflection of the adequacy of management by describing the clinical status of a patient as controlled, partially controlled, or uncontrolled. SINA expert panel recommends the utilization of asthma control test (ACT) to initiate asthma treatment in adults and adjust it at follow-up. It consists of five items including limitation of activity, shortness of breath, frequency of night symptoms, use of rescue medication, and rating of overall control of the disease over the past 4 weeks. The score of ACT is the sum of the five questions where each is scored from 1 (worst) to 5 (best), leading to a maximum best score of 25. The clinically important change in ACT score is considered ≥3 units. The level of asthma control is categorized into:

- Controlled: An ACT score of ≥20
- Partially controlled: An ACT score of 16–19
- Uncontrolled: An ACT score of <16.

Stages of asthma severity and risk

Persistent asthma is divided into mild, moderate or severe stages of severity that help your doctor determine the best daily therapy for you. According to symptoms, life interfere, severity and risk, asthma could be intermittent, mild persistent, moderate persistent, severe persistent, or life-threatening.

Stage of severity	Symptoms	Night time Symptoms	PEF
Step 1 Intermittent	<1 time a week Asymptomatic & normal between attacks	<2 times a month	>80% Predicted variability <20%
Step 2 Mild Persistent	>1 time a week But <1 time a day	>2 times a month	>80% Predicted variability 20-30%
Step 3 Moderate Persistent	Daily Use B2 agonist daily Attacks affect severity	>1 time a week	<80% Predicted variability >30%
Step 4 Severe Persistent	Continuous Limited physical activity	Frequent	<60% Predicted variability>30%

Intermittent, in which

- Occasional symptoms that happen less than two days each week
- Asthma awakens you at night less than twice each month
- You need to use your rescue inhaler less than two days a week
- Asthma does not interfere with your normal activities
- Your measured Peak Flow or lung function is greater than 80% of your personal best or the predicted average for someone like you

Mild Persistent

- Symptoms more than twice a week, but not daily
- Asthma awakens you at night 3-4 times each month
- You need your rescue inhaler more than twice a week, but not daily
- You have shortness of breath, but only with activity
- Your measured Peak Flow or lung function is still greater than 80% of your personal best or the predicted average for someone like you

Moderate Persistent

- Symptoms occur every single day
- Asthma awakens you at night more than once a week, but not every night
- You need your rescue inhaler every single day
- Shortness of breath limits usual activities
- Your measured Peak Flow or lung function is less than 80% of your personal best or the predicted average for someone like you

Severe Persistent

- Symptoms throughout the day
- Asthma awakens you often each night
- You need your rescue inhalers several times each day
- You are short of breath even when doing regular activities or resting, and it interferes with conversations
- Your Peak Flow or lung function is less than 80% but greater than 60% of your personal best or the predicted average for someone like you

Level	Characteristics	
Near fatal asthma	Raised $PaCO_2$ and/or requiring mechanical ventilation	
Life threatening asthma	**Any one of the following in a patient with severe asthma:** - PEF <33% best or predicted - Bradycardia - SpO_2 <92% (PaO_2 <60 mmHg) on high flow FIO_2 - Cyanosis - Dysrhythmia	- Hypotension - Normal or high PaCO2 - Exhaustion - Confusion - Silent chest - Coma - Weak respiratory effort
Acute severe asthma	**Any one of:** - PEF 33–50% best or predicted - Respiratory rate ≥25/min	- Heart rate ≥110/min - Inability to complete sentences in one breath
Moderate asthma exacerbation	- Increasing symptoms - PEF >50–75% best or predicted - No features of acute severe asthma	
Brittle asthma	**Type 1:** Wide PEF variability (>40% diurnal variation for >50% of the time over a period >3–6 months) despite intense therapy	**Type 2:** Sudden severe attacks on a background of apparently well controlled asthma

It is important to realize that a severe asthma attack is possible at any level of asthma severity and may become life threatening as described here:

LIFE-THREATENING

- Your peak flow is less than 50% of your personal best
- You are too short of breath to speak
- You are sweating, confused or weakYour skin is turning gray or blue
- You are at risk of death and should seek immediate medical attention (call 997 and/or be taken to the nearest emergency room

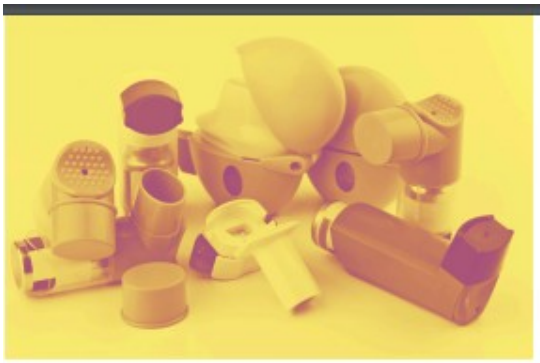
Oxygen and other medications are used through devices to control asthma such as Salbutamol with the response to these medications may determine patients' need for further treatment or even hospitalisation. For example, patients may need doses to be repeated or Salbutamol may be continuous for more than one hour if there is no or inadequate response to initial treatment.

Salbutamol Nebulizer Use

Combining medications may be considered to reduce hospitalisation such as Ipratropium with Salbutamol which are used to improve peak expiratory flow and the forced expiratory volume (FEV) in the moderate and severe acute asthma. Using systematic steroids and aminophylline are other options which are given for 7 days adults patients suffering with acute asthma.

Devices like pulse oximetry are used to tailor oxygen therapy with failure to achieve oxygen saturation of more than 92% may indicate the need for hospitalisation. High PaCo2 is an indicator of a sever attack and need for specialist consultation

Pulse Oximeter



Other common medications to control asthma

Control medicine is used on a daily basis to control inflammation which makes it necessary for patients to care for themselves. This also helps prevent the permanent damage of airways and decreases the frequency of asthma flares (exacerbations). There are several types of medications which are common and used to maintain and control asthma and airway inflammation which can also be prepared and used at home and by patients themselves.

1. Inhaled corticosteroids, acting directly on the site of inflammation and considered as the most effective control medications. Steroids stimulate proteins in the body that fight inflammation and they block other proteins that cause inflammation. They stop asthma and prevent the inflammatory reaction in the airways before it can cause damage. This group of medication is with minimal side effects.

2. Long-acting Beta agonists (LABA) simply relax the smooth muscles around the airways. They do nothing with inflammatory cause of asthma. Rather, they are used together with inhaled steroids so they can help control bronchospasm for twelve hours or longer. This type of control medicine should be used with steroids to control asthma. Alone, it can actually increase the frequency of asthma flare-ups.

3. Cell Stabilizers (Cromolyn and Nedocromil) are inhaled medications that stabilize the walls of cells that can cause inflammation. If these cells are stronger and cannot break open, the frequency of asthma attacks is decreased. Cell stabilizers tend to be weaker medications, but help some people who do not need the stronger steroids.

4. Leukotriene Modifiers are oral medicines (taken by mouth). Certain cells make chemicals called leukotrienes which increase inflammation, increase swelling, and cause the airway muscles to tighten up. These modifiers work on leukotrienes and block their action or production which consequently reduce asthma symptoms, especially if used together with inhaled steroids.

5. Injectable (shots) Immunomodulators are for people with moderate or severe allergic asthma that persists in spite of all other attempts at control. These medications block IgE, a part of the immune system that we all have, but one that is responsible for allergy symptoms. Injectable immunomodulators are quite expensive and can (rarely) cause severe allergic reactions, so their use must be worth the cost and the risk.

6. Theophylline is a traditional oral medication that is occasionally used for asthma control. Theophylline requires testing blood levels, and has now been replaced by more effective, less problematic medications.

Risk factors and possible action plan to manage asthma at home or contact professional team to help.

The following risk factors may worse asthma symptoms and complications with the presence of any of them might worses asthma despite controlled asthma status.

- High usage of asthma medications
- Inadequate inhaled corticosteroid (ICS) use
- Low forced expiratory volume in 1 s (FEV1)
- Previous Intensive Care Unit (ICU) admission
- History of severe asthma exacerbation (in the previous 12 months)
- Major psychological disorders or low socioeconomic status
- Continuous exposure to allergens like dust
- Asthma with the presence of comorbidities (sputum or blood eosinophils)
- Asthma with pregnancy

Even with these factors, assessing the severity of asthma is essential for proper treatment and management. Asthma may vary over months or years…Mild, moderate, or severe. This classification is essential to plan treatment; monotherapy or combination.

Communication and partnership with patients

Partnership between patients and health care professionals may enhance knowledge, skills, and attitudes toward understanding asthma and managing it properly.

A self-management plan for asthma should be available to patients.

Adherence to asthma management is essential to control asthma which might be due to different factors:

- Poor inhaler technique
- A regimen with multiple drugs
- Concern regarding side effects from the drugs
- The cost of medications
- Lack of knowledge about asthma
- Lack of partnership in its management
- Inappropriate expectations
- Underestimation of asthma symptoms
- Use of unconventional therapy
- Cultural issues

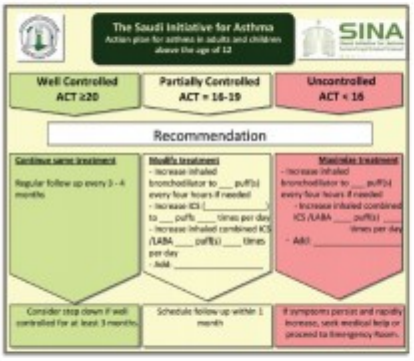
Is there anything to do before treatment?

Asthma Education

The goal of asthma education is to provide asthma sufferers with adequate training to enhance their knowledge and skills to be able to self-care asthma and adjust treatment according to guided self-management. Patients need a specific type of knowledge and skills to help them use such devices to control asthma, as there maybe misperceptions about avoiding asthma triggers as well as the use of these devices safely.

Avoiding asthma triggers

There are simple measures to take before developing asthma and its complications. These measures might prevent or decrease asthmatic attacks.



Asthma Triggers

Rinse your nose every time you brush your teeth. This will help decrease allergic reactions, upper respiratory infections, and sinus infections – all of which can cause more asthma attacks.

Wash your hair at night before you go to bed if you have been outside when pollen levels are high. This will help prevent your nose being on a pillow that is contaminated with allergens from your hair.

Monitor your peak flow to prevent severe exacerbations and faithfully use your Asthma Action Plan.

If you failed to control your asthma with these measures so you need to see your doctor and possibly many times for asthma check-ups and lung function testing. Within this you need to use daily medications (controllers) as instructed by your doctor to *prevent* inflammation of your airways.

Potential Action Plan

It is the time now to know about such action plan to control asthma and maintain health while at home. The Asthma Action Plan has been shown as the cornerstone of asthma management. At this point you should better understand asthma as a disease and know about such treatments and devices like Peak Flow, about triggers, and about the symptoms that asthma causes. We remind you here that you have learned about the common medications to control symptoms and to control airway inflammation. It is time to put it all together into your personalized Asthma Action Plan!

This education plan will help you to develop an Action Plan for you, which you can use to monitor and help to manage your asthma. It helps you decide when and how to deal with asthma exacerbations.

The Action Plan will:

- Help you learn to recognize early signs of asthma attacks
- Help you monitor your Peak Flow to identify decreased lung function
- Give you guidance on how to use and adjust your medications
- Remind you to identify and remove asthma triggers
- Help you monitor your treatment and seek your doctor's advice if your response to medications is not adequate
- Allow YOU to control your asthma instead of letting asthma control you!

16

Asthma and lifestyle

Asthma is chronic disease and may stay for life. So would you embarrassed by your asthma? Would you angry that you do not know and need to know have to deal with this? How can you handle your feelings about this disease? Here we will advise you to practice good self-care which may give you back a sense of control. At this point, you absolutely need to find a skilled healthcare provider who will work with you, to provide help when you need. The healthy lifestyle with its all aspects will help you and can work for you. A healthy lifestyle for people with asthma lets you manage your symptoms, prevent complications, and enjoy your day to day activities.

The asthma lifestyle includes:

- Working and contacting with your doctors to achieve control
- Attending workshops to learn about asthma and how to control it
- Never smoking
- Using your Asthma Action Plan
- Understanding and using your medications correctly
- Being aware of symptoms that come with asthma attacks
- Using your Peak Flow meter to monitor yourself daily
- Controlling asthma triggers and creating an asthma-friendly home and workplace
- Exercising regularly
- Reducing stress
- Becoming an expert on asthma and educating your family and friends

In this booklet, we have focused and stressed that asthma is not supposed to control your life. Sometimes, especially when you are first diagnosed, you find it difficult to imagine a normal lifestyle, but remember that if you managed to control your symptoms you will enjoy your life and forget asthma. This can be a reality!

QUESTIONS ?

Is there a program at the moment to know about my asthma ?

Yes, this program is part of a research study which aims to develop and test the impact of a culturally specific patients' self-management education programme in Saudi adults with asthma. This study will provide a self-care package to help patients with asthma to manage their asthmatic attacks while they are at home.

You will have an important role in this program and play an important role while the program is being delivered by nurses and health care professionals. You will need to attend all program sessions (See time table) and tests (prior to the program and two times within 6 months after the program has been delivered). The program manager Mr Hamad Dailah will be your reference if you have any queries or need further explanation on such point. This program is part of a PhD study conducted by Mr Dailah and involves delivering an information program for a group of patients which is the intervention part of the study. A simple test to evaluate participants' knowledge will be distributed to you before and after the program been delivered as you knew earlier. The researcher, Mr Hamad Dailah, will work with health professionals hand by hand to ensure the program is delivered and evaluated properly and meets high quality standards. If you have any questions about this program, please feel free to contact Mr Hamad Dailah at (*07767713885*).

Your participation is much appreciated.

Sincerely,

Hamad Dailah

The Program

The program is approved by the University of Salford and King Fahad Central Hospital in Jizan. The program is a two-day program developed by the researcher with cooperation with clinicians, nurses and other respiratory health experts in Jizan hospital. It is designed to motivate patients to manage and self-care their asthma at their homes. This program considers patients' beliefs about their asthma and their medicines, improving self-management and adherence. With the careful preparation and delivery of the program, patients will leave the programme with new confidence and skills to deal with and manage their asthma independently. They will also have a better understanding about how necessary knowledge and skills will be combined with their beliefs about adherence and self-care and help them to self-care themselves within their cultural values.

The current program was designed as part of PhD study and includes an education program for patients in Jizan area and will be delivered by trained staff (nurses, doctors, respiratory therapists, and so on) for patients with asthma. Prior to the consideration of the program in Jizan health care settings, it will be tested on a small number of patients who suffer with asthma. This part of the study will therefore develop and test the impact of a culturally specific patients' self-management education programme in Saudi adults with asthma. The study will then help to provide those concerned professionals such as nurses, doctors, and respiratory therapists with the necessary education and training that enables them to help patients and their families to self-care asthma and use such related devices to control their respiratory symptoms during asthmatic attacks. This professionals' training will be part one of the study to assure sufficient knowledge as well as skills on how to deliver the program equally by educators. This will then followed by part two in which patients will be educated and trained by these professionals on self-management of asthma through managing medications and devices.

Part One: Training of nurses and health professionals

Why is the program?

This program aimed to provide nurses and health professionals with the necessary knowledge and skills on managing asthma which would enable them to deliver the intervention program for patients (Part two).

Who will deliver the program?

The researcher will lead a team of experts in King Fahad Central Hospital to prepare and deliver the program for professionals.

Who are the attendees of the program?

Those nurses and health professionals who worked for at least two years with patients suffering with asthma.

Where the program will be held?

The program will be provided in the conference avenue in King Fahad Central Hospital in Jizan.

When will the program be held and for how long?

The program will be held over two days on the 3rd and the 4th of September 2018 and will be repeated on the 17th and 18th of September for those who missed sessions or been late to join the program.

Do attendees have to pay for the program?

No, the program will be totally free

Will professionals be paid for program delivery?

The professionals will be delivering the program as part of their daily activities. However, the program will be certified and the researcher worked with the hospital administration for awards for professionals.

How professionals will be selected for the program?

They will be evaluated and those with high scores would be selected with experience will also be considered

Program themes

- **Theme One**: Understanding the nature of asthma; triggers and worsening symptoms and asthma effect on activities of daily living
- **Theme Two**: Importance of asthma self-management and managing attacks. Within this theme, medications and other treatments to control asthma were provided.
- **Theme Three**: demonstration on using devices in managing asthma; Peal Flow reading, inhalers and other devices.
- **Theme Four**: Risk factors and possible action plan to manage asthma at home or contact professional team to help.
- **Theme Five**: Communication with patients

Program Time Table

The program will be run as a two-day sessions preceding the intervention delivery, held in conjunction with Jizan Hospital. It was planned to be conducted on the 3rd and 4th of September 2018 with the rest of the week was planned for the alternative session plan (17th and 18th of September 2018) either to provide professionals with further knowledge they might ask for or to train other members if any of them withdrawn from the first session plan. Nurses and professionals will then be oriented to the study instruments to help them understand and be ready to answer any potential question posed by patients during the patients' session. This will give more chance for the intervention to be feasible and well applicable in the following week (17th and 18th of September 2018) The program and its scheduling was arranged and coordinated by the management office in the hospital. The program will be presented by a team of experts from nurses and health care professionals, which included nurses, asthma and respiratory educators, practice nurses and respiratory scientists. At the end of the program, participants from nurses and health professionals will be evaluated using a suitable tool based on the program content to help selecting those who will deliver the intervention.

Part Two: Self-management education for patients with asthma

This part is educating patients to help them self-care themselves and manage asthma. Patients will then be provided with knowledge and skills on how to manage asthma with a test before and after the program to evaluate how effective it was. Following the post-test, patients will also be interviewed to further explain issues related to their asthma and its management. Below is a program time plan for the program.

A summary of asthma education sessions What is asthma? (Cognitive domain)	Delivered on the 1st day including demonstration of asthma characteristics using models, pictures & a parachute team-building game. Materials were gathered from SINA & other illustrative images available from other online resources.
What is your inhaler? (Cognitive and psychomotor domain)	Delivered on the 1st day including explanation about inhaler therapy, and indication & time of use. Then, demonstration and re-demonstration of different types of inhalers, showing how they work. Each student had the opportunity to perform the use of inhaler using a virtual inhaler.
What makes your asthma worse? (Cognitive and affective domain)	Delivered on the 2nd day including an explanation of the importance of understanding the impact of asthma on daily living activities. In addition, identification of asthma triggers using model toy kit and accompanying worksheet. Trigger-avoidance and prophylactic treatment were also applied. SINA and British Thoracic Society materials were used.
Managing an asthma attack (Cognitive and affective domain)	Delivered on the 3rd day including sessions of how to recognise and prevent asthma complications. Education of how to anticipate serious exacerbation of asthma and ways of managing asthma attacks.

Target Output **Presenter**	**Session Components/aim/Material**	**Time**
Day One		
Understanding Asthma and possible patients' practices GP DR.....	Demonstration of asthma characteristics using models and visual aids. Will support shared decision making by supporting patient knowledge and understanding of best practices and why these practices are used. ***(Materials gathered primarily from SINA)***	9 -10 AM
Understanding the nature of asthma; triggers and worsening symptoms and asthma effect on activities of daily living GP DR.....	Explanation of the importance of understanding the impact of asthma on one's activities of daily living. Identification of asthma triggers as well as trigger avoidance techniques and other prophylactic treatments ***(Supporting materials from SINA)***	10-10:30 AM
Coffee Breakfast (30 Minutes)		
Asthma and pregnancy GP DR.....	Understanding pregnant women practices to manage asthma and keep their pregnancy safe. ***Material gathered primarily from Medical references and Asthma UK***	11-11:30 AM
Understanding the importance of asthma self-management Specialized Nurse Mr/s.....	Presenting figures and case reports about visiting emergency departments as well as re-admissions Showing costs of hospital treatment and risk for travel with the availability of other possible self-management services. ***(Material gathered primarily from systematic review and Asthma UK)***	11:30 AM-12 PM
Managing an Attack Shared session Emergency nurse and respiratory nurse	Support shared decision making by supporting patient knowledge and understanding of practices. How to recognize and prevent asthma complications How to anticipate serious exacerbation and to respond to and manage asthmatic attacks ***Material gathered primarily from and Asthma UK and emergency plan in KFCH)***	12-1 PM
Understanding patients' possible response to asthmatic attacks Emergency Nurse Mr/s..... ***With conclusion of day one***	This session provide patients with their potential activities and responses if their asthma gets worse Through this session patients will be provided with helpline and other communications to get in touch with their doctors or nurses when their asthma gets worse and they are not able to manage it. ***(Material gathered primarily from SINA and help desk in King Fahad Central Hospital)***	1 -2 PM
Lunch Time 2-3 PM		

Program Time Table

Day 2		
Action Plan: training on managing asthma control; Peal Flow reading, taking medication, using inhalers and other devices Respiratory therapist Mr/s.....	Supporting patients' knowledge base to understand and acquire skills that enable them to assess their condition and make their decision to select activity and practices to use their medication and devices to manage their asthma. This includes demonstration on these activities through offering a real situation for performing activities using devices along with teaching and visual material. ***(Material gathered primarily from Asthma UK, SINA and help desk in King Fahad Central Hospital)***	9-10:30 AM
Coffee Break (30 Minutes)		
Patient gendered group discussion	Shared training and application through small group discussions and individual meetings of patients	11-11:30 AM
Gender Segregated Small Group Discussions	Agree gender segregated group discussion showing shared fears, concerns, and difficulties for multi-disciplinary support team work (nurse leader/ clinician/respiratory therapist) to manage and train this group of patients.	11 AM-12 PM
Evaluation of patients' level of independence to self-manage their asthma Shared session Specialized nurse and respiratory therapist	Use of Patient Activation Measure (PAM) to measure and appropriately gauge patient's progress and confidence in Asthma self-management skills and assess further education needs to build a more effective program through each section of self-management educational development. Nurse leader asks each participant to describe current self-management and questions regarding knowledge base. This allows the nurse leader to provide needed knowledge and understanding to patients and discuss personal decision making in self-management.	12-2 PM
Lunch Time 2-3 PM		
Program End		

“ *The author would thank Professors Alison Brettle and Paula Ormandy for their great support to develop this guide*

“ *Thanks for The Dean of the Nursing College at Jazan University Dr. Mohammed Arishi and the Director of Academic Affairs and Training in Health Jazan, Dr. Ibrahim Al-Naimi for their help and continued support in this stage of my study*

“ *Thanks for the research assistances who kindly gave their time toward the data collection and delivered with me Education Program for asthmatic patients*

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10.2. APPENDIX 2: ETHICAL APPROVAL

University of Salford MANCHESTER

Research, Innovation and Academic Engagement Ethical Approval Panel

Research Centres Support Team
G0.3 Joule House
University of Salford
M5 4WT

T +44(0)161 295 2280

www.salford.ac.uk/

19 October 2017

Dear Hamad,

RE: ETHICS APPLICATION–HSR1617-122–'Culturally Competent Adult Asthma Self-Management Education in Saudi Arabia.'

Based on the information you provided I am pleased to inform you that application HSR1617-122 has been approved.

If there are any changes to the project and/or its methodology, then please inform the Panel as soon as possible by contacting Health-ResearchEthics@salford.ac.uk

Yours sincerely,

Sue McAndrew
Chair of the Research Ethics Panel

Ethics Approval Form for Post-Graduate Researchers

10.3. APPENDIX 3: STUDY PARTICIPANT CONSENT FORM- QUANTITATIVE STUDY

RESEARCH STUDY
Participant - CONSENT FORM
for Quantitative Study

Title of Project: Culturally Competent Adult Asthma Self-Management Education in Saudi Arabia

Name of Researcher(s):

	YES	*NO*
I confirm that I have read and understand the information sheet (*Dated: V1.3 18.10.17)* for the above study and I have had the opportunity to **raise** questions.	☐	☐
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, **and** without my legal rights being affected. I understand that if I wish to withdraw, and my data removed from the study, I need to inform the researcher within 1 month of my data being collected.	☐	☐
I understand that my name and involvement in the study will remain confidential.	☐	☐
I understand that any personal information about me such as me email contact address will **not be disseminated or disclosed to anyone** other than the study team and will only be used for this research.	☐	☐
I understand that the information I provide could be used as part of the final study report or journal publications, but any comments used will not be identifiable to me.	☐	☐
I agree to take part in the quantitative portion of the study, as described above.	☐	☐

University of Salford MANCHESTER

D Date Signature

Hamad Dailah

Name of Researcher

Date

(V1.3. 18.10.17)

10.4. APPENDIX 4: CONSENT FORM- QUALITATIVE STUDY

RESEARCH STUDY
Participant - CONSENT FORM
for Qualitative study

Title of Project: Culturally Competent Adult Asthma Self-Management Education in Saudi Arabia

Name of Researcher(s):

	YES	***NO***
I confirm that I have read and understand the information sheet (*Dated: V1.3 18.10.17)* for the above study and I have had the opportunity to **raise** questions.	☐	☐
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, **and** without my legal rights being affected. I understand that if I wish to withdraw, I need to inform the researcher within 1 month of being interviewed. If this is my choice, I understand my data will be **cleared and marked for disposal** and **won't constitute** any part of the study	☐	☐
I understand that my name and involvement in the study will remain confidential.	☐	☐
I understand that any personal information about me such as my email contact address **not be disseminated or disclosed to anyone** other than the study team and will only be used for this research.	☐	☐
I understand that the interview will be audio recorded.	☐	☐
I understand that the information I provide could be used as part of the final study report or journal publications, but any comments used will not be identifiable to me.	☐	☐
I agree to take part in a qualitative interview as described above	☐	☐

Name of Participant	Date	Signature
Hamad Dailah Name of Researcher	Date	Signature

(V1.3 18.10.17)

10.5. APPENDIX 5: PARTICIPANT STUDY INFORMATION SHEET CODE:

Participant Information Sheet

Research Study:

You are invited to participate in this study entitled Culturally Competent Adult Asthma Self-Management Education in Saudi Arabia.

Do I have to take part?

Participation in this study is entirely voluntary**. P**lease read this information sheet to help you decide whether you wish to participate.

What is the purpose of the research project?

The study will evaluate the potential benefits of a clinician provided, culturally sensitive, asthma self-management education program, specifically focused on patients in the Kingdom of Saudi Arabia (KSA). The study will focus on the impact of the self-management program on patient knowledge and outcomes.

What will I have to do if I take part?

If you agree to participate in this research study, you will receive information and education about managing your asthma from specially trained nurses.

Participation will be for a period of 3 and 6 months. Participants will be divided randomly into two groups.

The first group will receive education from a nurse at the asthma clinic where you normally visit to manage your asthma. This group will be given materials to help manage their asthma on a day-to- day basis. The effectiveness of this education will be measured by completing questionnaires before the education program and again 3 and 6 months after the education program.

The second group will complete the questionnaires 3 and 6 months apart. After 3months, this group will be provided with the education program to help them manage their asthma on a day to day basis

A) You will be asked to complete four questionnaires enclosed with this information package**.** It should take you approximately10to 15minutes to complete each questionnaire. After 3 months you will be asked to complete these questionnaires again. the study questionnaires for the female respondents will be completed by the participant and a female staff nurse in the asthma center since the researcher acknowledges the religion and cultural implication of gender sensitivity in the locale of the study. Moreover, all female participants will be asked whether they prefer to have a female nurse, or their spouse or relative present during the interview in order to overcome such issue.

By doing this, your involvement for the first phase of the research will be completed.

B) You will also be asked if you are willing to participate in a one-on-one interview at the end of the study. The interviews will collect information on your views of the education (whether it was helpful and recommended improvements). The interviews will last up to one hour and will take place at King Fahad Central hospital. The volunteering action is not contingent. Your eligibility for being interviewed is not conditional on whether you are volunteer or not. Interviewed participants will be selected to represent (e.g., by age and gender) those who have received the education.

What benefit or risk is there to me if I participate in the research?

If you participate in this study, you will not receive any payment for your participation; however, you will receive information and education about managing your asthma from specially trained nurses. This should help you to manage your condition in the long term. You may receive the education soon after you agree to participate, or you may need to wait 3 and 6 months. You will need to travel to King Fahd Central Hospital Jazan, KSA for a 2-days education program. You will not receive any travelling expenses for this.

A timetable of the 2 days program is included in this pack (Please see appendix 9)

Your participation will also assist the researcher to develop a culturally sensitive, health education resource for adult asthma patients in the KSA, which will hopefully improve the lives of Saudi adults with asthma in the long term. It will also fulfill the requirement of the researchers PhD program. Being involved in this research will cause no harm to you or your family.

How will you use the information I provide and keep it confidential so no-one can recognize it was from me?

All information you provide will be kept confidential. To support the confidentiality of your responses, you will receive a personal code number which will replace your name on any documents relating to the study. No personal identifiable information will be collected with the responses. Your responses to the questionnaires, personal and clinical information, and if applicable, your contribution within the interview will be downloaded and stored safely and confidentially on a password protected computer. Any

recordings will be removed from the audio-tape recorder. Five years after the study is completed, all data collected in relation to the study will be destroyed.

What if I agree to participate then want to withdraw?

You can withdraw from the research at any time during the study by contacting the

Researcher directly and providing your personal code available at the upper right of your information sheet without giving a reason why. By doing this, all information you have provided, and your contact details will be removed from the study database and you will not be contacted further. Also, all possible comments made by you will be removed from discussion transcripts and will not be used in the study findings.

How will the study findings be published?

The outcomes of the study will be used for their searcher's PhD thesis and will be written in a way that protects the identity of the people who participate. The same procedures will be applied when publishing any study reports or articles. Participants have the right to ask for a copy of the thesis when published.

What if I want to complain about how the research is being conducted?

This study is being sponsored by the University of Salford, UK. 'If you remain dissatisfied

regarding any aspect of how this research is being conducted then please contact your nurse educator in the Nursing Department who speaks Arabic or email the supervisor of the researcher (in English) whose contact details are provided below. You may also contact *Dr. Sue McAndrew, Chair Ethics Committee, School of Health and Society, University of Salford, Salford, M6 6PU. Tel: 00 44161 295 2778. Email: smcandrew@salford.ac.uk*.

If you have any questions about the study that require clarification, then please contact the researcher who can speak both English and Arabic or the researcher's supervisor (who speaks English only). Their contact details are provided below

Searcher:

Hamad Dailah

PhD student at the University of Salford, UK Email:
h.g.h.dailah@edu.salford.ac.uk

Telephone: 00447448856512 (UK) or 00966556759506 (Saudi Arabia)

Supervisor:

Alison Brettle

Professor Health Information and Evidence Based Practice

Director Post Graduate Research, School of Health and Society

University of Salford

SALFORD

M6 6PU

Tel : 0161 295 0447

Email : a.brettle@salford.ac.uk

Thank you for taking the time to read this information

(V1.3 18.10.17)

10.6. APPENDIX 6: DRAFT INTERVIEW GUIDE

Opening

After welcoming and thanking the participants for their involvement in this phase, the participants will be asked to talk about their experience in asthma self-management before and after educational program.

Then, the researcher will start the interview by asking open-ended questions based on the concepts and domains of the theory of Patient Activation Measure and the results of the questionnaires.

My name is Hamad Dailah, I am undertaking a large research project as a part of my PhD study and am interviewing you today to explore your perceptions and experience of the education program you have recently participated in, and how, if at all, you have changed how you manage your asthma, and whether your level of knowledge related to asthma self-management has changed. As a researcher I am not asking you any questions to make a judgment on how you manage your asthma or how you embed culturally within your life, but just to understand your experience.

A. General

-Who do you live with, family, other?

-How many children do you have, and their ages?

-Is there any relative other than core Family, grandparents, grand children, brother, sister?

-What do you do for a living /work? Are you a breadwinner?

-How often do you socialize? With whom do you have a network of friends, community?

B-Knowledge

-Do you feel you have a good knowledge about your asthma?

-What information have you received? From whom?

- How did the asthmas education program for this study improve, if at all, your knowledge with regard to asthma?

-Do they have a training program for asthmatic patient at the hospital? If yes, can you describe it?

-Have health professionals explained the complication of asthma to you; if yes, what have you been told, and what do you understand?

-Do you feel you understand your condition enough to be able to manage it effectively? If yes, how and why, and if not, why not?

C – Asthma self-management

-How do you manage your asthma day-to-day?

What does self- management mean to you?

Would you say that your asthma is well-controlled, uncontrolled, stable, etc.?

Do you feel that the health professional is more in charge of your asthma than yourself and why or why not?

Do you follow the advice of the health professional? If so, what is that advice and from whom do you get it?

What strategies do you use to control your asthma triggers?

Are you confident in doing peak flow by yourself, why or why not?

Do you believe that culture directs how you live your life and manage your asthma (if so and How”?

Perceptions of the education program

Did you attend the education sessions?

Do you use the materials you were given in the program?

What was the most helpful thing about the education program?

What was the least helpful thing?

10.7. APPENDIX 7: RISK ASSESSMENT SUMMARY OF STUDENT PROJECTS

All student projects must include risk assessment. If this summary assessment of the risk proves in significant: i.e. answer no to all questions, no further action is necessary. However, if you identify risks you must identify the precautions you will put in place to control these.

Please answer the following questions.

1. What is the title of the project?

Culturally Competent Adult Asthma Self-Management Education in Saudi Arabia

2.Is the project purely literature based? NO

If YES, please go to the bottom of the assessment and sign where indicated. If NO, complete question3 and then list your proposed controls.

3.Identifying the Risks

Hazards	**Risks**	**If yes, consider what precautions will be taken to**
Use of ionizing or non ionizing radiation	Exposure to radiation **NO**	Obtain copy of existing risk assessment from place of Research and attach a copy to this risk assessment summary.
Use of hazardous substances	Exposure to Harmful substances **NO**	Obtain copy of existing risk assessment from place of research and attach a copy to this risk assessment summary.

Use of face-to-face interviews Interviewees could be upset by interview and become aggressive or violent toward researcher	Interviewing; Own classmates=Low risk **no** Other University students=Medium risk **no** Non-University personnel=High risk **Yes**	NB Greater precautions are required for medium &high risk activities Consider: How will contact with participants be made- i.e.do not give out personal mobile no., home number or home email, etc. Location of interviews–to be held in a safe environment, e g University building, work place What support will be available, i.e. will anyone else be available to assist if you call for help, etc. e.g. colleague knows where interview to take place and telephoned when completed and safe-what action to take after certain time

Interviewees could become upset by interview and suffer psychological effects		What to do if researcher uncovers information regarding an illegal act? What/who will be used to counsel distressed participants/ Interviewees ,what precautions will be taken to prevent this from happening?
Sensitive data	Exposure to data or Information which may cause upset or distress to	Consider: What initial and subsequent support will be available to the researcher
Physical activity	Exposure to levels of excerption unsuitable for a individuals level of	Consider: Health Questionnaire/Medical declaration form /GP clearance.
Equipment	Exposure to faulty unfamiliar equipment.- **NO**	Consider: Equipment is regularly checked and maintained as manufactures instructions. Operators receive adequate training in use of. Participants receive induction training prior to use.
Sensitive issues i.e. Gender/Cultural e.g. when observing or dealing with undressed members of the opposite sex	Exposure to vulnerable situations/sensitive issues that may cause distress to interviewer or interviewee **YES**	Consider: Use of chaperones/Translators. What initial and subsequent support will be made available for participants or interviewees?
Manual Handling Activities	Exposure to a Activity that could result in injury- **NO**	Adapt the task to reduce or eliminate risk from manual Handling activities. Ensure that participants understand and are capable of annual handling task beforehand. Perform health questionnaire to determine participant

If you have answered yes to any of the hazards in question 3, please list the proposed precautions below:

Face-to-face interviews

The interviews will take place in Saudi Arabia, and in the home town of the researcher. The semi- structured interviews will take place face-to-face and will be used to provide a deeper understanding of the impact and benefits of implementing a Culturally Competent Adult Asthma Self-Management Education program in Saudi Arabia. It will also enable the researcher to explore the application of the educational theory and Patient Activation Measure (PAM) to explain and offer new insight into the impact of the program. Interviews will be conducted in Arabic language, spoken by both the researcher and the participants. The interview should last for no more than1hour and will be digitally recorded and transcribed verbatim. Interviews will take place in a quiet room within the asthma center.

The interview participants have the right to terminate the interview if they feel uncomfortable. If any participant becomes aggressive during the interview, the researcher will terminate the interview after thanking them for their involvement in this phase of the study.

Male researcher interviewing female participants

The ethical issue of interviewing a female participant by a male researcher needs to be considered carefully in Saudi Arabia. Saudi Arabia is a Muslim country and, therefore, the relationship between different genders must be maintained and treated according to Islam's teachings. For example, unnecessarily private meeting between a man and a woman who

are not legally related to each other should be avoided. Therefore, the study questionnaires for the female respondents will be completed by the participant and a female staff nurse in the asthma center, since the researcher acknowledges the religion and cultural implication of gender sensitivity in the locale of the study. Moreover, all female participants will be asked whether they prefer to have a female nurse, or their spouse or relative present during the interview in order to overcome such issue.

Recruitment to the interviews will be made via a tear off slip attached to the questionnaires in the quantitative phase (appendix 13). Participants will leave their contact details so that they can be contacted by the researcher. Interviews will be conducted in a private setting within a safe, public environment, such as a conference room at the clinic. A colleague research assistant will be available during the interviews to ensure both participant and researcher safety. Information for therapeutic intervention or assistance will be provided should the participant demonstrate any aggressive or violent behavior or become upset during the interview process.

10.8. APPENDIX 9: PERMISSION ORGANIZATION MANAGEMENT CONSENT/AGREEMENT LETTER

Kingdom of Saudi Arabia
Ministry of Higher Education
Jazan University

المملكة العربية السعودية
وزارة التعليم العالي
جامعة جازان

الاسم	مسمى الوظيفة	السجل المدني	الجنسية
أ/حمد بن غالب دائله	محاضر	١٠٧٠٢١٦٦٩٠	سعودي

سعادة / مدير إدارة التدريب والابتعاث بصحة جازان **حفظه الله**

السلام عليكم ورحمه الله وبركاته . . . . . وبعد

تهديكم كلية التمريض والعلوم الصحية المساعدة بجامعة جازان أطيب التحايا .ونفيد سعادتكم بأن الموضح بياناته أعلاه أحد منسوبي كلية التمريض والعلوم الصحية المساعدة بجامعة جازان حيث أنه مبتعث بجامعة سالفورد بالمملكة المتحدة للحصول على درجة الدكتوراه في تخصص التعليم التمريضي ومن متطلبات الحصول على الدرجة المذكورة إجراء بحث حسب الإيميل المرفق . عليه آمل من سعادتكم الاطلاع والتوجيه لمن يلزم بتسهيل مهمته .

وتقبلوا أطيب تحياتي وتقديري ،،،

عميد كلية التمريض
والعلوم الصحية المساعدة
٦/١٩
١٤٣٧

د / محمد بن يحيى عريشي

الرقم: ٧٤/٨٦٦ التاريخ: ١٤٣٧/٦/١٥ المرفقات:

المملكة العربية السعودية - جازان - ص.ب: ١١٤ - هاتف: ٠٧٣٢٣٠٠٢٨ - ٣٢٣٢٨٠٠ - ٠٧٣٢٣٠٠٢٩
K. S. A.- Jazan - P.o. Box.:114 - Tel : 073230028 - 3232800 - 073230029 - www.jazan.edu.sa

10.9. APPENDIX 10: ANNOUNCEMENT TO RECRUIT RESEARCH ASSISTANCES

وزارة الصحة
Ministry of Health

University of Salford MANCHESTER

Letter to Director of Nursing at king fahad central Hospital in Jazan Region

Dear xxx,
I am a PhD candidate at the University of Salford in the United Kingdom. The title of my Study is (Culturally Competent Adult Asthma Self-Management Education in Saudi Arabia. The aim is to develop and to test a patient-centred, culturally specific education programme on the self-management of asthma in Saudi adults. I plan to collect data through questionnaire and an interview.

I have permission to conduct the research at the Academic Affairs and Training General Department at Jazan. I am writing to you to determine your willingness in helping to select appropriate nursing staff to deliver the asthma education program. The intervention will include individualized asthma management instruction from a nurse; and small group discussion sessions, led by a nurse. Nursing staff will be trained to deliver the self-management education program for adult asthma patients. Participants will be selected according to the following inclusion criteria:

*Saudi Nurses with two years nursing experience or more.
*Nurses with a BSc qualification.
*Nurses who have at least two years of experience in dealing with adult diagnosed with asthma.

I hope that finding of this proposed study will benefit not only practicing nurses but also the future nursing workforce.

I have enclosed a copy of a participants' information sheet to distribute (eventually)to the selected candidates.

If you require any further information regarding any aspect of the study, please do not hesitate to contact me as follows:

Hamad Dailah
PhD candidate at the University of Salford, UK Email: h.g.h.dailah@edu.salford.ac.uk
Telephone: 00447713885 (UK) or 00966556759506 (Saudi Arabia

10.10. APPENDIX 11: PERMISSION FOR USING ASTHMA CONTROL TEST AND ASTHMA SELF-MANAGEMENT QUESTIONNAIRE IN ARABIC VERSION

From: bakarelbue@yahoo.co.uk

To: hmd-dailah@hotmail.com. Date: Mon, 5 SEP 2017 09:20:33 +0200

Subject: Re: FW: Permission For Questionnaire

Dear Hamad

Of course you can use the questionnaires, that's why we did it. But I will be gladful if you send me any publication later on that has cited this questionnaire.

All the best with your PhD

Abu baker

Dr.Abubaker Ibrahim Elbur

Associate Professor of Pharmacy Practice. Department of Clinical Pharmacy

College of Pharmacy. Pulmonary Consultant MD, SFPD.

King Faisal Medical Complex. B.Sc. Pharm, Pharmacy Director.

King Faisal Medical Complex, Taif, Saudi Arabia.

10.11. APPENDIX 12: THE ARABIC VERSION OF THE ASTHMA CONTROL TEST

استبيان صفات (معلومات عن) المريض

أنثى□	ذكر□	النوع:		
51–65□	36–50□	26–35□	18–25□	الفئة العمرية:
متزوج□	أعزب□	الحالة الاجتماعية:		
تعليم جامعي□	تعليم ثانوي أو أقل□	المستوى التعليمي:		
دراسات عليا□				
غير موظف □	موظف□	الحالة الوظيفية		
يعمل لحسابه□				
يبحث عن عمل □	متقاعد□			

إجراء اختبار مُكافَحَةٌ (السيطرة على) الربو لدى المريض البالغ المصاب بالربو

الدرجة					
	1. في الأسابيع الأربعة الماضية، ما مقدار الوقت الذي عانيت فيه من الربو وبالتالي أثر على إنجازك للكثير من الأعمال في العمل أو المدرسة أو في المنزل؟				
	1) طول الوقت	2) معظم الوقت	3) بعض من الوقت	4) قليل من الوقت	5) لا شيء من الوقت
	2. خلال الـ 4 أسابيع الماضية كم عدد المرات التي عانيت فيها من ضيق في التنفس؟				
	1) أكثر من مرة واحدة في اليوم	2) مرة واحدة في اليوم	3) 3 إلى 6 مرات أسبوعيا	4) مرة واحدة أو مرتين أسبوعيا	5) لم يحدث على الإطلاق
	3. خلال الـ 4 أسابيع الماضية، كم مرة أيقظتك أعراض الربو (الصفير، والسعال، وضيق في التنفس، وضيق أو ألم في الصدر) في الليل أو في وقت سابق عن المعتاد في الصباح؟				
	1) 4 ليال أو أكثر أسبوعيا	2) 2 أو 3 ليال أسبوعيا	3) مرة واحدة أسبوعيا	4) مرة واحدة أو مرتين	5) لم يحدث على الإطلاق
	4. خلال الـ 4 أسابيع الماضية، كم عدد المرات التي استخدمت فيها مِنْشَقة أو بخاخات (مثل ألبوتيرول)؟				
	1) 3 مرات أو أكثر يوميا	2) مرة واحدة أو مرتين يوميا	3) مرتين أو ثلاث أسبوعيا	4) مرة واحدة أسبوعيا أو أقل	5) لم يحدث على الإطلاق
	5. كيف تقيم معدل مكافحة (السيطرة على) الربو خلال الأسابيع الأربعة الماضية؟				
	1) لم تتم السيطرة على الإطلاق	2) تمت السيطرة بشكل ضعيف	3) تمت السيطرة إلى حد ما	4) تمت السيطرة بشكل جيد	5) تمت السيطرة بشكل تام

10.12. APPENDIX 13: THE ARABIC VERSION OF THE PATIENT CHARACTERISTICS QUESTIONNAIRE

(First version)

النوع: ☐ ذكر ☐ أنثى

الفئة العمرية: ☐ 18-25 ☐ 26-35 ☐ 36-50 ☐ 51-65

الحالة الاجتماعية: ☐ أعزب ☐ متزوج

المستوى التعليمي: ☐ تعليم ثانوي أو أقل ☐ تعليم جامعي ☐ دراسات عليا

الحالة الوظيفية ☐ موظف ☐ غير موظف ☐ يعمل لحسابه ☐ متقاعد ☐ يبحث عن عمل

Asthma Control Test (ACT) For Adult Asthma Patient

إجراء اختبار مُكافَحَةٌ (السيطرة على) الربو لدى المريض البالغ المصاب بالربو

الدرجة					
	1. في الأسابيع الأربعة الماضية، ما مقدار الوقت الذي عانيت فيه من الربو وبالتالي أثر على إنجازك للكثير من الأعمال في العمل أو المدرسة أو في المنزل؟				
	1) طول الوقت	2) معظم الوقت	3) بعض من الوقت	4) قليل من الوقت	5) لا شيء من الوقت
	2. خلال الـ 4 أسابيع الماضية كم عدد المرات التي عانيت فيها من ضيق في التنفس؟				
	1) أكثر من مرة واحدة في اليوم	2) مرة واحدة في اليوم	3) 3 إلى 6 مرات أسبوعيا	4) مرة واحدة أو مرتين أسبوعيا	5) لم يحدث على الإطلاق
	3. خلال الـ 4 أسابيع الماضية. كم مرة أيقظتك أعراض الربو (الصفير، والسعال، وضيق في التنفس، وضيق أو ألم في الصدر) في الليل أو في وقت سابق عن المعتاد في الصباح؟				
	1) ليال أو 4 أكثر أسبوعيا	2) 2 أو 3 ليال أسبوعيا	3) مرة واحدة أسبوعيا	4) مرة واحدة أو مرتين	5) لم يحدث على الإطلاق
	4. خلال الـ 4 أسابيع الماضية، كم عدد المرات التي استخدمت فيها مِنْشَقَة أو بخاخات (مثل ألبوتيرول)؟				
	1) 3 مرات أو أكثر يوميا	2) مرة واحدة أو مرتين يوميا	3) مرتين أو ثلاث أسبوعيا	4) مرة واحدة أسبوعيا أو أقل	5) لم يحدث على الإطلاق
	5. كيف تقيم معدل مكافحة (السيطرة على) الربو خلال الأسابيع الأربعة الماضية؟				
	1) لم تتم السيطرة على الإطلاق	2) تمت السيطرة بشكل ضعيف	3) تمت السيطرة إلى حد ما	4) تمت السيطرة بشكل جيد	5) تمت السيطرة بشكل تام

وزارة الصحة
Ministry of Health

University of Salford MANCHESTER

10.13. APPENDIX 14: THE ARABIC VERSION OF THE ASTHMA SELF-MANAGEMENT QUESTIONNAIRE

يُرجى وضع دائرة حول الحرف التي يتوافق مع إجابتك لكل سؤال.

1. إحدى الطرق (الأساليب) لمنع ظهور أعراض الربو ..... هي ا. تناول الأدوية قبل وجبات الطعام ب. تناول الإستيرويد (سموم منشطة) في شكل حبوب ج. الحصول على لقاح الانفلونزا د. الانتقال إلى غرفة الطوارئ في بداية ظهور علامات الأعراض ه. لا أعرف	**4. أدوية المُداوَمَة** ا. تساعد على منع الأعراض في المستقبل ب. لا تحتاج إلى أن تُؤخذ كل يوم ج. تجعلك تتنفس بشكل أفضل بعد تناولها د. لا يمكن أن تؤخذ إلا في شكل حبوب ه. لا أعرف
2. أخذ عدد (2) نفث (نفخة) الموصوفة من خلال جهاز الاستنشاق مرتين يوميا ا. هو نفسه مثل أخذ نفخة واحدة أربع مرات في اليوم ب. هو نفسه مثل أخذ أربع نفخات مرة واحدة يوميا ج. يمكن ترتيبها بأي شكل من الأشكال طالما كنت تأخذ ما مجموعه أربعة نفخات يوميا د. ليست هي نفسها مثل أي نظام آخر ه. لا أعرف	**5. الطريقة الصحيحة لاستخدام مِقْياسُ ذِرْوَةِ الجَرَيان هي** ا. أخذ نفسا عميقا ثم نفخه في الفم ببطء ب. بدء الزفير ثم نفخه في الفم ببطء ج. وضع قطعة اللسان في فمك ثم القيام بالاستنشاق والزفير د. أخذ نفسا عميقا ثم نفخه في الفم بأسرع ما يمكن ه. لا أعرف
3. إذا لم تكن تعاني من أعراض الربو ا. لا تكون الرئتين لديك حساسة بالنسبة للمهيجات ب. يكون من الأفضل تخطي بعض جرعات الدواء ج. يجب الاستمرار في تجنب المنبهات د. ربما يتم شفائك من الربو ه. لا أعرف	**6. أدوية الإنقاذ** ا. لا ينبغي أن تؤخذ أكثر من ثلاث أو أربع مرات في اليوم ب. تساعد على منع ظهور الأعراض في المستقبل ج. ليس لها أي آثار جانبية د. لا تساعدك في أن تصبح أكثر تحملا للأدوية ه. لا أعرف

يُرجى وضع دائرة حول الحرف التي يتوافق مع إجابتك لكل سؤال.

7. عند استخدام جهاز الاستنشاق، ينبغي عليك ا. استنشاق الأنفاس الضحلة ب. الاستنشاق بسرعة ج. الاستنشاق ببطء د. الضغط على جهاز الاستنشاق عدة مرات بينما تقوم بالاستنشاق ه. لا أعراف	**10. أخذ المزيد من أدوية الإنقاذ أكثر من تلك الموصوفة** ا. هي في الحقيقة ليست ضارة ب. هي وسيلة جيدة لمعالجة الأعراض الناجمة عن الممارسة ج. قد يعني أنك بحاجة إلى مزيد من أدوية المداومة د. قد يعني أنك بحاجة إلى مزيد من أدوية المداومة ه. لا أعرف
8. بعد استخدامك لجهاز الاستنشاق الخاص بك، يجب عليك ا. حبس نفسك لعدة ثواني ب. أخذ النفخة الثانية في أقرب وقت ممكن بعد النفخة	**11. كل يوم الاستفادة من استخدام مِقْياسُ ذِرْوَةِ الجَرَيان** ا . تُمكنك من الكشف عن تغييرات صغيرة في الرئة حتى قبل بدء الأعراض ب. تُخبرك بموعد تقليل جرعة الأدوية الخاصة بك

الأولى ج. الحفاظ على أخذ النفخات حتى تشعر بتحسن د. غسل جهاز الاستنشاق في أنبوب المياه ه. لا أعرف	**9. إذا كنت تعاني من أعراض ولا تعرف ما هو أول شيء يجب عليك القيام به** ا. أخذ بعض جرعات من دواء الستيرويد ب. الاتصال بطبيبك الخاص ج. عد مدى سرعة إخراجك للنفس د. تغيير البيئة الخاصة بك على الفور ه. لا أعرف
ج. يمكنك أن ترى جيدا كيفية الاستنشاق د. يمكن أن يكون لديك وسيلة ما لمقارنة نفسك بأشخاص آخرين مصابون بالربو ه. لا أعرف	**12. ممارسة التمارين بالنسبة للأشخاص الذين يعانون من الربو** ا. هي أمر لا ينبغي القيام به بانتظام ب. يمكن أن تساعد على تحسين القدرة على التنفس ج. هو أمر جيد فقط إذا فعلته لمدة 30 دقيقة على الأقل د. يمكن أن تؤدي إلى تفاقم الأعراض لأن الرئتين لا تأخذ ما يكفي من الأوكسجين ه. لا أعرف

يُرجى وضع دائرة حول الحرف التي يتوافق مع إجابتك لكل سؤال.

13. يمكن علاج الربو من ا. تناول الدواء اليومي ب. تجنب المُحفزات مثل الغبار ودخان السجائر ج. باستخدام مِقْياسُ ذِرْوَةِ الجَرَيان د. لا يوجد علاج معروف للربو ه. لا أعرف	**15. إذا وُصفت لك مجموعة جرعات علاجية لمدة سبعة أيام من حبوب الستيرويد** ا. فلا تكون بحاجة إلى تجنب المحفزات بينما تتناول الحبوب ب. تزداد أعراضك سوءا بينما تتناول الحبوب ج. لا تحتاج إلى استخدام مِقْياسُ ذِرْوَةِ الجَرَيان الخاص بك بينما تتناول الحبوب د. يجب أن تنتهي من الوصفة الطبية حتى لو كنت تشعر أنك تحسنت بعد عدة جرعات ه. لا أعرف
14. ظهور أعراض الربو ا. عادة ما تحدث فجأة دون سابق إنذار ب. يمكن أن يحدث عندما تتجمع عدة مُحفزات طفيفة معا ج. لا يمكن أن تسببها المشاعر القوية د. دائما ما تسبب الصفير ه. لا أعرف	**16. أي مما يلي يمكن أن يساعد في السيطرة (القضاء) على الربو؟** ا . الحد (التقليل) من مستويات التوتر ب. شرب الكثير من الماء للبقاء رطب (مميَّه أو مُشبعا بالماء) ج. تجنب الأطعمة التي تحتوي على الكبريتات مثل الفواكه المجففة والنبيذ د. جمع ما سبق ه. لا أعرف

10.14. APPENDIX 15: THE ARABIC VERSION OF THE ASTHMA KNOWLEDGE QUESTIONNAIRE

سؤال حول المعرفة بالربو (الإجابات تكون صح أو خطأ أو لا أعرف)

السؤال	صح	خطأ	لا أعرف
هل الربو مرض التهابي في المَسالِكِ الهَوائِيَّة؟			
هل الربو مرض مُعد؟			
هل الربو مرض وراثي؟			
هل يسبب التهاب الربو انقباضا في الشعب الهوائية؟			
هل هناك أعراض مثل السعال، والصفير وضيق التنفس، وضيق الصدر في مرضى الربو؟			
هل الأسبرين، وبعض أدوية الروماتيزم، وبعض الأدوية الخافضة للضغط يسبب أعراض الربو؟			
هل الربو مرض لا يمكن علاجه ويستمر طوال حياة المرء؟			
هل يجب على المريض المصاب بالربو استخدام العلاج الوقائي بشكل منتظم حتى لو كان يشعر بأنها بحالة جيدة؟			
إذا كان مريض الربو لا يستخدم العلاج بانتظام، هل نوبات الربو المرضية تهدد الحياة؟			
هل الأدوية المستنشقة هي طريقة المعالجة الأكثر فعالية لعلاج الربو؟			
هل الأدوية المستنشقة تصل إلى الشعب الهوائية (المَسالِكِ الهَوائِيَّة) مباشرة؟			
هل تختفي آثار الأدوية المستنشقة بسرعة وتدخل نظام الدورة الدموية في كل الكميات الصغيرة؟			
هل هناك أي آثار جانبية ضارة للأدوية المستنشقة؟			
هل استنشاق الدواء يسبب الإدمان؟			
هل يمكن لمرضى الربو ممارسة الرياضة؟			
هل يمكن للمرضى الذين يعانون من الربو أن يصبحوا حوامل؟			
هل يمكن السيطرة على الربو تماما مع العلاج المستمر والمنتظم، ويمكن للمريض مواصلة الحياة الطبيعية			

10.15. APPENDIX 16: THE ARABIC VERSION OF THE PATIENT ACTIVATION MEASURE AND PERMISSION TO USED

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عناصر إجراءات التنشيط

1. بشكل عام، أنا الشخص المسؤول عن رعاية صحتي	غير موافق تماما	غير موافق	موافق	موافق بشدة	غير متوفر
2. أخذ دور فعال في الرعاية الصحية الخاصة بي هو أهم شيء يؤثر على صحتي	غير موافق تماما	غير موافق	موافق	موافق بشدة	غير متوفر
3. أعرف ما هو تأثير كل دواء يتم وصفه لي	غير موافق تماما	غير موافق	موافق	موافق بشدة	غير متوفر
4. أنا واثق من أنه يمكنني أن أقول ما إذا كنت بحاجة للذهاب إلى الطبيب أو ما إذا كان يمكنني الاهتمام بمشكلتي الصحية بنفسي.	غير موافق تماما	غير موافق	موافق	موافق بشدة	غير متوفر
5. أنا على ثقة بأنه في استطاعتي أن أخبر الطبيب بالمخاوف التي لدي حتى وإن لم يسألني عن ذلك.	غير موافق تماما	غير موافق	موافق	موافق بشدة	غير متوفر
6. أنا على ثقة بأنه في استطاعتي المتابعة من خلال العلاجات الطبية التي قد احتاج إلى القيام بها في المنزل	غير موافق تماما	غير موافق	موافق	موافق بشدة	غير متوفر
7. لقد كنت قادرا على الحفاظ (مواكبة) تغييرات نمط الحياة، مثل تناول الأكل الصحيح أو ممارسة التمارين	غير موافق تماما	غير موافق	موافق	موافق بشدة	غير متوفر
8. أعرف كيفية منع المشاكل التي تؤثر على صحتي	غير موافق تماما	غير موافق	موافق	موافق بشدة	غير متوفر
9. أنا على ثقة أنه يمكنني معرفة الحلول عندما تنشأ مشاكل جديدة مع صحتي.	غير موافق تماما	غير موافق	موافق	موافق بشدة	غير متوفر
		غير موافق	موافق	موافق بشدة	غير متوفر

Regarding patient activation Measure Permission

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patientactivation (NHS ENGLAND) <ENGLAND.patientactivation@nhs.net>
Fri 31/03/2017 07:33

Dailah, Hamad Ghaleb H (PG) <H.G.H.Dailah@edu.salford.ac.uk>

Dear Hamad,

We have now allocated all of the PAM licences purchased by NHS England in 2016 and therefore do not have any further licences to share. The focus for our programme is now on supporting those sites using licences from the national allocation and working through the national and local barriers to implementation.

The list of organisations using licences from the national allocation is available on NHSE's website. People interested in using the PAM may wish to link with one of these organisations to see if they are willing to share some of their licences.

The Patient Activation Measure is commercially available from Insignia Health http://www.insigniahealth.com/. However, you could be able to request a set of free licences from Insignia – on occasion, they offer up to 500 free licences to sites to pilot use of the tool for research purposes. More details on this can be found on their website.

Best wishes
Angela

Angela Hemingway

Project Support Officer I Person-centred Care Team I Nursing
NHS England I Room 7E56 Quarry House, Quarry Hill, Leeds LS2 7UE
england.patientactivation@nhs.net

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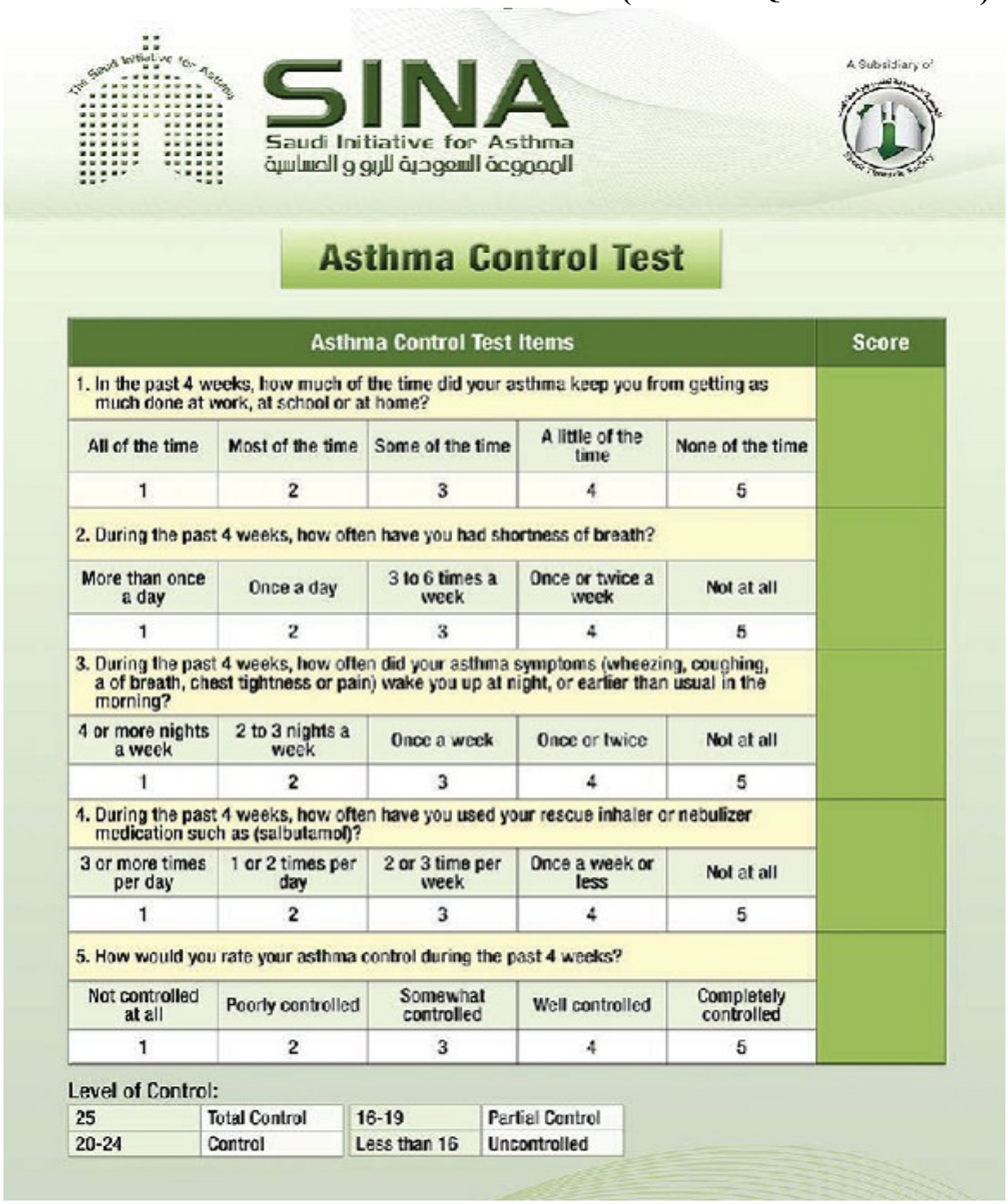
10.16. APPENDIX 17: ASTHMA CONTROL TEST (ENGLISH QUESTIONNAIRE)



SINA
Saudi Initiative for Asthma
المجموعة السعودية للربو و الحساسية

A Subsidiary of

Asthma Control Test

Asthma Control Test Items					Score
1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, at school or at home?					
All of the time	Most of the time	Some of the time	A little of the time	None of the time	
1	2	3	4	5	
2. During the past 4 weeks, how often have you had shortness of breath?					
More than once a day	Once a day	3 to 6 times a week	Once or twice a week	Not at all	
1	2	3	4	5	
3. During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, a of breath, chest tightness or pain) wake you up at night, or earlier than usual in the morning?					
4 or more nights a week	2 to 3 nights a week	Once a week	Once or twice	Not at all	
1	2	3	4	5	
4. During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication such as (salbutamol)?					
3 or more times per day	1 or 2 times per day	2 or 3 time per week	Once a week or less	Not at all	
1	2	3	4	5	
5. How would you rate your asthma control during the past 4 weeks?					
Not controlled at all	Poorly controlled	Somewhat controlled	Well controlled	Completely controlled	
1	2	3	4	5	

Level of Control:

25	Total Control	16-19	Partial Control
20-24	Control	Less than 16	Uncontrolled

In the past 4 weeks, how much of the time did your asthma keep you from getting as much done a .1 ? t work , school or at home	SCORE

All of The time 1	Most of The time 2	Some of the time 3	A little of the time 4	None of the time 5	5
?During the past 4 weeks how often have you had shortness of breath.2					
More than Once a day 1	Once a day 2	to 6 times 3 a week	Once or twice a week	Not at all	5
During the past 4 weeks . how often did your asthma symptoms (wheezing . coughing,shortness of breath , chest .3 ? tightness or pain) wake you up at night or earlier than usual in the morning					
or more 4 Nights a week 1	or 3 nights 2 a week 2	Once a week 3	Once or twice 4	Not at all 5	5
?During the past 4 weeks , shw often have you rescue inhaler or nebulizer (such as albuterol).4					
or more 3 times per day 1	or 2 times 1 per day 2	or 3 times 2 per week 3	Once a week or less 4	Not at all 5	5
? How would you rate your asthma control during the past 4 weeks .5					
Not controoned at all 1	Poorly controlled 2	Somewhat controlled 3	Well controlled 4	completely controlled 5	
In the past 6 months ,how many times did you visit Emerengency Departmen					5
More than Once week 1	or 2 times 1 per day 2	to 6 times 3 a week 3	None of the time 5		
Copyright 2002 by qualilymetric incorpated Asthma Control test is a trademark of Qualitymetric incorporated					

Appendix 1: Patient Characteristics Questionnaire

SEX: ☐ Male ☐ Female

Age group: ☐18-25 ☐26-35 ☐36-50 ☐51-65

Marital status: ☐Single ☐Married

Education: ☐High-school or less ☐Undergraduate level

☐Postgraduate level

Employment status: ☐ Employed ☐ Unemployed

☐Self-employed

☐ Retired ☐ Looking for work

Take the Asthma Control Test™ (ACT) For adult asthma patient.

1. In the past 4 weeks ,how much of the time did your asthma keep you from getting as much done a t work , school or at home ?					score
All of The time ①	Most of The time ②	Some of the time ③	A little of the time ④	None of the time ⑤	
2.During the past 4 weeks how often have you had shortness of breath?					
More than Once a day ①	Once a day ②	3 to 6 times 3 a week	Once or twice a week ④	Not al all ⑤	
3.During the past 4 weeks . how often did your asthma symptoms (wheezing . coughing,shortness of breath , chest tightness or pain) wake you up at night or earlier than usual in the morning ?					
4 or more Nights a week ①	3 or 3 nights a week ②	Once a week ③	Once or twice ④	Not al all ⑤	
4.During the past 4 weeks , shw often have you rescue inhaler or nebulizer (such as albuterol)?					
3 or more times per day ①	1 or 2 times per day ②	2 or 3 times per week ③	Once a week or less ④	Not al all ⑤	
5. How would you rate your asthma control during the past 4 weeks ?					
Not controooed at all ①	Poorly controlled ②	Somewhat controlled ③	Well controlled ④	completely controlled ⑤	

ASTHMA SELF MANAGEMENT QUSTIONNAIRE

Please circle the letter that corresponds to your answer for each question.

1.Amain method to prevent asthma flare-ups is to …..
a. take medicines before meals
b. take steroids in pill form
c. get a flu vaccine
d. go to the emergency room at the first sign of symptoms
e. I don't know

2.Taking the prescribed tow puffs of your inhaler tow times a day
a. is the same as taking one puff four times a day
b. is the same as taking four puffs once a day
c. can be arranged in any way as long as you take a total of four puffs a day
d. is not the same as any other regimen
e. I don't know

3. If you are not having asthma symptoms …..
a. your lungs are not sensitive to irritants
b. it is Ok to skip some doses of medicine
c. you should still avoid triggers
d. you are probably cured of asthma
e. I don't know

4. Maintenance medicines
a. help prevent future symptoms
b. don't need to be taken every day
c. make you breathe better right after you take them
d. can only be taken in pill form
e. I don't know

5. The correct way to use a peak flow meter is to
a. a take a deep breath and then blow into the mouthpiece slowly
b. start exhaling and then put the mouth – mouthpiece slowly
c. put the mouthpiece in your mouth and then inhale and exhale
d. take a deep breath then blow into the mouthpiece as fast as you can
e. I don't know

6. Rescue medicines …..
a. should not be taken more than three or four times a day
b. help prevent future flare – ups
c. have no side effects
d. do not cause you to become tolerant to medicine
e. I don't know

Please circle the letter that corresponds to your answer for each question.

7.When using your inhaler, you should
a. take shallow breaths
b. inhale quickly
c. inhale slowly
d. press your inhaler several times while you are inhaling
e. I don't know

8. After you have used your inhaler , you should
a. hold your breath for several seconds
b. take the second puff as soon as possible after the first puff
c. keep taking puffs until you feel better
d. wash the inhaler in a tub water
e. I don't know

9. If you are having symptoms and don't know why the first thing you should do is
a. take some doses of steroid medicine
b. call your doctor
c. count how fast you are breathing
d. change your immediate environment
e. I don't know

10. Taking more rescue medicines than prescribed
a. is really not harmful
b. is a good way to manage symptoms caused by exercise
c. may mean you need more maintenance medicine
d. may mean you need more maintenance medicine
e. I don't know

11. The benefit of using a peak flow meter every day is
a . you can detect small changes in lung function even befere symptoms start
b. it can tell you when you can decrease your medicines
c. you can see how well you can inhale
d. you can have a way to compare yourself to other people with asthma
e. I don't know

12. for people with asthma exercise
a. is something that should not be done regularly
b. can help improve breathing capacity
c. is only good if done for at least 30 minutes at time
d. can trigger symptoms because the lungs are not taking in enough oxygen
e. I don't know

Please circle the letter that corresponds to your answer for each question .

13.Asthma can be cured by
a. taking daily medicine
b. avoiding triggers such as dust and cigarette smoke
c. using a peak flow meter
d. there is no known cure for asthma
e. I don't know

14. Asthma flare – ups
a. usually occur suddenly without warning
b. can occur when several minor triggers come together
c. cannot be triggered by strong emotions
d. always cause wheezing
e. I don't know

15. If you are prescribed a seven – day course of steroid pills
a. you don't have to avoid triggers while you are taking the pills
b. your symptoms can I get worse while you are taking the pills
c. you don't need to use your peak flow meter while you are taking the pills
d. you should finish the prescription even if you feel better after several doses
e. I don't know

16. Which of the following can help control asthma?
a . reducing stress levels
b. drinking plenty of water to stay hydrated
c. avoiding foods with sulfites such as dried fruits and wine
d. all of the above
e. I don't know

Asthma Knowledge Questionnaire

Question on asthma Knowledge (responses are True, False or don't know)

Question	True	False	Don't know
Is asthma an inflammatory disease of the airway?			
Is asthma a contagious disease ?			
Is asthma a hereditary disease ?			
Does asthma inflammation cause constriction in the airways?			
Are there symptoms such as coughing, wheezing dyspnea, chest tightness in asthmatic patients?			
Do aspirin ,some rheumatism drugs, and some antihypertensive drugs cause asthma symptoms ?			
Is asthma a disease that cannot be treated which continues throughout one's life?			
Should asthmatic patient use the prophylactic treatment regularly even if they feel well?			
If an asthmatic patient does not use the treatment regularly ,do asthma attacks threaten life ?			
Are inhaled medications the most effective delivery method for treatment of asthma ?			
Do inhaled drugs reach the airways directly?			
Do the effects of inhaled drugs disappear quickly and enter the circulation system in every small amounts ?			
Are there any harmful side effects of inhaled medications?			
Do inhaled medication cause addiction?			
Can asthmatic patients do sports?			
Can asthmatic patients become pregnant ?			
Could asthma be completely controlled with continuous and regular treatment and can the patient continue normal life			

Patient Activation Measure

Activation Measure Items

1. When all is said and done, I am the person who is responsible for taking care of my health	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
2. Taking an active role in my own health care is the most important thing that affects my health	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
3. I know what each of my prescribed medications do	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
4. I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
5. I am confident that I can tell a doctor concerns I have even when he or she does not ask.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
6. I am confident that I can follow through on medical treatments I may need to do at home	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
7. I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
8. I know how to prevent problems with my health	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
9. I am confident I can figure out solutions when new problems arise with my health.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
10. I am confident that I can maintain lifestyle changes, like eating right and exercising, even during times of stress.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A

10.17. APPENDIX 20: SAMPLE-ASTHMA KNOWLEDGE QUESTIONNAIRE

وزارة الصحة
Ministry of Health

University of Salford MANCHESTER

الملحق رقم ٣: استبيان المعرفة بالربو

سؤال حول المعرفة بالربو (الإجابات تكون صح أو خطأ أو لا أعرف)

السؤال	صح	خطأ	لا أعرف
هل الربو مرض التهابي في المَسالِك الهَوائيّة؟	✓		
هل الربو مرض مُعد؟		✓	
هل الربو مرض وراثي؟	✓		
هل يسبب التهاب الربو انقباضا في الشعب الهوائية؟	✓		
هل هناك أعراض مثل السعال، والصفير وضيق التنفس، وضيق الصدر في مرضى الربو؟	✓		
هل الأسبرين، وبعض أدوية الروماتيزم، وبعض الأدوية الخافضة للضغط يسبب أعراض الربو؟	✓	✓	
هل الربو مرض لا يمكن علاجه ويستمر طوال حياة المرء؟		✓	
هل يجب على المريض المصاب بالربو استخدام العلاج الوقائي بشكل منتظم حتى لو كان يشعر بأنها بحالة جيدة؟	✓		
إذا كان مريض الربو لا يستخدم العلاج بانتظام، هل نوبات الربو المرضية تهدد الحياة؟	✓		
هل الأدوية المستنشقة هي طريقة المعالجة الأكثر فعالية لعلاج الربو؟	✓		
هل الأدوية المستنشقة تصل إلى الشعب الهوائية (المَسالِك الهَوائيّة) مباشرة؟	✓		
هل تختفي آثار الأدوية المستنشقة بسرعة وتدخل نظام الدورة الدموية في كل الكميات الصغيرة؟	✓		
هل هناك أي آثار جانبية ضارة للأدوية المستنشقة؟	✓	✓	✓
هل استنشاق الدواء يسبب الإدمان؟	✓	✓	✓
هل يمكن لمرضى الربو ممارسة الرياضة؟	✓		
هل يمكن للمرضى الذين يعانون من الربو أن يصبحوا حوامل؟	✓		
هل يمكن السيطرة على الربو تماما مع العلاج المستمر والمنتظم، ويمكن للمريض مواصلة الحياة الطبيعية	✓		

10.18. APPENDIX 21: TRAINING LIST AND CONFERENCE

Training

1-Post Graduate Research Training Program Induction, Semester 2 Including:

- Research & Research Ethics on 10-11-2016 at MS136, Salford University
- An Introduction to Quant on 13-11-16 in MS136, Salford University
- An introduction to quantitative data analysis for social science (Quantitative research methods: an overview) Semester 1 – 8th, 10th and 12th January 2018
- An introduction to quantitative data analysis for social science (Quantitative research methods: an overview) Semester 1 – 8th, 10th and 12th January 2018

2-LEAP and word scope Course (Philosophical Stance) including:

- ontology foundation on 2- 7-2-18.

- Epistemological Foundation on 5- 14-2-18

- Axiological Foundation on 7-21-2-18

3-Thesis Writing

-Grammar recap on 4- 8-2-18.

- Structuring on 15-2-18

4-Diagnosis and management of respiratory disorder course (Asthma personalised education) at the University of Birmingham, on Tuesday 27th March 2018 27-29 March 2018.

5- Celebrating PGR research Day (Present my study about An education package for the self-management of asthma in Saudi adults Mary Seacole – Room 302, SALFORD University, Friday 11th May 2018.

6- NVivo training and Introduction to SPSS on 13-15 Jan 2019, Salford university

7- Epidemiology and Statistics Module for Public Health, semester 1, January 2019, including

-Introduction to Epidemiology (Definitions, what is disease, epidemiological triad) 19-01.2019

-Quantifying health (Rates and standardisation; incidence and prevalence) 19-01.2019

-Key concepts and methods in epidemiology (Natural history of diseases; risks; introduction to study types) 5-02-2019

-Epidemiological study types: descriptive (Cross sectional and ecological study designs) on 5-2-19

-Epidemiological study types: case control (Features, advantages, disadvantages, odds ratios) on 12 - 2-19

-Epidemiological study types: cohort (Prospective/retrospective; features, advantages, disadvantages, risk ratios) on 12 -2-19

-Interpreting epidemiological studies (Association and causation; bias and confounding) on 19-2- 19

-Screening and surveillance (Immunisation, screening, surveillance, outbreaks) on 19-2-19

-Descriptive statistics (Populations and samples; means, medians and modes) on 12 March 2019

-Introduction to hypothesis testing (Data types, null hypothesis) 12 March 2019

-Difference testing (t test, MW-U test, paired t test) on 19 March 2019

-SPSS workshop (Screening and cleaning data; calculating means and confidence intervals; graphs) on 19 March 2019

-Frequency testing (Cross-tabulation and chi square tests) 26 Mar 2019

-SPSS workshop (t test, Mann-Whitney-U test, chi square tests) 26 Mar 2019

-Relationship testing (correlation coefficients: Pearsons, Spearmans; simple linear regression) 2 April 2019

-Multivariate analysis (Logistic regression and multiple regression) 2 April 2019

-SPSS workshop (Logistic regression and multiple regression) 30 April 2019

Conference

1-Conference, Respiratory Disease: a journey through life to be held at the Village Urban resort, Hull UK on 14th September 2016

2- British Lung Foundation Event Participant Certificate To certify that Hamad Dailah attended and displayed a poster of their research at the BLF Alumni conference on Friday 23 March 2018

3-4th International Health and Wellbeing Research with Real Impact Conference Poster presentation, Faculty of health & Wellbeing, University of central Lancashire on 12th April 2018.

4- Participated in present my research as presentation, small research conference for the nursing master's students for the research methods course. Room: MS 2.43, Salford Thursday 9am – 12 noon10th May 2018

5- SPARK conference, poster participation. Salford University, Media City, UK. 4&5 July 2018

6- British Society for allergy & clinical immunology annual meeting at the Telford International Centre, 30 September – 2 October 2018,

7- Future U Research Conference, Preston, UK, 11-14th December 2018

8-Participated in medical conference in Manchester. Published my abstract in their journal poster on 25-4-19.

9- Participated in Nursing Education Conference ,28th Edition of the World Congress in Nursing Education and Research, Poster Presentation on 26-27 April 2019 in London

10-SPARK conference, poster participation. Salford University, Media City, UK. 3rd July 2019

11 - Abstract(s) A SELF-MANAGEMENT EDUCATION PROGRAM FOR ADULTS WITH ASTHMA from Medicine 2019 has been published online on Royal College of Physicians Journal

12- Abstract entitled "Self-management education program for asthmatic patient" has been accepted for Poster Presentation and has been published by Editors – Journal of Nursing and Health Studies, Health Science Journal and Journal of Medical Research

10.19. APPENDIX 22: NURSES SURVEY

Hamad Dailah
PhD candidate at the University of Salford, UK Email:
h.g.h.dailah@edu.salford.ac.uk
(Telephone: 00447713885 (UK) or 00966556759506 (Saudi Arabia

A survey exploring health professionals' attitudes toward asthmatic patient

To all health professionals (Physicians, Nurses, respiratory therapists) who working at Chest Hospital in Jazan region.

Please provide information about the health education for asthmatic patients that will assist me in finding patient needs.

1. To the nurses: Have you got any programs delivered by nurses for asthmatic patients at all?
if yes, what were these programs about (content)? how when and where were they developed and delivered? and by whom?
(الى الطاقم التمريضي بالمستشفى: هل حصلت على أي برامج تعليم تمريضي تقدمها لمرضى الربو على الإطلاق؟
إذا كانت الإجابة بنعم، ما هي هذه البرامج حول (المحتوى)؟ كيف وأين وأين تم تطويرها وتسليمها؟ ومن؟

المحاضرات والمنشورات

2. Who were your patients? age, gender, education, etc.
(من هم نوع المرضى الذين قدم لهم البرنامج؟ العمر، الجنس، التعليم، الخ

(الأغلب كبار السن

3. Who are the nurses? community nurses?, respiratory nurses? etc.
من هم الممرضين(التخصص)؟ تمريض المجتمع؟ تمريض الجهاز التنفسي؟ (تمريض عام

تمريض عام

4. was there any evaluation for these programs? how?

(هل كان هناك أي تقييم لهذه البرامج؟ كيف؟)

استبيان بجوائز المحاضرة

5. To health professionals who working in emergency department, was there programs delivered to asthmatic patients in the KSA community? what content, when, where, and by whom?

إلى المهنيين الصحيين الذين يعملون في قسم الطوارئ: هل هناك برامج تم تسليمها لمرضى الربو في مجتمعنا السعودي(جازان)؟ ما المحتوى، متى، أين، ومن قبل من؟

منشورات ومطويات
قبل سنه وفي الطوارئ
من قبل الدكتور

6. were these programs funded? by whom?

هل تم تمويل هذه البرامج؟ بواسطة من؟

قسم إدارة المستشفى
والجودة

7. was there any preference for patients to receive like these programs? for example, in hospital, home, language, etc?

هل كان هناك أي تفضيل للمرضى لتلقي مثل هذه البرامج؟ على سبيل المثال، في المستشفى، المنزل، اللغة، الخ؟

لا

8. were there specific skills recommended by patients to learn and apply?

((هل هناك مهارات محددة يوصي بها المرضى للتعلم والتطبيق؟

لا

9. were these programs for both Saudi and Non-Saudi people? if yes, was there any difference in terms of patients' needs?

هل كانت هذه البرامج لكل من السعوديين وغير السعوديين؟ إذا كان الجواب نعم)
(هل كان هناك أي فرق من حيث احتياجات المرضى؟

نعم ، نعم

شكرا لكم على التعاون في هذه الاستشارة العلمية والتي بناء عليها سيتم تصميم برنامج تعليمي تمريضي لمرضى الربو بالسعودية

أخير / هل هناك أي اقتراحات او أفكار لتصميم هذا البرنامج مبنية على احتياجات المرضى وخبرتكم كطاقم تمريض؟

X

10.20. APPENDIX 23: PATIENT INTERVIEW

Patients' semi-structured Interview schedule

Introduction

My name is Hamad Dailah, I am undertaking a large research project as a part of my PhD study. I am interviewing you today to explore your perceptions and experience of the education program you have recently participated in, and how, if at all, it helped you better manage your Asthma. As a researcher I am not asking you any questions to make a judgment on how you manage your asthma or how you embed culturally within your life, but just to understand your experience.

Firstly, I want to thank you for taking time to attend the interview and want to assure you that everything you say in the interview will be absolutely **CONFIDENTIAL**

I would ask you if you just can sign this consent please. It is just to show that you agreed to participate in this part of the study.

This interview is to understand your experience of the asthma education program, what was good and what would you change to improve the program or training package for patients suffering with asthma in Jizan and possibly across Saudi Arabia.

General questions

1. How long have you had asthma? *(prompts – was it a complication of any disease or infection recently? OR is it a chronic condition you've acquired years ago? How many years ago?)*
2. If your asthma is not a result of such a disease, do you think it is a congenital or familial problem? *(Prompts; are there other family members in your family with asthma)*

About Asthma Control and self-management

1. Describe how you control and manage your asthma on a daily basis, what do you usually do? *(prompts, do you do it alone? is there anyone who usually help you to manage asthma?), what medications, devices, trigger avoidance, exacerbation management, or do you take non-pharmaceutical remedies, like herbs for example?*

2. Has the program changed the way you manage your asthma? (*Prompts; what specific part of the program helped you improve your control? what were the things that you started doing as opposed to things you discontinued since you had the program? What do you do differently after the program?*

3. Do you consider your asthma to be better controlled, less controlled, or unchanged after the program? (*Prompt; How do you feel about asthma management after the program? Better, worse, same*?

About your asthma knowledge

4. Before the program, where did you get your knowledge on how to manage asthma from? How do you feel this knowledge is helping you manage asthma? (*Prompts; Do you read on asthma? Do you have friends with asthma that try to help you manage your asthma? Are you a member of self-help groups, that may help you with knowledge and skills in managing your asthma?*

5. After the program, do you feel you have sufficient knowledge about asthma to be able to manage it yourself at home? *(prompts – asthma medication -how medications influence asthma, side effects treatment of asthma, or things can patients do to avoid asthma, managing life threatening situations/attacks, complications)*

6. We measured your knowledge part of the asthma management before and after the education program, and it increased (you had higher scores on questions on nature of asthma, medications use to control asthma, and using devices to self-manage asthma)? What part of the program helped your knowledge improve and why? (*Prompts; things you feel have made an impact and things you felt you already apply in controlling asthma?*

7. Can you think of anything else that has happened to you during the education program that would influence your knowledge of asthma or improve your asthma control?

About the program delivery

8. What did you like about the program?-(*Prompts; What were the things that you liked most, and the things that you disliked most? (content, place, people?)*

9.Would you change anything about the setting of the program? what did you not like? (*prompts - delivered in a different way (Brochures, offered in outpatient clinics, primary care settings, or multidisciplinary program).*

10.Would you change anything about the content of the program? (*Prompts; was there anything you think it should be changed, removed or added to the program?*

11.The program was delivered in a group – did you like this method of delivering education? *(Prompts; do you prefer group education over other methods such as one-to-one, or watching videos or reading information)*

12.What did you think of the lectures in terms of content, material and delivery?

13.Were you expecting anything to learn that you were not provided in the program? (Prompt; *Is there anything you still need to know for better management of your asthma that wasn't provided by the program?)*

14.Did you find the practical session helpful or not? (*prompts - materials on how to improve practical skills such as, preparing medications and using devices.*

15.Did you feel that people delivering the education program were knowledgeable, did they deliver the education in a simple way, could you understand what they said? (*Prompts; would nurses be sufficient, or would other professionals may also take part in the program?*

16.Did you find the program easy to follow? *(prompts - what did you like best, what would you change)*

17.Were the materials used useful to you? (*prompts - which ones did you like best, what would you change*)
18.Are two days enough for the program, would you have liked longer or more meetings?

Demographic specific questions – exploring individual findings in more detail
Demographic specific questions [19-24] – only ask if the interviewee meets the demographic characteristic

19.For women. Your score was higher on the ACT before the program and lower scores than males after the program– Why do you think this was the case? *(prompts; did they learn less than men, would women's role at home offer them less time and chance to learn and manage asthma for example?)*

20.For men. Your score was lower than females' scores on the ACT before the program and higher after the program. Why do you think this is? *(prompts; did they learn more than women, were they not in control before and could look after themselves better afterwards, would men's role at home give them more time and chance to learn and manage asthma for example?)*

21.Your score was higher on the ACT – why do you think this was the case? Actually in general older patients' scores were higher on ACT. Why do you think age could be a factor? (*Prompts; would you think young people have different interests that make them not keen to learn or apply techniques to control asthma? Do you think older people learnt asthma management from different sources; e.g. friends?)*

22.You as a married person had better knowledge and control over asthma than unmarried patients, why do you think this is the case? (*Prompts; do you think husbands/wives, or any family members are helping patients in managing asthma?)*

23.You as employed person had better knowledge scores than self-employed patients, why do think this is the case? (*prompts; do you think employers offer trainings in asthma management?)*

24.As an undergraduate student suffering from this ailment, you achieved higher scores on ACT, why do you think this is the case? (*Prompts; do you think colleges/schools offer programs for students on how to control asthma?)*

Any questions

Thank you for your time
End interview

10.21. APPENDIX 24 – POSTER FOR RECRUITMENT (TEXT ONLY)

Would you like your asthma to be managed better?

Would you be prepared to attend education sessions with nurses at Kings Fahd Central Hospital to help you manage your asthma better?

Education sessions, based on SINA guidelines are being developed to help patients manage their asthma better. This is part of a PhD project which is being undertaken by a Saudi Nurse (Hamad Dailah) at the University of Salford, UK

If you are interested in taking part, please tell the nurse at your clinic and leave your contact details so that the researcher can contact you.

For further information, please contact Hamad Dailah

PhD student at the University of Salford, UK Email: h.g.h.dailah@edu.salford.ac.uk

Telephone: 00447448856512 (UK) or 00966556759506 (Saudi Arabia)

10.22. APPENDIX 25 – SLIP FOR PARTICIPATION IN INTERVIEWS

I am interested in taking part in interviews to discuss my experience of taking part in this education program YES/NO

Interviews will take place at King Fahd Central Hospital -Jazan

If you have answered YES – please leave your Name and Contact Details below so that the researcher can arrange an interview at a time convenient to you

Name ……

Address……

Phone number
……