



MONASH University

Modelling Cardiac Rehabilitation Programs in
Saudi Arabia

Submitted by

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Abstract

Background

Non-communicable diseases are the major causes of death in Saudi Arabia, approximately 46% being from cardiovascular disease (CVD). A cardiac rehabilitation (CR) program is a strategy to lessen the likelihood of mortality or morbidity following CVD events. In Saudi Arabia, CR programs remain inadequately implemented in current clinical practice, despite World Health Organization (WHO) recommendations that all patients with CVD in all countries should have access to CR programs. As the impact of CVD remains elevated in Saudi Arabia, it is imperative that quality CR programs are developed and maintained in Saudi health care services. The development of a model of CR must be tailored to most effectively address the CR needs of patients within the cultural context of Saudi Arabia. This study is the first to extensively explore CR programs currently implemented internationally and model a program that may be suitable for implementation in Saudi Arabia. The guidelines for modelling CR programs are based on the best available evidence and are adapted for the Saudi context. They are expected to improve patient care and outcomes, enhance the development of policies, and enhance the mission and reputation of Saudi hospitals with regard to the management of patients in CR.

The aim of this study was to explore cardiac rehabilitation programs in Saudi Arabia. Furthermore, the objectives were to explore evidence based practice gaps, the barriers and enablers to attending a CR program from patients' perspectives, and to establish guidelines to model a cardiac rehabilitation program which will be suitable for the Saudi Arabian context.

Design

A concurrent triangulation mixed methods design in two phases was utilised. In Phase 1, a convenience sample of 306 healthcare providers was recruited from three cardiac centres located in Riyadh, the capital city of Saudi Arabia. A paper-based anonymous questionnaire was used to collect quantitative data and responses to open ended questions. In Phase 2, 15 semi-structured interviews were undertaken

with patients from two cardiac centres. The findings from both phases are integrated and finalized to form the final results.

Results

The majority of respondents from the healthcare providers' survey were from Asia/South East Asia, and non-Arabic speaking. Saudi Arabia relies on a significant expatriate workforce. Language barriers are a major impediment to effective treatment and care. Only 42.5% of the respondents indicated that they have CR programs in their hospitals. Of these, nurses represented 89.9% of respondents whereas physicians represented 11.2% who indicated that they are aware of CR programs. No clinicians from other departments responded, reflecting staff unawareness of available CR programs. Most eligible patients involved in CR programs were patients with myocardial infarction and the main components of in-patient CR programs reported by participants were health behaviour change and education. For outpatient programs, however, participants reported lifestyle risk factor management as the main component followed by health behaviour change and education.

After a patient is discharged, it is challenging to come back for follow up and join available programs due to some barriers. One of the critical barriers to participation in CR is the discontinuity of care. Patients reported discontinuity of care because of different factors, such as a lack of transportation, long travelling distances, and communication barriers between staff and patients. Most of the patients in this study also had difficulties accessing the cardiac centre, as they were located far from their residences. Most of the cardiac centres are located in the main cities and patients have to travel to attend regular appointments. Women with cardiac conditions are the most disadvantaged group because of cultural barriers, limited social support and getting time from home duties and family responsibilities.

A deeper understanding of patients' experiences was obtained through the qualitative results. Four themes emerged. Disconnectedness, Alternate help-seeking strategies, Sources of support and Feeling of involvement and connectedness. The main theme was a feeling of 'Disconnectedness' after leaving hospital, that the service lacked continuity or simply stopped. Patients then sought 'Alternate help-

seeking strategies' and 'Sources of support'. On the other hand, a less frequently occurring and a contrasting theme was also reported about satisfaction with care and attention, a 'Feeling of involvement and connectedness'.

Conclusion

There was low self-awareness of integrated models of CR programs in Saudi cardiac centres by healthcare providers and patients. Staff education is an important element in developing and maintaining a successful CR program. Most of the available CR programs lacked essential components in practice, in relation to applicability, transferability, and integration of cardiac rehabilitation into patient care. In modelling a CR program in Saudi Arabia, there needs to be a shift into a rehabilitation approach that applies patient-specific programs. Examples include gender-specific programs, and programs that go beyond lifestyle modifications, exercise and dietary change approaches, all of which offer multifaceted and multidisciplinary care, to optimize the physical, mental and social wellbeing of patients.

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List of Abbreviations

ACI: Agency of Clinical Innovations

ACS: Acute Coronary Syndrome

AIDS: Acquired Immune Deficiency Syndrome

AF: Atrial Fibrillation

CAD: Coronary Artery Disease

CHD: Coronary Heart Disease

CVD: Cardio-Vascular Diseases

CABG: Coronary Artery Bypass Graft

CCU: Coronary Care Unit/ Cardiac Care Unit

CCM: Chronic Care Model

CVICU: Cardio-Vascular Intensive Care Unit

CHF: Congestive Heart Failure

DMACS: Discharge and Management of Acute Coronary Syndromes

EF: Ejection Fraction

GP: General Practitioner

HDL: High Density Lipoprotein

HF: Heart Failure

KSA: Kingdom of Saudi Arabia

LDL: Low Density Lipoprotein

MOH: Ministry of Health

MOE: Ministry of High Education

MI: Myocardial Infarction

MRI: Magnetic Resonance Imaging

MUHREC: Monash University Human Research Ethics Committee

NHS: The National Health Service

PCI: Percutaneous Coronary Intervention

PTCA: Percutaneous Transluminal Coronary Angioplasty

RCT: Randomized Control Trial

ST: Sinus Tachycardia

UK: United Kingdom

USA: United States of America

WHO: World Health Organization

Glossary of terms

Cardiac rehabilitation program: A medically supervised program which is designed to improve patient's cardiovascular health if they have experienced Myocardial Infarction (MI), heart failure, angioplasty or heart surgery. It includes counseling to reduce stress and is designed to reduce future heart risks. Cardiac rehabilitation usually consists of: nutritional counseling; management of lipid levels, hypertension, weight, and diabetes mellitus; smoking cessation; psychosocial interventions; and physical activity counseling, and exercise training. Cardiac rehabilitation reduces the risks of subsequent MI and death from other causes (National Heart Foundation for Australia and Australian Cardiac Rehabilitation Association, 2004). It is generally agreed that cardiac rehabilitation is safe and beneficial.

Cath Lab (Catheterization Laboratory): An examination room in a hospital or clinic with diagnostic imaging equipment used to visualize the arteries and the chambers of the heart and treat any stenosis or abnormality found.

Coronary Care Unit (CCU): A hospital ward specialized in the care of patients who suffer from MI, unstable angina, cardiac dysrhythmia and various other cardiac conditions that require continuous monitoring and treatment.

Cardiac Centres: Centres, which are dedicated to the prevention, investigation and treatment of cardiac diseases. It is a specialized service for people who have experienced a cardiac event, heart failure or require assistance to minimize their risk of a cardiac event.

Case manager: A registered nurse who coordinates all aspects of the care of individual patients. The case manager ensures proper utilization of services and resources provides assistance within, between, and outside of facilities and works to meet complex patient needs.

Connectedness: The state of being joined or linked; it is a feeling of belonging to or having affinity with a particular person or group.

Congestive Heart Failure: A condition which presents when the heart cannot

pump blood as well as it should.

Full Disclosure: Participants are provided with all relevant information related to the study. Full disclosure is a provision of all the information to an individual who is making a decision about agreeing to participate in a study (Patton, 2015).

Multi-professional team: A group of health care providers (e.g. physicians, nurses, physiotherapists, psychiatrists, social providers, etc.), each providing specific services to the patient. The activities of the team are brought together using a care plan.

Model of care: The way health services are delivered (ACI, 2013).

Self-Determination: Participants have the right to freely decide to participate or to withdraw from the study without any external force; they have the right to know the benefits and the risks from participation in the current study (Patton, 2015).

Surgical OR (Operation room): a facility within a hospital where surgical operations are carried out in an aseptic environment.

Unified Model: United delivery of health systems and making it working together.

Chapter 1. Introduction

1.1. Introduction

Cardiovascular disease (CVD) is a major cause of morbidity and mortality worldwide (Gaziano, Bitton, Anand, Abrahams-Gessel, & Murphy, 2010). Although the mortality rate from CVD has declined in many developed countries in recent years, morbidity is increasing. Over 80% of deaths occur in low-income and middle-income countries (World Health Organization [WHO], 2011). To limit the socioeconomic and social impact of CVD, a comprehensive approach to health care is needed. An example is the cardiac rehabilitation (CR) programs approach (Turk-Adawi, Sarrafzadegan, & Grace, 2014). Effective, coordinated, quality, evidence-based cardiac care programs are essential to meet the demands of increasing numbers of patients presenting to health services with cardiac conditions (Nieuwlaat, Schwalm, Khatib, & Yusuf, 2013).

CR programs have become an essential part of the standard of care in modern cardiology. CR is defined as a medically supervised program designed to improve cardiovascular health for patients who have experienced MI, heart failure, coronary angioplasty or heart surgery and other CVD conditions. The programs involve exercise counselling and training, education for healthy heart and counselling to reduce stress (Turk-Adawi, Sarrafzadegan, & Grace, 2014). Ideally, CR programs should commence in hospitals as soon the patient is stable. The scope of CR programs has shifted in emphasis from exercise therapy to comprehensive secondary prevention strategies, managing nutritional, psychological, behavioral and social risk factors that can affect patient outcomes (Mampuya, 2012). The incidence of CVD and the effects of CR programs has been studied worldwide (Balady et al., 2007 and Thomas et al., 2007), however, very few studies have been undertaken in Saudi Arabia that assess or discuss CR programs. Furthermore, there is a significant gap between what is expected from the research and what is actually applied in clinical practice. There is a lack of awareness of the importance of programs like CR and other prevention programs for example diabetes mellitus and hypertension prevention programs (Rawas, Yates, Windsor, & Clark, 2012).

This thesis addresses the gap in the literature on assessment of CR programs in Saudi Arabia. Additionally, this study explores healthcare providers' awareness and knowledge about available programs. The current study extends to cover the experiences of patients with cardiac conditions about CR programs during inpatient and outpatient health care services. Furthermore, it explores barriers and enablers to attending CR programs. Importantly, the study provides recommendations for CR programs and model guidelines for effective CR programs unique to the Saudi context.

In this chapter, the background to the study and the significance of exploring a sample of available CR programs in Saudi Arabia are described. The research aim and the study objectives are described also. The significance of the study, scope and the conceptual framework that underpinned the study are provided. Furthermore, the thesis overview and the structure of the following chapters are discussed.

1.2. Background

CR programs are recommended for lowering the burden of CVD after coronary artery-related conditions and surgery. A healthy diet appears to be effective and there is evidence to support the promotion of weight loss interventions in people who are overweight or obese with CVD (National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2013). Physical activity and all forms of exercise appear to be effective, with a positive influence on CVD management. Effective CR programs incorporate both supervised exercise training and comprehensive disease-related self-care counselling (Balady et al., 2007).

Typically, CR programs are provided in three phases. Phase 1 is the inpatient CR program, which is commenced as soon as a patient is stable, and comprises mainly of early mobilization and patient education. Phase 2 commences when the patient is discharged from the hospital and is referred to out-patients CR clinics, and usually lasts for 8 to 12 weeks (National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2013), phase 3 is the long-term commitment, which is a non-supervised phase. Patients remain in CR programs for various lengths of time depending on physician recommendation as well as their individual needs and goals. Patients are provided with home exercise guidelines to follow

(National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2013). Phase 3 is a lifetime maintenance phase in which physical fitness and additional risk-factor reduction are emphasized. During this phase, exercise prescription is recommended for all patients depending on their cardiac conditions. It is used to maintain the results achieved during the earlier phases of rehabilitation (National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2013).

Effective CR maximizes physical, psychological and social functioning to enable people with cardiac disease to lead fulfilling lives with confidence (National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2013). CR programs have been shown to improve fitness and reduce morbidity and mortality (Taylor, Dalal, Jolly, Moxham, & Zawada, 2010). The programs deliver a cost-effective and structured exercise, education, and risk reduction program, which can reduce mortality by up to 25%, in addition to improving a patient's functional capacity and lowering re-hospitalization rates (Turk-Adawi, Sarrafzadegan & Grace, 2014). Despite these benefits and recommendations in clinical practice guidelines, CR programs are clearly under-used compared with revascularization or medical therapy for patients with CVD (Turk-Adawi et al., 2014). To the best of the researcher's knowledge there is no national, unified CR program available for the Ministry of Health (MOH) in Saudi Arabia. Therefore, in this study, models of care for CR for patients with cardiac conditions are explored in a sample of available MOH hospitals.

1.2.1. Context of Saudi Arabia

The Kingdom of Saudi Arabia (KSA) is the largest country in the Middle East. The country's population was 31,540,000 in 2015 and increased to 33,649,015 million in 2018. Islam is the main religion in the country, with the two holy cities of Mecca and Medina. Arabic is the official language. Furthermore, family members have a significant influence on patients' health and the family remains at the core of the Saudi cultural context (Bowen, 2014). Family health is a vital component as every person has a large family network, which involves grandparents, parents, aunts, uncles, siblings and cousins. In the Saudi context, the family is considered as the foundation of a person's identity, and many family members prefer to live close to

each other to maintain socialization and co-operation. The family unit promotes intimate ties with relatives and sustains connectedness (Bowen, 2014).

Changes in lifestyle amongst the Saudi population have led to an increase in non-communicable diseases, in particular cardiac diseases and diabetes mellitus. Recent WHO statistics for Saudi Arabia reported that in 2014 non-communicable diseases accounting for 78% of deaths, with 46% reported to be from cardiac diseases (WHO, 2014). In fact, Saudi Arabia is ranked 27th of 172 countries for risk of coronary heart disease (WHO, 2015).

As the burden of cardiac diseases remains high in Saudi Arabia, there is an increasing need for systematic, evidence-based, comprehensive care. The MOH established a range of programs to manage non-communicable diseases, including diabetes mellitus, cancer and genetic diseases, in 2006 (WHO, 2014). Although there are clinical management guidelines for hypertension and diabetes mellitus in Saudi Arabia, there is none for the management of patients after they have experienced an acute cardiac event.

Therefore, there is a need to increase the emphasis on preventing atherosclerosis by modifying risk factors, such as following a healthy diet, exercising regularly and avoiding smoking from a young age (Kalaf et al., 2016). It is imperative to evaluate and, if required, restructure the available CR programs. It is important to study the gaps in practice, and implement measurements to overcome the barriers to participation in those programs. For example, hospital discharge is a transition phase characterized by errors resulting from the discontinuity and fragmentation of care, which places patients at high risk of post-discharge adverse events and prehospitalization (Bell et al., 2011).

Care pathways (Models of care) have been shown to increase the survival rate among cardiac patients; not only those with heart failure, but also other conditions including chronic disease e.g. diabetes mellitus and hypertension in all healthcare organizations (Kul, Barbieri, Milan, Montag, Vanhaecht, & Panella, 2012). Clinical pathways are used to guide evidence-based healthcare practice. They emphasise multidisciplinary care plans that facilitate patients' management and improve communication with patients by providing a clearly written summary of care

(Kinsman, Rotter, James, Snow & Willis 2010).

In Saudi Arabia, after discharge from a hospital, patients who are able to attend are reviewed by available physicians in out-patient clinics. The physicians provide verbal instructions for medication use and no other multi-disciplinary team interventions are recorded (Rawas et al., 2012). Patient adherence to Phase 2 and 3 of CR programs after discharge can be supported through the use of structured care, which includes clear guidelines and systematic plans for the care of particular patients over a specific time period (Rawas et al., 2012).

1.2.2. Population profile

The Saudi health care system is planned based on the demographic profile of the population. With a population of 33,554,343 million as of August 2018 see (Table 1.1). Saudi Arabia ranks 41st in the world; the population density is 16 per km² (40 people per mi²). About 78% of the population is urban (26,304,988 people in 2018). The median age is 30.2 (World-o-meters, 2018). Saudi Arabia is also ranked 3rd for population of foreigners, with 10.4 million expatriates coming from different countries for work (De Bel-Air, 2014). The country has had a rapid growth of population with about 70% below the age of 40 years see (Table 1.1). However, it is predicted that there will be changes in population age; people aged between 40 and 59 will increase by 1.5 times and the number people who are age 60 will increase more than 3 times by 2018 (WHO, 2013).

Table 1.1 Demographic data of Saudi population

Year	Population	Yearly % Change	Yearly Change	Median Age	Density (P/Km²)	Urban Pop %	Urban Population
2018	33,554,343	1.87 %	616,130	30.2	16	77.0 %	26,304,988
2017	32,938,213	2.05 %	662,526	30.2	15	78.4 %	25,829,952
2016	32,275,687	2.28 %	718,543	30.2	15	78.5 %	25,344,685

1.3. Healthcare services

Health services in Saudi Arabia have been developed over the last three decades, as evidenced by the enhanced quality and access to health facilities throughout all parts of the Kingdom. According to the World Health Organization (WHO, 2011), the Saudi health care system is ranked 26th out of 190 in the world for quality. It is ranked higher than many other comparable countries' healthcare systems, including others in the region such as the United Arab Emirates, Qatar and Kuwait (WHO, 2011). The establishment of a modern health care and social services system has been one of Saudi Arabia's major achievements. The Saudi health care network provides free care to the public and some of the most sophisticated specialized care available anywhere in the world (Almalki, Fitzgerald & Clark, 2011). The Saudi healthcare sector is structured to provide a basic platform of healthcare services to all, with specialized treatment facilities offered at some private and public hospitals. The government also sponsors a wide range of social service programs aimed at ensuring that every citizen enjoys an acceptable standard of living. Saudi people have access to a national network of thousands of hospitals and clinics, and they can obtain virtually any specialized medical treatment they might need which is available in other countries (MOH, 2017).

The Saudi MOH provides over 60% of these services, while responsibility for the remainder is shared among other government agencies and the private sector (MOH, 2017). In fact, the health system in Saudi Arabia is divided in two governance categories: government sector and private sector. The government sector is led by the MOH. Other agencies in public sector include main governmental hospitals, for example the Ministry of National Guard-Health Affairs, health services in the Royal Commissions, Security Forces medical services, and Arabian American Oil Company (ARAMCO) health services. Most of these work as referral hospitals and teaching hospitals. On the other hand, the private sector includes private hospitals that provide all levels of health care either primary or tertiary care.

Despite all efforts and achievements, the Saudi health care system faces many challenges that require new strategies and policies by the Saudi MOH as well as effective cooperation with other governmental health sectors (Almalki, Fitzgerald

& Clark, 2011).

1.4. Healthcare workforce

The healthcare workforce in Saudi Arabia is culturally diverse, which is a mix of Saudi and non-Saudi. A significant number of expatriates from a range of countries represent the majority of the workforce (Aboshaiqah, 2016). In 1992, the Saudi government established a policy which stated that all sectors of the workforce should follow the so-called “Saudisation” policy. This policy aimed at reducing the dependence on the expatriate workforce and increasing the proportion of local employees. The Saudisation policy has resulted in an increase in the number of Saudi people entering the nursing and other health professions (Al-Mahmoud, Mullen & Spurgeon, 2012). There is a significant demand for nursing staff in general in Saudi Arabia, especially Saudi nurses and Arab nurses who can communicate in Arabic and understand the patients’ culture (Aboshaiqah, 2016).

However, many expatriates remain employed in a range of healthcare organizations and have a significant role in the development of the healthcare system (Almutairi, McCarthy, & Gardner, 2015). In 2013, more than 70% of the nursing workforce in Saudi Arabia was expatriate, according to MOH statistics (MOH, 2014). This shortage of Saudi staff leads to dependency on foreign staff who have little knowledge about Saudi culture and Islam (Al-Mahmoud & Mullen 2013). According to Mebrouk (2008), expatriate staff find it challenging to understand Saudi culture and communicate in the local Arabic. This language barrier negatively affects patients’ satisfaction and adherence to the treatment plan. Religious, cultural, and spiritual beliefs are other factors that affect the quality and safety of patient care, especially in a society with high proportions of multicultural staff; in fact, they can affect patients’ perception of sickness and required treatment (Taylor, Nicolle, & Maguire, 2013).

1.5. Problem Statement

Although many patients receive the required treatment when they are admitted to the hospital, the majority are not referred to Phase 2 and Phase 3 of CR programs. Those phases are significant because they are transition periods for patients with

cardiac conditions. All CR phases require more attention and emphasis on their importance and their role for patients recovering after cardiac events. Problems in continuity of care in CR programs in Saudi Arabia mostly arise following discharge from coronary care units (CCU), before Phase 2 and Phase 3, due to lack of patients' support, and access to CR programs.

1.6. Research aim and objectives

The aim of this study was to explore a sample of cardiac rehabilitation programs in three phases in Saudi Arabia, and to develop recommendations and guidelines to model a cardiac rehabilitation program suitable for the Saudi Arabian context.

The study objectives were to:

- Identify the evidence based practice and gaps in relation to the implementation of a well-structured CR program for people with cardiac diseases.
- Identify barriers and enablers for developing and participating in CR programs
- Develop guidelines and recommendations to model a cardiac rehabilitation program in Saudi Arabia

1.7. Significance of the study

With rapid advances in management of CVD worldwide and locally in Saudi Arabia, it is important that CR programs are informed by key stakeholders and that patients and clinicians contribute their perspectives to the modelling of care in this area. This study is the first to explore a sample of CR programs and structure a CR model in MOH hospitals in Saudi Arabia.

1.8. Scope of the study

This study explored the available sample of CR programs in three cardiac centres in Riyadh, the capital city of Saudi Arabia. Moreover, the study explored the healthcare providers' perspectives and importantly the experiences of patients with cardiac conditions throughout all the phases of rehabilitation. It was important to identify barriers and enablers to participation in CR programs and to highlight the

gaps in service and practice; however, quality of care was outside the scope of the study. The findings were used to formulate guidelines to structure a model of CR program that is suitable for the context of Saudi Arabia. Observers from other hospital governance types and locations such as private hospitals, National Guard, Military and Royal Health services should interpret the findings as relevant to individual circumstances.

1.9. Methodology and research design

A concurrent triangulation mixed method was chosen as the most suitable for this study (Creswell, 2013) see Chapter 3. The quantitative data and the qualitative data were collected concurrently and analyzed separately. A survey method was chosen for both phases as this allowed the researcher to explore and describe healthcare providers' knowledge related to CR programs while also investigating the barriers to and enablers for adopting CR programs from the perspective of patients with cardiac conditions. The study sample included patients who were admitted to cardiac units and were later followed up in CR clinics. The study sample also included nurses, physicians, and multi-professional teams who worked in coronary care units and outpatient cardiac clinics.

1.10. Conceptual framework

According to Baumgärtner (2000), modelling has many different meanings, originating in the late 1890s when scientists “interpreted their activity as model building” (Niehans, 1990, p. 313). Niehans (1990) describes other interpretations of modelling as a theory, a scientist's intuition, a set of assumptions (models at rest) and then finally as the precursor to simulation (dynamic models; Baumgärtner, 2000). ‘Modelling’ or a ‘model of care’ is defined as the way health services are delivered (Agency for Clinical Innovation [ACI], 2013).

The modelling of care aims to ensure best practice in the care and services for patients, so that they obtain the right care, at the right time, by the right team and in the right place. An effective model of care should be based on the best available evidence, and be developed in collaboration with clinicians, patients, families, managers and healthcare providers (evidence-based practice); furthermore, it is

important to extend it across the patient journey (ACI, 2013).

According to the ACI, (2013) the concept and the reason that supports a model of care application is the need for clinical knowledge that guides practice to meet care innovation. The ACI framework enhances clinicians to apply their ideas in evidence-based practice. Developing a model of care requires a varied range of skills, experiences, processes, which include clinical expertise, communication skills, financial, research and data analysis, evaluation and project management skills. It is important to empower the people's skills early in the development phases of the model of care. Within the team, there are different skills which are needed for them to develop a model of care in collaboration with patients, healthcare providers and the community (ACI, 2013). The process of modelling is explained in Figure 1.1.

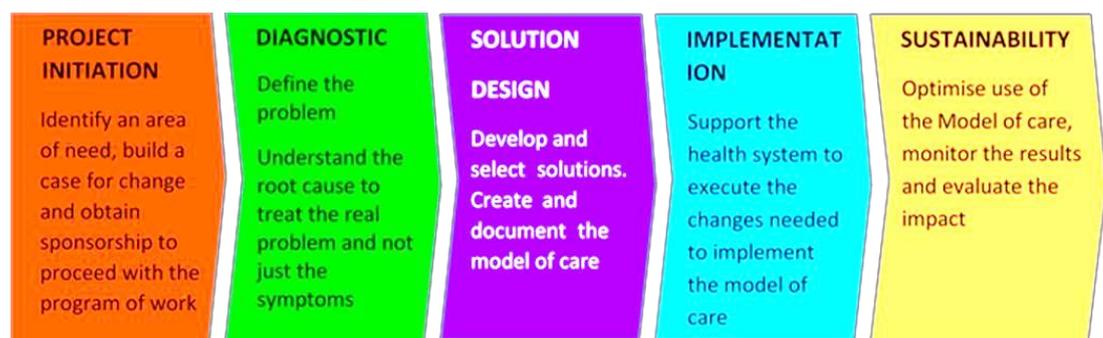


Figure 1.1 Stages of creating a model of care, from the Agency for Clinical Innovation (2013)

1.10.1. Project initiation

Model of care, according to ACI, (2013) should be based on the best available evidence. Usually, it is developed in a team that consists of managers, healthcare providers, patients, their families, and organisations that represent them. In order to make a successful plan for a model of care, this plan should include both qualitative and quantitative information. Furthermore, clear objectives will ensure effective collaborative work, where everyone is working towards the same goal (ACI, 2013).

1.10.2. Diagnostic

The diagnostic phase is based on a 'case for change'. In order to understand how services can be improved it is important to identify how services are currently being delivered. Data collection included patient and staff interviews, observation process and reviewing patients' survey results. To apply evidence-based practice, critical

evaluation of the relevant literature is another crucial step. Analysis of the literature should provide information on best practice and how different healthcare providers deliver care, which can then be compared to current practice (ACI, 2013).

1.10.3. Solution design

The aim of this phase of the redesign methodology is to define the main issues and develop a range of solutions. When designing solutions it is important to consider factors that influence funding and resources. During the solution design phase of the current study, alternative solutions were identified. Ideas were generated through a worldwide literature review, conducting workshops with clinicians and decision makers at health care organizations. All emerging solutions can be discussed with key representatives in health organisations and patients to see how effectively they address the issues from the diagnostic phase (ACI, 2013).

1.10.4. Implementation

The aim of this phase is to change current practice, including systemic and behavioural changes (ACI, 2013). However, this phase was outside of the scope of the current study.

1.10.5. Sustainability

While it is recommended that any new model of care be reviewed following implementation, this phase was beyond the scope of this study, although recommendations and guidelines that facilitate the implementation will be provided in Chapter 7 (ACI, 2013).

1.11. Summary of the conceptual framework

A model of care is the technique and the modes that health services are delivered. It aims to ensure the best practice of care for patients through their treatment journey. Furthermore, it aims to bring an effective change by improving services delivery.

The ACI created different models in relation to chronic illnesses management. Therefore, the ACI is a suitable conceptual framework for exploring and modelling current CR models in Saudi Arabia. It is important to consider all the stages of

developing CR models, i.e. project initiation, diagnostic, design solution, implementation and sustainability. However, this study includes the first three phases of the model of care and two phases relate to the post-doctoral period. . The current study used the ACI framework to explore the status of CR programs in Saudi Arabia, identify the issues and the pathway to solutions. The five steps for creating a CR model of care for Saudi Arabian health services offers the opportunity for reform in chronic illness management specifically, a positive effect on healthcare delivery in cardiac rehabilitation.

It is also important that when establishing a model of care, essential aspects are considered such as society, culture, lifestyle, people's habits and traditions. The MOH as the key stakeholder will also be consulted on the feasibility and applicability of the model in due course.

1.12. Overview of the thesis

This thesis consists of seven chapters. Chapter 1 introduced the thesis and the background to the study, including its objectives, aim and scope. The significance of the study was articulated, followed by a conceptual framework that underpinned the study, an outline of the total thesis structure and finally a conclusion.

In Chapter 2, a literature review and narrative synthesis on CR programs practices and modelling process are presented.

In Chapter 3 the research design of the study are described. The development and uses of a mixed methods approach, and the values of mixed methods research also highlighted. Ethical considerations, quality of data and data management are also discussed.

In Chapter 4 the details of quantitative results arising from the questionnaire are reported.

The qualitative results are provided in Chapter 5, arising from the semi-structured interviews.

In Chapter 6 an integration of quantitative and qualitative results is provided through a discussion of the overall findings and synthesised within the context of

the existing research literature and limitations of the study.

Chapter 7 provides a conclusion of the thesis including recommendations for practice, policy, education and research.

1.13. Chapter summary

This chapter begin with an introduction to CVD and CR followed by the aim of the study and research objectives. The significance of the study, scope and context of this study was established. The conceptual framework that underpins the study was explained in detail. The next chapter provides a narrative review of the relevant research literature.

Chapter 2. Literature review

2.1. Introduction

The leading cause of death worldwide is CVD (WHO, 2011). Therefore, there is an urgency to ensure access to quality integrated CR programs and engage patients with cardiac conditions to attend those programs. The aim of this study is to explore a sample of cardiac rehabilitation programs in Saudi Arabia and to develop recommendations and guidelines to model a program that is suitable for the Saudi Arabian context.

The aim of this chapter is to provide a review of the available literature on CR programs and CVD, including incidence, cause and management. It explores the literature on model of care, CR programs in Saudi Arabia, barriers and enablers to attending CR programs and the role of the multidisciplinary team in CR practice. One of the main purposes of reviewing the literature is summary of a large amount of research evidence. This chapter begins with an explanation of the review strategy. Next, the characteristics of the included studies are discussed. This is followed by presentation of the findings and conclusion.

2.2. Review structure

A narrative literature review is a critical and objective analysis of the current knowledge on a selected topic. It helps to focus on the context of the current research. A narrative review was selected to identify patterns and trends in the literature, to identify the gaps in knowledge. The narrative literature review reports the accurate findings from the available knowledge on the researched topic and base this summary on previously published research (Green, Johnson, & Adams, 2006).

The current review has five steps (Green, Johnson, & Adams, 2006).

1. Definition of the aims of the review.
2. Search strategy including screening and selection process
3. Findings

4. Narrative synthesis

5. Drawing of conclusions

2.3. Aims of the review

This review aimed to explore and appraise the available literature on CVD causes and management worldwide, and in Saudi Arabia particularly. It aims to review the presence of CR programs internationally and in Saudi Arabia. Furthermore, it explores barriers and enablers to attend CR programs, it highlights the importance role of the multidisciplinary team in CR programs and the definition and process of model of care.

2.4. Search strategy

To answer the aims of the review, CINAHL plus, ProQuest Central databases, PubMed and the Google Scholar search engines were searched for relevant papers. The studies were included if they met the review aims and focussed on CR programs, CVD and or models of care. They are peer-reviewed studies published in English from 1968 to 2018, available in full text, and met the study inclusion and exclusion criteria. The rationale for the search date is that 1968 was the year when the first study on CR programs was approved. Saltin (1968) published the Dallas Bed Rest and Exercise Study, which provided very strong evidence of the importance of exercise and the detrimental effect of prolonged bed rest after cardiac events. Since 1968, the physiologic benefits of exercise have been established, which led to the development of CR programs as a multidisciplinary approach to help cardiovascular patients recover and optimize their functional and mental status.

A manual search of reference lists from the included papers was also undertaken to identify studies not located in the electronic database search. Websites organization, government reports and books were also included. A list of the accessed databases and keywords used in the search are listed below.

Keywords

1-Cardiac rehabilitation programs

- 2- Barriers AND enablers AND Cardiac rehabilitation programs
- 3-Cardiac rehabilitation programs AND multidisciplinary team.
- 4-Cardiac rehabilitation programs AND Saudi Arabia.
- 5- Cardiovascular diseases incidences AND causes AND management
- 6- Cardiovascular diseases incidences AND Saudi Arabia
- 7- Model of care AND Cardiac rehabilitation programs

Databases and search engines

CINAHL plus, ProQuest, PubMed Central databases were used and Google Scholar search engine was used for grey literature.

Inclusion criteria

To be included, papers had to be in English, full text, qualitative or quantitative studies, review studies, peer-reviewed, and published between 1968 and 2018. Scientific report papers, Health Organizations and Health Associations protocols and recommendations related to practice of CR programs and CVD management were included.

Exclusion criteria

Articles were excluded that were not related to the aim of this review; for example, those related to other rehabilitation programs (neurological, pulmonary, traumatic injury etc.). Articles written in languages other than English were also excluded, as well as research papers, published outside peer reviewed journals.

2.5. Findings

The search resulted in a large number of articles (20,133) articles. Those articles were scanned for relevance to the key words and the aims of the review. Finally, the total articles retrieved from the three databases (PubMed, CINAHL and ProQuest) were 32. The references in the reviewed articles were also explored for relevance to the topic and accessed where appropriate, resulting in an additional 30 articles which were included in the literature review. Screening was performed at each step to ensure that the required information was included. To ensure appropriateness of the review, published information other than research papers relevant to aims of the review was included. These included publications such as websites organization, government reports and books. These documents were accessed via the Google and Google Scholar search engines. The search included the World Health Organisation (WHO), Australian Heart Foundation, National Heart Foundation, National Health Services (NHS) and other significant organizations that support CR programs and CVD management. The reference management Endnote X7 was used to sort the records and remove duplicates. Accordingly, full-text studies that met the aims of the review were 32 articles and seven scientific reports, 16 organizations and scientific websites and four books. See Table 2.1 for the number of retrieved articles from three databases, and see Table 2.2 Summary of retrieved studies.

Table 2.1 Search terms in databases

Search terms	PubMed	CINAHL Plus	ProQuest	Articles retrieved that met the review aims
'Cardiac rehabilitation program'	13,529	58	20	8
'Cardiac rehabilitation program' AND 'Saudi Arabia'	26	8	2	2
'Multidisciplinary team' AND 'Cardiac rehabilitation'	147	158	20	5
'Cardiovascular diseases' AND 'Causes' AND 'Management'	1275	14	823	2
'Cardiovascular diseases' AND 'Saudi Arabia'	3384	2	218	4
'Barriers' AND 'enablers' AND 'Cardiac rehabilitation programs'	23	11	2	6
'Model of care' AND 'Cardiac rehabilitation programs'	359	5	49	5
Total	20,133			32

Table 2.2 Summary of included studies and scientific reports (n=39)

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Abell, B., Glasziou, P., Briffa, T., & Hoffmann, T. (2016).	Exercise training characteristics in cardiac rehabilitation programmes: a cross-sectional survey of Australian practice.	Australia	To analyse the current status of exercise-based CR services across Australia	Cross-sectional survey. All CR sites were invited by email to participate in an online Survey Monkey questionnaire between October 2014 and March 2015. 297 eligible programmes were identified, with an 82% response rate	<ul style="list-style-type: none"> • 82% of programs were based at hospital or outpatient centres • 72% CR was offered in a comprehensive format • Exercise was prescribed 1–2 times per week for 60 min over 7 weeks. • 24% had a sole practitioner supervising exercise • The majority used a nurse/physiotherapist combination. • Low to moderate exercise intensities were used in 60% of programmes • Few sites (<6%) made use of technology, such as mobile phones or the internet, to deliver or support exercise training.
Ackerman, S. J., & Hilsenroth, M.	A review of therapist characteristics and	USA	To examine the therapist's personal	Review of literature	<ul style="list-style-type: none"> • Therapist's personal attributes such as being flexible, honest,

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
J. (2003).	techniques positively impacting the therapeutic alliance		attributes and in-session activities that positively influence the therapeutic alliance from a broad range of psychotherapy perspectives		<p>respectful, trustworthy, confident, warm, interested, and open were found to contribute positively to the alliance.</p> <ul style="list-style-type: none"> • Therapist techniques such as exploration, reflection, noting past therapy success, accurate interpretation, facilitating the expression of affect, and attending to the patient's experience were also found to contribute positively to the alliance. • The review showed how therapist personal qualities and techniques have a positive influence on the identification or repair of ruptures in the alliance.
Ahmed, A. M., Hersi, A., Mashhoud, W., Arafah, M. R., Abreu, P. C., Al Rowaily, M. A., & Al-Mallah, M. H. (2017).	Cardiovascular risk factors burden in Saudi Arabia: The Africa Middle East Cardiovascular Epidemiological (ACE) study	Saudi Arabia	To describe the current prevalence of cardiovascular risk factors among patients attending general practice clinics across Saudi Arabia	<p>Cross-sectional epidemiological analysis of the Africa Middle East Cardiovascular Epidemiological (ACE) study.</p> <p>A total of 550 participants were enrolled from different clinics across Saudi Arabia.</p>	<ul style="list-style-type: none"> • Dyslipidaemia was the most prevalent risk factor (68.6%). • The prevalence of hypertension was (47.5%), and dyslipidaemia was (75.5%) it was higher among expatriates when compared with SA nationals.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
				Group comparisons were made between patients of Saudi ethnicity (SA nationals) and patients who were not of Saudi ethnicity (expatriates).	<ul style="list-style-type: none"> • Conversely, obesity (52.6% vs. 41.0%; p = 0.008) and abdominal obesity (65.5% vs. 52.2%; p = 0.0028) were higher among SA nationals vs. expatriates • Modifiable cardiovascular risk factors are highly prevalent in SA nationals and expatriates
Al-Nozha, M. M., Al-Maatouq, M. A., Al-Mazrou, Y. Y., Al-Harhi, S. S., Arafah, M. R., Khalil, M. Z., ... & Abdullah, M. (2004).	Diabetes mellitus in Saudi Arabia	Saudi Arabia	To determine the prevalence of DM among Saudis of both sexes, between the ages of 30-70-years in rural as well as urban communities.	A community-based national epidemiological health survey, conducted by examining Saudi subjects between 30 and 70 from selected households over a 5-year period between 1995 and 2000	<ul style="list-style-type: none"> • The overall prevalence of DM obtained from this study was 23.7% in KSA. The prevalence in males and females were 26.2% and 21.5% • Diabetes mellitus was more prevalent among Saudis living in urban areas of 25.5% compared to rural Saudis of 19.5% • Despite the readily available access to healthcare facilities in KSA, a large number of diabetics 1116 (27.9%) were unaware of having DM.
Barter, P., Gotto,	HDL Cholesterol, Very	USA	To examine the	A post hoc analysis of the	<ul style="list-style-type: none"> • The HDL cholesterol level in

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
A. M., LaRosa, J. C., Maroni, J., Szarek, M., Grundy, S. M., & Fruchart, J. C. (2007).	Low Levels of LDL Cholesterol, and Cardiovascular Events		relationship between the frequency of major cardiovascular events and HDL cholesterol levels in a population of patients with clinically evident coronary heart disease who were being treated with statins; also, to investigate whether any observed relationship would be maintained when LDL cholesterol was reduced below 70 mg per decilitre.	recently completed Treating to New Targets (TNT) study assessed the predictive value of HDL cholesterol levels in 9770 patients.	<p>patients receiving statins was predictive of major cardiovascular events across the TNT study cohort.</p> <ul style="list-style-type: none"> • The relationship between HDL cholesterol level and major cardiovascular events was of borderline significance (P = 0.05).
Chow, C. K., Jolly, S., Rao-Melacini, P., Fox, K. A., Anand, S. S., & Yusuf, S. (2010).	Association of Diet, Exercise, and Smoking Modification With Risk of Early Cardiovascular Events After Acute Coronary Syndromes	Canada	To examine the influence of adherence to behavioural recommendations in the short term on risk of cardiovascular events.	<p>RCT</p> <p>The study population included 18 809 patients from 41 countries enrolled in the Organization to Assess Strategies in Acute Ischemic Syndromes (OASIS)</p>	<ul style="list-style-type: none"> • About one third of smokers persisted in smoking. • Quitting smoking was associated with a decreased risk of myocardial infarction compared with persistent smoking. • Diet and exercise adherence was associated with a decreased risk of myocardial infarction compared with non-adherence • Patients who reported persistent

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
					smoking and non-adherence to diet and exercise had a 3.8-fold increased risk of myocardial infarction/stroke/death compared with non-smokers who modified diet and exercise.
Chu, D., Anastacio, M. M., Mulukutla, S. R., Lee, J. S., Smith, A. J., Marroquin, O. C., & Badhwar, V. (2014).	Safety and Efficacy of Implementing a Multidisciplinary Heart Team Approach for Revascularization in Patients With Complex Coronary Artery Disease: An Observational Cohort Pilot Study	USA	To determine the safety and efficacy of implementing the MHT approach for patients with complex CAD.	Observational cohort pilot study. 180 patients with CAD involving more than 1 vessel in a single major academic tertiary/quaternary medical centre, from May 1, 2012, through to May 31, 2013.	<ul style="list-style-type: none"> • Most of the patients underwent percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG) • A small percentage of patients underwent a hybrid procedure or medical management • Incidence of 30-day peri procedural mortality was low across all groups of patients (PCI group, 5 of 64 [8%]; CABG group, 1 of 87 [1%]). • The rate of major adverse cardiac events during a median follow-up of 12.1 months ranged from 12 of 87 patients (14%) in the CABG group to 15 of 64 (23%) in the PCI group.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Clark, P. A., Drain, M., & Malone, M. P. (2003).	Addressing Patients' Emotional and Spiritual Needs	USA	To ascertain whether patients' emotional and spiritual needs are important, whether hospitals are effective in addressing these needs, and what strategies should guide improvement	The literature review was conducted in August 2002. Patient satisfaction data were derived from the Press Ganey Associates' 2001 National Inpatient Database; survey data were collected from 1,732,562 patients between January 2001 and December 2001.	<ul style="list-style-type: none"> • A strong relationship was found between the "degree to which staff addressed emotional/spiritual needs" and overall patient satisfaction. • The three measures most highly correlated with this measure of emotional/spiritual care were staff response to concerns/complaints, staff effort to include patients in decisions about treatment and staff sensitivity to the inconvenience that health problems and hospitalization can cause.
Dagres, N., Nieuwlaat, R., Vardas, P. E., Andresen, D., Lévy, S., Cobbe, S., ... & Crijns, H. J. (2007).	Gender-Related Differences in Presentation, Treatment, and Outcome of Patients With Atrial Fibrillation in Europe	Greece, Netherlands, Germany, France, Scotland	To investigate gender- related differences in patients with atrial fibrillation (AF) in Europe	Analysis of 5,333 patients (42% female) enrolled in the Euro Heart Survey on Atrial Fibrillation	<ul style="list-style-type: none"> • Women with AF had more comorbidities, more HF with preserved systolic function, and a lower quality of life than men • Compared with men, the women were older, had a lower quality of life, had more comorbidities, more often had heart failure (HF) with preserved left ventricular systolic function.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
					<ul style="list-style-type: none"> • Among patients with typical AF symptoms (56% of women, 49% of men), there was no gender-related difference in the choice of rate or rhythm control. • Among patients with atypical or no symptoms (44% of women, 51% of men), women less frequently underwent rhythm control. • In both genders, the one-year outcome was similar except that women had a higher chance for stroke.
Davidson, P., Halcomb, E., Hickman, L., Phillips, J., Graham, B., (2006).	Beyond the rhetoric: what do we mean by a 'model of care'?	Australia	To define what is meant by the term 'model of care' and document the pragmatic systems and processes necessary to develop, plan, implement and evaluate novel models of care delivery	Literature review. Searches of electronic databases, the reference lists of published materials, policy documents and the internet were conducted using key words including 'model*', 'framework*', 'models, theoretical' and 'nursing models, theoretical'.	<ul style="list-style-type: none"> • Crucial elements in changing health care delivery through the development of innovative models of care include the planning, development, implementation, evaluation and assessment of the sustainability of the new model.
Davidson, P. M., Elliott, D., &	Clinical leadership in contemporary clinical	Australia	To define and describe clinical leadership and	Research paper based on keywords:	<ul style="list-style-type: none"> • Significant barriers to clinical leadership are organizational

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Daly, J. (2006).	practice: implications for nursing in Australia		identify the facilitators and barriers to clinical leadership; to describe strategies to develop clinical leaders in Australia; to define models of care that highlight the importance of the nursing role; evidence-based practice and measurement of clinical outcomes; strategies to empower clinicians and mechanisms to ensure participation in clinical decision-making.	Australia, clinical leadership, nursing profession, nursing role	structures that preclude nurses from clinical decision making; the national shortage of nurses; fiscal constraints; absence of well evaluated models of care and trends towards less skilled clinicians
De Melo Ghisi, G. L., Grace, S. L., Thomas, S., Evans, M. F., & Oh, P. (2013).	Development and psychometric validation of a scale to assess information needs in cardiac rehabilitation: The INCR Tool	Canada	To develop and psychometrically validate a tool to assess information needs in cardiac rehabilitation (CR) patients.	Literature review	<ul style="list-style-type: none"> The INCR Tool was demonstrated to have good reliability and validity. Practice implications: This is an appropriate tool for application in clinical and research settings, assessing patients' needs during CR and as part of education programming.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Chirillo, F., Scotton, P., Rocco, F., Rigoli, R., Borsatto, F., Pedrocco, A., De Leo, A., Minniti, G., Polesel, E., Olivari, Z.	Impact of a Multidisciplinary Management Strategy on the Outcome of Patients With Native Valve Infective Endocarditis	Italy	To assess the impact of an operative protocol with a multidisciplinary approach on the outcome of patients with NVE.	From 1996 through 2009, 292 consecutive patients with definite NVE according to modified Duke criteria were identified. Clinical, microbiological, and imaging data were collected prospectively in a computerized database.	<ul style="list-style-type: none"> The result demonstrates a significant reduction in NVE-related mortality since the inception of a formalized policy regarding the establishment of a multidisciplinary and coordinated approach to management, suggesting a beneficial impact of this strategy.
Grace, S. L, Scarcello, S., Newton, J., O'Neill, B., Kingsbury, K., Rivera, T., & Chessex, C. (2013).	How do hospital administrators perceive cardiac rehabilitation in a publicly-funded health care system?	Canada	To investigate hospital administrators' (HA) awareness and knowledge of cardiac rehabilitation (CR), perceptions regarding resources for and benefit of CR, and attitudes toward and implementation of inpatient transition planning for outpatient CR.	A cross-sectional and observational design was used. A survey was administered to 679 HAs through Canadian and Ontario databases	<ul style="list-style-type: none"> Respondents reported good knowledge of what CR is. Awareness of the closest site was lower among HAs working in community versus academic institutions; HAs in non-executive roles perceived greater CR importance for patients' care than executives did; CR programs should be situated in both hospitals and community settings.
Grover, A., & Joshi, A. (2015).	An Overview of Chronic Disease Models: A Systematic Literature	India and USA	To examine various existing chronic disease models, their elements and their role in the	A literature search was performed using PubMed and CINAHL during the period from January 2003 to March	<ul style="list-style-type: none"> A total of 23 studies were included in the final analysis. The majority of the studies were US-based. Five chronic disease

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
	Review		management of Diabetes mellitus, Chronic Obstructive Pulmonary Disease (COPD), and Cardiovascular diseases (CVD)	2011.	<p>models included Chronic Care Model (CCM), Improving Chronic Illness Care (ICIC), and Innovative Care for Chronic Conditions (ICCC), Stanford Model (SM) and Community based Transition Model (CBTM).</p> <ul style="list-style-type: none"> • CCM was the most studied model. • Future studies are also needed to test chronic disease models in settings where more racially and ethnically representative patients receive chronic care. Future program development should also include information on other barriers including transportation issues, finances and lack of services
Hammill, B. G., Curtis, L. H., Schulman, K. A., & Whellan, D. J. (2010).	Relationship Between Cardiac Rehabilitation and Long-Term Risks of Death and Myocardial Infarction Among Elderly Medicare Beneficiaries	USA	To explore the relationship between the number of sessions attended and long-term outcomes	Document review In a national 5% sample of Medicare beneficiaries, 30 161 elderly patients were identified, who attended at least 1 cardiac rehabilitation session between January 1, 2000, and December	<ul style="list-style-type: none"> • Patients who attended 36 sessions had a 14% lower risk of death and a 12% lower risk of MI. • Among Medicare beneficiaries, a strong dose-response

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
				31, 2005 a Cox proportional hazards model to estimate the relationship between the number of sessions attended and death and myocardial infarction (MI) at 4 years	relationship existed between the number of cardiac rehabilitation sessions and long-term outcomes. Attending all 36 sessions reimbursed by Medicare was associated with lower risks of death and MI at 4 years compared with attending fewer sessions
Hendriks, J. M., de Wit, R., Crijns, H. J., Vrijhoef, H. J., Prins, M. H., Pisters, R., ... & Tieleman, R. G. (2012).	Nurse-led care vs. usual care for patients with atrial fibrillation: results of a randomized trial of integrated chronic care vs. routine clinical care in ambulatory patients with atrial fibrillation	The Netherlands	To compare the AF clinic with routine clinical care in patients with AF.	RCT 712 patients with AF assigned to nurse-led care and usual care.	<ul style="list-style-type: none"> • Adherence to guideline recommendations was significantly better in the nurse-led care group. After a mean of 22 months, the primary endpoint occurred in 14.3% of 356 patients of the nurse-led care group compared with 20.8% of 356 patients receiving usual care. • Cardiovascular death occurred in 1.1% in the nurse-led care vs. 3.9% in the usual care group. • Nurse-led care of patients with AF was superior to usual care provided by a cardiologist in terms of cardiovascular hospitalizations and

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
					cardiovascular mortality.
Heran, B. S., Chen, J. M., Ebrahim, S., Moxham, T., Oldridge, N., Rees, K. & Taylor, R. S. (2011).	Exercise-based cardiac rehabilitation for coronary heart disease	UK	To determine the effectiveness of exercise-based cardiac rehabilitation (exercise training alone or in combination with psychosocial or educational interventions) on mortality, morbidity and health-related quality of life of patients with CHD	Systematic review. RCTs studies were identified by searching CENTRAL, HTA, and DARE (using The Cochrane Library Issue 4, 2009), as well as MEDLINE (1950 to December 2009)	<ul style="list-style-type: none"> Exercise-based cardiac rehabilitation is effective in reducing total and cardiovascular mortality (in medium to longer term studies) and hospital admissions (in shorter term studies) but not total MI or revascularisation (CABG or PTCA).
Jones, J. L., Kotseva, K., Connolly, S., Jennings, C., Mead, A., Holden, A., Group, E. S. (2006).	Euroaction: a nurse-led multidisciplinary Cardiovascular prevention and rehabilitation in a hospital programme. 16 week results	Europe Belgium	To manage patients who have cardiac conditions and their families to follow the European lifestyle, risk factors and therapeutic targets for CVD prevention	RCT In each of six European countries, one pair of matched hospitals was randomised to intervention or usual care. All patients and partners were invited to attend the 16 week programme.	<ul style="list-style-type: none"> The programme increased control of blood pressure and lipids to the European targets and also identified and managed new diabetes mellitus and impaired fasting glycaemia. Achievement of these lifestyle, risk factor and therapeutic targets will reduce risk of further cardiovascular disease.
Lindström, J., Louheranta, A., Mannelin, M.,	The Finnish Diabetes mellitus Prevention Study (DPS): Lifestyle	Finland	To describe the lifestyle intervention used in the Finnish Diabetes mellitus	RCT 522 middle-aged, overweight	<ul style="list-style-type: none"> The intervention group showed significantly greater improvement in each

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Rastas, M., Salminen, V., Eriksson, J., ... & Tuomilehto, J. (2003)	intervention and 3-year results on diet and physical activity		Prevention Study, describe short- and long-term changes in diet and exercise behaviour, describe the effect of the intervention on glucose and lipid metabolism.	subjects with impaired glucose tolerance who were randomized to either a usual care control group or an intensive lifestyle intervention group.	intervention goal. After 1 and 3 years, weight reductions were 4.5 and 3.5 kg in the intervention group and 1.0 and 0.9 kg in the control group, respectively. Measures of glycaemia and lipoma improved more in the intervention group.
McDonald, H. P., Garg, A. X., & Haynes, R. B. (2002).	Interventions to enhance patient adherence to medication prescriptions: scientific review	Canada	To systematically review published RCT interventions to enhance patient adherence to medication prescriptions: scientific review	Literature review A search of Medline, CINAHL, Psychlit, Sociofile, IPA, Embase, The Cochrane Library databases, and bibliographies from 1967 through August 2001 to identify relevant articles of all RCTs of interventions intended to improve adherence to self-administered medications.	<ul style="list-style-type: none"> • 49% of the interventions tested (19 of 39 in 33 studies) were associated with statistically significant increases in medication adherence • 17 reported statistically significant improvements in treatment outcomes. • All the interventions that were effective for long-term care were complex, including combinations of more convenient care, information, counselling, reminders, self-monitoring, reinforcement, family therapy, and other forms of additional supervision or attention.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Mampuya, W. M. (2012).	Cardiac rehabilitation past, present and future: an overview	Canada	To present an overview of cardiac rehabilitation as a tool for secondary prevention of cardiovascular disease and its current status as a performance measure in the care of patients with cardiac disease.	Literature review	<ul style="list-style-type: none"> • Recent research in cardiac rehabilitation has demonstrated that tremendous benefits can be derived from the optimal use of cardiac rehabilitation in patients with various cardiac pathologies including ischemic heart disease, heart failure and post heart surgery. • The benefits of cardiac rehabilitation include mortality reduction, symptom relief, reduction in smoking and improved exercise tolerance, risk factors modification and overall psychosocial wellbeing.
Mullins, C. D., Blatt, L., Gbarayor, C. M., Yang, H.-W. K., & Baquet, C. (2005).	Health disparities: A barrier to high-quality care	USA	To discuss the disparities in the treatment of cardiovascular disease, diabetes mellitus, and cancer among the sexes and racial groups, and possible interventions	Review of literature	<ul style="list-style-type: none"> • Despite significant efforts over the past several years, health disparities continue to exist, particularly among minority groups. Interventions aimed at eliminating these disparities should include ensuring cultural competence among health care providers and improving health literacy among patients.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Mutwalli, H. A., Fallows, S. J., Arnous, A. A., & Zamzami, M. S. (2012).	Randomized controlled evaluation shows the effectiveness of a home-based cardiac rehabilitation program	Saudi Arabia	To evaluate the effectiveness of a home-based cardiac rehabilitation (CR) program on post-coronary arteries bypass graft patients	RCT 49 participants were randomized to either a control group (standard hospital treatment, n=21) or an intervention group (home-based CR, n=28).	<ul style="list-style-type: none"> The intervention group showed greater improvement in health-related QoL and risk factors compared to the control group, with significant differences in fasting blood glucose, triglycerides, high density lipoprotein cholesterol, physical function, and both QoL and HADS questionnaires (p<0.05). The intervention group also demonstrated significant improvements in QoL, HADS, body mass index, heart rate, high density lipoprotein cholesterol and physical function (p<0.05), while significant differences were observed in the control group in heart rate, QoL and physical function (p<0.05).
Naughton, J., Shanbour, K., Armstrong, R., Mccoy, J. O. H. N., & Lategola, M. T. (1966)	Cardiovascular Responses to Exercise Following Myocardial Infarction	USA	To ascertain difference, if any, in the cardiovascular responses of post-infarction patients versus healthy subjects under the demands of physical	Evaluation study Of the 36 men studied, 24 had recovered from well-documented episodes of MI and 12 were apparently in good health.	<ul style="list-style-type: none"> An early report indicated that patients experienced clinical and psychological improvement during the program. Despite widespread interest in physical rehabilitation for

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
			exertion, and (2) to test the ability of post-infarction patients to undergo physical conditioning.		<p>cardiac patients, there are still no standardized guidelines with which to select patients, to evaluate the progress of each subject, or to establish the minimal level of activity necessary for achieving a conditioning effect.</p> <ul style="list-style-type: none"> • The data indicate that non-symptomatic patients who have recovered from a myocardial infarction could develop a cardiovascular response following physical activity.
Piepoli, M. F., Corrà, U., Abreu, A., Cupples, M., Davos, C., Doherty, P., & Völler, H. (2015).	Challenges in secondary prevention of cardiovascular diseases: A review of the current practice	Italy and Greece	To summarise actual challenges of secondary prevention, and discuss how this intervention should not only be effective but also efficient; to bridge the gaps between research and real-world findings and thereby find ways to improve standard care.	Literature review	<ul style="list-style-type: none"> • More investment in preventive measures and facilities is necessary. • Cardiologists should be involved in implementing health policies favouring the development of secondary prevention, at the continental level and in each single country. • Well-designed pathways for continuity of care are

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
					<p>recommended.</p> <ul style="list-style-type: none"> Responsibilities should be formally shared among all professionals involved in the care of cardiac patients, including invasive and surgical colleagues, with provision of more information on prevention within the cardiologists' community. Minimum standards in terms of duration and quality of services delivered should be established within certified centres.
<p>Rawas, H. O., Yates, P., Windsor, C., & Clark, R. A. (2012).</p>	<p>Cultural challenges to secondary prevention: Implications for Saudi women</p>	<p>Saudi Arabia</p>	<p>To examine culturally specific issues for Saudi women and the implications for secondary prevention</p>	<p>Literature review</p>	<ul style="list-style-type: none"> There are differences between Saudi men and women in epidemiology, risk factors and health service provision for CHD. These sex- and gender-based factors are important in considering the health and well-being of Saudi women. Currently, there is limited focus on the cardiovascular health of Saudi women.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Redfern, J., Maiorana, A., Neubeck, L., Clark, A.M., and Briffa, T.(2011)	Achieving coordinated secondary prevention of coronary heart disease for all in need (SPAN)	Australia	<p>To describe a united organisation of care that aims to facilitate coordinated secondary prevention for all in need (SPAN).</p> <p>To propose a care map that synthesises evidence for ongoing preventative care and reconciles consistency of care with flexibility to help improve service delivery, access and quality.</p>	Literature review	<ul style="list-style-type: none"> • People with established CHD are at substantially higher risk for recurrent clinical events compared with the general population. • Contemporary evidence suggests preventive interventions to standard medical care must be flexible and tailored to the individual's preferences, needs, and values to achieve optimal and sustainable benefits for the majority with CHD.
Redfern, J., Hyun, K., Chew, D.P., Astley, C., Chow, C., Aliprandi-Costa, B. et al. (2014).	Prescription of secondary prevention medications, lifestyle advice, and referral to rehabilitation among acute coronary syndrome inpatients: results from a large prospective audit in Australia and New Zealand	Australia and New Zealand	To evaluate the proportion of patients hospitalised with acute coronary syndrome (ACS) in Australia and New Zealand who received optimal inpatient preventive care and to identify factors associated with preventive care.	Prospective audit of the care provided to consecutive patients admitted to an Australian or New Zealand hospital with suspected ACS during a specified 2-week period.	<ul style="list-style-type: none"> • Only one-quarter of ACS patients received optimal secondary prevention in-hospital. Patients with UA, who did not have PCI, were over 70 years or were admitted to a private hospital, were less likely to receive optimal care.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Regitz-Zagrosek, V. (2006).	Therapeutic implications of the gender-specific aspects of cardiovascular disease	Germany	To review gender differences in the most frequent cardiovascular diseases and their underlying sex-dependent molecular pathophysiology, and discuss gender specific effects of current cardiovascular drugs and the implications for novel strategies for drug development	Literature review	<ul style="list-style-type: none"> • Gender differences in CVDs exist and have an increasing role in therapeutic decisions in the near future. • Several classes of drugs have different effects on men and women, and these effects should be considered when choosing treatments for CVDs. • Overall, women have been reported to be at greater risk than men of experiencing an adverse reaction to medication.
Regitz-Zagrosek, V., Oertelt-Prigione, S., Seeland, U., & Hetzer, R. (2010).	Sex and Gender Differences in Myocardial Hypertrophy and Heart Failure	Germany	To review gender differences in Myocardial Hypertrophy and Heart Failure management	Literature review	<ul style="list-style-type: none"> • Women have more frequently diastolic HF, associated with the major risk factors of diabetes mellitus and hypertension and men have more frequently systolic HF because of coronary artery disease. • Male hearts develop more easily pathological hypertrophy with dilatation and poor systolic function than female hearts.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
					<ul style="list-style-type: none"> • Women with aortic stenosis have more concentric hypertrophy with better systolic function. • Atrial fibrillation (AF) is a more ominous sign in women than in men. • Expensive and invasive therapies such as advanced pacemakers and transplantation are underused in women.
Sagar, V. A., Davies, E. J., Briscoe, S., Coats, A. J., Dalal, H. M., Lough, F., & Taylor, R. S. (2015).	Exercise-based rehabilitation for heart failure: systematic review and meta-analysis	UK	To update the Cochrane systematic review of exercise-based cardiac rehabilitation (CR) for heart failure.	<p>Systematic review and meta-analysis of randomised controlled trials.</p> <p>MEDLINE, EMBASE and the Cochrane Library were searched up to January 2013. Trials with 6 or more months of follow-up were included if they assessed the effects of exercise interventions alone or as a component of comprehensive CR programme compared with no exercise control.</p>	<ul style="list-style-type: none"> • Improvements in hospitalisation and health-related quality of life with exercise-based CR appear to be consistent across patients regardless of CR programme characteristics and may reduce mortality in the longer term.
Taylor, R. S., Brown, A.,	Exercise-based rehabilitation for patients	UK	To review the effectiveness of exercise-	A systematic review and meta-analysis of randomized	<ul style="list-style-type: none"> • Cardiac rehabilitation was

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
Ebrahim, S., Jolliffe, J., Noorani, H., Rees, K., & Oldridge, N. (2004).	with coronary heart disease: systematic review and meta-analysis of randomized controlled trials.		based cardiac rehabilitation in patients with coronary heart disease.	controlled trials was undertaken. Databases such as MEDLINE, EMBASE, and the Cochrane Library were searched.	<p>associated with reduced all-cause mortality, greater reductions in total cholesterol level, triglyceride level and systolic blood pressure, lower rates of self-reported smoking.</p> <ul style="list-style-type: none"> • There were no significant differences in the rates of nonfatal myocardial infarction and revascularization, and changes in high- and low-density lipoprotein cholesterol levels and diastolic pressure. Health-related quality of life improved to similar levels with cardiac rehabilitation and usual care. The effect of cardiac rehabilitation on total mortality was independent of coronary heart disease diagnosis, type of cardiac rehabilitation, dose of exercise intervention, length of follow-up, trial quality, and trial publication date.
Thomas, M. J., Schultz, T. J., Hannaford, N., & Runciman, W. B.	Failures in Transition: Learning from Incidents Relating to Clinical	Australia	To investigate the principal types of incidents associated with clinical handover, and	The study was undertaken as a component of a project funded by the Australian Commission on Safety and Quality in	<ul style="list-style-type: none"> • The main types of incidents found to be associated with clinical handover are:

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
(2013).	Handover in Acute Care		the contributing and preventive factors associated with these incidents.	Healthcare to investigate ways to improve learning from patient safety incident data. The study undertook an analysis of incident reports submitted by health professionals to an Australian health service's incident reporting and management system between 2004 and 2008.	<ul style="list-style-type: none"> • Actions/tasks—core activities that were not undertaken during or after handover, resulting in a handover that was incomplete or incorrect; • Omissions at handover different types of information that were absent from the handover resulting in ineffective handover; • Errors in handover: incorrect information that was effectively transferred resulting in ineffective handover; and • Transfers and discharge indicating the absence of any handover at all, or the absence of a handover acceptable to colleagues resulting in incomplete and ineffective handover.
Wai, A., Pulver, L. K., Oliver, K., & Thompson, A. (2012).	Current discharge management of acute coronary syndromes: baseline results from a national quality	Australia	To describe the methodology and baseline results of the Discharge and Management of Acute Coronary Syndromes	Drug Use Evaluation methodology involving data collection, evaluation and feedback, and targeted educational interventions.	<ul style="list-style-type: none"> • Despite the robust evidence base and availability of national guidelines, the management of patients with ACS can be improved.

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
	improvement initiative		(DMACS) project, focusing on the prescription of guideline-recommended medications, referral to cardiac rehabilitation and communication between the hospital, patient and their primary healthcare professionals.	<p>Adult patients with ACS discharged during a 4-month period were eligible to participate.</p> <p>Data were collected (maximum 50 patients) at each site through an inpatient medical record review, a general practitioner (GP) postal/fax survey conducted 14 days post discharge and a patient telephone survey 3 months post discharge. 49 hospitals participated in the audit recruiting 1545 patients.</p>	<ul style="list-style-type: none"> • 57% of patients were prescribed a combination of antiplatelet agent(s), beta-blockers, statin and angiotensin-converting enzyme inhibitors and/or angiotensin II-antagonists. • 67% of patients recalled being referred to cardiac rehabilitation; 33% had completed the programme. • In total, 83% of patients had a documented ACS management plan at discharge. • 65% of GPs rated the quality of information received in the discharge summary as 'very good' to 'excellent'.
Weingart, S. N., Zhu, J., Chiappetta, L., Stuver, S. O., Schneider, E. C., Epstein, A. M., ... & Weissman, J. S. (2011).	Hospitalized patients' participation and its impact on quality of care and patient safety	USA	To understand the extent to which hospitalized patients participate in their care, and the association of patient participation with quality of care and patient safety	<p>Random sample telephone survey and medical record review.</p> <p>A total of 2025 recently hospitalized adults.</p>	<ul style="list-style-type: none"> • 99.9% of patients reported positive responses to at least one of seven measures of participation. • High participation (use of .4 activities) was strongly associated with patients' favourable ratings of the hospital

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
					<p>quality of care.</p> <ul style="list-style-type: none"> • Participation was strongly associated with favourable judgments about hospital quality and reduced the risk of experiencing an adverse event
Wood, D. A., Kotseva, K., Connolly, S., Jennings, C., Mead, A., Jones, J., & Faergeman, O. (2008).	Nurse-coordinated multidisciplinary, family-based cardiovascular disease prevention programme (EUROACTION) for patients with coronary heart disease and asymptomatic individuals at high risk of cardiovascular disease: a paired, cluster-randomised controlled trial	UK	To investigate whether a nurse-coordinated multidisciplinary, family-based preventive cardiology programme could improve standards of preventive care in routine clinical practice	<p>RCT design</p> <p>Eight European countries, six pairs of hospitals and six pairs of general practices were assigned to an intervention programme or usual care for patients with coronary heart disease or those at high risk of developing cardiovascular disease</p>	<ul style="list-style-type: none"> • The proportion of non-smoking high-risk patients in the intervention and usual-care groups did not differ. • A higher proportion of patients with coronary heart disease in the intervention group attained the dietary targets for saturated fat intake. • The preventive cardiology programme reduced the risk of cardiovascular disease compared with usual care mainly through lifestyle changes by families, who together made healthier food choices and became more physically active than before the intervention. • This change led to some weight

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
					<p>loss and, for high-risk patients, a reduction in central obesity.</p> <ul style="list-style-type: none"> • Blood pressure control was improved and for patients with coronary heart disease without the use of additional antihypertensive drugs. • Control of blood cholesterol concentrations in these patients was improved in both the intervention and usual-care groups; improvement was significant in high-risk patients because of the increased use of statins.
<p>Woodruffe, S., Neubeck, L., Clark, R. A., Gray, K., Ferry, C., Finan, J., & Briffa, T. G. (2015).</p>	<p>Australian Cardiovascular Health and Rehabilitation Association (ACRA) Core Components of Cardiovascular Disease Secondary Prevention and Cardiac Rehabilitation 2014</p>	<p>Australia</p>	<p>To review the core components that underpin effective services that deliver maximum benefits for participants.</p>	<p>Literature review</p> <p>The Australian Cardiovascular Health and Rehabilitation Association convened an inter-agency, multidisciplinary, nationally representative expert panel of Australia's leading cardiac rehabilitation clinicians, researchers and health advocates who reviewed the</p>	<ul style="list-style-type: none"> • Five core components for quality delivery and outcomes of services were identified and are recommended: 1) Equity and access to services, 2) Assessment and short-term monitoring, 3) Recovery and longer term maintenance, 4) Lifestyle/behavioural modification and medication adherence, and 5) Evaluation

Author (Year)	Title	Country	Study's aim	Design and Sample	Main findings
				research evidence.	<p>and quality improvement.</p> <ul style="list-style-type: none"> • CR services in Australia are diverse. • CR services should be tailored to the individual patient's needs and capabilities for participation and in some instances, multiple options made available.
Yohannes, A. M., Doherty, P., Bundy, C., & Yalfani, A. (2010).	The long-term benefits of cardiac rehabilitation on depression, anxiety, physical activity and quality of life	UK	To investigate the long-term benefits of a six-week comprehensive cardiac rehabilitation programme on physical activity, psychological well-being and quality of life in patients with coronary heart disease	A prospective repeated measures follow-up over 12 months. 105 patients were recruited, (76 men), patients referred to a hospital- based comprehensive outpatient cardiac rehabilitation programme following myocardial infarction	<ul style="list-style-type: none"> • Twice-weekly cardiac rehabilitation over six weeks, on average, led to significant differences in quality of life, physical activity status and mood. • A six-week cardiac rehabilitation programme is beneficial in improving quality of life, physical activity status, anxiety and depression. These benefits were maintained at 12 months. • Elevated levels of depression were associated with impaired quality of life

2.6. Narrative synthesis

2.6.1. Overview of Cardiovascular diseases

Cardiovascular diseases are a group of diseases affecting the cardiovascular system. CVD is a term used for conditions that negatively influence the heart or blood vessels (National Health Services [NHS] 2007; WHO, 2018). These conditions include coronary heart diseases, such as angina pectoris, known as chest pain that results from coronary artery atherosclerosis that restrict the blood flow to the heart muscle. MI, which occurs when the blood flow to the heart is suddenly obstructed. Whereas heart failure is a clinical condition when the heart is unable to pump blood effectively to all body parts (NHS, 2007). As well as stroke, rheumatic heart disease, congenital heart disease, peripheral arterial disease, aortic aneurysm and dissection, and deep vein thrombosis may also result. Fatty deposits that accumulate inside the arteries usually accompany CVD. It is known as atherosclerosis, which increase the risk of formation of coronary thrombosis and MI (NHS, 2007). Moreover, CVD can also be associated with significant damage to arteries in the other organs, for example the brain, heart and kidneys. It is the leading cause for death worldwide, despite the fact that many conditions can often be prevented with a healthy lifestyle (WHO, 2018).

Cardiovascular diseases (CVD) have become the major causes of both mortality and morbidity in Saudi Arabia, especially due to considerable changes in lifestyles and behavioural patterns (WHO, 2017). A study by Rawas et al. (2012) revealed that young people's eating behaviours are largely shifting towards a greater intake of unhealthy foods with high sugar and fat content. Other lifestyle changes include consumption of more red meat, increased smoking especially among young women, and overconsumption of Western style fast foods instead of home-cooked meals. As the rate of physical inactivity level has increased to 82.4%, with more women being physically inactive at 87.6% (WHO, 2017), this has led to the rise in obesity and diabetes mellitus levels in Saudi Arabia.

Globally, according to a report from WHO (2002), chronic conditions are rising annually. Chronic conditions are described as health problems that persist across time and require some degree of health care management (WHO, 2017). For

example, diabetes mellitus, heart disease, psychotic disorders, AIDS, and physical disabilities are considered chronic. Recently, population aging has been increasing because of improved public health, yet the number of people who live in urban areas and who have adopted an unhealthy lifestyle increases and contributes significantly to CVD incidences (WHO, 2017). This increment results in continuing demands on health care systems. CVD will be the leading cause of disability throughout the world by the year 2020 if not successfully managed (WHO, 2017).

In Saudi Arabia, heart diseases are widespread and contribute to at least 54 deaths for every 100,000 Saudis (Al Jadid, 2011). It often results in problems in functionality and performance of daily activities. Myocardial infarction and acute coronary syndrome are the most common, such that the high incidences are placing a significant strain on the country's healthcare. As noted by Al Jadid (2011), although the age-adjusted mortality for coronary-heart disease (CHD) is reducing, at least half of all diagnosed patients do not survive because of poor or non-existent access to preventive and rehabilitative interventions. The World Health Organization (2017) asserts that coronary heart disease is now the leading cause of mortality, with 31% of all reported deaths being attributed to the diseases, in addition to causing at least 5.8% of all disability cases. The aetiology and risk factors for CVD within the Saudi population are similar to those in Western countries (Al Jadid, 2011): unhealthy diet, smoking, obesity and physical inactivity.

2.6.1.1. Common types of cardiovascular diseases

There is a group of diseases under CVD which includes coronary heart disease (CHD). CHD happens when the flow of oxygenated blood to the heart muscle is obstructed or becomes very slow. As a result, there will be an increased strain on the heart, which can lead to angina pectoris, MI and heart failure. CHD is also called coronary artery disease (CAD) and atherosclerotic heart disease (WHO, 2018). CHD is the result of the accumulation of atheromatous plaques (the build-up of fats that adhere to arteries) within the walls of the arteries that supply blood to the myocardium. In many cases, the symptoms and signs of CHD are discovered in an advanced state of disease. Most patients with CHD have no symptoms for many years before the first onset of symptoms, often a "sudden" MI, happens (WHO, 2018). In the advanced stages some of atheromatous plaques rupture and with

formation of coronary thrombosis this starts limiting blood flow to the heart muscle. For this reason, CHD is the most common cause of sudden death (NHS, 2007).

Another disease in the CVD group is angina pectoris, which is defined as the pain associated with very advanced CHD. It usually presents as a feeling of pressure (discomfort is a term used to describe angina pain) in the chest and arm pain and the pain moves to the jaw. Angina pain varies among patients with regards to character and intensity and most people do not perceive angina as painful, unless it is severe (Nason, 2007; WHO, 2018).

Heart failure is another very critical condition which is classified under CVD. It happens when the heart muscle is damaged, becomes weak, and is unable to pump properly; once the heart is damaged, it cannot heal. Heart damage can be caused by other conditions, for instance a MI, or long-term hypertension or diabetes mellitus.

Cardiomyopathy, also a disease of the heart muscle, may affect any age group and is a serious lifelong condition. Cardiomyopathy means the heart is unable to pump an adequate supply of blood around the body (Nason, 2007; Heart Foundation Organization, 2018).

A MI occurs when there is a sudden, complete blockage of an artery that supplies blood to the heart. When there is a clot or a plaque breaks, blood cells and other parts of the blood stick to the damaged area. Many patients experiencing chest pain. When there is a severe blockage, parts of the heart start to die. The longer the blockage goes untreated, the more likely it is that the heart is damaged permanently (Heart Foundation Organization, 2018).

Finally, rheumatic heart disease is a disorder in which rheumatic fever caused by streptococcal infection destroys the heart valves. It is an inflammatory disease that can affect the body's connective tissues, especially the heart, joints, brain or skin (Heart Foundation Organization, 2018).

Gender differences are particularly well investigated in the CVD context. This is because there is strong epidemiological evidence that men and women have different risks factors and different outcomes. For example, the incidence of MI among young women is increasing, while it is decreasing in men (Lloyd-Jones,

Adams, Brown, Carnethon, Dai, et al., 2009). Young women have possibly not been reached by prevention programmes, and also many have increased CVD risk because of lifestyle changes such as smoking or experiencing increasing job stress (Lloyd-Jones et al., 2009). In addition, young women have a higher rate of mortality after the first MI and coronary bypass graft surgery than men in the same age group. On the other hand, men in all age groups have a higher risk of ischaemic sudden death (Regitz-Zagrosek, 2006). Women and men also differ in regard to the causes of MI: significantly, psychological factors are more important in women, while heavy exercise is a more common cause in men. Social stress is another main determinant of re-infarction after the first myocardial infarction in women (Regitz-Zagrosek, 2006). Women also seem to experience a greater variety of symptoms, so-called 'atypical syndromes', and more vagal activation signs than men (Regitz-Zagrosek, 2011).

In terms of diagnosis and treatment, women tend to receive less instructions-based diagnosis and less-invasive or critical treatment for MI than men (Regitz-Zagrosek, Oertelt-Prigione, Seeland, & Hetzer, 2010). The average woman suffering from coronary artery disease is about ten years older than a male sufferer. Women also present more frequently with single vessel disease and with other vessels problems. To diagnose women accurately, magnetic resonance imaging (MRI) is used; this is because exercise echocardiography is misleading in women, for unknown reasons, which are not fully understood. Women more frequently experience heart failure with normal systolic function or diastolic heart failure, whereas men present more often with heart failure with reduced ejection fraction (EF). The main causes for these differences are mainly physiological, including calcium signalling, nitric oxide synthesis and profibrotic mechanisms, which depend partly on the action of oestrogens and androgens. Survival is comparably poor for both genders, but women have a better outcome than men (Regitz-Zagrosek et al., 2010).

With regards to hypertension, it is more frequent in young men than in young women, but the incidence among women increases steeply after the menopause. Hypertension and myocardial hypertrophy are also relatively greater risk factors for heart failure in women than in men (Regitz-Zagrosek, 2011). Conditions like cardiomyopathies occur more frequently in men than in women with a ratio of 1.5:1 or 2:1. This condition is associated with psychological stress and with silent features

of acute MI with open coronary arteries, accompanied by severe left ventricular dysfunction. Concerning heart failure, women with cardiomyopathies and systolic failure tend to receive less-invasive treatment devices or organ transplants than men (Regitz-Zagrosek, 2011). Furthermore, women have more bleeding complications when undergoing invasive therapies in the coronary arteries, receive less anticoagulation with warfarin, and have a higher risk of bleeding with different forms of anticoagulant. In addition, an increasing number of younger women are affected by stroke each year. Atrial fibrillation (AF) is a greater risk for stroke in women than in men (Dagres, Nieuwlaat, Vardas, Andresen, Lévy et al., 2007; Nolte, Heuschmann, & Endres, 2012). CVDs are the only area in which men and women differ in their vulnerability to and survival of disease (Schmetzer and Flörcken, 2012).

2.6.1.2. Aetiology

More than 60% of the global population is not adequately active, according to the World Health Organization (2018). Physical activity plays an important role at any age to protect against chronic health problems including cardiovascular disease. Physical activity regulates weight and improves the body's use of insulin. Moreover, physical activity controls blood pressure, blood lipid levels, blood glucose levels and blood-clotting factors. The health of the blood vessels can be positively influenced by physical activity. Studies reveal that doing more than 150 minutes of physical activity every week will reduce the risk of CHD by 30% (WHO, 2018). Although there are existing risk factors for CVD, physical activities may lower the risk factor of premature death compared to inactivity. Physical inactivity is a risk factor for CVD because it can lead to hypertension, abnormal blood lipids and obesity (Nason, 2007). Significantly, a middle-aged woman who is doing less than one hour of exercise per week doubles the risk of dying from a cardiovascular event compared to a physically active woman of the same age. Small increases in physical fitness are associated with a significant reduction in cardiovascular risk, even if the disease is existent (WHO, 2018).

Stress can also be a possible cause for CVD. Stress can bring some changes to the cardiovascular system, and have negative effects on the heart's health that may lead to CVD (Nason, 2007; WHO, 2018). Since the 1940s it has been known that

smoking is linked to heart disease and cancer. Smoking promotes CVD through a number of mechanisms (Nason, 2007). It harms the endothelium (the lining of the blood vessels), increases the fatty deposits in the arteries, increases clotting, raises low-density lipoprotein cholesterol, reduces high-density lipoprotein and promotes coronary artery spasm. Nicotine, the addictive component of tobacco, accelerates the heart rate and raises blood pressure. Moreover, women who smoke are at a higher risk of MI than men who smoke (Nason, 2007; WHO, 2018).

Diet plays a crucial role in the development and prevention of CVD and is one of the key aspects that can influence CVD risk factors. For example, a diet high in saturated fat increases the risk of heart disease and stroke (WHO, 2018). Eating plenty of fresh fruit and vegetables can significantly reduce the risk of CVD, as research makes it clear that abnormal blood lipid levels have a strong correlation with the risk of CVD, MI and coronary death (WHO, 2018). This is because a diet high in saturated fats and trans-fats leads to high levels of cholesterol. Saturated and trans-fats raise cholesterol levels in the blood, which in turn can lead to atherosclerosis. Abnormal levels of lipids in the blood are well known risk factors for CVD (WHO, 2018). The human body makes cholesterol and the body consumes it. Cholesterol is carried through our blood by particles called lipoproteins: low-density lipoprotein (LDL) and high-density lipoprotein (HDL). High levels of LDL cholesterol lead to atherosclerosis, increasing the risk of MI. HDL cholesterol reduces the risk of CVD as it removes it from the circulation (Nason, 2007; WHO, 2018). Another risk factor is hypertension, which is defined as a systolic blood pressure level of 140 and above. This is a risk factor for CHD and for stroke. It causes about 50% of ischaemic strokes and increases the risk of haemorrhagic stroke (WHO, 2018). Hypertension can lead to atherosclerosis and the narrowing of the blood vessels, making them more likely to be blocked by blood clots or particles of fatty material breaking off from the lining of the blood vessel wall. Damage to the arteries can also result in defects or aneurysm that ruptures easily (Nason, 2007).

There are also increasing rates of obesity in children: worldwide, 17.6 million children under five are estimated to be overweight (Nason, 2007; WHO, 2018). Compared to the general population, the risk of developing heart disease can rise to 50% for people whose parents have both suffered from heart disease before the age

of 55. The chance of having a stroke is increased if first-degree relatives have had strokes. Studies have shown a genetic component for both hypertension and abnormal blood lipids, factors related to the development of cardiovascular disease (WHO, 2018). Type 2 diabetes mellitus also has a genetic component, so people are at greater risk of developing it if one of their parents did too. Type 2 diabetes mellitus is another risk factor for the development of cardiovascular disease (Nason, 2007). CVD is the leading cause of mortality for people with diabetes mellitus (World Heart Federation, 2017; Heart Foundation Organization, 2018). If the person has diabetes mellitus the risk of CVD rises. Uncontrolled diabetes mellitus causes damage to the body's blood vessels making them more prone to damage from atherosclerosis and hypertension. People with diabetes mellitus develop atherosclerosis at a younger age and more severely than people without diabetes mellitus (World Heart Federation, 2017; Heart Foundation Organization, 2018). People with diabetes mellitus are more likely to have a MI or stroke than people who do not, and their prognosis is worse. Diabetes mellitus can damage nerves as well as blood vessels so a MI can be 'silent' that is lacking the typical chest pain. If the person has diabetes mellitus, this will have a chance of two- to three-fold greater risk of heart failure compared to people without diabetes mellitus (World Heart Federation, 2017; Heart Foundation Organization, 2018).

2.6.2. Prevalence of CVD in Saudi Arabia

In Saudi Arabia CVD represents a major health challenge. A study conducted in Saudi Arabia by Ahmed and his colleagues (2017) revealed significant insight into the present status of CVD among patients who follow up in outpatient clinics. The results showed a significant increase in CVD incidence. Moreover, many patients with high risk factors or modifiable risks have poor control over the disease and poor follow up to the recommendations from healthcare providers (Ahmed et al., 2017). The number of people in Saudi Arabia living in urban areas has expanded in the earlier decade, with numbers anticipated to increase in coming years (WHO, 2017). In a country like Saudi Arabia, being overweight is one of the highest risks factors to develop hypertension, diabetes mellitus and atherosclerosis (WHO, 2018).

This move towards an expansion in urban Saudi population along with the

increasing number of expatriates (foreigners residing in the country) is likely to have significant implications in healthcare services administrations, medical services access, and resources usage, and general wellbeing (Ahmed et al., 2017). Results show that with the current risk factors, more resources are required to control CVD and its complications. For example, dyslipidaemia and abdominal obesity were the most prevalent risk factors, affecting approximately three-quarters of screened outpatients, followed by high rates of hypertension, diabetes mellitus, and smoking (WHO, 2017). Ahmed et al.'s (2017) findings show that approximately half of the participants from both genders did not use appropriate management, and half of the outpatients who were on therapy for dyslipidaemia still had poor lipid profile control. Although lipid-modifying treatments are available for free. It is important to have more studies exploring the barriers to risk factor control in a society where healthcare and medications are free of charge, making them largely accessible (Ahmed et al., 2017).

In another study by Al-Nozha et al. (2004), it was estimated that the prevalence of diabetes mellitus occurrence in the Saudi community is associated with coronary artery disease. The number of patients with diabetes mellitus is increasing, and thus there is an urgent need for a national prevention program that controls high-risk groups, risk factors and diabetes mellitus. Significantly, there has been an increase in the rate of hypertension from 26.1% in 2004 to more than 40% in 2017 (Ahmed et al., 2017). Furthermore, hypertension control is suboptimal in all outpatients. Therefore, public health programs are needed to reduce salt intake and improve physical fitness, measures that have been shown to reduce hypertension incidence, improve blood pressure control and reduce CVD incidence (Ahmed et al., 2017). Some patients with CVD risk factors have poor control over them. The potential reasons include inadequate assessment by healthcare providers, being unable to access healthcare facilities, and level of compliance (Ahmed et al., 2017). Furthermore, some physicians have limited knowledge about CVD risk factor management and advanced treatment, which may contribute to suboptimal risk factor management (Ahmed et al., 2017).

2.6.3. MOH recommendations to reduce CVD

Generally, maintaining a healthy diet, a healthy weight and regular physical activity

can reduce about 80% of premature deaths resulting from heart diseases (MOH, 2018). Furthermore, other measures, such as exercising regularly and quitting smoking, can help to control the incidence of CVD. Primary healthcare facilities monitor glucose, cholesterol and blood pressure for people over 40. It is important to educate the community about CVD risk factors (MOH, 2018).

According to the MOH in Saudi Arabia, there are population-wide interventions that can be implemented to reduce CVD incidences (MOH, 2018). This includes integrated approaches that focus on the most common risk factors for chronic diseases such as cardiovascular diseases, diabetes mellitus, unhealthy diet, physical inactivity and smoking. In addition, preventions include increasing or establishing a tax policy on certain foods to reduce the intake of those that are high in fat, sugar and salt. Other measurements includes providing healthy school meals to children; comprehensive tobacco control policies; and building of walking and cycle paths to increase physical activity (MOH, 2018). Furthermore, the MOH emphasised the need for increasing government investment through national programs aimed at prevention and control of CVD and all chronic diseases. These investments will help the governments to protect the population's health, increasing productivity and reducing treatment expenses (MOH, 2018).

A number of organizations such as MOH in Saudi Arabia play an important role to reduce the risk factors and limiting the incidences of CVD. When the rate of CVD incidences are reduced, so is health expenditure. The MOH in Saudi Arabia indicated the need to increase tobacco-free environments, additional taxes on smokers, and support rehabilitation programs (MOH, 2018). Furthermore, there is a need to establish and promote healthy diet and physical activity through community-based awareness programs. It is noteworthy to activate the social media interaction to reduce risk factor incidences of CVD. Education about reducing the intake of unhealthy foods (like saturated fatty acids and drinks with high calorie) should be promoted. Furthermore, the adoption and supplementation of National Guidelines on physical activity to support and encourage physical activity for all age groups will be key to improving overall health outcomes (Ahmed et al., 2017).

2.6.4. Development of cardiac rehabilitation programs worldwide

The relative importance of physical activity for patients with “disorders of the

chest" was noted over 200 years ago. In 1772, a physician named Heberden published a report describing a six-month exercise program consisting of 30 minutes of daily sawing activity for one of his male patients, who had a diagnosed chest disorder (Mampuya, 2012). In the early 1950s, walking for 3 to 5 minutes was allowed for 4 weeks after cardiac events (Saltin, 1968). In 1968, with the Dallas Bed Rest and Exercise Study, Saltin provided very good evidence of the importance of exercise and the side effect of prolonged bed rest after cardiac events. It was recognized that early ambulation prevented many of the complications of bed rest (Saltin, 1968).

A group of researchers noted the physiologic basis of exercise benefits and this led to the development of CR programs as a multidisciplinary approach to help cardiovascular patients recover and optimize their functional and mental status (Naughton, Lategola, & Shanbour, 1966 and Bethell, 2000). Since that time, the CR program approach has been confirmed to have very strong benefits, and it has been recommended by most cardiovascular professional societies (Bethell, 2000).

2.6.5. Overview of CR programs

Cardiac rehabilitation programs are intended to promote health improvements in individuals with heart conditions. This can take the form of physical training, education on healthy lifestyle choices, and counselling for stress reduction and adoption of active lifestyles (National Heart, Lung and Blood Institute, 2013). CR involves combining different activities ranging from exercise training to lifestyle/behavioural educational changes to psychological support, monitored exercise, medical evaluation, and counselling (WHO, 2017). The goal is to stabilise patients, reduce the rate of recurrent cardiac events and the progression of cardiac-related disabilities to reduce the risk of occurrence of any future cardiac event. There is agreement across the literature that CR is the most cost effective secondary prevention care plan (Meadows et al., 2011; WHO, 2017). Referral to the program is based on a patient's medical history and cardiovascular blood tests along with other procedures like coronary angiogram, echo-cardiogram, and a combination of pharmacological and physical exercise stress-test. CR programs require long-term commitment, not only on the part of healthcare professionals, but also on the part of the patient. Patients with cardiac conditions should follow up and seek medical

advice (National Heart, Lung and Blood Institute, 2013). CR is a program designed to reduce further complication from CVD or even death. In fact, as declared by the National Heart, Lung and Blood Institute (2013), most of the cited causes of cardiac problems can be prevented by adopting lifestyle modifications such as physical training and healthy eating habits. All recovery processes normally include health-improvement advice as well as practical application of those suggestions, and are divided into three phases (National Heart, Lung and Blood Institute, 2013).

According to National Heart Foundation of Australia (2017), the first phase of a recovery program typically starts when the patient is admitted to the hospital and it involves basic activities such as walking for short periods of time and exercise. These activities have the scope of helping the patient get accustomed to the activities that are normally carried out at home (Babu, Noone, Haneef, & Naryanan, 2010). The second phase begins when patients are discharged from the hospital and need to travel from their home to the clinic, where they will engage in recovering activities such as physical training, stress-reducing therapy, and learning how to eat more healthily. The third phase of CR programs is a long-term commitment as patients should dedicate the rest of their lives to maintaining the good habits they have begun to follow in order to achieve the best results (National Heart Foundation of Australia, 2017).

According to Abell, Glasziou, and Hoffmann (2016), the goal of CR programs in all three phases is to transform the patient's behaviour and lifestyle, especially by encouraging healthy eating habits and teaching them how to sustain positive moods. Evaluation is done by recording estimates of the patient entire daily caloric intake and dietary components like fat and cholesterol levels as well as nutrients. Eating habits have also been studied, especially the frequency of eating and how the diet should balance fruits, vegetables and whole grain bread (Agency for Clinical Innovation, 2013).

2.6.6. Core Components of Cardiac Rehabilitation programs

CR programs involve essential components (National Heart Foundation of Australia, 2017). Firstly, a review of current and previous cardiovascular condition and surgical diagnoses such as functionality of ventricles, review of comorbidities like cerebral vascular disease, as well as review of medications in terms of dosage,

frequency of use and level of adherence. The most commonly used medications are antiplatelet agents, beta-blockers, statins and angiotensin-converting enzyme inhibitors (National Heart Foundation of Australia, 2017). This review helps to determine educational barriers and individual preferences. It also helps to establish both short-term and long-term goals for patients.

Secondly, is the exercise training, which involves physical activities aimed at boosting the functioning of the heart and coronary vasculature, and stabilizing the patient's demand for myocardial oxygen. The goal is to facilitate normal endothelial functionality, autonomic coagulation (Sagar et al., 2014). Sagar et al. (2014) note that exercise enhances the patient's myocardial perfusion by easing endothelial dysfunction, which then dilates coronary vessels, in addition to stimulating the creation of new vessel via intermittent ischaemia. Exercise training also helps to decrease adrenergic tone while concurrently boosting vagal tone in addition to stimulating the vasodilation of skeletal muscle vasculature. Exercise training seeks to enhance the patient's fitness in addition to reducing risk profile. Patients experiencing clinically stable cardiovascular disease are required to attain at least thirty minutes of moderate to intense physical activity (Abell, Glasziou & Hoffmann, 2016).

Finally, the third component includes educational and psychological interventions. Furthermore, other core components from Australian CR programs services have been grouped into five areas and are explained in detail (Balady et al., 2007; Woodruffe, Neubeck, Clark, Gray, Ferry, et al., 2014; Australian Cardiovascular Health and Rehabilitation Association, 2015). Those core components are referral and access to services, assessment and short-term monitoring, recovery and longer term maintenance, lifestyle/behavioural modification and medication adherence and evaluation and quality improvement. Below, these main components of CR programs are explained in detail.

2.6.6.1. Referral and Access to Services

All eligible patients must have a referral to a CR service which best suits their individual needs as soon as possible after diagnosis or before discharge from hospital, including a referral to a general practitioner (GP) for long-term care and follow up. According to National Heart Foundation of Australia and Australian

Cardiac Rehabilitation Association (2004), patients who are eligible for a CR program are those with acute MI, both ST elevation and non-ST elevation, including patients with and without post-MI revascularisation. For example, some conditions which are medically-managed; patients after revascularisation procedures and post coronary artery bypass graft surgery. Furthermore, patients with percutaneous coronary interventions and patients with coronary artery disease (CAD), e.g. stable angina pectoris. Other conditions with which patients may present to be eligible for a CR program include heart failure and cardiomyopathy conditions. Patients may also participate in CR with a valve device, replacement and repair, permanent pacemaker and implantable defibrillator insertion, and patients post-heart transplant and ventricular assist device (National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004).

Evidence has determined that people with other conditions, too, are likely to benefit from CR (Hamburg & Balady, 2011), for instance people with atrial fibrillation (Hendriks, de Wit, Crijns, Vrijhoef, Prins, et al., 2012) and patients who are at high risk for CAD (Wood, Kotseva, Connolly, Jennings, Mead et al., 2008).

When referring a patient to a CR program, the referral includes both automatic referral, which includes a patient's electronic file, and the standard discharge orders. In some cases, a member of the CR team visits the patient during the hospital admission to increase participation in the CR program after discharge. Patients also should have a detailed initial assessment (National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004).

Location of local resources may limit CR service delivery; however it is imperative that all CR services strive to provide the most comprehensive care with the available resources (Hamm et al., 2010). Example CR models of service delivery include facility-based exercise, education and psychosocial components or combination services, home-based services, telephone-based services and mobile phone and internet-based services. CR programs should have a qualified and expert multidisciplinary team, because patients with cardiac conditions have complex physical, social and spiritual needs (Clark, Drain, & Malone, 2003). Skilled CR professionals can facilitate recovery, identify health care needs and changes in health status, and prevent deterioration in condition (Yohannes, Doherty, Bundy, &

Yalfani, 2010).

The CR team consists of a cardiologist, physicians, nurse specialist, physiotherapist, exercise physiologist, dietician, psychologist, occupational therapist, social worker, pharmacist, and administrator, depending on local resources and needs (National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004; Buckley, Furze, Doherty, Speck, Connolly et al., 2013).

2.6.6.2. *Assessment and Short Term Monitoring*

All eligible cardiac patients should receive an individualised initial assessment. Assessment includes physical, psychological and social parameters with referral on to appropriate services (internal or external to the CR service). This is based on patient needs followed by ongoing review, discharge assessment and follow-up (National Heart Foundation of Australia and Australian Cardiac Rehabilitation Association, 2004). The purpose of this detailed assessment is to gather information about the patient's clinical, psychological and social status and to enable the initiation of an appropriate CR service. All collected information should be directly entered into the patient's electronic file. This information will generate a report for the patient's medical practitioners. Following the completion of the initial assessment, all patients should receive ongoing CR relevant to their individual needs and goals (Sanderson, Southard, & Oldridge, 2004).

The initial assessment includes the patient's self-selected short- and long-term goals. All patients should receive a discharge assessment on completion of CR, and six and 12-month follow-up should be implemented to focus on ongoing prevention. Overall care is coordinated through the patient's GP (Sanderson, Southard, & Oldridge, 2004). Communication with the patient's GP and cardiologist should be ensured and maintained at all phases. Family members should be included; having a family member involved is culturally appropriate for many ethnic groups, increasing the likelihood of long-term maintenance of behaviour change. Family members tend to have similar risk profiles, and changes to the risk profile of the family is likely to have the same health benefits; furthermore, family engagement increases participation in CR programs (Woodruffe et al., 2015).

Communication is a vital element in healthcare systems. Effective communication (spoken, written and non-verbal) is important between patients, healthcare providers and families. Communication engages patients in decision-making and care planning. It should be tailored to the patient's needs, be honest and respectful, and with feedback. Errors from communication are a major participating factor in hospital incident events (The Joint Commission - Office of Quality and Patient Safety, 2016). At transitions of care or in the discharge time, the risk of communication errors is increased, this can lead to poor health outcomes, patient dissatisfaction and inappropriate patient care (Health Quality and Complaints Commission, 2012; Thomas, Schultz, Hannaford, & Runciman, 2013). Effective communication between healthcare providers and patients should be maintained in the transition of care. Effective communication can influence a person's health outcomes, reduce adverse events during care, and reduce readmission to hospitals following discharge (Weingart, Zhu, Chiappetta, Stuver, Schneider et al., 2011; Australian Commission on Safety and Quality in Health Care, 2015).

2.6.6.3. *Recovery and Longer Term Maintenance*

CR services aim to facilitate patients return to everyday activities and maintain life-long wellbeing. When cardiac conditions or co-morbid conditions are present, the CR service should focus on maximising coping strategies (Hamm et al., 2011). Education and support should emphasize physical activity, resumption of work or voluntary roles, driving, sexual activity, and tasks in general. Importantly the education should be tailored to the individual needs, be provided in writing, and include referral for additional support as needed (Hamm et al., 2011).

Regular physical activity is crucial in CVD management and prevention (Taylor, Brown, Ebrahim, Jolliffe, Noorani et al., 2004). Exercise training improves fitness, quality of life, disease related symptoms, and coronary risk profile; it decreases symptoms of anxiety and depression and reduces mortality (Briffa, Maiorana, Sheerin, Stubbs, Oldenburg et al., 2006). Patients with clinically stable CVD should aim to achieve 30 minutes or more of low to moderate intensity physical activity on most days of the week (Briffa et al., 2006). To enable all patients to achieve these recommendations, individualised exercise prescription with regular progression should be provided, where available (Briffa et al., 2006). High intensity training

may be offered to individuals with a high level of premorbid fitness aiming to return to high intensity physical activity (Heran, Chen, Ebrahim, Moxham, Oldridge et al., 2011). Resistance training has been shown to have positive effects on muscle strength, lean body mass, bone strength and vascular function in addition to improving quality of life (Williams, Haskell, Ades, Amsterdam, Bittner et al., 2007).

Prevention of CVD requires life-long self-management by the individual supported by the GP. For the benefits of secondary prevention to be maintained in different populations and health-care settings there must be strategies aimed at chronic disease self-management, at the provider, community and organisational level (Australian Government Department of Health, 2014).

2.6.6.4. Lifestyle/Behavioural Modification and Medication Adherence

CR services should be tailored to provide patients with essential knowledge that they need. This includes education and skill development to inspire and enable them to practice self-care and make changes in their lifestyle, to address multiple CVD risk factors, and ensure adherence to prescribed medications and given management plan. Lifestyle and behaviour change is most likely to occur when the patient and the healthcare provider have formed a therapeutic cooperation utilising techniques of motivational interviewing (Ackerman & Hilsenroth, 2003). Motivational interviewing encompasses empathy, interpersonal engagement, developing differences between an actual behaviour and a desired behaviour, and reinforcement of patient change (Miller & Rollnick, 2002). Finally, a mutual commitment to the agreed change is made. It is important that all healthcare providers undertake some training courses in management techniques to enable patients to modify lifestyle and other risk factors (Rollnick, 2002).

In addition to adaptive lifestyle changes, pharmacological advances in CVD management have contributed to improved survival after diagnosis (Perk, De Backer, Gohlke, Graham, Reiner et al., 2012). A complex group of factors contribute to medication adherence among patients: perceptions of the disease process; attitudes towards medications generally; and the therapeutic alliance with clinicians (McDonald, Garg, & Haynes, 2002). Most patients will require ongoing

pharmacotherapy to manage risk factors (e.g. hypertension, dyslipidaemia, and diabetes mellitus). It is important that CR professionals work with the patient and the prescriber to support the patient's continuation of evidence-based pharmacotherapy. Emerging evidence suggests that sedentary lifestyle is related to poorer health outcomes independent of meeting recommended targets for moderate physical activity. Appropriate guidance should emphasise the importance of physical activity in times of follow up for overall health benefits (Rollnick, 2002).

Furthermore, another factor that needs attention is smoking, a well-established risk factor for the development of CVD (Ockene & Miller, 1997). The effects of passive smoke are almost as damaging as those of active smoking, increasing the risk of CVD (Chow, Jolly, Rao-Melacini, Fox et al., 2010). Cessation and avoidance of smoking has been demonstrated to significantly reduce the risk of mortality. Within CR services patients should be actively supported to meet rehabilitation program aims and be referred to appropriate smoking cessation services as required (Cirillo, Li, Smolderen, Buchanan, Horwitz et al., 2012).

A very important element in lifestyle modification is diet and nutritional strategies for health target, hypertension, obesity, diabetes mellitus, and dyslipidaemia; many of the risk factors to these conditions can be prevented by following a healthy diet. The aim of education is to target healthy eating habits. A reduction is encouraged for the intake of saturated fats and trans fatty acids, sugar and salt while increasing the intake of fresh fruit and vegetables (National Heart Foundation of Australia, 2014).

Obesity is a leading cause of CVD, and therefore the mortality rate increases as a result of obesity (Australian Institute of Health and Welfare and National Heart Foundation of Australia, 2004). One indication of obesity is waist circumference. Each patient should have an individual education and counselling to support achievement of 5-10% weight reduction followed by further goal setting and advice.

Lifestyle changes and healthy adjustment, including a low salt diet, being physically active and achieving and maintaining a healthy weight are indicated for all patients with hypertension (Rangan, Flood, Denyer, Ayer, Webb et al., 2012). All patients should also be advised on the importance of following antihypertensive therapy,

because some medications given for treatment of hypertension offer additional cardio-protective benefits, e.g. beta-blockers (Hjalmarson, 1999). Lowering low-density lipoprotein (LDL) through medication reduces morbidity and mortality from CVD (Barter, Gotto, LaRosa, Maroni, Szarek et al., 2007). Equally, raised high density lipoprotein (HDL) levels have been shown to protect against CVD. CR healthcare providers should advise patients to take lipid-lowering medications as prescribed, follow a healthy eating pattern, and have regular lipid profile studies and liver function tests in accordance with national guidelines (National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand, 2012).

People with diabetes mellitus are at a higher risk of developing CVD morbidity and mortality than people without diabetes mellitus. Patients suffering from both CVD and diabetes mellitus have a greater risk of MI and death than those with either CVD or diabetes mellitus alone (Lindström, Louheranta, Mannelin, Rastas, Salminen et al., 2003). CVD and diabetes mellitus usually share the same risk factors, therefore lifestyle modification and healthy lifestyle have favourable outcomes for the management of both conditions. Patients with CVD and diabetes mellitus should be advised to follow up and do regular monitoring of blood glucose levels and modify lifestyle factors (diet, exercise, weight control) to improve diabetes mellitus management (Lindström et al., 2003).

CVD is also related to mental health. In a study by Lichtman et al. (2009) it was reported that depression is a common symptom in patients with CVD and it is an independent risk factor for CVD with unfortunate outcomes. Other common reactions to diagnosis of cardiac conditions include anxiety, anger and sexual dysfunction. Treatment of depression post MI improves quality of life and may improve other cardiovascular outcomes (Lichtman et al., 2009). All patients should be screened for depression and anxiety with a confirmed assessment tool in hospital, and this should be followed up and checked again after completion of CR programs (Lichtman et al., 2009). Any patients diagnosed with depression should be referred for collaborative care. The treatment may include psychotherapy or prescription of antidepressant/antianxiety medications. Patients with depression post events should routinely be provided with resources to facilitate lifestyle and behavioural modification and self-management. Some resources, often known as action plans, enable patients to put into practice strategies that improve the management of their

cardiac condition. These may include a chest pain management plan, heart failure management plan or diabetes mellitus management plan. When implemented appropriately, these action plans may prevent a potential hospital admission (Lichtman et al., 2009).

2.6.6.5. *Evaluation and Quality Improvement*

All departments providing CR services must collect information and report on key performance indicators to ensure continuous quality care and improvement of services with benchmarking. Despite the vast development of CR services and the evidence of their effectiveness, in some countries they are currently underutilised (Redfern, Hyun, Chew, Astley, Chow, Aliprandi-Costa, et al., 2014). As a result, for example in Australia, the National Heart Foundation of Australia put forward key action areas to improve equity and access, uptake and quality of services for patients with CVD (National Heart Foundation of Australia, 2014). Specific recommendations included the importance of identifying measures that reflect the results of care in three domains (behavioural, clinical and health) for CR services. It is important to collect national standardised outcome information as a part of benchmarking and ensuring standardised delivery of services (Redfern et al., 2014). Data is used as an evaluation tool to progress, measure improvement, demonstrate effectiveness and provide evidence on investment. The national performance indicators included in the Heart Foundation's recommendations for cardiac patients are derived from international standards (National Heart Foundation of Australia, 2014).

2.6.7. Types of Cardiac Rehabilitation Programs

The most common CR programs are facility-based programs (De Melo Ghisi, 2014). Emphasis is on attaining a common physical, therapeutic, and psychosocial status. Home-based rehabilitation programs are a new approach which seeks to bridge the gap between research and practice, because they are not expensive and require minimal resources; however, they are only appropriate for those patients with low or moderate level post-cardiac risk events. In a study by Sagar et al (2015) no significant differences were found between home-based CR programs and facilities-based programs in terms of reducing mortality rate, rate of repeated cardiac events, or in reducing modifiable risk-factors like elevated cholesterol and

lipoprotein levels. However, home-based rehabilitation can be difficult because most of the patients have fewer resources, such as financial ones to purchase healthy foods, or access to physical exercise tools (Sagar et al., (2015).

2.6.8. Multidisciplinary team approach in Cardiac Rehabilitation programs

Working as one team with different professions, families and patients aiming to improve the outcome of patients is a very important strategy that is based on the delivery of quality evidence-based care (Chu, et al., 2014). Allied health professionals include dietitians, psychologists and behavioural therapists. Some facilities even have vocational counsellors who seek to offer advice on return to work habits and social support resources (Piepoli et al., 2015). According to Sandhoff, Kuca, Rasmussen, and Merenich (2008), collaborative programs which use a multidisciplinary team approach provide high-quality care to patients with cardiac diseases. Patient follow-up by a multidisciplinary team ensures that both the mortality rate and the hospitalization period are reduced (Sandhoff, Kuca, Rasmussen, & Merenich, 2008). Using good knowledge and an effective treatment is a very important aspect to provide patients with quality of care based on valid evidence. A study done by Chirillo et al. (2013) demonstrated a significant reduction in mortality rate and increase quality of life when multidisciplinary teams coordinated and applied formalized policy and follow up (National Heart, Lung and Blood Institute, 2013).

2.6.9. Barriers and enablers to attending Cardiac Rehabilitation programs

Worldwide access to CR programs is low, with only between 14-35% of MI patients and 31% of coronary bypass-grafting surgery patients being able to access the programs (WHO, 2017). Furthermore, due to lack of social support, the timing of the programs often conflicts with the patient's responsibilities at home and work, especially for those women who have caretaking roles. Hamill et al. (2010) in his study notes that young adults are finding it difficult to organise time off work for CR and since most are under-insured they are under immense pressure to return to work. Hamill et al. (2010) note that most health services do not offer personal home visits, which are required to ensure that patients are adhering to recommended lifestyle habits. Individuals who are not enrolled in CR tend to be those with lower socioeconomic status, lower health literacy, and poor self-management skills when

it comes to ailments (Hamill et al., 2010). However, cultural attitudes are also another barrier to access, especially traditional attitudes regarding chronic diseases. For example, most people hold the view that cardiovascular events are not preventable and thus are not fully committed to adjusting their lifestyles (Mullins, Blatt, Gbarayor, Yang, & Baquet, 2005).

Family support, especially financial support and emotional encouragement, are key determinants of CR enrolment and participation. As observed by Grace et al. (2015), family members help to counter the attitude, found in many elderly people, that they should try “to get on with their lives” and being self-sufficient, as they view the programs as barriers that create overdependence on others. Most of the elderly patients living in rural areas need assistance for transportation, which is often difficult to organise when they are not enrolled in CR programs. Furthermore, patients having other underlying medical issues are facing challenges in receiving quality rehabilitation care that factors in their comorbid conditions (Mutwalli et al., 2012).

2.6.10. Providers experiences of Cardiac Rehabilitation programs

Physicians argue that on average only 34% of those patients they refer to CR programs actually enrol, and of those, only a small fraction complete the full 36-session, twelve-week course (WHO, 2017). Physicians attribute this to factors like costs, distance and uncertainty or doubts regarding the strength of some of the facilities’ programs in fulfilling individual needs. Others point to the failure of hospital teams to speedily refer the patients to the CR program; however, in some countries like Australia a system of automatic referral of eligible patients occurs (Wai et al., 2012).

Wai et al. (2012) notes that only 83% of patients are given a documented post-discharge management plan. This is because only 77% of GPs have the appropriate discharge summary to follow patients after discharge; of these, only 55% argue that the summary has critical information regarding continuing risk-factor management. Hence, a limited number of GPs assert that the quality of information they acquire in the discharge summary is very good or excellent (Wai et al., 2012).

2.6.11. Cardiac rehabilitation programs in Saudi Arabia

As is the case in most developing countries, CR programs in Saudi Arabia are expensive, lack highly qualified providers and most facilities struggle to acquire a suitable sized space in which to run the programs (Bdeir, Farah, & Conboy, 2014). In Saudi Arabia there is a wide gap between CR scientific evidence and clinical application of the programs. The most notable challenge is the failure by a significant proportion of patients to commence CR programs immediately after discharge. There are few active and fully compliant community-based CR programs in Saudi Arabia (Bdeir, Farah, & Conboy, 2014). The other challenge is that Saudi Arabia does not have a locally defined accreditation program that specializes in cardio-vascular disease management. Hence, there is widespread implementation of European-based methods, which emphasise European based in-hospital care without much innovation suitable for the Saudi context. The programs operate under a limited time-frame since most patients are under a shortened hospital stay, with lack of an outpatient physician visit (Bdeir, Farah, & Conboy, 2014). In another review of Saudi home-based rehabilitation programs, it was observed that home-based programs are more effective than hospital-based programs because emphasis is placed on enhancing health-related quality-of-life and risk factor profiles, especially those who have undergone coronary-artery bypass grafting (Mutwalli et al., 2011).

An example of a cardiac-rehabilitation program in Saudi Arabia is provided at the King Abdulaziz Cardiac Centre, which is coordinated by heart failure nurse specialists who consult with a cardiologist when required (Bdeir, Farah & Conboy, 2014). The program uses a dedicated and very comprehensive database to assess its efficacy, as well as monitoring several clinical indicators and care outcomes. Furthermore, the program emphasizes the need for follow-up visits, so that the frequency of home-based visits are determined by individual needs and recovery progression. Each patient referred to the program is attended to initially within a 24-hour timeframe and receives a personalised exercise program and dietary recommendations. The first visit lasts about 45 minutes and follow-up visits take between 15 to 20 minutes for the first three months; subsequent visits depend on the increase or decrease of symptoms (Bdeir, Farah & Conboy, 2014). Furthermore, heart failure nurse specialists have full autonomy in prescribing medications based

on standing orders (Bdeir, Farah, & Conboy, 2014).

In Saudi Arabia women are at a high risk of acquiring cardiac diseases because among other factors, there are no significant physical activities that they are allowed to undertake like sports. Hence, at least 44% of females are obese as compared to 26.4% in males (Rawas et al., 2012). The disease is more burdensome to women because men in Saudi Arabia have the power and authority to make decisions on behalf of women within a family set up (Rawas et al., 2012). For instance, the most effective and an inexpensive way of helping such patients to recover quickly is through CR programs (Rawas et al., 2012).

Mutwalli et al. (2012) argue that implementation of CR programs in Saudi Arabia face management challenges such as absent updated regulations, resource support constraints, outdated professional guidelines and poor information systems. Over the past years there has been more governmental support for other programs, such as traumatic injuries rehabilitation programs, to the detriment of CR programs (Mutwalli et al., 2012). For this reason, some CR programs shut down due to changes in administrative rules and lack of support and funding (Al Jadid, 2010). Those programs also may emphasize exercise training, they lack a comprehensive program that should involve a combination of educational and psychological interventions (Al Jadid, 2010). As a result, existing CR centres are facing numerous challenges such as reduced availability of social workers and clinical psychologists. Most of the potential student physicians and nurses avoid pursuing such programs because CR is not fully recognized and appreciated as an important program (Jones et al., 2006). It is important to highlight that women are facing challenges in accessing CR because it is often hard for them to be admitted to government-run hospitals without being accompanied with a male guardian in Saudi Arabia (Rawas et al., 2011). They are also not able to sign consent forms, especially for CR or invasive medical procedures, without a male present. Rolfe et al. (2010) observes that the low enrolment of women is often driven by most physicians' attitudes regarding women's ability to participate in the physical exercise of the rehabilitation program. Most women with cardiac events are older on average as compared to men and with severe cardiac events coupled with other numerous non-cardiac comorbidities, such as high anxiety, depression, diabetes mellitus and arthritis (Rawas et al., 2011 and Milani, Lavie, Ventura, & Mehra, 2011).

Women find it hard to enrol and complete the rehabilitation program because they feel uncomfortable under programs which are largely dominated by males as they are automatically referred jointly at the time of discharge (Rawas et al., 2011). Some women are fixated on ingrained cultural beliefs that they lack the stamina to undertake physical exercise (Rawas et al., 2011). This is not just driven by cultural beliefs, but also due to the tendencies of most women to raise their activity levels slowly and moderately compared to men; hence, they feel that they do not fit into the exercise-based rehabilitation program. Therefore, health care providers have to spend more effort in building trust, especially using appropriate communication skills regarding importance of physical exercise and dietary changes, in a culturally-sensitive manner (Rawas et al., 2011).

2.6.12. Elements for Improving Care for Chronic Conditions and CVD

In order to overcome the problem of chronic diseases including CVD, there are eight core components or measurements to apply. The following sections explain these essential elements.

2.6.12.1. Support for a Paradigm Shift

According to Grover and Joshi (2015), some models of care do not meet the patients' needs, especially those with chronic conditions; those health care models were planned to meet acute care and this need some improvement. It is important to consider the decreases in communicable diseases and the rapid growth of population: this have produced a gap between health problems and healthcare provision, as chronic conditions are increasing (WHO, 2002). Patients, healthcare providers, health managers should be aware that chronic condition care needs different types of health care systems. Many chronic diseases such as diabetes mellitus, asthma, heart disease, and depression require prolonged and consistent health care contact. Any new model or paradigm will advance the efforts to solve the current problems of managing patient demands with limited resources.

2.6.12.2. Managing the Political Environment

When applying a new model of care, governmental decision-makers, healthcare managers patients, families, and community members need to be consulted. Each group has to participate with their own values, standards, interests, and scope of

influence for transformation toward care for chronic conditions to be successful. It is vital to start effective two-way communication to build an agreement and commitment among all the groups at each stage (WHO, 2002; Pruitt, & Epping-Jordan, 2002; Epping, Pruitt, Bengoa, & Wagner, 2004).

2.6.12.3. Building Integrated Health Care

Health care systems must be built with the aim to avoid fragmentation of services. Integration of chronic condition care is important to ensure shared information across organizations and healthcare providers. Integration also includes coordinating care and investment into different healthcare departments, for instance inpatient, outpatient, and pharmacy services, including prevention efforts, and involving community resources that can influence health care services. The outcome of services integration is improved health and increases patients' positive experiences (WHO, 2002; Pruitt, & Epping-Jordan, 2002; Epping, Pruitt, Bengoa, & Wagner, 2004).

2.6.12.4. Aligning Sectoral Policies for Health

In government, health can be affected by different authorities to create policies and strategies. To maximize positive health outcomes the policies need to be united and analysed. Health care can be aligned with other practices for example education, by teaching health promotion in schools (WHO, 2002).

2.6.12.5. Using Health Care Personnel More Effectively

Health care providers, public health providers and those who support health care organizations need some models of care and evidence-based skills for managing chronic conditions. Important factors that help patients with chronic conditions include advanced and effective communication, behaviour change techniques, patient education, and counselling skills, which are all necessary in helping patients with chronic problems (Grover & Joshi, 2015).

2.6.12.6. Centering Care on the Patient and Family

Management of chronic conditions requires lifestyle modification and daily behaviour change, because the emphasis must be upon the patient's role and responsibility in health care. It is important that management of chronic conditions

is re-oriented around the patient and family, and patient advocacy is promoted (WHO, 2002; Pruitt, & Epping-Jordan, 2002; Epping, Pruitt, Bengoa, & Wagner, 2004).

2.6.12.7. Supporting Patients in their Communities

Healthcare providers should continue management for patients with chronic conditions even if the patient leaves the clinic (WHO, 2002). The care should extend beyond the clinic walls and include the patients' working and living environments and their families, who look for services and support from their communities to successfully manage chronic conditions. Communities play an important role to fill the crucial gap in health services that are not provided by health services (WHO, 2002).

2.6.12.8. Emphasizing Prevention

Most chronic conditions are avoidable and many of the complications of chronic conditions can be prevented. There are different strategies to reduce the complication of chronic illnesses, which include early detection, reducing smoking and unhealthy nutrition, and increasing physical activity. Prevention programs should be components of every health care plans (WHO, 2002; Pruitt, & Epping-Jordan, 2002; Epping, Pruitt, Bengoa, & Wagner, 2004).

2.6.13. Models of care

In the literature, it is not clear what 'model of care' means; currently, nursing model, philosophy, paradigm, framework and theory often used interchangeably, even though they refer to diverse but parallel concepts (Tierney, 1998). There is no regular or consistent definition of 'model of care' (Queensland Health, 2000). A model of care involves multi-dimension concepts that define the way in which health care services are delivered (Queensland Health, 2000). Davidson and Elliott (2001) described a model of care as a conceptual tool that is 'a standard or example for imitation or comparison, combining concepts, belief and intent that are related in some way' (p. 121). Another definition of model is 'a descriptive picture of practice which adequately represents the real thing' (Pearson and Vaughan 1986, p.2) (Davidson, Halcomb, Hickman, Phillips, Graham, 2006).

“Model of care” describes the delivery of health care within a wide-ranging context of the health system. The framework shapes and guides the implementation and evaluation phases of the model’s development. In other words, a model of care is the main design used to provide a particular type of health care service that is shaped by a theoretical basis (Davidson, Halcomb, Hickman, Phillips, Graham, 2006).

Models of care usually consists of clear core elements. It has a framework that affords a structure for the implementation and follow up evaluation of care. Having a clear, well defined model of care will help to ensure that all healthcare providers are viewing the same picture and are working toward a common goal and able to evaluate their performance regularly (Davidson, Halcomb, Hickman, Phillips, Graham, 2006).

In the modern healthcare system, health care organisations are encouraged to develop new models of health care for chronic conditions. For instance, the increasing load or burden of chronic cases with heart failure has encouraged research and analysis to inform innovative models of care, such as a nurse-led rehabilitation programs or discharge programs (Davidson, Halcomb, Hickman, Phillips, Graham, 2006). The development of a model of care is complex and it needs multidisciplinary teamwork, to integrate the best available resources, and evidence from stakeholders, i.e. patients, communities, healthcare professionals, policy makers, funding agencies, health organisations. This development should be based on theoretical and conceptual principles (Davidson, Halcomb, Hickman, Phillips, Graham, 2006).

The development of models of care is an ongoing process and consequently does not have fixed starting and finishing period (Davidson, Halcomb, Hickman, Phillips, Graham, 2006). This flexibility is an advantage; it generates challenges to use traditional evaluation techniques in research, such as randomised controlled trials (RCT). Other types of evaluation to assess the effectiveness of changing models of care include pre-test/post-test design and case study designs. Significant improvements in individual and organisational outcomes, which may be earned by adapting models of care, fuel the development of this method in current healthcare systems in spite of existing challenges. Creating of modern and new models of care typically involves skills, systems, processes and resources to fill the gap between

theoretical research and clinical practice (Davidson, Halcomb, Hickman, Phillips, Graham, 2006).

The model of care should be evidence based and/or grounded in theoretical propositions, and be based upon assessment of patient and health provider needs. It should incorporate evaluation of health-related and intervention outcomes. It should be comprehensive and incorporate consultation with key stakeholders. It should consider the safety and wellbeing of nurses and other healthcare providers, patients and families and involve a multidisciplinary approach where applicable. It is important that it considers the optimal and equitable utilisation of health care resources. It should be accessible and optimise equity of access for all members of society. It should consider different cultures and be appropriate.

2.6.14. Evidence-based practice

Evidence-based practice is based upon demonstration of improvement in patient outcomes once the most effective measurement is used to guide clinical practice. The EBP movement is motivated and actuated by the need and the desire to make sure that people receive the best treatments through an effective system. Models of care are developed to bridge the gaps in service delivery that responds to local needs (Eaton 2000). These models of care are usually being enforced by health care providers with restricted resources, with the goal of enhancing care. It is important to know that the application of traditional analytical research to measure the result of models of care might not be possible (Leape, Berwick, and Bates, 2002).

The fundamental components of a health care system should include patients and their families, health care organisations, community service organisations and policy frameworks (Grover & Joshi, 2015). The models of care define the key policy drivers and areas where policy development should be followed to deliver care at organisational and individual levels. At organisational level the health organisations or community service organisations may deliver organised campaigns and programs, which follow target patients for cardiovascular risk factors to prevent relapse. The National Heart Foundation health promotion campaigns for physical activity.

A model of care describes what programs should be available and how care should

be organised. Actions at the organisational level should support integration, coordination and communication between and across health professionals at the individual level (Grover & Joshi, 2015), including single health practitioners and the patient. Health practitioners may be health promotion staff, heart training provider, GPs or a cardiology specialist. The model of care also describes the activities that should be delivered directly during the patient interaction and the role of a sole practitioner. For example, it will recommend that diagnosis of heart failure should be confirmed by echocardiogram and that patients with established conditions should be referred for home medication reviews (Grover & Joshi, 2015).

2.6.15. Description of the six elements of chronic care model

The six elements of chronic care model (CCM) were initially described by Wagner Austin and Von Korff (1995) as follows:

1. Health organization can implement CCM: Which is composed of staff, leaders, operations, values and goals, and there may be differences between small and large organization depending on the integrated system.
2. Clinical information systems: should be accessible and need to have an accessible disease-specific database of patients. This database should be updated with patients' condition, with an alert system to alert the provider when tests are needed, and provide required follow up. The system should be based on information exchanges.
3. Decision support: this is defined as reliable, evidence-based guidelines based on scientific evidence and patient preference. These guidelines should be applied into daily practice and should be shared with patients to encourage participation with their significant ones.
4. Delivery system design: it involves the organization of system delivery and includes staff. This component is typically where care improvements are implemented and represents an important opportunity to improve quality of care and health outcomes of patients.
5. Self-management support: this stresses the patient's role in managing health. It recognizes and promotes self-management techniques such as shared and common goal setting and action planning. Various methods of teaching have

been trialled such as group classes, skill development, and various lifestyle behaviours.

6. Community including organizations and resources for supporting patients: this focuses on using community resources that support healthcare power by clinicians. The use of support groups, local community health programs, clinic-based support groups and the internet are acceptable community interventions.

In order to improve the current care, clear goals and policies need to be identified and translated into clinical practice through application of effective improvement strategies, including the use of motivations and a comprehensive system change. Interruptions in communication and patients care can be prevented through facilitated communication and data sharing, as patients can have access across settings and providers. Another theme is cultural competency; there is a need to improve the health of people with chronic illness by transforming the system to one that is proactive instead of reactive.

Participants in care need to be defined and tasks need to be distributed among team members. Communications between all members need to be planned and organized to support evidence-based care. Some patients with complex conditions may need more intensive management for a period of time to improve clinic care and self-management. Two factors need to be considered: health literacy and cultural sensitivity and healthcare providers respond effectively to the diverse cultural and communication needs of patients. Moreover, care coordination in health system and clinical information systems is an important theme: without information systems, the effective care for chronic illness care is impossible. This emphasizes the need to access the data of patients as well as of the community (Wagner et al., 2002). An information system can recognize groups of patients who need additional care as well as facilitate performance monitoring and quality improvement. Furthermore, community policies using community resources and policies should be applied, so that community resources can be efficiently used to meet patients' needs by advocating for policies to improve patient care.

2.7. Conclusion

This chapter reviewed important elements in CVD management and CR programs,

starting with the urgency to structure current programs and importantly bridging the gap in practice. Healthcare providers and stakeholders from different sectors should cooperate to improve both clinical and theoretical aspects. The current status of CR programs is underestimated worldwide. In Saudi Arabia, it is clear there is no unified CR program that is applicable in MOH hospitals. Different strategies were highlighted from different health organizations. Little is known about the current application and delivery of CR programs. It is clear that there is a need to assess the practice of CR programs, exploring healthcare providers' knowledge, awareness about CR programs and their applicability in different settings. Communication between patients and staff, culture and language barriers were the common barriers to effective care in the healthcare system. The following chapter, Chapter 3, presents the research design, and research methods.

Chapter 3. Research design

3.1. Introduction

This chapter begins with an introduction to the chosen methodology of mixed methods, its development and value, and why it was selected for this study. Then, the application process and the ethical considerations which framed the study are presented. The study setting is described along with sampling methods, the recruitment process, data collection strategies including the instruments used, data quality management and data analysis in both phases.

3.2. Development of the mixed method approach

In the 1980s, mixed methods was introduced as the third development in the methodology employed in social and behavioural sciences (Teddlie & Tashakkori, 2009). Mixed methods, also called ‘multi-methodology triangulation’, refers to the creation of novel qualitative strategies from the combination of quantitative and qualitative methods applied either at the same time or one after the other, with the purpose of pursuing a research question and producing new knowledge (Stange, Crabtree & Miller, 2006). Thus, the mixed methods design enhances studies with both quantitative and qualitative tools to be used together to collect rich data (Creswell, Plano Clark, Gutmann & Hanson, 2003).

This is justified by the fact that a research question can be more thoroughly investigated and understood by employing qualitative and quantitative approaches together instead of on their own. Mixed methods designs can be fixed or emergent, and researchers’ choice of one or the other depends on the research requirements (Morse & Niehaus, 2009). Fixed mixed methods designs are mixed methods whereby there is a clear outline of quantitative and qualitative methods to be used, as well as of the implementation approach, and it is decided prior to commencing the research. By contrast, emergent mixed methods are employed in studies in which issues arising during the research process prompt the use of mixed methods (Morse & Niehaus, 2009).

3.2.1. The four major types of mixed methods designs

The four major types of mixed methods designs are the Triangulation Design, the Embedded Design, the Explanatory Design, and the Exploratory Design (Creswell, 2013).

3.2.1.1. The Embedded Design

The embedded design is a mixed methods design whereby the main type of data employed in a study is supported by the other data (Creswell et al., 2003). Such a design is warranted by the fact that more than one set of data is needed to provide answers to the research questions, which require particular types of data depending on their nature. Such a design is usually adopted in studies that are either qualitative or quantitative in character and require additional quantitative or qualitative data to address the research questions. The embedded design is particularly relevant to experimental or correlational studies where the quantitative framework needs to be enhanced with qualitative data and approaches. The embedding of the distinct sets of data takes place at the level of the design, one data set being incorporated in a methodology rooted in the other set of data (Greene, 2007). The embedded design is advantageous because it aids studies that, due to time or resource limitations and the fact that one type of data is emphasised over another, cannot undertake collection of quantitative or qualitative data carefully (Teddlie & Tashakkori, 2009).

3.2.1.2. The Explanatory Design

The explanatory design referred to as the explanatory sequential design, it is a mixed methods design in two stages. In the first stage, quantitative data are gathered and analysed, while in the second stage, qualitative data are gathered and analysed. The overall purpose of this design is that qualitative data helps explain or build upon initial quantitative results (Creswell, Plano Clark, Gutmann, & Hanson, 2003). For instance, the design is useful in cases where results bearing significance or insignificance, outlier results or unexpected results need to be further clarified with qualitative data (Morse & Niehaus, 2009). An example is cases where the quantitative results are employed as the basis for delineation of groups for qualitative follow-up (Teddlie & Tashakkori, 2009). Another example is a case where purposeful sampling for qualitative strategies needs to be structured by

quantitative traits of participants (Creswell et al., 2013).

This second stage proceeds in such a way so that it is the natural sequence of the results obtained in the initial stage. Quantitative methods are usually prioritised over qualitative due to the fact that the initial stage is quantitative. Deemed to be the simplest of the mixed methods designs, the explanatory design is advantageous because its application is straightforward due to its two-stage structure, which ensures that the two types of data are collected separately as the quantitative and qualitative methods are implemented independently (Creswell, 2013). Owing to these characteristics, the explanatory design is particularly useful to researchers working on their own rather than as part of a group. Furthermore, the two-stage structure of the design also facilitates the writing up of the final report in a way that provides clarity to the readers. The design is compatible with both multiphase research and single studies based on mixed methods. Additionally, as its first stage is quantitative, the explanatory design is preferred by researchers adopting a quantitative approach in their work (Creswell, 2013).

3.2.1.3. *The Exploratory Design*

The intent of the two-phase Exploratory Design is that the results of the qualitative first phase can help develop or inform the quantitative second phase (Greene, 2007). The assumption underpinning this design is that exploration is necessary in the event of unavailability of measures or instruments, unknown variables, or lack of supporting framework or theory. As observed by Creswell et al. (2003), the exploratory design is useful for studies investigating a phenomenon, due to the fact that it starts with a qualitative stage, as well as for studies that require instrument development and assessment to make up for the lack of instruments (Creswell et al., 2013).

Generalisation of results to various groups is also facilitated by the exploratory design (Morse & Niehaus, 2009), as it evaluates different dimensions of a new theory or classification and detailed examination and prevalence measurement of a phenomenon. The Exploratory Design is also a two-phase approach (Creswell et al., 2003). The first stage involves collection of qualitative data necessary for the investigation of the phenomenon under consideration. The second stage is quantitative in nature and is linked to the first stage through procedures undertaken

in accordance with the qualitative findings, including instrument development, variable delineation, and formulation of hypotheses to be assessed based on a new theory or framework (Creswell, 2013).

It is understood that qualitative data are prioritised since the initial design stage is qualitative. The approach of instrument development is usually adopted when it is necessary to devise and apply a quantitative instrument according to the results of qualitative analysis. The process starts with a qualitative examination of the subject in question with a small research sample, the results of which will subsequently inform the formulation of quantitative survey items and scales. This is followed by the application and assessment of the developed quantitative instrument. Thus, it can be said that instrument development framework formulation is the element that links the qualitative and quantitative stages of this design, but the qualitative component is deemed the most important (Creswell, 2013).

Strengths of the exploratory design include: easy description, implementation and reporting due to the stage separation; increased acceptability to quantitative researchers due to integration of quantitative methods, despite the fact that priority is given to qualitative methods; and compatibility with both single and multiphase research studies (Creswell, 2013). Challenges in using the exploratory design include its lengthy implementation process, which needs to be duly taken into account in research planning and organisation. The selection and appropriate usage of qualitative data for the development of the quantitative instrument and the decision-making regarding the use of the same participants from the qualitative analysis in the quantitative analysis should be considered (Creswell, 2013).

3.2.1.4. The Triangulation Design

Triangulation is defined by Denzin (1978) as the combination of more than one method in a study in order to answer the same phenomenon. Researchers can improve the accuracy of their judgments by collecting different kinds of data bearing on the same phenomenon. In the social sciences, the use of triangulation can be traced back to Campbell and Fiske (1959) who developed the idea of multiple operations. They argued that more than one method should be used in the justification process to ensure that the variance reflected that of the feature and not of the method.

Triangulation can have other meanings and uses, for example within-method (Patton, 2015), which means the uses of multiple techniques within a given method to collect and interpret data. For instance, in quantitative methods such as survey research, this can take the form of multiple scales or indices focused on the same construct (Glaser & Strauss, 2017). Another very basic form of triangulation that is found in research is the use of observations to strengthen statistical results (Glaser & Strauss, 2017).

The effectiveness of triangulation relates to the principle that the weaknesses in each single method will be compensated by the strengths of another. The triangulation design is the most popular strategy for mixing methods (Creswell et al., 2013), being geared towards obtaining data on the same subject that are distinct yet interrelated (Morse & Niehaus, 2009), in order to attain as much insight into that subject as possible. Furthermore, as specified by Patton (2015), the mixed methods design is intended to take full advantage of the strong points of the two research methods, namely, the large sample size, theme development and generalisation of quantitative methods, and the small *n* detailed description and comprehensiveness of qualitative methods. The main application of this design is in studies where the aim is to conduct a comparative analysis of statistical results obtained with quantitative methods and the results of qualitative methods, or else to use qualitative data to corroborate or enhance quantitative data (Creswell, 2013). To sum up, the concurrent triangulation design is usually characterized by two or is used to confirm, cross-validate, or validate findings within a study. Data is collected concurrently and the purpose is that both quantitative and qualitative methods are used to overcome a weakness in using one method with the strengths of another. Table 3.1 below summarizes the four types of mixed methods.

Table 3.1 The four major types of mixed methods designs Creswell et al. (2003)

Creswell et al. (2003)	Stage of integration	Implementation	Priority / Status
Sequential designs Explanatory	Interpretation	QUAN→qual	Usually QUAN, can be QUAL or equal

Exploratory	Interpretation	QUAL→quan	Usually QUAL, can be QUAN or equal
Sequential Transformative	Interpretation	QUAL→QUAN QUAN→QUAL	Either dominant or both equal
Concurrent designs Triangulation	Interpretation or analysis	QUAL+QUAN	Equal

3.2.2. Uses of mixed methods approach

According to Creswell (2013) the reasons for using mixed methods are:

1. Validity is improved by the use of various types of data and collection methods.
2. Addressing the research question from more than one angle.
3. Elimination of ‘gaps’ from the gathered data or information.
4. Minimisation of the likelihood of researcher bias or pre-established views.
5. Making up for the gaps in information that may occur when only a single methodology is used.

3.2.3. The value of mixed methods research

The strength of the mixed methods design lies in the fact that it applies multiple angles to the same research subject and ensures that a research question is answered in detail and comprehensively (Teddlie & Tashakkori, 2009). Furthermore, the integration of qualitative and quantitative methods ensures that the advantages of each method are enhanced, while their disadvantages are minimised (Schneider et al., 2016). Similarly, Greene (2007) argued that the quantitative and qualitative methods are complementary and afford a more comprehensive research analysis. Furthermore, since the two types of methods corroborate and reinforce each other, the research is made more reliable and valid by a mixed methods design. In addition, the combination of qualitative and quantitative data leads to a richer and broader pool of evidence (Polit & Beck, 2014). Four key strengths of the mixed methods design have been proposed by Polit and Beck (2014) as follows:

Complementary: Quantitative data reflects the numerical facet of human communication, while qualitative data reflect the narrative facet, both being of equal importance (Teddlie & Tashakkori, 2009). Each data collection method has

drawbacks, but adoption of a mixed methods design ensures that those drawbacks are minimised.

Incremental: The mixed methods design ensures incremental research progress (Polit & Beck, 2014). For example, detailed investigation may be necessary to clarify quantitative results, while a hypothesis engendered by qualitative results may require quantitative assessment.

Enhanced validity: The complementarity of qualitative and quantitative data ensures ample support for a research hypothesis or model, therefore augmenting result validity.

Creating new frontiers: When the quantitative and qualitative results lack consistency, additional investigation is prompted, particularly in the case of studies adopting just one approach. By contrast, under these conditions, the mixed methods design enables relevant differentiations to be made.

3.3. Structure of the study

A mixed method design was considered the design of choice for the present study. The rationale for choosing this design is based on four main reasons:

1. The collection of data from healthcare providers alone would not have provided thorough information to explore the gap in practice of CR programs or highlight the barriers and enablers to attend the available CR programs.
2. The collection of qualitative data alone would have provided inadequate information to address the gap in practice, as the CR program is based on a multidisciplinary team approach and this would have limited the generalisability of the results.
3. To the best of the researcher's knowledge, there were no similar studies on the same topic (modelling CR programs in Saudi Arabia). Since there weren't any similar studies, it was more reasonable to cover both methods (qualitative and quantitative) by using mixed methods.

4. To meet the study aim it was important to have a holistic approach, which addressed all the areas related to modelling the CR programs in Saudi Arabia with respect to the country's culture and unique health system.

Therefore, mixed methods design was used to explore available models of CR program in Saudi Arabia as it is a valuable approach to developing deep, rich understandings of a phenomenon and testing their generalisability (Creswell, 2013). In order to develop a model of care in a new setting it is important to assess the current practice and define the extent of the problem. Collected data was utilized to complement each other and integration of data is very important from the beginning in order to meet the research objectives (Fetters, Curry, & Creswell, 2013).

3.4. Concurrent triangulation mixed methods design

In order to meet the aim of the study and its objectives, a decision was made to use a concurrent triangulation mixed methods design (see Figure 3.1). It was considered the most suitable to develop a framework or a model of care (Creswell, 2013). This design is useful in cases where information is insufficient or inappropriate, theoretical structure, instruments or variables are absent, or a phenomenon requires further investigation prior to its measurement or assessment (Creswell, 2013). In the present study, it is believed that concurrent triangulation research design helped to gain a comprehensive insight into the programs currently available in the cardiac centres in Saudi Arabia. Moreover, it explored the views of both healthcare providers and patients with cardiac conditions.

Quantitative data were collected from healthcare providers by survey, while qualitative data was collected from patients with cardiac conditions using interviews. Both types of data were collected concurrently, and integrated during the interpretation or analysis phase. Primarily the purpose of using mixed methods is confirmation, corroboration and cross validation within the current study. Priority is given to both data types because both data should meet the research aim and objectives equally. In the concurrent triangulation design, a single theoretical perspective may not guide the design, as its purpose is to address different research objectives from different groups or levels within one organization (Tashakkori & Teddlie, 2008; Creswell et al., 2013).

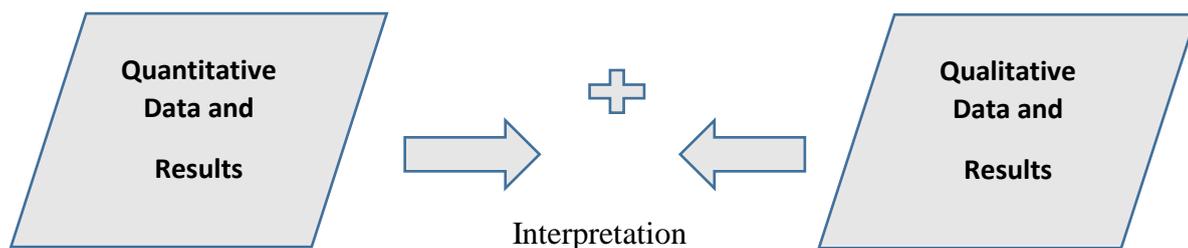


Figure 3.1 Concurrent triangulation design (Creswell et al., 2013)

3.5. Ethical considerations

Ethical approval was obtained from Monash University Human Research Ethics Committee (MUHREC; see Appendix A). Ethical approvals to conduct the research were also received from three cardiac centres in Saudi Arabia (see Appendices B, C and D). The guidelines of the National Statement of the National Health and Medical Research Council in Australia formed the ethical framework of this study. The participants had the right to anonymity, confidentiality and protection of their human rights, beneficence, awareness of risk, self-determination and full privacy. The names of the participants were not required in the interviews or the questionnaires. The explanatory statements were distributed to all the participants prior to the participation (Appendices G and H). Informed consent was obtained.

In this low risk study, to minimise any potential discomfort and support privacy and confidentiality, interviews were undertaken in a private room in each hospital. The participants had the right to withdraw from the research at any time up until data analysis and this was indicated in the explanatory statement. The participants were invited to ask questions or clarification at any time during the research. The participants had the right to self-determination and full disclosure (See Appendices E & F).

During the study period, data was obtained from participants for the purpose of the present study, then kept in a locked cabinet at the researcher's home office, and the computer data were password protected. Only the researcher and her supervisors had access to the raw data obtained from the participants. Upon completion of the study all the written data, including questionnaires, interviews audio-record,

interviews transcription and consent forms, were stored in a locked filing cabinet at Monash University and was saved securely for the required five-year period.

3.6. The study settings

This study was conducted in three cardiac centres (CCA, CCB and CCC) in Riyadh, the capital city of Saudi Arabia. Those cardiac centres are located within medical cities and specialist hospitals that provide care for thousands of people in Saudi Arabia and Middle East. Each medical city consists of four hospitals or more, depending on its mission and vision. This section addresses the context of the cardiac centres – background, geography and the healthcare system structures in central Saudi Arabia, where major national health services are centralized (see Figure 3.2).



Figure 3.2 Map of cardiac centres in Saudi Arabia

From Google maps (2018)

3.6.1. Cardiac Centre A

The centre is located in King Abdul-Aziz medical city, which has more than 1500 beds capacity. This centre has one of the most comprehensive programs for the management of heart problems in Saudi Arabia and the Gulf Region. This internationally accredited centre provides a complete range of high quality cardiac services to both adults and children. Varieties of advanced technologies have improved the speed and accuracy of diagnosis and treatment. 101 beds were

operational, 45 of which are located in Intensive Care Units (ICU), including a Medical Cardiac ICU, adult Cardiac Surgical ICU, Paediatric Cardiac ICU and a Coronary Care Unit (CCU). A wide range of expert clinical and administrative staff are responsible for the care of patients and families in associated programs. The cardiac programs have adult and paediatric patients each with their own highly specialized teams of cardiologists, surgeons, anaesthetists, nurses and other professionals. The centre has been selected as a regional lead investigator site for research, reflecting a growing regional leadership role in cardiac research in Saudi Arabia by other healthcare sectors (Ministry of National Guard Health Affairs, 2018). The cardiac program has an advanced nurse-based, physician-supervised congestive heart failure (CHF) and atherosclerosis clinic. This program depends on a comprehensive, multi-disciplinary program which is serving as a model for other cardiac centres. A recent quality review showed that the CHF program in the centre significantly reduced premature death and improved the quality of life (Ministry of National Guard Health Affairs, 2018).

3.6.2. Cardiac Centre B

This cardiac centre has emerged as a premier cardiac centre, highly equipped with technology, and is led by an experienced team (King Fahad Medical City, 2018). The centre is located within King Fahad Medical City in Riyadh where over 7,000 staff treat approximately 60,000 inpatients and over 800,000 outpatients every year. This centre is equipped with 122 clinical beds and new Cardiac Coronary Care Units (CCCU), Coronary Care Unit (CCU), and Cardiovascular Intensive Care Units (CVICU), where the CCU bed occupancy remains comparable with international benchmarks. The centre serves patients of all age groups. They accept internal transfers from other departments within the hospital and external referrals within the Kingdom of Saudi Arabia for patients with acquired, structural, infectious, genetic and congenital heart diseases. A multidisciplinary approach for the management of patients with mostly acquired vascular abnormalities is adopted, through the combination of imaging, interventional procedures in specialized catheterization laboratory as well as in the surgical operation rooms. The rehabilitation program provides comprehensive rehabilitation services to referred patients through an interdisciplinary rehabilitation program. Medical, nursing, clinical and administrative staff work together to assist patients in achieving their

maximum potential according to their outlined treatment plan (King Fahad Medical City, 2018).

3.6.3. Cardiac Centre C

The Heart Centre is a tertiary centre for cardiovascular care with international standards of excellence located within King Faisal Specialist Hospital and Research Centre. Paediatric and adult patients are evaluated in highly specialized clinics by multidisciplinary staff who are uniquely trained and certified by either North American or European Boards in their respective medical subspecialties. Patients are offered therapies consistent with disease-specific management guidelines in accordance with international standards. Annually, over 2500 inpatients are admitted to paediatric cardiology, adult cardiology, cardiac surgery and cardiac intensive care beds. Thousands of surgeries, specialized procedures and diagnostic tests are performed, which are not undertaken anywhere else in the Kingdom. For over 30 years, the Heart Centre has been caring for patients with many chronic and acute conditions such as hypertension, heart failure and cardiomyopathy. Patients are referred to the centre from all over the Middle East because of the specialty care. The primary mission of the Heart Centre is to provide the people of the Kingdom of Saudi Arabia with the highest quality of tertiary medical care for all types of cardiovascular diseases in a coordinated and balanced program through clinical practice, teaching and research. The cardiac rehabilitation programs at King Faisal specialist hospital and research centre concern vascular, pulmonary, and post open-heart surgery and heart transplantation. The rehabilitation program aims to educate the patients about how to reduce the risk for heart disease by making environmental and lifestyle changes such as quitting smoking, increasing physical activity, and choosing heart-healthy foods like low-fat and low-sodium foods (King Faisal Specialist Hospital and Research Centre, 2018).

3.7. Population, Sample and Recruitment

3.7.1. Quantitative sample

For the quantitative sample, the inclusion criteria for healthcare providers included staff working in cardiac centres who spoke English and provide patient care and who could respond to the questionnaire, written in English. Cardiac centres have

different departments including CCU medical and surgical and outpatient cardiac clinics. The aim was to recruit multidisciplinary team members including healthcare providers in different positions, including staff nurses and head of departments.

In quantitative research, the sample size ideally should generate a representative sample of the population (Teddlie & Tashakkori, 2009). Determining the adequate sample size for the quantitative approach is based on several factors including power and level of significance (Munro, 2005). The power calculation was undertaken using the National Statistical Services (NSS) to determine the sample size of healthcare providers for this study based on the following parameters: a level of significance of 0.05 with relative standard error of 0.5. The effect size can be small (< 0.3), medium (between 0.3 and 0.5) and large (> 0.5; Burns & Grove, 2010; Munro, 2005). Based on these calculations, the minimum required sample size was a total of 218 participants with a medium effect size.

3.7.2. Qualitative sample

For the qualitative sample the inclusion criteria for patients included adult patients who were admitted to cardiac units and discharged, and at the time of the study were being followed up in outpatient cardiac clinics. Patients were older than 18 years old available in the outpatient cardiac clinics during data collection, and were able to read and write in Arabic.

In qualitative research, the sample size used is typically small. Patton has stated there are no rules for sample size in qualitative inquiry (Patton, 2015). The sample size in qualitative research is considered adequate when the data collection is continued until saturation is achieved. Data saturation refers to the point when no new information is discovered when collecting data (Creswell, 2013).

3.7.3. Recruitment

Participant recruitment is a major challenge in many research studies when involving human subjects. Recruitment involves a number of activities, including identifying eligible participants, adequately explaining the study to the potential participants, recruiting an adequate sample based on study goals and design, obtaining informed consent and maintaining ethical standards, and retaining participants until study completion (Burns & Grove, 2010). Recruitment of the

research participants was conducted between November 2016 and January 2017.

3.7.3.1. Recruitment of healthcare providers

Recruitment of health care providers was undertaken according to the arrangements made with the Institutional Research Board (IRB) in each hospital. In all three cardiac centres, the recruitment of healthcare providers commenced after departmental approval (see Appendices B, C, and D). Each department issued approval memos to their staff after receiving the IRB approval. In the memos, the participation was clarified as being optional and the participants were free to contact the researcher for any clarification. All questionnaires were distributed along with the explanatory statements. Participants were given the instructions to keep the explanatory statement sheet with them for future reference should they be interested in the results of the study (see Appendices G, H). Adhering to the Monash University Human Research Ethics Committee (MUHREC) recommendations, the explanatory statement for healthcare providers included the name and contact details of the local ombudsman to address any complaints that may arise during the study and pass them on to the Committee. All participating departments were provided with secured boxes to accept the filled questionnaires. The researcher came frequently to check the process of survey collection.

3.7.3.2. Recruitment of patients with cardiac conditions

The researcher made all arrangements to conduct the study with cardiac centres. The Institutional Research Board (IRB) in each hospital sent the ethical approval along with the instructions of data collection. The research coordinators in each hospital facilitated the data collection phases. The researcher approached the patients in the waiting area and after the routine screening, the study and the explanatory statements were explained to each eligible patient in detail, and informed consent was provided. A private room was allocated for interviews to insure the privacy of participants and provide more comfort. All arrangements were facilitated by the coordinators who facilitated the patients' interviews and who provided the primary information about the patients' conditions. A large number of patients were approached in the outpatient cardiac clinics; however, it was difficult to interview female patients who refused to be recorded. On the other hand, male patients were more approachable and more open to recording their interviews.

Finally, 15 patients were being interviewed, 13 male patients and two female patients.

3.8. Data collection instruments

Data collection is a process of collecting information from appropriate sources to answer the research problem. Quantitative data collection use mathematical calculations in several formats (Creswell, 2013). Methods of quantitative data collection and analysis may include questionnaires with closed-ended questions, methods of correlation and regression, mean, mode and median and others (Creswell, 2013). The aim of qualitative data collection was to ensure a greater depth of understanding of participant thoughts. Qualitative data collection methods include interviews, questionnaires with open-ended questions, interviews and observation (Patton, 2015). In the current study, data was collected from healthcare providers using a questionnaire which included an open ended question. Qualitative data using face-to-face interviews was collected from patients with cardiac conditions and were being followed up at outpatient cardiac clinics in the chosen study settings. The interview included 10 open-ended questions, which were focussed on the patients' overall experiences of CR activities and cardiac care in the department and outpatient departments, and the barriers and enablers to attend CR programs.

3.8.1. Strengths and weaknesses of data collection instruments

Face-to-face semi-structured interviews were conducted with patients where depth of meaning is important and the research is primarily focused in gaining insight and understanding (Patton, 2015). Various approaches can be applied to analyse the data obtained in this way (Speziale, Streubert & Carpenter, 2011). Face-to-face interviews afford a chance to collect ample and detailed data, as the manner in which the interviewees choose to express themselves and articulate opinions is highly indicative of their views and perspectives. Data is collected by the researcher, which can influence how participants choose to answer questions, particularly in face-to-face interviews. Factors such as the gender, age, and ethnic background of the interviewer can especially have an impact on the participants' willingness to answer questions and the degree of openness that they demonstrate

(Patton, 2015). For example, in this study two female participants and five male participants refused tape recording, and this was a challenge to the researcher because all information needed to be written and transcribed in note form immediately after the interview.

However, in the quantitative study, despite the challenges in formulating the questionnaires, closed-ended questions are straightforward to answer and analyse (Polit & Beck, 2014). The efficiency of these types of questions lies in the fact that, since they require respondents to simply choose the answers deemed suitable, they do not take a long time to complete. The task of the respondents and of the researcher is further simplified by the fact that there are only a few answers available for the closed-ended questions (Schneider et al., 2016).

On the other hand, the simplicity of closed-ended questions means that they cannot generate detailed data, which may be detrimental to the research purposes. Moreover, their strict format hinders respondents from articulating answers in their own words (Polit & Beck, 2014). According to Tashakkori and Teddlie (2009), closed-ended questions are advantageous primarily because they can be processed rapidly, do not disclose respondents' identity, are cost-effective and provide acceptably high measurement validity. Meanwhile, the main limitations of closed-ended questions include high likelihood of incomplete or non-comprehensive data, validation requirement, and the risk that respondents will answer the questions selectively.

3.8.2. Healthcare providers' questionnaire

Healthcare providers were invited to participate in the study by completing a questionnaire in English incorporating three parts: socio-demographic information, general information about the content of CR program, and about eligible patients involved in CR programs. The third part was structured from the literature and it explored the healthcare providers' perceptions regarding current practice in available CR programs (see Appendix J).

3.8.2.1. Part one: Socio-demographic information

This part of the questionnaire includes questions eliciting demographic details (see Appendix J). The demographic details help to interpret data and understand the

background of the participants in the study and allow findings to be generalised (Polit & Beck, 2008). The socio-demographic part includes questions related to the healthcare provider's age, gender, and nationality, level of education, profession, years of employment and years of working experience in Saudi Arabia. These data were captured to determine any statistically significant differences in healthcare providers. Likewise, they were sought to determine whether the healthcare providers' practice of CR program were related to their age, gender, nationality, level of education and years of work experience.

3.8.2.2. Part two: Contents of cardiac rehabilitation program and eligible patients

The second part of the questionnaire aimed to examine the knowledge of health care providers regarding the contents of inpatient or outpatient cardiac rehabilitation program and the eligible patients involved in CR program. It was created from varied references from the literature to ensure that the questions involved all relevant information (National Heart Foundation of Australia & Australian Cardiac Rehabilitation Association, 2016). The respondents have to choose between different items which are related to CR program contents as many as he/she knows.

3.8.2.3. Part three: LIKERT perceptions of health care providers regarding cardiac rehabilitation program

Responses to this section were recorded on a five point Likert-type scale where respondents indicated to what extent they agreed or disagreed with each statement as follows: Strongly disagree (1), Disagree (2), Neither agree or disagree (3), Agree (4), Strongly agree (5). Free comments were invited at the end of the questionnaire. The questionnaire contained one open ended question about what the healthcare providers think and experience about the available CR program in their organizations; this question gave more space to the participants to express in details their thoughts, experiences and concerns.

3.8.3. Interview schedule

The semi-structured interviews proceeded easily guided by a set of questions (Appendix I) to encourage the participants to verbalize their experiences, providing their views about the CR programs they participated in. The questions were

intentionally broad at the beginning, attempting to capture more detailed information in each question. The questions for the interview were pilot-tested with two patients with cardiac conditions, one male and one female, both aged over 50 and who had ten years of cardiac disease. No changes were made, as the questions were clear and easily understood. The questions were in English or Arabic depending on the patients' preferences. The time also was varied from one patient to another depending on different factors, for instance, level of patient's education, experience of CR and psychological state. The average time of the interviews lasted from ten minutes to 45 minutes.

3.9. Data analysis

Concurrent triangulation mixed methods design, by Creswell and Plano-Clarke (2011) was chosen for the process of data collection and analysis. Data were collected and analysed concurrently. Quantitative data was collected followed by qualitative data in the same stage. In the following sections, the methods of data analysis will be discussed.

3.9.1. Questionnaire data analysis

Analysis was initiated once assessment of the quality of data and the refinement of data were finished. The purpose of data analysis is to scrutinise the data via suitable approaches and protocols in order to accomplish the aims of the research. The quantitative stage was based on descriptive and inferential statistics. As its name implies, descriptive statistics presents the data and what they indicate. On the other hand, inferential statistics estimates the probability of dependability or randomness of a discrepancy between groups. Overall, descriptive and inferential strategies were adopted in order to determine the sample features and their correlation with the number of stated variables, as well as to examine the nature of that correlation. Healthcare providers' questionnaire responses were coded and entered into an Excel spreadsheet for analysis. The quantitative data were analysed using the Statistical Package for Social Sciences (SPSS) complex program (Version 23 for Windows) for personal computer. Descriptive statistics were employed to analyse the demographic data in Part One; in Part Two, descriptive statistics were employed to describe the response data (Munro, 2005). Principal component analysis was used

to analyse Part Three of the questionnaire. Furthermore, qualitative description approach was used to analyse the data.

3.9.1.1. Descriptive statistics

Descriptive statistics were employed on the questionnaire with health care providers in Part One and Part Two. Part one includes demographic data; age, gender, work experience, nationality, department and qualification (Pallant, 2011). Descriptive statistics included percentages and frequencies. In Part Two, descriptive analysis was used to identify patterns in the components of cardiac rehabilitation programs.

Cross-tabulation analysis, also known as contingency table analysis, was used to analyse categorical data. A cross-tabulation is a two or more dimensional table which records the frequency of respondents that have the specific characteristics in the cells of the table. Cross-tabulation tables provide information about the relationship between the variables. Moreover, the shared frequency distribution can be analysed with chi-square statistic to determine whether the variables are statistically associated.

3.9.1.2. Inferential statistics

Parametric and non-parametric tests were performed as appropriate. Principal component analysis was used to analyse Part Three of questionnaire. Cronbach's alpha was used as a measure of internal consistency in Part Three questionnaire to relate a set of items in groups and to measure scale reliability.

3.9.1.3. Factor analysis

Part three of the questionnaire had 21 items. In order to reduce the number of those items the principal component analysis (PCA) was used. PCA is a statistical method which was used to condense and review data so the relationship between them can be interpreted and understood. It is a way of re-grouping and clustering the variables on shared variance and identify common patterns (Child, 2006; Yong & Pearce, 2013).

It is valuable for studies that have sets of variables where the items from questionnaires can be reduced to a smaller set to get at an underlying meaning or

idea to facilitate interpretations. The obtained variables can be reduced to fewer underlying variables that share a common variance (Bartholomew, Knott, & Moustaki, 2011). Principal Components Analysis (PCA) is a technique used to reduce the size of the collected data (Costello & Osborne, 2005). To reduce the data size, PCA can be used as the first step followed by rotation and extraction technique (Tabachnick & Fidell, 2007).

Three criteria were applied to identify the number of factors that should be extracted from the data: (A) cumulative percentage of variance, (B) eigenvalue, (C) the scree test (Pallant, 2013). All of the values relating to the eigenvalue must be positive numbers or zero and any values below zero indicate errors in the data. The minimum percentage of factor variance is 50 to 60% (Williams et al., 2012). A rotation assists the researcher in interpreting the factors and reading the data (Gaskin & Happell, 2014). Rotation is defined by Vogt and Johnson (2011) as several methods in factor analysis and component analysis which attempts to relate the calculated factors or components to theoretical entities, the factor either to be correlated (oblique) or the factors uncorrelated (orthogonal). Williams et al. (2012) describe a rotation as an attempt to maximise the loading variables and minimise the low-loading variables through either oblique rotation or orthogonal rotation.

The orthogonal technique involves different types of rotation methods, such as Varimax, Quartimax, and Equamax (Park, Dailey, & Lemus, 2002). The second type is oblique rotation which includes the methods of Direct Oblimin and Promax (Yong & Pearce, 2013). It is believed that the oblique technique provides precise measurements for nursing studies and it is the most appropriate for these disciplines (Gaskin and Happell, 2014). Labelling the components is the last step in PCA. Particularly in PCA, the components are interpreted according to their theoretical content. One of the limitations of this procedure is that naming or labelling the components can be difficult because it may not be accurately reflecting the variables. Furthermore, some variables may be loaded to more than one components making the interpretation more challenging (Tabachnick & Fidell, 2007).

3.9.2. Interview data analysis

Qualitative data were analysed manually. Upon completion of the interviews, the recorded data were transcribed. The transcription is a way of ensuring that the

opinions articulated by the respondents are adequately documented (Krippendorff, 2012). In this study, the qualitative data was analysed manually using thematic analysis approach (Braun & Clarke, 2006). All recorded interviews were transcribed verbatim. The transcription process was conducted flawlessly, with constant feedback and accuracy validation with the supervisors in order to guarantee that the data intended for analysis were of the highest quality (Patton, 2015).

The written data were read by the researcher and supervisors and some notes of different information were made. Each item was categorised in a way that described what it was about. Collected categories and themes were examined in detail to determine whether they were fit and relevant. A final review of the categories was done to determine whether some categories can be merged or if some need to be sub-categorised as major or minor themes. Finally, the various major and minor categories were compared and contrasted. Finally, the original transcripts were read again to ensure that all the relevant information had been categorised.

The process of data categorisation consists of a number of distinct procedures (Braun & Clarke, 2006): familiarisation with the data through transcription and review; generation of initial codes by applying the same method to every piece of data, and identifying the data associated with each code. Moreover, it is searching for themes through gathering codes and correlating them with the appropriate themes. Then, review of themes by verifying whether they are compatible with the codes and refining them further; theme definition and designation to clarify the nature of the data encompassed in each one, and finally, formulation of a report relating the theme-based analysis to the literature and research questions.

3.9.3. Back-translation procedure for Arabic interviews

Since the participants in the interviews were patients with cardiac conditions who did not understand English, the interviews were undertaken in Arabic (see Appendix I). All the interviews were translated back to English. Back translation is the most common, appropriate and recommended procedure for verifying translation from the source language to the targeted language (Chen & Boore, 2010). In the back translation procedure, the interviews were translated from the source language into the targeted language and then another translator translated that

version back into the source language to ensure accuracy of translation.

3.9.4. Integration of the datasets

In the more common mixed methods approaches, qualitative and quantitative data collection, which occurs in parallel analysis for integration, begins after the data collection process has proceeded or has been completed (Fetters, Curry & Creswell, 2013). In this study (concurrent design), the qualitative and quantitative data were collected and analysed in a similar timeframe. The two forms of data were analysed separately and then merged at the interpretation and reporting level. This occurred through a narrative approach. When integrating through a narrative approach, the researcher describes the qualitative and quantitative findings in a single or a series of reports.

The contiguous approach in a narrative way to integration of data involves the presentation of findings within a single report, but the qualitative and quantitative findings are reported in different sections (Fetters, Curry & Creswell, 2013). The findings of the interview questions about patients' experiences of CR and the type of education that the patients have received were integrated with the findings of the questions in the questionnaires in Part Two and Part Three. The questions were about components of CR and type of education that health care providers had provided to cardiac patients either in in-patient or outpatient settings. The output of integrated data was used to answer the third objective of the study about formulating the guidelines to structure a model of CR in Saudi Arabia.

3.10. Quality management

3.10.1. Data quality of quantitative results

Two important concepts, validity and reliability in research, will ultimately influence the findings (Brink & Wood, 2001). These criteria are concerned with data measurement, ensuring that the data are suitable for addressing the research questions (Brink & Wood, 2001). As defined by Burns and Grove (2009), validity in quantitative studies means an instrument's capacity to measure its intended object, while reliability represents the extent to which the acquired measure is consistent or dependable (Polit & Beck, 2014). This occurs when the methods used to collect data are consistent. To put it differently, reliability refers to the assurance

that the same results would be obtained if the same methods of data collection were used to assess the same variable in the same subject (Brink & Wood, 2001).

3.10.1.1. Treatment of missing data

Although the questionnaire is regarded as a major method to collect data, the possibility of some missing data was anticipated (Tashakkori & Teddlie, 2003). The missing data could reduce the integrity of the data and affect the generalizability of the result. However, in the current study very few data were missing in Part Three of the questionnaire, and the results were not affected (Ozman, 2016). After data analysis, the very few missing data were evaluated and discussed with the statistician, they had no influence in the generalisibility of the findings. The reliability test Cronbach's Alpha was used to assess the reliability of components in PCA results in (Part Three).

3.10.1.2. Validity

In the present study, the principles of content validity and construct validity guaranteed the overall validity of the quantitative instruments. As explained by Polit and Beck (2014), content validity reflects that the items of the instrument are representative of the aspects under analysis (Creswell & Plano-Clark, 2011). On the other hand, construct validity reflects the extent to which the aspects being analysed are actually measured by an instrument (Burns & Grove, 2009). A construct validity indicator is known as a criterion (Teddlie & Tashakkori, 2009). The criterion usually applied to assess an instrument's construct validity is the total test score associated with the instrument's items (Hoskins, 2004). The current questionnaire were tested by distributing it to 15 health care providers. The distributed questionnaires were checked and required changes were made.

3.10.1.3. Data screening and cleaning

Before analysis was commenced, the data set was screened and checked for errors. The data were entered first into an Excel spreadsheet then imported into an SPSS spreadsheet. In keeping with the recommendation of Pallant (2011), a two-stage data screening process was carried out in the present study, involving verification that all scores associated with the dependent and independent variables are written. Furthermore, verification of the sample size was undertaken to confirm the number

of participants. All items and categories were verified again in terms of their frequency and rank.

3.10.1.4. Reliability

The reliability of a quantitative instrument is a major criterion for assessing its quality, guaranteeing the instrument's ability to produce results demonstrating consistency, stability and repeatability (Polit & Beck, 2014). The reliability of a quantitative instrument can be evaluated in three different ways: checking for stability, equivalence and internal consistency (Burns & Grove, 2009). Stability refers to the endurance of the instrument in the long-term, equivalence is the consistency of results obtained by different researchers performing the same or similar assessments (Dunn, Baguley and Brunsden, 2014). Internal consistency represents the ability of the instrument's items to maintain consistency in their measurement of a concept throughout the test. According to Dunn, Baguley and Brunsden (2014), at least one of these measures has to be applied to determine how reliable the instrument is and of the three, the most popular measure is internal consistency (Polit & Beck, 2014). Internal consistency is usually assessed with the help of Cronbach's Alpha Coefficient, which is a statistical test of high precision and sophistication (Polit & Beck, 2014).

3.10.2. Qualitative data quality

3.10.2.1. Establishing rigour and trustworthiness for qualitative data

The qualitative measures associated with a research instrument must guarantee that results are reliable, credible, consistent and transferable (Polit & Beck, 2014). To ensure that the data are accurate, the research sample must be selected carefully and the participants must be allowed to articulate their views and opinions freely, with no attempt to influence them in any way.

Firstly, reliability should be an inherent property of the type of research that makes use of semi-structured interviews, and it implies both that data are confirmed to be reliable, and that the shortcomings are recognised. It means that data are stable enough to be used in future similar studies and it is confirmed by external reviewers based on assessment of the data and other research-related documentation (Polit & Beck, 2008). It also means that the results and interpretations are reliable enough to

make the research process clear and logical to readers.

Secondly, Polit and Beck (2008) explained credibility of the data to refer to the fact that the data and the manner in which they are interpreted are trustworthy (Aguinaldo, 2004). Furthermore, credibility can also be understood as a guarantee that the interpretation and conclusion put forth are convincing and valid (Hoskins & Mariano, 2004). The key aspects of credibility are determined by the researchers having extensive involvement in the domain or setting, data source triangulation, regular peer review, and member verification, which can be conducted by encouraging the research participants to revise and ratify the interpretations formulated by the researcher.

Thirdly, confirmability or consistency refers to evidence of the research's objectivity, according to Polit and Beck (2008). Additionally, confirmability can be understood as the validation of the results, conclusions and suggestions generated on the basis of the collected data, which means that the interpretation formulated by the researcher and the concrete evidence and findings are consistent (Polit & Beck, 2014).

Transferability refers to the extent to which the research results can be applied in other settings or populations and is indicative of how trustworthy the research is (Polit & Beck, 2008). Furthermore, transferability is also informative about the level of information that the research framework supplies with regard to various aspects, such as research participants, background and context (Polit & Beck, 2008).

Dependability is also used to assess trustworthiness of qualitative research. It means that data are stable enough to be used in future similar studies and it is confirmed by external reviewers based on assessment of the data and other research-related documentation (Polit & Beck, 2008). Meanwhile dependability as confirmation that the results and interpretations are reliable enough to make the research process clear and logical to readers.

3.10.2.2. *Reliability in Conducting Interviews*

Patton (2015) emphasised the importance of ensuring uniform understanding of

questions among the participants and eliminating any ambiguity from the coding of the responses provided. To this end, several measures were applied in this study, including interview schedule pre-test, performance of training and practice interviews, documentation of every face-to-face interview with the use of a tape recorder, and careful transcription of tapes to prevent any errors in analysis.

3.10.2.3. Validity in Conducting Interviews

Validity in qualitative research is concerned with the extent to which the explanation and the description provided are compatible or different. The degree of validity was demonstrated by to ensure the validity of the interview questions (Patton, 2015). Two interviews as pilot study were completed with two patients who have cardiac conditions to ensure understanding of the designed questions and no changes were made. The relevance of qualitative research outcomes depends on the validity of the interviews. The self-explanatory, semi-structured interview questions and consent form (Appendices, H and C) were designed in English first and then translated into Arabic by the interviewer, and rechecked again by an Arabic speaker to ensure that the translation expressed the same meaning.

3.11. Conclusion

A concurrent triangulation mixed method design was employed to meet the research aim and objectives. This design is the most suitable and appropriate approach to model a cardiac rehabilitation program in Saudi Arabia. The data was collected from both healthcare providers and patients in cardiac centres. Data was collected from healthcare providers using a self-administered, closed-ended questionnaire, and this questionnaire ended with an open question in order to explore the healthcare providers' points of views regarding the current cardiac program. Qualitative data was collected by undertaking interviews with patients with cardiac conditions and were being followed up in outpatient cardiac clinics. Data was collected using face-to-face semi-structured interviews. In Chapter 4 the results from healthcare providers will be presented followed by results from patients' interviews in Chapter 5, and all results will be integrated using the mixed methods approach in Chapter 6.

Chapter 4. Survey results

4.1. Introduction

The results from the current study are reported in Chapters 4 and 5. As explained in Chapter 3, this study on modelling cardiac rehabilitation programs in Saudi Arabia utilised a concurrent triangulation mixed methods design. The quantitative results arising from the survey of healthcare providers in three cardiac centres in Riyadh is presented in this Chapter. The qualitative results, which explore patients' experiences of a sample of CR programs in Saudi Arabia, are presented in Chapter 5.

The response rate is described first, followed by reporting of the results of Part 1 of the questionnaire, detailing the sociodemographic profile of the respondents. The results from Part 2 of the questionnaire, which focusses on details of the eligible patients who participated in CR programs and the main components of CR programs in inpatient and outpatient settings, are presented next. Results from Part 3 of the questionnaire, concerning the knowledge and perspectives of healthcare providers about delivering CR programs are then described. This includes the outcomes of the validity study of the questionnaire using principal components analysis (PCA).

4.2. Response rate

A total of 450 questionnaires were distributed to participants who met the inclusion criteria in three cardiac centres. The overall response rate was 68.0%. However, there was a range of response rates from individual sites, ranging from 50-89% (See Table 4.1). The majority of respondents in all hospitals were nurses (77.8%), followed by physicians (14.4%) and other professions (7.8%). In cardiac centres CCB and CCA the staff were helpful and had a background of research in cardiac fields. Moreover, the coordinators in CCB were active in distributing the questionnaires and collected them back by the due date, thus giving a high rate of response. In CCC, however, the ethical approval was obtained late from the institutional research board (IRB), and this limited the time available for staff to complete the questionnaires.

Table 4.1 Response rates

Cardiac centre	Distributed	Returned	Response rate%
CCA	200	122	61.0
CCB	150	134	89.3
CCC	100	50	50.0
Overall response rate	450	306	68.0

4.3. Part 1: Profile of respondents

In Part 1 of the questionnaire, respondents were asked to respond to questions about their age, gender, professional experiences, experience in cardiac units, qualifications, nationality and current department of employment. The demographic data are detailed in Table 4.2.

Table 4.2 Profile of participants (n 306)

Item	Frequency	%
Gender	Male	70 23.0
	Female	236 77.0
Age	21-25	20 6.5
	26-30	85 27.8
	31-35	88 28.8
	36-40	51 16.7
	Greater than 40 years	62 20.3

Item		Frequency	%
Profession	Physician	44	14.4
	Nurses	238	77.8
	Pharmacist	8	2.6
	Dietitian	7	2.3
	Physiotherapist	5	1.6
	Other (Please specify) (cardiac technicians)	4	1.3
How long have you been working in your profession?	0 - 2 years	25	8.2
	3 - 5 years	71	23.2
	6 - 15 years	159	52.0
	Greater than 15 years	51	16.7
How many years of experience do you have in coronary care units/ ICU?	0 - 2 years	93	30.4
	3 - 5 years	59	19.3
	6 - 15 years	135	44.1
	Greater than 15 years	19	6.2
What is your highest general qualification?	Diploma	89	29.1
	Bachelor	182	59.5
	Master	13	4.2
	PhD	22	7.2
	Saudi	45	14.7
	Gulf Countries	4	1.3

Item		Frequency	%
Nationality Nationality (cont.)	Arab Countries (Egypt, Yemen, Iraq, Syria, Lebanon, Palestine, Jordan)	36	11.8
	Africa	6	2.0
	Asia/South East Asia (China, India, Japan, Korea, Nepal, Indonesia, Philippines, Malaysia, Sri Lanka, Pakistan)	207	67.6
	Europe	6	2.0
	UK	2	0.7
	Total	306	100.0

4.3.1. Gender

Female respondents constituted the majority with 77% (n =236), while males accounted for 23% (n=70). This is consistent with the findings from subsequent questions about professional groups, where the majority of respondents were nurses; furthermore, it is consistent with the fact that women tend to be dominant in the nursing profession in Saudi Arabia (Alboliteh, Magarey, & Wiechula, 2017).

4.3.2. Age

It is clear that the majority of respondents were older than the typical clinical nurses in these hospital types. 56.5% were aged between 26-35 years, followed by 20.3% who were older than 40 years. This suggests that most of the respondents are not newly graduated staff and the majority have a substantial number of years of experience.

4.3.3. Years of experience

Most respondents had 6-15 years working experience in their profession with 52% (n= 159) and 23.2% (n=71) who had 3-5 years of experience. Furthermore, most of the respondents had 6-15 years working experience in a CCU with 44.1% (n=135),

followed by 30.4% (n=93) who had at least two years' experience in CCU.

4.3.4. Health professional groups

Respondents were asked to identify between different health professions, including staff nurse, physician, pharmacist, dietitian and physiotherapist, or others, e.g. cardiac technicians. The majority 77.8% (n = 238) were nurses, followed by physicians with 14.4% (n= 44), as would be expected from the proportions of a typical health service workforce in Saudi Arabia (Alboliteh, Magarey, & Wiechula, 2017).

4.3.5. Nationality

The majority 67.6% (n=207) of respondents identified as being from Asia/South East Asia (China, India, Japan, Korea, Nepal, Indonesia, Philippines, Malaysia, Sri Lanka, and Pakistan), followed by Saudi nationality 14.7% (n=45) and other Arab countries 11.8% (n=34). The majority from other nationalities is not surprising, since Saudi Arabia relies on a significant expatriate workforce (Ministry of Health Statistics Book, 2014).

4.3.6. Qualifications

Respondents with Bachelor degrees were the majority with 59.5% (n=182), followed by respondents who were Diploma-qualified (29.1%; n = 89), had a PhD (7.2%; n=22) or a Master's degree (4.2%; n=13). These results are expected because most of the expatriate staff who come to work in KSA hospitals should have at least a Bachelor degree, and very few staff have Master degrees or specialized diplomas (Al Malki et al., 2011; Al-Ahmadi, 2014).

4.3.7. Working departments

More than half of the respondents 55.6% (n=170) worked either in medical CCU or surgical CCU followed by 42.8% (n=131) who worked in general CCU, and only 1.63% (n=5) of the respondents who worked in a cardiac rehabilitation clinic.

4.4. Part 2: Profile of respondents and components of CR programs

Respondents (n=306) were asked if there was a CR program in their hospitals and

57.8% (n=177) of respondents indicated that they did not have any programs.

Respondents who indicated they had CR programs in their hospitals (n=129) proceeded to answer other questions in part 2 and part 3 of the questionnaire. Nurses represented 89.9% (n=116) of these respondents, the remainder being physicians, broadly reflecting the overall profile of respondents. All allied health respondents indicated that they were not aware of any CR programs in their hospitals.

The demographic profile of staff who indicated they had a CR program in their hospitals is presented in Table 4.3 and explained further in the following sections.

Table 4.3 Profile of respondents (Part 2) (n=129)

Items		Frequency	%
Gender	Male	17	13.2
	Female	112	86.8
Age	21-25	11	8.5
	26-30	30	23.3
	31-35	35	27.1
	36-40	22	17.1
	Greater than 40 years	31	24.0
Your profession	Physician	13	10.0
	Staff nurse	116	90.0
How long have you been working in your profession?	0 - 2 years	7	5.4
	3 - 5 years	29	22.5
	6 - 15 years	72	55.8
	Greater than 15 years	21	16.3

Items		Frequency	%
How many years of experience do you have in a coronary care unit?	0 - 2 years	38	29.5
	3 - 5 years	24	18.6
	6 - 15 years	57	44.2
	Greater than 15 years	10	7.8
What is your highest general qualification?	Diploma	38	29.5
	Bachelor	79	61.2
	Master	6	4.7
	PhD	6	4.7
Nationality	Saudi	9	7.0
	Arab Countries (Egypt, Yemen, Iraq, Syria, Lebanon, Palestine, Jordan)	10	7.8
	Africa	2	1.6
	Asia/South East Asia (China, India, Japan, Korea, Nepal, Indonesia, Philippines, Malaysia, Sri Lanka, Pakistan)	104	80.6
	Europe	3	2.3
	UK	1	0.8
Total		129	100%

4.4.1. Gender

Female respondents constituted the majority of the respondents with 86.8% (n=112), while males accounted for the remainder. This is consistent with the findings from the subsequent question about professional groups, where the majority of respondents were nurses; it is also consistent with the fact that women tend to be dominant in the nursing profession (Alboliteeh, Magarey, & Wiechula, 2017).

4.4.2. Age

The majority of the respondents (53.5%; n =69) were aged between 26-35 years, followed by 24% (n = 31) of respondents who are older than 40 years. This is consistent with subsequent findings about work experience, where the majority have more than three years' experience.

4.4.3. Years of experience

Most respondents had 6-15 years working experience in their profession with 55.8% (n =72) followed by 22.5% (n=29) who had 3-5 years of experience. Respondents who have more than 15 years of experiences constituted 16.3% (n=21), as shown in Table 4.3.

4.4.4. Work experience in CCU

The majority had 6-15 years working experience in the coronary care unit with 44.2% (n =57), followed by 29.5% (n=38) who had at least two years' of experience. This suggests that the majority of respondents had adequate experience to work in CCU, either in medical or surgical wards (see Table 4.3).

4.4.5. Health professional groups

Respondents were asked to identify between different health professions, which included nurse, physician, pharmacist, dietitian and physiotherapist, or others, e.g. cardiac technicians. Nurses were the majority of the respondents with 90.0% (n=116), followed by physicians with 10.0% (n =13; see Table 4.3).

4.4.6. Nationalities

Concerning nationalities, the majority of respondents were from Asia/South East

Asia (China, India, Japan, Korea, Nepal, Indonesia, Philippines, Malaysia, Sri Lanka, and Pakistan), comprising 80.6% (n=104), followed by respondents from Arab countries (7.8%; n=10) and respondents of Saudi nationality (7.0%; n=9).

4.4.7. Qualifications

Respondents were asked about their qualifications, which included Diploma, Bachelor degree, higher education (Master or PhD degrees). Respondents with a bachelors' degree were the majority with 61.2% (n =79), followed by respondents with a diploma (29.5%; n = 38), and respondents with Master or PhD who represented the same percentages (4.7%, or n=6, each).

4.4.8. Location of CR program

Participants were asked about the location of CR programs in their hospitals. Most of the respondents 48.8 % (n=63) had CR programs in both inpatient and outpatient cardiac clinics. Inpatient cardiac departments represented 25.5% (n=33) and outpatient cardiac clinics represented 26.3% (n = 34; see Figure 4.1).

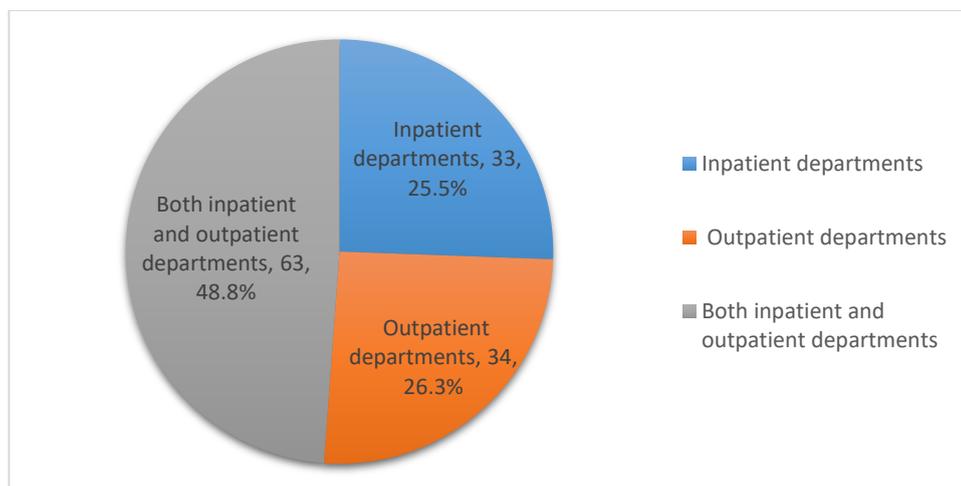


Figure 4.1 Location of the cardiac rehabilitation program

4.4.9. Eligible patients enrolled in CR programs

Respondents were asked a question about who are the eligible patients to enroll in CR programs. As shown in Table 4.4, most of the eligible patients involved in the CR programs, according to healthcare providers, were patients with myocardial infarction 78.3% (n =101), followed by patients with re-vascularization procedures

69% (n=89), then patients with controlled heart failure 66.7% (n= 86). Patients with stable or unstable angina accounted for 51.9% (n = 67). Finally, patients with other vascular or heart disease were 47.3% (n = 61).

4.4.10. Components of in-patient CR programs

Another important question in Part 2 is about the main components of CR programs. As shown in Table 4.4, the majority of the staff (76.7%) indicated the importance of health behaviour change and education, as well as lifestyle risk factor management, as the main components of inpatient CR programs. Medical risk factor management was indicated by 70.5% of respondents, and cardio protective therapies was selected by 63.6%. Finally, long-term management was indicated by 57.4% of respondents.

4.4.11. Components of outpatient CR programs

The majority of staff apply most of the main components of the outpatient CR program. This included lifestyle risk factor management (80.6%), followed by health behavior change and education (76%). A further 66.7% of staff reported medical risk factor management. Finally, long-term management and cardio protective therapies were indicated by 65.9% and 58.9% respectively, as shown in Table 4.4.

Table 4.4 Eligible patients, and components of cardiac rehabilitation program

Item	Frequency	%	
Who are the eligible patient involved in the cardiac rehabilitation program	Myocardial infarction (ST elevation MI, non-ST elevation MI)	101	78.3
	Patients with re-vascularization procedures	89	69.0
	Stable or unstable angina	67	51.9
	Controlled heart failure	86	66.7
	Other vascular or heart disease	61	47.3

Item		Frequency	%
What are the main components of the inpatient cardiac rehabilitation program that you have (select the one or more that apply)	Health behavior change and education	99	76.7
	Lifestyle risk factor management	99	76.7
	Psychosocial health	57	44.2
	Medical risk factor management	91	70.5
	Cardio protective therapies	82	63.6
	Long-term management	74	57.4
	Audit and evaluation	35	27.1
	Health behavior change and education	98	76.0
What are the main components of the outpatient cardiac rehabilitation program at your organization (select the one or more that apply)	Lifestyle risk factor management	104	80.6
	Psychosocial health	70	54.3
	Medical risk factor management	86	66.7
	Cardio protective therapies	76	58.9

Item		Frequency	%
	Long-term management	85	65.9
	Audit and evaluation	46	35.7

4.5. Relationship between profession and nationalities

Cross-tabulation (Table 4.5) indicates that the majority of the nurses are of Asian/South East Asian nationality (n=101) followed by Saudi (n=6). The majority of physicians are Arabic (Non- Saudi) (n=6) followed by Saudi (n=3). Therefore, the majority of nursing staff, who provide the majority of patient care, is non-Arabic speaking, whereas the majority of physicians can significantly communicate to patients and provide more information regarding treatment processes.

Table 4.5 Relationship between profession and nationalities

Item		Your profession		Total	Chi-square	df	p-value
		Physician	Staff nurses				
Nationality	Saudi	3	6	9	40.938	5	<0.001
	Arab Countries (Egypt, Yemen, Iraq, Syria, Lebanon, Palestine, Jordan)	6	4	10			
	Africa	0	2	2			

Item	Your profession		Total	Chi-square	df	p-value
	Physician	Staff nurses				
Asia/South East Asia (China, India, Japan, Korea, Nepal, Indonesia, Philippines, Malaysia, Sri Lanka, Pakistan)	3	101	104			
Europe	1	2	3			
UK	0	1	1			
Total	13	116	129			

4.6. Knowledge and perspectives about CR programs (Part 3)

Understanding the perspectives and knowledge of healthcare providers in relation to how to practice the CR programs provides the researcher with information about the everyday practice of CR programs. Moreover, it shows how staff work with patients, how they communicate, and how they put both evident and implicit knowledge into specific action.

4.6.1. Descriptive analyses

The use of descriptive statistics provides an overall sense of the respondents' views of CR programs in terms of knowledge and experiences. The results of the 21 Likert-style questions from the participants are presented in this section (see Table 4.6).

4.6.1.1. The cardiac rehabilitation program is based on scientific evidence that guides the staff practice

When asked if the CR program is based on scientific evidence that guides the staff practice, a majority agreed or strongly agreed (92.1%). Whereas, 4.6% of staff neither agreed nor disagreed and 3% disagreed or strongly disagreed.

4.6.1.2. The cardiac rehabilitation program starts as soon as the patient is stable in the unit

When responding to the question about whether the cardiac rehabilitation program starts as soon as the patient is stable in the unit, results were again mostly positive, with the majority agreeing or strongly agreeing (86.4%). Some staff responded neutrally to the question (neither agree nor disagree; 6.2%). The remainder disagreed or strongly disagreed with the statement.

4.6.1.3. All healthcare providers are aware of the cardiac rehabilitation program in the unit

When asked about whether all healthcare providers are aware of the cardiac rehabilitation program in their units, most of the sample agreed or strongly agreed (65.8%). 14.7% of staff remained neutral. Staff who disagreed or strongly disagreed represent 19.3%. This question is consistent with the findings from Part 2, where participants were asked if they have CR programs in their hospitals and 57.8% indicated that they do not have any.

4.6.1.4. The content of the cardiac rehabilitation program is clear to healthcare providers and easy to apply

Asked whether the content of the cardiac rehabilitation program is clear to health professionals and easy to apply, the majority of staff agreed or strongly agreed (74.3%), with 15.7% remaining neutral. A smaller number disagreed or strongly disagreed (10%). Although the majority of staff answered this question positively, the 10% who answered that the CR contents are not clear for them could influence CR practice in a negative way.

4.6.1.5. *Health care providers receive regular education regarding the cardiac rehabilitation program*

In response to the question about whether healthcare professionals receive regular education regarding the cardiac rehabilitation program, the largest proportion of the staff sample indicated that they agreed or strongly agreed to receive a regular education (62.7%), while 7% remained neutral. The remainder of staff (19.5%) indicated they disagreed or strongly disagreed. Since staff education is very important, a high percentage of staff was expected to answer that they receive regular education; however, a considerable number of staff indicated not receiving regular education related to CR programs.

4.6.1.6. *The healthcare providers ensure that the patient understands the components of the cardiac rehabilitation program*

When asked whether the healthcare professionals ensure that the patient understands the components of the cardiac rehabilitation program, most of the sample agreed or strongly agreed (78.2%). Only 5.3% participants disagreed or strongly disagreed with this statement. A number of respondents (16.2%) remained neutral.

4.6.1.7. *The communication with patients is on patient self-management*

When asked about whether the communication with patients is on patient self-management, which is a very important component in CR programs, most of the sample agreed or strongly agreed (82%). Whereas, 12.4% remained neutral, while staff who disagreed 5.4%.

4.6.1.8. *During admission the patient is educated about her/his symptoms and, if recurrent, how to manage them*

The majority participants (83.6%) agreed or strongly agreed with the statement “During admission the patient is educated about her/his symptoms and, if recurrent, how to manage them”, while 7.6% disagreed or strongly disagreed and 8.5% remained neutral regarding this statement.

4.6.1.9. *The patient receives information about how a healthy heart works*

The majority of staff (85.2%) responded that they agreed or strongly agreed that the patient receives information about how a healthy heart works. Only a small percentage either strongly disagreed or disagreed (3.8%), whilst 10.8% chose the neutral category.

4.6.1.10. *The patient receives information about what foods she/he should eat for a healthy heart*

When asked about whether the patient receives information about what foods she/he should eat for a healthy heart, most of the sample (92.1%) agreed or strongly agreed whereas (4.6%) remained neutral, while staff who disagreed represents 3.1%. Education about healthy food is an important component in CR programs, especially in Saudi Arabia, where the obesity rate remains high and many people do not follow a healthy lifestyle (Ahmed et al., 2017).

4.6.1.11. *Healthcare providers explain to the patient how exercise will improve their heart condition*

When asked whether healthcare providers explain to the patient how exercise will improve their heart condition, the largest number (92.1%) agreed or strongly agreed with this statement. This was expected because exercise is one of the core components of CR and many staff in this study stressed on this point in other questions. A smaller number of responses (3.7%) disagreed or strongly disagreed, with the remainder (3.8%) taking a neutral stance.

4.6.1.12. *The patient is educated about diabetes mellitus, and how to prevent low blood glucose with exercise*

The majority of staff (67.3%) responded that they agreed or strongly agreed that the patient is educated about diabetes mellitus, and how to prevent low blood glucose with exercise. The remainder (3%) either strongly disagreed or disagreed (3%), whilst 3.8% chose the neutral category.

4.6.1.13. *Healthcare providers explain what medications the patient should take and how they work to improve cardiac function*

When responding to the question about whether healthcare providers explain what medications the patient should take and how they work to improve cardiac function, the results were again mostly positive, with the majority (94.4%) agreeing or strongly agreeing. This result was expected in this study because pharmacists also participate in providing patients with required information about their medications. Some staff (3.8%) responded neutrally to the question. Only 1.4% disagreed or strongly disagreed with the statement.

4.6.1.14. *The patient receives information about what side effects are possible with their medications, and which ones interact*

When asked about whether the patient receives information about what side effects are possible with their medications, and which ones interact, the majority of the sample (92.2%) positively agreed or strongly agreed that they provide the patient with required information and 6.2% remained neutral. Staff who strongly disagreed represent 1.5%.

4.6.1.15. *The patient is educated about when she/he can return to work and do their previous activities*

The majority of staff (89.8%) responded that they agreed or strongly agreed that the patient is educated when she/he can return to work and do their previous activities. The remainder (3.8%) either strongly disagreed or disagreed whilst (6.2%) chose the neutral category.

4.6.1.16. *The healthcare providers explain to the patient how stress affects the heart and how to cope with stress*

When asked if the healthcare providers explain to the patient how stress affects the heart and how to cope with stress the majority of staff (86.8%) either agreed or strongly agreed. Few staff (6.1%) strongly disagreed or disagreed with this statement, the remainder (6.9%) being those with a neutral stance. Although the majority answered this question positively, still few staff members did not agree with this statement, which is an important aspect to stress on when creating a staff education program.

4.6.1.17. *It is important to teach each patient how smoking affects the heart and how to quit*

The number of participants who agreed or strongly agreed with the statement “It is important to teach each patient how smoking affects the heart and how to quit” was 95.2%, whilst 1.5% strongly disagreed and 3.1% remained neutral. Overall, this question was positively answered by the staff.

4.6.1.18. *All patients are educated about risk factors and which techniques are used to alleviate symptoms*

When asked whether all patients are educated about risk factors and which techniques are used to alleviate symptoms, the majority of staff (91.4%) either agreed or strongly agreed. A small percentage disagreed or strongly disagreed (3.8%) with this statement, with the remainder being those with a neutral position (4.6%).

4.6.1.19. *The treatment process and rehabilitation phases are explained in detail to all admitted patients.*

Asked whether the treatment process and rehabilitation phases are explained in detail to all admitted patients, the majority of staff (84.1%) agreed or strongly agreed, with 8.5% remaining neutral. A smaller number (6.9%) disagreed or strongly disagreed. This question also answered positively whether it is important to educate the patients about all the important component of CR in all three phases.

4.6.1.20. *Healthcare providers ensure that cardiac patients follow phases of cardiac rehabilitation program*

The majority of staff (82.8%) responded that they agreed or strongly agreed that healthcare providers ensure that cardiac patients follow phases of cardiac rehabilitation program. The remainder (6.9%) either strongly disagreed or disagreed whilst 10% chose the neutral category.

4.6.1.21 *Before discharge, the patient is educated about the services, support organizations and groups that are available for outpatient rehabilitation*

Finally, when asked about whether the patient is educated about the services,

support organizations and groups that are available for outpatient rehabilitation before discharge, most of the sample (85.2%). agreed or strongly agreed, 7.7% remained neutral. The staff who disagreed and strongly disagreed was 6.9%.

Generally, the majority of staff responded positively to all items. This reflects the staff willingness to develop CR programs and ensure the applications of all CR components to meet the international standards. Table 4.6 summarizes the results.

Table 4.6 Knowledge and perspectives of respondents about CR programs (n=129)

Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
	%	%	%	%	%
1. The cardiac rehabilitation program is based on scientific evidence that Guides the staff practice	2.3	0.7	4.6	72.8	19.3
2. The cardiac rehabilitation program starts as soon as the patient is stable in the unit	2.3	4.6	6.2	64.3	22.4
3. All healthcare providers are aware of the cardiac rehabilitation program in the unit	6.9	12.4	14.7	48.0	17.8
4. The content of the cardiac rehabilitation program is clear to health professionals and easy to apply	2.3	7.7	15.5	60.4	13.9
5. Health care professionals receive regular education	4.6	14.9	7.0	49.6	13.1

Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
	%	%	%	%	%
regarding the cardiac rehabilitation program					
6. The healthcare professionals ensure that the patient understands the components of the cardiac rehabilitation program	1.5	3.8	16.2	58.9	19.3
7. The communication with patients is on patient self – management	0	5.4	12.4	64.3	17.8
8. During admission the patient is educated about her/his symptoms and, if recurrent, how to manage them	0.7	6.9	8.5	63.5	20.1
9. The patient receives information about how a healthy heart works	1.5	2.3	10.8	67.4	17.8
10. The patient receives information about what foods she/he should eat for a healthy heart	0	3.1	4.6	69.7	22.4
11. Healthcare providers explain to the patient how exercise will improve their	0.7	3.1	3.8	72.0	20.1

Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
	%	%	%	%	%
heart condition					
12. The patient is educated about diabetes mellitus, and how to prevent low blood glucose with exercise	1.5	1.5	3.8	65.8	1.5
13. Health professionals explain what medications the patient should take and how they work to improve cardiac function	0.7	0.7	3.8	72.0	22.4
14. The patient receives information about what side effects are possible with their medications, and which ones interact	1.5	0.0	6.2	70.5	21.7
15. The patient is educated when she/he can return to work and do their previous activities	1.5	2.3	6.2	66.6	23.2
16. The health professionals explain to the patient how stress affects the heart and how to cope with stress	2.3	3.8	6.9	65.1	21.7
17. It is important to teach each patient how smoking	1.5	0.0	3.1	60.4	34.8

Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
	%	%	%	%	%
affects the heart and how to quit					
18. All patients are educated about risk factors and which techniques are used to alleviate symptoms	2.3	1.5	4.6	70.5	20.9
19. The treatment process and rehabilitation phases are explained in detail to all admitted patients	1.5	5.4	8.5	64.3	20.1
20. Healthcare professionals ensure that cardiac patients follow phases of cardiac rehabilitation program	2.3	4.6	10.0	63.5	19.3
21. Before discharge, the patient is educated about the services, support organizations and groups that are available for outpatient rehabilitation	3.1	3.8	7.7	64.3	20.9

4.6.2. Scale validation

In this section, PCA was undertaken to reduce the number of the 21 items and highlight the main components that represent the participants' answers. PCA is a

variable reduction procedure. It is suitable when the obtained data on a large number of variables is presented. It optimizes the number of items that account for the maximum possible variance and reduces those items to the main interpretable components. In this case some of the variables were believed to be correlated with one another, possibly because they are measuring the same concept. Firstly, reliability analysis determined the Cronbach's Alpha of 0.935 which indicated high internal consistency.

4.6.2.1. Results of the principal components analysis

As discussed in Chapter 3, PCA was implemented for summarizing the data set into small components. Two items were deleted because of low loading (less than 60%). PCA was undertaken again to test the remaining 19 items as shown in Table 4.7 below. All the items were component loaded and they finally formed four main components, which accounted for 73.10% (R^2) of the variance. The variance values are used to determine which components are most important, and the communality value for variance percentage indicates the total variation explained by all the components in the analysis. The communality values are generally high for all the items, which indicates that items are well represented by the four components.

4.6.2.2. Data appropriateness

The Kaiser-Meyer-Olkin index/measurement of sampling adequacy was used to determine whether the sample was adequate for PCA. The KMO measure was 0.89, indicating the data were sufficient to conduct a PCA. Additionally, Bartlett's Test of Sphericity (used to verify homogeneity of variances) was performed to determine whether a correlation existed among the items with a result of 1893.6, significant at $P < 0.001$. The test indicated adequate correlation among items. To conclude, the sample was sufficient for the PCA (Table 4.7).

Table 4.7 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.892
Bartlett's Test of Sphericity	Approx. Chi-Square	1893.6
	df	171
	Sig.	<0.001

4.6.2.3. Number of extracted components

Three methods were used to identify the number of components to be extracted from the data. First, a scree plot (Figure 4.2) was used for illustrative purposes to identify the number of components that had an eigenvalue greater than one (higher than the elbow). The red line in Figure 4.2 identifies the number of components in this case, 4 above the scree.

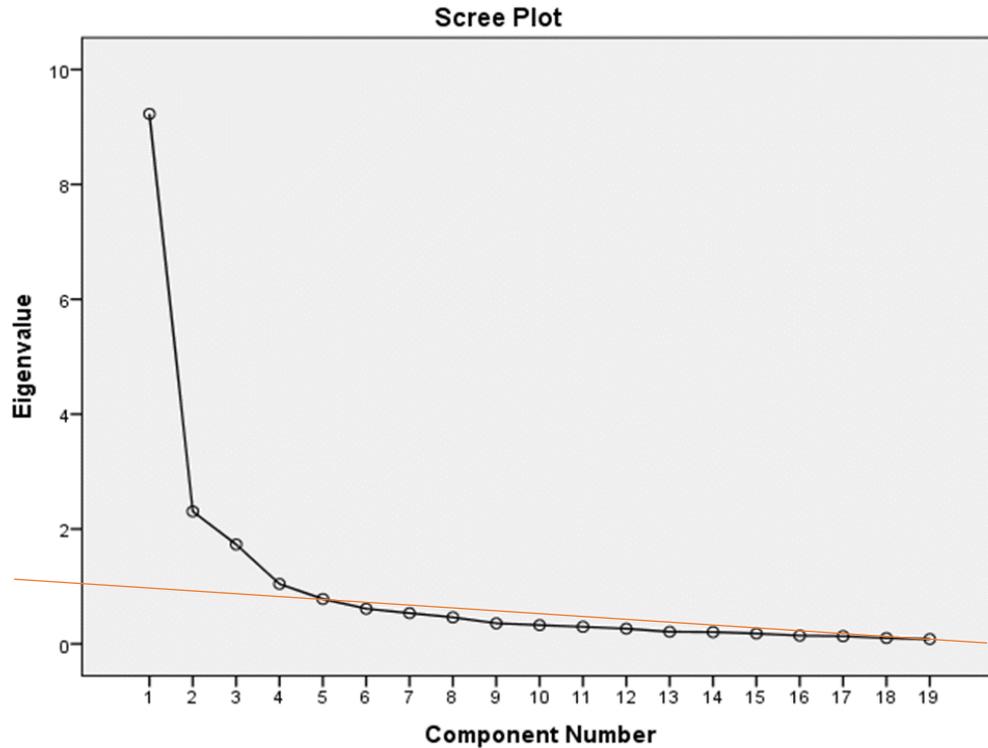


Figure 4.2 Scree Plot of Eigenvalues

As one principal is not adequate to define which components should be extracted from the data, other methods were used. The second principal used is the explained variance; this exceeded the adequate level of 60%, which is the level considered acceptable in humanities research as described in Chapter 3. In this study, using 60% as the cut-off for extracting components in terms of explained variance results in a total of four components. To conclude, the primary analysis of 21 items resulted in 19 items. Four components were extracted based on the results of the findings from the initial Eigenvalues and scree plot test to determine the number of factors (see Table 4.8).

4.6.2.4. Main components resulted from PCA.

In these results, four components were extracted from the 19 items (Table 4.8). Two items were deleted and were not included in the table because of low loading.

1- Patient education in Phase 1 of cardiac rehabilitation program

Component 1 comprised of 10 items, concerning patient education in Phase 1 of a cardiac rehabilitation program. It includes the following item numbers:

7,8,9,10,11,12,13,14,15,16. They are expressed as following: during admission the patient is educated about her/his symptoms and, if recurrent, how to manage them (0.685). In Phase 1, the patient receives information about how a healthy heart works (0.719), and the patient receives information about what foods they should eat for a healthy heart (0.770). Healthcare providers explain to the patient how exercise will improve their heart condition (0.675) and the patient is educated about diabetes mellitus; and how to prevent low blood sugar with exercise (0.654). Healthcare providers explain what medications the patient should take and how they work to improve cardiac function (0.668). Nevertheless, the patient receives information about what side effects are possible with their medications, and which ones interact with each other (0.842). The patient is educated when she/he can return to work and do their previous activities (0.775). Patients are educated about how stress affects the heart and how to cope with it (0.665), and all patients are educated about risk components for cardiac events and which techniques are used to alleviate symptoms (0.727).

2- Healthcare providers awareness of CR program

Component 2 comprised of four items (3, 4, 5, 6), concerning healthcare providers' awareness of a CR program. The items are expressed as follows: All healthcare providers are aware of the cardiac rehabilitation program in the unit (0.861); the contents of the cardiac rehabilitation program is clear to healthcare providers and easy to apply (0.778); healthcare providers receive regular education regarding the cardiac rehabilitation program (0.818); and the healthcare providers ensure that the patient understands the components of the cardiac rehabilitation program (0.658).

3- Healthcare providers clinical practice of CR program

Three items were highly loaded to component 3 (17, 18, 19), which concerns healthcare providers' clinical practice of CR program. The items are expressed as follows: The treatment process and rehabilitation phases are explained in details to all admitted patients (0.808); healthcare providers ensure that cardiac patients follow phases of cardiac rehabilitation program (0.856); and before discharge, the patient is educated about the services, support organizations and groups that are available for outpatient rehabilitation (0.809).

4- Significance of the CR program from healthcare perspectives

Component four comprised of two items only (1 and 2), which are highly loaded. They are concerned with the significance of the CR program from healthcare perspectives: The CR is based on scientific evidence that guides their practice (0.864), and the cardiac rehabilitation program starts as soon as the patient is stable in the unit (0.810).

To sum up the findings from the PCA, there are four main components (see Table 4.8). Component 1 is loaded with 10 items all about patient education in Phase 1 of the CR program. Component 2 is loaded with four items which cover healthcare providers' awareness about CR program. Component 3 is loaded with three items with regards to healthcare providers' clinical practice of CR program. Finally, component 4 is loaded with two important items, which indicates the significance of CR programs.

Table 4.8 Principal Components Analysis Extraction

Items	Components			
	1	2	3	4
1. The cardiac rehabilitation program is based on scientific evidence that guides my practice	.213	.116	.136	.864
2. The cardiac rehabilitation program starts as soon as the patient is stable in the unit	.078	.317	-.056	.810
3. All healthcare providers are aware of the cardiac rehabilitation program in the unit	.034	.861	.132	.201

Items	Components			
	1	2	3	4
4. The content of the cardiac rehabilitation program is clear to healthcare providers and easy to apply	.077	.778	.180	.109
5. Healthcare providers receive regular education regarding the cardiac rehabilitation program	.190	.818	.152	.056
6. The healthcare providers ensure that the patient understands the components of the cardiac rehabilitation program	.226	.658	.325	.116
7. During admission the patient is educated about her/his symptoms and, if recurrent, how to manage them	.685	.444	-.121	.167
8. The patient receives information about how a healthy heart works	.719	.367	.191	.050
9. The patient receives information about what foods she/he should eat for a healthy heart	.770	.276	.205	.216
10. Healthcare providers explain to the patient how exercise will improve their heart condition	.675	.300	.447	.064
11. The patient is educated about diabetes mellitus, and how to prevent low blood sugar with exercise	.654	.040	.239	.518
12. Health professionals explain what medications the patient should take and how they work to improve cardiac function	.668	-.027	.178	.412
13. The patient receives information about what side effects are possible with their medications, and which ones interact	.842	-.025	.211	.020

Items	Components			
	1	2	3	4
14. The patient is educated when she/he can return to work and do their previous activities	.775	.125	.373	.138
15. The health professionals explain how stress affects the heart and how to cope with stress	.665	.196	.499	.003
16. All patients are educated about risk factors and which techniques are used to alleviate symptoms	.727	-.010	.521	.098
17. The treatment process and rehabilitation phases are explained in detail to all admitted patients.	.290	.232	.808	.184
18. Healthcare professionals ensure that cardiac patients follow phases of cardiac rehabilitation program	.278	.290	.856	.024
19. Before discharge, the patient is educated about the services, support organizations and groups that are available for outpatient rehabilitation.	.368	.234	.809	.015

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 7 iterations.

4.6.2.5. *Communality of a variable*

The communality of a variable signifies the amount of variance for that variable that can be accounted for by all shared extracted components. Therefore, if the communality of a variable is high, the extracted components account for a larger proportion of the variable's variance, which improves reliability (Child, 2006). Table 4.9 shows the communalities of all the variables. The value of Kaiser-Meyer-Olkin measure of sampling adequacy was 0.891, which was close to 0. The Bartlett's test of sphericity $X^2 = 1893.6$, and $P < 0.001$.

Table 4.9 Communalities

Items	Initial	Extraction
1. The cardiac rehabilitation program is based on scientific evidence that guides my practice	1.000	.824
2. The cardiac rehabilitation program starts as soon as the patient is stable in the unit	1.000	.767
3. All healthcare providers are aware of the cardiac rehabilitation program in the unit	1.000	.801
4. The content of the cardiac rehabilitation program is clear to health professionals and easy to apply	1.000	.656
5. Health care professionals receive regular education regarding the cardiac rehabilitation program	1.000	.731
6. The healthcare professionals ensure that the patient understands the components of the cardiac rehabilitation program	1.000	.603
7. During admission the patient is educated about her/his symptoms and, if recurrent, how to manage them	1.000	.693
8. The patient receives information about how a healthy heart works	1.000	.690
9. The patient receives information about what foods they should eat for a healthy heart	1.000	.758
10. Healthcare providers explain to the patient how exercise will improve their heart condition	1.000	.758
11. The patient is educated about diabetes mellitus, and how to prevent low blood sugar with exercise	1.000	.749

Items	Initial	Extraction
12. Healthcare providers explain what medications the patient should take and how they work to improve cardiac function	1.000	.648
13. The patient receives information about what side effects are possible with their medications, and which ones interact	1.000	.754
14. The patient is educated when she/he can return to work and do their previous activities	1.000	.774
15. The healthcare providers explain how stress affects the heart and how to cope with stress	1.000	.730
16. All patients are educated about risk factors and which techniques are used to alleviate symptoms	1.000	.810
17. The treatment process and rehabilitation phases are explained in detail to all admitted patients.	1.000	.825
18. Healthcare providers ensure that cardiac patients follow phases of cardiac rehabilitation program	1.000	.895
19. Before discharge, the patient is educated about the services, support organizations and groups that are available for outpatient rehabilitation.	1.000	.845
Extraction Method: Principal Component Analysis.		

4.6.2.6. Variance

The variance is equal to the square of the component loadings (Child, 2006). The goal of extraction is to remove as much common variance in the first component as possible (Child, 2006). The percentage of variance explained by each of the first four components and cumulative variance are shown in Table 4.10. It can be observed the first component explained almost half of the variance. The scree plot

(Fig 4.2) suggested 4 components would be adequate and from Table 4.10 it can be observed the selected components explained 75.3% of variance in data.

Table 4.10 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.228	48.567	48.567	9.228	48.567	48.567	5.603	29.489	29.489
2	2.306	12.136	60.703	2.306	12.136	60.703	3.333	17.543	47.032
3	1.732	9.114	69.817	1.732	9.114	69.817	3.317	17.457	64.489

4	1.044	5.496	75.312	1.044	5.496	75.312	2.056	10.824	75.312
5	.782	4.113	79.426						
6	.612	3.221	82.647						
7	.535	2.813	85.460						
8	.462	2.431	87.891						
9	.358	1.885	89.777						
10	.326	1.717	91.493						
11	.297	1.563	93.057						
12	.264	1.391	94.448						
13	.209	1.101	95.549						
14	.205	1.082	96.631						
15	.180	.947	97.578						
16	.143	.754	98.332						
17	.133	.701	99.033						
18	.101	.532	99.564						
19	.083	.436	100.000						
Extraction Method: Principal Component Analysis.									

4.7. Analysis of responses to open-ended question

The final question in Part three of the questionnaire contained an open-ended question to encourage the healthcare providers to express their views about the CR programs in their hospitals. As described in Chapter 3, a qualitative description approach was used to analyse the data. The responses of participants were gathered, grouped and analysed according to category key words.

There were 129 participants who answered YES to the question of whether they have CR programs. Using descriptive analysis, about 11% (n=14) had written some

comments (13 nurses and only one physician). Due to a shortage of time, staff were in hurry to answer the questionnaires and returned them back to the coordinators.

Two main categories of healthcare providers experience were identified: unavailable resources, including shortage of staff and lack of staff education, and communication difficulties and language barriers.

4.7.1. Unavailable resources, shortage of staff and lacking of staff education

The lack of education in the field of cardiac rehabilitation in terms of clinical development and ongoing education to maintain the skills and competencies to practice CR program was challenging.

We do not have available resources including shortage of staff and lack of continued education. Cardiac rehabilitation program is not really active in our department since 2 years, nurses do not have time to practice Cardiac Rehabilitation and apply its components to the patients because of many responsibilities (Staff Nurse 8)

According to the participants, each nurse has a specific job description; however, the nursing staff indicated that they do not receive any information regarding CR program except at orientation time and unfortunately, less involvement after the orientation. This is the reason why they do not practice CR and apply its components to all eligible patients. Nurses need to be updated and educated to practice efficient CR programs.

Nurses are aware that the CR program should start as soon as a patient is admitted to the cardiac unit, however the lack of resources and support interfere when applying CR in clinical practice. Another aspect of the lack of resources is unclear guidelines or policies that support practice of CR programs, including the unavailability of a model of care. Nurses stated that they need a model of CR program that guides their practice and ensures that they apply all the components of CR programs according to international models. According to staff nurses, the reason for this is that a patient can choose the one that suits his/her condition and circumstances:

The present Cardiac Rehabilitation program should start when the patient is admitted to cardiac units, we should have more cardiac rehabilitation models to be shown to cardiac patients
(Staff Nurse 67)

Actually we do not have a structured Cardiac Rehabilitation program and we are looking for development and improvement
(Staff Nurse 54)

In general, nursing staff indicated that present programs involve some of the CR programs components but not all:

The Cardiac Rehabilitation program we have include consultation about weight loss and exercise that's all (Staff Nurse 36)

One staff stated that the current program is known with another name, “cardiac lifestyle modification program”:

We have cardiac lifestyle modification programs, that is what we apply in our hospital (Staff Nurse 57)

Another issue arising from staff nurses is the lack of support and education, which are important elements in a successful program. Staff expressed that there is a place for CR, especially for exercising, but the staff do not use it; they are not motivated and encouraged to apply the CR components.

Cardiac clinics have exercise room but the staff do not use it
(Staff Nurse 51)

Staff nurses also explained the types of education that they receive in some departments, specifically cardiac surgery:

The Cardiac Rehabilitation program includes regular education especially for invasive procedures like CABG, Aneurysm, and valve replacement; we have a regular education to support patient in cardiac rehabilitation programs especially

for invasive procedures like CABG, Aneurysm, and valve replacement (Staff Nurse 43)

It is apparent and clear that staff nurses seek more support. All staff nurses identified the need for support, including support to apply policies of care. More importantly the staff seeks organisational support, medical and nursing management support. Some respondents indicated that they are keen to take a part in rehabilitation services and integrate those programs at their hospitals, and work with other members of the health team:

We should start Cardiac Rehabilitation program while a patient is admitted; yet we should have more Arabic staff to explain to patient about the rehabilitation programs (international speaker is a plus); more cardiac models to show to patients (Staff nurse 76)

Nurses and other trained health professionals have been used to facilitate CR programs worldwide. Some staff in this study suggested organizing a healthcare campaign and gathering cardiac patients to give them more support and encourage follow up. Those activities work as motivation and provide patients with psychological support. The aim of nursing intervention in CR program is reducing anxiety and depression, improving quality of life and aiming for fewer readmissions to hospitals:

[We] can be more active by organizing a health care campaign; gather patients and discuss for support; do in phases; motivate patient participation (Staff nurse 26)

Nurses also look for support and educational sessions for staff and for patients to enforce and activate CR programs application:

We need a reinforcement to both patients and staff to activate the Cardiac rehabilitation programs (Staff nurse 29)

4.7.2. Communication difficulties and language barriers

Despite the clear benefits of cardiac rehabilitation, the practice of CR programs

remains low worldwide. Communication with patients in Saudi Arabia is challenging and staff always report language barriers, as the majority of them come from non-Arabic speaking countries. Most expatriate staff who work in hospitals come from Asian countries, and they find it difficult to communicate with patients and give information accurately. It is challenging for healthcare providers to build trust and to have good communication skills when there are language barriers.

Staff nurses indicated the need to have more Arabic-speaking staff in order to guarantee an effective communication with patients:

We should have more Arabic staff to explain to patients about the rehabilitation programs, an international speaker is good
(Staff Nurse 67)

It is difficult to communicate with patients because we do not speak Arabic (Staff Nurse 26)

On the other hand, some staff thought that they had an excellent cardiac rehabilitation unit, as one stated:

We do have an excellent program since 2002, as I know cardiac Rehabilitation Program is already in KSA (Physician 18)

Staff nurses indicated that patients do not comply with the program, and patients do not acknowledge the importance of the program:

Cardiac rehabilitation programs for patients' own good, we have an excellent cardiac rehabilitation unit; patients are not compliant but patients don't acknowledge the importance of the program that it is for their own good (Staff Nurse 54)

4.8 Conclusion

In this chapter, the analyzed results of the survey have been reported. Part 1 of the questionnaire provided comprehensive details regarding the participants' age, gender, work experience, working department and nationalities. The analysed results also highlighted the participants' responses to Part 2 of the questionnaire,

about the eligible patients enrolled in CR programs, and the components of CR programs. In general, the majority of respondents were staff nurses followed by physicians. PCA was used to analyse the results of Part 3 and finally four components were identified to describe the main elements of CR according to health care providers' views. These elements are the significance of CR program, healthcare providers' awareness in CR practice, patient education in Phase 1 of CR, and healthcare providers' clinical practice of CR program. Furthermore, narrative analysis of the open-ended question provided significant information about the status of CR programs in Saudi Arabia in the selected organizations.

The presentation of results will continue in Chapter 5 with the reporting of qualitative findings obtained from patients with cardiac conditions who follow up at cardiac outpatient clinics in cardiac centres in Riyadh city. The analysis of both narrative data from healthcare providers and patients will be integrated in Chapter 6 to present more detailed information about what a multidisciplinary team think about CR programs in Saudi Arabia. The results from the survey questions have provided useful information about the gap in practice and the main challenges associated with the implementation of CR programs models in Saudi Arabia.

Chapter 5. Interview results

5.1. Introduction

In this study, the experiences of patients with cardiac conditions were explored in relation to CR at cardiac centres in Riyadh. Patients with cardiac conditions were approached at the outpatient cardiac clinics while they were waiting for the regular follow up appointments. The participants described their experiences as inpatients and outpatients in CR programs. Participants remained positive toward the care provided overall; however, they were looking for more developed programs to meet their specific needs.

In this chapter, the results from these interviews are presented. An overview of participants will be presented first followed by the data collection process, data analysis procedure, and finally the interviews findings, where four emerging themes will be discussed, including their categories.

5.2. Overview of study participants

Participants in the study were patients with cardiac conditions who met the study inclusion criteria (see Chapter 3). Their ages ranged from 54 to 85 years, 13 were male and two were female (see Table 5.1). Interviews were undertaken from November 15, 2016 to January 25, 2017. The patients have a history of cardiac conditions including CVD, atherosclerosis heart failure or MI. Table 5.1 provides an overview of the participants characteristics including the cardiac centres where they were interviewed.

Table 5.1 Profile of participants

Code	Cardiac Centre	Pseudonym	Gender	Age	Level of education	Admission	Diagnosis
P1	CCB	Abdullah	M	65	PhD	Yes	Atherosclerosis post open heart surgery
P2	CCA	Ahmed	M	73	Intermediate school	Yes	CVD
P3	CCB	Ali	M	80	Intermediate school	Yes	CVD
P4	CCA	Mohammed	M	70	Intermediate school	Yes	MI
P5	CCB	Yahia	M	68	Intermediate school	Yes	CVD
P6	CCB	Bader	M	54	Bachelor degree	Yes	MI
P7	CCA	Musa	M	78	Intermediate school	Yes	Atherosclerosis
P8	CCB	Saleh	M	68	Intermediate school	Yes	CVD
P9	CCA	Hamad	M	75	Intermediate school	Yes	CVD
P10	CCA	Ibrahim	M	56	Bachelor degree	Yes	CVD
P11	CCA	Norah	F	85	Not formally educated	Yes	Heart failure
P12	CCA	Fahad	M	62	Intermediate school	Yes	MI and respiratory problem
P13	CCB	Fatimah	F	76	Not formally educated	Yes	Heart failure
P14	CCB	Khalid	M	80	Intermediate school	Yes	CVD
P15	CCB	Mana	M	78	Intermediate school	Yes	Heart failure

5.3. Data collection Process

As this study is a concurrent design, the quantitative data and qualitative data were collected in the same time. The integration of both results is presented in Chapter 6; the integration gives more detailed results about the findings from the quantitative and qualitative results.

In order to collect data, people with cardiac conditions were approached in the waiting areas at outpatient cardiac clinics. The study aim was explained and if they were interested and eligibility criteria were met, the next step was to provide an explanatory statement and obtain written informed consent. Fifteen interviews were undertaken, eight interviews were also audio-taped and seven were written manually, as shown in Table 5.2. Two females and five males declined a tape recording of their interview; therefore, the interviewer wrote notes during and after the interviews. Moreover, some notes were made by the interviewer, during, and at the completion of audiotaped interviews and were kept for reference to clarify interviews. Table 5.2 shows the interview summaries including gender of interviewee, the date the interview was undertaken, the length of each interview and the mode of each interview (whether written or audio-taped).

Table 5.2 Interview summary

Interviewee identifier (pseudonym)	Gender of the participant	Date of interview	Length of interview	Mode of the interview
Abdullah	Male	November, 2016	45 minutes	Recorded
Ahmed	Male	November, 2016	12 minutes	Recorded
Ali	Male	November, 2016	15 minutes	Recorded
Mohammed	Male	November, 2016	10 minutes	Written
Yahia	Male	November, 2016	18 minutes	Recorded
Bader	Male	December, 2016	25 minutes	Recorded
Musa	Male	December, 2016	14 minutes	Written
Saleh	Male	December, 2016	15 minutes	Written
Hamad	Male	December, 2016	12 minutes	Recorded
Ibrahim	Male	December,	25 minutes	Recorded

Interviewee identifier (pseudonym)	Gender of the participant	Date of interview	Length of interview	Mode of the interview
		2016		
Norah	Female	January, 2017	15 minutes	Written
Fahad	Male	January, 2017	10 minutes	Written
Fatimah	Female	January, 2017	18 minutes	Written
Khalid	Male	January, 2017	16 minutes	Written
Mana	Male	January, 2017	35 min	Recorded

5.4. Data analysis procedure

The study consisted of 15 semi-structured interviews. A decision was made to not interview any more participants when data saturation was reached. The interviews were undertaken in Arabic and then translated to English. All translated data were rechecked by an accredited bilingual translator (two-way translations technique) to check data accuracy as explained in Chapter 3. The process of thematic analysis was generated by applying the 6 steps of Braun and Clarke (2006) as described in Chapter 3.

5.5. Interview findings

The data were analysed using thematic analysis. Four themes emerged:

- Disconnectedness
- Feeling of involvement and connectedness
- Sources of support
- Alternative help seeking strategies

Each theme has 2-4 categories as illustrated in Table 5.3.

Table 5.3 Themes and categories

Themes	Categories
A. Disconnectedness	<ol style="list-style-type: none"> 1. Gaps and discontinuity in care (Practice and Education) 2. Language and Access challenges 3. Feeling challenged (communication with staff, distance, transportation, family, gender) 4. Ambiguity / uncertainty of care (wellness and deterioration).
B. Feeling of involvement and connectedness	<ol style="list-style-type: none"> 1. Happiness, wellness and awareness 2. Self-identity (positive self-esteem good outcome).
C. Sources of support	<ol style="list-style-type: none"> 1. Contextual (program, healthcare providers) 2. Existential (family, physical and psychological support from others)
D. Alternative help-seeking strategies.	<ol style="list-style-type: none"> 1. Patient preferences (program development, communication, teamwork, Proving homecare) 2. Providing alternative therapy.

5.6. Disconnectedness

5.6.1. Gaps and discontinuity of care in practice

Patients explained different reasons that contributed to a sense of being disconnected from the care, and the most common reason was the long gap between appointments. Many also reported a sense of discontinuity of care as their greatest concern due to the long time between appointments and follow up. This usually between Phase 2 and 3 in CR programs, where patients may not be seen by the

physician for more than a year after discharge from the hospital.

*After six weeks there was only one appointment every year
(Mana)*

*I had my operation and after five months and I had another
operation because there was no proper follow up (Abdullah)*

Another gap occurs when a patient is admitted to the hospital and the decision is made for intervention especially if the patient requires an urgent surgery; there is a long time to be transferred to the operation room.

*The main problem they do have is the gap between the
admission and the time of doing the operation (Abdullah)*

The participant described his experience and expressed dissatisfaction with delayed follow-up appointments as follows:

*The post operation follow up is very slow, I had the operation
and they gave me an appointment after six months, this is not
right. If I had the operation it should be a follow up after one
week then, can be six weeks follow up (Abdullah)*

Disconnectedness also occurs when there is a gap in communication with the staff and patients and their families. Disconnectedness happens when staff emotionally and physically disengage from the patients and their families. The patients experience uncoordinated care and perceived missed care. Poor communication between the patient and medical team exacerbates the problem, patients often not understanding the goals of treatment:

*In general, nobody explained to me about the diet that I should
eat, I have diabetes mellitus and hypertension (Fatimah)*

5.6.2. Language and access challenges

Patients in Saudi Arabia often face language barriers because many of the multinational workforce speak English language and they do not understand Arabic language. Therefore, ineffective communication may result, which can impact

quality and safe patient care.

Only thing is communication was difficult because of language barriers. Nurses were speaking English and hardly understand the Arabic language (Abdullah)

Another aspect of language barriers is that some patients had a hearing impairment, which is common in this age group; this affects the patients' understanding of the sent message and as a result, they may not receive adequate education and care:

The problem was with communication, I cannot understand the English language, and I am an old woman and I find communication difficult and I cannot express myself clearly (Fatimah)

Patients prefer to have Arabic-speaking staff who can explain to them in a simple language and clarify the instructions, as they want to receive consistent and understandable information in their own language:

I would prefer that some specialists came to me and sit with me explained in Arabic everything regarding rehabilitation and also about my disease and activities that I can do ... We need a clear program and a clear discharge plan that explains everything and also somebody who speaks clear Arabic language to understand (Fatimah)

Another patient emphasized the language barriers as the main problem in Saudi hospitals:

Communication is difficult because most of health care providers are non-Arabic speaking (Norah)

The problem was with communication, I cannot understand the English language, and I am old woman and find communication difficult and I cannot express myself ... There is a problem with communication with nurses and physicians (Fatimah)

Physicians were reported to be too busy to discuss with the patients in the time of the follow up. Communication issues are the cause of most patient complaints against doctors and feelings of dissatisfaction:

Physicians do not explain to the patient and they keep reading from the laptop without explaining and assuring the patient about his/her condition... It is rare to refer to other specialties and do communication (Fatimah)

Communication is difficult because most health care providers are non-Arabic speaking (Fahad)

Patients' work constraints and the time of appointments are another issued highlighted by the participants. Participants reported not having time to attend their appointment due to their jobs and having difficulties providing a reason to travel for the appointment. Furthermore, inappropriate appointment time can force them to miss their regular appointments.

The main important barrier is my work; if I do not have excuse from my work I cannot do follow up and I cannot come to the hospital to my appointments or to do other investigations (Bader)

Because of the gap between appointments, some patients forget the time of their appointments and this can result in disconnectedness from care; therefore, reminding the patients for their appointments can enhance patients follow up.

I do not have any problems, except the time of follow up and the doctors are so busy to communicate with me (Abdullah)

The main problem is I always forget my appointments so I need somebody to remind me (Mohammed)

Hospitals should make some efforts to allocate time according to patients' needs rather than having one appointment every year. Follow up time should encourage patients' input and decision-making; many patients may need longer time to

communicate with their physicians and explain their needs. Physicians at outpatient clinics require an additional and unique time-management to build patient-physician relationships.

Patients also expressed their worries about discontinuity of care because physicians are changing over for various reasons, and this may interfere with their usual care:

I would like to have the same doctor who understands my condition (Abdullah)

I do not have any problems, except the time of the follow up and the doctors are so busy (Musa)

5.6.3. Feeling challenged (communication, transportation and family)

Feeling challenged about communication, transportation, distance, family and gender differences are the main contents this category. During admission, some patients had experienced dissatisfaction because of staff behaviors. An elderly female patient was dissatisfied because of careless staff who did not respect her needs:

When I was admitted to the hospital, I was not happy about the care, some of the staff were careless, I kept calling them and they ignored me (Fatimah)

Dissatisfaction was reported also because of not receiving adequate education in all phases. Some patients reported ignorance by the staff during follow up, and the fact that some physicians would sit in the office reading from the computer without communicating with the patient and without giving any explanation about the investigation results and upcoming plans:

Actually during follow up the doctor will sit on front of his computer and rarely will talk and explains about the investigations and result ... this makes me sad (Norah)

Another patient described the deterioration of his condition because of a lack of communication and improper follow up and delay of appointments. Inconsistent

care and changes in the treating physicians can change the treatment plan. Therefore, some patients prefer to have the same physician who will follow up throughout the treatment:

I have one comment, the doctors are changed and this usually changes the plan, I would like to have the same doctor who understands my condition (Musa)

In my appointment, it's not always my consultant, but can be other junior physicians who are available in the clinics (Mana)

Participants regarded support to be a crucial factor that can assist them in coping during such a time of high stress. One patient reported lack of support, as she is an old woman who cannot drive or even work on her own:

As a female patient transportation is very difficult if no one is available to drive me to the appointments (Norah)

As the main cardiac centres are located in the main cities, many patients have to travel to attend their appointments. Patients come to their appointments to receive education and the required care. However, distance is seen to be a significant factor that interferes with patient care:

See our place is very far, but I try to plan this to come on time. I need to come to keep my health good (Ahmed)

Other patients reported:

Transportation and distance is a problem that prevents me from attending my appointments (Ali)

We come always on time but we have a problem with distance, we live far away from the hospital (Yahia)

I am living about 1000 km from Riyadh, and I am trying to arrange to come to my appointments and do follow up as I can come usually one week before my appointment (Mana)

With regards to age perception and gender differences, one female patient stated that she is an old woman who needs help to express her needs and communicate with staff because she finds it difficult to communicate by herself; some patients also have some physical problems that interfere with their communication with staff:

I am an old woman and find communication difficult because I cannot express myself (Fatimah)

In a country like Saudi Arabia, where a few months ago women started to drive, women are likely to become more independent in the future. However, many older female patients will not drive due to their conditions and some social concerns:

The first problem is transportation, it is not available always and I usually miss my appointments if my son is not here in Riyadh (Fatimah)

5.6.4. Ambiguity / uncertainty of care (wellness and deterioration)

Ambiguity in information about a patient's condition and the expected outcome were of great concern to patients. This can occur due to the inefficiency in the information system and the inability of a patient to communicate with staff nurses and physicians. Ambiguity is related to the patient expectation, responsibility and outcome. It reflects the lack of common understanding and being uncertain about how to maintain a healthy life after a cardiac event. In a CR program, the multidisciplinary teams should share the responsibility of keeping patient's aware and they should provide regular feedback to each patient about compliance and the importance of follow up:

Follow up is good although there is a big gap between appointments (Abdullah)

There is a gap between appointments and delay even though I can see a good result (Hamad)

5.7. Feeling of involvement and connectedness

On the other hand, some participants experienced a strong feeling of involvement

and connectedness. Involvement is to encourage patients' participation in the patient care and sharing of decision making and being able to express opinions about treatment and sharing information, feelings and guidance about healthcare instructions. Involvement leads to empowerment, satisfaction and happiness. This theme has different categories as follows:

5.7.1. Happiness, wellness and awareness

Some patients had a positive experience of the care they received either in the inpatient or in outpatient services. Participants feel very satisfied when they are involved in their care and participating in decision-making:

It was excellent and everything was complete, everyone helps me and explained to me whatever I need, doctors were good they took care and also nurses responded very well and answered all my questions (Ahmed)

I received total care; it was excellent, multidisciplinary team was there and they taught me about everything (Fahad)

The care was very excellent and we are happy about it (Yahia)

Another aspect, which is important according to the participants, is the hospital services and program structure and education, which gives them more support and satisfaction:

With regards to the hospital's services it was really excellent, all doctors and nurses were good and gave support (Ali)

The care was excellent, all services are available, I am happy about all the care I received (Hamad)

Patients are always looking for the best quality of care. Furthermore, teamwork and rapid interventions were reported as a positive experience:

During my admission the physicians came to me from different departments. I had gone through five procedures during one week. I think I received the best care (Mana)

Patients generally reported feeling happy and satisfied because of health improvements and feeling well.

I am happy about my health now, my doctor is good and he follows me up (Ahmed)

Some patients ascribed their good health and health improvement to a good CR program, which they follow and also to good physicians who follow them up:

My health improves well and I feel better, especially after I was discharged; I do follow up with my physician and joined the heart program in hospital in cardiac clinics (Khalid)

I do follow up and I am happy about the care they gave me every time, they are keen on doing follow up (Ahmed)

5.7.2. Self-identity (Positive self-esteem and good outcome)

One of the important factors that enabled patients to attend CR program and do regular follow up is self-interest, health awareness and willingness to participate. Self-esteem is a feeling of satisfaction that someone has in himself or herself and his or her own abilities to make decision-making (Clark et al., 2003).

Patients' willingness to participate and give their point of view is important in the current study as this is a part of multidisciplinary teamwork, which is likely to make the program successful:

I think everything is good and available to patients, if they develop the program more I will come anytime (Saleh)

I feel very happy about my health, the result is very clear (Mohammed)

Health improvement and feeling to be in a good health was another factor reported by patients. Wellbeing generally is not just the absence of disease or illness. It is simply a feeling of good physical, mental, emotional and social health, and it is usually linked to happiness and life satisfaction:

My health is much better now. I control my BP, I take my medications regularly, and I have good sleeping and I do not feel of shortness of breath as before (Mana)

I think when I see my health is improving this encourages me to come to the appointments and do follow up (Hamad)

When I am thinking about my health improvement this encourages me to follow up (Ibrahim)

A positive perception of one's good health can influence patients' habits and way of living. The perception of one's own health changes over time, and when a patient becomes more educated and knowledgeable about their condition this changes their perception positively:

My perception about my health encourages me to do follow up (Abdullah)

5.8. Sources of support

Patient support is a very important concept in healthcare organization. In the current study, it includes listening to the patients, informing them and involving them in their own care. Patient support is a part of patient-centred care, which means providing care based on patient preferences, needs and values, and ensuring that patients' needs and values guide all clinical decisions and treatment plans. Under this theme two categories emerged: contextual and existential support.

5.8.1. Contextual support

Contextual support includes staff follow up of patients' appointment. It was reported that staff do follow up a patient's appointments and call patients regularly to confirm their appointments. This action by staff nurses create a positive feeling, as participants expressed:

They call me any time to confirm about my health and the appointment (Bader)

I received total care; it was excellent, multidisciplinary team and the staff taught me about everything (Fahad)

Multidisciplinary teamwork was appreciated by the patients and reported to be effective according to patients' experiences, and this significant because CR programs based on multidisciplinary team approach:

I met the physiotherapist who taught me how to do light exercise after the catheterization, also one staff from the health education department came to me before any procedure and she explained to me what is going on (Mana)

The discharge summary was reported to be very important; it guides patient care after discharge from the hospital, and this ensures the continuity of care:

When I was discharged, they gave me a discharge summary that involves all the required information and they referred me to a pharmacist, dietitian and other specialists (Fahad)

When I was discharged, I received discharge summary. The staff explained to me about everything I need to know (Mana)

Some patients had a more effective experience than others; they received the required care in all three phases of CR, which included consultation and referral to other multidisciplinary team members:

One week after I did follow up and I was seen by my consultant and I was referred to the health education department, I participated in group physical exercise, I did breathing exercise and effort test ... I met the physiotherapist who helped me a lot to understand the benefits of doing physical activities (Mana)

Patients reported receiving health education when they were discharged, which includes education about diet, physical activities and importance of follow up:

When I was discharged to home, the staff gave me health education about healthy diet, physical activities and follow up
(Khalid)

Patient education is a very important component in CR programs. Education is the process by which health professionals give information to patients and their families; this information can change positively the patients' health behaviours, improving their health status.

Healthcare providers' active role to support patients and give the required education is crucial to improve the patient's outcome. This includes explanation about general health, investigations and routine exams. All of these interventions are seen to be essential elements to enable patients to attend CR programs and commit to follow up and attend appointments:

Explanation from the doctor and encouragement helps us a lot to come and do follow up, he explains to us the investigations and results this promote us to come every time (Yahia)

Another form of contextual support is related to the context and settings of CR programs. The structure of cardiac programs is a very important factor from the patients' perspective and the contents or components of education that patients are going to receive in each visit enable patients to attend CR programs and follow up appointments:

Actually, the program and education program encourage me to have a better life style (Khalid)

It is reported by patients that the hospital's system and its resources are another factor that help them to attend CR. Furthermore, appointment reminders and staff following up by contacting the patient and confirming the appointment is strongly appreciated by patients:

The staff also remind me through mobile text messages to attend my appointment; they help me to better eating habits and following good diet (Khalid)

The services are good and the team encourages me a lot to come to follow up (Abdullah)

5.8.2. Existential support

Family support is considered as an existential support that patients need post cardiac events. Many patients expressed their needs to have family involvement and support either inpatient care or in outpatient follow up. Family presence is seen as a main support factor to cardiac patients:

I cannot come alone, I need my son with me to understand what is going on and you know I cannot walk, I need someone to push my wheelchair and move me around the clinics (Fatimah)

Family support plays a critical role to support patients to attend CR programs and participate in regular follow up. Moreover, family support helps patients to perceive positive health improvements as an encouragement to continue follow up:

Family support is important, I have my sons and daughter who work in the medical field, they always encourage me to do follow up, follow healthy diet and take my medication on time (Mana)

Another aspect of existential support is one's belief in themselves and observing health improvements:

My health isthey encouraged me to attend especially if I have pain. I am more keen to do follow up (Ali)

My health improves well and I feel better especially after I was discharged and I do follow up with my physician and have joined the heart program in the hospital (Khalid)

5.9. Alternative help-seeking strategies

Under this theme, two categories related to different needs were expressed by the participants. These are patient's preferences and suggesting alternative therapies.

5.9.1. Patients' preferences

Receiving a good education, having support from health care providers and receiving a discharge summary were reported as positive factors. Nevertheless, patients want a clear program, and to receive a discharge summary to guide their follow up:

We need a clear program and a clear discharge plan that explains everything and also somebody who speaks clear Arabic language to understand (Fatimah)

Some patients were unsure about what exactly a good CR program is; however, they could appreciate that the available programs were 'good' based on their experiences:

I am not really aware about the good programs but I am happy about the care I receive now (Ahmed)

To our knowledge this is a good program, you know we are not specialized people, if there is development this will make it better (Yahia)

5.9.2. Provide alternative therapies

At this stage, it is very important to think about improving available programs and provide alternatives therapies when applicable. Different factors should be considered to meet patients' needs and wishes, for example providing alternative therapies, more exercise, providing more support and improving education:

Instead of taking too many medications, I prefer to do other alternative therapies if available like physical activities and following a special diet (Ibrahim)

More importantly, some participants highlighted the importance of considering different backgrounds and different cultures. Although it is a Saudi society, there are different families' backgrounds and also different environments or circumstances:

You should identify the awareness. We do not do physiotherapy and follow up. You should identify the people who are concerned and identify their level of circumstances and their environment, you know, our environment and culture... we should understand it first (Abdullah)

Nevertheless, family's culture can influence patients' commitments to CR programs, especially on diet and eating habits:

You should understand our society, you cannot change people diet; we are not American or European the nature of our society is different (Abdullah)

When restructuring the CR programs it is wise to take into account families' support, different groups with special needs and also provide education that suits each group with respect to their background:

The program needs to be developed. You should take the thing that suits the society, considering the society, the target groups, they need to be educated, the nature of the patient, need to be educated (Abdullah)

The role of family members is one of the factors that should be considered as soon as the patient is admitted to the hospital. In Saudi Arabia, family has a strong impact on patient health and improvement. Unless the family members are involved and well educated about the patient case, the patient condition is unlikely to improve:

If the patient sits with his father or mother and they invite him to eat, as you know in our culture they will still insist to him eat without control (Abdullah)

Patients' diverse circumstances, physical needs and teaching techniques are very crucial points stated by patients. Compliance is difficult especially when there is a need to change lifestyle habits or the patient needs to follow a special diet. Many participants thought this it may not work if there is no support from the network of people around them. Another aspect that should be considered is patient education. The staff should know how much the patient knows about the current condition and

the best approaches to patient management:

The only thing that will happen is the patient will comply with his drugs and take it on time; even though if he takes his medication on time but will not follow diet or lifestyle changes, this will not work (Abdullah)

The patients are different, some are non-educated and others are educated. Those who are educated, nothing stops them from learning, and those who are non-educated need more information, need more techniques to teach them about the disease physiology (Mohammed)

A patient who has difficulty hearing may have company or a family member who can understand the treatment plan and help explain it to her, to have a better outcome:

If the patient cannot hear they need to help him/her to understand and you should explain also to the patient's companion I think the program needs some development (Yahia)

Patient education and providing psychological support are very important aspects that should be considered by all health care providers. Most of patients reported not receiving the required support and education:

I think I still need more psychological support and education more about the disease and self-management (Abdullah)

If there is psychological support and social support; this will help me a lot to adapt my life with my condition (Fahad)

Participants considered teamwork and receiving information from different healthcare providers very important. Communication skills and be able to deliver a clear message also playing an important role in a successful CR program:

*I think it needs improvement in terms of working as a team;
refer the patient to other specialties and improve
communication skills (Fatimah)*

In Saudi Arabia family plays a significant role in patient care, therefore it should be included in patients' management; it is important also for the patient to have the required social support.

*When the patient comes to you he is already convinced to do
the operation, the patient comes to you because he is afraid and
needs help. So the question is will the people around him will
help him or the social pressure will keep him alone (Abdullah)*

Family education is one of the recommendations that patients highlighted because patients think that family can give support and can help that patient to comply with the treatment:

*You need as healthcare providers to educate the patient and the
people around him because the patient has some social
concerns and so he will not comply with the program, you
should be patient (Abdullah)*

Another reason for educating the family members is if the patient lacks formal education, and thus requires support to understand the treatment plan and necessity of follow up:

*When you explain to a non-educated patient you need to
explain to the person accompany him to understand with him
and to help him to follow up (Mohammed)*

On the other hand, a crucial point is to educate and give more training to the staff, as patients can see more staff need education and good training to deliver the CR components:

I think the staff need more care and attention, they need more training to learn how to communicate with different patients (Yahia)

If the patient cannot hear they need to help him to understand and explain also to the accompany, the staff needs more training and development (Fatimah)

I think health care providers need more training about cardiac rehabilitation and how to communicate with patients in a simple language (Fahad)

The program was good at the first 6 weeks, and then no regular follow up or communication except coming for my annual appointment and doing my blood tests (Mana)

Patients' education in the current study seems to be the first priority, which has been reported by all the participants: education about self-management, general information and supporting the patients psychologically during the education sessions to enable the patient to accept their condition and have better outcomes. Furthermore, patients stated the education process should continue with patients throughout life (Phase 3 in CR):

I think I still need more psychological support and education more about the disease and self-management (Abdullah)

Good education, from my point of view still I need education about taking medication, the effect of the prescribed drugs and its mechanism, side effects I think this is what I need to know (Khalid)

Excellent at beginning but I think this education should continue with the patient forever and should be in every appointment. The staff can see the patient and check how everything is going about medication, exercise and physical activities (Mana)

Since many patients reported not receiving a discharge summary or treatment plan

it is very important to create a policy, guidelines or a protocol to ensure that each cardiac patient receives the required information at discharge time in the patients' spoken language, including a clear plan.

5.10. Conclusion

In this chapter, the analysis of the interviews conducted was presented with four main themes identified: Disconnectedness; Feeling of involvement and connectedness; Sources of support; and Alternative help-seeking strategies. A cardiac rehabilitation program involves all measures that seek to decrease the impact of disability caused by cardiac heart disease and thus facilitate the patient to attain independence, social integration, better quality of life and self-actualization. This qualitative phase has explored patients' experiences of CR programs in Saudi Arabia. The result from this chapter indicated that there is a need to improve the current CR programs in different aspects including the need for staff education, improving the current patients' education strategies, and more importantly addressing language barriers and facilitating the communication process. In Saudi culture, family members play important roles to enhance patients' adherence and attendance to CR programs. Therefore, many patients reported the importance of family involvement in their treatment plan. In Chapter 6 further discussion of findings from Chapter 4 and 5 will be presented about what this means in relation to the existing evidence, enhancing CR care in the future to improve outcomes for patients, their families and the way health professional teams practice.

Chapter 6. Integrative Discussion

6.1. Introduction

In the previous chapters, the data were analysed and interpreted to provide information regarding the healthcare providers' knowledge and perspectives about available CR programs. The results explored the patients' experiences of available CR programs and the care they received in both inpatient and outpatient health services. The primary aim of this chapter is to integrate the findings from quantitative results with the themes arising from the qualitative data and address the overall aim of the study.

Mixed method design provides a great opportunity for investigating complex processes in healthcare systems when developing a model of care. Therefore, the integration of quantitative and qualitative data can enhance the value of mixed methods research. The integration of the results of both phases of the study offers complementary information and enables powerful conclusions (Creswell & Plano Clark, 2011). The chapter begins with a discussion of how the conceptual framework was used to interpret the findings and develop a model of care. This is followed by an integrative discussion of the findings, then the design solutions to model CR programs in Saudi Arabia, followed by the conclusion.

6.2. Modelling an innovative CR Program for Saudi Arabia

As described in Chapter 1, the conceptual framework underpinning this study was the 'model of care' by the Agency for Clinical Innovation (2013). This conceptual framework has five stages.

The first stage is the Project Initiation. In this study, this stage related to the importance of CR programs in Saudi Arabia and the evidence gap on CR programs in the country. Therefore, to develop a model of care it was important to study the health professional team's perspectives, and the perspectives of patients. As stated in Chapter 3, it was important to collect both qualitative and quantitative data in order to design a comprehensive model of care. A concurrent triangulation mixed method design was employed to meet the research aim and objectives. This design

is the most suitable and appropriate approach to model a CR program in Saudi Arabia. Three cardiac centres were included in this study, with a varied response rate between them.

The second stage (diagnostic stage) explains the integrative findings from the two phases which are explained in the following sections. Furthermore, the Design of solution stage, which is the third stage, is explained at the end of this chapter and is linked to the other stages in Chapter 7.

6.3. Characteristics of patients

Patients who participated in this study were mainly elderly people with primary education Hammill et al. (2010) reported the same finding in their study, where elderly patients are the common group affected by CVD. Importantly, all female patients in this study had no formal education and they worked as housewives. This finding influences the CR program restructure for female patients in Saudi Arabia, as more concern should be applied when formulating education programs for gender differences and considering women's situation and needs.

6.4. Characteristics of the healthcare professionals

The surveys were distributed to a range of health professionals and as expected nurses comprised the majority of respondents, followed by the physicians. Most nursing staff was expatriate from non-Arabic countries, mainly from Asia. This was an expected result, as Saudi Arabia depends on expatriate workforce to staff health services; this finding would be expected also for MOH hospitals because the Ministry of Health, like other health services in Saudi Arabia, relies on expatriates in many hospitals (Aboshaiqah, 2016).

Delivery of cardiac core components in CR requires skills and expertise from a wide range of professionals, including a multidisciplinary team that involves experts, such as cardiologists, specialized general practitioners, physicians, physiotherapists, nurses, dieticians, occupational therapists, and many others. All these professionals work together in close collaboration with the main objective of reducing mortality rates related to cardiovascular diseases enhancing quality of life and patients' safety. A multidisciplinary team in CR programs can adopt different

approaches; for example, one cardiac centre adopted the nurse-led approach to the CR program. This approach includes sessions on risk factor management that involve multidisciplinary collaboration and roles in the decision-making process. It also includes components such as nurse-led prescriptions, individualized behavioural counselling, drug therapies, goal setting and action plans that are supported by frequent follow-ups. Jennings (2017) stated that although the nurse-coordinated care approach is among the most common worldwide, successful healthcare programs are those which are coordinated by a multidisciplinary team and know all the CR components. Epstein (2014) explained that a successful CR program brings together different specialists to provide a well-coordinated health care program where the contribution of every professional is valued, including that of the patient, nurses, support persons, physicians, occupational therapist, dietician and other related professionals in the medical field.

It was mainly a nurse or a physician who coordinated the CR program. The result shows only nurses and physicians were aware of presence CR programs in their units. This finding partly agreed with a study by Piepoli et al. (2015), which found that worldwide, the professionals conducting the program may include primary-care physicians, nurses or exercise physiologists, but with coronary-care expertise and experience; they also found an exercise specialist, a physical therapist and a physiologist, dietitian, psychologists, and behavioural therapists among those conducting the program. According to the healthcare providers in this study, in order to meet the objectives of CR programs there is a need to equip the health care professionals with the skills to help patients and their families engage in lifestyle changes that are in line with the cardiovascular medication regimes. Similarly, this study showed that the creation of an environment of multidisciplinary teamwork approach is required, with clear roles, shared goals, effective communication, mutual trust, and measurable outcomes and processes, according to the respondents.

6.5. Challenges and barriers to practice in CR programs

Only nurses and physicians expressed their knowledge about available CR programs, yet no other profession (e.g. pharmacists, dietitian or physiotherapists) indicated that they knew about the available CR programs in their units. Only 42% indicated that they have a CR program in their organizations. This explains different

patients' views regarding dissatisfaction about the present programs, such as lack of communication between staff and patients, patients' lack of education, and insufficient knowledge regarding the patient's condition.

There is a wide treatment gap between CR scientific evidence and clinical application of the programs. The most notable challenge is a failure by a significant number of the patients to commence immediately with the CR programs after discharge, specifically in Phase 2 of the CR program (see Figure 6.1). Concurrently, very few patients worldwide are referred to CR programs after discharge, as reported by WHO (2017).

Other challenges included uncertainty or doubts regarding the strength of some of their programs in fulfilling individual needs, for example failure of the in-hospital team to promptly refer the patients to the CR program. Many patients in the current study reported the need to have a discharge summary and referral to CR programs. In a similar study by Wai et al. (2012), the authors note that only 83% of cardiac events patients were provided with documentation of post-discharge management plan and this makes it difficult for program directors, especially nurses, to commence care under such unclear conditions. In the current study, many patients argue that the summary would have critical information regarding continuing risk-factor management. Nevertheless, some patients in this study reported not receiving any discharge summary in the Arabic language, and when a summary was available it was usually written in English, which prevents understanding by the patient and their family.

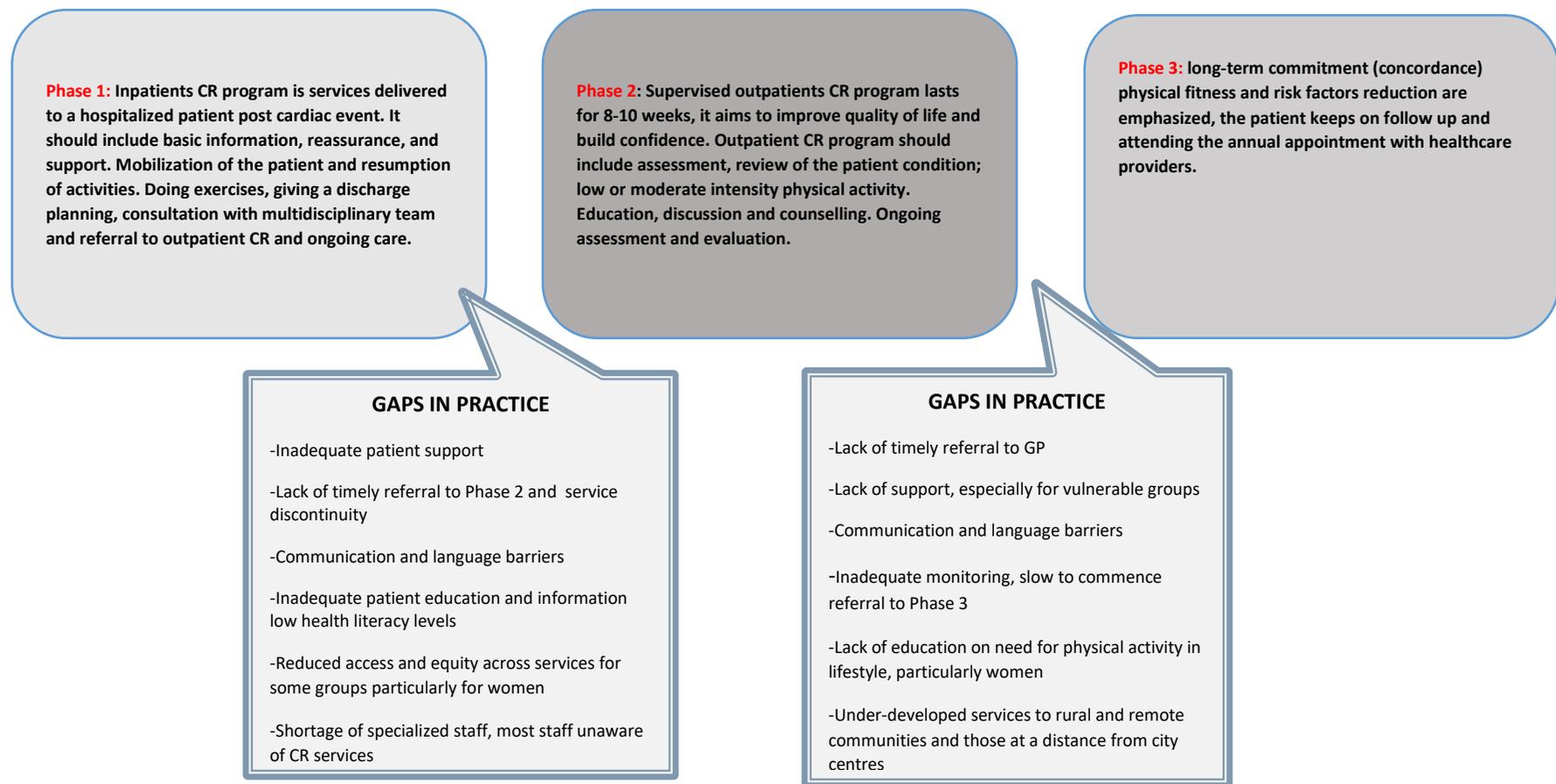


Figure 6.1 Gaps in practice related to modelling a cardiac rehabilitation program

Despite many benefits they remain under-used worldwide and their presence in the medical world is barely identified (Dalal, 2015). In fact, Dalal reports that less than 40% of countries in the world use CR programs; most of these countries are high-income (accounting for nearly 70%), while the rest of CR programs are found in low and middle-income countries, accounting for about 8.3% and 23% respectively (Dalal, 2015). To emphasize, the CR program is the least available among all the other evidence-based secondary prevention therapies worldwide (Leon et al., 2005). The findings of the current study are further evidence of the low awareness of CR programs. Therefore, there is a need to develop multi-level strategies to support CR availability and capacity at both national and international levels. Such strategies should include public health policies, alternative models of delivery, and systematic referral strategies.

Many patients reported not being referred to other professions for consultation, for example diabetic counsellors; other patients reported not being referred to Phase 2 of CR programs and being disconnected from the care as soon as they were discharged from a hospital.

Most of the patients also had difficulties accessing the cardiac centres, as they are located far from their residences. In fact, most of the cardiac centres are located in the main cities and patients are required to travel to attend regular appointments. For this reason, after a patient is discharged, it becomes challenging to return for follow up and to join available programs. This agrees with a study by Wood (2012), according to whom one barrier to attend CR programs is transportation and distance.

Furthermore, the structure of the present programs lacks some components to support women's needs and other patients who need special attention, as noted by the staff and patients. Moreover, the available program concerns about lifestyle modification and exercise training programs only, whereas other factors for example psychological needs and patient-centred care are ignored and not applied in practice. Shortage of staff is another barrier reported by patients and healthcare providers. This is also the case for MOH hospitals, which may lack flexible educational programs, unavailable organizational support, and motivation.

On the other hand, some enablers from the patients' perspective include patient self-awareness about the importance of CR and satisfaction about the available services. The feeling of involvement and connectedness is inspiring, according to cardiac patients, because it increases feelings of happiness, wellness and awareness. The patients feel satisfied because they know that they have a reliable medical partner who can trust and understands their conditions.

6.6. Organizational structure challenges for patients enrollment

The implementation of CR programs in Saudi Arabia face administrative and management challenges such as absent or insufficient legislation, funding constraints, health workforce and information system priorities, in addition to an increasing population. This is in line with a study by Al Jadid (2010), which concluded that in Saudi Arabia there has been an emphasis and focus of funding on traumatic injury and physical rehabilitation programs for survivors of traffic accidents which may have diverted attention from other rehabilitation programs.

Unavailable resources were reported by healthcare providers in the current study to be the main challenges, due to inadequate funding allocated to CR programs or lacking managerial support. As a result, most healthcare providers lack the necessary skills to carry out these programs, as patients highlighted. A lack of sufficient education can lead to poor service delivery. Grace et al. (2013) stated that there is a problem of recruitment procedures in CR programs and rotating staff, which can lead to a lack of continuity in health care provision. Medical personnel try not to become involved in the programs due to poor payment. In addition, members of the multidisciplinary teams in CR programs, such as pharmacists and dietitians are, in most cases, only available infrequently, due to shortages in these areas of expertise (Grace et al., 2013). The lack of trained staff was identified as a major problem that needs to be addressed

Furthermore, most of the eligible patients did not participate in CR programs; the low enrolment was due to low resources in the cardiac centres and patients' lack of awareness about the importance of CR programs. This finding is in line with a study by Clark et al. (2014), who found that patients drop out prematurely when they enroll in CR programs for a range of reasons, including low resources,

communication barriers, and lack of awareness. In order to maintain the participation of patients, it is important for healthcare providers in Saudi Arabia to have a good knowledge and provide reassurance before and during the early stages of the program. There is also a need to present the CR program as a comprehensive program of activities that can benefit patients irrespective of their gender, age or other personal characteristics. As explained by McIntosh et al. (2017), CR participation involves a complex decision-making process where eligible patients balance factors that help them perceive CR as beneficial against factors that act as disincentives to participation.

Healthcare providers in the cardiac centres reported that the CR program structure in which they practice is divided into three phases. The first phase involves the period of hospitalization of the patient after a cardiac event. The second phase is the period that follows discharge. The third phase is the period when the patient fully engages in a program of structured exercises and is known as the maintenance phase. Each particular phase has its own core components. However, many patients reported not being referred to Phase 2, which is critical to connect patients to other phases. The components included in the three phases as stated by staff are nutritional counseling, risk factor modifications, patient assessment, exercise training. Phase 1 of the CR program begins as soon as a patient is stable, when a physician writes a referral for them to other specialists. In this phase, patients are involved in supervised low-level exercise, including patient education. The goals of the program include prevention of weakness and complications resulting from long periods of bed rest.

The healthcare providers reported that a specialist nurse who has expertise in CR usually monitors exercise and educational sessions. Each patient receives a comprehensive assessment before starting these sessions. In the exercise sessions, patients are taken through the training, depending on their level of tolerance; this implies a process of evaluation, where each patient performs exercises without much strain. Internationally, Phase 1 exercise is usually assessed frequently. In Phase 1, the exercise goals are established each day and are communicated by the nurse and the patient. According to the healthcare providers, all patients in this phase receive blood pressure evaluation and heart monitoring prior to and during the session. All this information is registered in the patient's medical records for

other care providers. The patients also are given education based on their level of readiness to learn, including their own expressed interests. This education focuses on the patient's heart problem, nutrition, exercise or activity, lifestyle changes and risk factors, medication, planning of emergencies, including other resources available. Hospitals can also provide educational videos for the benefit of the patients.

Exercise training seeks to enhance patient fitness in addition to reducing their risk profile. Evaluation of patients' diet should be done by teaching the patient to record the estimates of the patient entire daily caloric intake, dietary components like fat and cholesterol levels as well as nutrients. There is also a review of eating habits, especially frequency and balance between fruits, vegetables and whole grain. There is also a measurement of the patient weight, height, blood pressure, and waist circumference. Patients experiencing clinically stable cardiovascular disease are reported to attain at least thirty minutes of physical activity per day.

While exercise training was regarded as the main core component of CR, the current practice guidelines recommend the adoption of comprehensive rehabilitation programs that also incorporate other components, not only exercise and diet counselling. It is important to note that CR programs are more than just diet and exercise programs; multidisciplinary approach should optimize the overall physical, mental, and social functioning of people with cardiac problems. CR programs should include specific core components that aim to optimize cardiovascular risk reduction, foster healthy behaviors and compliance with these behaviors, reduce disability, and promote an active lifestyle for patients with CVD. The core components stated by staff in the current study involved the following: 1) initial assessment, 2) lifestyle risk factor management (i.e., diet, exercise and tobacco), 3) medical risk factor management (e.g., lipid control, BP control), 4) education for self-management 5) return to work and 6) outcome evaluation. As such, one can reduce cardiovascular risk, reduce disability, promote an active lifestyle, and encourage healthy behavior and compliance to these behaviors.

Healthcare providers reflected on how effective the program is and which improvements need to be undertaken to increase the quality of service provision. These views are based on healthcare providers' knowledge and awareness of CR,

their perceptions, the resources required for the benefit of CR programs and their attitudes towards the changes or transitions between outpatient CR and inpatient CR. The staff in this study reported the need for policy that guides their practice. There is also the issue of reviewing current CR programs policy by introducing a systematic referral policy, which was advocated by several organizations, including the American Association of Cardiovascular and Pulmonary Rehabilitation, the Canadian Association of CR, and the European Association for Cardiovascular Prevention and Rehabilitation (Turk-Adawi, 2014).

The staff reported their willingness to support CR programs and work to increase the number of patient enrolments. However, the main challenge faced by participants was the language barrier and inability to communicate in patients' language, which affects the practice of CR program.

6.7. Communication and language barriers

Communication and language barriers were the main issues raised by healthcare providers and patients. Therefore, it is noted that few patients reported positive views regarding healthcare providers support. This support should occur during follow up when explaining the treatment plan and referral to a multidisciplinary team. Patients who attend and participate in CR programs have various reasons for doing so. However, the reasons held by most eligible patients are related to belief in the self and their bodies. Significantly, health education, behavior changes, and lifestyle risk management were the most important reasons selected by healthcare providers.

Poor patient adherence to CR programs in Phase 2 and 3 are caused by communication difficulties between healthcare providers and patients. This can be a result of language barriers, such as lack of understanding and objectives of such interventions. Most patients usually find it difficult to understand medical issues affecting their health. This might be due to cultural, and language barriers. Most of these patients do not seek a preventive cure, and they are also less likely to adhere to certain phases of the rehabilitation programs and treatment guidelines, recruitment and participation and clinical trials.

It seems that psychological health and long-term management (self-management)

were the least selected elements of CR programs as explained by patients. This explains why patients asked for psychological support, effective communication and education about self-management in different contexts during the interview. CR is a complex intervention measure that is offered to patients diagnosed with heart conditions and incorporates several components, such as health education, stress management, physical activity and counseling on cardiovascular risk management. CR services are long-term and comprehensive programs, seeking to limit the psychological and physiological effects of the cardiac disease, control cardiac symptoms, reduce the risk of sudden death, and enhance the vocational or psychosocial status of patients. Many participants stressed the importance of education and psychological interventions, the goal is to transform the patient behaviour and lifestyle for example enhancement of patients' eating habits through healthy diets and how to sustain positive moods. In the literature, Abell, Glasziou, and Hoffmann (2016) stated that one crucial goal of the CR program is to minimize anxiety and depression.

The patients expressed the need for communication and involvement in their care. There are two concepts that provide perspectives on the advantages of the provider-patient relationship, along with the manner in which they are created and maintained and how they impact on patient outcomes. Communication with patients and a feeling of involvement can be described by a sense of belonging, intimacy, empathy, caring, reciprocity, trust and respect. The delivery of safe care for cardiac patients calls for a growing commitment to form partnerships between healthcare providers, patients, and their families. Cardiac patients can generate a feeling of involvement and connectedness when they act as facilitators in building partnerships and enabling supportive communication. Trust is a key element in this process of connectedness, as it encompasses the interpersonal, non-technical and social nature of healthcare. In order for cardiac patients to feel that they are fully involved, they reported the need to be willing, have the ability, and know how to participate in CR programs in early stages of admission (McIntosh et al., 2017).

The patients reported that family contributions and involvement and communication with them can improve the detection and management of cardiovascular diseases. According to McIntosh et al. (2017), patients and their families can also improve the progress escalation of care received from healthcare

providers through playing an interactive and proactive role to ensure that quality services are provided. The feeling of involvement and connectedness on the side of the patients is uplifting, as it increases feelings of happiness, wellness, and awareness, as stated by the majority of patients in this study. The patients feel happy because they know that they have a reliable medical partner who understands their conditions. They feel confident that they have the support to help them manage their condition. They also become aware of their condition because of the regular interaction with healthcare providers. This awareness improves their sense of wellness, as the feeling of being informed generated the feeling of being in control.

Another barrier faced by patients is the lack of family support to follow up and encouragement, which is a key determinant for enrolment, adherence, and participation. Patients expressed the need for more support from family members and from healthcare providers. This agrees with Grace et al. (2015), who stated that family members help to change the attitude found in many elderly people of trying “to get on with their lives” and being self-sufficient, as they view the programs as barriers that create overdependence on others. Moreover, family is an aspect of geographical barriers too; most of the patients discussed being living in rural areas, and as such they need assistance in terms of transportation, which is often difficult to obtain without any family member; in addition, the schedule may not suit the family members working time.

Most patients reported that they can change their behavior to become positive once they feel a sense of involvement or connectedness to health providers. Self-identity is recognizing one’s inner characteristics as an individual in relation to one’s social environment. Similarly, they can change their attitudes and beliefs if they feel that it is the most appropriate thing to do. This has to do with their self-esteem and the feeling that their decisions are respected. In relation to their health, cardiac patients hold certain attitudes and beliefs regarding treatment, medications or health maintenance procedures. Their behaviors are influenced by the information given by healthcare providers. Therefore, when there is effective communication and patients have a feeling of connectedness with these providers, their attitudes are more likely to be positive and they are more likely to comply with the providers' interventions as they have faith in their abilities.

Huffman et al. (2014) state that when patients feel that they are a part of the decision-making process, they are more likely to participate in improving their conditions because their cognition influences their experiences in all stages of their illness and their perceptions of their symptoms. Thus, they will change their personal behavior to affect the development and course of their condition. This can be during the rehabilitative process, therapy and deciding when to return to their normal lives.

Patients can receive support from a number of sources in order to help improve their condition. This can be from the family, or physical and psychological support from health providers. Most patients experience depression and anxiety after MI. Some patients do not adjust well and need physical and emotional support. Family involvement is important in providing comfort and a feeling of love for the patient. Milani et al. (2011) and West, Jones, and Henderson (2012) agree that emotional distress is brought on by negative thoughts, which can be handled by therapists and psychologists. Therefore, healthcare providers need to work closely with patients and their families to improve patients' condition. In Phase 3 of CR, physicians are the most significant people who communicate with patients. In Saudi Arabia, at outpatients' clinics most of the physicians are Saudi or Arab physicians. This facilitates communication in Arabic and the delivery of a clear message to patients during the follow up. The support received from healthcare providers and the family can help the patient to develop an appropriate attitude, which ultimately improves their condition. Attention should be focused on the role of all professionals who have a great impact on the patient's health status. The CR program should have a team of specialists who are able to manage psychological needs in a professional manner.

It is important for the program coordinators to address the main challenges that face both patients and healthcare providers such as language barriers, while also increasing access to CR programs to such groups of people in order to bridge the gap between these health disparities. Shanmugasagaram et al. (2013) indicate that the staff should provide care that is culturally sensitive to help reduce these barriers and disparities. In Saudi society, the culture, patients' preferences, and patient's background should be considered first when creating any model of care.

6.8. Discontinuity of care

There are several identified reasons that contribute towards the under-utilization of CR and patients' dissatisfaction with it, despite the importance. These barriers are found at three levels that include provider, patient, and system levels. Patient-related levels entail aspects of low socioeconomic status, old age, patient disinterest, time conflicts and role obligations, language barriers. Although physicians play an important role in the utilization of CR services, barriers, such as insufficient knowledge on the importance of CR, low physician endorsement of CR to patients, and low incentives to do referrals, affect the presence of CR tremendously. Physicians are too busy to sit and talk to the patients is the main issue. All these barriers lead to a system level barrier that involves a lack of adequate human resources capacity to deliver CR. According to Wood (2012) there are also other barriers at the health system level, which affect the provision of CR, including low numbers of CR programs, lack of sufficient funds, lack of guidelines and policies that support practice of CR programs, distance and other barriers that are common and mostly reported by patients.

Despite providing benefits to patients with cardiac conditions, there are challenges with regards to care discontinuity of patients due to several reasons. Among these reasons is the issue of access and language, involving aspects of communication, where health providers are unable to effectively communicate with patients due to their cultural background. As such, the issue of access is revealed, where many patients are unable to access healthcare services because of distance created by geographical barriers and difficulties in reconciling health messages and implementing clinical guidelines. This finding agrees with Haghshenas et al. (2011), this situation results into a discontinuity of health care services that has a negative impact on the health on such groups of people. There are also gaps and discontinuity in care in the area of practice and education. A lack of awareness towards the implications of CR on the part of the patient and clinician leads to low participation rates. 57.8% of participants were not aware of CR programs in their organizations, thus most patients reported that they do not know how to self-manage their conditions at home. Similarly, some clinicians do not have enough knowledge of the program. This situation creates a gap between education and practice. Thus,

healthcare providers need to be well-trained to address lack of awareness among patients. A study by Feinberg, Russell, Mola, Bowles and Lipman (2017) suggested that staff training should tackle areas such as interactive education strategies that help the patient to adhere to the guidelines provided by healthcare providers.

There are also other challenges that lead to discontinuity of care faced by both patients and healthcare providers. Some of these are personal, geographical, or gender-based. Some patients have challenges communicating with healthcare staff due to a number of reasons. These can either be personal or cultural. The other challenge is in regard to geographical distance. Most patients live in remote areas where they do not have access to CR programs. Thus, the distance factor compels them to discontinue the health care service, as explained by Wood (2012). Transportation to healthcare facilities becomes too expensive, which is prohibitive for most patients living in rural areas. As such, most of them discontinue the care of CR programs because they feel that it interferes with other obligations.

6.9. Cultural challenges and gender access issues

Most of the patients have a lower health literacy, and poor self-management skills; furthermore, due to lack of social support the program's schedule conflicts with their responsibilities at home and work, especially for women, who are faced with caretaking duties. Young adults are finding it difficult to get some time off from work and since most are under-insured they are under immense pressure to return to work as they lack immediate term disability benefits. Cultural attitudes is also another barrier to access CR programs, especially traditional attitudes regarding chronic diseases – for example, the fact that most people hold the view that cardiovascular events are not preventable, and thus are resistant to adjusting their lifestyle.

From a gender perspective, cardiac disease is more burdensome to women. For instance, women are at a high risk of acquiring cardiac diseases because there are no significant physical activities that are undertaken by women. In a study by Rawas et al. (2012), in Saudi Arabia at least 44% of females are obese as compared to 26.4% in males. Therefore, the most effective and inexpensive way of helping such patients to recover speedily is through CR programs. CR programs involve all

measures that seek to decrease the impact of disability caused by cardiac heart disease and thus facilitate the patient to attain independence, social integration, and attainment of better quality-of-life and self-actualization, as discussed in the literature. Most of the women with cardiac events are older on average compared to men, and suffer from severe cardiac events coupled with other numerous non-cardiac comorbidities such as high anxiety, depression, diabetes mellitus, and arthritis. Female patients also report having other underlying medical issues face challenges in getting quality rehabilitation care that factors in their underlying conditions. Furthermore, women find it difficult to enrol and complete the rehabilitation program because they feel uncomfortable under programs, which are largely dominated and supervised by males.

Rolfe et al. (2010) observe that the low enrolment of women is often driven by most healthcare providers' attitudes regarding women's ability to participate in the rehabilitation program physical exercises. Some female patients hold ingrained cultural beliefs that they lack the stamina to undertake physical exercises. This is not just driven by cultural beliefs in Saudi Arabia, but also by the fact that women tend to increase their activity levels slowly and to a moderate level compared to men. Hence, they feel that they do not fit in the exercise-based rehabilitation program. Therefore, health care providers in this study have to make additional efforts in building trust, especially using appropriate communication skills, to convince female patients of the importance of physical exercises and dietary changes.

6.10. The evidence based practice

Evidence-based practice incorporates both scientific and clinical expertise along with practical clinical data with the values of patients to determine the method and quality of service. Only 42.16% of the respondents indicated that they do have CR programs in their hospitals, in contrast to 57.84% of respondents who reported that they do not. This indicates low awareness and inadequate knowledge that healthcare providers experience during their work with cardiac patients. Indeed, staff education is a very important element to maintain a successful CR program. Implementation of CR programs in Saudi Arabia faces administrative constraints and clear management challenges as reported by both healthcare providers and

cardiac patients.

The final decision to establish a model of care should be based upon a sufficient assessment of the available data and a reasonable belief that the decision will generate the best patient outcome. CR programs are regarded as the standard of care, making important resources available to optimize the care of cardiac patients. The development of the CR model is based on clinical outcomes which result from the optimal treatment of cardiac patients who participate in these programs. Although there are different international models of CR programs in the literature from different countries, it is clear that there is no integrated model of CR programs in Saudi cardiac centres. The available CR programs lack some essential components in practice in relation to their applicability, transferability, progress, and integration into patient care. It is important to address this significant shortcoming in terms of quality delivery because there are numerous evidence-based practice gaps when it comes to ensuring continuity of care.

There is a significant demand for CR programs because of an increasing population in Saudi Arabia with CVD. Healthcare providers reported significant factors that contribute to the lack of evidence-based structured CR models; for instance, unavailable resources including a shortage of staff, lacking education, and communication barriers between staff and patients are the major issues. The dissemination of these results provides the chance to hospital managers and policy makers to share information about the effectiveness of interventions that lead to clinical improvement. In order to overcome those factors, different strategies and guidelines should be established and implemented.

When considering individually and modeling CR programs, patients' data should record the progress of the patient towards reducing cardiovascular risk. The analysis of the outcome data that is used to measure the effectiveness of the rehabilitation program's intervention is the key element of outcome research. The dissemination of these results through research enables decision makers to share information about the effectiveness of interventions, while they are also able to pursue improvement initiatives that the research recommends.

A multidisciplinary team in a CR program should observe clinical practice

guidelines, which ultimately provide the team with evidence on the best approach to be implemented. However, a gap can be observed between the recommended guidelines on cardiovascular disease rehabilitation services internationally and the realities of the clinical practice of CR programs in Saudi Arabia, which need to be bridged. In the literature, less than 50% of patients are advised to attend a cardiovascular prevention and rehabilitation program (Savage et al., 2011).

An effective CR program is one which produces behavioural changes that is an enhancement of physical mobility, smoking cessation, sustained use of a healthy diet, appropriate stress management technique and vocational exploration. It should also have a comprehensive risk-factor management that assesses the patient biological factors like lipids, hypertension, average weight, and psychosocial state. However, just like most developing countries, CR programs in Saudi Arabia lack highly qualified providers and most facilities find it difficult to acquire spaces to run the programs. The WHO (2017) notes that there are few active and fully compliant community-based CR programs worldwide. The main issue is that Saudi Arabia does not have a locally defined accreditation program that specializes in cardiovascular disease management to guide clinical practice. Hence, there is a widespread implementation of European based methods, which emphasizes European based in-hospital care without much innovation. Moreover, the programs have a limited time frame since for most patients they are under a shortened hospital stay with lack of outpatient physician visits.

Healthcare providers in cardiac centres face numerous problems when working on the implementation of research results. When healthcare providers implement the best clinical practice, rapid changes can be observed, which can quickly close the evidence-practice gap and lead to better health care provision in CR programs. Similarly, it also improves on the knowledge acquired through such practices.

There are encounters of attempting to close the evidence practice gap may add to the body of knowledge on the best actions to be taken to ensure that patients receive the best treatment available. The rate of healthcare research that penetrates the clinical practice is a common problem. As such, there is the need to bridge this gap between practice and research. Worldwide, healthcare providers' clinical practice of CR programs is guided by the Agency for Health Care Policy and Research

(Kristensen et al., 2016). These guidelines recommend the provision of low technology, low cost, multifaceted programs of education, support and exercise, which should be carried out by qualified healthcare providers working in collaboration with close medical support. These guidelines mainly focus on the benefits to be attained by exercise, patient education, behavioural interventions, and counselling. Equally, it is known that optimal benefits of clinical practice in CR include: a) exercise tolerance improvements; b) symptoms improvements; c) blood lipid levels improvements; d) cigarettes smoking reduction and e) reduction in mortality (Kristensen et al., 2016).

6.11. Solution design modelling

The third stage in the conceptual framework is the Solution Design. It aims to define the main issues raised from results and develop a range of solutions. During the solution design stage, alternative solutions are identified. New ideas can be generated and all the emerging solutions can be established with key representatives in health organizations in MOH hospitals, including patients, to see how well they address the issues from the diagnostic stage.

The Design Solution stage was achieved by integrating the results from quantitative data and qualitative data. Those data were collected concurrently in order to highlight the gaps in practice and explore the barriers and enablers to attending CR programs. Recommendations to model a CR program in Saudi Arabia are going to be provided in Chapter 7.

In order to model a CR program in Saudi Arabia, there should be a shift to a rehabilitation approach that applies patient-specific programs, such as creating gender-specific programs and considering the needs of minority groups. It is very important to enhance the communication between patients and primary care professionals, and create solutions to overcome the language barriers. The plan should involve constant communication on the main components of CR programs as reported by patients. There is a need for interpreting services for patients and families to give them the required information as requested by patients, ensure two-way communication, and ensure patient follow up. Diet counselling, physical exercises, psychological support, and medication management are CR components

that can be attained by conducting targeted educational interventions for discharged patients.

Staff asked for more education and training programs, and therefore the staff should be evaluated for CR competencies, which are internationally approved and practiced. Third party organization or private centres can be established and funded to take over the care of discharged patients in Phase 2 and 3. In those programs, it is very important to recruit Arabic speaking staff who can communicate in the patients' language. Other recommendations are discussed in Chapter 7 of this thesis.

Alternative help-seeking strategies can also be adopted, offering patients a choice from various facilities on an equitable basis that can help improve uptake in all groups of cardiac patients. The patients' preference can involve a choice of home, centre-based or online programs. Equally, collaboration with healthcare providers should be considered, as it can improve uptake and outcomes. In this light, different strategies should be evaluated to determine their effectiveness. The possibility of making use of tele-rehabilitation in addition to standard rehabilitation tailored to the patient's need becomes beneficial. This type of strategy can implement several core components of CR by using tele-coaching and tele-monitoring strategies.

The view of many healthcare providers in cardiac centres is that CR programs should be located both within the communities and in the hospitals. They believe that this type of model can ensure full access to specialized and supervised care for his-risk outpatients in hospitals and lower risk patients in home-based facilities.

It is important to note that major organizations from high-income countries have established core components of CR, and thus cardiac centres in Saudi Arabia should do the same. Those international associations include the American, Australian, British, Canadian, and European associations for heart management.

The conceptual framework from ACI (2013) includes two more stages: the Implementation and Sustainability stages. These stages fall out of this study's scope and are briefly addressed in Chapter 7.

6.12. Limitations

Although the study was undertaken only in the Riyadh region of Saudi Arabia, which may be considered a limitation of this study, the findings provide significant knowledge and information to support CR modelling at the national level. Furthermore, the qualitative sample was predominantly male and this may affect the applicability of the findings arising from the interviews considering the implications of the gender issues raised by this study. Further, the workforce sample was predominately expatriate and readers of this work should consider that they may be reserved in critiquing the health services of their host country.

6.13. Conclusion

CR programs combine several services that seek to help the patients attain lifestyle improvements. The services include exercises, dietary changes, behavioural changes, psychological counselling, and vocational training. However, it is noted that most healthcare providers are concerned about the wide gap between the quality of care patients receive and the outcomes recommended under the national and international CR guidelines. Most of the patients have difficulties accessing the programs as they are located far from their residences. Women are the most disadvantaged group because of cultural barriers, limited social support and difficulties finding time off from home duties. The guidelines to practice CR programs should explore the complexity of cardiac illness using patient-tailored approaches that are based on reviewing the link between disease characteristics and individual factors and needs. In Chapter 7, the conclusion of this thesis is provided including recommendations for a model of CR programs in Saudi Arabia.

Chapter 7. Conclusion

7.1. Introduction

The current study aimed to explore a sample of CR programs in Saudi Arabia. It highlights the gaps in practice, some barriers and enablers to attending CR programs from patients' experiences and proposes recommendations to shape a CR model of care program. The proposed model could facilitate best practice in CR programs at MOH hospitals in Saudi Arabia.

The main objectives of the study were: 1) Identify the evidence-practice gaps in relation to the implementation of a well-structured CR program for people with cardiac diseases, 2) Identify barriers and enablers for developing and attending a CR program from patients and healthcare providers perspectives, and 3) Develop guidelines to model a cardiac program in Saudi Arabia. The findings from this study provided the researcher with rich data to inform a model of CR program, in particular for MOH hospitals, the main healthcare provider in Saudi Arabia.

The healthcare providers answered a questionnaire, in three parts which reflected their perspectives and knowledge of CR in three cardiac centres in Riyadh, the capital city of Saudi Arabia. The three major cardiac centres provide care for a large proportion of the population in Saudi Arabia and the Middle East. Patients with cardiac conditions also provided valuable information that highlights their understanding of CR programs and what challenges they have faced through their treatment journey. A set of conclusions is summarized from the study findings and explained in this chapter.

Language barriers were a major barrier to effective treatment and care. Only 42.5% of the respondents indicated that they have CR programs in their hospitals. Of these, nurses represented 89.9% of respondents whereas physicians represented 11.2 % who indicated that they are aware of CR programs; no respondents from other departments responded, possibly reflecting staff's lack of awareness of available CR programs. The programs have different components, but the main components of in-patient CR programs as reported by participants were health behaviour change and education. In outpatient programs, however, participants reported lifestyle risk

factor management as the main component, followed by health behaviour change and education. In the current study, more concern from healthcare providers related to Phase 1 of CR. Only a few healthcare providers mentioned Phase 2, and this highlights the findings from patients' interviews who reported the need for regular appointments and for proper education as soon as they are discharged from hospitals. It is very clear that there is a significant gap in practice between Phase 1 and 2 of CR program. Many patients reported attending an annual appointment and follow up in Phase 3 of CR program.

The study highlights one of the critical barriers to participation in CR, which is the discontinuity of care. Patients reported discontinuity of care because of different factors, such as a lack of transportation, long travelling distances, and communication barriers between staff and patients. Most of the patients in this study also had difficulties accessing the cardiac centres, as they were located far from their residences. Most of the cardiac centres are located in the main cities and patients have to travel to attend regular appointments. After a patient is discharged, it is challenging to come back for follow up and join available programs. Women with cardiac conditions are the most disadvantaged group because of cultural barriers, whereby women are not able to attend appointments without a family member, not able to make decisions about their care without a male, and are often not informed about the true nature of their condition, their medications or the outcome of those decisions, particularly older women. Another barrier is limited social support, and getting time off from home duties and family responsibilities.

A deeper understanding of patients' experiences was obtained through the qualitative results. Four themes emerged: the main theme was a feeling of 'Disconnectedness' after leaving the hospital, that the service lacked continuity or simply stopped. Patients then sought 'Alternate help-seeking strategies' and 'Sources of support'. On the other hand, a less frequently occurring and contrasting theme was also reported about satisfaction with care and attention: 'Feeling of involvement and connectedness'.

7.2. Key findings

The findings provide significant and valuable information towards modelling of CR

programs in Saudi Arabia.

- 1- Just over half of staff were not aware of the presence of CR program in their departments; this reflects a significant gap in practice.
- 2- Staff reported a lack of competencies and training to practice CR program, and patients' dissatisfaction with the given care.
- 3- Respondents in the questionnaire reported the lack of updated policy and regular education with regard to practicing CR programs.
- 4- The majority of participating patients with cardiac conditions revealed a discontinuity of care because of language barriers and the inability to communicate effectively with healthcare providers, as well as a lack of support.
- 5- Gender, cultural and background differences in patients are factors that interfere with patient care and modelling a CR program in Saudi Arabia.
- 6- A range of challenges are present at three levels including patients, healthcare providers, and hospital policy and management.
- 7- The main barriers to participate in CR programs from patients' perspectives are language barriers, distance, transportation and lack of support from healthcare providers and families.
- 8- Healthcare providers also face language barriers between them and patients, as well as a lack of education and continuing professional development.

7.3. Modelling a CR program in Saudi Arabia

In order to model a CR program in Saudi Arabia it was important to explore different views of healthcare providers and patients with cardiac conditions. In order to create a CR model, the researcher followed the stages of creating a model of care as specified by the Agency for Clinical Innovation (2013; see Figure 7.1). Although the implementation and sustainability stages are out of the study scope, further information is provided for future follow up work with decision makers at MOH.

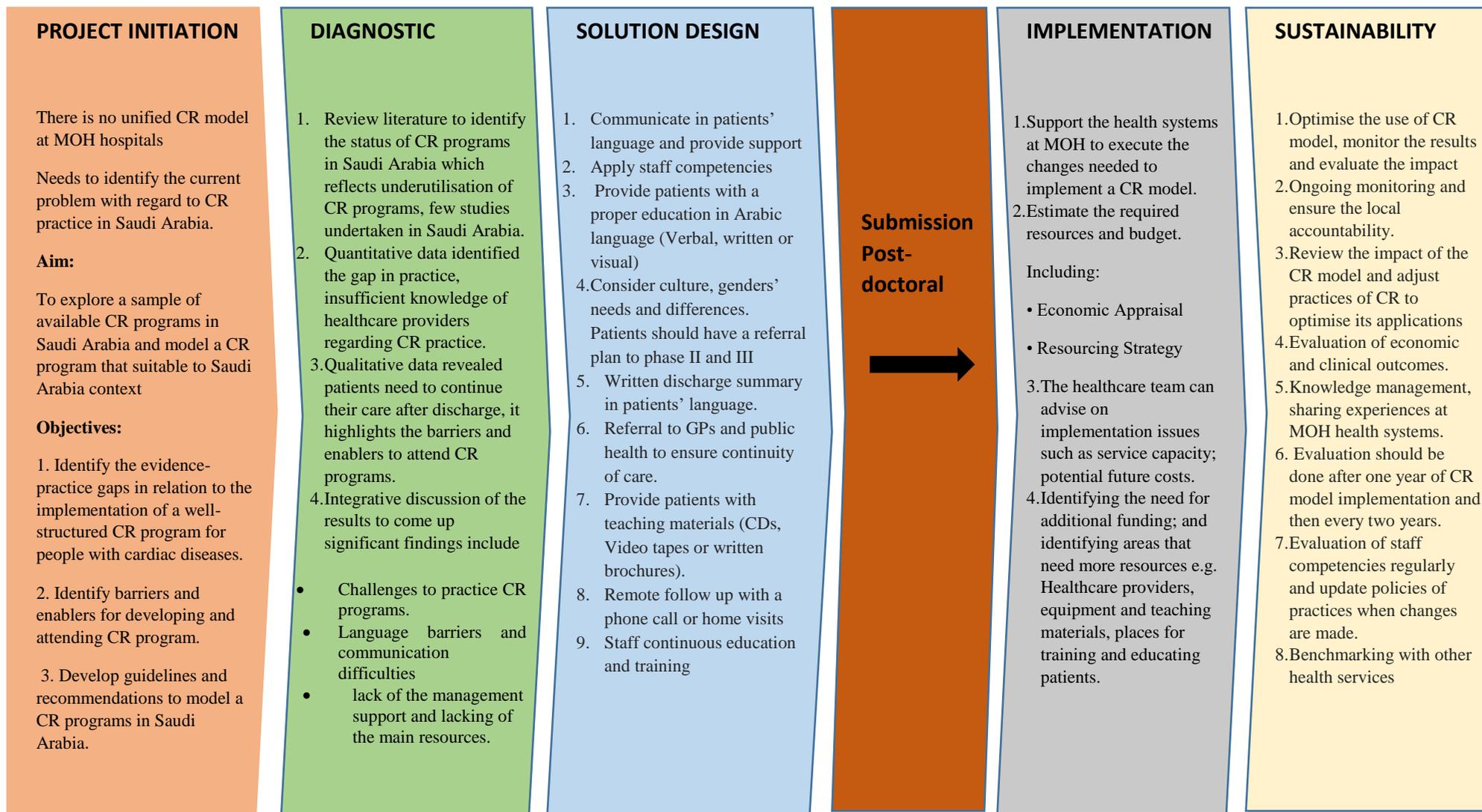


Figure 7.1 The stages of creating a model of CR in Saudi Arabia (adapted from ACI, 2013)

7.3.1. Project initiation

In Saudi Arabia, the model of CR model should be based on the best available evidence. The incidence of CVD remains high according to the report from WHO (2017). Few works of literature discuss CR programs, and no study has been undertaken before to explore the current CR programs or examine the perceptions and experiences of healthcare providers and patients in Saudi Arabia. The data that was collected from multidisciplinary team and patients with cardiac conditions provided significant information, which supports the importance of CR modelling.

7.3.2. Diagnostic

The findings from the literature in Chapter 2 supports the need for further studies in the field of cardiac rehabilitation studies. The collected data from healthcare providers regarding the CR programs in three cardiac centres highlighted the gaps in practice and the main challenges facing CR programs in Saudi Arabia in different areas. Similarly, exploring patients' experiences regarding the current CR programs identified the barriers and enablers to attendance and provided information on how to encourage patients' enrolment in these programs. The main issues were highlighted by considering the main factors that influence modelling CR programs, including the lack of main resources, language barriers and communication difficulties between patients and healthcare providers. In this way, new ideas can be generated, and emerging solutions can be implemented with key representatives in MOH hospitals including patients and their families to see how well they address the issues from the diagnostic stage. Below are some recommendations to model a CR program in Saudi Arabia.

7.3.3. Design solutions

In this section, the aim is to define the main issues raised from the findings of the study and recommend solutions. Although the available programs applied some of CR components which are internationally approved for practice, the available CR programs should go beyond lifestyle modifications programs, exercise and dietary change approach, to offer multifaceted and multidisciplinary care. The goal of CR programs to optimize the patient's general physical, mental, and social well-being.

It is crucial to focus on the patient's psychological needs, creating more approaches to meet patients' requirements to optimize the reduction of CVD risk factors and thus minimize disability post cardiac events. The patients expressed the need to apply more efforts to make early appointments soon after the hospital discharge. Discharge plans should be written in the patient's language to include all the main CR program components and ensure that patients are able to continue in Phase 2 and Phase 3. Patients reported the need for a referral plan to the GP, and this plan should meet the patients' personal needs. Nevertheless, the role of GPs should be activated and emphasized to do follow up with patients and continue the treatment plans.

7.3.4. Implementation

The aim of this stage is to change current practice to apply a model of CR. Although this stage is out of the study scope, it is important to highlight the important points. It is fundamental at this stage to link any system changes with required behaviour changes. Therefore, in order to develop a CR model, it is important to define it and explain the status of CR programs at MOH hospitals and what changes are recommended. It is also important to highlight the needs of healthcare providers and patients and create solutions to the behaviours that need to be changed. This will assist in informing stakeholders, including the MOH of changes and what measures need to be applied for a successful model. Self-assessment tools will help to evaluate practice under the new model.

One of the key elements to ensuring success of the implementation of the CR model is communicating the right messages to the right people, for example healthcare managers. Communication is a tool used to facilitate team engagement, including healthcare providers, patients and their families. It must be facilitated by the CR program directors to ensure that everyone is informed about the CR model. At this stage, to facilitate the change, the people that need to be involved in the change and how they can be engaged in the process needs to be planned.

7.3.5. Sustainability

Sustainability is also out of the study scope. It is defined as ongoing monitoring, continuing local focus and accountability. It is crucial to state that monitoring

systems should be in place and ready to start together with the implementation of the CR model. This enables the decision makers, managers and clinicians to ensure that the model is working in the way that it was planned to, and managers will be aware of how CR model is being implemented in practice. Although small developments or changes may occur within the service over time, some changes can be made. It is recommended that the CR model is reviewed and evaluated after one year of implementation, and then every two years after that. To continue best practice and innovation in the CR model, it is crucial to share the knowledge and expertise across health systems at MOH hospitals and benchmark against other cardiac centres' experiences.

7.4. Recommendations

It is important to address the numerous evidence-based practice gaps when it comes to ensuring continuity of care. It is recommended in the future to explore the problem in other healthcare sectors in Saudi Arabia, for example private hospitals and military hospitals, to assess the current CR practice in the cardiac units.

7.4.1 Patient education

The available CR programs should go beyond exercise and dietary change approaches to offer multifaceted and multidisciplinary approaches with the goal to optimize the patient's general physical, mental, and social wellbeing, towards the reduction of cardiovascular risk-factors and thus minimizing disability. Other recommendations include early appointments soon after hospital discharge and creation of gender-specific programs. Accreditation of CR units, CR programs including details of qualified staff, competencies and standards should be proposed to The Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI), Australia implements an evidence-based clinical practice guideline referred to as Discharge-Management-of-Acute-Coronary-Syndrome or DMACS (NSM Agency for Clinical Innovation, 2013).

Delivery of care can be enhanced by employing more Arabic-speaking qualified staff who will focus on structured nursing services and lead CR programs, as the nurses are the majority of staff. Provide videos in Arabic with discharge education messages and access to e-copy for home use. 24/7 Triage nurse who speaks Arabic

for discharged CCU patients for Questions and Answers for patients and family members. Other recommendations are

7.4.2 Practice and policy

1. Endorse the CR programs components of Saudi cardiac centres, which are approved and recommended by WHO.
2. Development of guidelines and competencies for healthcare providers to practice accredited CR programs and update policies.
3. All patients should have a discharge summary in their language, in which they have been actively involved in developing, and this summary should explain the treatment plan to ensure continuity of care.
4. Referral to GPs should be considered a priority after a patient is discharged, to help patients continue their treatment plan in a convenient time and place.
5. Women and other vulnerable groups, e.g. low-income patients and patients with comorbid conditions, should have a tailored program that supports their needs with the cooperation of community services.
6. Activate the role of case managers. A case manager is a registered nurse who coordinates all aspects of the care of individual patients, and ensures proper utilization of services and resources within, between, and outside of facilities. He/ She works to meet complex patient needs in all three phases of CR. For example, nurses can lead CR programs, communicate with patients and ensure exchange of knowledge, quality of care, patient's safety and continuity of care after discharge.

7.4.3 Staff Education

1. Providing appropriate staff education sessions with a focus on knowledge and awareness of CR programs and orientation of new staff.
2. All medical and nursing staff working in cardiac units and cardiac centres should pass the CR program competencies and attend specialist training courses.
3. Involve family members in the patient's education to improve health literacy and adherence to treatment plans and maintain concordance in Phase 2 and 3 of CR.

7.5. Suggestions for further research

Future research is recommended on:

1. Stakeholders views on planning and provision of CR services and patient outcomes of CR programs.
2. The effect of nursing leadership and development of CR programs should be investigated in Saudi Arabia, including comparative international studies with health services with similar gender, cultural and social issues.
3. Care coordination, patient, and family satisfaction after implementation of the new model of care, including sustainability measures by repeating the study at time intervals.
4. An exploration of CR in other healthcare sectors in Saudi Arabia, for example hospitals in the private sector, or military hospitals.

7.6. Conclusion

Cardiac rehabilitation is complex. It is multidisciplinary, multifactorial, supportive, and requires high levels of integration and coordination of services. Most importantly cardiac rehabilitation requires patient and family participation and acknowledgement of the impact of culture, context, gender, age, education, residential location, preferences, the medical conditions and other personal factors. The study results and the discussion that followed enhanced knowledge and understanding of CR in Saudi Arabia and provided insight into gaps in practice and how this can be improved. Noting the limitations of the study a model of care was developed which offers solutions for patient satisfaction, reducing complications and unplanned returns to hospital and to the operating room. Timely referral by specialist and culturally competent staff to community doctors and nurse case managers for continuous care and monitoring will avoid dissatisfaction, errors and adverse events. Evidence based models of care are essential to safe quality CR health services.

Publications in final draft prepared during the candidature

- 1- Alasiry, S., Hills, D. & Plummer, V. (2019). The role of the nurse in cardiac rehabilitation programs: a systematic review.
- 2- Alasiry, S., Hills, D. & Plummer, V. (2019). Healthcare provider's knowledge and awareness of cardiac rehabilitation programs in Saudi Arabia: a quantitative study.
- 3- Alasiry, S., Hills, D. & Plummer, V. (2019). Patients experience of cardiac rehabilitation programs in Saudi Arabia: a qualitative study.
- 4- Alasiry, S., Hills, D. & Plummer, V. (2019). Modelling cardiac rehabilitation programs in Saudi Arabia: A mixed methods design.

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Appendix A Ethical approval Monash University



Human Ethics Certificate of Approval

This is to certify that the project below was considered by the Monash University Human Research Ethics Committee. The Committee was satisfied that the proposal meets the requirements of the *National Statement on Ethical Conduct in Human Research* and has granted approval.

Project Number: CF16/1638 - 2016000857
Project Title: Modeling a cardiac rehabilitation program in Saudi Arabia
Chief Investigator: Assoc Prof Virginia Plummer
Approved: From: 23 May 2016 To: 23 May 2021

Terms of approval - Failure to comply with the terms below is in breach of your approval and the Australian Code for the Responsible Conduct of Research.

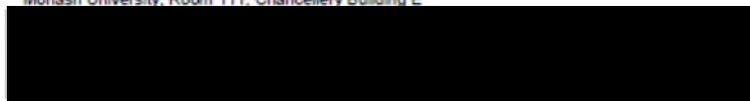
1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, before any data collection can occur at the specified organisation.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must include your project number.
6. **Amendments to the approved project (including changes in personnel):** Require the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.



Professor Nip Thomson
Chair, MUHREC

cc: Ms Sharifa Alasiry, Dr Danny Hills

Monash University, Room 111, Chancellery Building E



Appendix B Ethical approval KAMC

Kingdom of Saudi Arabia
National Guard-Health Affairs
King Abdulaziz Medical City



المملكة العربية السعودية
الحرس الوطني - الشؤون الصحية
مدينة الملك عبدالعزيز الطبية

NURSING SERVICES
Center of Nursing Education (NS-CNE)
Ref. No. MBS/2016/07/24A2

Date: 24 July 2016(G)
19 Shawwal 1437(H)



Permission to conduct nursing research at KAMC-R, Nursing Services

Applicant Details:	Ms. Sharifa Alasiry, PhD candidate, Monash University.
Title of proposed research study:	Modelling a cardiac rehabilitation program in Saudi Arabia.

Subsequent to screening review by the Nursing Services Research Committee (NSRC), permission in principle is granted for you to conduct your nursing research study at KAMC-R Nursing Services pending scientific and ethical approval from KAIMRC Research office that is required before you commence data collection. Kindly submit the research project yourself directly to the KAIMRC Research office with this permission letter.

Best wishes for successful completion.

Permission recommended by:



Dr. Mustafa Bodrick
SN: 41774 Pager: 4177

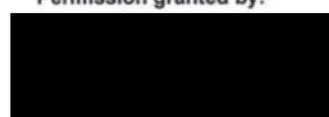
24 JUL 2016
Dr. Mustafa M.E. Bodrick
Chairman, Nursing Services Research Committee
Assistant Professor, College of Nursing – Riyadh KSAU-HS
Director, Nursing Education, KAMC-R & KASCH

Date: _____

cc. Dr. Majed Al Jeraisy, Chairman, Research Office KAIMRC (Memo only)

MMB/SL/31 Mat 2016 /Permission to conduct nursing research at KAMC-R, Nursing Services – Template B (without feedback)

Permission granted by:



Ms. Veronica Kavanagh
Chief, Nursing Transformation Program
Nursing Services, KAMC-R & KASCH

27 JUL 2016
Date: _____



KFH-MATERIALS 14574 (05/96) (ORACLE 29795)

ص. ب. الرياض ٢٢٤٩٠ ١١٤٢٦
تلفون : ٢٥٢٠٠٨٨
تلكس NGRMED ١٠٣٤٥٠

٣٨/٢٠٨

Appendix C Ethical approval KFMC

Kingdom of Saudi Arabia
Ministry of Health
King Fahad Medical City
(162)



المملكة العربية السعودية
وزارة الصحة
مدينة الملك فهد الطبية
(١٦٢)

IRB Registration Number with KACST, KSA: H-01-R-012
IRB Registration Number with OHRP/NIH, USA: IRB00010471
Approval Number Federal Wide Assurance NIH, USA: FWA00018774

September 27, 2016
IRB Log Number: 16-344E
Department: External
Category of Approval: EXEMPT

Dear Sharifa Alasiry,

I am pleased to inform you that your submission dated September 25, 2016 for the study titled '**Modelling a cardiac rehabilitation program in Saudi Arabia**' was reviewed and was approved. Please note that this approval is from the research ethics perspective only. You will still need to get permission from the head of department or unit in KFMC or an external institution to commence data collection.

We wish you well as you proceed with the study and request you to keep the IRB informed of the progress on a regular basis, using the IRB log number shown above.

Please be advised that regulations require that you submit a progress report on your research every 6 months. You are also required to submit any manuscript resulting from this research for approval by IRB before submission to journals for publication.

As a researcher you are required to have current and valid certification on protection human research subjects that can be obtained by taking a short online course at the US NIH site or the Saudi NCBE site followed by a multiple choice test. Please submit your current and valid certificate for our records. Failure to submit this certificate shall a reason for suspension of your research project.

If you have any further questions feel free to contact me.

Sincerely yours,


Prof. Omar H. Kasule
Chairman, Institutional Review Board (IRB)
King Fahad Medical City, Riyadh, KSA




Appendix D Ethical approval KFSH/RC



1

مستشفى الملك فيصل التخصصي ومركز الأبحاث
King Faisal Specialist Hospital & Research Centre
مؤسسة عامة Gen. Org.
Office of Research Affairs

INTERNAL MEMORANDUM

TO: Rehab Aljayzani
Clinical Instructor
Nursing Development & Saudization Department

Sharifa Al Asiry, PhD Student
School of Nursing & Midwifery, Monash University
[REDACTED]

DATE: 03 Jumada Al Awal 1438
31 January 2017

THRU: Ammar Al Kawi, MD, FAAN, FACP
Deputy Chairman, Research Ethics Committee
Office of Research Affairs
[REDACTED]

REF: ORA/0427/38

FROM: Rana Moslimany, PharmD, CCRP
Member, Research Ethics Committee
Office of Research Affairs

SUBJECT: Project # 2171 023
Modeling A Cardiac Rehabilitation Program in Saudi Arabia

Thank you for submitting the requested document. The above-referenced proposal was reviewed expediently by the Research Ethics Committee (REC) on 29 January 2017. It is my pleasure to inform you that the REC has recommended the proposal, Questionnaire and waiver of signed consent form for approval as submitted; and I would like to take this opportunity to congratulate you on behalf of the Research Advisory Council.

Please be informed that in conducting this proposal, the Investigators are required to abide by the rules and regulations of the Government of Saudi Arabia, KFSH&RC, and the RAC. Further, you are required to **submit a Progress/Final Report by 29 December 2017**; so it can be reviewed by the Research Ethics Committee (REC) without lapse of approval. The approval of this **proposal will automatically be suspended 29 January 2018**, pending the acceptance of the Report. You also need to notify the ORA as soon as possible in the case of any amendments to the project, termination of the study, any event or new information that may affect the benefit/risk ratio of the proposal.

RM/AK/GH
O
R
A

0427 2171 023 Ms. R. Al Jzani & Ms. S. Al Asiry reply Accept REC

E-mail: ora@kfshrc.edu.sa

Appendix E Explanatory statement for cardiac patient in English

Consent form

Modelling a cardiac rehabilitation program in Saudi Arabia

NOTE: This consent form will remain with the Monash University researcher for their records

I agree to take a part in the Monash University research project specified above. I have had the project explained to me, and I have read the Explanatory Statement, which I can keep for my records. I understand that agreeing to take part means that:

I agree to be interviewed by the researcher Yes No

And

I agree to allow the interview to be audio-taped Yes No

and

I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project time prior to my approval of the interview transcript without being penalised or disadvantaged in any way.

and

I understand that any data that the researcher extracts from the interview for use in reports or published findings will not, under any circumstances, contain names or identifying characteristics.

and

I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party.

and

I understand that data from the interview will be kept in a secure storage and accessible to the research team. I also understand that the data will be destroyed after a 5 year period unless I consent to it being used in future research.

Participant's name

Signature

Date

Researcher signature

Date

Appendix F Consent form for cardiac patients in Arabic

Consent form for cardiac patients to participate in the interview

وثيقة موافقة مرضى القلب للمشاركة في البحث

عنوان الدراسة: إنشاء برنامج تأهيل لمرضى القلب بالمملكة العربية السعودية

ملاحظه: هذه الوثيقة ستحفظ في سجلات جامعة موناش بأستراليا وسيتم تزويدك
بنسخه منها .

أعطي موافقتي الطوعيه للمشاركة في البحث المذكور أعلاه. مشاركتي تعني
فهمي لكافة مجريات البحث من خلال قراءتي لشرح الدراسة المفصل وأيضا من
خلال شرح الباحث .

مشاركتي بالبحث تعني التالي:

1. موافقتي على إجراء المقابلة مع الباحث () نعم (لا)
2. موافقتي لتسجيل صوتي اثناء المقابلة () نعم (لا)

أعي بأن النتائج التي سيحللها الباحثة من المقابلة لإعداد أي تقرير أو
بحث ينشر في المستقبل لن تتضمن , وتحت أي ظرف , أية أسماء أو أية
معلومات أخرى يمكن التعرف من خلالها على معلومات المشاركين.

الإسم:

التوقيع:

التاريخ:

Appendix G Explanatory statement for cardiac patients

Explanatory statement for cardiac patients to do the interview. (Arabic language)

بسم الله الرحمن الرحيم

تحية طيبة وبعد

عزيزي المريض

أسمى شريفه محمد العسيري طالبة دكتوراة بجامعة موناش , أستراليا. وأنا أقوم بجمع معلومات من مرضى القلب وذلك لأستكمال دراستي الدكتوراة و التي تدور حول إنشاء برنامج تأهيل لمرضى القلب بالمملكة العربية السعودية.

أدعوك للمشاركة في هذا البحث لأنك مريض بالقلب وقد تستفيد من هذا البرنامج مستقبلاً , كما أنه سوف يستفيد من هذا البرنامج مرضى آخرون. ان مدة المقابلة تستغرق بين 20- 30 دقيقة حيث أن هذه المقابلة تجرى فقط مع مرضى القلب الذين يراجعون عيادات القلب الخارجية.

مشاركتك في هذا البحث ليس لها أي منافع مالية ولكنها تعطيك الفرصه لإبداء رأيك وتطلعاتك من أجل إنشاء برنامج تأهيل لمرضى القلب بالمملكة العربية السعودية. لن تلحقك أي أضرار جراء مشاركتك في هذا البحث, ولكن عندما تشعر بالإستياء وعدم الارتياح تستطيع الانسحاب في أي وقت من هذه المقابلة.

تضمن لك الباحثة السرية التامة فكل الأجوبة سيتم تحليلها بشكل عام, بالإضافة أن الباحثة والمشرفين على الرسالة هم فقط من سيطلعون على الأجابات , وبعد ذلك سوف يتم حفظ البيانات في خزانة مؤمنة لمدة خمس سنوات , ثم يتم إتلافها حسب ما تنص عليه أنظمة الجامعة.

مشاركتك في الدراسة تطوعية وتستطيع الانسحاب من هذه الدراسة في أي وقت تشاء. كما أن مشاركتك أو عدمها لن تؤثر على الخدمة الصحية المقدمة لك.

كما تقرر الباحثه أنها لاتربطها أي صلة بأي مستشفى من المستشفيات المشاركة في هذه الدراسة. إذا كان لديك أي استفسار أو سؤال تستطيع التواصل معي على هذا الأيميل

إذا كان لديك أي شكوى بخصوص البحث يمكنك التواصل مع لجنة الأبحاث بجامعة موناش أو مع المنسق لهذا البحث من خلال المعلومات التاليه:

الدكتور : معاذ المله

مدينة الملك عبدالعزيز الطبيه , الحرس الوطني ,مركز القلب

ايميل

mouaz74@gmail.com

**Associate Professor of Medicine
Consultant Cardiologist and Division Head, Cardiac Imaging
King Abdul-Aziz Cardiac Centre
King Abdul-Aziz Medical City (Riyadh)
Ministry of National Guard - Health Affairs
Department Mail Code: 1413
P.O. Box 22490, Riyadh 11426**

Appendix H Explanatory statement for health care providers



EXPLANATORY STATEMENT

Project Title: Modelling a cardiac rehabilitation program in Saudi Arabia

Project Number:

Chief Investigator's name : Associate Professor Virginia Plummer	Student's name: Sharifa Alasiry
Department of Nursing and Midwifery	Phone [REDACTED]
Phone: [REDACTED]	email: [REDACTED]
email: [REDACTED]	

You are invited to take a part in this study. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

What does the research involve?

The aim of this study is to explore a model of cardiac rehabilitation program in Saudi Arabia

The study involves self-administered questionnaires. You will need 20 minutes to complete the questionnaire.

Why were you chosen for this research?

This survey is open to all health professions who are working in coronary care units and out patients cardiac rehabilitation clinics in the following hospitals: Prince Sultan Cardiac Centre, Riyadh, King Abdul-Aziz Medical City National Guard, Riyadh and King Faisal Specialist Hospital and Research Centre, Riyadh.

Consenting to participate in the project and withdrawing from the research

Being in this study is voluntary and you are under no obligation to consent to participation. However, if you do consent to participate, you may withdraw from further participation at any stage but you will only be able to withdraw data prior to the anonymous questionnaire being submitted.

Possible benefits and risks to participants

There may be no direct benefits for you or anyone, who takes part in this study, but the study's findings will help improve the cardiac care that is provided to cardiac patients in Saudi Arabia.



MONASH University

Apart from the possibility of 'mild discomfort', there are no foreseeable risks to you, but if at any time you feel more than mild discomfort, please discontinue the survey. If further discomfort anticipated, please refer to your doctor.

Confidentiality

Your identity will be kept anonymous, as you do not have to reveal, in questionnaires, your name or any information that may lead to you.

Storage of data

Data collected will be stored in accordance with Monash University regulations, kept on University premises, in a locked filing cabinet for 5 years. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

Results

The results of this survey will be made available to participating hospitals for circulation at the completion of the study. It is anticipated that the results of this survey will be reported in the theses of the student researcher, and a report of the study may be submitted for publication. The data collected as part of this study will be not used for any other purpose.

Complaints

Should you have any concerns or complaints about the conduct of the project, you are welcome to contact

Mouaz H. Al-Mallah, MD MSc FACC FAHA FESC
Associate Professor of Medicine
Consultant Cardiologist and Division Head, Cardiac Imaging
King Abdul-Aziz Cardiac Center
King Abdul-Aziz Medical City (Riyadh)
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Appendix I Questions for the interview

Interview questions

- 1- Could you describe your overall experience regarding the **in-patient cardiac** rehabilitation program?
- 2- Could you describe your overall experience regarding the **out-patient cardiac** rehabilitation program?
- 3- What were the most important things about the programs for you?
- 4- Is there any barriers prevent you from participating in cardiac rehabilitation program? Can you explain
- 5- Is there any enablers that help you to attend the CR program? Can you explain
- 6- What were the things that caused concern about the programs? If any?
- 7- Could you describe your physical health and quality of life following the rehabilitation programs?
- 8- Could you describe your feelings about how the rehabilitation programs prepared you to self-manage the cardiac disease?
- 9- How would you describe the patient education provided in the program?
- 10- Is there anything else you want to tell me?

Appendix J Questionnaire

Modelling a Cardiac Rehabilitation Program in Saudi Arabia

A **'cardiac rehabilitation program'** is defined as a medically supervised program that helps improve the health and well-being of people who have heart problems. Rehabilitation programs include exercise training, education on heart healthy living, and counselling to reduce stress and help the patient return to an active life.

For each item, please tick the box that best represents your response.

PART ONE

Please tell us about yourself.

1- Your age

- 21-25 years
- 26-30 years
- 31-35 years
- 36-40 years
- Greater than 40 years

2- Your profession?

- Physician
- Staff nurse
- Head nurse
- Pharmacist
- Dietitian
- Physiotherapist
- Other (please specify):

3- How long have you been working in your profession?

- 0 – 2 years
- 3 – 5 years
- 6 – 15 years
- Greater than 15 years

4- How many years of experience do you have in a coronary care unit?

- 0 - 2
- 3 - 5
- 6 - 15
- Greater than 15 years

5- What is your highest general qualification?

- Diploma
- Bachelor
- Master
- PhD

6- Nationality

- Saudi
- Gulf Countries
- Arab Countries (e.g. Egypt, Yemen, Iraq, Syria, Lebanon, Palestine, Jordan)
- Turkey
- Iran
- Africa
- Asia/South East Asia (e.g. China, India, Japan, Korea, Nepal, Indonesia, Philippines, Thailand, Malaysia, Sri Lanka, Pakistan)
- Europe
- UK
- USA
- South America
- Australia or New Zealand

Russian Confederation

7- Gender

Male

Female

8- Department

Coronary Care Unit CCU

Cardiac rehabilitation clinic

Other (please specify):

PART TWO

Tell us what you think.

9- Do you have a cardiac rehabilitation program in your hospital or health service?

Yes – if yes, please go to the next question

No – if no, please stop and return this questionnaire to the head of your department.

10- Where do you have the cardiac rehabilitation program?

Inpatients (Cardiac departments)

Outpatients (Out-patients cardiac clinics)

Both

11- Who are the eligible patients involved in the cardiac rehabilitation program (select all that apply)

Myocardial infarction (ST elevation MI, non-ST elevation MI)

Patients with re-vascularisation procedures

Stable or unstable angina

- Controlled heart failure
- Other vascular or heart disease

12- What are the main components of the in-patient cardiac rehabilitation program that you have (select the one or more that apply)

- Health behaviour change and education
- Lifestyle risk factor management
- Psychosocial health
- Medical risk factor management
- Cardio protective therapies
- Long-term management
- Audit and evaluation

13- What are the main components of the out-patient cardiac rehabilitation program at your organization (select the one or more that apply)

- Health behaviour change and education
- Lifestyle risk factor management
- Psychosocial health
- Medical risk factor management
- Cardio protective therapies
- Long-term management
- Audit and evaluation

PART THREE

Please indicate the degree to which you agree or disagree with the following statements.

Information you know about the cardiac rehabilitation program	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1- The cardiac rehabilitation program is based on scientific evidence that guides my practice					

Information you know about the cardiac rehabilitation program	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
2- The cardiac rehabilitation program starts as soon as the patient is stable in the unit					
3- All healthcare providers are aware of the cardiac rehabilitation program in the unit					
4- The content of the cardiac rehabilitation program is clear to health professionals and easy to apply					
5- Health care professionals receive regular education regarding the cardiac rehabilitation program					
6- The healthcare professionals ensure that the patient understands the components of the cardiac rehabilitation program					
7- The communication with patients is on patient self -management					
8- During admission the patient is educated about her/his symptoms and, if recurrent, how to manage them					
9- The patient receives information about how a healthy heart works					
10- The patient receives information about what foods she/he should eat for a healthy heart					
11- Healthcare providers explain to the patient how exercise will improve their heart condition					
12- The patient is educated about diabetes mellitus, and how to prevent low blood sugar with exercise					
13- Health professionals explain what medications the patient should take and how they work to improve cardiac function					
14- The patient receives information about what side effects are possible with their medications, and which ones interact.					

Information you know about the cardiac rehabilitation program	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
15- The patient is educated when she/he can return to work and do their previous activities					
16- The health professionals explain how stress affects the heart and how to cope with stress					
17- It is important to teach each patient how smoking affects the heart and how to quit					
18- All patients are educated about risk factors and which techniques are used to alleviate symptoms					
19- The treatment process and rehabilitation phases are explained in detail to all admitted patients.					
20- Healthcare professionals ensure that cardiac patients follow phases of cardiac rehabilitation program					
21- Before discharge, the patient is educated about the services, support organizations and groups that are available for outpatient rehabilitation?					

Do you have any other comments about cardiac rehabilitation in your hospital or health service?

Thank you for your time