Alignment of primary care services for people with type 2 diabetes in Saudi Arabia with the Chronic Care Model (CCM): A mixed methods study

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Abstract

Aim: Diabetes mellitus is a major health issue in Saudi Arabia. It is a common, complex, long-term disorder that places a demand on individuals and healthcare providers. To ensure comprehensive and efficient care coordination for people with diabetes, primary care is an important part of the overall care delivery system. This study aimed to determine the extent to which current primary care services in one city in Saudi Arabia are aligned with an evidence-based model of chronic care delivery, the Chronic Care Model (CCM). It also aimed to ascertain the facilitators and barriers to its implementation.

Methods: This was an explanatory sequential mixed methods study. The first phase was a narrative review to explore the extent of the use of the CCM as a whole or partially in the MENA region. Then, a cross-sectional survey in Saudi primary care centres was carried out to examine the alignment of diabetes care services with the six elements of the CCM from the perspectives of healthcare providers and people with diabetes. The tools used to examine the alignment were the Assessment of Chronic Illness Care (ACIC) and the Patient Assessment of Chronic Illness Care (PACIC-5A). Following that, a purposive sample of healthcare professionals and diabetes managerial personnel was chosen for the qualitative approach to explain their perceptions about the factors that facilitate and hinder the implementation of the six elements of the CCM. The final phase was to integrate the findings from the quantitative and qualitative approaches to obtain a clearer picture about the suitability to adopt the model in the context of the Saudi Arabian healthcare system.

Results: The narrative review showed that the CCM was seldom used in the MENA and had not been systematically evaluated. The participants for the quantitative approach were recruited from 11 primary care centres (PCCs) in the Al Baha region. Responses were collected from 237 out of the 330 surveyed patients, and 27 physicians out of 33, with 71.8% and 81.8% response rates, respectively. From the patients' perspective using PACIC-5A, primary care services were aligned with the CCM "most of the time", with a summary score of 3.5/5.0 for PACIC and 3.4/5.0 for a summary score of 5A. The summary scores of the PACIC subscales were in the range of 3.7/5.0 for "delivery design" and "problem-solving/contextual counselling" to 3.2/5.0 for "follow up/coordination". The subscales of 5A ranged between 3.6/5.0 for "Advise" and 3.0/5.0 for "Arrange". There was no association between patients' demographic and social characteristics with the PACI-5A scores. The hierarchical modelling of clustering within PCCs indicated that approximately 14–15% of the variability in the

PACIC-5A scores was due to variation between the PCCs. From the healthcare providers' perspective using ACIC, primary care services were aligned with the CCM and reflected a "reasonably good support for chronic illness care", with a summary score of 6.3/11. The subscales of ACIC were in the range of "fully developed chronic illness care" for "Organisation of the healthcare delivery system" (7.5/11) to "reasonably good support for illness care" for the "integration of Chronic Care Model components" (5.8/11). Mapping the findings from PACIC-5A and ACIC found that the scores were broadly consistent. However, there was no correlation between the summary scores of PACIC-5A and ACIC, and the identified correlations between the subscales from PACIC-5A and ACIC were not statistically significant. In the interviews, 11 participants were purposively recruited from primary care centres and the region's General Directorate of Health Affairs. The qualitative analysis for the anticipated facilitators and barriers toward the adoption of the CCM were described. The analysis identified three major themes: top-down system, cultural determinants, and recommendations to improve care. These factors recognised the rigid organisational structure of the healthcare system and cultural determinants to impede the implementation of the different elements in the CCM. The integration of the findings from the quantitative and qualitative approaches concluded that, while the surveys showed apparent high adherence to the CCM, some high scores were for elements that were not actually present, suggesting that the ACIC and PACIC-5A need to be used with caution. In other elements, the adherence reported in the survey was not to the "original" CCM, but to a locally and culturally modified version of it. This creates an important issue for implementation and its measurement between adapting the CCM to a context/culture and enforcing the CCM as originally specified.

Conclusion: This study was unique in examining how the CCM was implemented in Saudi Arabia and the MENA region. It was the first study to combine ACIC and PACIC-5A to examine the alignment of PCC services for people with diabetes in Saudi Arabia with the CCM, and to examine the perceptions of healthcare providers, primary care managers, and diabetes coordinators about the factors that support or hinder the model implementation. This mixed methods study indicated that while the CCM is a multifaceted intervention that can be used to improve the quality of service in primary care centres, its assessment tools fall short of addressing a number of critical policy and cultural issues relevant in Saudi Arabia or the Middle East. For future research, the outcomes of this study lay the foundations for assessment studies in which the success of this model's implementation is evaluated using the necessary analysis that takes specific local contextual aspects into account.

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Finally, I want to express my heartfelt appreciation to my family for their unmatched and continuous love and support. I am indebted to my dad, my siblings, and my late mother for providing me with the experiences that have shaped who I am today.

In loving memory of my mother, who has been such a strong foundation in my life.

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List of Abbreviations

ACIC	Assessment of chronic illness care
ADA	American Diabetes Association
CCM	Chronic Care Model
CIS	Clinical information system
CL	Community linkages
DD	Delivery design
DM	Diabetes mellitus
DS	Decision support
EBG	Evidence-based guidelines
ECCM	Expanded Chronic Care Model
GDP	Gross domestic product
GRAMMS	Good Reporting of a Mixed Methods Study
Hb1Ac	Haemoglobin 1Ac
ICCC	Innovative Care for Chronic Conditions
ICIC	Improving Chronic Illness Care
KSA	Kingdom of Saudi Arabia
MENA	Middle East and North Africa
MoH	Ministry of Health
NCDs	Non-communicable diseases
NDC	National Diabetes Centre
NICE	National Institute for Health and Care Excellence
NIH	National Institutes of Health
PACIC	Patient assessment of chronic illness care
PCCs	Primary care centres
PHM	Public Health Model
RCTs	Randomised controlled trials
SMS	Self-management support
T1DM	Type 1 diabetes mellitus
T2DM	Type 2 diabetes mellitus
TCM	Transition Care Model
UAE	United Arab Emirates
UK	United Kingdom
UNRWA	United Nations Relief and Works Agency
USA	United States of America
WHO	World Health Organisation

Structure of the Thesis

This thesis consists of seven chapters, as follows:

Chapter 1 is an introduction and background about diabetes, the healthcare system in Saudi Arabia, models of care to manage chronic conditions, and the rationale for the selected model of care in this thesis.

The literature review is provided in Chapter 2, including a narrative review about the use of the CCM in the MENA region, a detailed description of the six elements of the model, and a comparison of the selected studies regarding the extent of the model implementation. The aims of the current study, the research questions, and the objectives are presented later in this chapter.

Chapter 3 presents the general methodology utilising Saunders's research onion where a description was provided for the research philosophy, approaches, strategies, choices, time horizon, and techniques and procedures.

Chapter 4 presents the quantitative research phase, where the patients' and healthcare professionals' surveys are described in terms of the methods used, results, and discussion of each survey.

Chapter 5 presents the qualitative research phase, providing the methods, results, and discussion.

Chapter 6 presents the integration of the quantitative and qualitative approaches by utilising the triangulation protocol.

Chapter 7 completes the thesis with the conclusion and recommendations, providing the principal findings from the narrative review, quantitative and qualitative methods, and the integration of the mixed methods. This chapter also discusses the study's implications, its strengths and limitations, and the recommendations for future research.

Chapter One: Introduction and Background

1.1 Overview

Diabetes mellitus (DM) is a major health problem worldwide, and particularly in the Middle East and North Africa region (MENA) (International Diabetes Federation, 2021). It is a long-term condition that places a demand on patients to control their illness (Wagner et al., 2001). It also places a demand on health services to deliver person-centred care for this chronic condition (Iyengar et al., 2016). The current healthcare system in the MENA region is unprepared to satisfy the multi-faceted and complex demands of people with chronic conditions (Mate et al., 2017). Given the need for continuity, comprehensiveness, and coordination, primary care may be a key component of effective care management and integration (Rothman and Wagner, 2003). However, according to Mate et al. (2017), research on current practice in the MENA indicates that the emphasis has changed to a more curative approach, with significant investments being made in acute care in hospitals. This could result in an allocative mismatch, with resources diverted to acute care while demographic trends necessitate increased investment in primary care. According to WHO (2007), MENA will need to address a number of identified weaknesses, including insufficient cross-sectoral cooperation, a lack of community involvement in decision-making and provision of services, inadequate health information system and poor organisation of health care services.

This thesis examines the extent of adopting a multifaceted and evidence-based model of care (the Chronic Care Model) in the MENA region. It focuses on the extent of the implementation of this model in primary care services in one country in the MENA and seeks to understand what the facilitators and barriers are toward its implementation. It does so by using a narrative review in the MENA region and a mixed methods approach focusing on primary care services in one city of the Kingdom of Saudi Arabia (KSA).

This introductory chapter describes the epidemiology of diabetes globally and illustrates how diabetes has become a public health issue in the KSA. Following the background, this chapter describes the focus of the study on primary care services as an approach to improving the quality of care for people with diabetes. A brief description of the Saudi healthcare system will be provided, and then the selected framework of the study will be explained. A range of models of care for chronic illness will be explored, and the rationale for selecting one model for use as the conceptual framework for this study will be provided.

1.2 Background

Diabetes mellitus is a group of metabolic disorders characterised by a high level of blood sugar (hyperglycaemia) over a prolonged period, where hyperglycaemia is a result of a defect in insulin secretion, insulin action, or both (American Diabetes Association, 2014). Insulin is a hormone secreted by the beta cells of the pancreas, and it plays a vital role in regulating the level of blood sugar (glucose) by converting the absorbed glucose from food to energy or stores it in the body (liver, skeletal muscles, and fat cells) for future use (Qaid and Abdelrahman, 2016). The abnormality in diabetes is the deficit of the action of insulin during the metabolism of carbohydrate, protein, and fat. Two main processes are involved in the development of diabetes: low secretion of insulin as a result of the destruction of beta cells in the pancreas and increased resistance to insulin's action on target body tissues (American Diabetes Association, 2014).

DM can be broadly classified into type 1 diabetes, type 2 diabetes, and other specific types of diabetes. Type 1 diabetes mellitus (T1DM), previously known as insulin-dependent diabetes or juvenile-onset diabetes, is mainly developed as a result of beta cell destruction, which usually leads to absolute insulin deficiency (American Diabetes Association, 2014). T1DM accounts for 5–10% of all types of diabetes, and the causes of T1DM can be immune-mediated or idiopathic (unknown aetiology) (American Diabetes Association, 2014). Type 2 diabetes mellitus (T2DM), previously known as non-insulin-dependent diabetes or adult-onset diabetes, is more prevalent and accounts for about 90–95% of all other types of diabetes (American Diabetes Association, 2014). According to Defronzo (2009), T2DM is distinguished by a number of pathophysiologic abnormalities known together as the Ominous Octet. The Ominous Octet consists of eight factors that have contributed to the pathophysiology of T2DM (Defronzo, 2009). These eight factors are: 1) insulin resistance in muscles that causes decreased glucose absorption, 2) insulin resistance in the liver that causes excessive glucose production, 3) apoptosis and progressive β-cell failure, 4) insulin resistance in adipocytes that causes increased lipolysis and circulation levels of plasma free fatty acid (FFA), 5) reduced incretin effect due to β-cell resistance to intestinal hormones glucagon like peptide-1 (GLP-1) and gastric inhibitory polypeptide (GIP), 6) increased glucagon secretion from alpha cells and hepatic glucagon sensitivity, 7) increased glucose reabsorption by kidneys, and 8) insulin resistance in the brain and altered neurotransmitter activity, resulting in decreased appetite suppression and weight gain (Defronzo, 2009).

Other (less common) specific types of diabetes can be a result of monogenetic defects in the beta cells of the pancreas (e.g., maturity-onset diabetes of the young, neonatal diabetes); genetic defects in insulin action (e.g., patients with Rabson–Mendhall syndrome); diseases of the exocrine pancreas (e.g., pancreatitis); drug or chemical induced diabetes (e.g., glucocorticoids); and endocrinopathies (e.g., Cushing's syndrome) (American Diabetes Association, 2014).

Diabetes has become a significant public health concern that is reaching epidemic proportions in some countries worldwide (Olokoba et al., 2012). According to the International Diabetes Federation (2021), diabetes prevalence among people aged 20 to 79 years old was estimated to be 10.5% (536.6 million) in 2021 and is likely to rise to 12.2% (783.2 million) by 2045. According to Sun et al. (2022), men and women had similar rates of diabetes in 2021, with those aged 75–79 years old having the highest rates. In addition, the prevalence of diabetes in 2021 was estimated to be higher in urban (12.1%) than rural (8.3%) areas, as well as in high-income countries (11.1%) versus low-income countries (5.5%) (Sun et al., 2022). Between 2021 and 2045, the highest relative increase in diabetes prevalence is expected in middle-income countries (21.1%), followed by high-income (12.2%) and low-income (11.9%) countries (Sun et al., 2022). Diabetes-related health expenditures are expected to reach 966 billion USD in 2021 and 1,054 billion USD by 2045 (Sun et al., 2022).

1.3 Kingdom of Saudi Arabia

The Kingdom of Saudi Arabia is the largest country in the Arabian Peninsula in terms of land size (The Embassy of the Kingdom of Saudi, 2022). King Abdul Aziz bin Saud established the KSA on the 23rd of September 1932 (Ministry of Foreign Affairs, 2019). Six years later, huge reserves of oil were discovered, and commercial production began, which led to a dramatic change in the social and economic status of the country (Alharbi, 2018). As a result, the KSA has become a modern, industrial country with a gross domestic product (GDP) worth USD 792.97 billion in 2021 (World Atlas, 2021)

Given this rapid economic growth, the KSA has seen the population growth rate increase; the life expectancy rate has become higher (life expectancy at birth rose from 46.77 years in 1963 to 75 years in 2020), and the proportion of people living in towns and cities (urbanisation) has increased (The World Bank, 2020). The lifestyle pattern has changed to include the higher consumption of high-fat food, a more sedentary lifestyle, and a higher prevalence of obesity and overweight (Murshid, 2022).

A significant rise in diabetes prevalence accompanied these changes in the population structure, behaviour, and socioeconomic status. The Ministry of Health (MoH) reported a 2.7-fold increase in the diabetes incidence rate in less than two decades (from 0.9 million people with diabetes in 1992 to 2.5 million in 2010). According to the IDF, the prevalence of diabetes in adults aged 20–79 years in KSA was 16.2 per cent in 2011 and is expected to rise to 20.8 per cent by 2030 (Guariguata et al., 2011, Whiting et al., 2011). In addition, the KSA has unique genetic and physiological characteristics. Consanguineous marriage among Saudis is common, which may play a role in the raised prevalence of diabetes due to genetic predisposition; for instance, individuals with ketosis-prone T2DM are characterised to be obese with a strong family history of T2DM (Elhadd et al., 2007; Umpierrez et al., 2006).

1.3.1 Healthcare system in Saudi Arabia

In Chapter 5 of the basic law of the KSA, “rights and duties” article 27 states: “The State shall guarantee the rights of the citizens and their families in cases of emergency, illness, disability and old age. The State shall support the Social Insurance Law and encourage organisations and individuals to participate in philanthropic activities”, and article 31 states: “The State shall look after public health and provide healthcare for every citizen” (Royal Order, 1992).

Regarding the healthcare system, the first established public health department was in 1925 in Mecca on a royal decree from King Abdulaziz bin Saud (Almalki et al., 2011). Its establishment was to provide healthcare services for both the population and visiting pilgrims. Later, the Ministry of Health was established in 1950 based on another royal decree (Almalki et al., 2011). Considerable changes and improvements in the MoH and healthcare services have been achieved over the years, especially after the introduction of the five-year development plans for all governmental sectors including healthcare systems (Almalki et al., 2011).

As shown in Figure 1.1, the MoH is the principal governmental provider and financer of healthcare services in the KSA. Three health sectors provide the care, comprising government (60%), private (20%), and other agencies (20%), including referral hospitals, teaching hospitals, ARAMCO health services, Security Forces health services, National Guards health affairs, Armed Forces medical services, Red Crescent, and health services in the Royal Commission for Jubail and Yanbu.

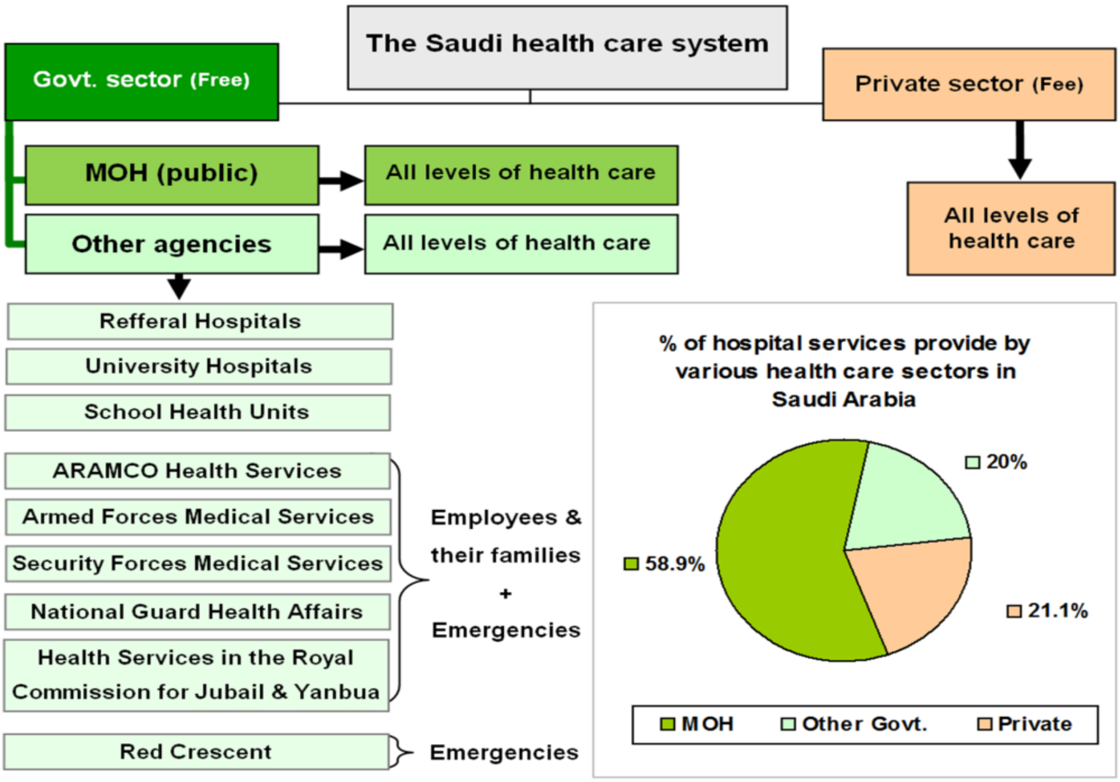
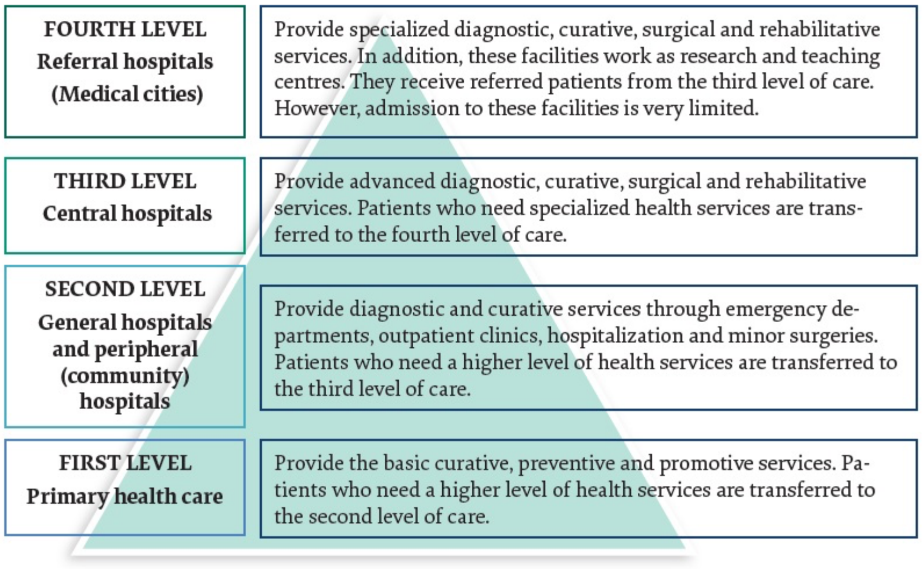


Figure 1.1 Saudi healthcare system (Almalki et al., 2011)

Saudi Arabia has three tiers of healthcare services: primary, secondary, and tertiary (Almalki et al., 2011). However, a recent study considered referral hospitals (‘medical cities’) as the fourth level in healthcare services, as shown in Figure 1.2.



FOURTH LEVEL **Referral hospitals** **(Medical cities)**	Provide specialized diagnostic, curative, surgical and rehabilitative services. In addition, these facilities work as research and teaching centres. They receive referred patients from the third level of care. However, admission to these facilities is very limited.
THIRD LEVEL **Central hospitals**	Provide advanced diagnostic, curative, surgical and rehabilitative services. Patients who need specialized health services are transferred to the fourth level of care.
SECOND LEVEL **General hospitals and peripheral (community) hospitals**	Provide diagnostic and curative services through emergency departments, outpatient clinics, hospitalization and minor surgeries. Patients who need a higher level of health services are transferred to the third level of care.
FIRST LEVEL **Primary health care**	Provide the basic curative, preventive and promotive services. Patients who need a higher level of health services are transferred to the second level of care.

Figure 1.2 Levels of care in the Saudi healthcare system (Al Asmri et al., 2020)

Primary healthcare is the patient's first point of contact in the KSA. They provide preventive and curative primary services and have a referral system for cases that need advanced care at the secondary level (general hospitals). More complex cases are referred to the tertiary level of care, i.e., specialised hospitals (WHO, 2006)

Every primary care centre serves a catchment area with a well-known and defined population, and the services range from preventive, promotional, curative, to rehabilitative. Services cover the management of chronic disease, maternity and childcare, immunisation, dental clinics, environmental health, disease control, food hygiene, and health education (WHO, 2006)

1.4 Interventions to improve the quality of diabetes care

There are different approaches to combat the risks and complications associated with diabetes at the primary care level. For instance, a focus on outcome measures (e.g., Hb1Ac, blood glucose, protein in urine), productivity measures (e.g., number of patients seen in the clinic), or process indicators (e.g., percentage of patients referred for eye tests) (Cramm et al., 2011). The effectiveness of these measures and indicators could depend on different interventions such as providers' and patients' educational programmes, feedback to healthcare providers, and reminders to providers and patients (Weingarten et al., 2002). However, those interventions are single-facet and disease-specific approaches which focus on limited elements to improve the quality of diabetes care. According to Wagner et al. (2001), the absence of a standardised framework for performance improvement is not specific to diabetes and has hampered quality improvement efforts in chronic diseases. Hence, a comprehensive and person-centred approach that could improve patient care and patient outcomes, implemented as a multi-facet intervention, would be a better choice and has proven to be more effective than a single-facet intervention (Wagner et al., 2001, Weingarten et al., 2002). Hence, there is a need to implement an evidence-based, multi-facet intervention to improve the quality of diabetes care in primary care centres. The following section describes different models of care for chronic conditions and elaborates on the selected model in this study.

1.4.1 Models of care for chronic illness

The World Health Organisation defines chronic diseases, or non-communicable diseases (NCDs), as diseases with long duration and slow progression (WHO, 2018a). The four common chronic diseases identified by the WHO are cardiovascular diseases, diabetes mellitus, chronic respiratory diseases, and cancers (WHO, 2018b)

Chronic diseases pose a threat as they are the leading cause of death and disabilities worldwide. As reported by WHO (2018b), 71% of all deaths globally are attributed to chronic diseases, where 15 million people die between ages of 30-69. The burden of chronic diseases continues to escalate; it is predicted that seven out of ten deaths will be related to chronic disease by 2020 in developing countries (Habib and Saha, 2010). As a result, non-communicable diseases are recognised as a major challenge for the 2030 Agenda for Sustainable Development, which includes a target to reduce premature death from NCDs by one third. The 2030 Agenda for Sustainable Development is “a plan of action for people, planet and prosperity”, where the Heads of State and Government decided 17 goals and 169 targets at a meeting at the United Nations Headquarters in 2015 (United Nations, 2015)

Given the future burden of NCDs, including diabetes, investing in improving NCDs management, including screening, treatment and rehabilitation, is a high priority. Importantly, interventions to prevent and control NCDs can be delivered through primary healthcare approaches (WHO, 2018b). However, managing people with chronic diseases is different from traditional care for people with acute conditions, which primary care was established to provide. In chronic care management, patients play an active role in the daily management of their illness. Therefore, this active role requires a patient–provider partnership to ensure effective chronic disease management within collaborative care (Grover and Joshi, 2014).

To achieve an approach that emphasises patient–provider partnership and helps to empower patients to manage their diseases, various models for chronic disease care have been developed. Different models have different approaches and distinct elements, and the next section will elaborate more on these differences.

1.4.2 Rationale for selecting an appropriate model of care

In order to select an appropriate model of care, a brief scoping review was conducted, which involved a structured search and narrative summary of the identified models of care.

1.4.2.1 Structured search

The search was conducted in the following medical databases: PubMed, Medline, and Embase. Additionally, other online sources were searched (Google and Google Scholar). Different search terms were used to identify the various models of care for non-communicable diseases, including “chronic diseases models” OR “models for chronic illness” OR “models, organisational” AND “chronic illness” OR “diabetes mellitus”.

The search resulted in the identification of six models of care:

1. Chronic Care Model (CCM) or Wagner Chronic care model;
2. Expanded Chronic Care Model (ECCM);
3. Innovative Care for Chronic Conditions (ICCC);
4. Public Health Model (PHM);
5. Transition Care Model (TCM).

1.4.2.2 Description of the models

1.4.2.2.1 Chronic Care Model

The Chronic Care Model (CCM) initially came from various improvement interventions for patients with chronic diseases. The first version of the CCM was developed in the mid-1990s by the MacColl Centre for Health Care Innovation’s staff at the Group Health Research Institute, Kaiser Permanente Washington Health Research Institute, Seattle, USA (Coleman et al., 2009, Improving Chronic Illness Care, 2006).

In 1997, the CCM was refined and revised in light of contributions from a large number of national experts, and based on their recommendations, the CCM was used to collect data and analyse innovative programmes (Improving Chronic Illness Care, 2006).

In 1998, the Robert Wood Johnson Foundation (RWJF) funded the MacColl Centre to test the CCM across different healthcare settings nationally. Hence, the Improving Chronic Illness Care (ICIC) national programme was created (Improving Chronic Illness Care, 2006).

In 2003, the ICIC and small groups of experts made the last update of CCM to illustrate the improvement in the field of chronic care after model implementation in different healthcare systems (Improving Chronic Illness Care, 2006).

The CCM has six elements: health system organisation, decision support, delivery system design, self-management support, clinical information system, and community linkages. These elements work together in addition to a productive interaction of a prepared, proactive health team and informed, activated patients, which ultimately leads to improved outcomes of chronic diseases, as shown in Figure 1.3.

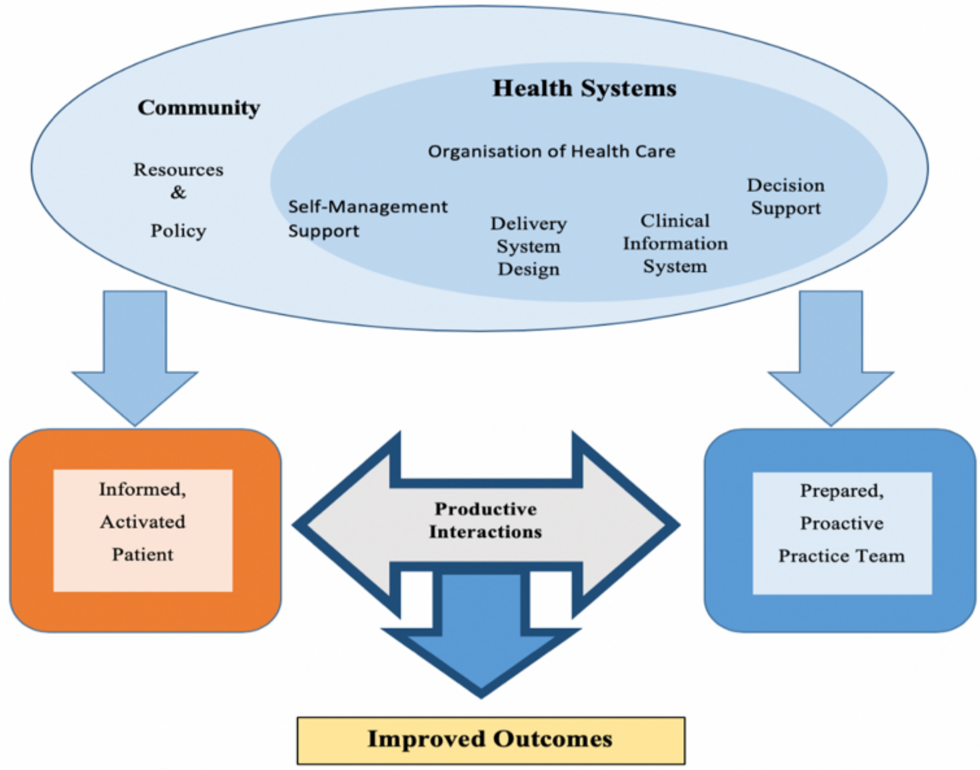


Figure 1.3 The Chronic Care Model adapted from Wagner (1998)

1.4.2.2.2 Expanded Chronic Care Model (ECCM)

Glasgow et al. (2001) acknowledged the inadequately defined community resources and health policy in their model (the CCM). However, they did not re-conceptualise the CCM to include the principles of health promotion and population health. Therefore, policymakers Barr et al. (2003), in The Vancouver Island Health Authority, introduced the expanded chronic care model (ECCM), which was conceptualised to include enhanced community participation and population health promotion. The expanded elements of the ECCM to the CCM are shown in the red font in Figure 1.4.

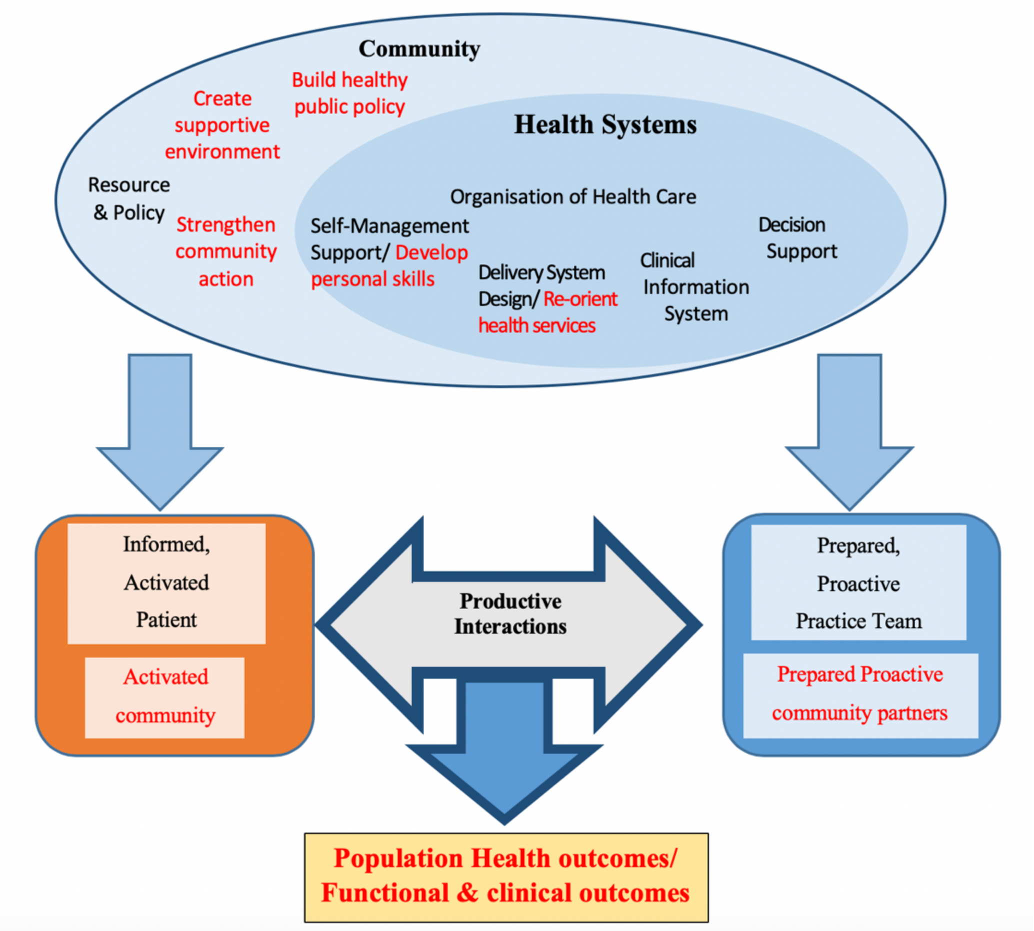


Figure 1.4 Expanded model of the Chronic Care Model adapted from Barr et al. (2003)

1.4.2.2.3 Innovative Care for Chronic Conditions

In 2002, the WHO expanded the CCM to develop the Innovative Care for Chronic Conditions (ICCC), presenting a structure for organising the healthcare for chronic conditions. Compared to the CCM, it appreciates a broader involvement of community linkages and policy environment. The ICCC focuses on three levels to improve the care for people with chronic diseases: the macro level (policy), the meso level (healthcare organisations and community), and the micro level (individuals, families, and health staff). There are eight essential elements in the ICCC, namely: support a paradigm shift, manage political environment, build integrated healthcare, align sectoral policies for health, use healthcare personnel more effectively, centre care on the patient and family, support patients in their communities, and emphasise prevention (Who, 2015). Table 1.1 shows the description of the eight elements of the ICCC, and Figure 1.5 depicts the building blocks of the ICCC framework in the three levels (macro, meso and micro levels).

Table 1.1 Description of the essential elements for the Innovative Care for Chronic Conditions

Elements	**Description**
Support a paradigm shift	This element aims to shift the care from acute and reactive care to prepared and proactive care for non-communicable diseases. This shift can also overcome the limited available recourses to provide advanced care.
Manage political environment	Different stakeholders, including policymakers, patients and their families, and community members, should be included to reach a consensus in service planning and decision making.
Build integrated healthcare	A system that provides shared services between different settings with less fragmentation, including clinical information, financial coordination, health promotion, and disease prevention.
Align sectoral policies for health	In the government, policies in different sectors, including labour, agriculture and education regulations, need to be aligned for improved population health.
Use healthcare personnel more effectively	There is a need for the training and education of healthcare team members to provide the knowledge and clinical skills necessary to deal with people with chronic diseases. However, even with limited education or evidence-based skills, healthcare teams can work in an organised way to ensure effective care.
Centre care on the patient and family	People with chronic conditions need to be empowered and supported rather than being a passive recipient of care. In addition, it is important to consider the involvement of the patient's family.
Support patients in their communities	Healthcare organisations need to build community linkages to facilitate more support for people with chronic conditions and their families.
Emphasise prevention	It is important to consider prevention strategies, especially given that most chronic diseases are preventable and their complications can be reduced with proper preventive interventions, including early detection, encouraging physical activity, and supporting a healthy diet.

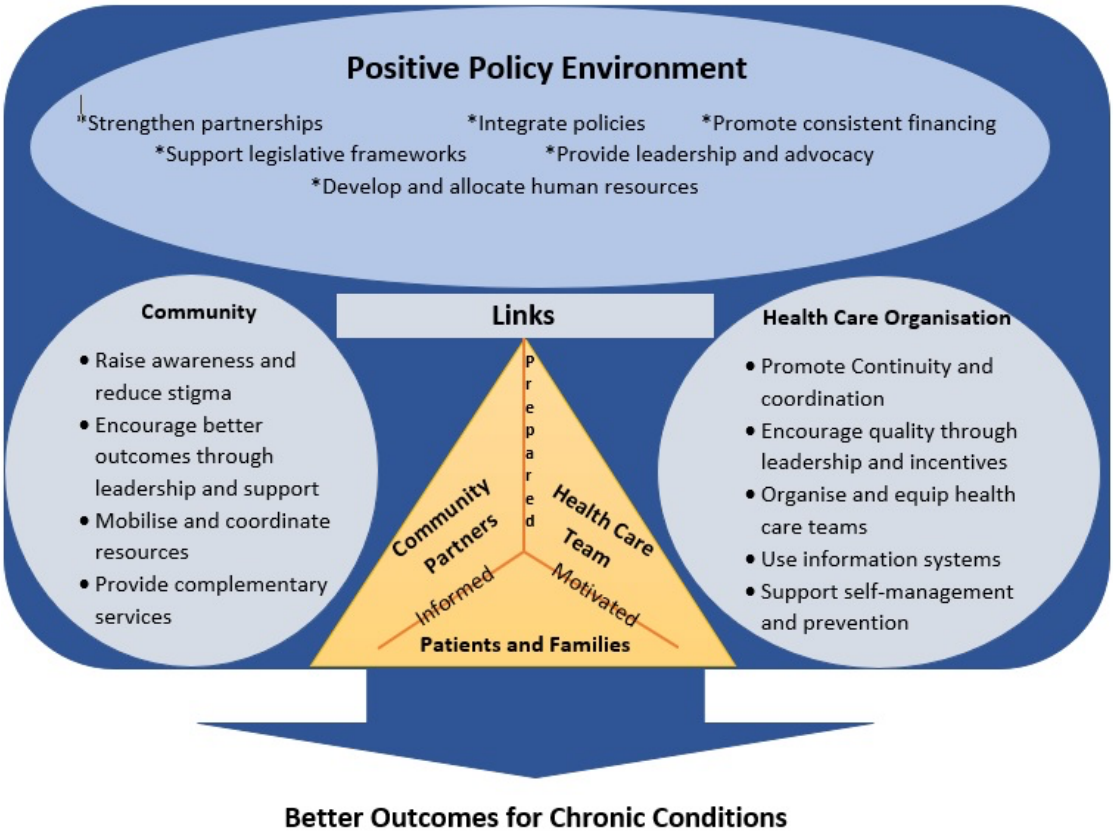


Figure 1.5 Innovative Care for Chronic Conditions (ICCC) framework adapted from WHO (2002)

1.4.2.2.4 Public Health Model

The Public Health Model (PHM) (Robles, 2004) was developed in the early 2000s in the USA. Its principles include three levels of intervention that must be available, and their interactions are to be addressed to influence the burden of non-communicable diseases. The three levels are population wide policies, community activities, and health services (preventive services and ongoing care). The model emphasises not only the chronic diseases determinants, but also social, cultural, and economic factors that could influence the quality of care.

1.4.2.2.5 Transitional Care Model

The transitional care model (TCM) is “a nurse-led intervention targeting older adults at risk for poor outcomes as they move across healthcare settings and between clinicians” (Hirschman et al., 2015). The TCM is essential for people with complex care needs. It focuses on comprehensive care and well-trained practitioners in chronic care who can address the patient's needs, goals, and preferences. The TCM focuses on and identifies the gaps in all care transitions for the patient. Care transitions can include discharge from hospital to home, home to hospital admission, and chronic care to palliative care. The model has nine components: screening, staffing, maintaining relationships, engaging patients and caregivers, assessing/managing risks and symptoms, educating/promoting self-management, collaborating, promoting continuity, and fostering coordination (Hirschman et al., 2015).

1.4.2.3 Comparing models

Table 1.2 and Figure 1.6 compare the different models of care. In Table 1.2, the CCM has elements that can be adopted to improve the chronic care services at the primary care level, while the ECCM and ICCC are considered an expansion of the CCM to address more community services and improve the policy environment. The PHM does not originate from the CCM, yet it shares similar concepts regarding health services and community activities and focuses on healthcare policy, as seen in the ICCC. However, the three levels are not explicitly described as in the previously mentioned models. The TCM is more suitable for adoption in an integrated care system to ensure a better transition of care at different levels of care, either in the same health organisation or between different organisations, so it is more than simply an improvement at a primary care level. Figure 1.6 shows the different models of care for chronic conditions, including the ECCM and ICCC, which originate mainly from the CCM.

Table 1.2 Comparison of the different models of care for chronic conditions

Model	Origin	Key components
Chronic Care Model (CCM)	USA	Health organisation Community linkages Delivery design Decision support Clinical information system Self-management support
Expanded Chronic Care Model (ECCM)	USA	Health organisation Community linkages/build healthy public policy/create supportive environments/strengthen community action Delivery design/re-orient health services Decision support Clinical information system

		Self-management support/develop personal skills
Innovative Care for Chronic Conditions (ICCC)	WHO	Macro level (policy) Meso level (health organisation) Micro level (individuals, families)
Public Health Model (PHM)	USA	Population-wide policies Community activities Health services
Transitional Care Model (TCM)	USA	Care transitions (various levels of care or several locations)

1.4.2.4 Rationale for the chosen model of care

The CCM was selected in this study as a conceptual framework for five reasons. First, the CCM is broadly and widely used as a model in different countries (America, Europe, Mexico, Africa, and Asia) to improve the quality of care for people with chronic conditions (diabetes, cardiovascular diseases, chronic obstructive pulmonary disease) (Coleman et al., 1999, Feifer et al., 2006, Lemay et al., 2010, Lemmens et al., 2009, Walters et al., 2012, Martin and Peterson, 2008, Pilleron et al., 2014).

Second, there is available evidence for its effectiveness to improve biomedical outcomes (HbA1c, blood pressure, creatinine level, cholesterol level, and fasting glucose), patient-reported outcomes (health-related quality of life), and reduced diabetes complications after the implementation of one or more element of the CCM (Schmittdiel et al., 2006, Bongaerts et al., 2017).

Third, the model's focus on healthcare organisations makes it appropriate for the context of this study (diabetes and primary healthcare) (Weeramanthri et al., 2003, Barceló et al., 2010, Chin et al., 2007, Chin et al., 2004, Coleman et al., 1999).

The fourth reason is the availability of tools to measure the implementation of its elements (Assessment of Chronic Illness Care and Patient Assessment of Chronic Illness Care) (Bonomi et al., 2002, Glasgow et al., 2005a).

Finally, the model has drawn attention from a range of countries in the Middle East and North Africa (MENA) region, and it has been gradually implemented (Paulo et al., 2018, Spitzer-Shohat et al., 2017, Itani et al., 2015).

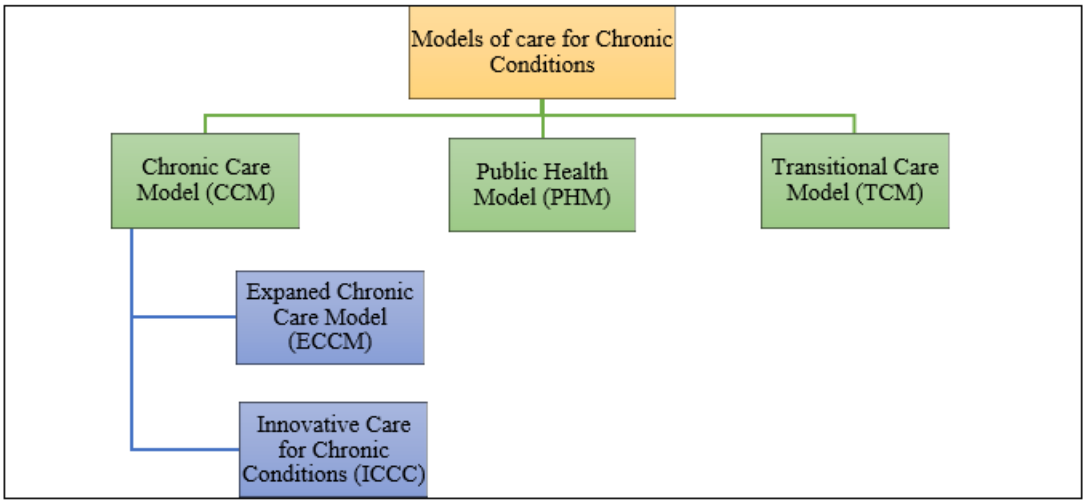


Figure 1.6 Models of care for chronic conditions

1.4.3 Elaboration of the CCM as a conceptual framework

Worldwide, the CCM is a widely utilised approach to ambulatory care enhancement (Kadu and Stolee, 2015). It aims to transform daily care from reactively acute to population-based and proactively planned care for chronically ill patients (Glasgow et al., 2001). The CCM was developed to capitalise on the interdependence of six evidence-based aspects that contribute to better clinical quality Table 1.3. For instance, in order for patients to engage in proactive care (delivery system design), practices must be able to view all of the patients on their panels who require particular guideline-based therapies (decision support), and patients must consent to and integrate any changes in their care (self-management support) (Coleman et al., 2009). As such, interventions based on the CCM emphasise practice redesign across the majority, if not all, of the six aspects (Coleman et al., 2009).

1.4.3.1 Effectiveness of the CCM

Several studies have used the CCM to improve the health outcomes associated with specific chronic diseases (e.g., HbA1c for diabetes), as well as healthcare practices for the management of chronic conditions (e.g., adherence to evidence-based guidelines) (Boyd et al., 2010, Meulepas et al., 2006, DiPiero et al., 2008, Si et al., 2008, Chin et al., 2004). These studies differed in their designs and included randomised and non-randomised controlled trials, retrospective cohort, cross-sectional, and case studies. The implementation of the different elements of the CCM ranged between the studies, where the CCM was entirely or partially adopted. In addition, there was variation between the studies about how the different elements were implemented. Nevertheless, the evidence reported improved diabetes-related biomedical outcomes (HbA1c, blood pressure, creatinine level, cholesterol level, and fasting glucose), patient-reported outcomes (health-related quality of life), and reduced diabetes complications after the implementation of one or more elements of the CCM (Schmittdiel et al., 2006, Bongaerts et al., 2017, Davy et al., 2015).

Table 1.3 Description of the essential elements of the CCM and their specific concepts (Improving Chronic Illness Care, 2006)

Element	Description and change concepts
Health system	Create a culture, organisation, and mechanisms that promote safe, high-quality care. - Visibly support improvement at all levels of the organisation, beginning with the senior leader; - Promote effective improvement strategies aimed at comprehensive system change; - Encourage open and systematic handling of errors and quality problems to improve care *(2003 update);* - Provide incentives based on quality of care; - Develop agreements that facilitate care coordination within and across organisations *(2003 update).*
Decision support	Promote clinical care that is consistent with scientific evidence and patient preferences. - Embed evidence-based guidelines into daily clinical practice; - Share evidence-based guidelines and information with patients to encourage their participation; - Use proven provider education methods; - Integrate specialist expertise and primary care.

Delivery system design	Assure the delivery of effective, efficient clinical care and self-management support. - Define roles and distribute tasks among team members; - Use planned interactions to support evidence-based care; - Provide clinical case management services for complex patients (2003 update); - Ensure regular follow-up by the care team; - Give care that patients understand and that fits with their cultural background *(2003 update).*
Self-management support	Empower and prepare patients to manage their health and healthcare. - Emphasise the patient’s central role in managing their health; - Use effective self-management support strategies that include assessment, goal-setting, action planning, problem-solving and follow-up; - Organise internal and community resources to provide ongoing self-management support to patients.
Clinical information system	Organise patient and population data to facilitate efficient and effective care. - Provide timely reminders for providers and patients; - Identify relevant subpopulations for proactive care; - Facilitate individual patient care planning; - Share information with patients and providers to coordinate care *(2003 update);* - Monitor performance of practice team and care system.
Community linkages	Mobilise community resources to meet the needs of patients. - Encourage patients to participate in effective community programmes; - Form partnerships with community organisations to support and develop interventions that fill gaps in needed services; - Advocate for policies to improve patient care *(2003 update).*

1.4.3.2 Facilitators and barriers of the CCM

Despite the observed benefits of the CCM, there are a number of facilitators and barriers to its implementation (Kadu and Stolee, 2015). The CCM was evaluated after its implementation in 22 primary care centres spread across North America (Canada, the USA, and Mexico) and Europe (Belgium and the Netherlands), and different facilitators and barriers were identified in terms of execution, the knowledge and beliefs of healthcare providers, structural characteristics, engagement, organisational culture, networks and communication, implementation climate, and readiness for implementation (Kadu and Stolee, 2015).

The identified facilitators included expanded and well-built communication and networks between care providers and healthcare organisations, organisational environments that appreciate patient-centred care and encourage multidisciplinary care, recognition of the need for change by the health organisation, leadership that was engaging and committed and not confined to physicians, but expanded to other providers, to promote knowledge among providers about the execution and goals of the CCM implementation (Kadu and Stolee, 2015)

On the other hand, barriers to the intervention's implementation included the additional responsibilities placed on working staff, the challenges of sustainability, staff turnover, size and flexibility of the organisation to restructure the provided care, limited resources, lack of interest from leadership, limited support and accountability, and the misunderstanding or the unclear goals of the CCM implementation (Kadu and Stolee, 2015).

1.4.3.3 Suitability of the CCM for use in Saudi Arabia

While the CCM appears to be a well-described care model globally, it is important to understand whether it is appropriate for use in Saudi Arabia and more widely in the MENA region.

1.5 Research aims

This study will focus on primary care services for people with type 2 diabetes by comparing current practice with the Chronic Care Model (CCM). It aims to examine the extent to which current services are aligned with the CCM elements and to understand what are the facilitators and barriers toward its implementation.

1.6 Research questions

1. How well are primary care services for patients with type 2 diabetes in Al Baha city aligned to the Chronic Care Model:
    - A. From a health organisation perspective?
    - B. From a patient perspective?
2. What are the anticipated factors to facilitate and hinder the implementation of the Chronic Care Model in primary care centres in Al Baha city?

1.7 Research objectives

1. Explore to what extend the CCM was used in the Middle East and North Africa region primarily for people with diabetes at primary care level.
2. Translate the ACIC questionnaire from English to Arabic.
3. Using the ACIC questionnaire, describe how primary care physicians perceive which elements of the Chronic Care Model are implemented and to what extent in Saudi primary care centres.
4. Describe how patients with type 2 diabetes perceive which elements of the Chronic Care Model are implemented, using the existing Arabic version of the PACIC-5A questionnaire.
5. Describe how health professionals perceive barriers and facilitators for implementing the Chronic Care Model for people with diabetes in Saudi primary care centres using semi-structured interviews.
6. Understand how findings from the patient and health organisation questionnaires relate to each other and to the reported barriers and facilitators.
7. Consider these findings in the light of other implementation studies of the Chronic Care Model for type 2 diabetes in primary care in the Middle East and North Africa.
8. Develop recommendations for future implementation.

1.8 Chapter summary

This chapter provided an overview of the significant increase in diabetes prevalence in Saudi Arabia and the need to tackle the associated burden by adopting a model of care that examines the different aspects of care for people with diabetes. The chapter elaborated on the rationale for the selected model, reported the facilitators and barriers to its implementation in North America and Europe, and the suitability of its use in the context of the Saudi healthcare system. It concluded with the research aims, questions, and objectives.

Chapter Two: Narrative Review of the Literature on CCM Implementation in the MENA Region

1.1 Overview

This narrative literature review is designed to contribute to the knowledge of the primary healthcare services for people with diabetes in the Middle East and North Africa (MENA) region, and to identify the gaps in the provided services using the CCM as a theoretical framework. The MENA region was chosen to obtain a comprehensive view of the application of the Chronic Care Model in this location due to the lack of use of this model, specifically in Saudi Arabia and the Arab Gulf region. It was justifiable to expand the search to the MENA region to explore the extent of implementing the six elements of the model in Saudi Arabia and its neighbouring countries. Furthermore, the review was expanded beyond Saudi Arabia in the MENA region because of the cultural similarities among the populations, and findings from other MENA regions may also apply to Saudi Arabia. The original focus of this chapter was to conduct a systematic review about the feasibility and effectiveness of the CCM in Saudi Arabia; however, no relevant studies were identified during the review process, which consequently shifted the focus to broader issues related to the implementation of the model in the MENA region. Hence, this is a narrative review conducted systematically. It involves a narrative synthesis in which the results of the included studies are summarised, but not statistically combined. The focus of the review is to answer the following questions: How has the CCM been implemented for people with diabetes in primary care in the Middle East and North Africa region? Was the CCM implemented partially or as a whole? How have the assessment tools (Assessment of Chronic Illness Care and Patients Assessment of Chronic Illness Care) been used in the MENA region for people with diabetes?

The scope of this review was focused on primary care because the majority of people with diabetes in Saudi Arabia are managed in governmental primary care centres. This could be due to their wide availability, and they are free of charge, especially for chronic diseases such as diabetes that require recurrent visits (Al-Rubeaan et al., 2015). Thus, quality improvement could start at this level, but it does not mean underestimating the importance of improving quality at other tiers of care. On the other hand, it is worth noting that the CCM's purpose is to encourage improvement at all stages and promote effective strategies on a system-wide scale for people with chronic conditions. However, this study focused on people with diabetes, but not people with chronic conditions, especially those concordant with diabetes (e.g., cardiovascular diseases, kidney diseases), due to the feasibility of collecting data from those patients given the time and funding constraints.

2.1 Methods

2.1.1 Data sources and eligibility criteria

The review included published peer-reviewed and non-peer-reviewed articles. The review had the following inclusion criteria: studies were conducted in the MENA region; the healthcare setting was primary care or family medicine practice; and the chronic disease was diabetes mellitus. Quantitative, qualitative, and grey literature were all considered and included in the review. The exclusion criteria comprised studies conducted in diabetes specialised care, but not in primary care, and studies describing the entire health system, which encompasses primary and specialised care.

2.1.2 Search strategy

A search of Ovid Medline and Embase was undertaken using MeSH terms and free-text terms to identify relevant studies related to the four key concepts of "diabetes mellitus", "primary healthcare", "chronic care model", and "Middle East and North Africa", as shown in Table 2.1. Additional searches were conducted using Google Scholar and by following the references and citations of the included papers.

Table 2.1 Search terms used for the chronic care model in primary healthcare for people with diabetes in the MENA

Concept	Search terms
Diabetes Mellitus	Diabetes Mellitus, Type 2/OR DIABETES MELLITUS/ (Type 2 diabetes OR type two diabetes OR T2DM OR type 2 diabetes mellitus OR type two diabetes mellitus OR T2DM OR diabetes mellitus OR type II diabetes).mp. Chronic Disease/ OR Chronic dis$.mp
Middle East and North Africa	(Saudi Arabia OR United Arab Emirates OR Kuwait OR Bahrain OR Qatar OR Oman OR Yemen OR Palestine OR Iraq OR Jordan OR Iran OR Syria OR Lebanon OR Israel OR Egypt OR Algeria OR Morocco OR Libya OR Tunisia OR Sudan OR South Sudan).mp. Africa, Northern/ Middle East$.mp. OR Middle East/
Primary healthcare	(Primary care OR primary healthcare OR primary healthcare OR family practice OR general practice OR general practi$ OR community health).mp. Primary Health Care/ OR Family Practice/ OR General practice/

Chronic Care Model	Models, Organisational/ OR Disease Management/ "Delivery of Health Care"/ (Assessment of chronic illness care OR ACIC).mp. (Patient assessment of chronic illness care OR PACIC).mp. (Chronic care model$ OR CCM OR chronic disease$ model$).mp. ((chronic care adj3 model$) OR (chronic care adj3 framework$) OR (chronic disease$ adj3 care) OR (chronic illness$ adj3 car) OR (Wagner$ adj3 chronic care model$)).mp.

2.1.3 Data extraction

Data extraction was conducted by one reviewer (HA), and to eliminate extraction bias, the extraction was carried out twice without looking at the first extraction. Two doctoral researchers also checked a sample of the extraction to ensure consistency. The data were extracted from the included studies independently, and the six elements of the CCM with their subcomponents (as described in the Assessment of Chronic Illness Care) were considered in the data extraction.

The CCM elements guided the extraction of the data from the included studies. These elements were explained in a more organised and detailed manner in the Assessment of Chronic Illness Care (ACIC) (Bonomi et al., 2002). Therefore, it was used to help extract information clearly in line with the original model. The ACIC was designed to assess the six elements of the CCM in primary healthcare, where the six elements were divided into three main parts: organisation of the healthcare delivery system, community linkages, and practice level. Under practice level, the remaining four elements of the CCM comprise self-management support, decision support, delivery system design, and clinical information systems. Each element has its components that range from three to six and will be named subcomponents in this review.

Each element with its subcomponents was placed in a separate table and data from the included papers were extracted based on the element and its subcomponents. Then, all tables were grouped into one main table that contained all elements and their subcomponents. The extracted data were reviewed to ensure that they belonged to the appropriate element.

2.1.4 Assessment of study quality

Although quality assessment is not mandatory in a narrative review, a decision was made to assess the methodological quality of the included primary studies. The quantitative studies were assessed for quality using assessment tools developed by the National Institute of Health

(NIH) (National Institute of Health, 2013). These tools were tailored to specific study designs and tested for flaws in their research methods or implementation. The assessment tools were for (i) cohort and cross-sectional studies, (ii) uncontrolled before-and-after studies, and (iii) systematic reviews and meta-analyses. Because the NIH currently offers no assessment tool for qualitative studies, the assessment tool by the National Institute for Health and Care Excellence (NICE) was utilised to assess the qualitative studies (National Institute for Health and Care Excellence, 2012).

For quantitative assessment, the Cohort and Cross-Sectional Studies tool has 14 questions, which can be answered by Yes, No, or Other (CD, cannot determine; NA, not applicable; NR, not reported). Uncontrolled before–after (pre-post) studies have 12 questions with similar answer choices. After answering the questions, each study can be categorised as good, fair, or poor. All assessment tools are provided in Appendix 1.

The quality appraisal checklist for qualitative studies has 14 questions divided into six sections, comprising theoretical approach (two questions), study design (one question), data collection (one question), trustworthiness (three questions), analysis (six questions) and ethics (one question). Each question has its own answer choices (rating choices), and the overall assessment at the end of the assessment tool can be rated using one of three labels (-, +, ++). This assessment tool is provided in Appendix 2.

Some studies did not fit into any of the quality assessment tools. These were typically reports, case studies, or short communication papers. In these cases, such papers were regarded as being of low quality.

2.2 Results

2.2.1 Study selection

The search returned 105 studies. Eighty-eight studies were from Medline and Embase, and 17 studies were identified from other sources (Google Scholar and references/citations from the included papers). The titles and abstracts of 90 papers were screened after removing duplicates (15 duplicates), and then 50 studies were excluded due to the inclusion of a population from countries outside the MENA region. After that, the full texts of 40 studies were screened and 14 were excluded because they provided a description of the overall health system rather than primary care or chronic diseases other than diabetes. After eligibility screening for studies that described one or more elements of the CCM in a primary healthcare setting for people with diabetes, 26 studies and reports were included in this qualitative review (Figure 2.1). The data were qualitatively summarised, but not quantitatively, due to the marked heterogeneity of the context such that a quantitative comparison would be inappropriate.

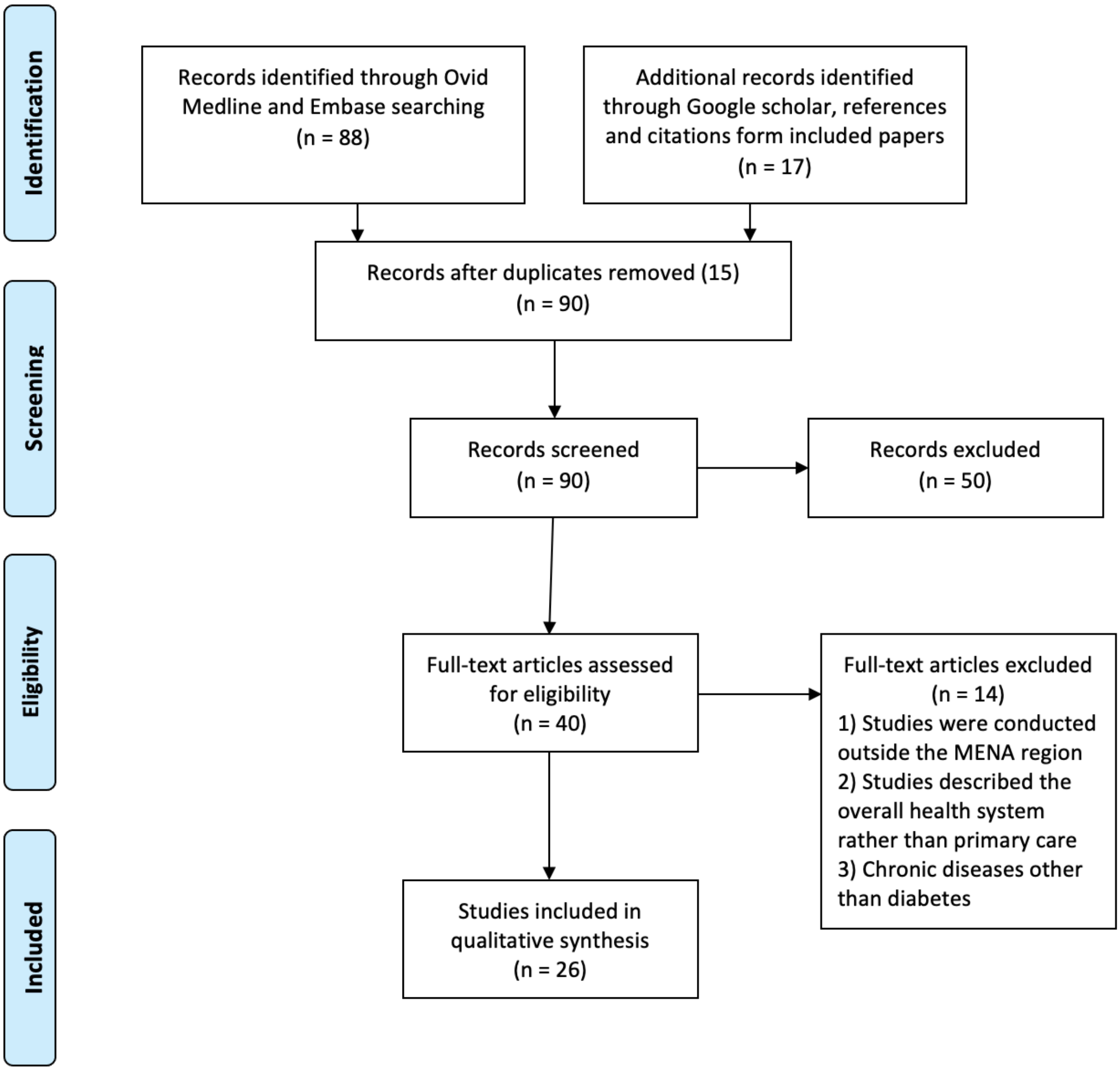


Figure 2.1 PRISMA flow diagram

2.2.2 Study quality assessment result

The overall assessment of the quantitative and qualitative studies in this review is shown in Table 2.2. Observational studies, including reports, case studies, or short communication, are assessed as being of low quality.

Table 2.2 Study type and quality assessment for the quantitative and qualitative studies

No.	Study	Study design	Quality assessment
1	(Paulo et al., 2019)	Case study	Low
2	(Aljohani, 2018)	Cross-sectional	Fair
3	(Al Slail et al., 2018)	Qualitative focus group discussions	+
4	(Paulo et al., 2018)	A modified Delphi survey	Good
5	(Alikhani and Damari, 2017)	Report	Low
6	(Paulo et al., 2017)	Review	Low
7	(Salama and Soltan, 2017)	Cross-sectional	Fair
8	(Spitzer-Shohat et al., 2017)	Qualitative Semi-structured interview	+
9	(Waheedi et al., 2017)	Cross-sectional	Good
10	(Badedi et al., 2016)	Cross-sectional	Good
11	(Santoro et al., 2016)	Short communication	Low
12	(Itani et al., 2015)	Cross-sectional	Good
13	(Tayefi et al., 2015)	Cross-sectional	Good
14	(Al-Khaldi, 2014)	Cross-sectional Retrospective records review	Fair
15	(Esmaeili et al., 2014)	Qualitative Semi-structured interviews	+
16	(Baynouna et al., 2010)	Before–after intervention	Good
17	(Rawhya et al., 2009)	Cross-sectional	Fair
18	(Zoughbie, 2009)	Report	Low
19	(Moharram and Farahat, 2008)	One-year, before–after intervention	Good
20	(Khattab et al., 2007)	Before–after intervention and audit review	Good
21	(Shimoni, 2006)	Cross-sectional	Good
22	(Arevian, 2005)	Case study (Audit review before and after collaborative intervention)	Low
23	(Reed et al., 2005)	Controlled before–after trial	Good
24	(Abdelmoneim and Al-Homrany, 2002)	Cross-sectional retrospective records review	Fair
25	(Al-Khaldi and Khan, 2002)	Cross-sectional retrospective records review	Fair
26	(Reed et al., 2001)	Controlled before–after	Fair

2.2.3 Summary of study designs and location of included studies

This review identified different study designs, including observational (descriptive and analytical) and experimental (controlled and uncontrolled before–after intervention). The number of observational studies totalled 21, including 11 descriptive and analytical cross-sectional studies, three qualitative studies, two case studies, two reports, and one each of a review of published data from health organisations, a modified Delphi study, and a short communication paper.

The experimental studies were interventional before–after studies comprising different interventions. The interventions included flow sheets, a partnership model, a chronic care programme, and a diabetes quality improvement programme.

In terms of countries where the papers were published, seven studies were published in Saudi Arabia, seven studies in the United Arab Emirates (UAE), two studies in Lebanon, two in Israel, three in Iran, one each from Kuwait, Qatar, Egypt, and Palestine, and there was one multi-country study described as being in the Near East.[1] Table 2.3 summarises the characteristics of the included studies in this narrative review.

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[1] There is no standard definition of the Near East; however, the included study described the health system reform for the United Nations Relief and Works Agency (UNRWA) for Palestine refugees in the Near East, where its services spread in Jordan, Syria, Lebanon, and the West Bank and Gaza Strip.

Table 2.3 Summary of the included studies

No.	Title	Authors, year of publication and location of the study	Study design	Keynotes
1.	Assessment of diabetes disease management in Saudi primary healthcare	(Aljohani, 2018) Al Madinah, Saudi Arabia	Cross-sectional	Aim of the study was to assess the primary healthcare management services for people with diabetes in Al Madinah city, Saudi Arabia All primary healthcare centres were included (43 centres) The CCM was utilised as a framework and the used survey was the ACIC The results of the study were in favour of reasonable implementation of the CCM in Al Madinah primary care centres for people with diabetes
2.	Patient assessment of chronic illness care in the Family Medicine Outpatient Clinic, Suez Canal University, Egypt	(Salama and Soltan, 2017) Suez Canal, Egypt	Cross-sectional	Aim of the study was to assess the family medicine clinic services for people with chronic illness using the PACIC questionnaire with a goal of quality improvement for this clinic. The study was conducted in the Family Medicine Outpatient Clinic, Suez Canal University, Egypt between February and April 2016 A convenience sample of 270 patients was included The highest mean score was in problem-solving while patient activation was the lowest
3.	The relationship between patients' knowledge of diabetes therapeutic goals and self-management behaviour, including adherence	(Waheedi et al., 2017) Kuwait	Cross-sectional	The study aimed to inspect how diabetic patients' knowledge of diabetes therapeutic goals relate to adherence to self-care measures (medication, diet and physical activity) in primary care clinics A convenience sample of 238 patients was used from six primary care clinics Better knowledge about diabetes therapeutic targets and own levels of diabetes indicators were associated with improved adherence to self-care measures (taking medication, diet, and physical activity)
4.	Factors associated with long-term control of type 2 diabetes mellitus	(Badedi et al., 2016) Jazan, Saudi Arabia	Cross-sectional	The study aimed to assess the factors associated with glycaemic control among people with diabetes in primary care clinics in Jazan, Saudi Arabia A stratified cluster sampling for male and female patients with diabetes in all primary care centres was conducted and random samples were selected form each primary care centre. The study included 288 patients with type 2 diabetes. There was a high percentage of poor glycaemic control (74% had HbA1C < 7%)

				A number of factors were associated with poor control (e.g., not taking medication, number of medications, long duration of diabetes and low confidence in diabetes control) Effective interventions needed to overcome the barriers for poor diabetes control
5.	The feasibility of implementing the chronic care model in the management of diabetes at a public health centre in Lebanon	(Itani et al., 2015) Beirut, Lebanon	Cross-sectional "Respond and think aloud" method	This project was part of the master's degree in science for the researcher at the American University of Beirut, Lebanon The project aimed to assess the feasibility of the CCM implementation in a primary healthcare centre in Beirut A gap analysis was conducted using the ACIC tool in a non-governmental healthcare centre located in Beirut that serves around 4000 diabetic patients (until 23/01/2015) Implementation of the CCM for diabetes management was concluded to be feasible to enhance the patient outcomes and help in diabetes prevention and management
6.	Patients' satisfaction with the Diabetes Control and Prevention Programme in Tehran, Iran: A cross-sectional study	(Tayefi et al., 2015) Tehran, Iran	Cross-sectional	Aim of the study was to assess the diabetic patients' satisfaction with the diabetes prevention and control programme in primary care centres in Tehran, Iran The study included 239 patients from 15 primary care centres The centres were selected by two consecutive sampling techniques: first, stratified sampling and then a clustering method, while the participants were enrolled in a convenient way (people with diabetes referred for diabetes control and prevention, over 30 years old) The highest level of diabetic patients' satisfaction was related to continuity of care, staff humanness, and effective services, while the lowest level was associated with health education
7.	Quality of diabetic care in family practice centre, Aseer Region, Saudi Arabia	(Al-Khaldi, 2014) Aseer, Saudi Arabia	Cross-sectional Retrospective records review	The study aimed to evaluate the quality of diabetes care services in a primary care centre in Asser, Saudi Arabia Patients' records were extracted (all patients with diabetes), and process and outcomes of diabetes care were reviewed Evaluation of care was based on Standards of Care Delivery issued by Ministry of Health The study included 637 records for review and evaluation

				Compared to previous studies in the same centre, there is an improvement in diabetes care (e.g., physical examination, laboratory investigations); however, there is still a need to improve other areas including recall system and coordination with other healthcare sectors (e.g., referral to hospitals)
8.	Audit of diabetes care at Al Wakra Health Center	(Rawhya et al., 2009) Al Wakra, Qatar	Cross-sectional	Quality assessment study for diabetes care in a primary care centre in Al Wakra, Qatar Quality assessment of diabetes care included structure, process, and outcome The structure of diabetes care was assessed by two checklists (essential and less essential items), while the process was assessed using a scoring system against 10 items for standard care in the past year. The outcome was assessed using international quality assurance protocol that includes smoking, diabetes, and blood pressure control. The researchers added HbA1c to the list Structure assessment revealed fair to good availability of essential and less essential items, and the process of care depicted good to fair improvement compared to last year. The outcome assessment showed poor results for most of the 315 registered patients with diabetes (35% poor knowledge about diabetes, 57.8% uncontrolled HbA1c, 75.6% uncontrolled fasting blood sugar, 63.5% obese, and 49% uncontrolled PB)
9.	Quality of diabetes care in the community	(Shimoni, 2006) Clalit, Israel	Cross-sectional	Aim of the study was to evaluate the quality of diabetes care for patients treated exclusively in primary care and those who also have additional treatment in specialised diabetes clinics From Clalit Health Services centre in Israel, a random sample of 209 medical records from patients diagnosed with type 2 diabetes, aged 40–75, and treated in urban community practices were included The sample was divided into two groups: the first included patients who were only treated in primary care by family physicians (n = 130), and the second included patients who received additional care from specialised diabetes clinics (n=79) Regarding patients who were only treated in primary care, the quality of follow-up (fundus and foot examination) and smoking status documentation (as a risk factor for cardiovascular diseases) were significantly lower in comparison to specialised diabetes clinics Blood pressure and cholesterol control were low in both groups No difference was identified in either group regarding HbA1C control and use of medications (aspirin, statins, and antihypertensive)

10.	Health education in the management of diabetes at the primary healthcare level: Is there a gender difference?	(Abdelmoneim and Al-Homrany, 2002) Abha, Saudi Arabia	Cross-sectional retrospective records review	The study aimed to assess health education effects on people with diabetes who were registered in a primary healthcare centre in Abha, Saudi Arabia. It also aimed to examine whether there was any gender differences that might affect the validity of health education The study was conducted in one primary care centre and a sample of 198 diabetic patients' files were eligible (90 males and 108 females) Females were shown to have higher FBS and they were more obese. The number of health education sessions was also lower than for the male group (though mean education sessions for males were low: 4.2 ± 1.9) Both groups were poorly compliant with diabetes care appointments, and they had poor glycaemic control Although education sessions were more for the male group, no improvement in glycaemic control was noted. This might be a result of the few sessions, as physicians were not aware about different cultural habits and norms; patients' concerns and/or knowledge about diabetes were not addressed well, and there may be financial barriers that inhibit better health education in primary healthcare
11.	Impact of a mini-clinic on diabetic care at a primary healthcare centre in southern Saudi Arabia	(Al-Khaldi and Khan, 2002) Aseer, Saudi Arabia	Cross-sectional retrospective records review	The study aimed to evaluate the impact of a diabetes mini-clinic on the quality of care in a primary healthcare centre in Aseer, Saudi Arabia Files for people with diabetes in the centre were reviewed and all files were included (198 records) Process of care and diabetes outcomes were examined and evaluated Implementation of the mini-clinic for diabetes care in primary healthcare improved the processes of care (except measurement of PB, weight, and cholesterol) and diabetes outcomes (e.g., health education, diabetes control)
12.	Levels of health awareness in diabetic patients during Ramadan 2015: Focus group discussion in Riyadh, Saudi Arabia	(Al Slail et al., 2018) Riyadh, Saudi Arabia	Qualitative Focus group discussions	The study aimed to explore the health awareness of people with diabetes in the month of Ramadan A purposive sample of 15 patients with diabetes from 10 primary healthcare centres in Riyadh was used Most of the participants were not satisfied with the primary healthcare services including education, medication, and laboratory investigations

13.	Reducing inequity in primary care clinics treating low socioeconomic Jewish and Arab populations in Israel	(Spitzer-Shohat et al., 2017) Clalit, Israel	Qualitative Semi-structured interview	The study used the CCM to recognise the implemented interventions in primary care clinics that help to reduce inequity for disadvantaged Arab and Jewish people after the implemented quality improvement initiative in Israel 80 staff from 26 clinics were interviewed and types of interventions were coded using the CCM elements and clinical domains (e.g., diabetes control) There were 454 different implemented interventions in the clinics (17.5 interventions/clinic on average)
14.	Family medicine in Iran: Facing the health system challenges	(Esmaeili et al., 2014) Iran	Qualitative Semi-structured interviews	Aim of the study was to understand what policy and decision makers in Iran think about family medicine implementation in urban healthcare 27 interviews were conducted with policy makers and decision makers from five health organisations in Iran (Ministry of Health Medical Education, Iranian Health Insurance Organisation, Medical Universities and affiliated Research Centres, Iran Medical Council, and Executive Directors in Pilot Provinces) In urban areas, primary care services for people with chronic diseases are passive and not enough to face the growing burden of chronic diseases in Iran It is important to implement family medicine practice to improve healthcare systems in urban areas
15.	A successful chronic care programme in Al Ain, United Arab Emirates	(Baynouna et al., 2010) Al Ain, UAE	Before–after intervention	The study described the four stages of a diabetes and hypertension project that was implemented in Al Ain, UAE, and how successful it was after implementation In Al Ain, there are 19 primary care centres: 11 in urban and 8 in rural areas The four stages were healthcare assessment, identification of gaps and developing interventions, piloting those interventions, and generalising the interventions to all health centres After implementation, improvement in quality and clinical outcomes were noticed, including better documentation for patients' history and physical examination, better utilisation for laboratory investigation, and improvement in patients' HbA1c, BP and lipid profiles Lifestyle-related risk factors (obesity, smoking, physical inactivity) failed to improve after implementation of the interventions Self-management assessment and change requires further improvement as this project revealed a lack of health educators and nutrition specialists

16.	Quality improvement of diabetes care using flow sheets in family health practice	(Moharram and Farahat, 2008) Taif, Saudi Arabia	One-year before–after intervention	The study aimed to improve the quality of diabetes care in family practice using a flow sheet, which was developed considering Canadian practice guidelines for type 2 diabetes management The flow sheet was developed and implemented in seven family clinics in Taif, Saudi Arabia, from March 2006 to June 2007. Baseline and post-intervention data were collected to show how the quality of care changed The study included 414 medical records in the baseline assessment and compared the results after flow sheet implementation. The post-intervention records included 371 files Documentation was improved for clinical indicators (e.g., BMI, HbA1c, lipid profile). In addition, health education and referral to dietician improved (50%–90% and 30%–55%, respectively) There was no significant improvement in FBG and PB
17.	Quality improvement programme for diabetes care in family practice settings in Dubai	(Khattab et al., 2007) Dubai, UAE	Before–after intervention and audit review	The study aimed to evaluate quality improvement for diabetes care in primary care centres before and after implementation of a diabetes quality improvement programme in Dubai, UAE There were 16 family practice centres included in the intervention. Two audits were conducted in June 2003 (baseline assessment for 2548 records) and in January 2005 (post-intervention assessment) The intervention included developing up-to-date guidelines in accordance with American Diabetes Association guidelines; developing a clinical information system by the establishment of a computerised system for a diabetes register and important clinical indicators; and initiating diabetes quality improvement teams in all clinics included in the intervention After programme implementation, improvement was noticed in the process of care and clinical indicators including HbA1c (target level < 7% raised from 20.6% to 31.7%), BP (mean systolic blood pressure decreased from 135.3 to 133.2), lipid profile (mean LDL cholesterol reduced from 129.2 mg/dl to 115.4 mg/dl), and fundoscopy referral
18.	The significance of a collaborative practice model in delivering care to chronically ill patients: A case study of managing diabetes mellitus in a primary healthcare centre	(Arevian, 2005) Beirut, Lebanon	Case study	Aim of the study was to evaluate the quality of diabetes care before and after the implementation of a collaborative practice model in a not-for-profit healthcare centre in Beirut, Lebanon

			(Audit review before and after collaborative intervention)	Two cycles of audit of 375 diabetic patients' charts over three years were conducted: the first was to retrospectively select eligible files, and the second was for follow-up after the guidelines' implementation The collaborative programme for diabetes care focused on three areas, comprising provider support, patient education, and improved access to and continuity of care Process and outcome of care after the programme implementation were evaluated, and the result showed improvements in team spirit, documentation, continuity of care, glycaemic control, and financial costs
19.	A controlled before–after trial of structured diabetes care in primary health centres in a newly developed country	(Reed et al., 2005) Al Ain, UAE	Controlled before–after trial	A similar intervention was conducted by the same research team in 2001 (see 26 in this table) In this study, the duration of intervention was longer (33 months) and included more enrolled participants (n= 738 total, distributed to 354 in intervention clinics and 384 in control clinics). Additionally, the intervention focused on assessing guidelines adherence and diabetes-related outcomes, but not patients' knowledge and satisfaction The same three intervention clinics and the comparison of six clinics as controls were included The result of the intervention was similar to the previous one, where statistically significant improvement was found in diabetes guidelines adherence, but not diabetes-related outcomes
20.	A clinical trial of chronic care diabetic clinics in general practice in the United Arab Emirates: A preliminary analysis	(Reed et al., 2001) Al Ain, UAE	Controlled before–after trial	This interventional study aimed to evaluate diabetes care improvement before and after the implementation of a structured programme within three primary care centres (intervention) and compared to six primary care centres (control) This intervention lasted for 18 months and 219 diabetic patients were recruited to participate in a convenience approach (109 from the intervention group and 110 from the control group). Medical records were reviewed 12 months before the intervention and in the last 12 months of the intervention The intervention was multifaceted and included the establishment of diabetes clinic; education programmes for patients and providers; and improvement of the clinical information system

				The target improvement aspects from the intervention, within the intervention clinics and compared with the control clinics, were adherence to diabetes guidelines, improvement of diabetes-related outcomes (HbA1c, Lipid, BP), and advanced patient knowledge and satisfaction Baseline characteristics were similar in both intervention and control clinics except age and gender (intervention clinics had younger and more males than control clinics) The intervention was successful in terms of guidelines adherence and some aspects of satisfaction in the intervention clinics. However, there was a statistically insignificant change in diabetes-related outcomes and patients' knowledge about diabetes
21.	How do we strengthen the health workforce in a rapidly developing high-income country? A case study of Abu Dhabi's health system in the United Arab Emirates	(Paulo et al., 2019) Abu Dhabi, UAE	Case study	The aim of the paper was to improve the primary healthcare system in Abu Dhabi, UAE, for patients with chronic illness through the identified gaps of the CCM Gaps in primary healthcare were identified in a systematic review study (Paulo et al., 2017) Full implementation of the CCM was found to be helpful to achieve the UAE Vision 2021 that included the development of a world-class healthcare system
22.	Pushing chronic care forward in Abu Dhabi by identifying priorities and addressing barriers: A modified Delphi technique	(Paulo et al., 2018) Abu Dhabi, UAE	Modified Delphi survey, three rounds	The purpose of the study was to reach a consensus on the top five priorities and barriers to the implementation of the CCM elements in Abu Dhabi, UAE A purposive sample of 20 experts in the health system were recruited Three rounds were conducted during which priorities and barriers were reduced respectively from 28 and 20 to the top five in each one
23.	The primary healthcare in the emirate of Abu Dhabi: Are they aligned with the chronic care model elements?	(Paulo et al., 2017) Abu Dhabi, UAE	Review of officially published data from health organisations	Primary healthcare services were reviewed through the lenses of the CCM from officially published data in the UAE Ministry of Health and Prevention, the Health Authority–Abu Dhabi (HAAD) and the Abu Dhabi Health Services Company (SEHA) to recognise the potential opportunities for improvement Implementation of the six elements of the CCM was aligned with the current services in Abu Dhabi
24.	A partnership model to improve population health screening for noncommunicable conditions and their common risk factors, Qazvin, Islamic Republic of Iran	(Alikhani and Damari, 2017) Qazvin, Iran	Report	This review was designed to prioritise chronic diseases and risk factors that require a population-based screening programme and improve care services in primary healthcare in urban areas A partnership initiative between public and private health sectors was initiated to improve primary healthcare services in urban areas

				Diabetes mellitus was ranked the first priority for screening in Qazvin, Iran Different strategies were devised to target three main areas, namely, wider provision of care, better quality for services, and ensuring cost-effective care The researchers designed a new model for screening non-communicable diseases including diabetes
25.	Community-based diabetes programme: The micro-clinic project	(Zoughbie, 2009) Palestine	Report	The paper described the diabetes micro-clinic project that was implemented in Palestine in 2005 There were four steps to implement this project, comprising assessment of available resources and volunteer training; health education on a large scale that is open to the community and funded mainly from the UNRWA; dividing large groups into smaller ones for better education and possible referral to clinics when needed; and finally, from the small educated and evaluated groups, individuals with high glucometer readings were divided into micro-clinics. Those micro-clinics were supplied with a glucose monitor to share after they were trained on how to use it properly Micro-clinic groups are usually led by a family member, and they receive regular education and follow-up from a registered nurse This project facilitates community awareness, involves families and friends, helps to reach remote locations, can possibly be used as an emergency support system, and empowers people with diabetes to take care of their own health
26.	Primary healthcare reform in the United Nations Relief and Works Agency for Palestine Refugees in the Near East	(Santoro et al., 2016) The Near East	Short communication	The paper aimed to analyse the primary healthcare reform initiated by the UNRWA for Palestine refugees using the CCM as a framework The UNRWA provides healthcare services for Palestinian refugees through its network in the Near East region (138 primary health centres) In 2011, the UNRWA started an extensive structural primary healthcare reform to combat non-communicable diseases The reform was based on the CCM and the WHO reported it as a good example of reform for primary healthcare under challenging situations

In the following sections, the availability and implementation of all six elements and their subcomponents, according to ACIC, in the primary healthcare system in the MENA region for people with diabetes will be described. Each element will be briefly described as it is defined in the CCM, and then a list of subcomponents under the element will be named.

2.3 Description of the six elements of the CCM and their subcomponents

2.3.1 Organisation of the healthcare delivery system

In the CCM, health system organisation is defined as "creating a culture, organisation and mechanisms that promote a safe and high quality of care" (Improving Chronic Illness Care, 2006). There are six subcomponents under this element: overall organisational leadership in chronic illness care, organisational goals for chronic care, improving strategy for chronic illness care, incentives and regulations for chronic illness care, senior leaders, and benefits.

2.3.1.1 Overall organisational leadership in chronic illness care

In the MENA region, this subcomponent is ranked the first among the top five priorities to address in improving the primary healthcare services for people with chronic illness in Abu Dhabi, UAE (Paulo et al., 2018). In Beirut, Lebanon, the assessment of a public health centre using the ACIC showed that the vision statement of this centre reflects the organisational leadership by providing affordable primary care services with a high quality of care (Itani et al., 2015). However, there were no specific resources allocated for diabetes care in this centre. In the Near East, the United Nations Relief and Works Agency (UNRWA) for Palestinian refugees initiated extensive primary healthcare structure reform in 2011 to respond to the growing burden of non-communicable diseases, including diabetes (Santoro et al., 2016). This system reform was led by the UNRWA Headquarters in Amman, taking account of the Agency's available resources and assets.

Similarly, in Iran, the government introduced and supported health reforms in primary care through implementing family medicine practice and health insurance (Esmaeili et al., 2014). This reform involved policy and decision makers to support it, especially in urban areas where the services are undermined compared to rural areas (Alikhani and Damari, 2017). However, this reform does not allocate specific resources to execute the work compared to the aforementioned example in the Near East. In Israel, three interventions were implemented to improve the health system organisation in primary care clinics serving disadvantaged Arab and Jewish populations, and the organisation's leadership supports it (Spitzer-Shohat et al., 2017). The three interventions are not explained, but the overall organisational leadership was reflected by dedicated resources and leadership support.

2.3.1.2 Organisational goals for chronic care

In the UAE, significant investment was made in developing the healthcare system at all levels by applying total quality management. Goals and specific objectives were set to achieve strategic directions for improving the quality of care, including decision support, clinical information systems, teamwork mobilisation, and delivery of care (Khattab et al., 2007). In Beirut, Lebanon, updated organisational goals for people with diabetes in the studied healthcare centre have been achieved; however, they lack any measurable indicators and need to be revised (Itani et al., 2015). In the Near East, the UNRWA has organisational goals that are actively reviewed – for instance, the free provision of care for Palestinian refugees (Santoro et al., 2016). In contrast, primary care services in urban areas in Iran suffer from the passive structure of care, limited number of healthcare centres, and no measurable goals to improve the quality of care for people with chronic illness (Esmaeili et al., 2014).

2.3.1.3 Improving strategy for chronic illness care

In the MENA region, different improvement strategies have been implemented in primary care for people with diabetes. In Saudi Arabia and Palestine, mini- and micro-clinics for people with diabetes have been introduced. The differences between Saudi mini-clinics and Palestinian micro-clinics mainly concern the location and who provides the care. In Saudi mini-clinics, the provider of care is a team of health workers (employees), and the clinics are located in the same primary care centres (Al-Khaldi and Khan, 2002). On the other hand, Palestinian micro-clinics are provided by volunteer nurses, doctors, and university faculty members who meet patients on business premises or designated houses (Zoughbie, 2009). Both projects have their special characteristics and outcomes; for instance, mini-clinics mainly lead to an improvement in the process and outcomes of diabetic care in primary care centres, while micro-clinics can facilitate community awareness and outreach (Zoughbie, 2009, Al-Khaldi, 2014, Al-Khaldi and Khan, 2002). In the UAE, a chronic care programme was successfully implemented in all health centres in Al Ain city in four stages, and yielded an improvement of the process of care (e.g., documentation of patient history, recording physical signs), and parameters reflecting outcomes of care (e.g., HbA1c, blood pressure, lipid profile) (Baynouna et al., 2010). The four stages of the project were the assessment stage, the development of appropriate interventions, piloting the developed strategies and interventions in one centre and evaluating the outcome, and lastly, implementing the project in all health centres in the city. In Abu Dhabi, UAE, the patient-centred medical home model has been adopted in the Ambulatory Healthcare Centres (AHS) that have provided primary healthcare since 2013 (Paulo et al., 2017). This model has similar core foundations as the CCM in providing structured, proactive, and coordinated care rather than the reactive and episodic management of illnesses (Epperly, 2011).

Regarding strategy improvement for chronic disease care, the Abu Dhabi Health Services Company (SEHA), which is responsible for operating the health system in Abu Dhabi, launched the National Quality Hospital Measure that provides performance data to the different professions, linking each SEHA hospital to the AHS (Paulo et al., 2017). SEHA has also initiated partnerships with healthcare providers (e.g., Johns Hopkins Hospital, Cleveland Clinic) to ensure easy accessibility. In Beirut, Lebanon, a gap analysis approach showed that the diabetes team in the centre utilise an ad hoc approach for targeted problems whereby the staff and leadership meet and discuss the areas that require improvement; however, there are no available comprehensive quality improvement plans (Itani et al., 2015). In the Near East, as part of the strategy improvement, there are regular meetings with accountable workers to streamline strategies across different fields to improve the care for people with chronic diseases, including people with diabetes (Santoro et al., 2016).

2.3.1.4 Incentives and regulations for chronic illness care

In Saudi Arabia, the ACIC was used to assess primary care services, and the lowest score in the organisation of the healthcare delivery system was given to incentives and regulations for chronic illness care (Aljohani, 2018). In contrast, the health services company (SEHA) in Abu Dhabi, UAE, provides incentives and rewards based on the quality of care and to distinguished individuals who contribute to different categories (Paulo et al., 2017). In the Near East, the UNRWA provides incentives for staff who are new to chronic disease care, while in Beirut, Lebanon, the only incentive provided at the studied healthcare centre was occasionally sending staff to attend workshops (Santoro et al., 2016, Itani et al., 2015).

2.3.1.5 Senior leaders

In the included studies, there are few details about how senior leaders contribute to improving healthcare services for people with diabetes; however, a number of strengths and gaps in the provided services were elaborated upon in three studies. In the UAE, a new leadership of the health system in Dubai supports the vision of the Department of Health and Medical Services to develop a system that meets international standards and pursues excellence in healthcare. However, in Abu Dhabi, a recognised gap in visible support improvement at all levels of the healthcare organisation, beginning with senior leaders, was reported (Paulo et al., 2019, Paulo et al., 2017, Khattab et al., 2007). In Beirut, Lebanon, senior leaders in the studied centre encourage the improvement of chronic care services and support the centre to be accredited by a Canadian body in collaboration with the Lebanese Ministry of Health (Itani et al., 2015).

2.3.1.6 Benefits

The last subcomponent under the organisation of the healthcare system is benefits, which vary in their effect on patient self-management and system changes.

Varied data about the benefits and their effect on the organisation of the healthcare system in the MENA region were identified. In the UAE, different insurance packages (based on monthly income and residence visa status) led to unstandardised care services, which is considered a barrier in providing care for people with diabetes (Lapão et al., 2018). In Iran, a partnership with private sectors was established to control the costs of the treatment in addition to increased service provision and improved quality of care (Alikhani and Damari, 2017). In Beirut, Lebanon, some resources in the assessed health centre were dedicated to diabetic patients (e.g., discounts on laboratory tests) (Itani et al., 2015).

2.3.2 Community linkages

In the CCM, the community constitutes a fundamental part of the support in providing healthcare services for people with chronic illness. Community linkages are about mobilising community resources to meet the needs of people with chronic diseases (Improving Chronic Illness Care, 2006). This element has three main subcomponents, comprising linking patients to outside resources, partnerships with community organisations, and regional health plans. The implementation of each subcomponent will be described in the following sections.

2.3.2.1 Linking patients to outside resources

The best example of an established public domain of social and community interaction is the Palestinian micro-clinics. Zoughbie (2009) described the project established in the Bethlehem area and the D'heisheh refugee camp, where 50 diabetes micro-clinics were created and staffed by volunteer doctors, nurses, and students. The micro-clinics project does not mean a small structure or building – instead, these clinics are a people-based network comprising small groups who have access to health education, technology, and community support. In this project, a small group of patients meet together in a designated private or business location for diabetes screening, education, and management. This project established a public realm of community interaction where families, friends, and neighbours could access diabetes education, treatment, and psychological support. Other studies in the MENA did not explicitly describe how people with diabetes are linked to community resources; however, Aljohani (2018) reported a non-systematic linkage between people with diabetes and outside resources in Al Madinah, KSA. In the UAE, Paulo et al. (2017) recognised linkage through some electronic programmes and communication channels for people with diabetes with community facilities, while in Lebanon, there were assigned social workers and diabetic nurses for coordinating and referring patients to community resources (Itani et al., 2015).

2.3.2.2 Partnerships with community organisations

Health systems can form partnerships with different community organisations to enhance patient care and avoid duplicate efforts. In Al Madinah, Saudi Arabia, there were no partnerships identified with any community organisations (Aljohani, 2018). In the UAE, healthcare experts identified forming partnerships with community organisations to provide the needed support to patients with chronic conditions as a gap in the current healthcare system in Abu Dhabi (Paulo et al., 2019).

On the other hand, there were community participation initiatives piloted in Jordan and Syria, where community volunteers help with health promotion and identify non-adherence of treatment among people with chronic diseases in the Near East area; however, these services were not systematically adopted due to budget constraints (Santoro et al., 2016). Similarly, in Israel, there were 34 interventions, culturally tailored, to fulfil the patients' needs from the community. For instance, religious leaders are involved in promoting screening, vaccination, or changing to a healthier lifestyle (Spitzer-Shohat et al., 2017). In

Beirut, Lebanon, the partnership with community organisations was through contracts to provide diabetes medicines and health coverage for refugees, yet there were no regular meetings between the health system, other community service agencies, and people with diabetes (Itani et al., 2015).

2.3.2.3 Regional health plans

In Al Madinah, Saudi Arabia, regional health plans target people with diabetes as assessed by physicians in primary healthcare centres (Aljohani, 2018). However, these plans are not clearly described or explained in the study. In Beirut, Lebanon, there was a lack of formal supportive programmes and related policies across the entire health system, and coordinated guidelines between the health centre in the study and other community or regional health organisations were missing (Itani et al., 2015).

2.3.3 Self-management support

As defined in the CCM, self-management support (SMS) refers to a number of strategies to prepare and empower people with diabetes to take care of their health and healthcare (Improving Chronic Illness Care, 2006).

SMS is clearly an essential aspect of the CCM. When the ACIC measures it, it has four subcomponents: assessment and documentation of self-management needs and activities; self-management support; addressing the concerns of patients and families; and effective behaviour change interventions and peer support. The evidence for each component is provided in the following subsections.

2.3.3.1 Assessment and documentation of self-management needs and activities

In Al Madinah, Saudi Arabia, the level of assessment and documentation of patients' needs and activities scored the highest among other subcomponents of the self-management support element when the researcher used the ACIC survey, but how the assessment and documentation were implemented was not explained (Aljohani, 2018). Similarly, in Lebanon, assessment and documentation were done for every patient by the diabetic nurse and documented on the electronic files for all patients (Itani et al., 2015).

On the other hand, other studies showed poor and limited assessment to address patients' needs. Esmaeili et al. (2014) described health system challenges in the absence of family medicine practice for patients in urban areas in Iran, as they were left searching for ways of meeting their needs because of the absence of proper needs assessment. Al Slail et al. (2018) conducted a focus group discussion with fifteen patients with diabetes to explore their health status in the month of Ramadan, during which they fasted through the day (this will be described more in the ‘patients’ knowledge’ section) and required support before, during, and after this month. However, the researchers reported that most of the participants who aimed to fast during Ramadan did not have counselling prior to the start of the month because it is non-mandatory – almost all of the patients visited their physicians in primary healthcare centres only if they ran out of medication or had an appointment, but not for advice or adjustments to their medication.

Regardless of the quality of the assessment and documentation, the available data about documented information for people with diabetes revealed low adherence and compliance with regard to meal planning, medication, physical exercise, and testing blood glucose (Badedi et al., 2016, Waheedi et al., 2017, Khattab et al., 2007). Moreover, patient compliance is considered a barrier for the delivered care for people with diabetes (Lapão et al., 2018). Therefore, there is a need not only for documentation, but also for providing appropriate support, addressing patients’ concerns, and implementing effective behaviour change interventions, which will be discussed in the next subsections.

2.3.3.2 Self-management support

In the MENA region, health education programmes and patient knowledge (about diabetes, therapeutic goals, and patients’ own level of glucose) are the most popular themes for self-management support in the included studies.

Regarding health education programmes and strategies, there are different descriptive and intervention studies about the availability, implementation, and effectiveness of health education for self-management support.

In Saudi Arabia, descriptive studies in different regions concluded that the majority of people with diabetes were given health education about diet, physical activity, and foot care (Al-Khaldi, 2014); there was no training in diabetes management before or during the month of Ramadan for the majority of the participants in the study (13 out of 15) (Al Slail et al., 2018); and there was gender inequity about health education sessions, and while males had more sessions than females, their poor glycaemic control was not improved (Abdelmoneim and Al-Homrany, 2002). On the other hand, an intervention using a flow sheet for people with diabetes in Taif, Saudi Arabia, helped to raise health education from 50% to 90% (Moharram and Farahat, 2008). In the UAE, self-management support is provided through health education materials available online (website and mobile application), demonstrating the impact of how decisions made by patients and their daily routine could affect their health. There is also available information about how to manage chronic diseases including diabetes. Nevertheless, there is a gap in terms of providing practical strategies for SMS in clinical practice, including assessment, goal setting, action planning, problem-solving, and follow-up (Paulo et al., 2019, Paulo et al., 2017). In Qatar, the majority of the physicians acknowledged the available health education materials either sometimes or all the time (Rawhya et al., 2009), but this study did not describe their effectiveness or how they were delivered to people with diabetes. In Beirut, Lebanon, clinical educators are actively involved in providing regular health education to individuals and groups; however, the researcher reported that they are not trained in how to empower patients or in the methodologies of problem-solving (Itani et al., 2015). In Tehran, Iran, a patient satisfaction survey revealed that the lowest level of satisfaction for people with diabetes was related to the health education materials provided in primary care centres (Tayefi et al., 2015).

Regarding patients' knowledge, in Kuwait, Qatar and Iran, there is a low level of knowledge among people with diabetes who visit primary care centres (PCCs) about diabetes management, the importance and benefits of home monitoring for blood glucose, and therapeutic goals or their own level of certain clinical indicators (i.e., HbA1C, LDL, blood pressure, glucose level) (Waheedi et al., 2017, Rawhya et al., 2009, Alikhani and Damari, 2017).

In the MENA region, patients' knowledge is critical due to the religious and cultural importance of fasting. Islam is by far the dominant religion in nearly all of the MENA territories, and citizens take part in the well-known practice of fasting, either mandatorily during Ramadan, or voluntarily on certain days of other months (Muharram, Shawal, and Dhu Elhejah) or throughout the year (Mondays and Thursdays). Fasting means stopping eating or drinking from morning (dawn) to evening (dusk). There are two main meals, one before sunrise and the other after sunset, to fulfil these religious obligations. However, patients are allowed to break the fast and they have the choice either to make them up later or feed a poor person for every day they do not fast, as stated in the Holy Qur'an: *"Fast a (fixed) number of days, but if someone is ill or is travelling (he should complete) the number* *of days (he had missed); and those who find it hard to fast should expiate by feeding a poor person. For the good they do with a little hardship is better for men. And if you fast it is good for you, if you knew"* (Qur'an 2:184).

Nevertheless, in their study, Al Slail et al. (2018) found that most of the patients believed that the injection of insulin affects fasting, and 25% (4 out of 15) did not know whether it would count as breaking fast or not. Moreover, 12% responded that pregnant women who have diabetes must fast, while two participants denied compulsory fasting and the other two participants neither agreed or disagreed. However, Muslims with diabetes and women who are pregnant are exempted from fasting, and it is their personal choice to fast or not; however, after discussing their decision with their diabetic health team and deciding to fast, they can be reassured that insulin injection does not invalidate fasting (Ali et al., 2013).

2.3.3.3 Addressing concerns of patients and families

Patients' concerns were the least identified subcomponent in the included studies. Al Johani (2018) used the ACIC and found that the lowest mean (5.1/11) of the four subcomponents in the self-management support component was addressing the concerns of patients and families. In a similar study in Beirut, Lebanon, the score was low (5/11), as patient and family concerns are not an integral part of care, and the only identified means of addressing their concerns was through referrals to specialised centres (Itani et al., 2015).

2.3.3.4 Effective behaviour-change interventions and peer support

Different interventions were assessed and implemented in different primary healthcare centres in the MENA region to support behavioural change and provide peer support for people with diabetes. A face-to-face approach, individual meetings, group activities, workshops, lectures in the clinics, posters, pamphlets, handheld booklets, online website and mobile applications, self-management cards, and free blood glucose monitoring devices for home monitoring are different approaches used as interventions to support patients and help to change their behaviour (Al-Khaldi, 2014, Baynouna et al., 2010, Spitzer-Shohat et al., 2017, Santoro et al., 2016). In Abu Dhabi, UAE, this subcomponent was ranked the second among the top five priorities for healthcare improvements for people with chronic disease (Paulo et al., 2018).

Although there is a variety of interventions, some are not efficient enough in terms of behaviour change or patient support. For instance, in Beirut, Lebanon, clinical educators have an active role in distributing pamphlets and providing regular individualised and group training sessions, but they lack formal training in patient empowerment and problem-solving methodologies (Itani et al., 2015). In addition, in Aseer, Saudi Arabia, male patients who received more education sessions than female patients exhibited no improvement in their glycaemic control (Abdelmoneim and Al-Homrany, 2002). However, this may be due to the concerns of people with diabetes being unaddressed by their physicians, different cultural backgrounds, financial barriers to delivering adequate diabetes care, and the possibility of care that does not meet evidence-based guidelines. These limitations indicate that not only the availability of the interventions is required, but also the effectiveness of the interventions is an important goal that requires more attention.

2.3.4 Decision support

In the CCM, decision support in primary care means "to promote clinical care that is consistent with scientific evidence and patient preferences" (Improving Chronic Illness Care, 2006). It has four subcomponents, comprising evidence-based guidelines, involvement of specialists in improving primary care, providing education for chronic illness care, and informing patients about guidelines. Descriptions of each subcomponent and to what extent they were implemented in the MENA region are provided in the following sections.

2.3.4.1 Evidence-based guidelines

In the MENA region, the availability and use of evidence-based guidelines (EBGs) to support decision making vary from a lack of clinical guidelines and standardised process of care to fully formulated diabetes care guidelines based on the most up-to-date clinical evidence (Paulo et al., 2018, Khattab et al., 2007). Examples of the successful implementation of EBGs include flow sheets and health education checklists, both of which are available in Riyadh and Aseer, Saudi Arabia (Al-Khaldi, 2014, Moharram and Farahat, 2008). In the UAE, different programmes were initiated and implemented in various emirates; for instance, SEHA launched a consumer care development programme named "Kafu" to standardise care by adopting the best practice in Abu Dhabi (Paulo et al., 2019, Paulo et al., 2017). In addition, a quality improvement programme was initiated in Al Ain for people with diabetes and hypertension, with three main objectives including improving healthcare professionals' knowledge and adherence to evidence-based guidelines (Baynouna et al., 2010). In addition, a set of clinical guidelines was developed based on WHO and American Diabetes Association guidelines, which were then adopted by the MoH (Reed et al., 2001). Moreover, diabetes care guidelines were formulated and implemented in Dubai to develop the decision support system (Khattab et al., 2007). In Beirut, evidence-based guidelines were supported through provider education in healthcare centres; however, it was not integrated into care through proven behaviour-change methods or reminders for healthcare providers (Itani et al., 2015). In another study in Lebanon, the guidelines for diabetes management were standardised to facilitate organised and evidence-based care for people with diabetes (Arevian, 2005). In the Near East, diabetes and hypertension guidelines were adapted and updated regularly, and made available for nurses and midwives who primarily deliver the care (Santoro et al., 2016). Moreover, preventive and curative care services were standardised to plan follow-up. In Israel, diabetes management guidelines were compiled in primary care centres, and computerised follow-up charts were introduced (Shimoni, 2006).

2.3.4.2 Involvement of specialists in providing primary care

A successful example of the involvement of specialists is found in Abu Dhabi, where the diabetic team in primary care has specialists' expertise in integrative teams to provide care for people with diabetes (Paulo et al., 2017). Another example is found in Beirut, where specialists are available in the primary care centre to help improve diabetes care (Itani et al., 2015).

On the other hand, the involvement of specialists is limited in Al Madinah, Saudi Arabia, and occurs through traditional referral only (Aljohani, 2018). Also in the Near East, the reform in the health system led by the UNARWA has provided limited access to doctors for individual cases, and the majority of people with diabetes are managed by nurses and midwives (Santoro et al., 2016). The reason behind this is to protect doctors from excessive workloads. As a result, the number of consultations per day was reduced by 8.7% after this reform (Santoro et al., 2016).

2.3.4.3 Provider education for chronic illness care

Examples of successful education programmes in the MENA region are available in the UAE, Qatar, Egypt, Lebanon, and Israel. In the UAE, diabetes care workshops for nurses and continuous medical education sessions (CME) for doctors are offered (Baynouna et al., 2010). Moreover, health education programmes have been developed for healthcare professionals, such as diabetic nutrition, patient education, and retinopathy examination (Reed et al., 2005). In Qatar, physicians in primary care receive specialised training in the endocrinology department in a tertiary care hospital in Qatar (Rawhya et al., 2009). Similarly, physicians in primary care in Egypt receive training on problem-solving methods delivered by university faculty (Salama and Soltan, 2018). In Beirut, Lebanon, nurses were sent on courses for community care provided by the American University of Beirut; however, not all members of the practice team in diabetes care receive regular training in diabetes care methods (Itani et al., 2015). In Israel, nurses and physicians participate in diabetes management workshops (Shimoni, 2006) that cover a range of selected topics mainly focusing on improving diabetes care (Spitzer-Shohat et al., 2017).

2.3.4.4 Informing patients about guidelines

In the current studies, there is a shred of limited evidence regarding patients' awareness about diabetes guidelines. In the UAE, there is an identified gap in sharing evidence-based guidelines with patients and encouraging them to participate (Paulo et al., 2019, Paulo et al., 2017). In Beirut, some guidelines are provided to people with diabetes, but not all of the guidelines specifically describe their roles in guideline adherence (Itani et al., 2015).

2.3.5 Delivery system design

The aim of the delivery system design, as defined in the CCM, is to assure the delivery of effective, efficient clinical care and self-management support (Improving Chronic Illness Care, 2006). There are six subcomponents under the delivery system design element using the ACIC, comprising practice team functioning, practice team leadership, appointment system, follow-up, planned visits for chronic illness care, and continuity of care. Descriptions of each subcomponent assessment and their implementation in the MENA area are given in the following sections.

2.3.5.1 Practice team functioning

In Saudi Arabia, two studies were conducted in the same region – Aseer – but they reached two different conclusions. In the earlier study (Abdelmoneim and Al-Homrany, 2002), it was reported that physicians are not well trained in diabetic care and do not consider patients' habits and customs. In contrast, the diabetic care in the later study (Al-Khaldi, 2014) was conducted by well-trained family physicians, and was supported by well-trained nurses in managing diabetic patients' files, measuring vital signs, scheduling appointments, and arranging patient follow-ups. In the UAE, there were three studies: two in Abu Dhabi, and one in Dubai. In Abu Dhabi, diabetic care is delivered by physicians who understand patients' cultural background and provide care that patients understand (Paulo et al., 2019, Paulo et al., 2017). In Dubai, an intervention study revealed the gaps in practice team functioning before the intervention, where there was poor teamwork, a lack of experience among some staff, short consultation times with patients, and a shortage of staff (Khattab et al., 2007). However, the researchers were able to establish a diabetes quality improvement team in 16 family practice centres and improve the diabetes team experience. In the Near East, the care for people with diabetes is family-centred and is delivered by a multidisciplinary family health team (Santoro et al., 2016). The care is mainly provided by nurses and midwives, but a well-designed referral system is implemented and helps when any complications arise. In Israel, the teamwork in clinics was addressed, and changes to the practice team roles to improve the care was initiated in a combination of regular team meetings (Spitzer-Shohat et al., 2017). In Beirut, Lebanon, the centre has a diabetic team that meets regularly to address any staff problems and training needs (Itani et al., 2015).

On the other hand, Aljohani (2018) reported the failure to address the functioning of practice team for people with diabetes in primary care, but there was no further explanation about the barriers behind that. In Al Ain, UAE, it was reported that the majority of the healthcare team members are expatriates and do not have formal training or certification in primary care (Reed et al., 2001). This poses a challenge in understanding cultural habits and designing person-centred care for people with diabetes.

2.3.5.2 Practice team leadership

In the MENA region, there is a scarcity of studies describing the leadership of the practice team in diabetes or chronic illness care. In Beirut, Lebanon, leadership is assured by the appointment of a team leader who is in charge of diabetic clinics with defined roles and responsibilities (Itani et al., 2015). In contrast, leadership was identified as a known gap in primary care centres in Abu Dhabi, UAE, where there are no defined roles or task distribution among team members (Paulo et al., 2019).

2.3.5.3 Appointment system

There are few studies that focus on appointment systems in the MENA region; however, the one that was found to be the best implemented, as per the ACIC, was in Beirut, Lebanon. The centre has an appointment system organised by nurses who ensure that diabetic patients see multiple care providers in a single visit (Itani et al., 2015). In Saudi Arabia and the UAE, there is a monthly scheduled follow-up for diabetic patients (Abdelmoneim and Al-Homrany, 2002), and flexible access without the need for appointments for citizens from the UAE (Baynouna et al., 2010). In Qatar, the appointment system limits the number of patients seen in the clinic (Rawhya et al., 2009), while in Israel, diabetic patients cannot have an appointment to see specialists for the first time unless a referral is made by their family physician (Shimoni, 2006).

2.3.5.4 Follow-up

The shortage of medication and delays to, or lack of, laboratory investigations were a prominent gap in the follow-up system for people with diabetes in primary care centres in Saudi Arabia (Al Slail et al., 2018, Al-Khaldi, 2014). In Iran, although there is easy access to public health centres, the service remains passive with no follow-up system and incomplete treatment for patients (Esmaeili et al., 2014). On the other hand, a successful chronic care programme was implemented in Al Ain, UAE. As a result, access to medication and laboratory investigations improved, nurses ensured that the required investigations were performed before the consultation, and a visit reminder by telephone was introduced to help reduce the non-attendance rate (Baynouna et al., 2010). Also in Beirut, Lebanon, the follow-up system was customised to patients' needs, followed the guidelines, and varied in intensity and methodology (in person, phone, email) (Itani et al., 2015).

2.3.5.5 Planned visits for chronic illness

Interestingly, there are no data in the included studies regarding this subcomponent, except in one study conducted in Beirut, Lebanon. In this study, planned visits are made for all patients with diabetes and include assessment and prevention interventions (Itani et al., 2015). In Saudi Arabia and the UAE, there was a monthly follow-up for people with diabetes.

2.3.5.6 Continuity of care

Continuity of care varied from one country to another; however, some data were available in the published papers regarding this subcomponent. In Saudi Arabia, three studies were conducted in different cities, including Al Madinah, Aseer, and Jazan. The continuity of care was highly rated with regard to free and easy access to primary care, while problems were encountered in the coordination of care, especially the referral system (Aljohani, 2018, Badedi et al., 2016, Al-Khaldi, 2014). In Iran, the referral system is underdeveloped, and there are repeated unnecessary specialisation interventions (Esmaeili et al., 2014). This could be a consequence of lack of continuity and the indiscriminate use of health facilities in Iran. In the UAE, continuity of care was selected as a priority to be implemented in primary care because patients are not allocated to a specific family physician, which leads to a lack of continuity of care (Lapão et al., 2018). A similar problem was identified in Dubai, where the researchers realised that the gap in the continuity of care was a result of allowing patients to register with more than one health system, thus receiving care from any available clinic (Khattab et al., 2007).

On the other hand, patients in Beirut have easy access to and continuity of care with a single identified healthcare provider (Arevian, 2005), and an example of fully developed care for people with diabetes is identified in a healthcare centre in Beirut that provides active coordination of care between primary care specialists and other relevant groups (Itani et al., 2015). In Tehran, Iran, people with diabetes who are referred to a diabetes control and prevention programme, active since 2005, are highly satisfied with their continuity of care and the effective primary care services (Tayefi et al., 2015).

2.3.6 Clinical information system

Within the CCM, this element describes the organisation of patient and population data to facilitate efficient and effective care (Improving Chronic Illness Care, 2006). This element has five subcomponents, including registry (list of patients with specific conditions), reminders to providers, feedback, information about relevant subgroups of patients needing services, and patients' treatment plans.

2.3.6.1 Registry (list of patients with specific conditions)

Registries have been reported in different countries in the MENA region. In Dubai and Abu Dhabi, UAE, a computerised diabetes programme register in each primary healthcare centre with key clinical indicators of best practice was developed (Paulo et al., 2019, Paulo et al., 2017, Khattab et al., 2007). In a similar manner, an automated registry, including a list of patients with diagnosis, contact information, and date of last visit, was adopted in Beirut, Lebanon (Itani et al., 2015). Likewise, Clalit Health Services, the largest health management organisation in Israel, registers patients with a single family physician instead of duplicated care services, so the access to patients' data and the date of last contact with the patient can be easily identified. On the contrary, the registers in Al Ain, UAE, contain deficient and duplicated data, making it difficult to determine how many diabetic patients are registered in each clinic (Baynouna et al., 2010).

2.3.6.2 Reminders for providers

In the UAE, there was inadequate documentation in the medical records (lack of diabetes follow up, lack of problem and drug lists) in the Dubai healthcare system. However, an intervention was implemented in 2007, resulting in developing medical records to help advise care providers about patients' status (Khattab et al., 2007). In Abu Dhabi, the Patient-Centred Medical Home model of care has a dashboard that depicts graphs, charts, and spreadsheets about patients with chronic illnesses and their doctors' performance (Paulo et al., 2019, Paulo et al., 2017). In the Near East, the UNRAWA developed an electronic medical records system (eHealth) that rolled out across the majority of healthcare centres managed by the UNRWA, and it provides information to care providers about the number of patients, the services offered, and the outcome of care (Santoro et al., 2016). Likewise, in Israel, electronic health records facilitate the monitoring of care provided for patients with chronic diseases (Spitzer-Shohat et al., 2017). In Beirut, Lebanon, though the clinical information system does not provide the necessary services at the time of encounter or through periodic reporting, it does give a general notification of the existence of chronic disease (diagnosis) (Itani et al., 2015).

2.3.6.3 Feedback in relation to team performance specific to the team's population

In the MENA region, there is little reported evidence about the systematic use of feedback. However, the studies conducted in the UAE reflected a gap in monitoring the performance of the diabetes care teams, which also extended to the overall care provided for the patients who visit primary care centres (Paulo et al., 2019, Paulo et al., 2017). Contrarily, a quality improvement initiative in primary care clinics in Israel established an electronic health records system that helped to monitor the quality of the provided services, create reports, provide feedback regarding the overall and individual care, and assess the performance to achieve the quality indicators (Spitzer-Shohat et al., 2017). In Beirut, Lebanon, the studied centre performs performance appraisals every year, but the documented goals are not incorporated into the healthcare system (Itani et al., 2015).

2.3.6.4 Information about relevant subgroups of patients needing services

In Saudi Arabia, this subcomponent scored the lowest among all other subcomponents under the clinical information system when the ACIC was used (Aljohani, 2018). Similarly, in Abu Dhabi, the CCM was used as a theoretical framework to assess the quality of care services for people with chronic diseases, and the gap was identified in the absence of information about relevant subgroups of patients who need help (Paulo et al., 2019, Paulo et al., 2017). Similarly in Beirut, the ACIC was used in a public healthcare centre, and there was a gap where the information about the relevant subgroups of the patients can be obtained with special efforts or additional programming, and this information was not provided routinely to the healthcare providers to help them deliver the planned care (Itani et al., 2015).

2.3.6.5 Patient treatment plans

In Saudi Arabia, this subcomponent scored the highest among all subcomponents of the clinical information system element when the ACIC was used (Aljohani, 2018). However, the high scores can be criticised, as it was the physicians who provided the care who completed the ACIC, but there is no supporting evidence of how this subcomponent was implemented. In Al Ain, UAE, a card containing relevant data about the care provided to people with diabetes was given, and patients were asked to present it whenever they had an appointment at the clinic (Reed et al., 2001). However, this intervention only improved the process of care, while the outcome remained the same. In Beirut, Lebanon, the ACIC was used and the assessment of the treatment plans for people with diabetes subcomponent was achieved using a standardised approach, but those plans were not established collaboratively and do not include self-management support and clinical management plans together (Itani et al., 2015).

2.3.7 Comparing studies across the entire CCM

Table 2.4 shows the CCM elements with the 28 subcomponents that were identified in the included studies. All six elements were implemented in the MENA primary healthcare systems, but to different extents. However, self-management support and delivery system design were the most identified elements (19 studies out of 26), followed by decision support (18/26), organisation of the healthcare delivery system (13/26), and clinical information system (9/26), and the least-described element was community linkages (6 studies out of 26). In terms of the subcomponents, evidence-based guidelines (decision support) and self-management support (self-management support) were the most commonly reported (12 and 11 studies out of 26, respectively), while the least reported subcomponents were planned visits for chronic illness care (1/26) and practice team leadership (2/26) in delivery system design, addressing the concerns of patients and families (2/26) in self-management support, and regional health plans (2/26) in community linkages.

In general, some studies elaborate on one or more elements; however, one study was explicit and covered all elements in Lebanon, but it was limited to one centre (Itani et al., 2015).

2.3.8 Updated literature search

The search was updated in December 2021 to look for recently published papers about the implementation of the CCM in the MENA region. The identified papers, when mapped with the CCM elements, included studies that focus mainly on one element (e.g., self-management support, clinical information system) in different countries, including Saudi Arabia (Hazazi and Wilson, 2021, Al-Gassimi et al., 2020), Oman (Al Ghafri et al., 2021), and Iran (Zarrin et al., 2020, Molayaghobi et al., 2019a, Mohseni et al., 2020). They all emphasised the gap of the implementation of a single-facet approach to improve care for people with diabetes. One study in Iran looked at all of the elements of the CCM after its implementation in specialised polyclinics in Isfahan city (Molayaghobi et al., 2019b). The conclusion of the study highlighted the feasibility of implementing the model despite several challenges (e.g., limited financial support). It also emphasised the benefits of the redesigned care that shift the services from reactive treatment centres and unplanned care to integrated, patient-centred, and teamwork-based care. These findings support the evidence on the effectiveness of adopting the model and the feasibility of its use in the MENA region, taking into consideration the limitations of its implementation. This study used qualitative methods with diabetes teams to reflect on the implementation, and quantitative measures (i.e., metabolic indicators such as BMI, FBS, HbA1C) from 17 patients to examine the effectiveness of the model.

2.4 Conclusion of the studies

The narrative review summarised the published information about the CCM implementation in the Middle East and North Africa region and identified the gaps in the literature that should be addressed through further investigation. Throughout the evaluation process, it became clear that, while the model has been widely adopted around the world, its use in the Middle East and North Africa region has so far been infrequent and has not been systematically evaluated. Studies that have been published have evaluated the various elements of the model, either together or independently, but from a single point of view (i.e., the provider or patient perspective). In the absence of a detailed understanding of the varied viewpoints of providers and users of care in a shared setting, it was difficult to draw a full picture of whether the model was congruent with the primary care services provided in the MENA region. In addition, no study (from the original search) analysed or evaluated the potential factors that could promote or hinder the model's implementation in a primary care setting. Instead, just one study in the UAE examined the top five implementation priorities as well as the barriers to their execution.

This study contributes to the knowledge by exploring the extent of the implementation of the CCM in one country in the MENA region and identifying the gap in the assessment of its use from the perspectives of healthcare providers and patients in primary care centres. It also addresses the gap about the potential factors that could facilitate or hinder its implementation in primary care centres in the MENA region.

Table 2.4 Summary of the described elements with subcomponents in the included studies

Studies	Chronic Care Model elements																										
	Organisation of the healthcare delivery system						Community linkages			Self-management support				Decision support				Delivery system design						Clinical information system				
	1	2	3	4	5	6	1	2	3	1	2	3	4	1	2	3	4	1	2	3	4	5	6	1	2	3	4	5
(Paulo et al., 2019)	-	-	-	-	√	-	-	√	-	-	√	-	-	√	-	-	√	√	√	-	-	-	-	√	√	√	√	-
(Aljohani, 2018)	-	-	-	√	-	-	√	√	√	√	-	√	-	-	√	-	-	-	-	-	-	-	√	-	-	-	√	√
(Al Slail et al., 2018)	-	-	-	-	-	-	-	-	-	√	√	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-
(Paulo et al., 2018)	√	-	-	-	-	√	-	-	-	√	-	-	√	√	-	-	-	-	-	-	-	-	√	-	-	-	-	-
(Alikhani and Damari, 2017)	√	-	-	-	-	√	-	-	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(Paulo et al., 2017)	-	-	√	√	√	-	√	-	-	-	√	-	-	√	√	-	√	√	-	-	-	-	-	√	√	√	√	-
(Salama and Soltan, 2017)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
(Spitzer-Shohat et al., 2017)	√	-	-	-	-	-	-	√	-	-	-	-	√	-	-	√	-	√	-	-	-	-	-	-	√	√	-	-
(Waheedi et al., 2017)	-	-	-	-	-	-	-	-	-	√	√	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(Badedi et al., 2016)	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-
(Santoro et al., 2016)	√	√	√	√	-	-	-	√	-	-	-	-	√	√	√	-	-	√	-	-	-	-	-	-	√	-	-	-
(Itani et al., 2015)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
(Tayefi et al., 2015)	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-
(Al-Khaldi, 2014)	-	-	-	-	-	-	-	-	-	-	√	-	√	√	-	-	-	√	-	-	√	-	√	-	-	-	-	-
(Esmaeili et al., 2014)	√	√	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-
(Baynouna et al., 2010)	-	-	√	-	-	-	-	-	-	-	-	-	√	√	-	√	-	-	-	√	√	-	-	√	-	-	-	-
(Rawhya et al., 2009)	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	√	-	-	-	√	-	-	-	-	-	-	-	-
(Zoughbie, 2009)	-	-	√	-	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(Moharram and Farahat, 2008)	-	-	-	-	-	-	-	-	-	-	√	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(Khattab et al., 2007)	-	√	-	-	√	-	-	-	-	√	-	-	-	√	-	-	-	√	-	-	-	-	√	√	√	-	-	-
(Shimoni, 2006)	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	√	-	-	-	√	-	-	-	-	-	-	-	-
(Arevian, 2005)	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-	-	√	-	-	-	-	-
(Reed et al., 2005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-
(Abdelmoneim and Al-Homrany, 2002)	-	-	-	-	-	-	-	-	-	-	√	-	√	-	-	-	-	√	-	√	-	-	-	-	-	-	-	-
(Al-Khaldi and Khan, 2002)	-	-	√	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(Reed et al., 2001)	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	√	-	-	-	-	-	-	-	-	-	√

Table 2.5 Elements of the CCM and subcomponents of each element as described in the ACIC tool (Bonomi et al., 2002)

Organisation of the healthcare delivery system	**Community linkages**	**Self-management support**
Overall organisational leadership in chronic illness care Organisational goals for chronic care Improvement strategy for chronic illness care Incentives and regulations for chronic illness care Senior leaders Benefits	Linking patients to outside resources Partnerships with community organisations Regional health plans	Assessment and documentation of self-management needs and activities Self-management support Addressing concerns of patients and families Effective behaviour change interventions and peer support
Decision support	**Delivery system design**	**Clinical information system**
Evidence-based guidelines Involvement of specialists in improving primary care Provider education for chronic illness care Informing patients about guidelines	Practice team functioning Practice team leadership Appointment system Follow-up Planned visits for chronic illness care Continuity of care	Registry Reminders to providers Feedback in relation to team performance specific to the team's population Information about relevant subgroups of patients needing services Patient treatment plans

Chapter Three: General Methodology

3.1 Introduction

This chapter outlines the general strategy of the study and the research context. It describes the research philosophy, methodological approach, strategies used, choices, time horizon, and data collection techniques.

3.2 Research strategy

Saunders et al. (2009) suggested that researchers can use the research “onion” to describe all steps of their research to validate their methodological approach for their study. The research onion can be described as layers of interaction, where each layer explains a different stage of the research. For instance, the centre of the research onion describes the techniques and procedures (data collection and analysis); the next layers are time horizons, strategies, methodological approaches, and researcher approach; and the outer layer is the research philosophy. Figure 3.1 shows how this study used the research onion to describe the steps and methods to answer the research questions.

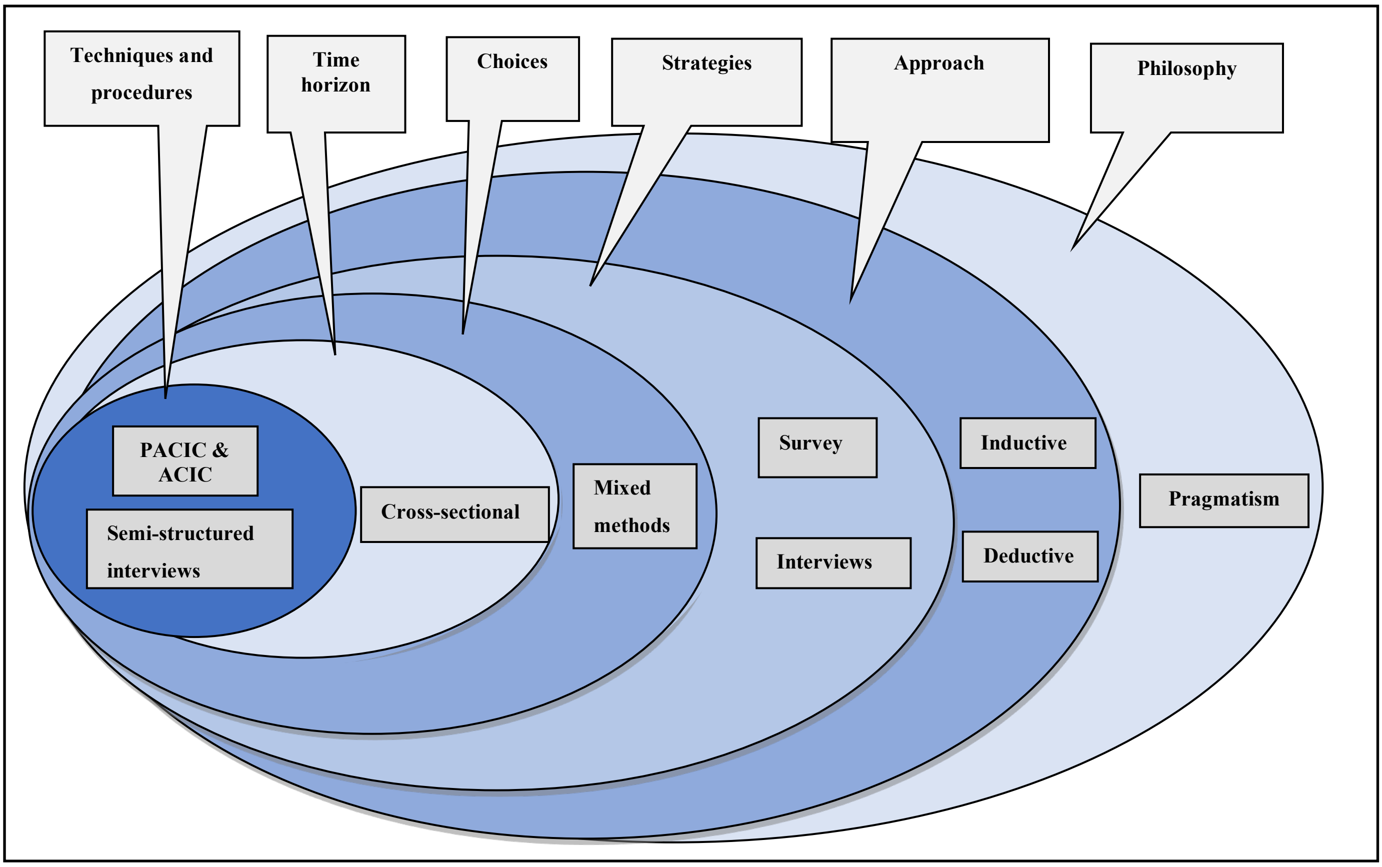

Figure 3.1 The research "onion" model for research strategy, adapted from Saunders et al. (2009)

3.2.1 Research philosophy

According to Saunders et al. (2009), a research philosophy is an "*over-arching term (that) relates to the development of knowledge and the nature of that knowledge*". There are two common constructs within the research paradigm: ontology (the nature of reality) and epistemology (what knowledge is considered acceptable in a given field of research). There are two philosophical positions related to ontology: objectivism and subjectivism, while epistemology has three philosophical positions: positivism, interpretivism, and realism.

Guba and Lincoln (1994) argued that ontology and epistemology are of greater importance for questions than methods, and sometimes it is practically impossible to choose between one position and another. According to Crotty (2020), an ontological position presupposes a certain epistemological position and vice versa. For example, researchers who conduct research with a purely quantitative approach tend to articulate assumptions that are congruent with the positivist paradigm, and argue that social observations should be considered as things in the same manner that physical scientists examine physical phenomena. In contrast, the qualitative purist, sometimes known as an interpretivist or a constructivist, rejects the positivist presupposition and argues that reality is subjective, multifaceted, and socially produced by its participants (Bryman, 1984, Guba and Lincoln, 1994).

Johnson and Clark (2006) argue that what matters is not so much whether our research should be philosophically informed, but rather how well we can reflect on and justify our philosophical choices compared to other alternatives. It is worth mentioning that choosing one philosophy over another does not mean simply what one prefers, but rather depends on the "better" way to answer the research question(s) (Saunders et al., 2009, Johnson and Clark, 2006).

While the debate is frequently framed in terms of a choice between positivist and interpretivist research philosophies, sometimes it is relatively difficult to choose between the two (Saunders, 2014). As a result, selecting one paradigm to reflect the researcher's ideas, values, and where he stands stand as a researcher was difficult. Regarding the examination of the extent of the CCM implementation in PCCs, the researcher agreed with the positivist (objectivist) paradigm. He believes that there is only one version of reality (e.g., a primary care centre either does or does not have a registry that contains a list for patients with chronic conditions), and that his opinions and values should not impact the conclusions of this study; therefore, he pursued a quantitative approach to answer the first question. In contrast, when conducting a qualitative study with different healthcare professionals to obtain their opinions on primary care services for people with diabetes, the researcher leaned toward the interpretivist paradigm, believing that there may be more than one version of the truth (e.g., healthcare providers see patients without an appointment because they care about them, but they could do this to avoid patients' complaints), that his prior values and beliefs can influence his interpretation of the findings, and that a qualitative approach would best serve to answer the second research question.

This situation is known as paradigm incompatibility, in which it is difficult to mix quantitative and qualitative methodologies without contradicting Lincoln and Guba's philosophical principles (Stanovich, 1990). The difficulty with Lincoln and Guba's paradigms is their emphasis on philosophical principles underpinning research rather than practical concerns, particularly when qualitative and quantitative methodologies are combined (Morgan, 2007). As such, Morgan presents the pragmatic paradigm as a viable answer to this difficulty because of the mismatch between these paradigms, their philosophical assumptions, and the practical challenges of conducting mixed methods research (this will be discussed further in the sections on "Choices" and "Techniques and procedures"). In the context of a mixed methods study, pragmatism is a paradigm that identifies and addresses the practical challenges of adopting a set of beliefs (Morgan, 2007). Pragmatism recognises that there are several ways to perceive the world and conduct research, that no single point of view can ever provide the full picture, and that various realities may exist (Saunders, 2014). The research question(s), according to pragmatism, is the most important determinant of epistemology and ontology the researcher uses; one may be more appropriate than the other for addressing certain issues (Saunders et al., 2009). Hence, pragmatism was selected as the research philosophy in this study because it is conducive to incorporating quantitative and qualitative approaches to answer the research questions.

According to Tashakkori et al. (1998), the researcher in a specific study should think of the philosophy adopted as a continuum rather than opposing perspectives. In addition, one should study items of interest and what is of value for purposes of studying various ways that are deemed acceptable, and use the results in ways that will benefit one's value system (Tashakkori et al., 1998, Saunders et al., 2009).

3.2.2 Approaches

According to Morgan (2007), the pragmatic position proposes the notions of abduction "*connection of theory and data*", intersubjectivity "*relationship to the research process*", and transferability "*inference from data*". As a pragmatist, the researcher agrees with the concept of abduction, which involves the researcher switching back and forth between induction and deduction, and with the pragmatic emphasis on intersubjectivity, in which the researcher's interaction with the study process is not forced into the contradiction of subjective and objective dichotomy. Instead, the researcher may switch between several frames of reference as needed. The researcher also agrees with the notion of transferability, which states that while not all quantitative research is generalisable, and not all qualitative research is context-specific, a set of characteristics should be studied to evaluate whether the research findings are transferable to other contexts.

3.2.3 Strategies

There are different strategies that can be used for explanatory, exploratory, or descriptive research, and they can belong to inductive or deductive approaches (Yin, 2003, Saunders et al., 2009). Surveys and interviews were the most appropriate strategies for use in answering the research questions and to fulfil the objectives of the study. The combination of surveys and interviews is attainable and there is no superiority of one over another, but importantly, they are both able to address the research questions and meet the objectives of the study (Saunders et al., 2009).

3.2.4 Choices

The next layer is choices. This refers to the decisions made as to whether and how to combine qualitative and quantitative techniques and procedures. As shown in Figure 3.2, there are different research options, and this study employed the mixed methods design. The data collection techniques and procedures of both quantitative and qualitative designs were used in the same study.

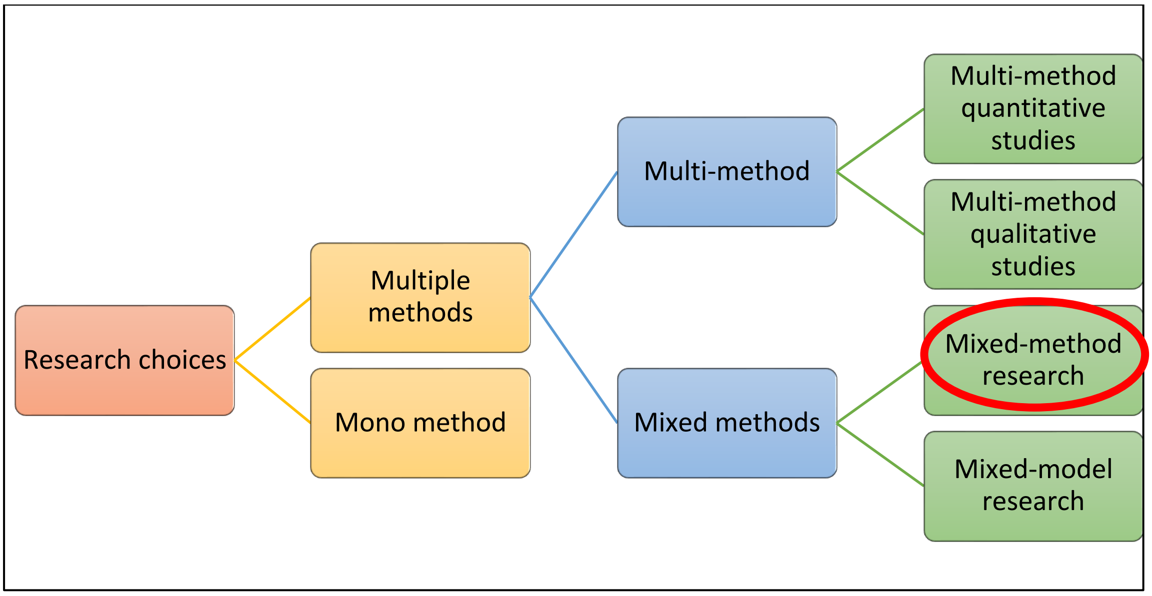

Figure 3.2 Research choices, adapted from Saunders et al. (2009)

The integration of mixed methods at the different levels of the study was conducted as shown in Figure 3.3. When a mixed methods study is reported in an integrated model, the yield of the findings is increased in a way that best answers the research questions (Andrew and Halcomb, 2009). The integration of mixed methods at the level of choice can be performed in three ways: an explanatory sequential design, an exploratory sequential design, and a convergent design (Fetters et al., 2013). The difference between these design methods is the sequence of collecting and analysing qualitative or quantitative data (Fetters et al., 2013). At the study design level, the integration was explanatory sequential, in which quantitative data are collected and analysed first, and the findings are used to guide the qualitative phase. In terms of weighting and prioritising the decisions made in this study, quantitative and qualitative methods have equal weight and both play an important role in addressing the research questions. Surveys were used to answer the first research question, while interviews were used to answer the second question.

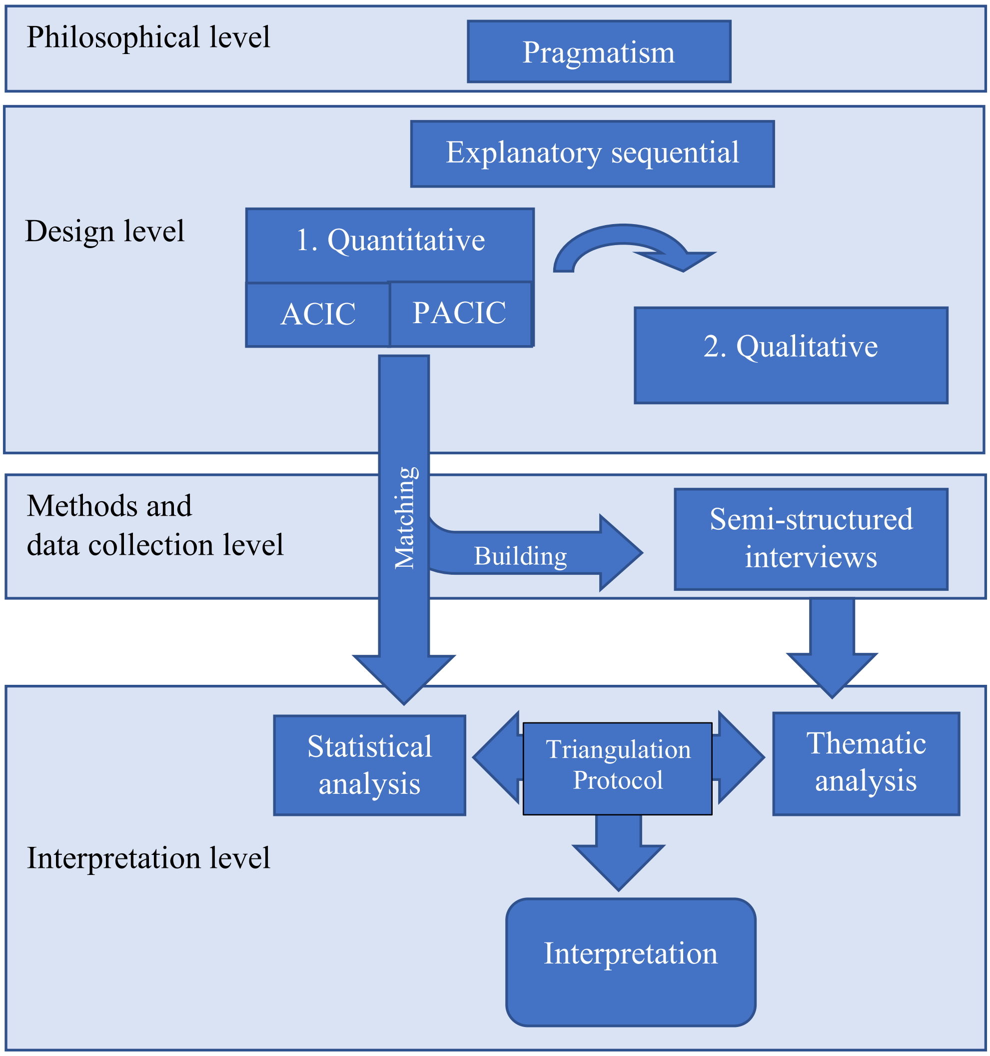

Figure 3.3 Mixed-methods integration at the different levels of the study

3.2.5 Time horizons

There are two options for time horizons. These are cross-sectional studies and longitudinal studies. Each study has its own strengths and weaknesses, and the selection of the appropriate choice depends on the research question. This study was cross-sectional, as it employed a survey and semi-structured interviews.

The cross-sectional design has advantages over other observational studies, namely cohort and case-control, as it is relatively quick, cost-effective, and multiple outcomes can be measured where all measurements are made in a single point in time (Mann, 2003, Levin, 2006). On the other hand, this design has its limitations, primarily due to the simultaneous assessment of exposure and outcome, which leads to undetermined cause and effect association. Furthermore, the analysis of associations in such a design bears the risk of bias such as selection bias, information bias, and confounding (Kesmodel, 2018). To reduce selection bias in PACIC, the researcher selected a target population during specific days (diabetes follow-up days) to reflect on the services provided to them, and not the participants' characteristics. In PCCs, there are specific days during which doctors see people with diabetes in the chronic condition clinic as part of their regular follow-up. The researcher ensured that the data were only accessible by the researcher alone, thus assuring confidentiality. In the ACIC, healthcare professionals had the option to include their personal details in case they were willing to provide further data through interviews. In terms of confounding, statistical modelling (i.e., multivariate regression and multilevel analysis) was conducted to control for one or more potential confounders at the same time and to enable the assessment of each confounder's influence separately.

In this study, a cross-sectional design was chosen to collect data about how the different elements and subcomponents of the chronic care model were implemented from healthcare professionals' perspectives and patients' perspectives. It is also a cost-effective approach and is not particularly time consuming, which is an important aspect in this study as the data were collected outside of the UK. In addition, this method has potential overall ethical advantages, since the surveys do not generally expose the target individuals to invasive techniques (e.g., the use of medications or invasive procedures); instead, they merely expose the participants to specific events that usually occur in the real world (Mathers et al., 2007).

As a result, it was evident that many of these strengths associated with the cross-sectional design fulfil the requirements for the research questions; thus, the researcher employed this study design to address the research questions by utilising questionnaires and semi-structured interviews.

3.2.6 Techniques and procedures

The onion's final layer takes the research design even further into the practicalities of techniques (data collection) and procedures (data analysis). As mentioned earlier, the technique used for the quantitative design was the survey, and semi-structured interviews were adopted for the qualitative design. For the quantitative design, pre-existing questionnaires developed by the Improved Chronic Illness Care (ICIC) staff, named the Assessment of Chronic Illness Care (ACIC) and Patient Assessment of Chronic Illness Care (PACIC), were used in this study. The ACIC questionnaire was designed to be filled in by healthcare professionals (chronic care team), while the PACIC was designed to be completed by patients with chronic illnesses. Both questionnaires were designed in alignment with the CCM, where the ACIC assesses the quality of services from the healthcare professionals' perspective and the PACIC is used to complement the ACIC to reflect patients' perspectives (Glasgow et al., 2005a). The Arabic version of the PACIC was used (Alharbi et al., 2021), while the ACIC was translated from English into Arabic, culturally adapted, and validated as part of the research.

In the literature, the ACIC and PACIC were used separately in the MENA countries to assess primary healthcare services for patients with chronic diseases (AlMomen et al., 2015, Salama and Soltan, 2017, Aljohani, 2018), but there has been no study where both surveys have been used together for assessing diabetes or any other chronic disease care.

While the administration of the questionnaires may identify the gaps in the delivered care considering the CCM, they cannot reveal why these gaps exist or how they can be bridged. Accordingly, semi-structured interviews were conducted with healthcare professionals working in primary care centres, and health administrators in the General Directorates of Health Affairs in the Al Baha region.

The semi-structured interviews were in-depth interviews in which the interviewer used a set of open-ended questions that the participants were encouraged to answer at length. The topic guide helped to achieve the optimum use of time and to explain why different elements of the

CCM were scored similarly or differently by the ACIC and PACIC in order to identify gaps (i.e., barriers) and how they can be bridged (i.e., facilitators) in a systematic and comprehensive way.

In this type of study and at the technique level, seven approaches can be used for mixed methods research integration. They include data connecting (with the use of sampling to connect), data building (the results of one strand are used to design data-gathering tools or processes for the other), data hypothesis generation and testing (generating hypotheses with one type of data and testing those hypotheses with another type of data), data matching (on a domain-by-domain basis, themes, or constructs match), data diffracting (using data slices to better understand a phenomenon), data embedding (data gathering and analysis are intertwined at several points), and data merging (for comparison and analysis, the two datasets are brought together) (Fetters et al., 2013). During data collection, all of these approaches can be used; however, data merging can be used for data analysis, and data diffraction can be used for both data analysis and data collection. The integration at the technique level in this study was through matching surveys and building quantitative and qualitative approaches.

At the interpretation and reporting level, mixed methods research integration can be achieved through joint displays (data combined by visualising it in order to obtain new perspectives that go beyond the knowledge received from the distinct quantitative and qualitative outcomes), data transformation (one type of data must be transformed into another type of data, and then merged with non-transformed data), narratives (in a single or series of reports, researchers discuss the qualitative and quantitative findings), or a combination of any of these methods (Moseholm and Fetters, 2017, Fetters et al., 2013).

However, combining the findings from qualitative and quantitative data is difficult in practice (Creswell and Clark, 2017, Curry and Nunez-Smith, 2014). It is challenging because qualitative and quantitative data come in different forms, which are difficult to compare (Moseholm and Fetters, 2017), and it takes more time and effort to integrate the findings after the completion of each study's data collection and analysis (Morgan, 1998). Different techniques of integrating qualitative and quantitative data have been proposed in the literature. They include (1) the triangulation protocol (comparing the separate results of qualitative and quantitative analysis), (2) linking (qualitative data themes and quantitative data instruments), (3) following a thread (making qualitative data and quantitative data depend on each other), (4) joint display (comparing the outcomes of qualitative data and quantitative data side-by-side), (5) transformation (turning qualitative data into quantitative data, and vice versa), (6) correlation (correlating qualitative data with quantitative data), (7) consolidation (data from both quantitative and qualitative sources are combined to create new consolidated codes, variables, or datasets), and (8) using GIS mapping to harmonise qualitative data and quantitative data (Bazeley, 2012, Fetters et al., 2013, O'Cathain et al., 2010, Johnson and Christensen, 2014). This study achieves the practical implementation of integration at the interpretation level using the triangulation protocol, which was employed to compare results from both approaches (i.e., quantitative and qualitative) and to make inferences about areas of agreement, disagreement, complementarity, and silence.

3.2.6.1 Triangulation protocol

Triangulation is the combination of findings from separately collected and analysed quantitative and qualitative data (O'Cathain et al., 2010). This is a broad description, and in practice, there are two common definitions. The first is to describe the corroboration between findings from the two different methods. The second is to describe the process of exploring a problem utilising various approaches to obtain a more complete picture (Sandelowski, 1995). Mixed-methods studies commonly use the second approach (exploration from different perspectives) because it helps to gain a more complete picture than separately reporting the results (O'Cathain et al., 2010). Moreover, it could enhance the validity of the findings and assess whether the data converge (agree), complement one another, contradict (disagree), or were in silence (a key finding identified from one component, but not another) (Moseholm and Fetters, 2017).

As a result, both quantitative and qualitative data can build a comprehensive understanding of the primary care services for people with diabetes in the Al Baha region in terms of the extend of alignment with the chronic care model, and facilitators and barriers toward model implementation in the context of the Saudi healthcare system.

3.2.6.2 Quality assessment of mixed methods research

Every attempt was made to incorporate the issues identified in the suggested list of issues that should be considered when presenting mixed methods research into the final report. The researcher followed the guidelines of the Good Reporting of a Mixed Methods Study (GRAMMS) checklist (O'cathain et al., 2008), which advises that the following six aspects be included in the reporting of a mixed methods study: 1) reason for using a mixed methods approach, 2) the design used, 3) description of each method, 4) where and how the integration has occurred, 5) limitations of each method, and 6) insight gained from the integration.

3.3 Ethical considerations

3.3.1 Data storage

The questionnaires were collected personally from all PCCs and stored in a locked safe at the home of the researcher. All documents were scanned and transformed into digital copies and stored securely in the University of Sheffield filestore (X:drive). Another copy was stored in the cloud storage service of the University of Sheffield through Google Drive. Physical copies of the surveys were personally transferred by keeping them in a locked briefcase during the trip back to the UK, and were then destroyed after having secured digital copies.

3.3.2 Ethical approval

The ethical approval for this research was obtained from the Ministry of Health Institutional Review Board in Saudi Arabia (Central IRB Log No: 2019-0128E) (Appendix 7). The board is recognised as having sufficiently robust ethics review procedures by the University of Sheffield's Research Ethics Committee.

3.3.3 Disclosure

This study provided all potential participants with a participant information sheet and an informed consent form. The researcher gave the participants the opportunity to read about the upcoming survey before deciding whether or not to participate. The participant information sheet included the following information: the purpose of the study, the significance of the study, what kind of contribution the participants can make, and how to provide consent for further contact and interview.

3.3.4 Understanding

The participants were given an opportunity to fully understand the purpose of the study and to ask any questions they may have had about the survey or interviews before providing their final consent to take part. The informed consent form was designed by the ethics committee in the MoH, and was written in simple language (English and Arabic) – the researcher avoided all complicated wording in order to ensure the clarity of the information.

3.3.5 Volunteering

All participants in this study were informed that their participation to take part in this study was entirely voluntary and free of any coercion. In addition, all participants were informed they were not obliged to take part in the study, as well as the fact that they had the right to skip any questions without giving a reason. Furthermore, the participants were free to withdraw from the survey or interviews at any time without providing any explanation.

3.3.6 Consent form

The research participants who received the participant information sheet and decided to take part in this study were requested to sign the consent form. The consent form informed the participants that their details would remain confidential and that they could quit at any time during the study.

3.3.7 Confidentiality and anonymity

All of the data collected from the participants during the study were kept confidential. The researcher reassured the participants that any data collected from the questionnaires would not be shared with anybody until all of their relevant personal information had been encoded and deleted. The collected data were analysed and kept anonymously on a password-secured computer, to which only the researcher had access.

3.3.8 Data governance

All personal information and data related to identifiable and living individuals were appropriately managed and complied with the General Data Protection Regulation (GDPR). The data were lawfully processed and collected for limited purposes, which were relevant and adequate for the research purposes; in addition, the data were kept no longer than necessary and were secured when being transferred from Saudi Arabia to the UK. All relevant documents associated with the fieldwork of this study were maintained in a locked safe at the researcher's home. Once the collected data had been analysed and completed, all participant information was destroyed.

3.4 Chapter summary

This chapter presented the research methodology strategy. The adopted philosophy was pragmatism with the alternative use of induction and deduction approaches. The study utilised explanatory sequential mixed methods and it combined pre-existing surveys with qualitative interviews to answer the research questions. The ACIC survey was translated, validated, and culturally adapted. The triangulation technique was used to integrate the results from both approaches, quantitative and qualitative, to draw the conclusions, implications, and avenues for future research. The chapter concluded with a description of the ethical considerations.

Chapter Four: Quantitative Research Phase

4.1 Overview

This chapter describes the quantitative phase of the study. Two surveys were identified and used to collect data from people with diabetes and healthcare professionals in PCCs. They were taken from the literature as they were designed to address the elements of the CCM. A description of each tool considering the methods, results, and discussion is provided in the following sections.

4.2 Survey I: Patient Assessment of Chronic Illness Care (PACIC-5A)

The Patient Assessment of Chronic Illness Care (PACIC) measures specific qualities of care reported by patients about their experiences in the healthcare delivery system. According to Glasgow et al. (2005a), it was developed to supplement the ACIC by providing the patient's perspective on receiving chronic illness care related to the CCM. This instrument is necessary for three reasons: to give convergent evidence regarding the provision of care, to understand and incorporate patient viewpoints, and to overcome the potential for physicians' over-reporting biases in describing their care delivery (Glasgow et al., 2005a).

4.2.1 Methods

4.2.1.1 Structure of the questionnaire

This survey has two versions, namely PACIC and PACIC+. PACIC+ contains the same 20 items as the PACIC, but with an additional six items. The extra items in the second version were taken from the '5As' model (ask, advise, agree, assist, and arrange) (Appendix 3). The 5As model is a general patient-centred model of behavioural counselling that is compatible with the Chronic Care Model (CCM) (Glasgow et al., 2003, Glasgow et al., 2005b). It has often been used to increase self-management and overall community support, which are both elements of the CCM.

The 20 items in both surveys came from 46 items created by a nationwide group of experts that study chronic illness care and CCM. After piloting the survey on a sample size of 130 patients, the 20 items were arranged into five different subscales, as follows:

- Patient Activation (items 1–3).

- Delivery System Design/Decision Support (items 4–6).
- Goal Setting (items 7–11).
- Problem-Solving/Contextual Counselling (items 12–15).
- Follow-Up/Coordination (items 16–20).

The remaining six items in the PACIC+, henceforth PACIC-5A, are based on the 5As model, and they are:

- "Asked what I would like to discuss about my illness at that visit".
- "Asked how my work, family, or social situation related to taking care of my illness".
- "Helped to make plans for how to get support from my friends, family or community".
- "How important the things I do to take care of my illness (e.g., exercise) were for my health".
- "Set a goal together with my team for what I could do to manage my condition".
- "Given a book or monitoring log in which to record the progress I am making".

4.2.1.2 PACIC-5A scores and scoring system

The PACIC-5A is a five-point Likert scale questionnaire consisting of 26 items. The first 20 items are categorised into five subscales, and the rest were subscales of the 5A approach to physicians' counselling (behavioural counselling), as follows:

- Subscale 1: Patient Activation (items 1–3).
- Subscale 2: Delivery System Design/Decision Support (items 4–6).
- Subscale 3: Goal Setting (items 7–11).
- Subscale 4: Problem-Solving/Contextual Counselling (items 12–15).
- Subscale 5: Follow-Up/Coordination (items 16–20).

The 5As model of behavioural counselling:

- Assess (items 1, 11, 15, 20, 21).
- Advise (items 4, 6, 9, 19, 24).
- Agree (items 2, 3, 7, 8, 25).
- Assist (items 10, 12, 13, 14, 26).
- Arrange (items 16, 17, 18, 22, 23).

The Likert scale response anchors of the PACIC-5A are “almost never” and “almost always”, and response points range from 1 to 5, as follows: “almost never” (1), “generally not” (2), “sometimes” (3), “most of the time” (4), and “almost always” (5). As such, the average score for each subscale can be calculated as the result of the sum score for the responses under the subscale divided by the number of questions under that subscale. A total summary score can be obtained by the sum of the questionnaire responses over the total number of questions. The scoring instructions for the PACIC and 5As model of behavioural counselling are shown in Table 4.1.

Table 4.1 Scoring system for APCIC-5As survey

PACIC Scoring	
PACIC summary score	Average of the first 20 items
Patient Activation	Average of items 1–3
Delivery System Design/Decision Support	Average of items 4–6
Goal Setting	Average of items 7–11
Problem-Solving/Contextual Counselling	Average of items 12–15
Follow-Up/Coordination	Average of items 16–20
5As Scoring	
5As summary score	Average of items 1–4 and 6–26 [2]
Assess	Average of items 1, 11, 15, 20, 21
Advise	Average of items 4, 6, 9, 19, 24
Agree	Average of items 2, 3, 7, 8, 25
Assist	Average of items 10, 12, 13, 14, 26
Arrange	Average of items 16, 17, 18, 22, 23

4.2.1.3 Definition of the PACIC-5A subscales

The subscales of the PACIC and 5A are defined and described as shown in Table 4.2 and Table 4.3.

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[2] Note: a typing error was identified in the scoring system for the 5A summary score in the original study as calculated for items 1–4 and 6–20 (Glasgow et al., 2005b).GLASGOW, R. E., WHITESIDES, H., NELSON, C. C. & KING, D. K. 2005b. Use of the Patient Assessment of Chronic Illness Care (PACIC) with diabetic patients: relationship to patient characteristics, receipt of care, and self-management. *Diabetes care,* 28**,** 2655-2661.However, a correct score should include items 1–4 and 6–26, which was achieved in a recent study that used the same questionnaire (SCHWENKE, M., WELZEL, F. D., LUCK-SIKORSKI, C., PABST, A., KERSTING, A., BLÜHER, M., KÖNIG, H.-H., RIEDEL-HELLER, S. G. & STEIN, J. 2019. Psychometric properties of the

Table 4.2 Definition of the PACIC scale (Glasgow et al., 2005)

PACIC Subscales	**Definition**
Patient Activation	Actions that solicit patient input and involvement in decision making
Delivery System Design/Decision Support	Actions that organise care and provide information to patients to enhance their understanding of care
Goal Setting/Tailoring	Acquiring information for and setting of specific, collaborative goals
Problem Solving/Contextual	Considering potential barriers and the patient's social and cultural environment in making treatment plans
Follow-Up/Coordination	Arranging care that extends and reinforces office-based treatment, and making proactive contact with patients to assess progress and coordinate care

Table 4.3 Definition of the 5As counselling approach (Glasgow et al., 2003)

5A Subscales	**Definition**
Assess	Beliefs, behaviour, and knowledge
Advise	Provide specific information about health risks and benefits of change
Agree	Collaboratively set goals based on patient's interest and confidence in his or her ability to change the behaviour
Assist	Identify personal barriers, strategies, problem-solving techniques, and social/environmental support
Arrange	Specify plan for follow-up (e.g., visits, phone calls, mailed reminders)

4.2.1.4 Patient Assessment of Chronic Illness Care (PACIC-5A) questionnaire language

The PACIC-5A has been used for people with chronic diseases in primary care and was translated into Arabic in two published studies: one in Saudi Arabia and the other in Egypt, although the Arabic version was not provided by either study. However, a translated version into Arabic was produced by Alharbi et al. (2018), and the validity and reliability of this version were demonstrated. The Arabic version of the PACIC-5A was used with people with diabetes in specialised diabetes centres in Riyadh, Saudi Arabia (Alharbi, 2018) (Appendix 4).

4.2.1.5 Target population

The participants who were eligible to enrol in this study met the following criteria:

Patient Assessment of Chronic Illness Care measure (PACIC-5A) among patients with obesity. *BMC health services research,* 19**,** 61-61.

- Is a person who has had type 2 diabetes.
- Is an adult patient aged 18 years and older.
- Speaks and understands the Arabic language (all registered patients speak Arabic as the main language).
- Is registered at the PHCCs.

Any potential applicant was disqualified if they met any of the following criteria:

- Has functional illiteracy or other incapacities rendering them unable to complete a questionnaire.
- Pregnant women with gestational diabetes.
- Patients with type 1 diabetes.

4.2.1.6 Administration of the survey

4.2.1.6.1.1 Setting

This study was conducted in the Al Baha region, one of the 13 administrative regions in Saudi Arabia. It is located in the southwest corner of the Kingdom, and it is bordered in the north, east, and west by the Makkah region, and in the south by the Aseer region. It has an emirate quarter (Al Baha city) and six governorates, and the target area was the emirate quarter. Geographically, there are three PCCs in Al Baha city; however, the General Directorate of Health Affairs organised the PCCs by sector, with the largest two health sectors being Al Baha and Blajurashi, each containing 11 centres. Thus, all PCCs in Al Baha sector were selected for inclusion in the study, and seven PCCs in Blajurashi were selected to pilot and test the validity and reliability of the translated ACIC survey.

Since all PCCs in Saudi Arabia are under one administration (the Ministry of Health), the organisational differences between regions are unlikely to be significant, and therefore this region was chosen for the current study.

In Al Baha, there are significantly more non-Saudi physicians than Saudis – the percentage of non-Saudi physicians in all tiers of care is 75%. This is close to the percentage of expatriate physicians in all regions (61%). In PCCs, there are more non-Saudi doctors and nurses than Saudis.

Figure 4.1 shows the allocation of PCCs (yellow marks) in Al Baha sector, while the area demarcated by the red line is for Al Baha city.

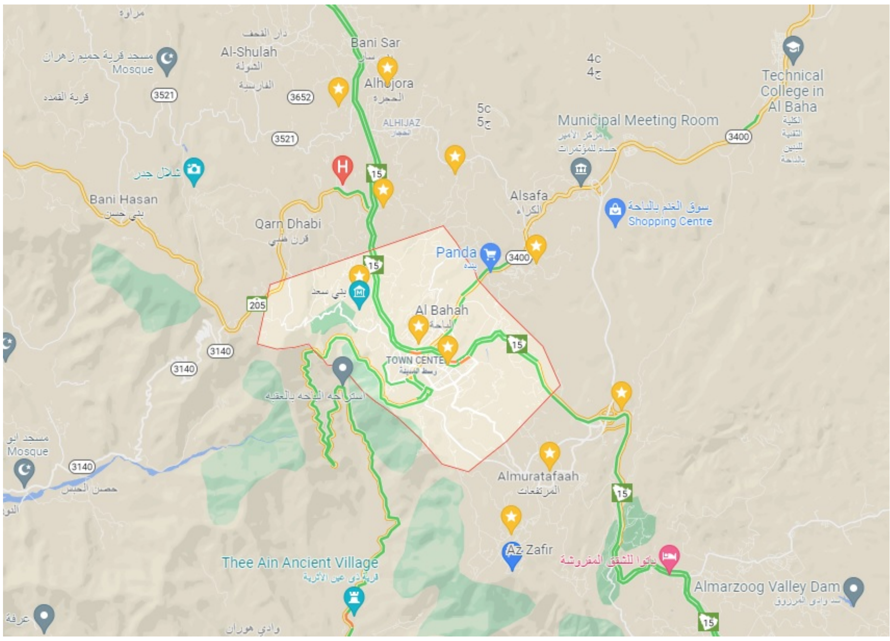


Figure 4.1 Primary care centres in Al Baha health sector

4.2.1.6.1.2 Sampling strategy

Convenience sampling was used whereby the researcher recruited participants from primary healthcare centres on the specific days that the practice dealt with patients with diabetes.

The researcher visited each PCC personally and discussed the aim of the study with the practice managers and medical directors. The researcher was given permission from the MoH to conduct the study and to facilitate data collection from patients and healthcare professionals in the PCCs.

4.2.1.6.1.3 Sample size

The calculated sample size was 381 participants based on a 5% margin of error, a confidence level of 95%, and population size of 40,000. However, due to the COVID-19 pandemic, it was difficult to collect a sample of this size, and a total of 241 questionnaires were eventually collected by the researcher.

4.2.1.6.1.4 Patient invitation and recruitment

The researcher visited all centres personally and invited patients who were sitting in the waiting rooms to participate. He described the aim of the study and assured the patients of the confidentiality of their data. As mentioned earlier, it was unhelpful to make daily visits to the health centres to collect data, so only diabetes-specific days were selected to recruit participants.

4.2.1.6.1.5 Patient consent

A consent form was provided to all patients in the waiting room, and the researcher was present to answer any questions or concerns raised by the potential respondents. The PACIC-5A questionnaire was attached to the consent form. The consent form and the questionnaire were in Arabic. However, the researcher noticed that many patients declined to participate at the beginning due to the number of pages (five pages for the consent form, one page for sociodemographic characteristics, and one page for the questionnaire), so he separated the two sociodemographic and questionnaire pages from the consent form to encourage them to participate.

4.2.1.6.1.6 Patient survey completion and collection

For the PACIC-5A questionnaire, the researcher administered the questions personally to the participants and supervised them during completion. The researcher collected the completed questionnaires on the same day from the male participants. While it was impossible to access the female section due to cultural reasons, the researcher provided copies of the questionnaire to the nurses in charge to distribute them to the female patients. The nurses in each centre were informed about the aim of the study and were made aware of the eligibility criteria, and they were asked to distribute the survey packs containing the consent forms and the questionnaire to diabetic patients who were sitting in the waiting room. The researcher then collected the completed questionnaires either later the same day or the following week.

The researcher selected the diabetes days because it was difficult to collect data on weekdays, as most of the patients had an acute problem or were not eligible to participate. However, some PCCs allocated the same day for diabetes follow-up, so the researcher attended either for the whole day at the same centre, or split the visit into morning/afternoon sessions to attend two centres.

4.2.1.7 Data analysis

The data analysis was performed using the R programme, and the most appropriate method was chosen based on how the values were distributed. The researcher analysed the data with the assistance of a statistician and his supervisor.

The data from the PACIC were entered into Excel, and separate databases were created for each survey. The data were then imported into RStudio (version 4.1.0), and data cleaning was performed to check for any inconsistencies, missing values, and potential errors.

4.2.1.7.1 Descriptive analysis

For the PACIC-5A, the participants' sociodemographic and medical characteristics and the association between the demographic features were summarised in the form of numbers and percentages. Primary care characteristics were summarised, and numbers and percentages were demonstrated in figures and tables according to the participants' demographics, sample population, and the differences between centres. For the PACIC-5A scores, the distribution of the summary scores and domain scores, as aggregated and by PCCs, were presented graphically. Due to non-normality, the median and interquartile range were used as the measures for central tendency and dispersion, respectively. However, for comparison purposes with other studies, the mean and standard deviation were calculated.

4.2.1.7.2 Inferential analysis

The inferential statistics considered the research question, study design, and levels of measurement. The degree of association among the PACIC and 5A subscales was measured using Spearman's correlation coefficient. The relationship between patients' characteristics and the PACIC-5A, summary, and subscale scores was assessed using simple and multiple linear regression. With a hierarchical structure of data where patients nested within the PCCs, a multilevel modelling of variation was used to examine the unexplained variation in PACIC-5A, summary, and subscale scores that was attributable to the variation between PCCs.

4.2.1.7.3 Missing data

For the PACIC-5A, the analysis of the missing values returned a random pattern, and while the scores can be calculated even with missing values, data imputation was not performed.

4.2.2 Results

This chapter represents the analysis of the PACIC-5A questionnaire that was distributed throughout primary care centres in the Al Baha region to patients with type 2 diabetes. Descriptive and inferential statistical analysis were used to describe the basic features of the data and to compare the reported differences in the PACIC elements between individual patients and between primary care centres. People with type 2 diabetes were recruited from all 11 primary care centres in Al Baha using a convenience sampling approach.

In order to obtain a representative sample of patients, a total of 330 questionnaires were distributed. In total, 81 (24.5%) participants refused to complete the survey, eight surveys (2.42%) were incomplete, and the response rate for fully completed surveys was 73.03% (241). While the target population in this study were people with type 2 diabetes, four surveys were excluded because the participants had type 1 diabetes, so the total sample size in the study was 237 (71.82%).

4.2.2.1 Patient characteristics

Table 4.4 shows the number and the percentage of the sociodemographic and medical characteristics of the participants. In this study, most participants were females (52.3%), and the predominant age group was people aged between 40 and 59 years old (45.8%) followed by people aged 60 years and over (42.8%). More than three-quarters of the participants were married (86%) and most of the participants' education level was high school or less (75.1%). Regarding medical characteristics, around half of the participants (49.8%) had had diabetes for between 4 and 10 years. The majority were on oral hypoglycaemic agents (60.2%), while 21% were on insulin. Ninety participants (38%) had one or more diabetes-related complications, including retinopathy or other visual problems (47%), cardiovascular disease (25.64%), neuropathy (17.1%), and renal disease (10.25%). Grouping patients with microvascular and macrovascular complications, it was found that 25% had microvascular complications in the form of retinopathy, nephropathy, and neuropathy, 5% had macrovascular complications in the form of cardiopathy, skin ulcers, and amputation, and 8% had a combination of both micro- and macrovascular complications.

Table 4.4 Characteristics of PACIC participants

Participant Characteristics	**N (237)**	**Percentage (%)**
Sociodemographic Characteristics		
Gender		
Male	113	47.7
Female	124	52.3
Age		
18–39	27	11.4
40–59	108	45.8
> 60	101	42.8
Marital Status		
Single	7	2.9
Married	204	86.1
Divorced	3	1.3
Widowed	23	9.7
Educational Level		
High school or less	178	75.1
Diploma	17	7.2
Bachelor	39	16.5
Postgraduate	3	1.3
Medical Characteristics		
Duration of Type 2 Diabetes		
≥ 3 years	28	11.9
4–10 years	117	49.8
< 10 years	90	38.3
Treatment Status		
Oral	142	60.2
Insulin	49	20.8
Both	45	19.1
Complications		
Yes	90	38
No	147	62
Smoking		
Yes	26	11
No	211	89

4.2.2.1.1 Association between demographic features

Table 4.5 shows the relationship between age and sex in the sample. Males and females were almost equally distributed by age group, with slightly more females (25%) in the age group 40 –59 compared to males (21%).

Table 4.5 Number and proportion of participants by age group and sex

Age	Gender			
	Male (N)		Female (N)	
	N	%	N	%
18–39	13	6	14	6
40–59	49	21	59	25
60 or over	51	22	50	21

Table 4.6 shows the relationship between age and marital status. Most of the participants were married (86%) and the majority were aged between 40 and 59 years old (45%). Those who were widowed were mostly aged 60 and over (91%), and single people were all aged between 18 and 39.

Table 4.6 Participant marital status by age

Age	Marital status							
	Single		Married		Divorced		Widowed	
	N	%	N	%	N	%	N	%
18–39	7	3	19	8	1	0.4	0	0
40–59	0	0	106	45	0	0	2	1
60 or over	0	0	79	33	2	1.2	20	8

Table 4.7 shows the education level by gender: males were more likely to have been educated beyond high school than females. The participants with an educational level of high school or less made up the majority of the sample (75%), with females representing 43% in comparison to males at 32%. The percentage of males with higher education degrees was 16% versus 9% for females.

Table 4.7 Frequency of the level of the education of the participants by gender

Education	**Gender**			
	Male		Female	
	N	%	N	%
High school or less	76	32	102	43
Diploma	14	6	3	1
Graduate or postgraduate	23	10	19	8

4.2.2.1.2 Diabetes-related characteristics

Figure 4.2 shows the differences in medication prescribed according to the duration of diabetes. The use of oral medication only was the predominant prescription (77%) for people who had had diabetes for less than ten years. However, the frequency of prescribing oral medication only was very similar to other treatment options for people who had had diabetes for ten years or more (oral: 34%, insulin: 35%, and both: 31%).

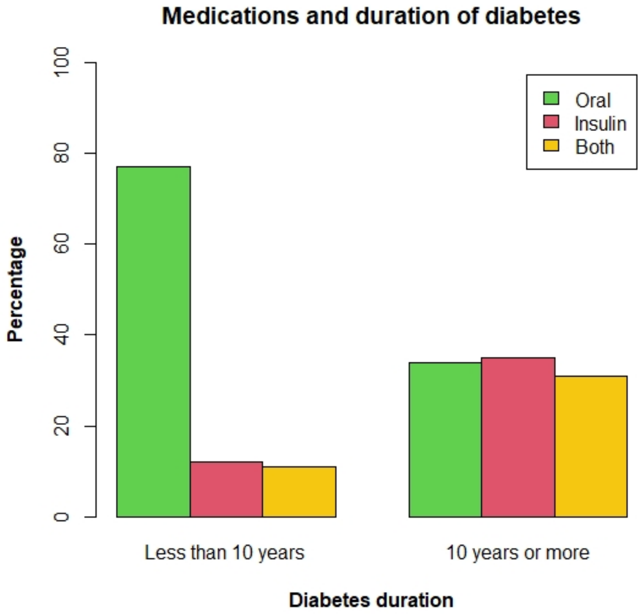


Figure 4.2 Type of medication according to duration of diabetes

Table 4.8 shows the frequency and proportion of complications by age group. Most participants had no complications related to their diabetes (62.3%). People with complications had microvascular complications alone (24.6%), macrovascular alone (5.1%), or both classes of complications (8.1%). However, there was a pattern of an increased number of people who had diabetes related complications with older age. Microvascular complications alone affected 30 (12.7%) people with diabetes aged 60 years and over, compared to 20 (8.5%) people aged between 40 and 59, and only 8 (3.4%) diabetic patients under 40. Both complications were found to affect 16 (6.8 %) older people aged 60 or over compared to only 3 (1.3%) people aged between 40 and 59.

Table 4.8 Number of people with diabetes with complications by age group

Age	**None**		**Microvascular**		**Macrovascular**		**Both**		**Total**	
	N	%	N	%	N	%	N	%	N	%
18–39	18	7.6	8	3.4	1	0.4	0	0.0	27	11.4
40–59	78	33.1	20	8.5	7	3.0	3	1.3	108	45.9
60 or over	51	21.6	30	12.7	4	1.7	16	6.8	101	42.7

Table 4.9 shows the frequency and percentage of the complications by the duration of diabetes. The prevalence of complications was greater among people with a longer duration of diabetes. Microvascular complications alone affected 30 (12.7%) participants who had had diabetes for 10 years and more, 23 (9.7%) with a duration of diabetes between 4 and 9 years, and only five (2.1%) with a duration of three years or fewer. The prevalence of macrovascular complications alone was lower in general, affecting only 12 (5%) participants, where eight (3.4%) had had diabetes ≥ 10 years and four (1.6%) had had diabetes < 10 years. Patients who reported having both micro- and macrovascular complications tended to have duration of diabetes for 10 years or more (7.2%).

Table 4.9 Number of patients with complications according to duration of diabetes

Duration of diabetes	**None**		**Microvascular**		**Macrovascular**		**Both**		**Total**	
	N	%	N	%	N	%	N	%	N	%
3 years or less	21	8.9	5	2.1	2	0.8	0	0	28	11.8
4–9 years	90	38.1	23	9.7	2	0.8	2	0.8	117	49.4
10 years or more	36	15.3	30	12.7	8	3.4	17	7.2	91	38.6

4.2.2.1.3 Diabetic complications and risks

The reported rates of smoking were low (11%). This was less than previous estimates of the prevalence of smoking among adults in Saudi Arabia (21.4%) (Algabbani et al., 2018). Figure

4.3 shows the percentage of complications among smokers versus non-smokers. Half of the smokers (50%) and 63.5% of non-smokers had no complications. The rate of people with diabetes who had microvascular complications (retinopathy, neuropathy, and nephropathy) alone was double among smokers (42.3%) compared to non-smokers (23%). Macrovascular complications (cardiopathy, skin ulcers, and amputation) alone was reported in 5.7% of non-smokers, but not in smokers. The rates of both micro- and macrovascular complications were almost identical among non-smokers (8%) and smokers (7.7%).

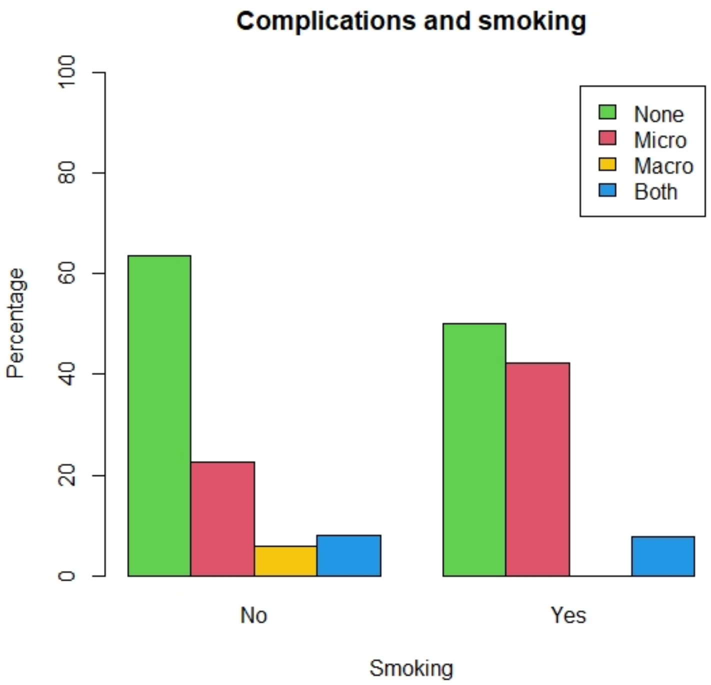


Figure 4.3 Complications and smoking

4.2.2.2 Primary Care Centre characteristics

Table 4.10 represents the workforce, percentage of people with diabetes, and the presence of laboratories and pharmacies within the PCCs. Healthcare workers were doctors (residents, general physicians, or family medicine physicians), nurses, and public health practitioners. There were other healthcare practitioners including dentists, dental assistants, lab technicians, and health informatics, but they were outside of the scope of the study because they were indirectly related to people with diabetes. The difference between health centres regarding the number of doctors was in the range of two to four doctors in each centre. Nurses were in the range of between five and eight. Eight primary care centres had public health practitioners who were mainly epidemiologists; however, they were responsible for health education within centres.

The percentages of people with diabetes based on the total population of registered patients in each centre were in the range of between 6.8% and 12%. The percentage is updated monthly, so it was difficult to obtain a specific number of people with diabetes during the data collection period. The provided percentages were received in September 2021, but the date of collecting these statistics was not specified.

Although there was a laboratory in each centre, the range of tests for people with diabetes was limited (full blood count, liver and kidney function tests) and there were no available tests for HbA1c. Pharmacies were available in all of the centres for prescriptions and the refill of diabetes medication (oral and injections); however, some types of medication were not available (glucagon-like peptide 1 agonists (GLP-1), and sodium–glucose co-transporter 2 inhibitors (SGLT2i)) and were only prescribed by diabetologists from the diabetes centre.

Table 4.10 Characteristics of the primary care centres

PCC	Doctors	Nurses	Public Health Practitioners	% T2DM	Laboratory	Pharmacy
A	3	7	2	10.9	Yes	Yes
B	3	6	2	10.4	Yes	Yes
C	2	5	0	8.4	Yes	Yes
D	4	5	1	6.8	Yes	Yes
E	2	7	2	12.0	Yes	Yes
F	2	6	1	8.0	Yes	Yes
G	4	7	1	12.4	Yes	Yes
H	4	8	0	12.0	Yes	Yes
I	4	5	0	8.5	Yes	Yes
J	3	5	2	11.7	Yes	Yes
K	2	4	1	11.0	Yes	Yes

4.2.2.2.1 PCC sample population

Figure 4.4 shows the distribution of age among the sample of people with diabetes across the primary care centres. The distribution was broadly similar. The proportion of people with diabetes aged 18–39 ranged between 0% and 25%. The proportion of people aged 40–59 ranged between 35% and 61%, and people aged 60 and over ranged between 35% and 59%.

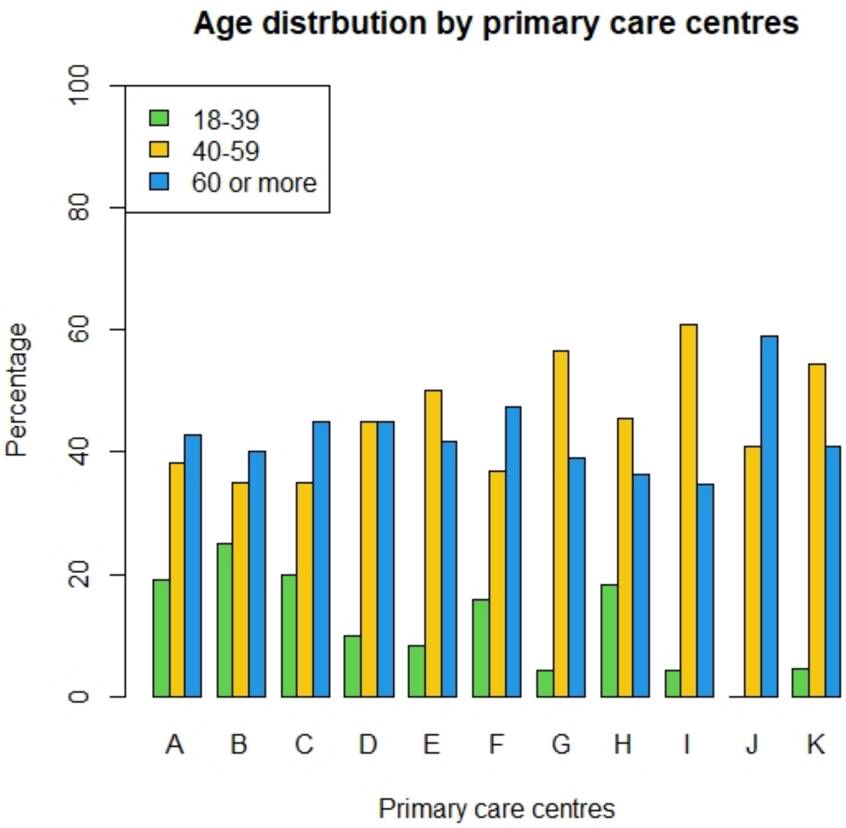


Figure 4.4 Age distribution by PCCs

Figure 4.5 shows the distribution of medication prescribed for people with diabetes across the PCCs. Prescribing oral hypoglycaemic agents alone was the highest across all centres compared to other prescriptions, ranging between 40% and 89.5%. The prescription of insulin alone ranged from 8.3% to 43%. The prescription of both oral and insulin agents ranged between 0% and 37.5%.

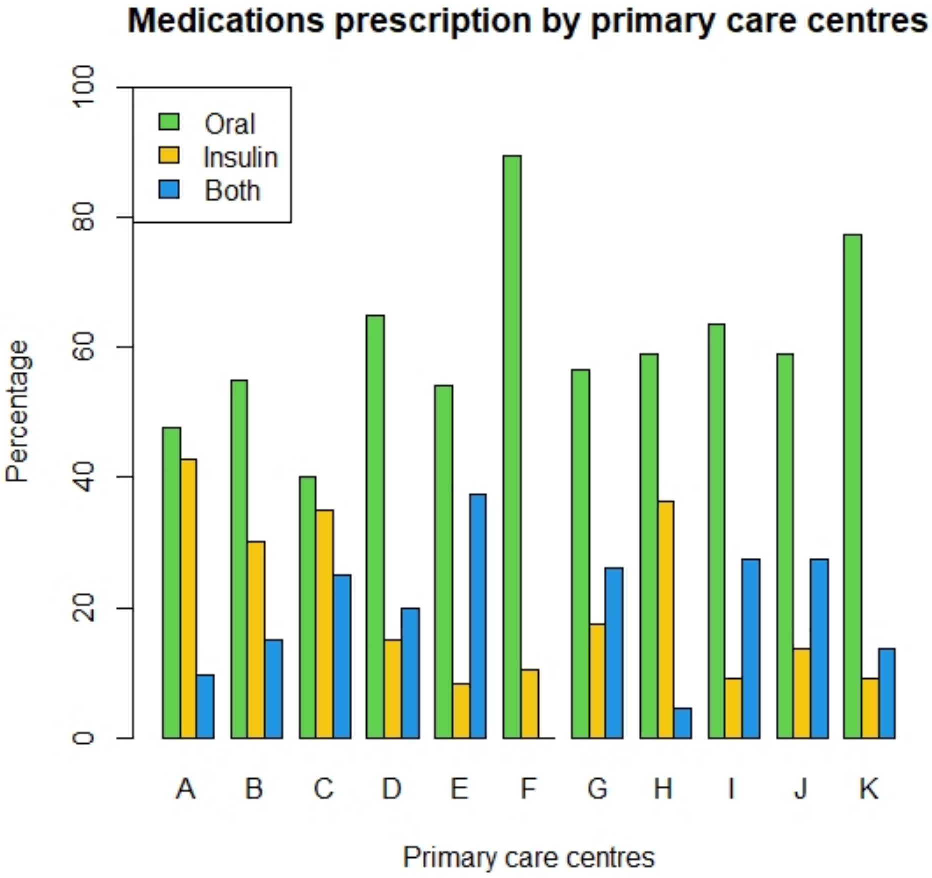


Figure 4.5 Medication prescription distribution by PCCs

Figure 4.6 shows the distribution of complications according to primary care centres. The distribution was not similar between the PCCs, which could be due to the self-reporting of complications. Most of the participants reported having no complications related to diabetes (35% to 96%). Microvascular complications alone were reported by between 4.3% and 47.4% of the participants, and macrovascular complications alone were reported by between 0% and 20% of the participants. The percentage of people with diabetes who had both complications ranged between 0% and 22%.

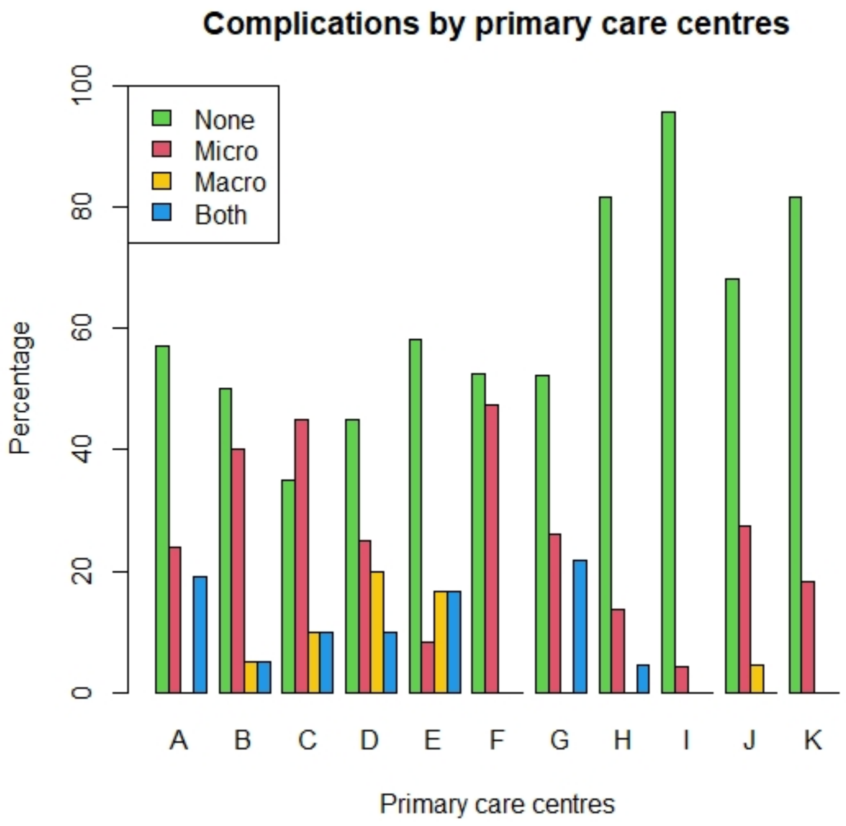


Figure 4.6 Complications distribution by PCCs

4.2.2.3 PACIC-5A data

4.2.2.3.1 Distribution of summary scores

The distributions of the summary scores for the PACIC and the 5A model are shown in Figure 4.7 and Figure 4.8. Both figures show unimodal distributions of the data, although these are not normally distributed.

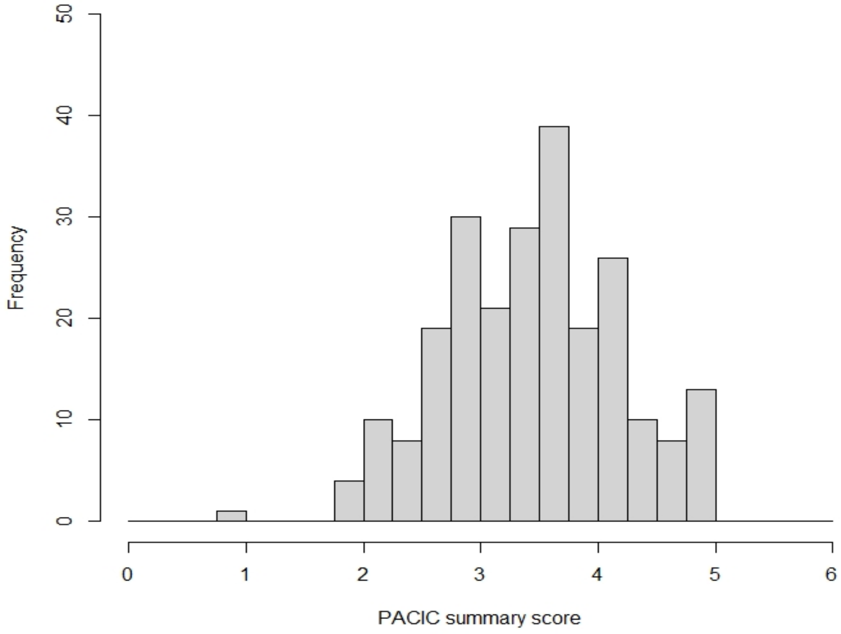


Figure 4.7 PACIC summary score

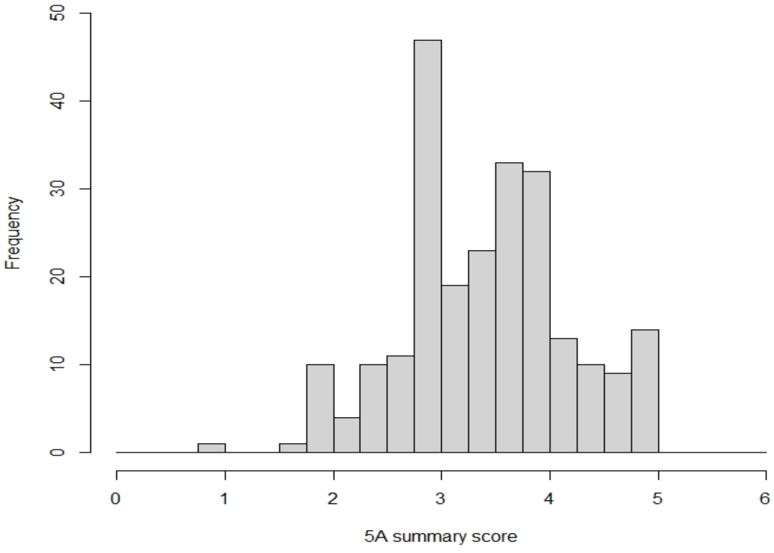


Figure 4.8 5A summary score

4.2.2.3.2 Distribution of domain scores

The subscales of the PACIC and the 5A model showed non-normal distribution of the data, as shown in Figure 4.9 and Figure 4.10.

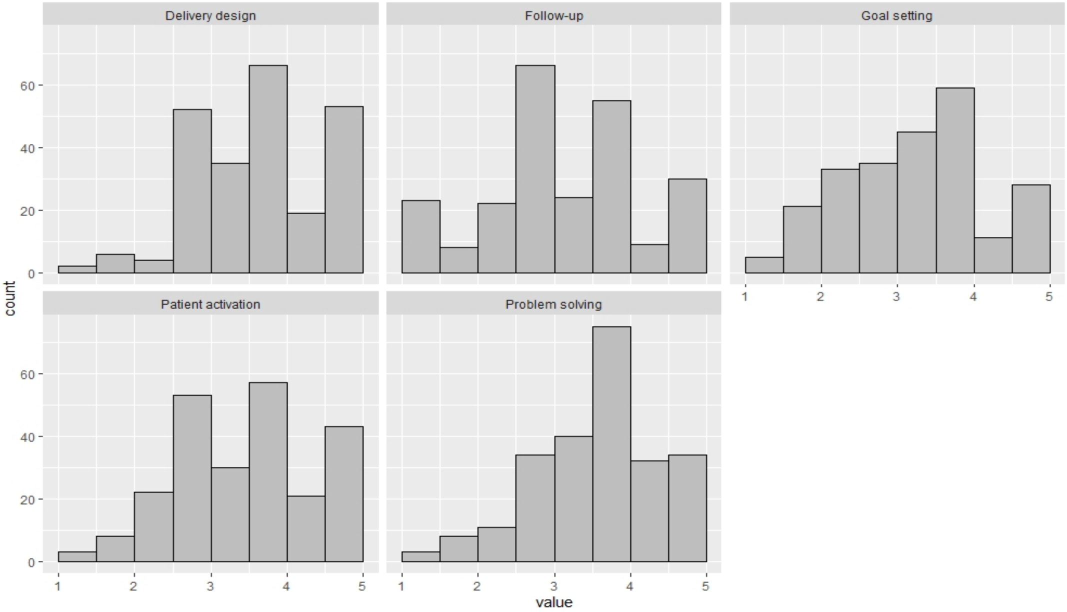


Figure 4.9 Distribution of the PACIC subscales for the total sample

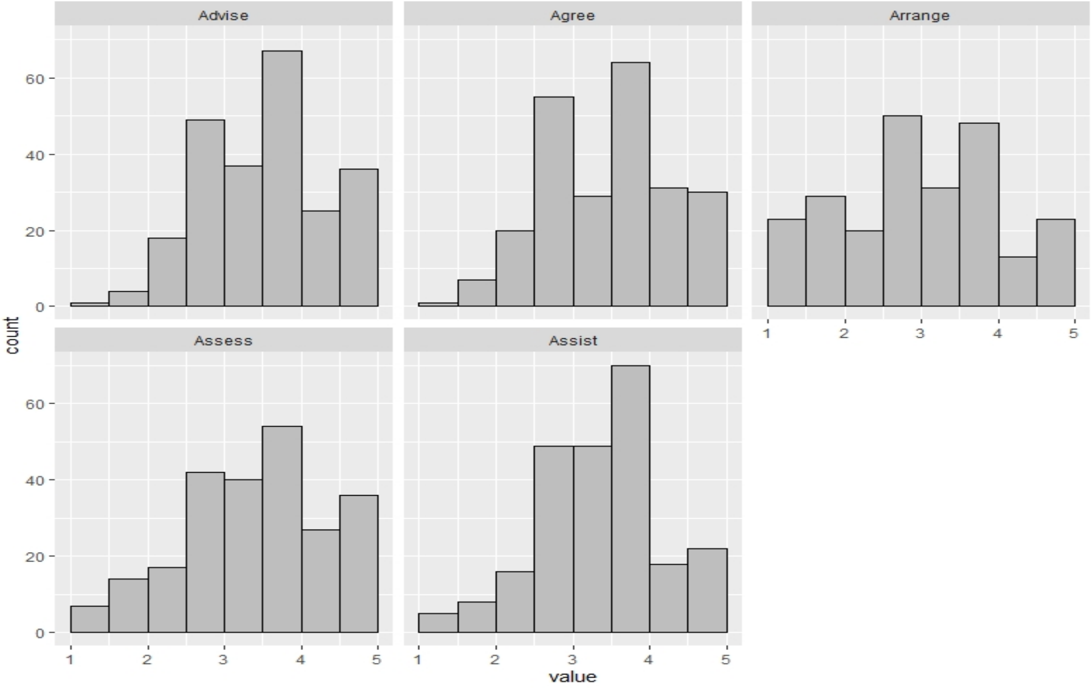


Figure 4.10 Distribution of the 5A subscales for the total sample

4.2.2.3.3 Summary scores of PACIC-5A by PCC

As shown in Figure 4.11, the median score of the PACIC scale was in the range of 2.95 to 4.68 and the interquartile range was approximately similar across all PCCs, with exception of a narrow range in PCC I. Primary care centres F and G showed slightly higher median scores (4.68 and 4.1, respectively) compared to the other PCCs.

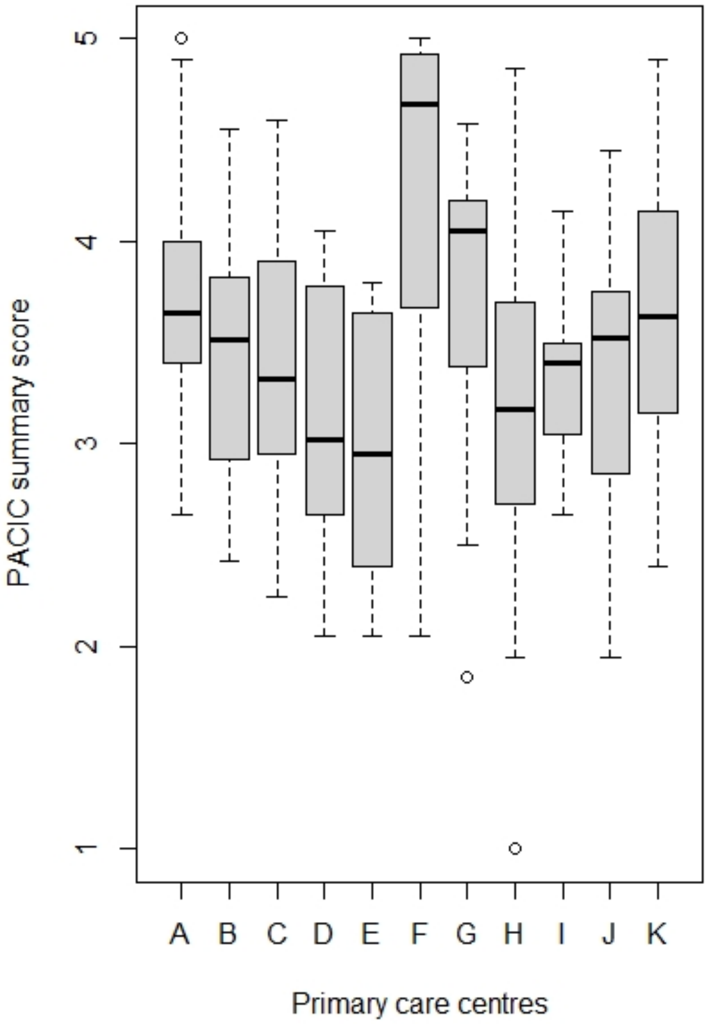


Figure 4.11 PACIC summary score by PCCS

Figure 4.12 shows a similar range of median scores of the 5A model, between 2.98 and 4.66, and a similar interquartile span across all PCCs except for PCC I. Primary care centres F and G showed higher median scores (4.66 and 3.96, respectively) and interquartile range compared to the other PCCs.

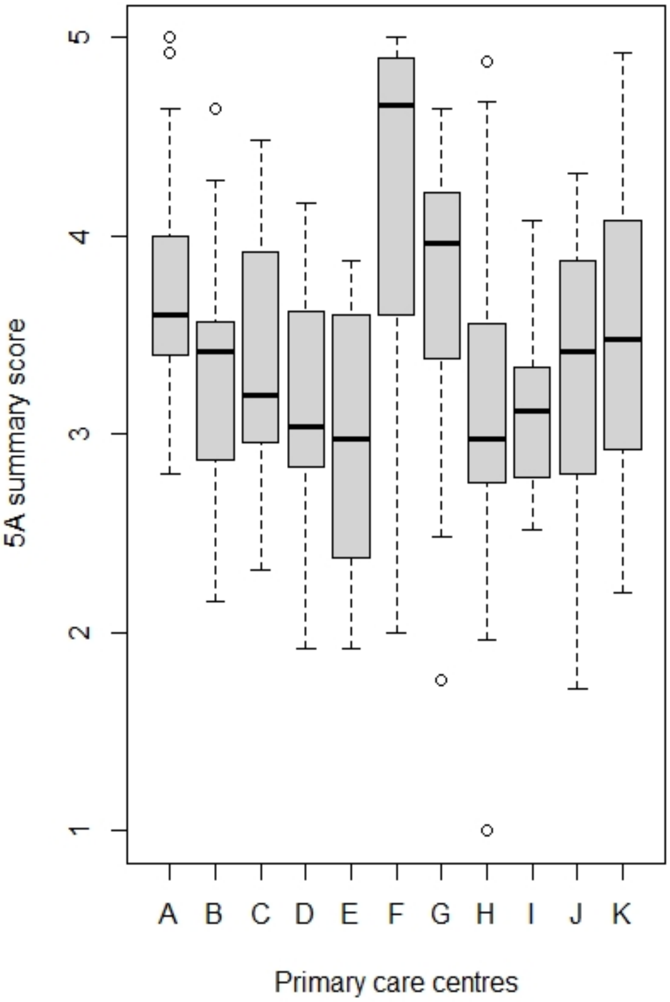


Figure 4.12 5A summary score by PCCS

4.2.2.3.4 Comparison of PACIC-5A subscales scores

Figure 4.13 and Figure 4.14 summarise the distribution of the centre, spread, and overall range of the subscales of the PACIC and the 5A model by PCCs. They show a variety of different shapes and positions and the comparison of the median scores of each subscale showed slight differences between the PCCs, with the lowest range in subscale 2 “Delivery System” (3.0–4.5) and subscale 4 “Problem Solving” (3.12–4.62), and the highest range in subscale 5 “Follow-Up/Coordination” (2.6–4.7).

Generally, the box plots indicate a wide range of scores among the participants across all domains and across the PCCs. The only exception was for PCC F that showed consistently high median scores and interquartile range across all PCCs and for all subscales of the PACIC.

The subscales of the 5A model were very similar to the PACIC subscales, with the lowest range of median scores in the subscale “Assist” (3–4.4) and the highest range in the subscale “Arrange” (2.5–4.5). Likewise, there was consistently higher median scores and interquartile range for all subscales of the 5A model in PCC F.

As shown in Table 4.11, a one-way ANOVA was performed to compare the effect of primary care centres on the PACIC summary score. The results showed that there was a statistically significant difference in the PACIC summary score between at least two groups (F = 4.48, p = <0.001).

Table 4.11 One-way ANOVA with PACIC summary score as the outcome

	Df	**Sum Sq**	**Mean Sq**	**F Value**	**Pr(>F)**
PCCs	10	21.6	2.2	4.48	<0.001
Residuals	225	108.7	0.5		

Similarly, a one-way ANOVA was performed to compare the effect of PCCs on the 5A summary score, as shown in Table 4.12. The results showed a statistically significant difference in the 5A summary score between at least two groups (F = 4.50, p = <0.001).

Table 4.12 One-way ANOVA with 5A summary score as the outcome

	Df	**Sum Sq**	**Mean Sq**	**F Value**	**Pr(>F)**
PCCs	10	22.9	2.3	4.5	<0.001
Residuals	225	114.7	0.5		

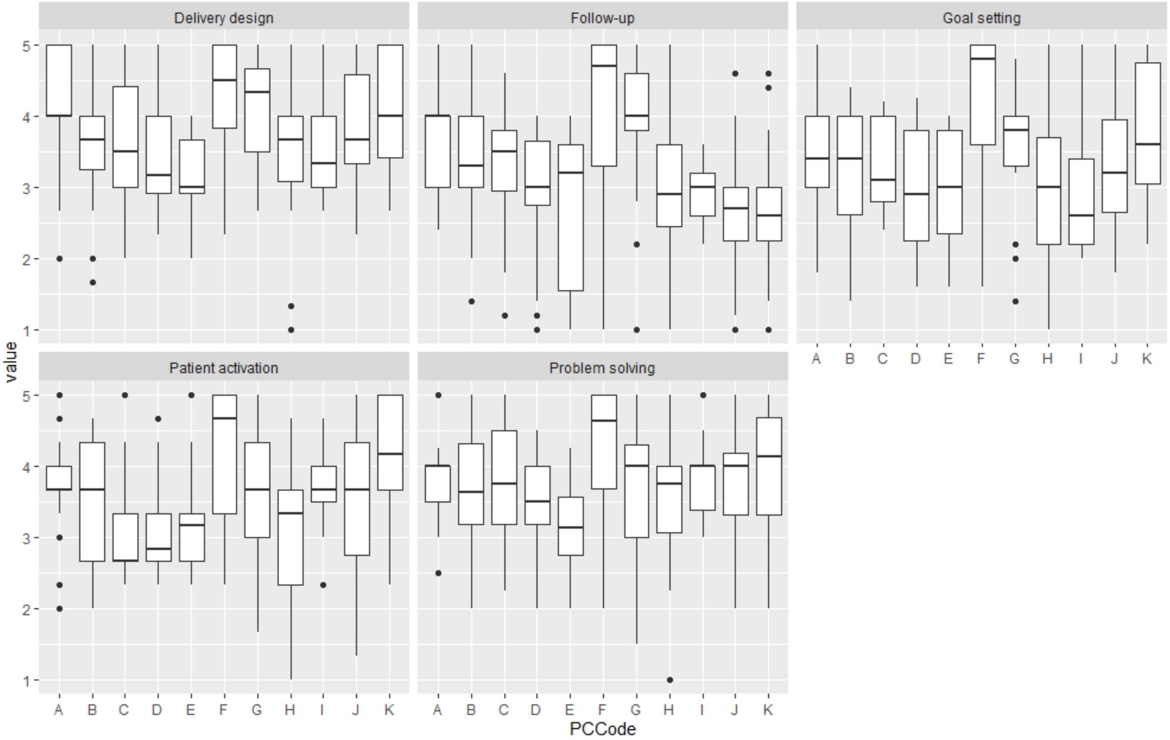


Figure 4.13 Subscales of the PACIC in each primary care centre

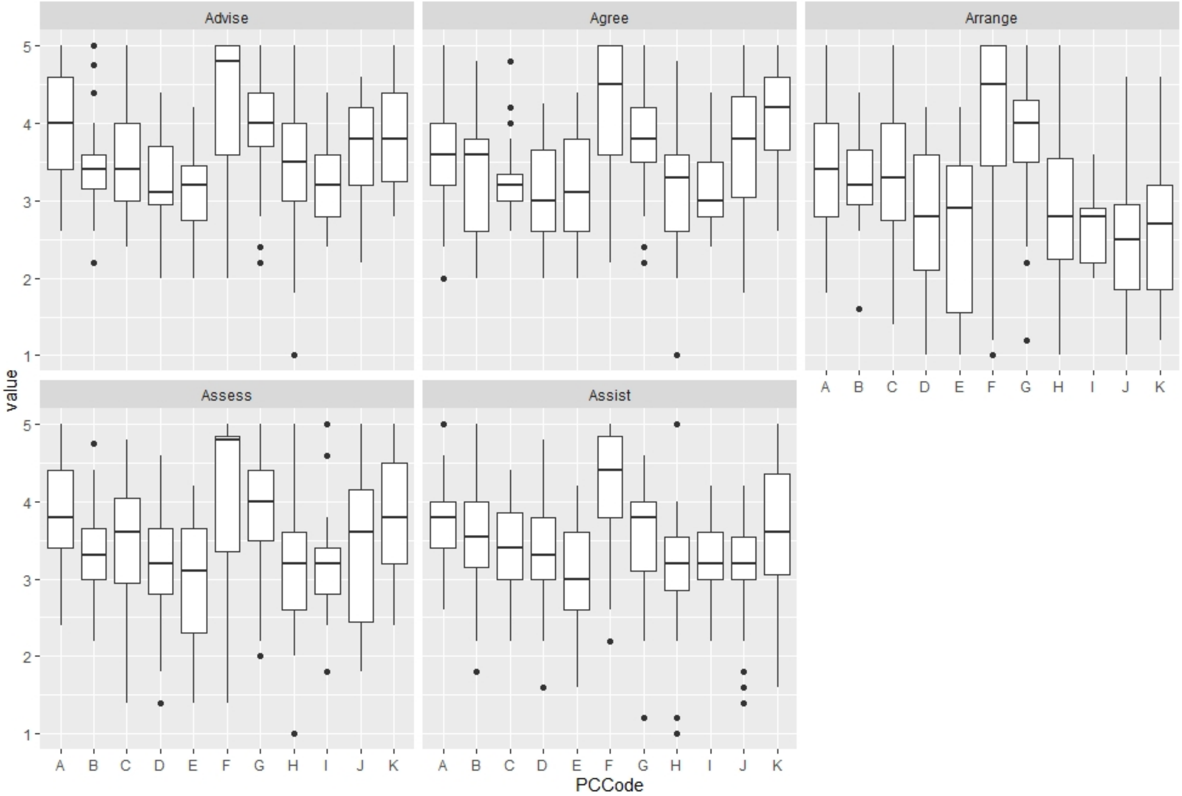


Figure 4.14 Subscales of the 5A model in each primary care centre

4.2.2.3.5 Outlying items

PCC F consistently scored higher than the other centres in both the summary scores of the PACIC-5A or their subscales. This could be due to the high-quality services that were provided in the centre compared to others, or social desirability in answering the survey that was reflected in the higher-rated responses.

To test whether there are significant differences between PCCs excluding PCC F, a one-way ANOVA was performed to compare the effect of PCCs on the PACIC-5A summary scores, but without including participants from PCC F. As shown in Table 4.13 and

Table **4.14**, there are still statistically significant differences between at least two centres excluding PCC F.

Table 4.13 One-way ANOVA for PACIC summary score excluding PCC F

	Df	Sum Sq	Mean Sq	F Value	Pr(>F)
PCCs	9	12.5	1.4	3.18	0.001
Residuals	207	90.4	0.4		

Table 4.14 One-way ANOVA for 5A summary score excluding PCC F

	Df	Sum Sq	Mean Sq	F Value	Pr(>F)
PCCs	9	12.7	1.4	3.04	0.002
Residuals	207	96.2	0.5		

It is worth mentioning that while the primary care centres share similar characteristics to some extent (e.g., similar guidelines for doctors or health educators), this could violate the assumption of the independency of the samples that had been drawn from these centres.

4.2.2.3.6 Category distribution of PACIC-5A scales and subscales

A mean score of 3 or above was the cut-off point to determine whether the services were congruent with the elements of the CCM or not.

Table 4.15 shows the mean (standard deviation), median, and interquartile range scores of the PACIC-5A scales and subscales. The PACIC mean score was 3.46 (0.75) and the 5A model mean score was 3.40 (SD 0.77). The mean scores of the subscales of the PACIC were all above the cut-off point, with the lowest for “Follow-Up/Coordination” at 3.19 (1.0), and the highest for "Delivery Design/Practice design" at 3.73 (0.84). Similarly, the mean scores of the subscales of the 5A model were above the cut-off point, with the lowest mean score for "Arrange" at 3.0 (1.0) and the highest mean score for "Advise" at 3.6 (0.79). This indicated that, on average, people with diabetes described receiving primary care services that were consistent with the CCM "some of the time".

Table 4.15 Mean and median scores of the PACIC-5A scales and subscales

PACIC-5A	Mean (SD)	Median	IQR
PACIC summary score	3.5(0.8)	3.5	3.0 – 4.0
Delivery System	3.7(0.8)	3.7	2.7 - 4.3
Problem-Solving/Contextual Counselling	3.7 (0.8)	3.8	3.0 - 4.3
Patient Activation	3.5(0.9)	3.7	2.6 – 4.0
Goal Setting	3.3(1.0)	3.4	3.3 – 4.3
Follow-Up/Coordination	3.2(1.0)	3.0	2.6 – 4.0
5As summary score	3.4(0.8)	3.4	2.8 – 4.2
Advise	3.6(0.8)	3.6	3.0 – 4.2
Agree	3.5(0.8)	3.6	2.8 – 4.2
Assess	3.5(0.9)	3.4	2.8 – 4.2
Assist	3.4(0.8)	3.4	3.0 – 4.0
Arrange	3.0(1.1)	3.0	2.2 – 3.8

In addition to plotting the distributions of the PACIC-5A scores and estimating the mean and standard deviation, the scores were also transformed to categories. These used the same categories as the professional ACIC scale and were mapped to PACIC scores as follows: limited (score of 1 to 1.9), basic (2 to 2.9), good (3 to 3.9), and fully developed (4 to 5). This was carried out for the PACIC summary score and subscales and also for the 5A summary score and subscales. The findings are shown in Figure 4.15. The primary care services for people with diabetes were generally rated as "reasonably good" by the majority of the participants (44.7%), as reflected by the summary score of the PACIC. The individual subscales of the PACIC were rated as "fully developed" by between 27% and 48% of the participants, "reasonably good" by between 34% and 45%, "basic" by between 11% and 28%, and "limited" by between 1% and 12% of the respondents. "Problem-Solving" and "Delivery Design/Decision Support" received the highest rates as "fully developed" by 48% and 46% respectively. "Patient Activation", "Goal Setting/Tailoring", and "Follow-Up and

Coordination" were rated as "fully developed" by 39%, 32%, and 27%, respectively. The subscales with the lowest rating of "limited" were all below 10%, except for "Follow-Up/Coordination", which was rated as "limited" by 12% of the respondents.

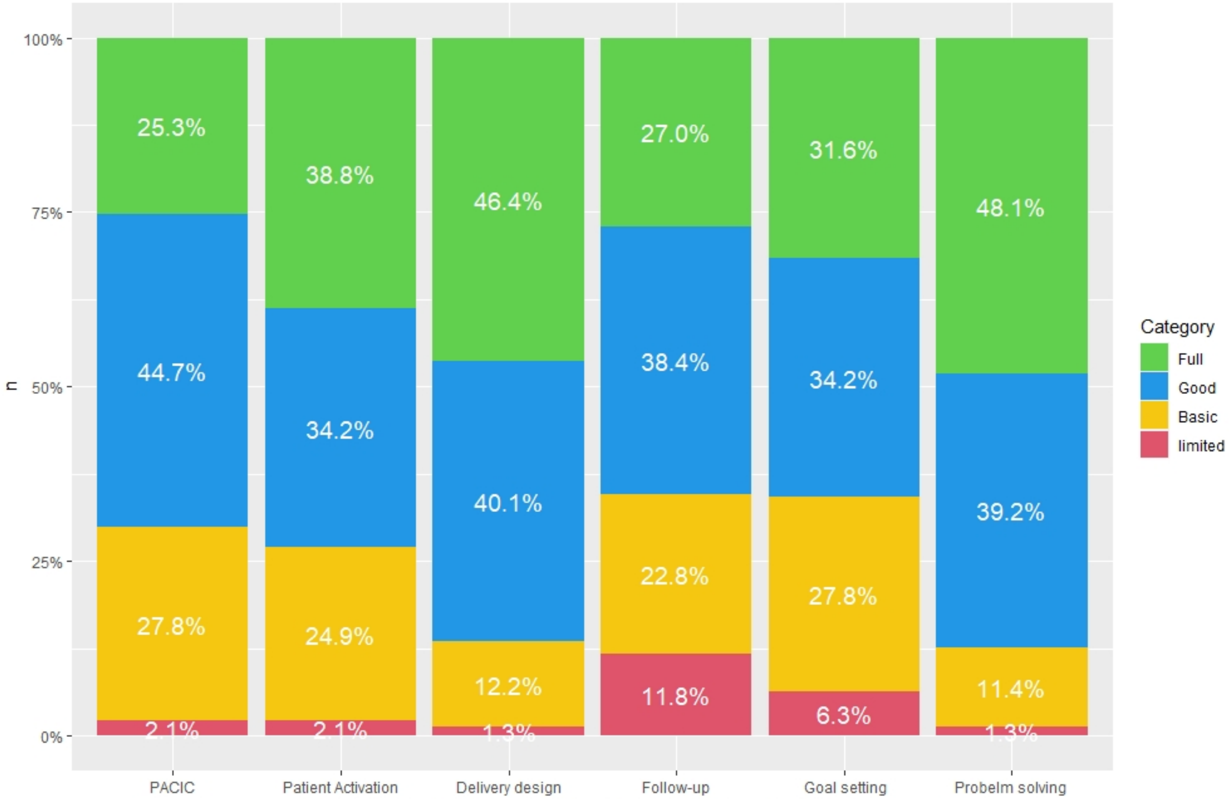


Figure 4.15 Categories of care by PACIC summary and subscales scores

Similar patterns were seen in Figure 4.16, which shows the four categories of care derived from the 5A scale and subscales. The majority of the participants rated the 5A model of behavioural counselling as "reasonably good", as reflected in the summary score given by 49% of the participants. The subscales of the 5A model were rated "fully developed" by between 24% and 37%, "reasonably good" by between 29% and 52%, "basic" by between 18% and 30%, and the lowest category of "limited" by between 1% and 17%. The "Advise" subscale was rated the highest with 37% of participants reporting it to be "fully developed" and 44% as "reasonably good" support. The "Arrange" subscale was by far the lowest scoring, with 17% of participants reporting "limited" support and only 24% "full" support.

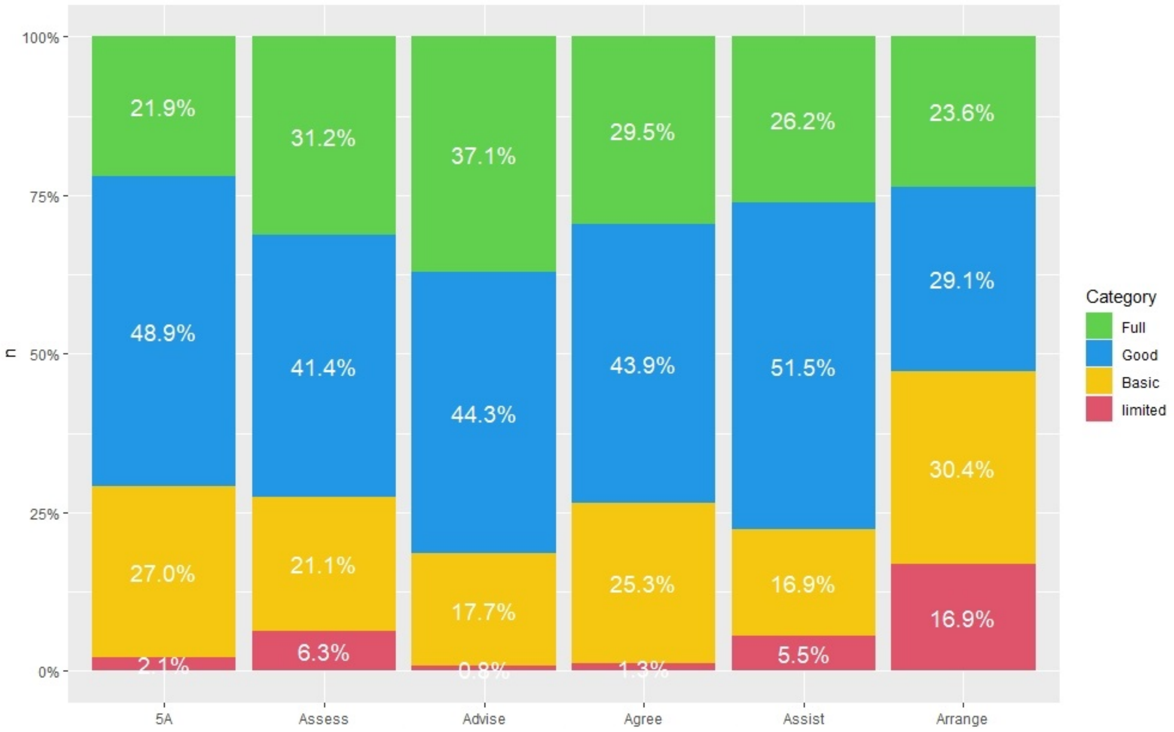


Figure 4.16 Categories of care by 5A summary and subscales scores

4.2.2.4 Correlations

4.2.2.4.1 Correlations of Domain Areas

Table 4.16 and Table 4.17 show the correlations among the PACIC subscales and 5A subscales using Spearman's correlation coefficient. The relationships between the PACIC's individual subscales varied between 0.38 and 0.62 and were all statistically significant ($p < 0.001$). The individual subscales of the 5A model ranged from 0.62 to 0.77 and were all statistically significant ($p < 0.001$). In general, Spearman correlations below 0.4 are categorised as weak, those in the range 0.4–0.59 as moderate, and those of 0.6 or above as strong.

Table 4.16 Correlation matrix of the individual PACIC subscales

Subscales of PACIC	Patient Activation	Delivery System	Goal Setting	Problem Solving	Follow-Up
Patient Activation	1.00	0.60	0.53	0.51	0.38
Delivery System	0.60	1.00	0.60	0.55	0.47
Goal Setting	0.53	0.60	1.00	0.60	0.62
Problem Solving	0.51	0.55	0.60	1.00	0.46

Follow-Up	0.38	0.47	0.62	0.46	1.00

Table 4.17 Correlation matrix of the individual 5As subscales

Subscales of 5A	**Assess**	**Advise**	**Agree**	**Assist**	**Arrange**
Assess	1.00	0.72	0.71	0.66	0.65
Advise	0.72	1.00	0.77	0.69	0.68
Agree	0.71	0.77	1.00	0.66	0.63
Assist	0.66	0.69	0.66	1.00	0.65
Arrange	0.65	0.68	0.63	0.65	1.00

4.2.2.5 Patient factors associated with PACIC-5A

The variability in the PACIC-5A scales could be explained by the characteristics of the participants. To examine whether the independent variables (participants' factors) could predict the PACIC-5A scores, a univariable linear regression model was performed first and then followed by a multiple linear regression. The univariable linear regression was conducted first to examine the effect of each explanatory variable before and after controlling for all factors (i.e., multiple regression analysis).

A univariable linear regression was calculated to predict the PACIC mean score based on the participants' characteristics (gender, age, education, etc.) independently. The results were not statistically significant, except for the predicted PACIC mean score based on the duration of diabetes. The coefficient (-0.25, $p = 0.01$) indicates that, on average, the PACIC score was 0.25 points lower in people who had had diabetes for 10 years or more. The R^2 value of 0.027 indicates that diabetes duration accounted for less than 3% of the variance in the PACIC. Table 4.18 shows the univariable linear regression models with each factor as a coefficient and the summary score of the PACIC as the dependent variable.

Similar to the PACIC, univariable linear regression was calculated to predict the 5A mean score based on the same characteristics individually. The duration of diabetes was the only variable with a statistically significant association with the summary score of the 5A. The significant equation was ($F(1,233) = 5$, $p = 0.02$), with R^2 0.022. The predicted mean score of the 5A model was equal to 3.49–0.23 (diabetes duration of 10 years or more). The average score of the 5A decreased by 0.23 for people who had had diabetes for 10 years or more compared to people with diabetes for less than 10 years.

Table 4.19 shows the results of the univariable linear regression results considering the 5A summary scores as the dependent variable and participant factors as the independent variables.

Table 4.18 Univariable linear regression with the PACIC summary score

Coefficients	**Coefficient**	**95% CI**	**p-value**
Gender			
Female	0.17	-0.03 to 0.37	0.08
Marital status			
Not married	0.23	-0.04 to 0.50	0.11
Age (vs. 40–59)			
18–39	-0.19	-0.5 to 0.12	0.24
60 and over	-0.12	-0.32 to 0.08	0.26
Education (vs. high school)			
Graduate or postgraduate	-0.02	-0.24 to 0.20	0.90
Diabetes duration			
10 years +	-0.25	-0.45 to -0.05	0.01
Medication (vs. oral only)			
Insulin alone	-0.19	-0.43 to 0.05	0.12
Combined	-0.13	-0.38 to 0.12	0.30
Smoking			
Smoker	0.08	-0.23 to 0.39	0.61
Complications (vs. none)			
Microvascular	0.04	-0.20 to 0.28	0.74
Macrovascular	-0.34	-0.77 to 0.09	0.13
Both	-0.12	-0.47 to 0.23	0.51

Table 4.19 Univariable linear regression with summary score of the 5A

Coefficients	**Coefficient**	**95% CI**	**p-value**
Gender			
Female	0.17	-0.03 to 0.37	0.08
Marital status			
Not married	0.20	-0.07 to 0.47	0.16
Age			
18–39	-0.19	-0.5 to 0.12	0.26
60 and over	-0.10	-0.32 to 0.12	0.34
Education			
Graduate or postgraduate	-0.00	-0.24 to 0.24	0.96
Diabetes duration			
10 years +	-0.23	-0.43 to -0.03	0.025
Medication			
Insulin	-0.17	-0.42 to 0.08	0.18
Both	-0.1	-0.35 to 0.15	0.42
Smoking			
Smoker	0.05	-0.26 to 0.36	0.74
Complications			
Micro	0.05	-0.19 to 0.29	0.70
Macro	-0.33	-0.78 to 0.12	0.16
Both	-0.05	-0.42 to 0.32	0.77

The statistically significant association with the duration of diabetes was diminished after fitting a multiple regression analysis with all variables together. A non-significant regression equation was found with the PACIC summary score (F (12, 220) = 1.49, p = 0.13), with an R^2 of 0.08, and a p-value > 0.05 for coefficients. Table 4.20 presents the results of the multiple linear regression analysis with the PACIC summary score as the outcome.

Similarly, non-significant regression was found with the 5A summary score (F (12,220) = 1.2, p = 0.30), with an R^2 of 0.06, and a p-value > 0.05 for the coefficients. Table 4.21 shows the multiple linear regression analysis with the 5A summary score as the outcome.

Table 4.20 Multiple linear regression with the PACIC summary score

Coefficients		Estimate	Std. Error	Pr(>|t|)
(Intercept)		3.5	0.11	
Gender	Female	0.17	0.10	0.10
Marital status	Not married	0.29	0.15	0.06
Age	18–39	-0.25	0.17	0.14
	60 or over	-0.07	0.12	0.55
Education	Graduate or postgraduate	-0.05	0.12	0.71
Diabetes duration	10 years or more	-0.23	0.12	0.07
Medication	Insulin	-0.10	0.14	0.47
	Both	-0.07	0.14	0.60
Smoking	Yes	0.12	0.17	0.46
Complications	Micro	0.07	0.13	0.58
	Macro	-0.23	0.23	0.33
	Both	-0.00	0.20	0.99
Multiple R^2: 0.08, Adjusted R^2: 0.02 F-statistic: 1.49 on 12 and 220DF, P-value: 0.13				

Table 4.21 Multiple linear regression with the 5A summary score

Coefficients		Estimate	Std. Error	Pr(>|t|)
(Intercept)		3.42	0.12	
Gender	Female	0.17	0.11	0.12
Marital status	Not married	0.25	0.16	0.11
Age	18–39	-0.25	0.18	0.17
	60 or over	-0.07	0.13	0.57
Education	Graduate or postgraduate	-0.01	0.13	0.96
Diabetes duration	10 years or more	-0.22	0.13	0.08
Medication	Insulin	-0.10	0.15	0.52
	Both	-0.03	0.15	0.85
Smoking	Yes	0.08	0.17	0.64
Complications	Micro	0.10	0.13	0.47
	Macro	-0.22	0.24	0.37
	Both	0.06	0.21	0.76
Multiple R^2: 0.06, Adjusted R^2: 0.01 F-statistic: 1.19 on 12 and 220 DF, P-value: 0.30				

The assumptions of the regression were tested, as shown in Figure 4.17 and Figure 4.18. Overall, the assumptions of linearity, normal distribution of residuals, and homoscedasticity of variance were preserved.

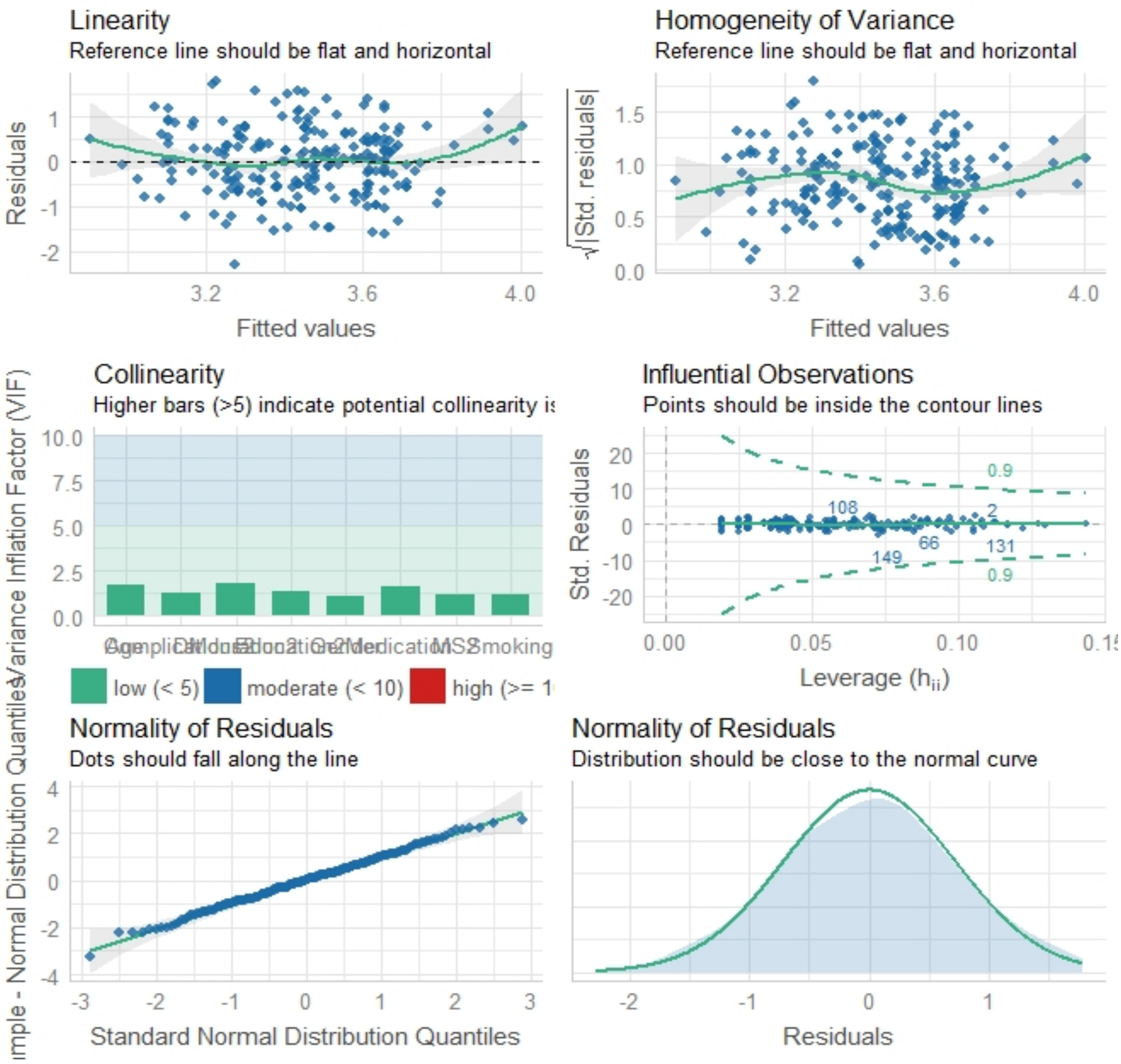


Figure 4.17 Assumption of regression with the PACIC

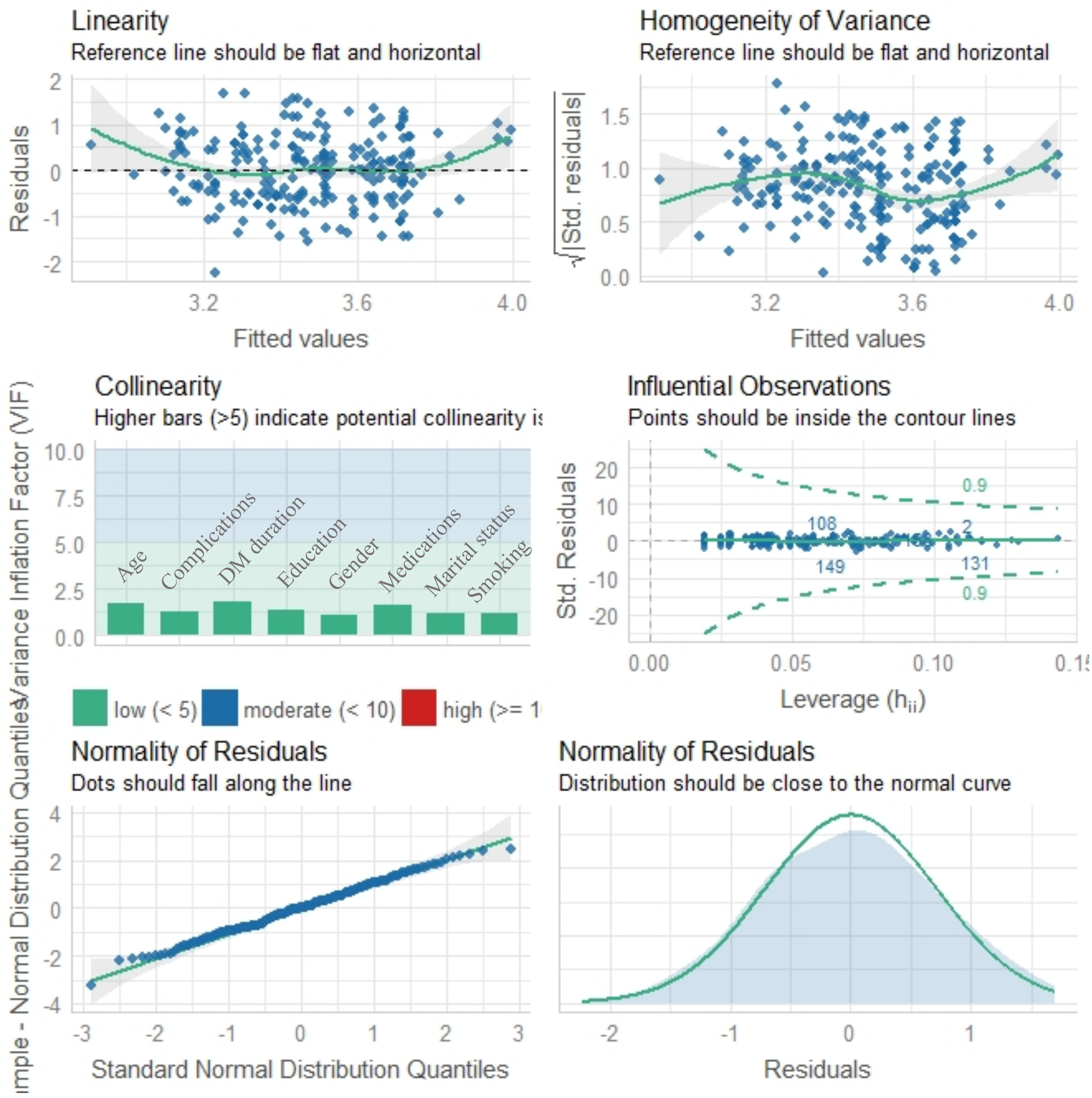


Figure 4.18 Assumption of regression with the 5A model

4.2.2.6 Patient factors associated with PACIC-5A subscales

A univariable linear regression was calculated to predict the mean score of the individual subscales of the PACIC by the participant factors to identify any statistically significant association between the responses and the independent variables before fitting the multiple regression model. The prediction of the individual subscales of the PACIC were not statistically significant with any of the factors except three: duration of diabetes, gender, and medication. Duration of diabetes had a statistically significant association with three subscales: “Patient Activation”, “Delivery Design/Decision Support”, and “Goal Setting/Tailoring”. These subscales were predicted to have lower scores for people who had had diabetes for 10 years or more compared to those less than 10 years. The average scores for patient activation, delivery design, and goal setting were predicted to decrease by 0.37, 0.28, and 0.36, respectively, for people who had had diabetes for 10 years or more compared to those less than 10 years. Gender was significantly associated with two subscales: "Goal Setting/Tailoring" and "Problem Solving/Contextual". Females tended to give higher scores for received care with regard to these two subscales compared to men. The average scores for goal setting and problem-solving were predicted to increase by 0.27 and 0.31, respectively, for females compared to males. Type of medication (oral, insulin, or both) was only significantly associated with patient activation. Patient activation was predicted to decrease by 0.41 among people with diabetes who were on insulin only compared to people with diabetes on oral hypoglycaemic medication. Table 4.22 shows the results from the univariable regression of the PACIC subscales with a statistically significant association with patient factors.

Table 4.22 Univariable linear regression with subscales of the PACIC

Subscales of PACIC	**Patient factors**		**Intercept**	**Estimate**	**Std. Error**	**Pr(>|t|)**
Patient Activation	Duration of diabetes	< 10years	3.68		0.08	
		≥ 10 years		-0.37	0.12	0.003
	Medication	Oral only	3.67		0.08	
		Insulin only		-0.41	0.15	0.007
		Both		-0.20	0.15	0.20
Delivery Design/Decision Support	Duration of diabetes	< 10years	3.84		0.07	
		≥ 10 years		-0.28	0.11	0.013
Goal Setting/Tailoring	Duration of diabetes	< 10years	3.44		0.08	
		≥ 10 years		-0.36	0.13	0.004
	Gender	Male	3.17		0.09	
		Female		0.27	0.12	0.031
Problem Solving/Contextual	Gender	Male	3.56		0.08	
		Female		0.31	0.11	0.004

Similar to the subscales of the PACIC, the subscales of the 5A model were tested for their associations with patient factors by fitting a univariable linear regression model for individual subscales. Likewise, most of patient factors did not exhibit any statistically significant associations with the subscales of the 5A model, except with two factors: duration of diabetes and gender. Duration of diabetes was significantly associated with "Assess", "Advise", and "Agree", while gender was only significantly associated with "Assist". The average scores of the associated subscales with the duration of diabetes were predicted to decrease among people with diabetes for 10 years or more compared to people with diabetes for less than 10 years. The predicted mean scores for “Assess”, “Advise”, and “Agree” were predicted to decrease by 0.31, 0.23, and 0.32, respectively, for diabetic patients with a duration of diabetes of 10 years or more compared to people with diabetes < 10 years. The average score of the “Assist” subscale was predicted to increase by 0.32 for females compared to males. Table 4.23 shows the statistically significant association of the patient factors with the subscales of the 5A model.

Table 4.23 Univariable linear regression with subscales of the 5A model

Subscales of 5A	Patient factors		Intercept	Estimate	Std. Error	Pr(>|t|)
Assess	Duration of diabetes	< 10years	3.59		0.08	
		≥ 10 years		-0.31	0.12	0.013
Advise	Duration of diabetes	< 10years	3.69		0.07	
		≥ 10 years		-0.23	0.11	0.030
Agree	Duration of diabetes	< 10years	3.61		0.07	
		≥ 10 years		-0.32	0.11	0.004
Assist	Gender	Male	3.24		0.08	
		Female		0.32	0.10	0.002

A multiple regression analysis was conducted for the individual subscales of the PACIC with the patient factors. The whole model for each subscale was not statistically significant, with a p-value of the F-statistics >0.05. However, the p-values for the coefficients of duration of diabetes and gender with the “Goal Setting/Tailoring” subscale remained significant at 0.02 and 0.03, respectively. In addition, the coefficient of gender with the “Problem Solving/contextual” subscale remained statistically significant (p = 0.01), as shown in Table 4.24 and Table 4.25.

Table 4.24 Goal setting/tailoring

Coefficients		Estimate	Std. Error	Pr(>|t|)
(Intercept)		3.30	0.14	
Gender	Female	0.29	0.13	0.025*
Marital status	Not married	0.37	0.19	0.052
Age	18–39	-0.27	0.22	0.21
	60 or over	-0.11	0.15	0.47
Education	Graduate or postgraduate	0.06	0.15	0.70
Diabetes duration	10 years or more	-0.33	0.15	0.035*
Medication	Insulin	-0.11	0.18	0.54
	Both	-0.12	0.18	0.51
Smoking	Yes	0.12	0.21	0.57
Complications	Micro	0.06	0.16	0.71
	Macro	-0.22	0.29	0.45
	Both	0.15	0.25	0.54
Multiple R^2: 0.07, Adjusted R^2: 0.03 F-statistic: 1.64 on 10 and 222 DF, p-value: 0.095				

Table 4.25 Problem solving/contextual

Coefficients		Estimate	Std. Error	Pr(>|t|)
(Intercept)		3.60	0.12	
Gender	Female	0.30	0.11	0.008*
Marital status	Not married	0.22	0.17	0.20
Age	18–39	-0.15	0.19	0.42
	60 or over	-0.01	0.13	0.97
Education	Graduate or postgraduate	-0.10	0.14	0.45
Diabetes duration	10 years or more	-0.10	0.14	0.48
Medication	Insulin	0.10	0.16	0.53
	Both	0.05	0.16	0.76
Smoking	Yes	0.19	0.18	0.31
Complications	Micro	0.01	0.14	0.91
	Macro	-0.29	0.26	0.26
	Both	-0.20	0.22	0.37
Multiple R^2: 0.05, Adjusted R^2: 0.004 F-statistic: 1.11 on 10 and 222 DF, p-value: 0.36				

Likewise, a multiple regression analysis was conducted for the individual subscales of the 5A model with the patient factors. The whole model for each subscale was not statistically significant, with a p-value of the F-statistics >0.05. However, the duration of diabetes coefficient kept its statistically significant association with the "Assess" subscale with a p-value equal to 0.048. The coefficient of gender also retained its association with the “Assist” subscale with a p-value of 0.005.

Table 4.26 Multiple regression analysis with “Assess” subscale as the response

Coefficients		**Estimate**	**Std. Error**	**Pr(>|t|)**
(Intercept)		3.55	0.14	
Gender	Female	0.10	0.13	0.43
Marital status	Not married	0.26	0.19	0.17
Age	18–39	-0.42	0.21	0.051
	60 or over	-0.01	0.15	0.97
Education	Graduate or postgraduate	0.01	0.15	0.99
Diabetes duration	10 years or more	-0.31	0.15	0.045*
Medication	Insulin	-0.16	0.18	0.37
	Both	0.01	0.18	0.99
Smoking	Yes	0.24	0.20	0.24
Complications	Micro	0.07	0.15	0.63
	Macro	-0.21	0.29	0.46
	Both	0.01	0.25	0.96
Multiple R^2: 0.05, Adjusted R^2: 0.01 F-statistic: 1.28 on 10 and 222 DF, p-value: 0.24				

Table 4.27 Multiple regression with “Assist”

Coefficients		**Estimate**	**Std. Error**	**Pr(>|t|)**
(Intercept)		3.29	0.12	
Gender	Female	0.31	0.11	0.006*
Marital status	Not married	0.11	0.17	0.51
Age	18–39	-0.12	0.19	0.54
	60 or over	0.01	0.13	0.99
Education	Graduate or postgraduate	-0.01	0.14	0.93
Diabetes duration	10 years or more	-0.17	0.14	0.22
Medication	Insulin	0.03	0.16	0.86
	Both	-0.05	0.16	0.73
Smoking	Yes	0.06	0.18	0.76
Complications	Micro	0.07	0.14	0.60
	Macro	-0.12	0.26	0.63
	Both	0.06	0.22	0.78
Multiple R^2: 0.05, Adjusted R^2: 0.005 F-statistic: 1.12 on 10 and 222 DF, p-value: 0.35				

4.2.2.7 PCC variation in PACIC

Figure 4.19 and Figure 4.20 show the distribution of the PACIC-5A summary scores derived from the PCCs. Similar distributions were noted across the PCCs, with exception of PCC F (both PACIC and 5A) and G (only for PACIC) for which the responses were mostly above 4.

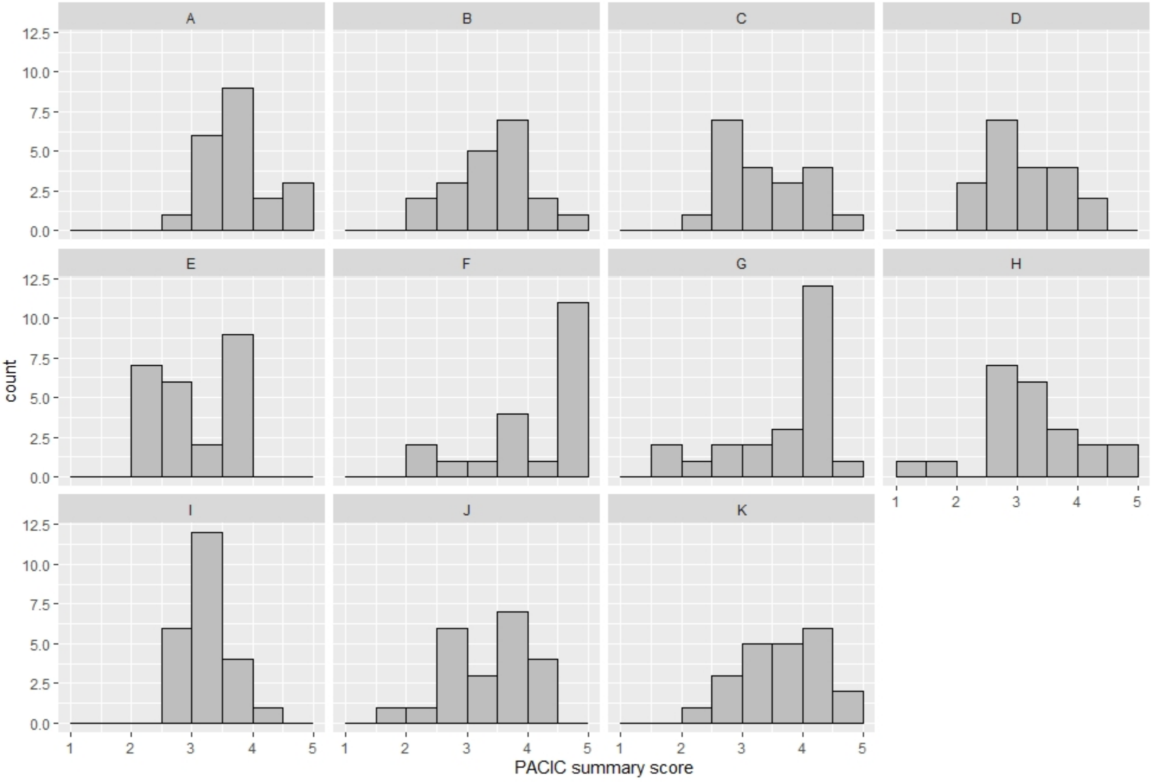


Figure 4.19 Distribution of PACIC summary score by PCCs

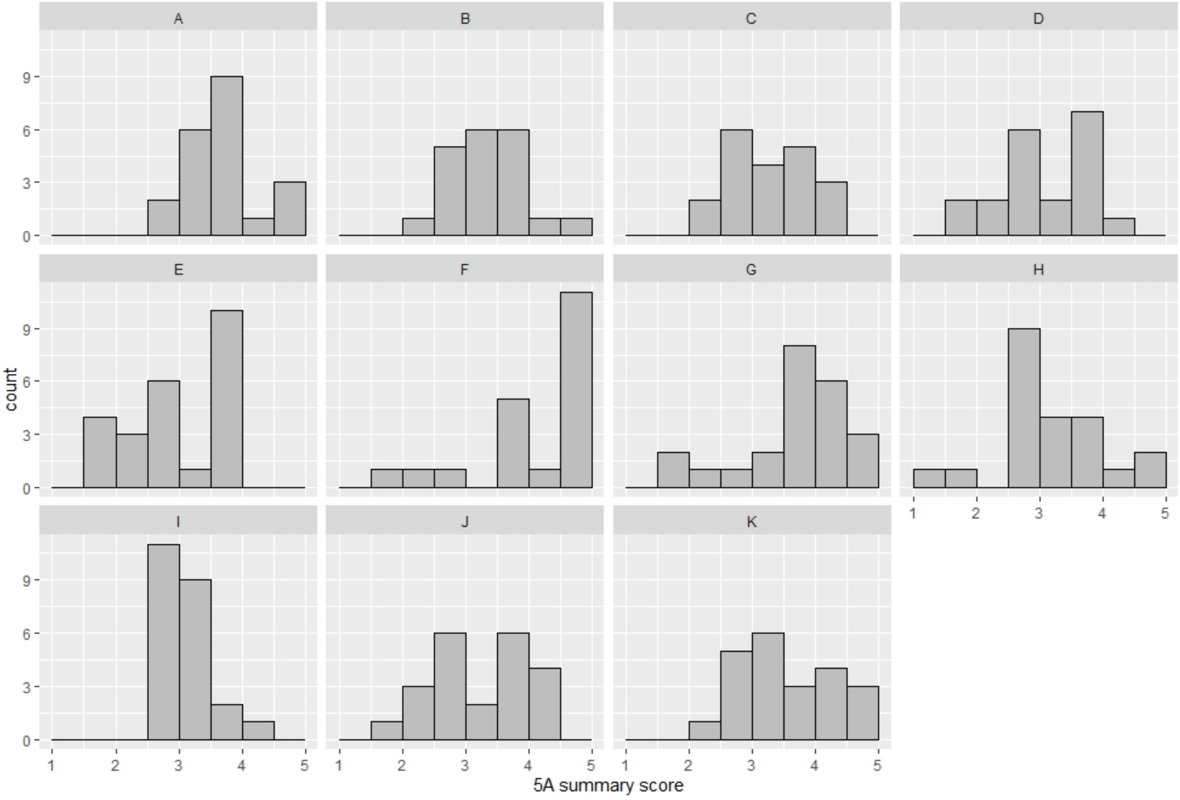


Figure 4.20 Distribution of 5A summary score by PCCs

4.2.2.7.1 Subscales scores by PCC

Figure 4.21 shows the different shapes and sizes of the box plots that represent the scores of the PACIC subscales in each PCC. Most of the PCCs exhibited similar distribution patterns for the median and interquartile range of the subscales, except PCC F, which showed higher scores for all subscales.

Figure 4.22 shows the box plots of the scores of the 5A subscales in each PCC. Similar to the PACIC subscale scores, the patterns of the box plots of the subscales of the 5A model were similar for all centres, with the same exception of PCC F, which reflected higher median scores and interquartile range for all subscales compared to the other centres.

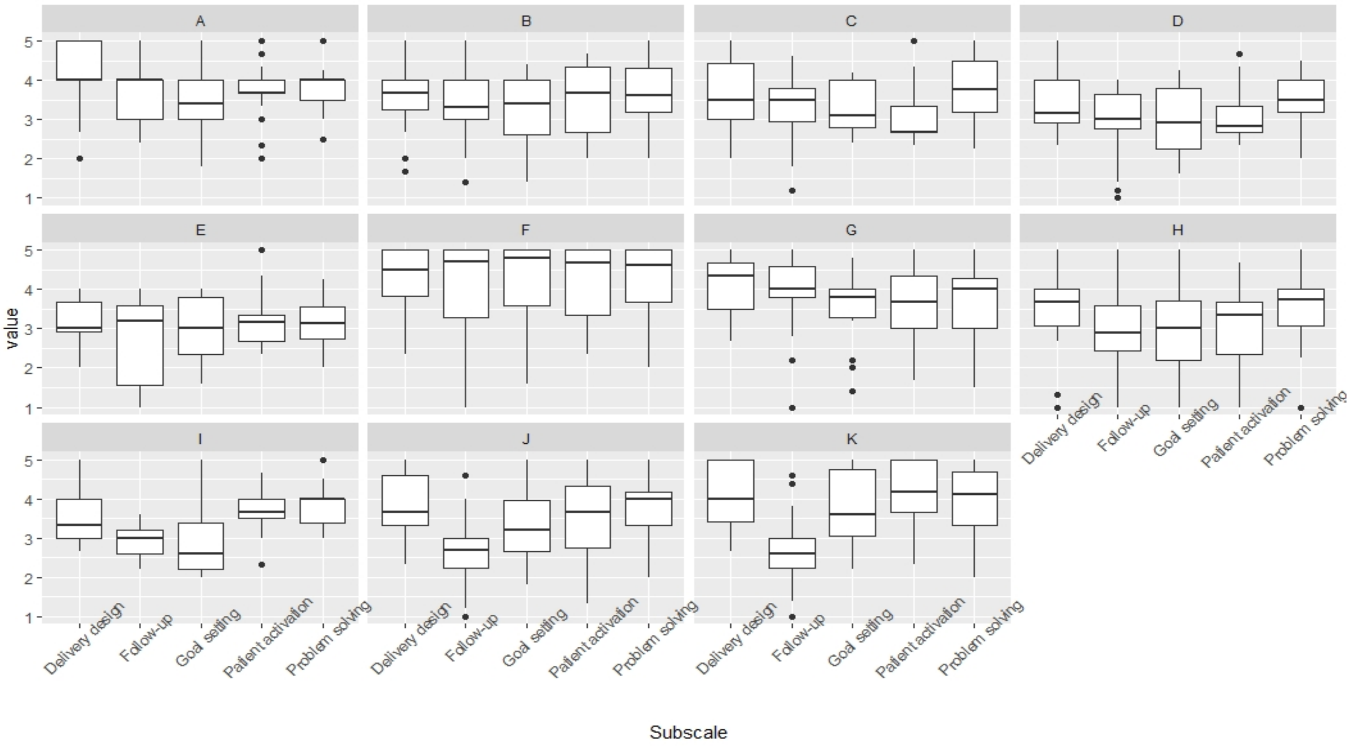


Figure 4.21 Subscales of the PACIC by PCCs

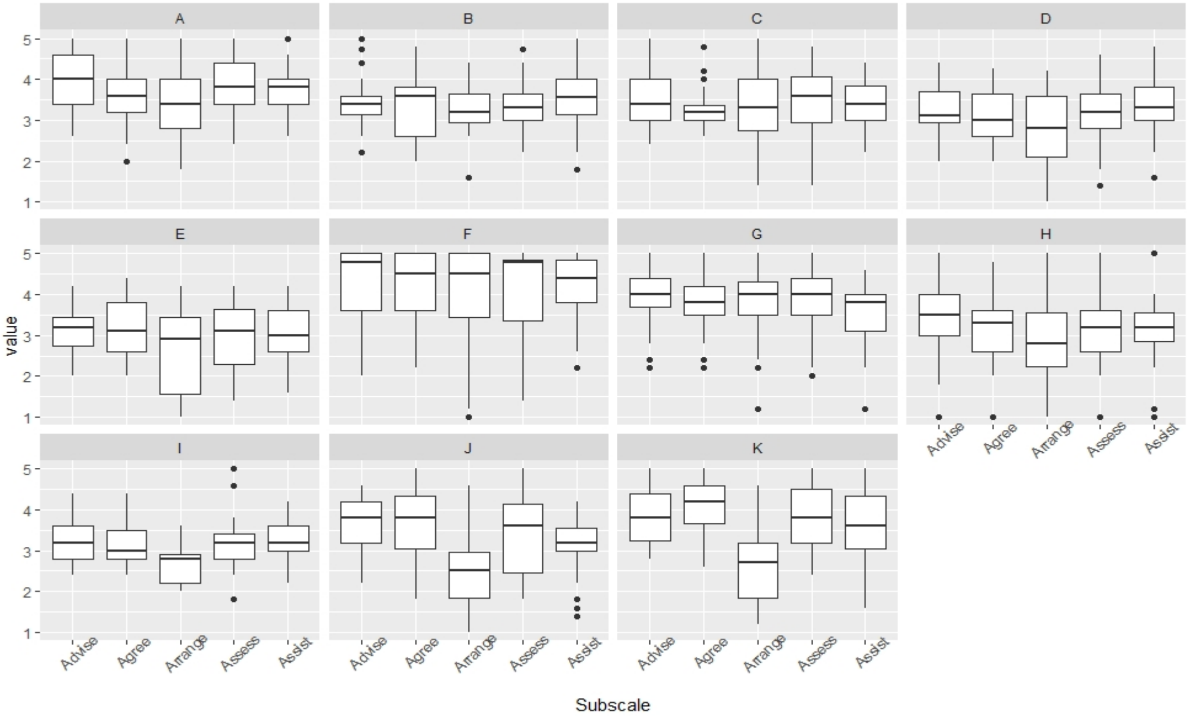


Figure 4.22 Subscales of the 5A model by PCCs

4.2.2.7.2 Categories by PCC

Figure 4.23 shows the four categories of care derived from the PACIC summary score by primary care centre. Care was rated in the lowest category, “limited”, in only three of the PCCs, and then only by less than 10% of the respondents. Care was rated as “good” or “full” by between 50% and 90% of the participants. Notably, two PCCs (F & G) were rated as providing the highest level of care (“full”) by over 50% of the participants.

Similar patterns were seen in Figure 4.24, which shows the four categories of care derived from the 5A model summary score by primary care centre.

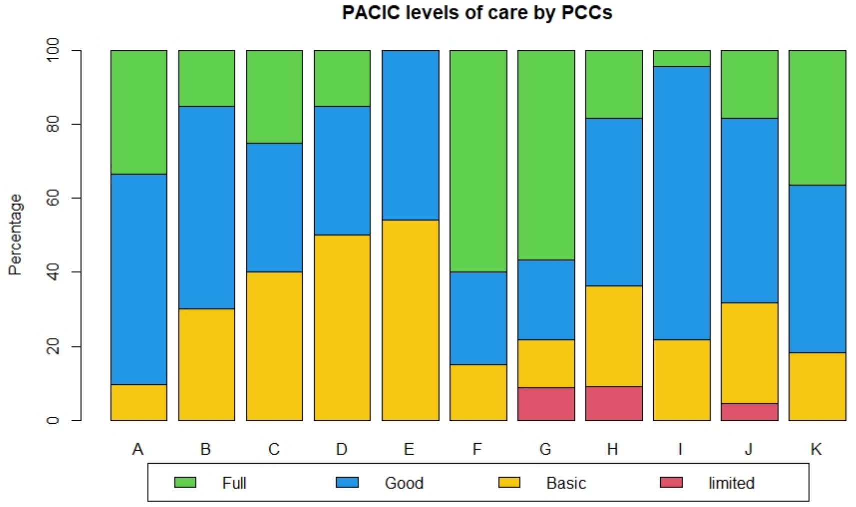


Figure 4.23 Levels of care in primary care centres by mean PACIC score

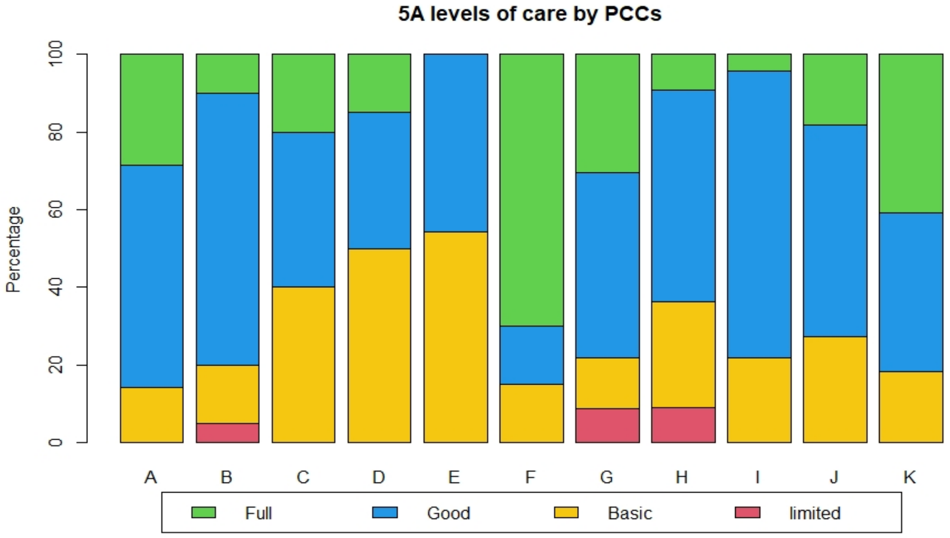


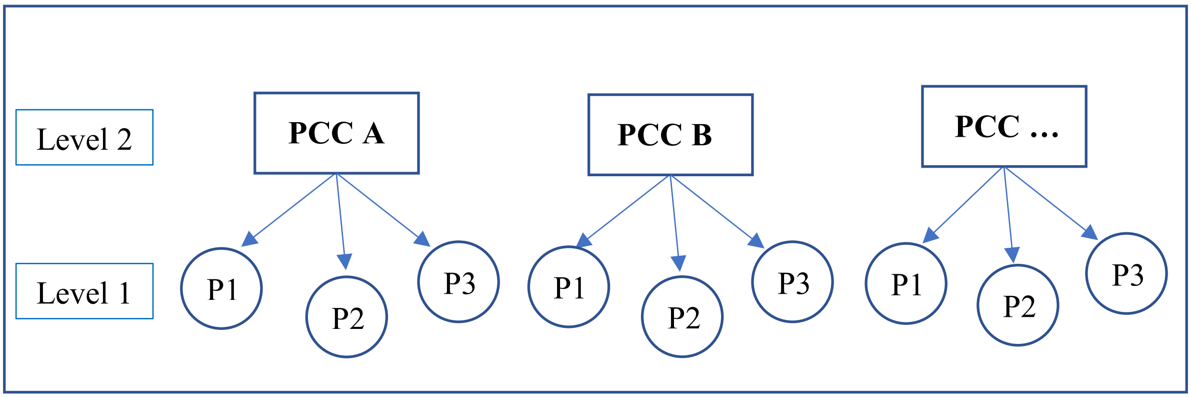
Figure 4.24 Levels of care in primary care centres by mean 5A model score

4.2.2.8 Variation in PACIC-5A attributable to PCCs

The variation in the PACIC and 5A summary scores were examined in the previous section, in which the univariable and multiple linear regression analyses were performed. However, the unexplained variation in the response variable (PACIC or 5A summary scores) associated with the PCCs were not examined. Hence, multilevel modelling (hierarchical linear modelling) was performed to examine the variation in the dependent variables due to the variations between PCCs.

4.2.2.8.1 Multilevel (hierarchical) modelling of variation

The participants in the study were recruited from 11 PCCs, as described earlier. Fitting univariable or multiple regression could violate the assumption of independence of the participants due to the nested nature of the data (i.e., patients nested within PCCs), as shown in Figure 4.25. A lack of statistically independent observations that are treated as independent might lead to pseudo-replication bias (Lazic, 2010). Pseudo-replication can occur when multiple observations are in a hierarchical structure, as in this study. Hence, examining the data without considering this issue could lead to meaningless results or may undermine the conclusions of the statistical analysis. Thus, hierarchical linear modelling was performed in which the participant factors were treated as fixed effects, and the PCCs as the random effect.



PCC: primary care centre, P: participant

Figure 4.25 Hierarchical model

4.2.2.8.2 Testing for PCC effects

The linear regression was compared with the linear mixed model to identify the model with the best fit, as shown in Table 4.28. The difference between the AIC (Akaike's Information

Criteria) was 13 and the model with the lower AIC was the linear mixed effects model, so this was selected over the linear regression model (the lower AIC is a better fit if the difference is more than 10).

Table 4.28 Comparing the best fit model

Name	**AIC**	**BIC**	**ICC**
Linear regression	537.82	544.76	
Linear mixed effect model	524.86	535.27	0.15

Table **4.30** reveals the results of the multilevel analysis, where the summary score of the PACIC was the outcome and PCC was the random effect. The overall mean of summary PACIC score, across all primary care centres, was estimated at 3.47, the between-primary care centres (level 2) variance in the summary PACIC score was estimated at 0.08, and the within-PCC between-patients (level 1) variance residual was estimated at 0.48. The variance partition coefficient (VPC) indicated that 14% of the variance in the summary PACIC score was attributable to differences between primary care centres.

Table 4.29 Effect of PCCs as random effects

<table>
<tr><th colspan="6">Random Effects</th></tr>
<tr><th>Group</th><th>Name</th><th>Variance</th><th colspan="3">SD</th></tr>
<tr><td>PCCs</td><td>(Intercept)</td><td>0.08</td><td colspan="3">0.29</td></tr>
<tr><td>Residual</td><td></td><td>0.48</td><td colspan="3">0.70</td></tr>
<tr><td colspan="6">Number of observations: 237, groups: PCCs, 11</td></tr>
<tr><th colspan="2" rowspan="2">Fixed Effects</th><th rowspan="2">Estimate</th><th rowspan="2">Std. Error</th><th colspan="2">95% CI</th></tr>
<tr><td>2.5%</td><td>97.5%</td></tr>
<tr><td colspan="2">(Intercept)</td><td>3.47</td><td>0.10</td><td>3.26</td><td>3.67</td></tr>
</table>

4.2.2.9 Participant-level explanatory variables, random intercept models

Table **4.30** presents the results of the multilevel analysis in which the summary score of the PACIC was the outcome, PCCs were the random effect, and patient factors were the fixed effects. The overall mean of the summary PACIC score, across all primary care centres, was estimated to be 3.52, the between-primary care centres (level 2) variance in the summary PACIC score was estimated to be 0.08, and within-PCC between-patients (level

1) variance residual was estimated at 0.48. The variance partition coefficient (VPC) indicated that 14% of the variance in the summary PACIC score was attributable to differences between PCCs.

Similarly, a multilevel mode was performed to examine the effect of the PCCs on the 5A model, as shown in Table 4.31. The summary score of the 5A model was estimated to be 3.45 across all primary care centres, between-PCCs variance was estimated at 0.09, and PCCs between-patient variance (within PCCs) was estimated at 0.51. The VPC reflected that 15% of the variance in the summary score of the 5A model was attributable to the differences between PCCs.

Table 4.30 Multilevel analysis of the PACIC summary score

Random Effects					
Groups	**Name**	**Variance**	**SD**		
PCCs	(Intercept)	0.08	0.28		
Residual		0.48	0.70		
Number of observations: 233, groups: PCCs, 11					
Fixed Effects		**Estimate**	**Std. Error**	**95% CI**	
				2.5%	97.5%
(Intercept)		3.52	0.14	3.26	3.78
Gender	Female	0.15	0.10	-0.03	0.33
Age	18–39	-0.19	0.16	-0.50	0.12
	60 or over	-0.05	0.11	-0.27	0.17
Education	Graduate or postgraduate	-0.01	0.11	-0.24	0.21
Diabetes duration	10 years or more	-0.18	0.12	-0.40	0.05
Medication	Insulin	-0.11	0.14	-0.38	0.16
	Both	0.01	0.14	-0.26	0.27
Complications	Micro	0.01	0.12	-0.22	0.24
	Macro	-0.10	0.23	-0.54	0.35
	Both	-0.01	0.19	-0.39	0.36

Table 4.31 Multilevel analysis of the 5A summary score

Random Effects					
Groups	**Name**	**Variance**	**SD**		
PCCs	(Intercept)	0.09	0.29		
Residual		0.51	0.72		
Number of observations: 233, groups: PCCs, 11					
Fixed Effects		**Estimate**	**Std. Error**	**95% CI**	
				2.5%	97.5%
(Intercept)		3.45	0.14	3.17	3.72
Gender	Female	0.15	0.10	-0.03	0.33
Age	18–39	-0.21	0.17	-0.53	0.11
	60 or over	-0.06	0.12	-0.28	0.17
Education	Graduate or postgraduate	0.02	0.12	-0.22	0.26
Diabetes duration	10 years or more	-0.17	0.12	-0.41	0.06
Medication	Insulin	-0.09	0.14	-0.36	0.19
	Both	0.07	0.14	-0.21	0.34
Complications	Micro	0.01	0.12	-0.24	0.25
	Macro	-0.12	0.24	-0.58	0.34
	Both	-0.02	0.20	-0.37	0.40

A multilevel analysis was carried out for the individual participant factors with the PCIC-5A summary scores as the outcome, and the PCCs as the random effect. After accounting for the effect of the participant factors individually, the proportion of unexplained variance that was due to differences between the PCCs was the same: 14% for the PACIC summary score and 15% for the 5A model.

Another multilevel analysis with the same fixed and random effects, but with the subscales of the 5A as the outcome of interest, was carried out. The initial test to determine the difference between the linear regression and the multilevel model revealed no significant difference between the two models based on the difference in the AIC, which was less than 10.

Intra-cluster correlation coefficients (ICCs) for patients' experience regarding the subscales of the PACIC and 5A in the PCCs were calculated, as shown in Table 4.32 and

Table **4.33**. For the PACIC subscales, the ICC values were between 0.08 (problem solving) and 0.16 (follow-up). The mean scores for each subscale were in the middle of the scale, ranging between 3.19 and 3.73. Two subscales, "Patient Activation" and "Delivery Design", had the same ICC value of 0.15, while the “Goal Setting” subscale had a lower ICC value of 0.13. The “Follow-Up” subscale had a significantly higher ICC value at 0.16 than the other subscales. This indicated that the PCCs differed slightly more in terms of coordination of care and follow-up with people with diabetes as part of the provided services in these centres.

For the 5A subscales, the ICC values were between 0.10 (“Assess”) and 0.16 (“Advise” and “Agree”). Similar to the PACIC subscales, the mean scores for each subscale were in the middle of the scale, ranging between 3.04 and 3.60. The “Arrange” subscale had a higher ICC value (0.15) than the “Assist” subscale (0.12). The different ICC values showed that there were somewhat greater disparities among the PCCs when it came to giving specific information about the risks of diabetes and the advantages of change, and to set goals with the patients based on their interest and trust in their ability to change their behaviour. The average cluster size for people with diabetes in this study was 22 (range 20–24).

Table 4.32 Intra-cluster correlation coefficients of PACIC subscales for people with diabetes in PCCs

Subscales	Average cluster size	Mean (SD)	ICC	95% CI
Patient Activation	22	3.54 (0.92)	0.15	0.03-0.29
Delivery Design	22	3.73 (0.84)	0.15	0.03-0.30
Goal Setting	22	3.31 (0.95)	0.13	0.02-0.27
Problem Solving	22	3.72 (0.82)	0.08	0.00-0.19
Follow-Up	22	3.19 (1.03)	0.16	0.30-0.31

Table 4.33 Intra-cluster correlation coefficients of 5A subscales for people with diabetes in PCCs

Subscales	Average cluster size	Mean (SD)	ICC	95% CI
Assess	22	3.47 (0.92)	0.10	0.00-0.22
Advise	22	3.60 (0.80)	0.16	0.03-0.30
Agree	22	3.49 (0.83)	0.16	0.03-0.31
Assist	22	3.41 (0.82)	0.12	0.01-0.24
Arrange	22	3.04 (1.06)	0.15	0.03-0.30

4.2.3 Discussion

4.2.3.1 Summary of the findings

There was no association between the patient factors and the PACIC-5A scores. In general, the participants received primary care services that were consistent with the CCM “some of the time”. However, there was unexplained variation between the PCCs and a possibility that some scores were artificially high. Linear regression analysis returned non-significant associations with the PACIC-5A summary scores and the subscales scores. The hierarchical modelling that measured the clustering within PCCs could explain around 14–15% of the variability in the PACIC-5A summary scores that was attributable to the variation between PCCs.

4.2.3.2 Comparison with other studies

The findings from this study were compared to other studies, locally and globally, that used the PACIC-5A survey.

4.2.3.2.1 Comparison of mean scores

The PACIC-5A was used for the assessment of diabetes and other chronic conditions in different healthcare settings and in different countries. Table 4.36 summarises the studies that used the PACIC-5A for people with diabetes in the MENA region, the USA, and Europe (Switzerland and Germany). In comparison with these studies, the mean scores of the PACIC-5A and most of the subscales in the current sample were by far the highest, as shown in Table 4.36.

In Saudi Arabia, the aspects of primary care services in the current sample were more consistent with the CCM elements compared to a recently published study from tertiary diabetes healthcare centres in Al Riyadh, Saudi Arabia (Alharbi, 2018). All scales and subscales of the PACIC-5A in the current sample were above the mid-point (3 out of 5) compared to the study that was conducted in tertiary care clinics, where the scales and subscales of the APCIC-5A fall behind, with scores less than the mid-point (3 out of 5). In this study, the mean score for the PACIC was 3.45 (0.75) and for the 5A model was 3.48 (0.75), while in the study carried out by Alharbi et al. (2018), a mean score of 2.52 (0.74) was reported for the PACIC and 2.58 (0.76) for the 5A scale. Hence, the participants in this study received primary care services that were consistent with the CCM model “some of the time" on average compared to the participants who received tertiary care services that were not in congruence with the CCM in general. Interestingly, both studies reached similar conclusions about the order of elements that were consistent with the CCM based on the mean scores of the PACIC-5A. In other words, "Delivery Design/Decision Support" was rated the highest among the other subscales under the PACIC in both primary care centres and tertiary care, while the "Follow-Up/Coordination" subscale was at the bottom of the list. Similarly, the order of subscales in the 5A were similar in both studies, where "Advise" was at the top and "Arrange" was at the bottom of the subscales. Table 4.34 depicts the order of the scales and subscales in both studies in Saudi Arabia.

Table 4.34 PACIC-5A in Saudi Arabia

Order	**PACIC-5A**	**Current Study Mean (SD)**	**Alharbi et al. (2017) KSA**
	PACIC summary score	3.45 (0.75)	2.52 (0.74)
1	Delivery System	3.73 (0.84)	3.02 (1.0)
2	Problem Solving/Contextual Counselling	3.7 (0.83)	2.84 (1.0)
3	Patient Activation	3.53 (0.92)	2.69 (1.0)
4	Goal Setting	3.29 (0.95)	2.29 (0.76)
5	Follow-Up/Coordination	3.18 (1.04)	2.10 (0.76)
	5As summary score	3.48 (0.75)	2.58 (0.76)
1	Advise	3.59 (0.79)	2.84 (0.95)
2	Agree	3.48 (0.83)	2.62 (0.84)
3	Assess	3.45 (0.91)	2.62 (0.83)
4	Assist	3.4 (0.82)	2.48 (0.76)
5	Arrange	3.03 (1.06)	1.89 (0.64)

In a recently published study in Egypt (Salama and Soltan, 2017), the participants who responded to the PACIC-5A in a family medicine clinic reported receiving care that was less congruent with the CCM model among all scales and subscales (below 3 out of 5) apart from "Problem Solving/Contextual" and "Assist", which had mean scores of 3.1 and 3.2, respectively.

In Europe, Feri et al. (2014) conducted a study to examine the congruency of diabetes care with the CCM from the patients' perspectives across two different healthcare settings in Switzerland: managed and non-managed care groups. Similarly, in Germany, Szecsenyi et al.

(2008) explored the patients’ perspective in two German federal states, where the participants were randomly recruited from two different healthcare settings: managed and non-managed disease programmes. In general, both studies reflected a congruency with the elements of the CCM either “some of the time” or “not in general”.

Diabetes care in Switzerland tended to be consistent with the CCM “some of the time”, especially in the managed care groups, where the mean scores were 3.39 (0.68) for the PACIC and 3.31 (0.71) for the 5As model. The subscales ranged from 2.87 (0.97) for “Follow-Up/Coordination” to 3.98 (0.65) for “Delivery Design/Decision Support”. In Germany, people with diabetes who were enrolled in the disease management programme (DMP) reported receiving care that was aligned with the CCM “some of the time”, while patients in the non-disease management programme (non-DMP) tended to receive diabetes care that was not consistent with the CCM in general. For the DMP, the mean scores were 3.26 (0.9) for the PACIC scale and 3.08 (1.0) for the 5As model scale, while the non-DMP had mean scores equal to 2.86 (0.9) for the PACIC and 2.78 (1.0) for the 5As model. “Delivery Design/Decision Support” had the highest mean score and “Goal Setting” was the least rated among the other subscales under the PACIC for both the DMP and non-DMP. Subscales of the 5As showed the highest mean score for “Agree” in the non-DMP at 2.99 (1.1), “Advise” in the DMP at 3.32 (0.9), and the lowest score was for “Arrange” in both healthcare settings.

The original study in which the PACIC-5A was used for the first time (Glasgow et al., 2005) in the USA was compared to the current study sample, and both studies exhibited a similar degree of consistency with the CCM in terms of the mean scores of the PACIC and 5As above the mid-point (3 out of 5). The subscales of the PACIC-5A differed in terms of the ranking of the subscale with the highest mean score, but they were similar with respect to the subscales with the lowest mean scores. As mentioned earlier, the current study had the highest score for “Delivery Design/Decision Support” and “Advise”, while Glasgow et al. (2005) reported the highest mean scores for the “Patient Activation” and “Agree” subscales. The lowest subscales were similar in both studies for the “Follow-Up/Coordination” and “Arrange” subscales.

Table 4.35 Studies that used the PACIC-5A for people with diabetes

Title	Country	Year of publication	Sampling	Healthcare setting	Participants (N)	Chronic condition	Study design
Current	SA	NA	Convenience	11 PCCs	M: 113 F: 124	T2DM	Cross-sectional
Towards the holistic management of diabetes in Saudi Arabia: A multi-method study	SA	2018	Convenience	4 diabetes clinics	M: 348 F: 209	Diabetes	Cross-sectional
Patient assessment of chronic illness care in the Family Medicine Outpatient Clinic, Suez Canal University, Egypt	Egypt	2017	Consecutive sampling	Family medicine clinic	M: 48 F: 222	Diabetes 97.8%	Cross-sectional
Use of the Patient Assessment of Chronic Illness Care (PACIC) with diabetes patients	USA	2005	Convenience	30 primary care practices	M: 192 F: 171	T2DM	Cross-sectional
Congruency of diabetes care with the Chronic Care Model in different Swiss healthcare organisations from the patients' perspective: A cross sectional study	Switzerland	2014	Consecutive sampling	Non-MCO: 30 PCP (10 single, 20 group practices) MCO: 1 (mediX group practice)	Non-MCO (326) M: 187 F: 139 MCO (48) M: 29 F: 19	T2DM	Cross-sectional

German diabetes disease management programmes are appropriate for restructuring care according to the Chronic Care Model	Germany	2008	Random sampling	2 German federal states, from previous study ELSID	DMP (865) M: 400 F: 465 Non-DMP (534) M: 249 F: 285	T2DM	Cross-sectional

PCCs: primary care centres, PCP: primary care practice, T2DM: type 2 diabetes mellitus, non-MCO: non-managed care group, MCO: managed care group, non-DMP: non-disease management programme, DMP: disease management programme

Table 4.36 Comparison of mean scores between the current study and studies used PACIC-5A survey

PACIC-5A	**Current study (237)**	**Al Harbi et al. (2018) KSA (557)**	**Salama et al. (2017) Egypt (270)**	**Glasgow et al. (2005) USA (363)**	**Feri et al. (2014) Switzerland**		**Szecsenyi et al. (2008) Germany**	
					Non-MCO (326)	MCO (48)	Non-DMP (534)	DMP (865)
PACIC Summary Score	3.45(0.75)	2.52(0.74)	2.7(0.7)	3.2(0.9)	3.18(0.85)	3.39(0.68)	2.86(0.9)	3.26(0.9)
Patient Activation	3.53(0.92)	2.69(1.0)	2.4(1.0)	3.6(1.1)	3.83(1.13)	3.73(0.95)	3.09(1.2)	3.26(1.2)
Delivery System	3.73(0.84)	3.02(1.0)	2.8(0.9)	3.5(0.9)	3.87(0.82)	3.98(0.65)	3.29(0.9)	3.52(0.9)
Goal Setting	3.29(0.95)	2.29(0.76)	2.7(0.9)	3.0(1.0)	2.86(0.98)	3.19(0.82)	2.50(1.1)	2.91(1.1)
Problem Solving/Contextual Counselling	3.7 (0.83)	2.84(1.0)	3.1(0.8)	3.4(1.1)	3.26(1.22)	3.58(0.88)	3.04(1.2)	3.39(1.2)
Follow-Up/Coordination	3.18(1.04)	2.10(0.76)	2.7(0.7)	2.9(1.0)	2.66(1.05)	2.87(0.97)	2.70(1.1)	3.13(1.1)
5As Summary Score	3.48(0.75)	2.58(0.76)	2.7(0.7)	3.2(1.0)	3.09(0.88)	3.31(0.71)	2.78(1.0)	3.08(1.0)
Assess	3.45(0.91)	2.62(0.83)	2.7(0.8)	3.3(1.0)	3.20(1.07)	3.36(0.86)	2.91(1.1)	3.26(1.1)
Advise	3.59(0.79)	2.84(0.95)	2.9(0.8)	3.3(1.0)	3.22(0.91)	3.50(0.80)	2.95(1.0)	3.32(0.9)
Agree	3.48(0.83)	2.62(0.84)	2.9(0.8)	3.4(1.0)	3.68(0.96)	3.59(0.91)	2.99(1.1)	3.24(1.1)
Assist	3.4 (0.82)	2.48(0.76)	3.2(0.7)	3.1(1.0)	2.98(1.05)	3.42(0.83)	2.82(1.1)	3.21(1.1)
Arrange	3.03(1.06)	1.89(0.64)	2.4(0.8)	2.7(1.0)	2.51(1.05)	2.78(1.01)	2.55(1.0)	2.87(1.0)

Non-MCO: non-managed care group, MCO: managed care group, non-DMP: non-disease management programme, DMP: disease management programme

4.2.3.3 Biases

4.2.3.3.1 Social desirability bias

Completing a survey that measures the quality of care provided by specific personnel (e.g., doctors) or specific teams can result in the tendency for patients to answer questions in a way that makes them look good to their caregivers or to the research team who collects the data. Participants might overrate the quality of the care they received in a way that makes them more socially attractive. To alleviate the effect of social desirability, the principal investigator ensured that the participants were fully aware that their responses would be completely confidential, and the importance of providing accurate responses was emphasised to ensure the results would be helpful for the assessment of the current care and to inform any changes for improvement. In addition, the responses from healthcare professionals in the ACIC and the semi-structured interviews could mitigate its hidden effect by mapping the results and obtaining more in-depth data about the quality of care.

4.2.3.3.2 Cultural factors

The sample of the study was drawn from a larger population where cultural factors could be an important factor to consider as a confounder. The relationship between patients and their healthcare providers could create a social bond that is resistant to criticism. Patients may have a tendency to give higher scores regarding the received care as a courtesy to their health teams. The importance of providing real evaluations was emphasised by the researcher to reduce the effect of cultural factors as much as possible.

4.2.3.3.3 Limited framing

Choosing the PACIC survey to measure specific domains (subscales) as a measure of the quality of the organisation could be a limit to the other possible choices that measure the same concept (quality). However, the purpose of the study was specifically to examine the domains of the CCM through the available designed surveys by the people who created the model itself. Hence, the PACIC was legitimately used to measure the quality of care through the lenses of the CCM by people with diabetes in the region.

4.2.4 Conclusion

According to the analysis of the PACIC-5A survey, the primary care services were aligned with the CCM elements. The findings in this study were higher than comparable studies locally or in the MENA region. The variability between PCCs was not significant, probably due to the centralised healthcare system in which services were equally distributed, or because of the reliance on doctors alone as the main providers of care. With this in mind, the next section explores the results of the healthcare professionals' survey and matches the findings with patients' results, and then a further explanation of the results is provided through the semi-structured interviews in the following chapter.

4.3 Survey II: Assessment of Chronic Illness Care (ACIC)

The Assessment of Chronic Illness Care (ACIC) questionnaire was designed as a result of specific evidence-based interventions for the CCM elements, and it addresses the same components for chronic illness care improvement at the level of the community, care practice, patient care, and organisation level (Bonomi et al., 2002, Glasgow et al., 2005a).

4.3.1 Methods

4.3.1.1 Structure of the ACIC

There are two versions of the ACIC survey (3.0 and 3.5). They both include the six main components, but the later version (3.5) has an additional item that addresses how the elements of the Chronic Care Model are integrated in practice by a practice team or the organisation (Appendix 5). The six components with the additional item are:

- Healthcare organisation (six items).
- Community linkages (three items).
- Self-management support (four items).
- Decision support (four items).
- Delivery system design (six items).
- Clinical information systems (five items).
- Integration of Chronic Care Model components (six items).

4.3.1.2 Translation and cultural adaptation of the ACIC

The ACIC survey has been translated into different languages, but at the time of conducting this study, there was no Arabic version of it. The translation of the ACIC could be helpful for the future use of the survey, not only in Saudi Arabia, but in the Middle East and North Africa region where healthcare professionals can read and understand the Arabic language. The ACIC was not used in Saudi Arabia except in one study, where the English version was used, and it was limited to physicians in primary care centres in Al Madinah city (Aljohani, 2018).

Before beginning the translation, the researcher sought and obtained permission to carry it out from the authors at the MacColl Center for Health Care Innovation at Kaiser Permanente's Washington Health Research Institute. The translation of the ACIC questionnaire was carried out according to the World Health Organization's 'Process of translation and adaptation of instruments' guidelines (WHO, 2010), which comprise the following stages: forward translation, expert panel review, back translation, pretesting, and cognitive interviewing.

A successful translation depends on achieving equivalence between the original and translated versions. This equivalence can be considered in terms of conceptual, semantic, idiomatic, and functional elements, and these are explained below.

4.3.1.2.1 Forward translation

A team of four translators, including and led by the researcher, independently translated the English version of the ACIC into Arabic. All team members were healthcare professionals, and all were native Arabic speakers who were bilingual in Arabic and English. They were knowledgeable about health terminology and the content area of the questionnaire, and they were familiar with the cultural and linguistic nuances of the desired target language.

4.3.1.2.1.1 Comparison of the translated versions: Synthesis I

After the initial translation, all of the translated versions were compared, looking for ambiguities and a lack of compatibility regarding words, phrases, and meanings. This was followed by a series of team meetings held online to discuss and resolve any identified ambiguities and discrepancies. The meetings continued until consensus on one translation was reached, and these meetings typically lasted 60 minutes. Notes were taken during these meetings for any terms that needed more attention during the last step (i.e., cognitive interviewing). The team members were initially uncertain about a number of different items in the questionnaire and how they could be translated into understandable terms without affecting the meaning of the original version. The translation process was not word-for-word, but rather aimed for the equivalence of words and phrases. This is consistent with the recommendations of the WHO process mentioned earlier (WHO, 2010). Nevertheless, the process was challenging, due to the difficulty in finding semantic, idiomatic, and conceptual equivalences that were a good fit with the target culture. Consensus was achieved after four meetings focused on the preliminary, initial translated version. The following sections describe the equivalences in translation that were discussed during these meetings.

4.3.1.2.1.1.1 Conceptual equivalence

Conceptual equivalence relates to the way in which the elements of a construct or concept are understood. In short, it means that the elements that constitute a construct can be seen as similar by people from both cultures, and it seeks to ensure that people from the source and the target cultures understand the concept in the same way. However, finding cultural equivalence for the content of each item does not mean there is a complete agreement between them; rather, it might exist in the target culture, but be different in terms of the weight given to elements or the aspects that constitute some of them. Accordingly, a comparison was made between the US health system and the Saudi health system with respect to primary care services provided to people with chronic conditions, including diabetes. There were no conflicts among the translators regarding the possibility of translating the ACIC questionnaire, due to the similarity of most of the elements in the survey between the two cultures. The main observed differences were regarding the national healthcare system that exists in Saudi Arabia compared to the decentralised healthcare system in the United States, in which distinct organisations provide care. All Saudi citizens and expatriates employed in the public sector are currently entitled to free healthcare, which is offered mainly by the Ministry of Health (MoH) and other governmental organisations. Hence, the element 'Benefits', under 'Part 1: Organisation of the Healthcare Delivery System', which largely refers to health insurance benefits in healthcare systems, was confusing, and different translations were used to describe it. Under the Saudi national healthcare system, 'benefits' can refer to the scope of coverage of different activities; thus, we agreed to use the term 'الفوائد' to achieve an equivalent conceptual meaning.

4.3.1.2.1.1.2 Semantic equivalence

Semantic equivalence means that when an instrument is translated into a target language, the investigator decides whether the meaning of each element is the same in the two involved cultures. Discrepancies were identified related to three terms, and these were discussed and resolved. The first on the list was ‘self-management’, which is used frequently in the questionnaire (25 times). Hence, it was important to keep the meaning clear and understandable. Self-management, as defined by the *Oxford English Dictionary*, is ‘the taking of responsibility for one’s own behaviour and well-being; (now frequently) management of one’s disease or condition oneself’; however, the word management (إدارة) does not readily apply to the self, and certainly not to the things implied by “self-management”. Instead, the translation adopted was ‘self-care’ (الرعاية الذاتية). The next term the panel discussed was ‘population-based’, which is used in three instances: ‘population-based management’, ‘population-based approaches’ and ‘population-based care’. It was difficult to find a clear definition for each term, but the common link among them was that a population could be defined as a group of individuals who shared a geographic location or sociodemographic characteristics. With this in mind, the word ‘based’ was removed from some of these phrasings, provided that the meaning did not change. Lastly, a component of the clinical information system that was not translated clearly was that of ‘feedback’. This term is used in the ACIC to describe feedback from the system itself whenever there is a gap in the provided services for a defined population. In Arabic, a direct translation of feedback sounded odd to the Arabic readers, and the meaning might be lost due to language differences, so to keep it simple and clear for readers, the word was translated as ‘observations’ to describe the process of identifying gaps and reporting them back to the healthcare team.

4.3.1.2.1.1.3 Idiomatic equivalence

There was one Latin idiom discussed during panel’s meetings, and the uncertainty around suitable wording and translation was resolved. This idiom was ‘ad hoc’, which is used three times in the ACIC: twice under the ‘Organisation of the Healthcare Delivery System’ section and once under ‘Delivery System Design’. For example, in the improvement strategy for chronic illness care as a component of the organisation of a healthcare delivery system, the first option was ‘… is ad hoc and not organised or supported consistently’. Here, the term can be defined as ‘… for a particular purpose; in response to a specific need or demand’ (Oxford English Dictionary, 2018), so the closest meaning used in Arabic was ‘as the need arises’.

4.3.1.2.1.1.4 Functional equivalence

All overlapping and repeatedly mentioned terms in the ACIC were discussed thoroughly to see how they could be used in the Saudi healthcare system; two of these were ‘practice level’ and ‘practice team’. It could be unclear to use these terms in Arabic without specifying the physical and functional meaning of the word ‘practice’. Hence, two different meanings were identified for the first term, ‘practice level’. They refer to the physical existence of a practice as either a clinic within a primary care centre or a primary care centre itself. However, while the provided care is delivered through primary care centres, rather than separate clinics, the authors agreed to choose the primary care level as the functional equivalent of the practice level. By contrast, the second term, ‘provider practice’ or ‘providers’ in the survey, was identified as the team who provides care to people with chronic conditions in primary care centres.

Under the ‘community linkages’ section, the original survey contains an item named ‘regional health plans’ to assess the extent of coordinating chronic disease guidelines, measures and care resources by different regional health plans. However, this healthcare organisation structure does not exist in Saudi Arabia. Instead, the country has a national health system governed by the MoH through general directorates in each region. With this in mind, the wording was changed to ‘health plans in the region’, rather than ‘regional health plans’, where coordinating chronic disease guidelines, measures, and care resources may vary from region to region despite the health plans offered in each being the same.

4.3.1.2.2 Back translation

After generating the preliminary initial translation of the instrument, a back translation was produced by two qualified and independent translators. Both back translators were knowledgeable about healthcare terminology, but they were completely blind to the original version of the survey. This yielded two back-translated versions, which allowed for more clarification of words and phrases used in the translations.

4.3.1.2.2.1 Comparison of the back-translated versions: Synthesis II

The researcher compared the back-translated versions to identify similarities and differences between them and the original instrument. Comparisons were made for instructions, items, and responses. Then, a committee meeting was held to discuss the discrepancies originating either between the back-translated questionnaires or between either of the back-translations and the original survey in the source language. Discrepancies were mainly due to the great number of synonyms that exist in Arabic that also depend on context. The translators reported that this was the most challenging element of working with the original version. The translators also critiqued the ACIC because it uses short sentences that can be translated differently based on context; for instance, 'feedback' under the clinical information system was confusing because it was not referring to a specific party who would provide this feedback. It could mean feedback from healthcare professionals, patients, or from the system itself, and it was mandatory to read all options for the item to understand what was being requested and how to select the appropriate option.

4.3.1.2.3 Cognitive debriefing

The pre-final version of the survey was pilot-tested among participants working in primary care centres and whose native language was Arabic. The aim of the pilot test was to evaluate the clarity of the content of the survey's instructions, items, and responses. Participants were recruited from primary care centres in the same region as the main research, Al Baha, but from different governorates that share similar settings to those in which the instrument was later used. A sample of seven healthcare professionals from five primary care centres were included. The participants were asked to read through the instrument and, in cases where clarity was lacking, to add comments, suggestions, rewrite the sentences, or put a question mark. A dichotomous scale for rating the clarity was used, and each participant could rate each item as clear or unclear. Items noted by 20% of participants as unclear were re-evaluated to achieve a minimum inter-rater agreement among the sample of 80%. After this step, five items were identified, and different comments and suggestions were added. Later, another expert panel meeting was held for further determinations on the items' conceptual and content equivalence and to resolve the lack of clarity among the identified items. This step was carried out to enhance the conceptual, content, and semantic equivalence of the two versions and to make the instrument clearer for the target population prior to psychometric testing. A detailed description of the ambiguities is depicted in Table 4.37.

Table 4.37 Back translation and cognitive debriefing

Element of the CCM	Item recognised as unclear	Back translation	Equivalent	Suggestion
Organisation of the healthcare delivery system	Incentives and regulations for chronic illness care	Incentives and regulations for chronic illness care	Functional, as there are no incentives in the current healthcare system	-Add ‘if exist’ -Remove ‘incentives’ -Keep it for completion
	Benefits	Advantages	Conceptual, how it could be applied where there is currently no insurance system	-Description of the meaning and how it could be different than the incentives noted above. -Use ‘provided services’ instead, or between brackets or as footnote
Practice level, self-management support	Self-management	Self-care	Idiomatic and semantic	-Use ‘self-management’ instead of ‘self-care’ -Describe the meaning before scoring the item
Delivery system design	Planned visits for chronic illness care	Planned visits for care of chronic diseases	Semantic	- Use ‘scheduled visits’, rather than ‘planned’, so it will be more understandable
Clinical information system	Feedback	Feedback (notes)	Semantic	-Use ‘notes’ or ‘suggestions’ rather than ‘feedback’

The incentives for chronic care were not clear, because there are no incentives under the current Saudi system of regulations and legislation. The panel suggested removing this from the item, or adding ‘if exist’ beside ‘incentives’ in the translated instrument. At the same time, the word ‘benefits’ was ambiguous due to the presence of a national system that provides care equally and without charge to all patients. In addition, there was some confusion with the previously discussed item regarding incentives, as some participants asked about the meaning of ‘benefits’ and how this word differs from ‘incentives’. An Arabic translation of ‘benefits’ was back-translated to ‘advantages’, which would be clearer if the phrase ‘provided services’ was added in Arabic.

At the practice level, ‘self-management support’ was translated as ‘self-care’; however, the panel also suggested either describing the meaning of the term before scoring it or changing it to ‘self-management’, as this was the term used in the source language.

‘Planned visits for chronic illness care’ caused confusion, as described by some participants, as they wondered who planned these visits – healthcare professionals or patients? With this in mind, the panel suggested amending the translation to ‘scheduled visits within the health plan’ or ‘scheduled visits for chronic illness care’.

‘Feedback’ was literally translated into Arabic as ‘التغذية الراجعة’, which is a term rarely used, though it could be understandable to some participants. We decided it would be better translated as ‘notes’ or ‘suggestions’, or using both words, since the meaning would be the same with respect to feedback.

In addition to evaluating the clarity of the form, the participants were asked to evaluate content equivalence in terms of content relevance, rated 0–4, where 0 = not relevant; 1 = somewhat relevant; 2 = relevant, but needs minor alteration; and 4 = very relevant. Accordingly, any item was revised if it was rated 1 (somewhat relevant) or 0 (not relevant). Then, a calculation based on the content validity index at both the item and scale levels was conducted.

4.3.1.2.4 Test for final version: Psychometric validation

Further testing for the internal consistency and stability of the adapted version was conducted within seven PCCs in the same region.

4.3.1.2.4.1 Internal consistency

Internal consistency was assessed by estimating the Cronbach’s alpha (α) with an acceptable level of alpha in the range between 0.7 and 0.8. As shown in Table 4.38, the Arabic version achieved a good level of reliability with a coefficient alpha of 0.94 for the ACIC summary score and in the range 0.81–0.94 for the subscales.

Table 4.38 Cronbach’s alpha results

Subscales	Cronbach’s alpha	No. of items
Organisation of healthcare delivery system	0.94	6
Community linkages	0.87	3
Self-management support	0.93	4
Decision support	0.94	4
Delivery design	0.85	6
Clinical information system	0.82	5
Integration	0.81	6
ACIC summary score	0.93	34

4.3.1.2.4.2 Test–re-test reliability

To test the stability of the adapted survey, a test–retest was carried out over two weeks. The results showed a statistically significant reliability score (r = 0.91, p = <0.001). The high result of the stability reliability test was expected due to the short duration between the time point measurements. This short duration could lead to an increase in the stability and reliability results, which was inevitable due to the limited time for data collection.

4.3.1.2.5 Final version

A final version was produced after completing the process of translation, cultural adaptation, and testing the reliability (internal consistency and stability). This final version was used to collect data from the selected PCCs in the Al Baha region (Appendix 6).

4.3.1.3 Administration of the survey

4.3.1.3.1 Setting

Similar to the PACIC-5A, the survey was distributed in the same primary care centres in the Al Baha region.

4.3.1.3.2 Sampling strategy

All primary healthcare centres in Al Baha health sector (n = 11) were included in the study and a convenience sampling of healthcare professionals (doctors) was used where the ACIC was completed by doctors in every PHCC.

4.3.1.3.3 Sample size

For the ACIC questionnaire, the sampling was convenience and the size depended on the number of doctors in each primary care centre. The total number of doctors in the 11 PCCs was 33 and the researcher was able to collect data from 27 participants.

4.3.1.3.4 Health professional invitation and recruitment

Doctors were invited to participate when they were eligible and available. The researcher met the doctors (males and females) face-to-face and verbally explained the purpose of the research, the confidentiality of the data, the limited access to the collected information, and the option to participate or not. The researcher also explained the next step to collect more data through interviews, which was included in the written consent form.

4.3.1.3.5 Health professional consent

The researcher provided the consent form to doctors who agreed to participate with a copy of the ACIC questionnaire. The consent form was designed by the ethical committee at the MoH and was written in both Arabic and English. The participants were free to add their contact information for further researcher (i.e., interviews).

4.3.1.3.6 Health professional survey completion and collection

The doctors completed the questionnaire privately, either on the same day or later. They were free to select either the Arabic or English version of the survey and they were free to contact the researcher if they had any further questions or concerns. They were given 1–5 days to complete the ACIC and the researcher visited all centres every day to remind them and to collected the completed questionnaires.

4.3.1.4 Data analysis

The data from the ACIC were entered into Excel, and separate databases were created for each survey. These data were then imported into RStudio (version 4.1.0), and data cleaning was performed to check for any inconsistencies, missing values, and potential errors.

4.3.1.4.1 Descriptive analysis

Due to the small sample size, the data were only analysed descriptively. For the ACIC, summary, and subscales, the scores were summarised in numbers, both individually within centres and as aggregated average scores among all centres. The average scores of the ACIC and its subscales by PCCs were also summarised as numbers and graphs.

4.3.1.4.2 Comparison of ACIC and PACIC

Correlation was measured to examine the relationship between the ACIC and PACIC-5A summary and subscales scores. However, the different scales of the two surveys were considered. The PACIC-5A summary and subscales scores were transformed into the same categories as the ACIC (i.e., limited support, basic, reasonably good, and fully developed care) and they were mapped accordingly. This was performed to identify areas of similarity and differences between the six elements of the CCM from both perspectives: patients and healthcare professionals. It also helped to demonstrate the extent of the alignment with the CCM from these different perspectives.

4.3.2 Results

Descriptive analysis was used to describe the basic features of the data and to compare the reported findings with the PACIC-5A. The association between the ACIC and PACIC-5A summary and subscale scores was examined. The findings of this study were compared to the original study in which the ACIC was first used, and with other studies locally or internationally.

4.3.2.1 Descriptive analysis

The individual scores of the ACIC within PCCs, average scores by centre, and aggregated average scores across all centres are described in the following sections.

4.3.2.1.1 Participants

All participants who filled in the ACIC were doctors working in primary care centres. Only doctors were included because they were the main providers of care for people with diabetes, so they were able to evaluate all of the subscales in the ACIC. The sample included participants from all 11 centres and the response rate was 82% – a total of 27 doctors agreed to participate out of a total of 33.

4.3.2.1.2 Individual ACIC scores

Table 4.39 shows the variation of individual scores of ACIC subscales and summary scores within PCCs. In general, the subscale scores were consistent within the PCCs except two centres (B and G). In PCC B, the responses from two doctors were different across all of the subscales except “community linkages” and “decision support”. The inconsistencies for the subscale “level of care” were between “basic support” and “reasonably good support”. In PCC G, three participants evaluated the care, and the responses from one participant were inconsistent with the others. Moreover, this participant was the only one who evaluated the integration of all elements as “limited” compared to all other participants in the study. However, the inconsistencies within centres according to the level of care in the ACIC were between two successive levels, namely, between “basic” and “reasonably good” or between “reasonably good” and “full support”. The subscales with the fewest inconsistencies within centres (except three centres) were “self-management support”, “decision support”, and “clinical information system”, while the other subscales showed slightly more inconsistencies within five centres.

The summary score of the ACIC was generally consistent within all centres except four (B, D, G, and K), but when taking into account the number of participants, PCCs D and G were consistent, because two out of three participants gave equal evaluations.

Table 4.39 Individual scores of ACIC subscales and summary score by participants across PCCs

PCC	Participants	OC	CL	SMS	DS	DD	CIS	Intg	Summary
A	P1	8.3	5.3	6.0	6.5	7.7	6.6	5.3	6.5
	P2	8.7	4.7	6.3	7.0	7.5	7.0	5.7	6.7
	P3	9.0	4.3	7.0	7.3	7.8	6.4	6.2	6.9
B	P1	5.2	3.3	5.3	2.8	3.2	4.0	4.5	4.0
	P2	8.0	4.7	6.3	3.5	6.2	5.6	6.0	5.7
C	P1	7.2	5.0	8.0	6.0	7.8	7.2	6.8	6.9
	P2	6.7	5.7	7.3	5.8	5.3	6.4	4.0	5.9
D	P1	6.0	4.3	6.0	5.3	3.7	4.6	5.0	5.0
	P2	6.5	7.3	6.0	7.0	4.3	5.4	5.5	6.0
	P3	7.0	5.3	7.3	7.8	5.5	5.4	6.2	6.3
E	P1	8.2	5.7	5.8	7.3	5.8	4.0	5.5	6.0
	P2	9.0	5.7	6.5	8.0	6.2	5.2	5.0	6.5
F	P1	9.2	8.0	6.5	6.3	7.0	5.8	6.7	7.1
	P2	8.7	6.0	6.8	5.3	7.3	5.4	6.7	6.6
G	P1	3.8	6.0	3.5	3.3	3.0	4.4	2.5	3.8
	P2	6.5	5.0	7.3	6.3	6.3	7.6	5.5	6.3
	P3	7.5	7.0	8.5	8.3	6.8	7.2	5.5	7.3
H	P1	9.3	7.3	9.8	6.8	6.8	7.4	7.3	7.8
	P2	8.2	7.0	8.8	7.5	8.0	7.6	6.5	7.6
	P3	8.5	7.7	9.5	6.3	5.2	7.4	7.2	7.4
I	P1	8.0	6.0	7.0	7.5	6.0	5.2	5.7	6.5
	P2	8.0	4.7	7.8	7.0	7.7	4.6	6.5	6.6
	P3	7.7	5.7	7.3	7.8	6.3	5.4	5.8	6.6
J	P1	7.3	7.3	7.8	8.5	7.3	6.4	7.2	7.4
	P2	7.7	8.0	6.8	8.3	7.0	6.2	6.3	7.2
K	P1	6.2	5.3	4.8	5.0	5.7	5.6	6.2	5.5
	P2	7.5	7.0	6.0	5.3	5.5	6.2	5.7	6.2

OC: organisation of healthcare system, CL: community linkages, SMS: self-management support, DS: decision support, DD: delivery design, CIS: clinical information system, Ing: integration of elements

A- Fully developed care	9-11	🟩
B- Reasonably good support	6-8	🟩
C- Basic support	3-5	🟧
D- Limited support	0-2	🟥

4.3.2.1.3 Average scores by primary care centres

Table 4.40 shows the average scores of the individual elements of the ACIC and the total score by PCCs. In general, the average score of the ACIC summary and subscale scores were in the category "reasonably good support for chronic illness care". The summary score of the ACIC by centres revealed that all primary care centres assessed themselves as providing "reasonably good support" for people with diabetes except one centre, which fell into the "basic support" category. The "organisation of healthcare delivery system" was the only subscale with levels of care between "reasonably good" to "fully developed care" across all centres. The "self-management support" scale had the three levels of care (basic, reasonably good, and fully developed) across PCCs. The rest of the subscales ranged from "basic support" to "reasonably good support".

Table 4.40 Average scores of individual elements of the CCM and the total score by PCCs

PCC	**Organisation of healthcare delivery system**	**Community linkage**	**Self-management support**	**Decision support**	**Delivery design**	**Clinical information system**	**Integration**	**ACIC summary score**
A	8.7	4.8	6.4	6.9	7.7	6.7	5.7	**6.7**
B	6.6	4.0	5.7	3.1	4.7	4.8	5.2	**4.9**
C	6.9	5.3	7.6	5.9	6.6	6.8	5.4	**6.4**
D	6.5	5.7	6.4	6.7	4.5	5.1	5.6	**5.8**
E	8.6	5.7	6.1	7.6	6.0	4.6	5.2	**6.3**
F	8.9	7.0	6.6	5.7	7.2	5.6	6.7	**6.8**
G	5.9	6.0	6.4	5.9	5.4	6.4	4.5	**5.8**
H	8.7	7.3	9.3	6.8	6.7	7.5	7.0	**7.6**
I	7.9	5.4	7.3	7.4	6.7	5.1	6.0	**6.5**
J	7.5	7.7	7.2	8.4	7.2	6.3	6.7	**7.3**
K	6.8	6.2	5.4	5.1	5.6	5.9	5.9	**5.8**
Average	**7.5**	**5.9**	**6.8**	**6.3**	**6.2**	**5.9**	**5.8**	**6.3**

A- Fully developed care	9-11	🟩
B- Reasonably good support	6-8	🟩
C- Basic support	3-5	🟧
D- Limited support	0-2	🟥

The pattern of scores by practice is shown in Figure 4.26. There was variability between the PCCs on implementing the different subscales of the CCM as per the ACIC. In general, two PCCs (F and J) exhibited a higher degree of consistency with the elements of the CCM, where all subscales of the ACIC were at level B or A; other centres were in the range between level

C to level A. However, one centre (PCC B) was the one with the least consistency with the elements of the CCM, in which most of the subscales were at level C.

Figure 4.26 ACIC summary and subscales scores by PCCs.
V1: organisation of the healthcare delivery system, V2: community linkages, V3: self-management support, V4: decision support, V5: delivery system design, V6: clinical information system, V7: integration of CCM elements, Vtotal: summary score of all elements.

4.3.2.1.4 Aggregate average scores

The subscales of the ACIC were ranked by the average score among all PCCs, as shown in Table 4.40. The overall score of the ACIC (6.3) fell into the category of “reasonably good support” for people with diabetes. The average scores of the subscales of the ACIC varied between 7.5 (organisation of healthcare delivery system) to 5.8 (integration of the elements); however, all elements fell within the same category of “reasonably good support” for people with diabetes.

Table 4.41 Average scores of the ACIC summary and subscales scores

Rank	Elements of the ACIC	Average score
1	Organisation of healthcare delivery system	7.5
2	Self-management support	6.8
3	Decision support	6.3
4	Delivery design	6.2
5	Community linkage	5.9
6	Clinical information system	5.9
7	Integration	5.8
ACIC summary score		6.3

4.3.2.2 Mapping categories of care of ACIC and PACIC

The evaluation of primary care services for people with diabetes from the perspective of the healthcare professionals using the ACIC was mapped with the patients' view from the results of the PACIC through matching. As shown in Table 4.42, the level of care in all PCCs was rated as level B: "reasonably good support for chronic illness care", as per both the ACIC and PACIC-5A, but with a few exceptions. Only one centre (PCC B) was rated as level C in the ACIC, and one centre (PCC F) was rated as level A in the PACIC-5A.

Table 4.42 Levels of care from the perspective of healthcare professionals and people with diabetes

PCC	Level of care ACIC	Level of care PACIC	Level of care 5A	Average score of ACIC	Average score of PACIC	Average score of 5A
A	B	B	B	6.7	3.7	3.7
B	C	B	B	4.9	3.4	3.3
C	B	B	B	6.4	3.4	3.4
D	B	B	B	5.8	3.2	3.1
E	B	B	B	6.3	3.0	3.2
F	B	A	A	6.8	4.1	4.1
G	B	B	B	5.8	3.7	3.6
H	B	B	B	7.6	3.2	3.1
I	B	B	B	6.5	3.3	3.2
J	B	B	B	7.3	3.3	3.2
K	B	B	B	5.84	3.67	3.7

It is worth mentioning that mapping the subscales of the PACIC-5A with the ACIC was approximate and was not intended to be perfectly matched in the first place. In other words, both surveys could help provide a complimentary assessment of how primary care services are aligned with the CCM; however, matching them based on the level of care was carried out for the first time in this study. It was challenging to find an exact match between the PACIC-5A subscales and the ACIC subscales, especially as the creators both surveys admitted the challenge of assessing some elements of the CCM from the patients' perspective, such as "clinical information system" (Glasgow et al., 2005a). Hence, the mapping process was approximately based on the definition of each subscale and how it could be mapped with subscales that share similar characteristics.

Table 4.43 shows the mapping of the categories of care of the subscales of the ACIC and PACIC. Four PCCs (A, C, D, and J) exhibited a high degree of consistency between healthcare professionals' and patients' perspectives of PACIC and 5A subscales. Three PCCs (K, F, and H) showed a low degree of consistency with the PACIC-5A subscales: one centre (B) was mainly in disagreement with how the ACIC matched with the 5A subscales. Three centres (E, G, and I) were mismatched with a maximum of two subscales of the PACIC and two subscales of the 5A.

Table 4.43 Mapping the four categories of care of ACIC and PACIC

Subscales of PACIC-5A and ACIC		**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
PACIC	**ACIC**											
Patient activation		B	B	B	B	B	A	B	B	B	B	A
	Self-management	B	B	B	B	B	B	B	A	B	B	C
Delivery design/decision		A	B	B	B	B	A	A	B	B	B	A
	Delivery design	B	C	B	C	B	B	C	B	B	B	B
Goal setting/tailoring		B	B	B	B	C	A	B	C	C	B	B
	Self-management	B	B	B	B	B	B	B	A	B	B	C
Problem-solving		B	B	B	B	B	A	B	B	B	B	A
	Self-management	B	B	B	B	B	B	B	A	B	B	C
Follow-up/coordination		B	B	B	C	C	B	B	B	C	C	C
	Delivery design	B	C	B	C	B	B	C	B	B	B	B
5A model												
Assess		B	B	B	B	C	A	B	B	B	B	B
	Self-management	B	B	B	B	B	B	B	A	B	B	C
Advise		B	B	B	B	B	A	B	B	B	B	B
	Self-management	B	B	B	B	B	B	B	A	B	B	C
	Decision support	B	C	B	B	B	B	B	B	B	B	C
Agree		B	B	B	B	B	A	B	B	B	B	A
	Self-management	B	B	B	B	B	B	B	A	B	B	C
	Delivery design	B	C	B	C	B	B	C	B	B	B	B
Assist		B	B	B	B	B	A	B	B	B	B	B
	Self-management	B	B	B	B	B	B	B	A	B	B	C
	Community link	C	C	C	B	B	B	B	B	C	B	B
Arrange		B	B	B	C	C	B	B	C	C	C	C
	Delivery design	B	C	B	C	B	B	C	B	B	B	B

🟩	Similar levels
🟧	Different levels

4.3.3 Discussion

4.3.3.1 Summary of the findings

There was variation in the element's implementation among the PCCs, ranging from "basic support" to "fully developed care". The average score of each element and the summary score of the ACIC indicated that there is "reasonably good support". Mapping the four levels of care, based on the average scores, from the ACIC and PACIC showed a high degree of consistency. There was no correlation between the summary scores of the ACIC and PACIC-5A. The association between the subscales of ACIC and PACIC-5A was in the range of no correlation to strong correlation, but all were statically non-significant. The lack of correlation could be explained by the restricted range of variation in the scores. The correlation coefficient reduces in restricted ranges of data (Bland and Altman, 2011).

4.3.3.2 Comparison with other studies

The results of this study were compared to local and international studies that used the ACIC, as shown in Table 4.44. The results of the different elements of the CCM in this study scored higher than the original scores of Bonomi et al. (Bonomi et al., 2002), and the Switzerland study, which included different practices: Swiss managed care practices (MC), Swiss group practices (GP), and Swiss single-handed practices (SP) (Steurer-Stey et al., 2010). This variation could be attributable to different factors including the different structure and organisation of the health systems in these countries (e.g., free access to care in Saudi Arabia).

In the MENA region, the overall scores of the ACIC from the sample in the Al Baha region were broadly similar to a local study in Al Madinah city, Saudi Arabia (Aljohani, 2018), and were generally higher than a study in Lebanon (Itani et al., 2015).

In Saudi Arabia, the ACIC scores from the samples from Al Baha and Al Madinah showed that all elements fell into the same category, “reasonably good support care”, except for “self-management support”, which fell into the category “basic support” in Al Madinah (Aljohani, 2018). The overall score of the ACIC in both studies was similar between Al Baha and Al Madinah (6.3 vs 6.1, respectively). However, Aljohani (2018) acknowledged the study’s shortcomings in terms of being confined to collecting responses from the ACIC, and recommended an in-depth study of each element of the CCM, including patients’ perspectives. Hence, the study in Al Baha added to the knowledge of a comparable result from the ACIC and the patients’ perspective through the PACIC. In addition, an in-depth assessment of the survey results was conducted through qualitative interviews.

Table 4.44 Comparison of ACIC mean scores with other studies

No.	**ACIC elements**	**Current study SA (n=27)**	(Aljohani, 2018) **SA (n=75)**	(Itani et al., 2015) **Lebanon (n=5)**	(Bonomi et al., 2002) **USA (n=90)**	(Steurer-Stey et al., 2010) **Switzerland**		
						MC (n=7)	GP (n=11)	SP (n=7)
1	Organisation of healthcare delivery system	7.5(1.3)	7.2 (2.2)	5.5	6.4 (1.8)	6.8(1.5)	5.4(1.0)	4.6(2.1)
2	Community linkage	5.9(1.2)	5.7 (2.3)	4.6	5.9 (2.3)	4.2 (1.5)	4.8(1.8)	3.1(2.1)
3	Self-management support	6.8(1.4)	5.5 (2.4)	6.5	5.4 (2.0)	5.0 (1.1)	4.7(1.4)	4.4(1.3)
4	Decision support	6.3(1.5)	5.9 (2.4)	7.2	4.8 (2.0)	4.7 (1.1)	4.2(0.9)	3.2(1.6)
5	Delivery design	6.2(1.4)	6.3 (2.6)	8.8	5.4 (2.2)	6.0 (1.6)	5.0(2.0)	3.9(1.5)
6	Clinical information system	5.9(1.1)	6.3 (2.6)	5.6	4.4 (2.2)	4.3 (2.5)	2.1(1.3)	3.2(1.6)
7	Integration	5.8(1.0)	6.0 (2.5)	5.1	**	**	**	**
	ACIC summary score	6.3(1.0)	6.1 (2.4)	6.2	**	**	**	**

4.3.3.3 Limitations

The sample size of 27 participants was relatively small because the number of included PCCs was limited to 11 centres. However, all PCCs in Al Baha sector were included and the response rate was high from the participants from all centres. Hence, the collected data were analysed descriptively, and the results were mapped with the patients' findings from the PACIC-5A questionnaire. The test of associations between the ACIC and PACIC-5A was carried out, but the small sample size from the ACIC possibly affected the correlation coefficient, which led to the conclusion that there is no association between the results from the two questionnaires.

4.3.4 Conclusion

The use of the ACIC in this study suggested a reasonable implementation of the CCM in the PCCs in Al Baha. Matching the findings from the ACIC and PACIC according to the four levels of care showed broadly similar levels of care. This could reflect the consistency between the different perspectives descriptively; however, the correlation between the ACIC and PACIC scores indicated no statistical association. A comparison with international studies showed higher scores in this study, which could be attributable to the different health systems. The comparison with the local study reflected almost similar results. The qualitative interviews will pursue a more in-depth assessment of the different elements in the next chapter.

4.4 Chapter summary

This chapter presented the first phase of this mixed methods study. The methods, results, and discussion of the PACIC-5A and ACIC surveys were described.

Chapter Five: Qualitative Research Phase

5.1 Introduction

This chapter examines how services for people with diabetes in primary healthcare centres are perceived from the perspective of healthcare professionals, managers of PCCs, and chronic care supervisors. It helps to understand how these services are delivered through the lens of the CCM with its six elements. This chapter aims to answer the research question:

What are the facilitators and barriers to implementing the CCM in primary care centres in Al Baha, Saudi Arabia?

It is worth mentioning that people with diabetes were not included in the qualitative phase mainly due to two reasons. First, it was difficult to recruit participants during the COVID-19 pandemic. Second, the time frame for data collection (quantitative and qualitative) was limited. However, this limitation of the study was considered for future work as a continuation of this study.

5.2 Methods

The first phase of the study was the quantitative approach. Using two parts, it provided information about how the current primary care services were consistent with the six elements of the CCM from the perspective of people with diabetes and healthcare professionals. Nevertheless, this approach did not explain why these elements vary in implementation – in other words, what could facilitate or hinder their implementation in primary care centres. As such, the second phase of the study aimed to fill this gap and explain possible reasons and factors that encourage or inhibit the CCM implementation by conducting semi-structured interviews with three major stakeholders comprising healthcare professionals, primary care managers, and supervisors of diabetes care in the region. Interviews were selected as the primary method for data collection over other widely used qualitative methods, namely observations and focus groups (Leydens et al., 2004), because interviews were considered to be more suitable to answer the second research question. With interviews, there is a unique opportunity to gather information from a diverse group of participants, who can use their own words to communicate their thoughts and feelings during qualitative interviews, which gives the study's respondents a unique voice to describe their experiences (Ritchie et al., 2013). Observations were not suitable because this was deemed to be a time-consuming and intrusive approach that would not be the best way to answer the research question. Focus groups were also thought unsuitable due to the possibility that persons with varying employment positions would not share their true ideas and opinions. Focus groups were also ruled out due to practical difficulties, since it would be difficult to convene a sufficient number of people with the relevant job responsibilities working in different locations and settings in the Al Baha region at the same time.

5.2.1 Sampling of the qualitative interviews

As mentioned earlier, the target population for the qualitative approach included healthcare professionals (doctors, nurses, and health educators), primary care managers, and employees in the general directorates of health affairs in the region who had administrative authority for diabetes care.

While the design of the study was sequential and the qualitative phase was to explain the findings of the quantitative approach, the sample size was smaller because the aim was to understand the factors that could facilitate or prohibit the CCM implementation rather than obtaining statistical generalisability or representativeness.

Hence, sampling was purposive, where selected participants had the relevant knowledge and experience in the topic being studied. This method of sampling is to gather information from individuals who are selected based on the knowledge of the issues and experience they possess and the ability to assist with the relevant research (Etikan et al., 2016).

The sample approach started with an initial selection of participants who provided their consent for further participation, through the ACIC survey during the study's previous phase. Second, the sample was subsequently supplemented with new participants through snowballing. During the sampling, the researcher considered the importance of recruiting participants from different job roles, and from both male and female sides, described as maximum variation purposive sampling. For conceptual rather than statistical generalisation, it was important to collect information from a diverse range of perspectives and settings. By broadening the sample to include alternative contexts or informants, efforts were undertaken to obtain perspectives that might contradict or modify the results. In addition, the interviews were conducted until data saturation was reached. Data saturation is reached when no new information emerges from the data (Bowen, 2008).

5.2.2 Data collection and interview guide

The aim of the semi-structured interview was to explore the barriers and facilitators involved in the implementation of the CCM in Al Baha primary care centres. The researcher developed the interview guide, which was informed by the responses from ACIC and PACIC-5A (Appendix 8). The interview guide was piloted with two healthcare professional experts and the questions were modified accordingly. The questions were initially formulated to examine the CCM implementation in PCCs; however, the two participants found it difficult to identify factors that might help or prevent the model from being implemented without the model being applied initially. Consequently, the questions were modified to discuss the factors that may affect the application of the six elements separately without directly asking about the application of the model itself. These questions were formulated to help deductively in the first stage when assessing the six elements, and then inductively to identify themes pertaining the factors related to the facilitators and barriers of the implementation of the model. The questions were set and discussed with supervisors prior to conducting the interviews. However, during the interviews, the researcher could go beyond the flexible interview guide to explore related themes in greater depth (Table 5.1). In addition, depending on the context of the interview, the interviewer could opt to omit or include some questions. All interviews were conducted online (either video call or audio only) due to the COVID-19 pandemic.

Table 5.1 Interview protocol

Step	Phase	Guide
1	Objectives	- To identify barriers and gaps in the delivered care according to the CCM. - To appreciate the facilitators that made the delivered care more congruent with the CCM.
2	Introduction	- Introduce the study purpose, confidentiality, participant's rights, and length of the interview. - Start audio/video recording.
3	During the interview	- Guide the participants through the study questions. - Clarify each answer by asking sub-questions.
4	Ending the interview	- Make sure to cover prepared interview questions. - Emphasise the confidentiality of the recorded interview. - Thank the participant and elucidate how their contribution is important and valuable to the study. - Turn off the recording.

The participants were given the interview questions prior to the interviews so they had the opportunity to view the questions before deciding whether or not to participate. Verbal and written consent to participate and to record the interview were obtained from all participants. All interviews were carried out by the researcher, and they lasted between 24 and 101 minutes. The participants were offered the choice of the interview being in Arabic or English, but all participants preferred to choose Arabic because they regarded it as easier and faster in conveying their ideas. All interviews were audio recorded to capture the interview data more effectively and make it easier for transcript generation.

Since the interviews were conducted online, the ability to notice non-verbal cues and body gestures was a challenge, being even more difficult for audio-only interviews. However, the tone of voice and the speed of speech were helpful to understand the participants’ feelings most of the time. In order for the researcher to get used to conducting interviews and capture these non-verbal cues, he conducted several interviews with friends before the actual study. This enabled the researcher to familiarise himself with the obtained data in order to gain a better understanding of its depth and extent, which was useful during the actual data collection.

5.2.3 Role of the researcher

One of the major drawbacks of qualitative research is the possibility that the analysis and coding of qualitative data would result in divergent and numerous interpretations among researchers. Thus, it is proposed that focus be placed on the researcher’s reflexivity, which is a written reflection of the researcher’s biases, views, and experiences and how they may affect the participants (Creswell, 2016). Green and Thorogood (2018) indicated that two distinct perspectives can influence the conclusions of qualitative research. The emic perspective, or insider’s perspective, refers to when the researcher is a member of the culture or group under study and thus conversant with this culture. In comparison, the etic perspective, or outsider’s perspective, is used when the researcher is unfamiliar with or not a member of the culture being studied. If the researcher is a member of the culture being studied, he or she may be able to contribute additional knowledge due to their familiarity with expressions, sentiments, modes of communication, and developing rapport (Green and Thorogood, 2018). On the other hand, as an outsider, the researcher may be able to view the participants’ experiences objectively and without previous notions. Additionally to the emic and etic perspectives, Creswell (2016) recommends that a written reflexivity statement should cover three areas:

the researcher's history, how that background may affect the data analysis, and finally, the predicted reaction of participants and general literature readers to the study findings. As such, the following paragraph discusses the researcher's background and how it influenced his interpretation of the data (emic and etic perspectives), as well as the impact the study findings are anticipated to have on readers and participants in the general health services literature.

Throughout the qualitative investigation, brief notes were kept and reflexive remarks were made regarding what was experienced during the interviews and the researcher's awareness of how his presence affected or did not affect the research.

The researcher's interest in this study stems from his own role as a junior doctor and researcher at a university in Saudi Arabia, where he gained experience working in primary care centres during medical school training and where he is passionate about improving primary care services for people with chronic conditions. Given the researcher's centrality as a qualitative research tool, it was critical to check the subjective elements he assumes about doctors and other healthcare professionals who frequently differ on the quality of services for people with diabetes. His medical student experience affected his view that primary care centres are crucial for providing proper management for patients, but they act as a bridge to secondary or tertiary care rather than being an important provider. Along with his employment as a researcher at the university, this experience affected his perception of international healthcare professionals and their comprehension of Saudi Arabian society.

Bias among researchers may be a significant issue if the researcher enters the field with prior expertise and preconceived notions (Silverman, 2015). This may put the researcher in danger of attempting to focus exclusively on points that support a pre-existing idea. He attempted, as far as possible, to maintain a neutral position throughout the data collection and analysis procedure in this study. He has a similar professional background to the doctors and has worked in primary care settings. As a Saudi citizen, he is familiar with the various norms and characteristics of Saudi society, as well as with some of the obstacles that healthcare providers may experience when providing care for patients. In this regard, the researcher's ability to give a synthesis of emic and etic views aided in bringing personal and professional insight to the study process, as well as descriptions of healthcare professionals' and Saudi diabetic patients' experiences.

To speculate on how this account may have influenced the participants, readers of health services research, and policymakers, the following points were considered: first, the participants may have perceived the researcher as a medical professional concerned with the development of the service, which may have made them more candid in disclosing their views and experiences. At the same time, the researcher is Saudi, which may suggest that foreign healthcare professionals could refrain from expressing negative thoughts about the Saudi people or culture. While the researcher was born and raised in Saudi Arabia, he may share a similar patient culture, but not the same experience of diabetic patients. As he shares doctors' medical experiences and patients' culture, he may be in a unique position to comprehend the views of the participants and then evaluate the results. However, it also requires the researcher to be mindful of how the participants may see him, as well as the reality that his own viewpoint will invariably influence their interactions and the data generated. Many participants expressed a strong desire to learn about the study's findings and to read the final report. Naturally, there are a variety of perspectives on this subject, and some participants may find it beneficial to learn about others' perspectives and experiences.

The second consideration was how ordinary readers of health services research and policymakers react to the study's findings. It may be argued that this study will assist them in creating future recommendations by providing a better understanding of what factors can and cannot be considered to improve the current services, as well as additional suggestions drawn from interview data that could be tested in the future. The supervisors of the present study, who came from a different contextual background, engaged in frequent discussions with the researcher about data analysis. This increased his level of reflexivity, as they raised difficulties and asked questions that assisted in explaining underlying meanings that the researcher had neglected due to the cultural differences between himself and the supervisors.

5.2.4 Data analysis

All audio-recorded interviews were transcribed verbatim in the same language, Arabic. Exclamations, pauses, and emotion were noted in the transcripts whenever indicated and made it possible to provide more information about how the individuals expressed themselves. To ensure that meaning is not lost in translation, to increase the variety of material that could be compromised if it were translated, and to save time, the transcripts were written and analysed in the original language (Smith et al., 2008).

With the aim of identifying the anticipated facilitators and barriers toward the implementation of the six elements of the CCM in PCCs, thematic analysis was used for the qualitative data analysis. Braun and Clarke (2006) argued that thematic analysis should be seen as a fundamental approach for qualitative analysis, as it is a technique that is both accessible and theoretically flexible.

In qualitative studies, thematic analysis involves recognising prevalent and recurring themes, and the six phases of thematic analysis were followed: familiarising yourself with the data, initial codes generation, searching for themes, reviewing the themes, defining the themes, and then writing up (Braun and Clarke, 2006). The phases need not necessarily be followed in order – the researcher can move forward and back between them, especially if complex data exist (Braun and Clarke, 2006).

Along with data collection, interview data analysis was carried out, with the interpretation of each interview influenced by the learning gained from the previous data gathered. In other words, the questions asked during a later interview could be changed depending on what the researcher learned during earlier interviews. The qualitative data analysis process extends beyond data collection, since information from all data-collecting processes were collated, compared, and analysed together. The iterative process of qualitative data collection and its incorporation with data analysis ensures that the data acquired becomes increasingly relevant and refined as the process of data collection progresses (Pope et al., 2000). While the transcription of verbal data may appear to be time-consuming, irritating, and frustrating, it can be an excellent way to begin familiarising yourself with the data (Riessman, 1993). This allowed the researcher to immerse and familiarise himself with the collected data through interactive means during data collection and repeated reading of transcripts. Braun and Clarke (2006) argued that transcription time is not wasted because it influences the early phases of analysis, and you will gain a considerably more detailed grasp of your data by having it transcribed.

After repeated reading and immersion in the data, the researcher had a general understanding of the data's context and breadth, so initial codes were generated in order to categorise the data for interpretation. Coding in this study was manually performed. The researcher systematically worked through the dataset to identify interesting characteristics of the data items that might form the basis for recurring patterns across the data collection. Coding was performed by highlighting texts and writing notes beside them to help identify a potential pattern. Sometimes, more than one code was used under the same text; however, these codes were revised in terms of the meaning they convey and that codes were always kept with the text from which they were generated.

Following the coding of all of the interviews, the analysis progressed to the stage of grouping the codes into themes. This phase aims to organise the various codes into probable themes and collect all of the applicable coded data extracts within the themes that have been found. Hence, it began with an examination of the identified codes and how they may be combined to generate a theme. To facilitate this process, the researcher visualised codes and how they can be combined to form themes using tables and mind-maps. Initial thematic maps and tables helped to organise different codes under the appropriate theme(s) or subtheme(s).

The themes and subthemes were reviewed and refined. During this phase, data within themes should be coherent, and there should be clear and apparent distinctions between themes (Braun and Clarke, 2006). As a result, it was better to combine some themes rather than them being separate, while other themes were considered a sub-theme rather than a theme. Following Braun and Clarke (2006), the ideas were analysed on two levels: codes (with their associated text) and themes. This helped to evaluate the coded data for coherence under a theme, and if this condition was met, the themes were evaluated for their appropriateness to include these codes. If the potential themes do not fit, the researcher must consequently decide whether the theme is troublesome in general or whether some of the data extracts within just do not belong there (Braun and Clarke, 2006). Accordingly, these themes could be recreated, the coded data moved to another theme, or the themes discarded. Hence, once the researcher was satisfied with the themes and included coded data, he evaluated them in relation to the entire dataset. This process was performed to consider the validity and accuracy of the themes to represent the meanings seen in the collected data as a whole (Braun and Clarke, 2006). Additionally, it enabled the checking of whether the themes operated with the dataset, and to code any new data within themes that were missing during the earlier coding steps. However, coding and creating new themes could continue indefinitely, and if refinements are not making a significant difference, this indicates the need to stop (Braun and Clarke, 2006). At the end of this phase, the researcher was able to recognise the different themes and how they fit together.

The themes and subthemes were defined and refined to make certain that there was not too much overlap across themes, and for detailed analysis in relation to the research question. As a result of the refinement, subthemes and minor themes were identified. They were effective for providing structure to broader and more complicated themes, as well as demonstrating the hierarchical structure within the data. At the end of this phase, the researcher was able to name themes clearly and define what constitutes a theme and what does not.

The final analysis and write-up were carried out after the themes, subthemes, and minor themes were clearly set. The data extracts were translated into English and they were integrated within an analytic narrative.

5.2.5 Trustworthiness in qualitative research

The term ‘trustworthiness’ relates to the degree of confidence in the data, their interpretation, and the techniques utilised to verify the study’s quality (Pilot & Beck, 2014). Positivists frequently criticise the validity and reliability of qualitative research, probably because these notions cannot be addressed in the same way in naturalistic studies (Shenton, 2004). Nonetheless, some authors on research methods have illustrated how qualitative researchers can incorporate measures addressing these concerns into their own qualitative research, and have attempted to address these issues directly in their qualitative studies (Shenton, 2004, Silverman, 2015). Lincoln and Guba (1985) outlined four criteria that they believed qualitative researchers should examine when conducting a study, and these criteria are widely acknowledged by qualitative researchers to determine the reliability and validity. These criteria for trustworthiness are credibility, transferability, dependability, and confirmability.

5.2.5.1 Credibility

Credibility refers to the researcher’s effort to demonstrate and offer an accurate picture of the phenomenon under study (Lincoln and Guba, 1985). In quantitative research, this concept is equivalent to internal validity (Connelly, 2016). This study employed several ways to achieve this objective.

Semi-structured interviews with healthcare professionals were performed online via Google Meet and Zoom. In the field of healthcare, this is a well-established qualitative research method that has been utilised repeatedly. The topic guide was produced using literature and expert reviews and was piloted with two participants. Using a well-established research approach should help to increase the data’s credibility and, thus, its trustworthiness (Shenton, 2004).

Triangulation was used as a measure of credibility in the current study. Triangulation can take two forms: one involves the collection of data using multiple methods, such as focus groups and interviews, and the other involves the utilisation of a diverse variety of informants or data sources (Shenton, 2004, Krefting, 1991). Additionally, some researchers refer to site triangulation, which is the process of recruiting participants from multiple locations rather than just one. This can minimise or reduce the effect of local characteristics exclusive to one institution. A wide range of primary care providers were enlisted to participate in this study. In this way, the study's credibility may have been increased by comparing individual experiences and opinions.

Developing early familiarity with the involved organisations is one of the suggested strategies to increase credibility. This helps the researcher to understand the organisation and build trust with the participants. This was accomplished by pre-data collection (ACIC and PACIC-5A) visits to PCCs in Al Baha.

Potential participants were issued with a research invitation with the questions in the interviews and were free to decide whether or not to participate. They were free to raise any concerns or to enquire about any data security and confidentiality issues. The researcher emphasised the fact that the data would be coded, and that no one other than the study team would have access to the list of identifying participants. The participants were encouraged to be candid, express themselves, and share their stories.

Discussions with the supervisors throughout the interviews helped the researcher to expand his knowledge. The supervisors were able to share their research experiences and provide feedback on the topic guide, interview questions, and study focus.

5.2.5.2 Transferability

Transferability refers to the extent to which findings can be applied in different contexts (Lincoln and Guba, 1985). In quantitative research, this concept is equivalent to external validity (Connelly, 2016). Qualitative researchers are not interested in generalisability to other contexts; rather, they seek an in-depth knowledge of ordinary life experiences. As a result, qualitative research typically does not require a large number of participants (Bryman, 2008). While the objective of qualitative research is not necessarily to generate replicable findings, it is reasonable to assume that the findings will be generalisable in the sense that they will be applicable in other settings or, in this case, to different PCCs (Green and Britten, 1998).

This study's goal was to provide in-depth research of the issues under inquiry in this particular setting. The current study's findings may be applicable to other regions of Saudi

Arabia or nations such as the Arab Gulf Cooperation Council countries that have a similar cultural or organisational structure.

Experts in qualitative research suggest various elements that researchers should mention to help the reader evaluate whether the study's findings can be applied to other institutions, including the study's participants and their locations; the data collection methods used; the number and length of data collection sessions; and the time period during which the data were collected (Shenton, 2004, Krefting, 1991).

As a result, the methods and results sections included a thorough explanation of the aforementioned features, but the participants' affiliation with the chosen primary care centres was omitted to preserve their privacy.

5.2.5.3 Dependability

Dependability means that if the work is repeated by another person in comparable circumstances, the results will be similar (Shenton, 2004). It is comparable to reliability in quantitative research, but with the notion that the stability of conditions varies according to the study's nature (Connelly, 2016). Qualitative research makes this difficult because the interpretation of the results can vary from researcher to researcher, but researchers should provide a thorough description of their methods and findings so that others can replicate the research. Every effort has been taken in this study to detail the research design, methods, and data collection.

5.2.5.4 Confirmability

Confirmability indicates that personal views and theoretical tendencies cannot impact the investigation or the findings (Bryman, 2016). Quantitative research's concept of objectivity is similar to confirmability (Connelly, 2016). Four methods were used to maximise the study findings' confirmability (Shenton, 2004). First, data triangulation was used to interview participants from various healthcare backgrounds to enhance the data and minimise investigator bias. Second, Section 5.2.3, 'the role of the researcher', also clearly outlined the researcher's beliefs and preconceptions. Third, a detailed description of the methodologies used was provided to ensure that the research findings could be examined. The researcher also emphasised the study's methodological limitations and their potential impact on the conclusions of the research.

5.3 Results

5.3.1 Participants

As shown in Table 5.2, seven males and four females agreed to participate, and the interviews lasted between 24 and 101 minutes.

Table 5.2 Interviewee characteristics

Gender	Interview duration (minutes)	Healthcare provider	Manager	Diabetes coordinator
Male	101	√		
Female	45	√		
Male	66	√		
Female	45	√		
Male	37			√
Female	24	√		
Female	82	√		
Male	65		√	
Male	52		√	
Male	69			√
Male	36	√		

5.3.2 Thematic groups

Three major thematic groups emerged from the analysis of the interviews: top-down healthcare system, cultural determinants, and recommendations to improve care. Each major thematic group contained smaller groups, which in turn contained individual themes. These are summarised in Table 5.3.

Table 5.3 Major and minor thematic groups

Themes	Subthemes	Minor themes
1. Top-down healthcare system	• Ministry of health level factors	○ Governmental healthcare coordination ○ National initiatives to support community services ○ Nationally provided appointment system ○ Specialised diabetes centre ○ Training programmes for healthcare professionals
	• Primary care level factors	○ Management ○ Access and continuity of care ○ Diabetes screening programme ○ Electronic health system
2. Cultural determinants	• Physical inactivity	○ Urban design and transport infrastructure ○ Climate condition ○ Social barriers
	• Dietary patterns	○ Dietary habits ○ Social norms in gathering and hospitality
	• Perception about self-management behaviour	○ Adequate physical exercises ○ Healthy and balanced diet ○ Management of diabetes
3. Recommendations to improve care	• Resources	○ Mental health support ○ Specialised diabetes centres ○ Improving health information system ○ Support community linkages ○ Incentives and financial support
	• Delivery of care	○ Training and educating healthcare professionals ○ Build trust ○ Empower leadership

The participants identified several factors that can be categorised as facilitators or barriers toward implementing the CCM elements. However, this classification was made from the perspective of the participants, and in some instances, the same element could be deemed a facilitator by some and a barrier by others. For example, some participants saw the shift of the health information system from paper-based documentation to an electronic system as a facilitator toward implementing the clinical information system element in the CCM, whereas others saw it as a barrier to the proper implementation of the delivery system design. It was looked at as a facilitator because it was easier to access patients' medical records, add important information with few missing data, and support decision making by notifications about drug–drug interactions. On the other hand, it was perceived as a barrier because the electronic health system was time-consuming, and doctors could not keep adequate eye contact with their patients during visits.

The following sections describe the themes and thematic groups and how they mapped with the CCM elements.

5.3.2.1 First theme: Top-down healthcare system

All participants identified the top-down organisation of the healthcare system through two main themes: organisational factors at the level of the MoH, and organisational factors at the primary care centre level. Six minor themes were identified at the MoH level: governmental healthcare coordination, nationally provided appointment system, national initiatives to support community services, specialised diabetes centre, training programmes for healthcare professionals, and drug-dispensing procedures. Five minor themes were identified under the primary care centre level: management, access and continuity of care, diabetes screening programme, electronic health system, and chronic care clinics.

5.3.2.1.1 Ministry of Health

The Ministry of Health (MoH) is the major governmental agency of the national healthcare system in the Kingdom of Saudi Arabia. Its responsibility is to provide healthcare for all citizens. It has a network of hospitals and primary care centres, which are distributed around the country and provide more than 62% of care services (Walston et al., 2008). However, other governmental and private sectors play an important role, but with lower involvement (20% and 17%, respectively). The MoH has the power and authority to regulate and coordinate healthcare in the Kingdom apart from the military and university teaching hospitals (Walston et al., 2008).

In the following sections, participants identified factors at the MoH level about the organisation of care that could play an important role in implementing the CCM.

5.3.2.1.1.1 Governmental healthcare coordination

As mentioned above, the MoH is leading the change in care delivery as a governmental sector with a broad scope of legislative power. Through its network of primary care centres distributed in all regions (over 2200 primary care centres), some participants asserted that the MoH represents an important role in adopting initiatives like the CCM.

> *"It is the MoH's role to implement such a model of care in our primary care centres, if policymakers and decision-makers in the Ministry [of health] were convinced to adopt the model, so you can overcome challenges of legislation and implementation" P5*

While the MoH's legislative power was expected to be a facilitator in implementing the CCM, it was also viewed as a possible barrier to local initiatives.

> *"Unless the decision was made at the top level in the MoH, we cannot adopt such a model in all primary care centres" P8*

Nevertheless, an example of improving one element of the CCM in Al Baha was described by one participant. Although this improvement was supposed to be initiated at the level of the MoH and implemented to all tiers of care, people in the General Directorate of Health Affairs overcame the lack of connecting PCCs to secondary care by implementing an electronic link that allows healthcare professionals at different levels to access patients' records and add their feedback accordingly.

> *"We overcame the challenge of connecting primary care centres to hospitals in Al Baha until the MoH will officially establish a connection between all primary, secondary, and tertiary centres in all regions. It is a unique achievement because the current electronic system does not have this feature yet" P10*

This example could possibly overcome the barrier of the MoH to recognise the model as an important implementation in all centres. In other words, the General Directorate in any region could adopt such a model in case they recognised its importance. However, its implementation is dependent on the recognition of its importance, and available resources. This is because each regional directorate has relative autonomy in coordinating and managing its health affairs (Walston et al., 2008). Hence, the need for MoH approval is still important.

5.3.2.1.1.2 National initiatives to support community services

Supporting community services was frequently mentioned. Currently, there are two main initiatives: ‘Health Friends Committees’ and ‘Community Empowerment’.

> *“In every primary care centre, it is expected to have a health friends committee. It comprises a number of people who are active in the community; they have social power, and they are [or were] working in specific governmental and private sectors like education, law, engineering, and so on. They help to fill the gap between patients’ needs and available resources in primary care centres” P9*

Bridging the gap between patients’ needs and the available resources varies according to the activation of the role of this committee. Purchasing medical devices, though not limited to people with diabetes (e.g., mammogram for diagnosis and screening for breast cancer), or arranging awareness and sport campaigns, were among the contributions of this committee.

> *“We arrange different campaigns outside the [primary care] centre in malls, public parks, and schools. We targeted different ages and medical conditions and members of health friends’ committee supported us. They funded and sometimes participated as in a campaign that was organised to encourage physical activity by walking for long distances. They paid for presents and gifts, and they participated in the activity” P9*

A wide variation between the role of this committee among different PCCs was noted. While some centres have active members who are willing to participate, others were not active or were minimally involved.

> *“One of the health centres in the region got first place in the Kingdom in activating community partnership, as some businessmen invested nearly 100,000 riyals (around 20,000 British pounds), providing sports equipment for men and women and specialised trainers inside the centre to encourage patients to exercise free of charge at any time [within working hours of the centre]” P10*

This example was exceptional, as the participants agreed that the role of this committee is variable and mainly depends on the committee coordinator, who is usually the manager of the centre.

> *“This committee was formed a long time ago, in addition to that fact that the coordinator often does not have enough time to devote himself to coordinating meetings with members [of the committee], especially with the heavy preoccupation with the tasks entrusted to him within the centre” P4*

Although the idea behind initiating such committees is to help to improve primary care services for patients through community engagement, their performance and functionality are not inspected or checked regularly by the MoH. Their performance is dependent on the managerial administration in each primary care centre.

> *"Organisation and supervision of health friends' committees are managers' responsibility in primary care centres. They are responsible to organise, supervise, and ensure their performance" P1*

Managers in primary care centres appreciate such initiatives, but it is an extra burden to bear due to number of reasons including shortage of time, shortage of staff, other important issues, and conflicting meeting times.

> *"Arranging meetings with the health friends committee is challenging, to be honest. As a manager, I'm busy with tasks that cannot be delegated, and I need an assistant to arrange meetings. It is better to be by a technical employee, but we do not have enough workers. Also, all meetings are expected to be during duty time, but it is unattainable most of the time because a number of committee members are working and they cannot afford leave to attend such meetings" P8*

Community empowerment is a second national initiative that was launched and supported by the MoH. It aims to "empower community members in the health promotion process by giving them a leadership role in determining the health problems they face in the district, prioritizing, making decisions, and working side by side with the district healthcare centre to boost the pioneering role of primary healthcare" (Ministry of Health, 2021).

> *"Recently, in the last few years, we have a new initiative called community empowerment. Its role is to empower people in the community to promote the health status among residents in the region together with primary care centres. They help to identify problems because they are in the field and they know the major concerns for people who are living in the same area. They helped us to go beyond our clinic in the [primary care] centre and think broadly about patients' concerns" P10*

Compared to Health Friends committees, community empowerment is more organised and widely approachable. This is mainly due to its dependency on teams within primary care centres and its accessibility by any person who has an interest in becoming a member or a volunteer.

> *"We have partnerships with gyms and healthy food stores as part of the community empowerment initiative that was initiated in 2017... We currently have six primary*

> *care centres in the region where you can find teams for this initiative and anyone who wants to join as a member, or a volunteer, can contact them directly" P5*

It is worth mentioning that this initiative was in line with the national transformation plan and Saudi Vision 2030 to encourage self-management support among community members (Ministry of Health, 2021). However, there is no recent publication of how it was adopted or its effectiveness.

5.3.2.1.1.3 Nationally provided appointment booking system

The participants identified the flexibility of the appointment system, designed and organised by the MoH, as a very important aspect of organised care. Appointments can be booked online, by calling 937, or within primary care centres. Nurses facilitate bookings for patients who face difficulties booking online or by calling 937, especially older patients. There was flexibility in terms of the affordable access to care through different channels, and the participants within the PCCs described how they supported some patients who were reluctant to use the nationally provided booking system.

> *"We provide appointments every 20 minutes because we have more than 400 diabetic patients and over 3000 patients in general. Patients can freely book a slot that is convenient for them. They can call 937 to book an appointment if they do not have access to the internet or they cannot use technology. We can also help patients, especially old people, by booking an appointment when they visit the primary care centre either in the male or female section" P7*

Prior to the implementation of the national appointment system, patients did not need to book an appointment online or by phone. Instead, they would visit the PCC where they were registered and wait in the waiting area to be seen. Neither doctors nor patients knew how many patients would visit the primary care centre or at what time they would be seen. It was effectively a walk-in clinic. The new system presented problems:

> *"When we activated the online booking, we faced many problems at the beginning and all patients were visiting the centre without appointments. We gradually started to inform them of the importance of booking online or by phone. Though there is an excellent response, some patients, especially old, still visit the clinic without appointments and we still help them by booking appointments in the centre" P4*

The national implementation of an appointment system was challenging, as described by the participants, but what made it easier and smoother was the continuous support from the higher administration, which supported organisational leadership as part of the CCM.

> *“Our administration at the level of the General Directorate of Health Affairs was supporting us to fully collaborate with patients until they were aware of the importance of early booking online or by phone” P6*

The participants described a change as people visiting their primary care centres became more aware of the necessity to book an appointment before heading to the centre, and there was a noticeable increase in patients’ obedience to the system’s requirement. However, despite all efforts and attempts to facilitate booking appointments by the MoH, there was still a small proportion of noncompliance either in making appointments or attending on time.

> *“...however, old people have an exception, and we facilitate booking in the centre when they visit us, but we told them how long they will wait and how many patients waiting before them. On the other side, many patients are not used to turning up at the scheduled time and we are not surprised to see patients coming in the afternoon when their appointment was in the morning!” P3*

5.3.2.1.1.4 Specialised diabetes centre

A factor frequently mentioned by all participants that supports decision making and self-management is the availability of a specialised diabetes centre. It is staffed by specialised doctors (endocrinologists, diabetologists) and healthcare professionals (nurses, public health practitioners, and health educators) to provide care for people with diabetes. It is affiliated to the main hospital in Al Baha (King Fahad Hospital), where it provides counselling and management services specifically for people with diabetes.

> *“As a doctor, I send patients who have controlled blood sugar to the diabetic centre in Al Baha for the annual check-up, including blood test, fundoscopy, and diabetic foot examination. They also help in reviewing the treatment plan and they can amend it if it is for the patient’s benefit. We get feedback, a printed one, when the patient visits the primary care centre after that” P1*

Complicated cases with an uncontrolled blood sugar are referred to the diabetes centre for further investigations and proper management. The involvement of specialists is an important component that facilitates decision support in the CCM.

> *“... sometimes we have complicated cases who are not responding to the treatment, so we refer these cases to the diabetic centre to review the plan and make the necessary changes” P4*

Although the availability of a specialised diabetes centre could improve self-management support and decision support, it is the only specialised centre in the region for all people with diabetes and consequently leads to limited access to specialised care.

> *"Al Baha is not a small region, and [a person] who has diabetes in areas far from the city will struggle to access to the diabetic centre. Furthermore, there is a huge load on the centre already, which may cause a delay in appointments or very long waiting time on the day of the appointment" P5*

5.3.2.1.1.5 Training programmes for healthcare professionals

Healthcare providers identified the training programme as a facilitator to help in decision support. The General Directorate for Health Affairs in the region provides a monthly training programme including lectures and workshops for medical doctors and nurses about guidelines and updates on diabetes management.

> *"There are different training programmes in the region, but speaking about diabetes, we have a monthly training programme through the year for doctors and nurses. It is a three-day programme, and it includes lectures and workshops. It is free and we invite healthcare professionals in rotations, so we can cover all practitioners in all [primary care] centres in the region" P5*

Though this programme runs throughout the year and is designed to strengthen the decision support for healthcare professionals regarding the management of diabetes, there was another perspective from some participants according to the limitations to attend this programme.

> *"I appreciate their effort in the General Directorate to hold such programmes, but it is not enough. I attend once a year, but I need more sessions and workshops. I prefer to have at least a week with specialist in the field, like an attachment to see how they manage people with diabetes in the specialised centre, for instance" P11*

Little is known about the nature or effectiveness of this programme in Al Baha, or more generally in Saudi Arabia. Among the limited studies on this subject, a study in the Al Hasa district found that physicians must improve their knowledge, attitude, and practice in order to appropriately treat diabetic patients (Khan et al., 2011). According to another study conducted in Abha, about one-third of PHPs failed to follow Saudi DM treatment standards (Almetahr et al., 2020). Both studies identified gaps in knowledge, attitude, and practice among healthcare providers in PCCs, and they recommend continuous education and training to improve these three domains.

5.3.2.1.2 Primary care level factors

The participants distinguished four aspects at the level of primary care centres comprising access and continuity of care, management, diabetes screening programme, and the electronic health system.

5.3.2.1.2.1 Access and continuity of care

Access and continuity of care are two important components under the delivery of care element of the CCM. Participants recognised having a specific primary care centre that serves a catchment area with a known population as a strength in the health system, and can help in terms of access and continuity of care.

> *"As you know, our primary care centre has a catchment area like other centres and we have files for all families in this area and there is a good relationship with them, and you can imagine that some diabetic patients request to see me by name whenever they have an appointment in the centre. They insist, even if I am busy or have other patients, because they trust me and they like how I treat them" P1*

From provider's perspective, trust between doctors and patients was because of the continuous personalised care provided to patients. As per Saudi guidelines, people with diabetes have a regular follow-up with their doctors in primary care centres every month.

> *"We see those patients monthly for follow-up and to do some laboratory investigations. We make sure they have controlled diabetes by testing their fasting blood sugar in every visit and hgA1c every three months. We refer them to the diabetic centre every year, though some of them ask us to not send them because they feel more comfortable and happier with us" P3*

Monthly visits were recognised as a facilitator to deliver continuous care for people with diabetes. This monthly follow-up covers history taking, physical examination, laboratory investigations, and refilling prescriptions.

> *"We see patients with diabetes every month. They come mainly for refilling a prescription, but we take their vital signs and we take a history and do physical examinations, and we take fasting or random blood glucose levels" P3*

From a different perspective, it was an extra burden on doctors as they face a challenge to spend admissible time with their patients. In addition, these regular visits not only contradict the guidelines' recommendations, but they do not add a clinical value to improve patients' conditions, especially people with controlled blood sugar.

> *"... if the patient has controlled blood sugar level, why should I see him every month? It is a waste of time while other patients need more attention" P1*

It was found through the interviews that monthly visits are unavoidable because drugs are only dispensed a month at a time, and as a result, patients have to visit their doctors even if they have controlled blood sugar. Hence, this strict legislative regulation prohibits appropriate and effective medical practice to take place and adds extra workloads onto doctors and creates unnecessary urgency for patients who are only visiting to collect their medication.

> *"Patients are in a rush every time they visit us for a follow-up because they believe it is a refill appointment rather than a follow-up! They sometimes send their offspring to collect their medication instead of coming by themselves, though we always reject their request unless they bring their parents or grandparents, but when they bring them later on. We struggle with the limited time and the big number of patients who missed their appointment and want to see doctors urgently!" P4*

Challenging factors that exist in this regard were the shortage of staff – not in all centres, but centres with large numbers of patients – and cultural habits (this will be covered in the second theme). A shortage of staff is a limitation in the system where there is no equal distribution of the workforce based on the number of people visiting the centre.

> *"... in contrast to primary care centres that serve a small number of patients ... we face a challenge with the large number of visitors where there are few doctors to cover the clinics" P1*

5.3.2.1.2.2 Leadership skills of managers

Different obstacles were identified at the managerial level in primary care centres, which could possibly prevent the optimal delivery of care. According to some participants, managers' poor knowledge and lack of qualifications or experience were major barriers to optimal care.

> *"Some managers do not fully understand the importance of spending enough time with the patient. What is important for them is how to reduce waiting times in the waiting area regardless of the harm that could result from seeing patients in a rush and not giving them enough time!" P3*

Weak leadership skills have an impact on workflow as well as on the provider of care. Some people in managerial positions underestimate the importance of supporting healthcare providers to attend courses, health conferences, workshops, and seminars as part of the continuous education outside of the centre.

> *"It is hard to attend courses or conferences if they are held during work time because we need official leave, and managers usually refuse to attend such activities due to the importance of staying in centre and serving patients, but they do not understand how these activities help us to be updated and to improve our practice" P11*

Undervaluing the importance of attending such activities might hinder a factor that could influence the decision support element in the CCM. However, this view was contradicted, and further explanation shed light on the reasons that could justify why it is not allowed to pursue such requests.

> *"Managers have limited authority and they follow instructions from the MoH and the General Directorate in the region. They cannot give leave to doctors, for instance, unless their clinic is covered by another doctor, but there is a shortage of staff and taking care of patients is more important than attending courses or lectures" P5*

This conflict of views raised the concern of a possible misunderstanding about managerial power and how it is conceived by healthcare providers. Some participants reflected on the disproportion between the managerial role and the qualifications obtained by some managers.

> *"There is no clear regulation about how managers are appointed. I think it is important they have a bachelor's degree, at least, in management or to be a doctor by profession" P11*

Leadership in primary care centres, represented by managers, is better to not be overlooked, and leaders in the MoH and the General Directorate of Health Affairs are responsible for fostering and supporting qualified personnel who understand what healthcare professionals need and how to support them to provide better care. At the same time, legislative power is a constraint, even for qualified managers.

5.3.2.1.2.3 Diabetes Mellitus Screening Programme

A screening programme is carried out in all primary care centres for all patients who are at risk of developing diabetes. The implementation of the screening programme in all centres was repeatedly mentioned by participants. It was perceived as a strength of the delivered care and participants reflected on how this programme facilitated the early detection and prevention of diabetes among asymptomatic persons who are at risk of developing diabetes.

> *"We have a great programme, which is the screening programme for diabetes and hypertension. We screen all patients who are visiting the centre and who are at*

> *increased risk of developing diabetes or hypertension, and if we discover patients with prediabetes, we start health education and schedule a follow-up" P2*

The rationale for this is that screening within healthcare centres is more effective than community-based screening for two reasons: people with negative results can repeat the test, while people with positive screening results can receive the appropriate follow-up testing and care (Association, 2002).

5.3.2.1.2.4 Electronic medical records (EMRs)

The participants asserted that electronic medical records are important factor in the delivery of care compared to the paper-based documentation. Its importance arises through ensuring the safety of patients' information, easy access to patients' files, mandatory screening and assessment sections, warning messages in case of drug–drug interactions, and sending reminders to patients regarding their next appointments. Previously, these advantages were partially present with the old system and they were heavily dependent on persons rather than an established system.

> *"The health information system (HiS) is a unified system across all primary care centres, and we began to enter the data for all patients… previously, some pages from patients' files might go missing, but now they are secured and safe and backed up… and if there is an interaction between medications, the system will give you an alert message to revise the list of medications" P3*

The health information system (HiS) is still under development and in its early stages, so some limitations were reported by the participants. However, the repeatedly mentioned pitfall was the lack of connection between primary care centres and other tiers of care, such as secondary, tertiary, and home care.

> *"… one of the problems with this system is the absence of communication with hospitals or the diabetic centre, I mean electronically, so we send patients with a report of their condition and they return back with the feedback from specialists, but what is worse than that is the conflict in prescribing medication for diabetic patients who are supervised by home care. We need a link to avoid such conflict!" P7*

The MoH is working on this issue, but there is still no specific timescale regarding how or when it is going to be sorted out. Nevertheless, uniquely in the Al Baha region, a link between primary care centres and hospitals in the region was initiated and built up to facilitate the transition of care between primary, secondary, and tertiary care in the region:

> *"Uniquely in Al Baha, we initiated an electronic secure connection between primary care centres and hospitals. We completed around 80% of the project, but because of COVID-19 we were forced to wait and finish it later" P10*

5.3.2.2 Second theme: Cultural determinants

Almost all participants saw a strong link between cultural determinants and diabetes care through three main narratives: physical activity, dietary patterns, and how people with diabetes perceive self-management to control their diabetes. The participants agreed on the importance of physical activity, a healthy diet, and self-management for people with diabetes, but they identified a number of anticipated barriers for convincing their patients about this importance. They attributed this difficulty to several reasons, which are discussed in more detail in the next subsections.

5.3.2.2.1 Physical activity

Almost all participants agreed on the low level of physical activity among people with diabetes, which does not meet the minimum recommended level. As per the ADA recommendations for physical activity, the recommended amount is at least 150 minutes of moderate-intensity aerobic exercise (Colberg et al., 2016). The reluctance to engage in the minimum activities stems from a number of reasons identified by participants and was categorised under three main subgroups: urban design and transportation infrastructure, climate conditions, and social barriers.

5.3.2.2.1.1 Urban design and transport infrastructure

The participants reflected on the difficulties encountered by patients in terms of performing one of the most important exercises, which is walking. The way that buildings, shopping markets, governmental organisations, and roads and streets are structured is not conducive to walking because of the absence of a "city centre" where the majority of the city's business, entertainment, retail, and political power are concentrated. In addition, the access to these places, by walking or cycling, is difficult or risky because the streets are inaccessible to cyclists, and road markings for pedestrians are missing in many places.

> *"... it is difficult for patients to walk long distances for shopping or working, in addition to the fact that most of the streets have a very narrow sidewalks for walking, and sometimes [these streets] may pose a danger to people's lives because there is no layout to cross the street to the other side" P2*

Although public transportation could be an alternative to private cars and a potential barrier to encouraging physical activity, it was perceived as a factor that encouraged walking, at least for short distances.

> *"There are no buses or public transportation, which at least can encourage them to walk to the station from their houses or from work. There is nothing! They must drive their cars, or they hire drivers to help them if they are old and cannot drive by themselves" P4*

It is worth mentioning that public transportation in Saudi Arabia is available in limited areas for limited distances and with a few stations. Buses are the most frequently used form of public transport, and they are available in large cities, but not in all districts. There are no assigned lanes either for buses or for cycles. In Al Baha, there is no public transportation at an affordable price; the only available options are taxis, Uber, and Careem. Uber and Careem are operated by two different firms, but they offer similar services with better prices than taxis.

The allocation of areas for walking, running, and cycling was neglected in the planning of the city, although recently there has been a movement to change this and appoint more spaces to support such activities. However, the number of public parks that can be modified to support walking and other exercise is still small. On the other hand, drive-through restaurants, coffee vendors, cash machines, and petrol stations are widely available and increasing. Hence, people with diabetes are discouraged from doing the minimum required exercise, as described by some participants.

> *"Sometimes I cannot blame them. They cannot find appropriate places for running or simpler than that, walking! Maybe the best place they might have is around their houses, or the nearest park, if they are lucky to be close to one" P2*

Appropriate places for running or walking means well-lit places, designed to encourage such activities, and known to be for physical exercise. Nevertheless, other accounts considered this barrier as weak and unconvincing. Physical activity should be part of the daily routine, not only for people with chronic conditions, but for healthy persons, too.

> *"I think they are not used to doing exercises or going to gyms from an early age! I am old and I have worked in different cities here in the Kingdom, but I used to do exercises every day – even if I did not find an appropriate place, I created one! Physical activity is important regardless of your age or where are you living" P4*

The adoption and maintenance of physical activity among people with diabetes is one of the key elements in the management of blood sugar and overall health (Colberg et al., 2016). Acquiring the habit of making it part of the daily routine is preferable from an early age, but it can be developed and maintained later. Some participants described creative approaches to integrating exercise into daily activity consistent with social norms and religious beliefs.

> *"What I do with my patients to encourage them to walk more minutes per day is simply advising them that as they pray at mosque five times daily, to go four times to the mosque that is closest to them and one time at another mosque that is further from them, so they can walk more. So, it is a habit and a worship at the same time" P1*

In the absence, or lack, of appropriate locations for physical activities in public places, there is an option to join sports clubs or gyms. However, different participants agreed on the shortage and scarcity of gyms, especially for females,[3] and affordability for everyone.

> *"In Al Baha, there are few gyms and they are expensive! Here we are talking about males – females are another story. There are much fewer or they do not exist. I do not know why!" P6*

Investment in public places to become more attractive for people with chronic conditions, or even for healthy individuals, to exercise and work out could support self-management as one of the key elements in diabetes management and in the CCM. In addition, partnerships with private sectors to offer affordable prices to join sports class or workouts in gyms could encourage patients to employ moderate to vigorous activities under the supervision of specialised trainers.

> *"Some patients say that they need to exercise properly so that it is under the supervision of a trained trainer, but they cannot because of the high joining fees and the lack of training centres" P2*

5.3.2.2.1.2 Climate

The nature of the weather in the region is affected by its different geographical features between high places on the Sarawat Mountains (also known as Sarat), and other low places on the Red Sea coast, and therefore the temperature difference between being hot and dry in summer, and cold and rainy in winter, was one of the factors affecting the practice of physical activity in public places.

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[3] In Saudi Arabia, gyms are segregated by gender, including staff.

> *"Some patients complain about the difficulty exercising when the weather is hot or rainy" P2*

Although the weather may be an important factor for refraining from exercising, walking can be practised, and when the participants were asked about the reluctance of some patients to walk, the reason was that the clothes worn, especially by women, do not encourage walking, particularly if the weather is hot. However, this was considered a social barrier and is clarified in the next section.

5.3.2.2.1.3 Social barriers

A frequently mentioned barrier by participants was the cultural stigmatisation of exercising in public, especially females.

> *"In a region like Al Baha, people know each other, and they feel ashamed to wear sportswear and exercise in public. Females will never think about it. It is prohibited and culturally unacceptable" P1*

Cultural habits and norms vary from region to region, but sometimes they share the same norms. In southern region of the Kingdom, people share common customs and traditions, and it is forbidden for women to go outside (in public) without wearing *Abaya*[4]and *Hijab*[5]. Adherence and commitment to social traditions are more obvious with older females regardless of the benefit that could be gained from breaking these customs. Brisk walking is not a challenging task and can fit within the limits of these traditions, but it is inevitably difficult during months where the weather is hot and dry.

> *"My patients complain about the hot weather while wearing Abaya! It is impossible during the day, but what I try to convince them to do is walk at night, but it is not a suitable option for many of them – almost all – because they are either busy with the family or there is no designated area for walking close to them!" P4*

As described earlier, under the urban design and infrastructure, investment in constructing and creating areas that support such activities was missing, despite the fact that it could encourage people to be more active by adopting simple exercises like walking. In addition, supporting people to be members of sport clubs or gyms was not affordable.

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[4] "A long piece of clothing that reaches to the ground, covering the whole of the body except the head, feet, and hands, worn by some Muslim women" – Cambridge Dictionary.

[5] Head covering for women to wear when they are outside.

5.3.2.2.2 Dietary patterns

The healthcare professionals described the challenges of culture-bound dietary habits that prevent patients from adopting a healthy diet. Obesity and overweight have become an epidemic, attributable to a sedentary lifestyle and the consumption of a high-fat and energy-dense diet, and this was a concern voiced by healthcare professionals. These challenges can be categorised under dietary habits and social customs in gathering and hospitality.

5.3.2.2.2.1 Dietary habits

The interviewees reflected on a number of dietary habits that are predominant in the community and which conflict with self-management support. Food is provided on large plates and 4–6 persons can sit at the same plate. The traditional food that is popular and is served in all homes is rice with meat or chicken.

> *"Kabsah*[6] *is one of the basic meals in every house. They love it so much. It is usually provided in a large dish and family members sit at one dish. During health education in the clinic, some patients asked me to kindly avoid talking about refraining from eating kabsah, because they are used to eating it, it is easy to cook, and not expensive" P2*

Dates also play an important role in the Saudi diet and food-related customs. Dates with Arabic coffee is common before breakfast and in the early evening.

> *"The most serious habit here is dates. We always explain to them about the heavy sugar content in dates, but some patients cannot avoid that; they always ask 'how many pieces can I take per day?' regardless of the medication they are taking" P1*

5.3.2.2.2.2 Social customs and hospitality

Dates play an important role in Saudi social customs, as previously mentioned. The date palm is one of the famous icons of Saudi Arabia and the preference for dates in hospitality is a strong tradition. Guests are greeted with dates and Arabic coffee, and sometimes there are other dishes with dates like nuts and sweets.

> *"Whenever you visit a relative or friend or someone you met for the first time, they must offer dates with coffee and you have to eat and drink. It is unavoidable! Though there is a good awareness and knowledge about dates' risk and some educated persons will condone abstinence from eating them." P11*

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[6] Popular name for rice with chicken or meat.

The second part of this quote indicates that perceptions may slowly be changing; however, the cultural norms force people to provide dates with Arabic coffee as a tradition of hospitality. In addition, social gatherings of relatives and friends are common in Saudi culture, and dates and Arabic coffee are traditionally served before the main meal, which usually contains rice and meat presented on large plates.

Regardless of the occasion, excessive amounts of rice and meat are a certain and unchangeable expression of generosity. People with diabetes encounter cultural stigmatisation if they refuse to attend or eat with others.

> *"On occasions like an engagement, marriage, having a new baby, graduation, people celebrate by gathering in houses or large halls and the principal meal for guests is rice and meat, of course. The female side may have more options like an open buffet, but still there is high-fat and carbohydrate food. It is difficult for old people, in particular, to refuse to attend or to not share when guests sit for eating. They try to eat less, but they cannot avoid it from the beginning" P3*

5.3.2.2.3 Perception of self-management behaviour

Misconceptions about physical activity, diet, medication, and religious beliefs were recognised by the participants. A lack of awareness or misunderstandings can make effective self-management hard to achieve. In addition, the role of healthcare providers is not limited to medical care, but also includes an understanding of societal norms and religion.

5.3.2.2.3.1 Adequate physical exercise

The level of recommended physical activity is explained by doctors to their patients during health education sessions. However, a frequent misconception was females' perception of housekeeping as a substitute for the recommend physical exercise.

> *"When I ask my patients to do exercise like walking or running where the heartbeat is raised and they get the benefit from exercise, they said: we already do enough exercise in the home, cleaning rooms, washing dishes, mopping and sweeping floors. So, I explain to them how this is not satisfying the accurate exercise that is needed" P4*

5.3.2.2.3.2 Healthy diet

A major misunderstanding that was identified by doctors and health educators concerned sugar. Patients believe that if they avoid eating white sugar, they will be safe from hyperglycaemia, but they do not differentiate between sugar and food rich with carbohydrates like dates, rice, and bread.

> *"... they believe that sugar is the evil – white sugar, I mean. They drink tea without it, which is good, but they do not have any idea about food that contains sugar but is not noticeable, like bread and dates" P1*

Explaining about foods that have high carbohydrate content was seen as the task of health educators. The interviewees described a need for simple explanations about terms for types of food they usually eat and the percentage or amount of carbohydrate within it.

> *"We also need to explain to them which foods have high carbohydrate because we need to make it simple for them. We cannot say 'avoid carbohydrate' because they do not know what that means, but we prepared brochures and flyers that have images of food with carbohydrate, protein, and fat, and they like the idea!" P2*

Another concern voiced by participants was about the religious misunderstanding of food mentioned in the Holy Qur'an as a source of healing, but that is harmful for people with diabetes.

> *"Many patients, especially the old or uneducated, have wrong beliefs about honey. It was mentioned in the Qur'an to be a cure for people, but not for every disease" P7*

Islam's teachings have an impact on health beliefs and behaviours. Muslims, for example, are highly advised to consume dates and honey by the Qur'an or the Prophet Mohammed (peace be upon him):

> *"Then eat from all the fruits and follow the ways of your Lord laid down [for you]. There emerges from their bellies a drink, varying in colours, in which there is healing for people. Indeed, in that is a sign for a people who give thought. (69)" (Quran 18: 16–69)*

Dates were given special attention by Prophet Mohammed (PBUH) as part of the believer's diet, particularly in the morning and during the Holy Month of Ramadan to break fasting; he said:

> *"If one of you breaks his fast, he should break his fast with dates. It is a blessing, and if he does not find dates, then water. It is pure" (Musnad Ahmed ibn Hanbal, 4/17).*

It is not mandatory to break fasting with dates and water is an alternative. In addition, honey was mentioned as a cure, but was not specific. However, patients worry about violating the religious teachings and they strictly follow the religious texts without understanding the meaning.

5.3.2.2.3.3 Management of diabetes

The participants reflected on number of patients' beliefs about the management of diabetes. A prominent one was the belief in the power of medication, tablets, or injections to control the level of blood sugar in the body regardless of the food consumed.

> *"Surprisingly, I realised that many patients think when they take their diabetes medication, they are free to eat whatever they want!" P2*

The misunderstanding of disease control was not limited to the ability of treatments to exceed the importance of eating, but rather went beyond this, because the concept was related to the nature of the chronic disease and the ability of treatment to end the problem.

> *"Some of them [patients] say 'all right, as long as I take pills or insulin, it means that I will recover from the disease'. Although it is a chronic disease, some patients think that it is like an infection that takes a while and ends" P2*

Although health education had various forms in PCCs, such as being face-to-face with the patient or through leaflets, some patients did not have enough knowledge about the nature of the disease and dealing with it, or about the method of taking treatment such as insulin injections.

> *"I remember a diabetic patient who visited the centre because of skin problems, and after the examination, I found a bigger problem, which is that the patient did not know how to take insulin injections! A misfortune! I was shocked, and I started to tell her how to take insulin and teach her the right way" P4*

5.3.2.3 Third theme: Recommendations to improve care

The participants in this study suggested a number of recommendations that might improve the services for people with diabetes in PCCs. These recommendations were allocated under two main categories: how to improve the organised care (resources), and how to support delivery design.

5.3.2.3.1 Resources

Three main suggestions and recommendations were discussed under this category. Mental health support for all patients with chronic conditions including diabetes; the establishment of more centres for specialised diabetes care in the region; and improving the electronic health system.

5.3.2.3.1.1 Mental health support

People with diabetes bear a risk of developing mental health comorbidities such as anxiety, depression, and eating disorders (Ducat et al., 2014). However, some participants identified problems diagnosing and treating mental comorbidities without a referral to a specialist. Referrals to psychologists or psychiatrists is limited, mainly due to two possible reasons: first, there is a scarcity of specialists in the region, and second, because of social stigmatisation. The interviewees cited the shortage of mental health specialists:

> *"I think if I have the power to change, I'll increase the number of psychiatrists or psychologists and make them accessible in every primary care centre, not only to see diabetic patients, but any patients with suspected mental illness" P5*

Healthcare providers described the difficulty in diagnosing mental health problems related to diabetes and urged the activation of the role of psychotherapists, either within or outside of PCCs, so people with diabetes who need counselling can be referred.

> *"The psychological difficulties that diabetics face, we may not be able to diagnose them correctly. In addition to that, we do not have the experience in cognitive behavioural therapy, for example, or even dispensing some medications to treat mental disorders" P11*

The proportion of specialists in Saudi Arabia is far less than the average in other high-income countries. For instance, the number of mental health professionals including psychiatrists, psychologists, mental health nurses, and other mental health workers per 100,000 population in Saudi Arabia is 19.4 compared to 64.3 in other high-income countries (Al-Subaie, Al-Habeeb and Altwaijri, 2020).

On top of this low number of mental health professionals, there is the social barrier of stigmatisation. People with mental illness in Saudi Arabia face challenges seeking medical advice from specialists and have problems disclosing their mental illness to others, as they want to avoid situations where they might feel stigmatised (Alateeq et al., 2018).

> *"Diabetes affect patients mentally, as you know. They know it is a chronic condition, they are worried and anxious, they need to use medication every day, injecting insulin, avoid eating sweets and sugar, and when they develop a complication, sensory or visual or other than that, they develop depression with it, but they do not complain because they feel it is shameful and they can cope with it without need to be labelled as mentally ill!" P1*

The cultural barriers to seeking medical advice from psychotherapists could hinder effective self-management among patients, including people with diabetes. A gradual implementation of mental health therapy clinics within PCCs was suggested as one of the possible approaches the MoH can adopt to overcome the barrier of stigmatisation.

> *"If patients are used to see psychology clinics within PCCs, they might feel there is no harm to be seen by specialist within the centre instead of being referred to the mental health hospital in the region" P3*

The last part of this quote may explain the reluctance of patients to visit a psychiatrist because their clinics are within a specialised psychiatric hospital that is not integrated into the main hospital or other hospitals in the region. It was hard to further explore this factor from the healthcare providers' perspective, apart from the previously recommended approach.

5.3.2.3.1.2 Diabetes centres

Although there is a specialised diabetes centre in the region, the need to establish more centres in the region was described by some participants. The current centre is located in the emirate of Al Baha province, but it covers all six governorates. As described by the participants, patients might need to travel for up to two hours to reach the centre if they live far from it, but they have no other options. The number of diabetic patients visiting the centre is increasing, while the staff and size of the building and facilities remain the same.

> *"I am one of the diabetic patients and I think it is unfair to have one centre in the region. Patients coming from Al Aqeeq or Al Makhwat*[7] *are travelling for more than 30 minutes or one hour, and when they arrive, they have to wait extra hours to see a doctor! What could happen if we have more than one centre and patients can visit the nearest one without the need to travel and wait for several hours?" P5*

5.3.2.3.1.3 Improving health information system

Many participants described the need to improve the current health information system through connecting primary care centres with hospitals and tertiary care. Hence, patients would be able to move smoothly between different tiers of care through a unified medical records system.

> *"There is no connection currently with hospitals, but when it is established, it is going to be a major shift in the health system ... I heard about the unified medical record*

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[7] Names of two of the six governates in the region

> *system and if it is implemented, it is going to save time, effort, and costs for the MoH" P6*

Since the announcement of the National Transformation Programme 2020 and Vision 2030, the Saudi MoH has started to make major changes and improvements in the healthcare system, including the health information system and medical records. One of the goals of these improvements is to introduce unified health records to promote the quality and efficiency of healthcare services (National Transformation Programme, 2016).

Other improvements were suggested by health professionals who compared the previous system (i.e., manual and paper-based files) and current health information system and they were minor changes with great impact from their point of view. One feature is enabling doctors to enter laboratory results for their patients instead of waiting for the specialists in the lab to enter them.

> *"For instance, we cannot enter laboratory results, though we have them printed. They must be added by laboratory specialists, so we should wait until they add them" P3*

Another suggestion was to enable access for patients to see their medical reports, investigations (laboratory and scans), and list of medications. This access to patient records can help people with diabetes to be more aware of their condition, and it could help as a potential substitute for the unified medical record system until it is officially published.

The doctors raised issues related to the facilities within PCCs, which needed improvement. All of the PCCs had a laboratory for basic tests, and many of them were equipped for HbA1c testing. However, the machines to do this test were no longer available, and all patients must now visit the central laboratory in the region to do it.

> *"We used to do it [HbA1c testing] in the centre, but now we must refer all patients to the central lab to do it every three months. The problem is that, sometimes, we do not receive the results early or might receive results for another test, but not what we requested!" P4*

The last part of this quote does not only raise an issue around the difficulty to perform the test within centres, but the requested tests might also be missed and not conducted for referred patients to the central laboratory. Thus, it was recommended to return to the previous approach by equipping PCCs with the necessary machines to be able to obtain the HbA1c results onsite.

5.3.2.3.1.4 Support community linkages

Community linkages is one of the pillars to improve care in the CCM. The participation of community groups in diabetic self-management activities and programmes lowers healthcare expenditures, while also increasing knowledge and self-efficacy among participants (Pirkle et al., 2019). In this study, the partnership with community organisations was described as important to support people with diabetes; however, they could not describe what was actually available, apart from the two initiatives by the MoH.

> *"I have no idea about any community resources that provide education, you know, teaching or I mean, like, you know, education about healthy diets or groups of people with the same condition sharing ideas about how they deal with diabetes. It is like, you know, what is called peer support ... we do not, as far as I know, have such services" P7*

The lack of the implementation of health education in the current system was voiced by some participants, and the presence of community resources where peer group support is available may have a better effect on, or complement, the services provided in PCCs.

> *"We still need to develop health education in the centre, especially since it is in its infancy now, but the presence of other supportive bodies outside the centre may help support self-care, especially in the presence of people who share the same problem" P1*

The importance of health education by trained professionals was described by all participants. Training health educators depends on the Ministry's ability to train them, which may not be available currently, or on the educators themselves through self-learning, which may take time and effort; thus, the presence of certified and trained educators may help to overcome this obstacle.

> *"I think it would be a great idea if we could direct patients to other places where there are licensed health educators for health education" P11*

However, the effectiveness of community linkages and the challenges for their implementation were difficult to establish, since there are no identified community services, either governmental or private (non-governmental organisations).

> *"... for now, I cannot think about how, or where, to refer patients, I mean, outside the centre, so they can get support about self-management education, or I mean, to do physical activity with group. I mean, patients with chronic conditions too, or how effectively they [community services] could help patients" P4*

5.3.2.3.1.5 Incentives and financial support

The lack of incentives for health professionals was voiced by some participants. Healthcare practitioners employed by the MoH are paid a fixed salary per month based on their qualifications and experience. This increases yearly by a fixed amount. Salary and allowances are based on grades and steps (each grade has four steps) for specialists and consultants with a promotion that is granted every year with a fixed rate of increase. They do not receive bonuses or overtime because they have fixed hours for duty, and there are no on-calls or work during weekends. However, some participants felt that the presence of a fixed-hours contract may provide a lack of incentive to work harder, and they suggested that providing additional incentives could promote delivery of care.

> *"I think if we could improve chronic care in primary care centres, we could give incentives, not limited to a bonus, I mean money, but could be leave for one or a few days, or a small party with co-workers, or a certificate of appreciation. I mean something that recognises the efforts done by the healthcare team and that supports them for what they are doing" P11.*

On the other hand, the lack of financial incentives was perceived by other participants as a potential barrier to providing care. They believed that their assistance to people who need help is not limited to the salary they receive, and that God will reward them for their good deeds in return for what they do.

> *"We thank Allah [God] that he sacrificed us to serve others. It is true, we get paid for our work, but all of this is the grace of Allah [God] ... I am afraid that having a financial reward for what you do may transform the intention into a desire to get more instead of providing the service with the intention of reward from Allah [God]" P1*

This may seem a formal contradiction, but the point of agreement between the points of view is the preference for the presence of incentives, in any form, as long as this does not affect performance and the intention of reward from God in the first place.

5.3.2.3.2 Delivery of care

Three recommendations can be considered under the improvement of delivery design: supporting further education and training for healthcare practitioners; building trust; and empowering managerial and leadership skills.

5.3.2.3.2.1 Training and educating healthcare professionals

The healthcare professionals in primary care centres addressed the need for more training and education to support decision making. Though there is a training programme for doctors and nurses who work in primary care centres about diabetes management, there remains a need for more training.

> *"Attending the training programme once yearly is not enough ... I suggest adding more sessions, or giving online lectures or sending us to the diabetes centre 3–5 days to sit with consultants and see how they deal with complicated cases and learn from them" P4*

While attending such activities required official leave, and managers of primary care centres cannot offer that due to the shortage of staff and the need to cover clinics, a recommendation to increase the manpower was made by some participants.

> *"If the shortage of staff was filled, I think we can have the chance for more training" P6*

5.3.2.3.2.2 Building trust and confidence

According to Salvage and Smith (2000), the relationship between physicians and non-physicians, as healthcare providers, was affected by number of factors including power, education, salary, prestige, and gender. In the study, a lack of confidence between physicians and health educators or nurses was voiced by some participants. The point of difference was about the provision of health education to diabetic patients, in which the participants differed regarding the eligibility of the service provider, who was preferred to be a doctor. This preference granted to physicians is related to two main reasons: the trust of patients in them, and the lack of trust between physicians and other healthcare providers.

> *"Patients think that doctors are better because they are more experienced and have a higher degree, and therefore they rely on what they say" P2*

Moreover, doctors believe that health educators or nurses do not have sufficient experience and training to provide health education, whether for diabetic patients or others.

> *"They [health educators] are good, but they do not have enough experience to provide education without assistance" P7*

Health educators acknowledge that experience and training are important factors for building trust, whether with patients or with doctors, but they suffer from weak programmes provided by the MoH to train them, as mentioned earlier.

> *"Self-reliance. I mean, I myself search for information and the ways to deal with patients, but it is a personal diligence. Sometimes I ask for advice from a doctor, but due to lack of their free time, it is difficult for me to get an answer quickly" P6*

On the other hand, some doctors claimed that they help health educators in designing health education brochures and review these brochures with them to ensure the correctness of the information.

> *"I ask them to make a brochure or leaflet, so that they can be self-reliant, and I review it with them to make sure that the information and presentation are correct" P1*

In general, the summary of what was going on between the different points of view emphasises the need to train non-physicians in health education through a systematic approach, so that they can provide the service with confidence, in addition to making their role in providing care a requirement for visiting patients to possibly help to build patient–health educator trust.

5.3.2.3.2.3 Empower leadership

Managerial and leadership skills are important for persons in charge of primary care centres. Lack of experience and poor knowledge were obstacles identified by some participants against the managers of some primary care centres. A recommended solution was appointing qualified persons and training current managers on managerial and leadership skills. The MoH is responsible for training and appointing qualified managers.

> *"Some managers need training on education about management. Whenever there is poor information or lack of experience, there are unhappy staff and low-quality outcomes. Not always, but in general" P11*

In this study, managerial positions in healthcare were gendered, where males and females were treated unequally. All PCCs were managed by males, while females were appointed as healthcare providers only. Although female patients were satisfied to receive care from someone of the same gender, organisational leadership was considered differently.

> *"As you know, the women's section is separate from the men's, and this is satisfactory for patients and families in the area... the idea [of a female manager running the centre] may be strange to some at first, but with time, I think people will start to accept it" P7*

Saudi Arabia has seen tremendous transformations in recent decades, with women now allowed to assume greater responsibilities in public arenas and hold higher positions in different organisations (Thompson, 2015). Yet, in leadership roles, women are still underrepresented, and professional women in Saudi Arabia encounter a variety of social, religious, cultural, and organisational problems (Hodges, 2017).

The role of females as leaders in healthcare positions was out of the scope of this study and was not explored further; however, it was identified as a barrier to improving care through empowering leadership in the healthcare system as part of “organisation of healthcare delivery system” in the CCM.

5.4 Discussion

The centralised role of the Ministry of Health could be anticipated as a facilitator toward the implementation of the CCM; however, it could also be seen as a potential barrier to local initiatives, too. The transformation of healthcare in Saudi Arabia under the Vision 2030 might support the implementation of the model where the focus of this transformation will be on different elements that already constitute the CCM. This includes the delivery of care, an electronic healthcare system, and following international guidelines to support decision making (Chowdhury et al., 2021).

Partnerships with community organisations or the involvement of community members to support diabetes management were limited. The Community Empowerment initiative, as part of community partnership, facilitates community linkages and it appears to be more organised and widely approachable than the Health Friends committees. However, their performance and functionality are not inspected or checked regularly by the MoH. Peer support was missing, though it was perceived by healthcare providers as an important element for the management of diabetes.

The flexible appointment system to facilitate access to care though the national implementation was challenging. Despite all efforts and attempts to facilitate booking appointments by the MoH, there is still a small proportion of noncompliance, which may be due to the system’s flexibility or due to cultural barriers. Similarly, in Riyadh, patients and providers of care perceived no-shows and late arrivals as a disadvantage, and the majority of patients preferred afternoon appointments (Al-Haqwi and Al-Shehri, 2007).

The availability of a specialised diabetes centre supports decision making and self-management, but it also leads to limited access to specialised care. There is a need for specialised diabetes centres to serve as liaising bodies because the management of diabetes involves different medical specialties, including ophthalmology, cardiology, nephrology, and others (Al-Rubeaan et al., 2015).

Personalised care was perceived as a facilitator for access to and continuity of care. Monthly visits were recognised as a facilitator to deliver continuous care for people with diabetes; however, factors that exist in this regard in terms of barriers were the non-added value, especially for people with controlled blood sugar, the contradictions with the guidelines, and the shortage of staff, especially in centres with large numbers of patients.

The implementation of the screening programme in all centres was perceived as a strength in the delivered care because it facilitated the early detection and prevention of diabetes or its related complications. This programme had not been provided before, and was recommended in previous studies to improve primary care services for people with diabetes in Saudi Arabia (Alharbi, 2018).

The health information system (HiS) is still under development and in its early stages. The lack of connection between primary care centres and other tiers of care was identified as the main barrier of continuity of care, although this barrier has been temporarily overcome in Al Baha. This lack of connection was expected due to the recent transformation of healthcare under the Vision 2030 that supports a comprehensive and expanded electronic and digital health service (Chowdhury et al., 2021).

Urban design was a barrier to healthy behaviour, as it does not encourage people to perform one of the simplest activities: walking. Despite a recent drive to reform and designate additional locations to accommodate physical activities, the number of public parks that are available for walking and other exercise remains minimal. Despite this, even if suitable locations are available, the weather is unhelpful most of the time because most months of the year are hot and dry. Another challenge was the cultural norms that forbids females from wearing sportswear in public. Indoor spaces, as alternatives to public spaces that promote physical activity (e.g., gyms), are few, especially for females, and are not affordable for everyone. In addition, the lack of physical activity could be due to the attitude of people who prefer sedentary lifestyles and have not been active from an early age.

The community's prevailing food habits conflicted with support for self-management, and regardless of the purpose of social gatherings, an abundance of food is a constant and immutable symbol of generosity. On top of that, it is culturally stigmatised for people to decline to attend or to dine with attendees at such gatherings. As a result, people with diabetes face a cultural problem if they refuse to accept these customs and traditions at the expense of their health, and this requires further investigation to develop appropriate solutions.

Misconceptions around the nature of diabetes and how it can be managed were predominantly related to the adequate level of physical activity, types of food that do not affect glucose levels, the adherence to religious teachings without understanding the exceptions contained in them, and false beliefs about the power of medication to combat diabetes. These misconceptions emphasise the need to strengthen health education in primary care centres to avoid undesirable consequences. Training and educating healthcare providers could be an important factor in supporting decision making and increasing self-confidence, and since the current training is not enough, intensifying efforts to increase training opportunities in a way that does not conflict with the nature of work in health centres is an important way to achieve decision-making support and build trust, both among care providers and patients (Liu et al., 2022).

The participants suggested five recommendations that seem important to improve diabetes care in primary care centres, but they need further investigation to examine their appropriateness given the available resources and the centralised structure of the MoH in Saudi Arabia. The first is to involve psychiatrists/psychologists in PCCs to help improve patients' mental health, and maybe reduce the stigma associated with seeing psychotherapists outside of the centres. However, the number of specialists in this field still falls short in terms of covering the needs in the different regions, including Al Baha.

The involvement of diabetes specialists was another recommendation that could be achieved by the establishment of more than one diabetes centre in the region, so patients may conveniently consult diabetes specialists and receive self-management assistance without the need to travel long distances. However, this depends on the budget allocated for such projects and is entirely dependent on the decision makers in the MoH.

The third recommendation is to improve the electronic health system using unified health records, so different healthcare providers can easily access patients' profiles and provide their feedback promptly. This step could facilitate better decision making and improve the delivery of care, and is part of the healthcare transformation programme under the Vision 2030.

The fourth recommendation is to expand the community linkages with governmental or non-governmental organisations where health education is delivered by trained educators and where peer support is available. This could improve self-management support and reduce the burden on the doctors working in PCCs. However, health educators in the PCCs could be the target for such partnerships with community organisations to improve their skills and enable them to deliver health education sessions.

Lastly, incentives may encourage and motivate healthcare professionals to do more, with the importance of maintaining the principle of not impacting on performance or the purpose of receiving a reward from God. The dispute over whether or not to provide incentives is difficult to judge at present due to the difficulty of its implementation and the scarcity of its presence in government institutions like the MoH.

5.5 Chapter summary

This chapter described the methods and results of the semi-structured interviews. It identified a number of facilitators and barriers to the implementation of the different elements of the CCM in PCCs in Al Baha through three major themes. The top-down system plays an important role in adopting the model, especially with the existing resources. However, it can be a barrier to the partial or full implementation of the different elements. Cultural determinants hinder healthy behaviours such as a healthy diet and physical activity, either due to factors outside the control of patients, or due to a lack of knowledge about diabetes management by people with diabetes. The interviewed healthcare professionals provided recommendations calling for the exploitation of resources in the development of primary care organisations to help support decision making, support self-management, and benefit from community resources. In addition to investing in the development of primary care workers, providers of care and managers of centres must make an effort to facilitate the implementation of different elements of the CCM, including the organisation of the healthcare delivery system, decision-support, and self-management support.

Chapter Six: Integration (Triangulation) of Findings

6.1 Introduction

This chapter brings together the statistical results from the quantitative methods and the findings of the qualitative interviews. The aim is that by integrating these approaches, new findings can be generated that provide a better understanding of the studied topic by achieving a "whole greater than the sum of its parts" (O'Cathain et al., 2010).

6.2 Triangulation protocol

Triangulation is the combination of findings from separately collected and analysed quantitative and qualitative data (O'Cathain et al., 2010). This is a broad description, and in practice there are two common definitions. The first is to describe a corroboration between findings from the two different methods. The second is to describe a process of exploring a problem utilising various approaches to obtain a more complete picture (Sandelowski, 1995). Mixed-methods studies commonly use the second approach (exploration from different perspectives) because it helps to gain a more complete picture than separately reporting results. It can also enhance the validity of the findings and assess whether the data converge (agree), complement one another, contradict (disagree), or were in silence (a key finding identified from one component, but not another component).

In this context, a convergence matrix was used by ordering the six elements of the CCM in rows and each method (i.e., quantitative or qualitative) was used in a separate column. The emerging findings from each method were listed and matched with the elements of the CCM. This was followed by identifying whether there was an agreement, a partial agreement, disagreement, or silence between findings from the different methods.

The average scores of each subscale under the PACIC-5A and ACIC were used as the sources of data for integration from the surveys: they range from 0–5 in the PACIC-5A and 0–11 in the ACIC. The PACIC-5A summary and domain median scores were dichotomised at the midpoint (3) to distinguish between individuals who reported receiving care that was aligned with the elements of the CCM some or most of the time (≥3), and individuals who reported receiving these elements less frequently than the defined mid-point (<3). The ACIC scores were already divided into four levels (or categories) of care: limited support for chronic illness care (category D), basic support for chronic illness care (category C), reasonably good support for chronic illness care (category B), and fully developed chronic illness care (category A) (Bonomi et al., 2002). The integration of the quantitative approaches and interviews was based on the average score of the subscales of the PACIC-5A and ACIC across all PCCs and the themes identified in the qualitative analysis. In other words, the integration was not specific for individual PCCs or individual interviewees.

It is worth mentioning that the average scores of the PACIC-5A across PCCs were transformed into similar categories of the ACIC (level A–D) and were mapped with the ACIC average scores as described in Chapter 4. The results showed a high degree of consistency between patients and healthcare professionals' questionnaires across all PCCs except two (B and F). This approach was used to describe the degree of consistency between the different perspectives to help for further explanation by the interviews.

The integration of the findings from the different methods in this study was used to gain better understanding on the perceptions of primary care services by patients and providers in relation to the CCM and the facilitators and barriers to its implementation in the context of the Saudi healthcare system.

As shown in Figure 6.1, the integration of the findings from the different approaches was achieved through the triangulation protocol.

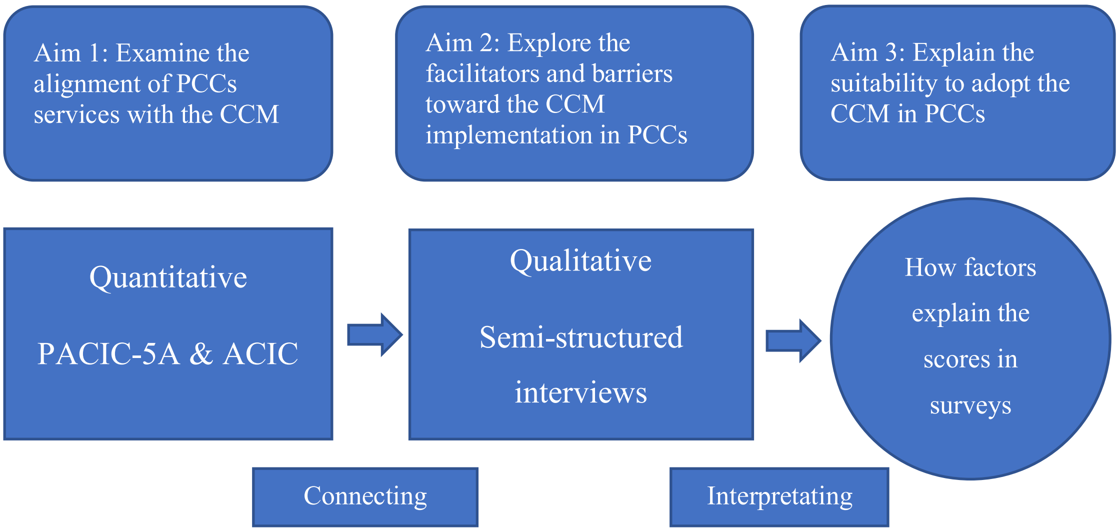

Figure 6.1 Explaining the alignment of PCCs with the CCM: An explanatory sequential design

In Chapter 4, the average scores of the PACIC-5A across the PCCs were transformed into similar categories of the ACIC (level A–D) and were mapped with the ACIC average scores. The results showed broadly similar results (i.e., that most elements were reasonably good), but they were not correlated at all at the PCC level. This approach was used to describe the degree of descriptive consistency between the different perspectives of healthcare professionals and patients to help the further explanation in the interviews.

In the following sections, the integration of the findings from the different methods in this study was achieved using the triangulation protocol technique to gain a better understanding of the perceptions of primary care services by patients and providers of the CCM and the facilitators and barriers of its implementation in the context of the Saudi healthcare system.

6.3 Findings

The findings of the integration process using triangulation are presented by each element of the CCM in turn. The ACIC survey of practitioners covers all six elements of the CCM, while the PACIC patient survey has only four (excluding organisation of the health delivery system and clinical information system). All six elements (in the ACIC survey) were integrated with the findings from the interviews using themes and subthemes generated from the qualitative analysis. Integration with PACIC-5A is limited only to the four elements of the CCM that it captures. Areas of agreement, complementarity, and disagreement are described first, while areas of silence, where they exist, are presented later.

6.3.1 Organisation of the healthcare delivery system

The integration of the findings relating to the organisation of the healthcare delivery system was carried out around four key findings: organisational leadership, organisational goals, incentives and regulations, and benefits. As highlighted above, there were no data from the PACIC survey that assessed this element, and so the integration of this element does not reflect the patients’ perspective (Table 6.1).

Table 6.1 Integration of organisation of the healthcare delivery system elements

Element	PACIC	ACIC	Interviews	Integration
Organisation of the healthcare delivery system	No data	Organisational leadership is reflected by senior leadership and specific dedicated resources (money and personnel)	- Managerial and leader positions were dominated by male gender regardless of qualifications or experience - Shortage of staff was asserted - Allocation of resources was at the level of MoH	Disagreement
	No data	Senior leaders encourage improvement efforts in chronic care	Lack of experience discourage proper delivery of care	Disagreement
	No data	Organisational goals are measurable and reviewed	Organisational goals set by NDC, not owned or controlled by PCCs	Partial agreement
	No data	Benefits encourage patient self-management or system changes	- Not applicable due the national health system - Encourage SMS in terms of free access to care, continuity of care, availability of medication, investigations, and referral to specialists	Partial agreement
	No data	Incentives and regulations are used to support patient care goals	- No incentives - Religious or ethical motivation to provide help without return	Disagreement
	No data	Improvement strategies utilises a proven improvement strategy for targeted problems	No data	Silence
	No data	No data	- Top-down system - Integration of tiers of care - Prevention measures, not only treatment	Silence

6.3.1.1 Organisational leadership and senior leaders

The findings from the ACIC and interviews mostly disagreed. The responses to items in the ACIC about senior leadership and specific allocated resources suggested high levels of organisational leadership in diabetes care in PCCs. However, the interview findings did not support the quantitative findings. Leadership in diabetes care was biased by gender, and leadership in PCCs was dominated by males as directors or managers. The lack of women with administrative and leadership experience was one of the reasons. Another reason was the social and cultural barriers that favour males over females in administrative positions. Hence, the appointment of senior leaders to support diabetes leadership was not necessarily related to experience, but rather was affected by gender. Moreover, there was conflict between the powers of health centre managers and medical directors, as some health centre managers lacked administrative experience or were not sufficiently qualified. The interviewees felt that managers tried to pressure doctors to see more patients, despite the importance of giving each patient enough time to present their medical condition and treat their problems in a better way.

Nevertheless, organisational leadership at the level of PCCs was executive, not legislative, according to the healthcare system. Managers and medical directors have limited powers to legislate new laws or create new resources. Furthermore, the allocated resources (e.g., money and staff) by the MoH for PCCs were limited. The shortage of staff was one of the complaints identified by healthcare professionals, which was difficult to solve at the level of the health centre. The findings from the ACIC reflected how organisational leadership was reflected by senior leaders and dedicated resources, but did not capture the shortage of resources or the central control of the MoH on PCCs.

6.3.1.2 Organisational goals for diabetes care

The findings from the ACIC and the interviews were in disagreement regarding who sets organisational goals for diabetes care at the PCC level. The organisational goals were measurable and reviewed as evaluated by healthcare professionals on the ACIC. This contradicts with the findings from the interviews, where participants reported that diabetes goals are set by the National Diabetes Centre (NDC) and are not under the control of the healthcare teams at PCCs. Instead, the role of the PCC medical directors is to implement the strategic steps to achieve diabetes goals set by the NDC. As mentioned earlier, medical directors have an executive role in implementing diabetes goals, but not in setting them up.

6.3.1.3 Incentives and regulations

The ACIC survey results endorsed items suggesting that diabetes care incentives and regulations were employed to promote patient care goals. In contrast, the interviews indicated that incentives did not exist in the current health system. The medical staff are employed by the MoH and they receive specific salaries with an annual bonus based on the length of service and the job performance, but not on achievements in improving the quality of diabetes care. Interestingly, some participants reflected on financial incentives as a possible barrier to providing person-centred care: such incentives could hinder the value of being compassionate and considerate in exchange for monetary reward. The ethical nature of providing care to people who are in need was addressed by healthcare professionals as a motivation to offer care regardless of the financial reward. Instead of worldly incentives to provide standardised care, practitioners described religious or ethical motivation to provide help without financial reward.

6.3.1.4 Benefits of diabetes care to encourage self-management support

This was endorsed in the ACIC, yet the interviews confirmed the experience of the questionnaire translation process that benefits were not applicable because of the national healthcare system that ensures free access and utilisation of care in PCCs. It was difficult to translate the benefits, but they were kept for completeness. The participants understood the term to mean the coverage of care for the different activities of diabetes care, rather than health insurance benefits. Accordingly, benefits encourage self-management support in terms of free access to care that ensures continuity of care, the availability of medication (oral or injections), the range of investigations, and regular referrals to secondary or tertiary care.

6.3.1.5 Instances of silence in the organisation of healthcare delivery design

There were areas of silence, where key findings were gleaned from the ACIC but not the interviews, and vice versa. The utilisation of improvement strategies for chronic illness care was shown in the ACIC for specific problems, but there were no data from the interviews that could illuminate the available strategies in the PCCs. Improvement efforts in diabetes care were encouraged by senior leaders, but the presence of senior leaders was not one of the characteristics of the health system.

The macro level of care that can be represented by policy making at the top level was identified in the interviews, but was not captured by the ACIC. The top-down structure of the healthcare system in Saudi Arabia affected all subscales of the organisation of healthcare delivery systems according to the ACIC. The organisation of the healthcare delivery system was affected by the hierarchical structure of leadership; setting goals for diabetes care; establishment and monitoring of the improvement strategies for diabetes care; and the implementation of incentives and benefits to improve care and to support self-management. In addition, the integration of the tiers of care that ensure the continuity of care for people with diabetes between the different specialties was not assessed by the ACIC. Finally, the efforts of primary prevention and the early diagnosis of diabetes (e.g., screening programmes) were identified in the interviews, although the focus of the ACIC was mainly on the secondary or tertiary prevention.

Although the integration of the findings from the ACIC and interviews were mostly inconsistent for this element, it does not mean that the CCM cannot be used in PCCs in Saudi Arabia. Rather, this element could be adapted or modified to make it suitable for implementation in the context of the Saudi healthcare system. This could be achieved if the model is expanded to capture policy at the MoH level, which was evident from the qualitative interviews, but not the ACIC survey.

6.3.2 Community linkages

The integration of people with diabetes with the community centred around partnerships with community organisations and linking patients with outside resources (Table 6.2).

Table 6.2 Integration of community linkages elements

Element	PACIC	ACIC	Interviews	Integration
Community linkages	- Assist - Coordination - Q10: “Encouraged to go to a specific group or class to help me cope with my chronic illness” - Q17: “Encouraged to attend programmes in the community that could help me”	Linking patients to outside resources is limited to a list of identified community resources in an accessible format	- Limited resources where doctors can refer patients to the gym and healthy food shop	- Partial agreement between PACIC and ACIC - Agreement between ACIC and interviews - Disagreement between PACIC and interviews

	- Q23: “Helped to make plans for how to get support from my friends, family or community”			
	No data	Partnerships with community organisations are being considered but have not yet been implemented	- Two initiatives to support partnership with community organisations	Convergence
	No data	Regional health plans currently coordinate guidelines, measures, or care resources in one or two chronic illness areas	Not applicable	Silence

6.3.2.1 Linking patients with outside resources

Partial agreement was identified from the integration of the quantitative and qualitative findings. Patients’ responses to the PACIC reflected that healthcare professionals encouraged people with diabetes to join diabetes groups or classes, attend community programmes, and to develop plans to obtain support from relatives or the community. Linking patients with the community was happening “some or most of the time”, according to both the median and the interquartile range of the responses to questions that evaluated this domain. On the contrary, healthcare professionals’ responses to the ACIC reflected only a limited list of community resources that could provide support for people with diabetes. In addition, the partnership with community organisations in most PCCs was being considered, but had not yet been implemented. The findings from the interviews were inconsistent with patients’ responses, but agreed with the healthcare professionals’ evaluation.

6.3.2.2 Partnership with community organisations

There was agreement between the healthcare professionals’ surveys and interviews regarding the weakness of community partnerships. The healthcare professionals could not identify any community organisations, groups, or classes that provide support for people with diabetes, though partnership with community organisations was considered by the MoH. The existing initiatives by the MoH to foster collaboration between health centres and the community are good in concept, but inadequate in execution. Although the capabilities granted to health centre managers are more flexible in terms of activating the community partnership role, they remain limited. This may point to the idea that centre managers are unmotivated to pursue such initiatives, either because they are of lesser relevance, or because they require time and effort. On the other hand, the problem may stem from the absence of the concept of community partnership in government institutions in general.

6.3.2.3 Regional health plans

Regional health plans were assessed as part of the ACIC survey, but were not covered during the interviews. The survey was designed to assess different health plans in the region, while all PCCs were organised by one entity, the General Directorate of Health Affairs, that represents the MoH in the region. Hence, the participants identified it as the reference organisation that produces guidelines and resources for diabetes care.

6.3.3 Self-management support

The integration of this element was done around four key findings: assessment and documentation of self-management needs and activities, self-management support, addressing patients' concerns, and effective behavioural change interventions and peer support (Table 6.3).

Table 6.3 Integration of self-management support elements

Element	PACIC	ACIC	Interviews	Integration
Self-management support	Assess Advise Agree Assist	Assessment and documentation of self-Management needs and activities are completed in a standardised manner	Standardised form filled in by doctors for all patients	Convergence
	Goal setting/tailoring Problem solving/contextual Patient activation	Self-management support is available by referral to self-management classes or educators	- Doctors responsible for health education, but were not trained - Health education referral was not the main reason, but part of the treatment plan - Health education clinic staffed by untrained personnel - Lack of trust was identified at the level of patient–educators, and doctors–educators	Contradiction with explanation from interviews
	Problem solving/contextual Assess Assist	Addressing concerns of patients and families is encouraged, and peer support, groups, and mentoring programmes are available	- Addressing concerns was part of health education - Peer support and mentoring programmes were absent. - Recognising social and cultural barriers was a challenge for expatriate professionals	- Convergence - Disagreement about peer support and mentoring programmes
	Assist	Effective behavioural change interventions and peer support are only available by referral to specialised centres staffed by trained personnel	- Different approaches used in the clinic - Peer support was missing	Complementation

6.3.3.1 Self-management needs and activities

There was some convergence between different sources. The patient survey responses indicated that they received care that assesses their belief, behaviour, and knowledge "some or most of the time". Professionals described how self-management needs and activities were regularly assessed and documented in a standardised approach. This involved physicians completing a unified form and documenting the needs and activities in the patients' medical profile. However, with the recent changes from paper-based documentation to the electronic system, one doctor complained about the word limit (500 words) for the health education section in the electronic system. This limitation was perceived as an underestimation of efforts to record optimal documentation of the health education.

6.3.3.2 Self-management support

The combination of data about self-management support reflected areas of contradiction. Self-management support was achieved through referral to classes and educators as per the ACIC. The PACIC responses reflected self-management support in PCCs "some or most of the time" by setting goals, solving problems, involvement in decision making, and identifying potential barriers in making treatment plans. The interviews complemented these generally positive ratings by providing greater detail of what actually happens and explaining the contradiction between them. The interviewees described how PCC doctors provide health education as part of the self-management support, but not all were trained as clinical educators. Health education and support for self-management by trained clinical educators was provided, but only in the specialist centre and following referral because of uncontrolled blood sugar.

Health education clinics had recently been established in PCCs and staffed with health educators, but the interviews suggested that these clinics do not see patients regularly due to the lack of confidence in them by patients and some of the doctors. The interviewees reported that patients have more trust in doctors because they have a higher degree of training than health educators, while doctors doubt their professional abilities as educators due to their lack of training. Health educators noted the lack of confidence from patients and doctors, and they complained about the scarcity of educational training in the field. They reported being self-reliant in their learning and trying to be a part of the medical team. In addition, some doctors encourage them to participate and assign a few projects for them to carry out (e.g., design a booklet or flyer with educational information).

6.3.3.3 Addressing patients' concerns

There was agreement between the findings from the different approaches with complimentary inferences from the qualitative interviews. The PACIC responses indicated that patients' concerns were addressed, and their physicians considered societal and cultural barriers in making treatment plans some or most of the time. The professionals' ACIC responses indicated that addressing the concerns of patients and families was encouraged and that "peer support and mentoring programmes" were available. The interview findings converged with these in relation to the encouragement to address patients' concerns, but contradicted regarding the availability of peer support or mentoring programmes. Mentoring programmes or peer support were absent in the current primary care services. They also identified the challenge of considering patients' social and cultural barriers when interacting with expatriate doctors who have different cultures and customs. Additionally, some doctors found that disagreement with false religious or social beliefs, which negatively affect the health of the individual, is one of the more difficult challenges, becoming even more difficult when it comes from a person from a different country.

6.3.3.4 Effective behavioural change interventions and peer support

There was complementarity between the different methods. Behavioural change interventions were available by referral to the diabetes specialist centre, as per the ACIC. Additionally, patients' responses showed that they were assisted by the healthcare team in PCCs to identify strategies and problem-solving techniques "some or most of the time". The patients agreed with their doctors to collaboratively set goals in line with their interests, and they were confident in their ability to change their behaviour. The interviews illustrated the interventions used in PCCs and they were in the form of face-to-face education, distribution of written information, display on TVs in PCCs, and delivering short information sessions for patients sitting in the waiting areas. Face-to-face was the most frequently used approach to intervene and assist in behavioural change. However, the short time of the visit was identified as a barrier to help in collaboratively identifying problems and setting appropriate goals using this approach. Written information was the second most commonly used intervention, and a booklet or pamphlet was produced by the healthcare team in the centre and distributed after the visit. Other interventions were used occasionally in an ad-hoc manner. The interviewees were not able to identify different behavioural interventions or the presence of peer support when healthcare teams refer their patients to the specialised diabetes centre.

6.3.4 Decision support

The integration of decision support was achieved by combining the results from the quantitative and qualitative methods around informing people with diabetes about guidelines, the involvement of specialists in improving diabetes care, and provider education for diabetes care in PCCs (Table 6.4).

Table 6.4 Integration of decision support elements

Element	PACIC	ACIC	Interviews	Integration
Decision support	Patient activation Delivery design/decision support Agree Advise	- Evidence-based guidelines are available and supported by provider education - Informing patients about guidelines is done through specific patient education materials for each guideline	- Guidelines were available in all PCCs; however, were not activated - Patients were passively involved	Convergence
	Follow up/coordination Arrange	Involvement of specialists in improving primary care includes specialist leadership and designated specialists who provide primary care team training	Primarily through traditional referral to diabetes specialists	Contradiction
	No data	Provider education for chronic illness care is provided using optimal methods (e.g., academic detailing)	Systematic approach in training but through traditional methods	Partial agreement

6.3.4.1 Informing patients about guidelines

Areas of agreement were identified between the different data sources. Patients were encouraged to add their input and participate in decision making with their healthcare professionals, as reflected by the responses from the PACIC. Shared decisions were made between people with diabetes and healthcare professionals "some or most of the time". Doctors share guidelines with their patients, provide information to enhance their understanding, and consider social and cultural barriers in the care plan. This information is provided to help people with diabetes to make informed decisions and be part of the management plan.

In the ACIC, the healthcare professionals' responses agreed with regard to informing the patient about the guidelines through specific education materials. However, the assessment of patients' needs and addressing their concerns were assessed in the previous element (i.e., self-management support). As explained in the previous section, needs assessment was performed in a standardised manner and addressing patients' concerns was encouraged and supported.

The findings from the interviews could not shed any light on the process of shared decision making between healthcare professionals and patients, because patients were not included in the interviews. Nevertheless, the doctors asserted that guidelines were available in all PCCs, but were not integrated into the care; consequently, the doctors varied their approaches to how they inform their patients about the available guidelines. Some doctors did not stick with the available guidelines and used recommendations from other guidelines (e.g., NICE, ADA). There was no specific reason for why they chose different guidelines, except that it was not mandatory to follow the guidelines issued by the MoH. The doctors emphasised the importance of involving patients in making decisions, but patients prefer to passively participate rather than be actively involved. This stems from the trust given to doctors by their patients, as described in the interviews.

6.3.4.2 Involvement of specialists in improving diabetes care

The combination of findings on the involvement of specialists in improving diabetes care showed contradictory results. Diabetes specialists were involved in improving primary care services through specialist leadership and team training, as per the ACIC. Qualitative findings converged with the notion of specialist involvement, but not at the PCC level.

Diabetes specialists were involved in the management of selected diabetes cases through traditional referral, but were not members of the PCC teams. Family physicians were considered specialists compared to general practitioners, and they work as medical directors in the centre. While they were not diabetes specialists, they had more training (residency or diploma programme in family medicine) than general practitioners. Nevertheless, doctors preferred to involve diabetes specialists if patients had uncontrolled diabetes after changes in the management plan or if they were in doubt and wanted to shift their patients from oral medication to insulin.

6.3.4.3 Provider education

There was partial agreement between the quantitative and the qualitative methods on provider education. Educational training for healthcare professionals in PCCs was provided, but was insufficient. It was by optimal methods (e.g., university or non-commercial based educational outreach) as per the ACIC, but the interviews showed traditional training. Educational training was held regularly in the region to revise international guidelines for diabetes management and to provide new updates if they exist, but all doctors expressed a need to attend extra sessions. Training was held once monthly, with a limited number of available spaces. The opportunity was once per year for most of the healthcare professionals. Hence, the interviewees were not satisfied about the limited opportunities to attend training sessions, even though they felt they needed such training to support their decision making in the management of diabetes. In addition, attending seminars or conferences organised by other parties requires full-time attendance, which is difficult to achieve due to the shortage of staff who can provide work cover for those that will be attending such educational activities. Hence, healthcare professionals were trying to search online for sources of information that can help support decision making instead of attending formal training.

6.3.5 Delivery design

The findings concerning the delivery design from the qualitative and qualitative methods were integrated around five key areas: practice team functioning, practice team leadership, the appointment system, follow up, and continuity of care (Table 6.5).

Table 6.5 Integration of delivery design elements

Element	PACIC	ACIC	Interviews	Integration
Delivery system	Delivery design/decision support	Practice team functioning is assured by regular team meetings to address guidelines, roles and accountability, and problems in chronic illness care	- Regular meetings for administrative and medical issues - Job description defined accountability	Complementarity
	No data	Practice team leadership is assured by the appointment of a team leader but the role in chronic illness is not defined	- Hierarchical structure of system ensures leadership positions - Medical directors lead, but the role was not specific to diabetes	Complementation
	Follow up/coordination Arrange	Appointment systems are flexible and can accommodate innovations such as customised visit length or group visits	- Flexible and adapt to cultural effect - Extra load on practice team	Complementation
	Follow up/coordination Arrange	- Follow-up is assured by the practice team by monitoring patient utilisation. - Planned visits for chronic illness care are occasionally used for complicated patients	- Monthly follow-up for all patients, even for refill - Can be weekly for complicated cases	Complementation
	Follow up/coordination Arrange	Continuity of care between primary care providers and specialists and other relevant providers is a priority but not implemented systematically	- Through referral to secondary or tertiary care - Priority but not systematically implemented	Complementation

6.3.5.1 Practice team functioning

There was complementarity between the findings from the different data sources around the functioning of the practice team in PCCs. The practice team has regular meetings to address different issues related to roles, accountability, and problems related to diabetes care, as per the ACIC. The interviews confirmed that regular meetings occur and these meetings focus on administrative and technical problems and to implement any new updates issued by the Ministry of Health. Diabetes care-related issues were part of the discussion, and problems related to chronic care in PCCs were addressed. The practice team in the centre usually consists of a nurse and a doctor, in addition to a health educator in some centres. Doctors were responsible for the provision of diabetes care, while nurses had administrative or regulation roles rather than being involved in the management of people with diabetes. Health educators were not available in some PCCs; however, their role was not addressed, as mentioned earlier, and physicians provide health education despite the presence of health educators in some PCCs.

6.3.5.2 Practice team leadership

There was a complementarity of the findings from the different data sources in terms of practice team leadership. The responses to the ACIC showed that practice team leadership was provided by a team leader, but this was not specific to chronic illness care. The interviews clarified more about the role of leadership in chronic disease management, as it was found that there is a medical director who handles the affairs of the clinics, and a technical director who takes care of the administrative issues of the centre. They, in turn, submit their reports and discuss work issues with the manager of the health centre. Regarding diabetes care, medical directors lead practice teams and are part of the chronic care clinics in the centre; however, while they help in the organisation of care, this is done with limited legislative power according to the system. Improvements to care that require financial resources or additional manpower was out of their control due to the hierarchical organisation of care, with the power to hire or increase funding vested at the level of the MoH.

6.3.5.3 Appointment system

The findings complement each other, where the qualitative interviews provide more depth to the quantitative results about the appointment system. The appointment system was quantitatively evaluated to be flexible and can accommodate innovative approaches, and the arrangement of care reinforced clinic-based management for people with diabetes. The qualitative interviews agreed with the flexibility of the appointment system and explained the diversity of ways to book an appointment in PCCs. People with diabetes can book, cancel, and reschedule their appointments online through the Central Appointment System (*Mawid*) portal, or by downloading the application on their phones. They can also book by calling the reception at the centre, the charge-free telephone number service of the MoH (937), or by heading to the PCC directly (on-site booking).

Despite the flexibility of the appointment system, it adds an extra load onto the clinics by accepting walk-in appointments. Patients, especially the elderly, were used to the old system where they could visit their primary care centre when they needed it or when they had run out of medication, without the need to book an appointment upfront. However, with the transfer to the electronic system, older patients experience difficulty adjusting to the new system. The on-site appointment was a step to bridge the gap between the old and the new system and to ease the transition to the new era of the electronic appointment system. There was a flexible schedule for appointments at the beginning, but then it became more restrictive for specific allocated times, and now no one can be seen unless they have booked an appointment prior to arrival. Healthcare professionals were disturbed by patients missing their appointment or being late for the scheduled visit. In addition, patients can submit a complaint directly to the unified call centre (937) if they have not been accepted to be seen if they were late for their scheduled appointment. Their complaints must be resolved directly by the medical director or the manager of the centre, which eventually results in the patient being accepted onto the booked list. Accordingly, healthcare professionals refrain from rejecting patients in the first place to avoid complaints that are ultimately resolved in the patient’s favour. This was considered a defect in the appointment system, which requires strict refusal of patients without a booked appointment and to provide other alternatives (e.g., separate walk-in clinics) or to increase the number of medical staff. However, many patients understand the need to book an appointment and attend on time, but complaints were still expected, as described by some interviewees.

Interestingly, avoidance of complaints was not the only reason to accept patients who were late or did not have an appointment. Elderly patients were an exception, as they can arrive without a booked appointment and nurses can assist them to be seen by a doctor based on availability. Some participants perceived this as an appreciation of elderly patients because it is “inappropriate” and “disrespectful” to refuse to see them if they have already arrived. This can be tolerated as long as the walk-in appointments do not exceed the daily limit according to the availability in each PCC.

6.3.5.4 Follow-up and planned visits

There was a reasonable complementarity between the findings from the PACIC, ACIC, and interviews. The practice team ensured follow-up by tracking patient utilisation as per the ACIC, and patients reported the use of a specific follow-up strategy by the healthcare team "some or most of the time". However, monthly follow-ups for all people with diabetes were mandatory, as described by the interviewees. This monthly follow-up was against the guidelines that recommend a visit every three months, especially for people with controlled blood sugar, but this was out of the control of the PCCs. The reason for monthly follow-ups was because diabetes medication is only permitted to be dispensed one month at a time. The purpose of this rule could not be explored in this study because it is regulated at the level of the MoH. This regulation was considered to be a waste of time and effort due to the unnecessary scheduled visits for people with diabetes who have controlled blood sugar. In addition, follow-ups necessitate a full examination by doctors, despite the principal reason for the visit (i.e., refill of the medication). Patients were frustrated at the requirement to attend monthly appointments simply for a medication refill, which could otherwise be collected by a caregiver or delivered to their address instead. Likewise, doctors felt overloaded by unnecessary appointments that do not require full check-ups.

6.3.5.5 Continuity of care

Areas of convergence and complementarity were identified from the combination of the findings. The continuity of care between PCCs and other tiers of care was a priority, but was not systematically implemented when evaluated by the ACIC. The findings from the interviews agreed with the importance of continuity of care, and highlighted the challenges that hinder systematic implementation. Although all tiers of care were managed by the MoH, the connection between them was not fully established. Referrals were well organised based on the condition of the patients and the required services, but they were done on paper. Although the electronic health system was recently established, it still falls behind in terms of connections between the different tiers of care through one system. Doctors in secondary or tertiary care were not able to access patients' profiles in PCCs, and their feedback was delivered to patients on paper forms. Doctors in PCCs were unable to access information about plans made in other tiers of care unless there were full details on the form delivered by their patients. This was not the case for all patients, however, and forms can also go missing, which negatively affects decision making in PCCs. However, in the region where the study was conducted, a temporary link was created to establish this connection, but it was not yet supported by the MoH. Further improvements to the electronic healthcare system are being worked on, but no timescale has so far been defined for this.

6.3.6 Clinical information system

The integration of the findings was limited for the clinical information system topic for two reasons. The PACIC was not designed to assess this element from the patients' perspective, and there was silence between the data collected by the ACIC and the interviews except for three key findings: registry, reminders to providers, and patients' treatment plan (Table 6.6). Moreover, the clinical information system in PCCs was in a transition from a paper-based to an electronic system during the data collection period of this study. Fortunately, the quantitative data were collected before the transition, and the participants evaluated the same clinical information system that was dependent on paper. The qualitative data were collected later when the transition was carried out, but it was in its early stage. Nevertheless, the interview guide was designed to assess the paper-based system and take the opportunity to compare the two systems. The limitations of the recent implementation of the electronic system were considered.

Table 6.6 Integration of clinical information system elements

Element	PACIC	ACIC	Interviews	Integration
Clinical information system	No data	Registry (list of patients with specific conditions) allows queries to sort sub-populations by clinical priorities	Available and sorted by chronic conditions, but not clinical priorities	Partial agreement
	No data	Reminders to providers includes indications of needed service for populations of patients through periodic reporting	Simple way as reminder about patients' conditions (coloured stickers), but no periodic reporting	Partial agreement
	No data	Patient treatment plans are established collaboratively and include self-management as well as clinical goals	Collaboratively set, but was dependent on the treating physician	Convergence
	No data	Information about relevant subgroups of patients needing services can only be obtained with special efforts or additional programming	No data	Silence
	No data	Feedback is provided at infrequent intervals and is delivered impersonally	No data	Silence
	No data	No data	Unified medical record	Silence

6.3.6.1 Registry

Partial agreement was attained regarding the existence and use of registries in PCCs. All PCCs reported having a list of patients with chronic conditions that allows them to sort subgroups by clinical priority. This partially agreed with findings from the interviews, where participants confirmed the presence of a registry, but subgroups were not sorted by clinical priority. The list of patients with chronic conditions consisted mainly of people with diabetes or hypertension. The list included patients' diagnosis and type of medication. The list was updated regularly and the statistics were delivered to the General Directorate for Health Affairs in the region. This is part of the initiative to have a national database for people with diabetes in the Kingdom.

6.3.6.2 Reminders to providers

There was partial agreement between the ACIC and interviews with further explanation about how providers were reminded about diabetes care. Healthcare teams were reminded of the necessary services for certain patients via periodic reporting, as per the ACIC. In practice, reminders for healthcare teams included notifications of the existence of chronic conditions with the required services, but there was no periodic reporting for certain groups of patients. Patients' profiles included coloured stickers on the cover to indicate any chronic conditions patients may have. This provides a visual reminder to doctors about the existence and type of chronic condition prior to individual patient encounters. This was part of a programme in the region to improve the quality of services in PCCs through the organisation of patients' profiles.

6.3.6.3 Patient treatment plans

There was agreement between the findings around treatment plans for people with diabetes in PCCs. The treatment plans were collaboratively created and included health education and patients' goals, as evaluated by healthcare professionals. The interviewees confirmed the treatment plans that were collaboratively established with their patients. As mentioned earlier, patients tended to be passively involved in the management plan, and self-management support was dependent on the treating physician.

6.3.6.4 Unified medical records

The lack of connection between PCCs and other tiers of care was a prominent theme in the interviews, but was not assessed by the ACIC. This was similar to the first element (i.e., organisation of the healthcare delivery system) where the integration with other secondary or tertiary care was not captured by the quantitative approach. However, the pitfall in connecting PCCs with other tiers of care was solved partially in the region where this study was conducted, but was not officially implemented. The MoH is seeking to implement unified medical records throughout the Kingdom; the intention was that 70% of this project would be implemented during the year 2020, but due to the COVID-19 pandemic, the project was postponed.

6.3.6.5 Paper-based versus electronic medical records

As noted above, the interviews were an opportunity to gather more information to examine the differences between the paper-based and electronic health systems that were not assessed by the quantitative approach. The Health Information System (HIS) was recently launched in PCCs in the region, whereby it was mandatory to transfer all medical records from paper files to the electronic system. The advantages and disadvantages of the paper-based and electronic health systems, as described by the interviewees, are summarised in Table 6.7.

Table 6.7 Advantages and disadvantages of paper and electronic medical records

	Clinical information system	
	Paper-based medical records	**Electronic health system**
Advantages	Each chronic condition has a unique colour stuck to the patients' files There is a unified form for the "Plan of care for diabetes" in all files Healthcare teams can organise a plan of care for one year Feedbacks from specialists can be added to the patients' files Communication with patients is more effective	Files are safe and backed up regularly Easy access to files (PC, laptop, phones) All steps during the patient journey must be entered into the system Patients receive a text message as a reminder for their next appointment Support decision by notifying healthcare teams if there are drug contraindications
Disadvantages	Files are subject to loss and damage partially or completely Some steps during the patient journey are not completed and might be skipped (e.g., vital signs documentation) No reminders for patients to attend their appointments	Electronic files not sorted or labelled by medical condition There is no connection between the tiers of care (primary, secondary, tertiary, and home care) Time-consuming and dependent on speed of writing and technical skills Plan of care is limited to 500 words and not organised as in paper files Difficult to create a plan for the year Technical issues that need improvement (limited access to some pages, cannot copy the medication for refills) Feedback from specialists must be entered manually by a medical records technician

6.4 Summary

The integration of the different results for the organisation of healthcare delivery system elements identified several inconsistencies. Organisational goals scored highly on the ACIC, but were not locally set, owned, or controlled. Incentives scored quite highly on the ACIC, but were not actually in place, were seen as possibly counterintuitive, and the benefits were not applicable as presented, so were reframed and scored quite highly. The assessment of policy making was not captured by the ACIC, and the interviews showed the effect of the top-down system on the organisation of healthcare delivery systems.

The integration of the findings for community linkages recognised instances of dissonance. While linking patients with community resources scored highly among patients, this element received low scores in the ACIC and was perceived as “unsatisfactory” by healthcare professionals. Only two initiatives were identified, and these were not effectively implemented. Partnership with community organisations was absent, and no community organisations to support people with diabetes were recognised.

The integration of the different results for the self-management support element identified a reasonable degree of convergence with three key findings: assessment and documentation of patients’ needs and activities, self-management support, and addressing patients’ concerns. Several barriers were identified to improve self-management support, including the lack of peer support and mentoring programmes, a lack of trained clinical educators, cultural barriers to recognising patients’ needs by expatriate healthcare professionals, and the lack of behavioural change interventions to support self-management.

The integration of decision support elements identified areas of convergence, complementarity, and contradiction. There was agreement among the data on the availability of evidence-based guidelines that were used to help people with diabetes to make informed decisions. Provider education was systematically provided, but was limited. The involvement of specialists scored highly in the ACIC, but specialists were not involved in the improvement of primary care; rather, their involvement was through traditional referrals. The PACIC was less informative about the role of patients in supporting decision making; instead, it evaluated patient activation and shared decision making. Their responses contradicted the results from the interviews that revealed a more passive involvement rather than active engagement.

The integration between the different sources regarding delivery design identified areas of convergence and complementarity. Practice teams hold regular meetings to discuss administrative, technical, and implementation issues, including diabetes-related issues. Leadership was defined and specific personnel held accountable for medical and technical roles. The national appointment system was flexible and access to care was attainable; however, a cultural effect was evident on the process of accepting late arrivals, especially for older patients. Regular follow-ups were implemented, but these were perceived as superfluous, particularly for people with controlled blood sugar. However, there was limited power to amend or change the regulations at the PCC level. Continuity of care was in place, but the link between tiers of care faces several challenges.

The integration of the different results of the clinical information system reflected instances of convergence, but more silence compared to the previous elements of the CCM. The availability of registries and reminders to providers helped to sort patients according to their illness and plan care according to their needs. Treatment plans were collaboratively established, but were shared with patients verbally. Information about the necessary services for relevant subgroups of patients was difficult to obtain using the paper-based system, but could be more feasible with the newly established system; unified medical records had not yet been established, but this is one of the projects that MoH is seeking to implement in the Kingdom.

Some aspects of the thematic analysis of the interview data were not reflected in the ACIC or the PACIC, in particular cultural issues and the hierarchical structure of the healthcare system.

Overall, integrating the different data has helped to obtain a more comprehensive picture and a deeper understanding of the topic compared to the analysis of each individual method. While the ACIC and PACIC indicated a high degree of consistency with the CCM, some of the higher scoring results were for components that were not actually present. Other components of the survey were regionally or culturally adjusted versions of the CCM rather than the original CCM. This leads to problems when implementing and measuring the difference between adapting the CCM to a certain situation or culture and enforcing the CCM as originally intended.

Chapter Seven: Conclusion and Recommendations

7.1 Introduction

This chapter begins by summarising the study's aims, objectives, and methods, and then covers the key findings from the literature reviews, the qualitative and quantitative components of the study, and the mixed methods integration results. Finally, this chapter discusses the study's strengths and limitations and the implications for practice and future research.

This study aimed to determine the extent to which current PCC services adhere to the CCM elements, and ascertain the facilitators and barriers to the implementation of these elements.

The narrative review summarised the available information on the CCM implementation in the Middle East and North Africa region and identified gaps in the literature worthy of additional research. Throughout the review process, it was apparent that while the model was widely adopted globally, its use in the MENA region was infrequent and not systematically examined. The published studies assessed the different elements, either together or separately, but from one perspective (i.e., the provider or patient perspective). It was difficult to assess how the model was consistent with primary care services in the MENA region without a thorough understanding of the divergent perspectives of providers and recipients of care in a shared setting. In addition, no study assessed or evaluated the potential factors that support or hinder model implementation in a primary care setting. Instead, only one study evaluated the top five priorities and barriers to implementation (Paulo et al., 2018).

A sequential mixed method design was adopted for the primary research in this thesis. The research questions examined various issues concerning the degree of the model implementation in Saudi Primary Care Centres.

The data were collected in three ways through distributing two questionnaires and conducting semi-structured interviews, and each set of data was analysed separately. To address the challenge of combining the results from the diverse approaches utilised in the study, a formal process of integration of the mixed methods findings was used. The integration of methods was achieved through the triangulation protocol. An effort was made to compare and integrate the findings of various types of data – concurrently, where possible – to maximise the study's yield in terms of insights gained. One area of the study in which integration was particularly beneficial was when the analysis integrated two distinct types of data to determine the convergence or divergence of the results. The survey quantified the degree of consistency of

PCC services with the model, which was later confirmed and investigated further in qualitative interviews.

7.2 Key findings

This section describes the key findings drawn from the literature review, PACIC-5A and ACIC surveys, semi-structured interviews, and the integration of the mixed methods design. Although previous evidence from RCTs and observational studies indicated that the implementation of the CCM resulted in improved practice and patient-related outcomes in different countries, but mainly in the USA, a review of the model implementation in the MENA region revealed an evidence gap regarding the adoption or assessment of the model's implementation or assessment of the model alignment with primary care services from the perspectives of both providers and patients (Key Finding 1). The empirical studies found that the involvement of healthcare professionals and people with diabetes to assess the degree of the model alignment provided complementary data and the results reflected a consistent alignment of PCC services with the CCM (Key Finding 2). The qualitative research found that there are structural and cultural factors that contribute to the model implementation and raised questions about whether the findings reported in the surveys were reliable (Key Finding 3). Combining the findings from the surveys and interviews provided insight into the underappreciated role of the centralised healthcare system and the cultural determinants in Saudi Arabia (Key Finding 4). This creates a conflict in terms of implementation and measurement between adapting the CCM to a particular context/culture and enforcing the CCM exactly as specified.

7.2.1 Key Finding 1: The CCM is widely used globally, but is rarely adopted or evaluated in the MENA region

The initial scoping review of the available models of care that have been used for people with chronic conditions suggested that the CCM is widely adopted globally, either partially or as a whole. Several randomised controlled trials reported its effectiveness in improving diabetes-related outcomes (e.g., improvement in HbA1c) as well as chronic disease management practices (e.g., adherence to evidence-based guidelines) (Davy et al., 2015, Coleman et al., 2009). The evidence from these studies made it appropriate to examine the extent to which the current PCCs in Saudi Arabia are aligned with the CCM, so the feasibility of implementing the model can be tested. However, there was a dearth of published studies that assess the use of the CCM, as a whole, in Saudi Arabia or in the MENA region.

The systematic evaluation of all relevant comparative studies concluded that the six components of the CCM can be observed in diabetes care in the MENA region; however, it also revealed that CCM use is sporadic, with few studies examining all of its components. In particular, the assessment tools that examine the elements of the model from the perspectives of providers of care and the patients (ACIC and PACIC-5A) were used independently, and were not combined in a single study. The identified experimental studies were mainly conducted in the UAE, and the researchers examined the quality of diabetes care (the process of care and clinical indicators) only after implementing some elements found in the CCM. These studies were limited to three elements: delivery of care, self-management support, and clinical information systems. In addition, the qualitative studies were limited to a general description of the implemented interventions to reduce inequity in specific populations (i.e., disadvantaged Arab and Jewish populations), or to assess one element on a specific occasion (i.e., self-management support in Ramadan). Hence, it was appropriate in this research to assess all elements of the model to obtain a clearer picture of its alignment with PCC services in order to better understand how the CCM could be implemented.

In Saudi Arabia, three studies have used the CCM to collect data from patients or healthcare professionals via PACIC-5A or ACIC surveys. Two studies were in PCCs (Aljohani, 2018; AlMomen et al., 2015) and one in a tertiary care setting (Alharbi, 2018). These studies were either limited to one centre, or they did not sufficiently examine the variation between centres. This confirmed the need to examine all elements from the different perspectives of providers and recipients of care in multiple centres. The research in this thesis utilised both surveys (PACIC-5A and ACIC) in multiple PCCs to gain more knowledge about the alignment of services with all elements of the CCM from the perspectives of healthcare professionals and patients at the same time. This study was the first of its kind in the MENA region to combine both surveys and to examine the factors that support or hinder the model implementation.

7.2.2 Key Finding 2: Primary care services in the region studied were broadly consistent with the CCM

Two hundred and thirty-seven participants from all PCCs in the selected region filled in the PACIC-5A survey to reflect on the degree of receiving the different elements of the CCM during the last six months. The participants reported receiving primary care services consistent with the CCM “some or most of the time”. However, there was unexplained variation between PCCs, and a possibility that some scores did not reflect the real experiences of what was happening in reality. There was no significant association between patients' characteristics and PACIC-5A scores, and the variability in the PACIC-5A scores due to the variation between PCCs was not large (12–15%).

The PACIC-5A scores indicated a high degree of consistency with the CCM in this study compared to other studies that used the same questionnaire locally or internationally. For instance, primary care services for people with diabetes in Al Baha were reported as more consistent with the CCM than tertiary care services in Riyadh. This could be due to the better provision of care in PCCs, the design of the PACIC-5A to be used mainly in primary care settings, or a bias in the questionnaire responses, such as social desirability bias. In comparison to the original study in the USA (Glasgow et al., 2005b), this study showed slightly higher scores, but both studies reflected a similar degree of consistency with the CCM.

The ACIC survey was filled in by the main providers of care for people with diabetes who were able to evaluate the different elements of the CCM within their own centre. A total of 27 participants from all PCCs in the city were enrolled in this phase of the study. ACIC summary and element scores within PCCs were similar between most, but not all, centres. There was wide variation between the responses in two centres, which could be due to the different perceptions of care by healthcare professionals, the local adaptation of the western system in the Saudi context, or that the response of one of the participants was an accurate assessment of the current services. With this in mind, it was necessary to compare such questionable responses with other centres, map the results of the ACIC with the PACIC-5A, and seek further explanation of the results through interviews. This is discussed further in the fourth key finding.

The ACIC average scores by PCCs showed a variable range for scales that fell into different categories, but with summary scores that fell into the same category of "reasonably good support". One PCC exhibited scores lower than the other centres, and its average summary score fell in the "basic support" category. The aggregated average scores of the ACIC scales and summary scores for all centres were within the "reasonably good support" category. This suggests low variability between PCCs as perceived by people with diabetes in the PACIC-5A. The low variation between centres could be due to the centralised healthcare system, where similar policies and procedures are followed by all members of PCCs. Still, there is room to examine how similar policies and procedures were operationalised by different healthcare professionals, which is discussed in more detail in the fourth key finding. Although there was no correlation between the ACIC and PACIC-5A scores, similar results were concluded in the USA (Noël et al., 2014).

Overall, the ACIC survey was helpful to explore how healthcare professionals evaluate primary care services from the perspective of the CCM, and it helped to see how the results could be consistent with the patients' evaluation of the care (PACIC-5A) from the same centres. These results were not conclusive, but they were useful for designing the semi-structured interviews.

7.2.3 Key Finding 3: The rigid organisational structure of the healthcare system and cultural factors impeded local implementation of the CCM

Although the results from the ACIC and PACIC-5A showed that primary care services appeared consistent with the CCM, the qualitative interviews with health workers identified multiple barriers to the implementation of the CCM. Because the CCM is a predefined framework, it is limited in its ability to address local factors that were not present in the healthcare systems where it was first designed. Hence, these local factors may require a regionally and culturally modified version of the original model. Despite this, the six elements of the CCM were still present, but were conceptualised in terms of the national health system in Saudi Arabia.

Many of the identified factors appear to act as both facilitators and barriers. These factors were also time-sensitive, especially with the continuous improvement in the health system in line with the Saudi Vision 2030. For instance, lack of prevention measures in PCCs was reported as a barrier to improving diabetes management in Saudi Arabia (Alharbi, 2018); however, screening programmes in all PCCs as a measure of primary or secondary prevention were identified in this study. Similarly, Al Asmri and colleagues (2020) found that older studies in Saudi Arabia identified several reasons for patients' dissatisfaction with primary care services, which were omitted or improved in the more recently published studies about the same topic.

The identified factors generally fell into two main categories: structural and cultural. In general, the structural factors recognise the rigid healthcare system as adopting the different elements in the model. In other words, the centralised structure of the MoH offers a foundation for all elements of the CCM to be implemented in PCCs, but it conflicts with the operationalisation of some elements. For instance, the national appointment system and the monthly scheduled follow-up visits support the delivery of care and self-management support; however, these regular visits conflict with guidelines and they add a burden on healthcare professionals who are already suffering from shortages of staff. While these barriers were identified by the participants, they were said to be difficult to amend or change at the PCC level.

On the other hand, cultural factors were mainly considered as barriers to implementing the model. Addressing the social norms of gathering, dietary habits, and physical inactivity require more effort beyond merely adopting quality improvement interventions through the implementation of the CCM. By way of explanation, self-management support and community partnership could help address these factors; however, further exploration from the patients' perspective is important to enable them to take care of themselves.

Addressing patients' perspectives is not limited to the aforementioned behaviours; indeed, beliefs held by patients that are culturally dependent could be explored to build more structured self-management support. For instance, some patients may not only accept the diagnosis of diabetes "as an act of God", but also the associated complications that can occur due to poor adherence to the management plan (i.e., diet, exercise, and medication). Such beliefs could be missed by healthcare professionals who have less knowledge about culture and some religious beliefs. At the same time, these beliefs are culturally sensitive, and physicians could find it difficult to refute such views held by some patients at times.

7.2.4 Key Finding 4: The ACIC and PACIC-5A fall short in recognising the centralised health system and cultural determinants

The ACIC and PACIC-5A elements appear to provide complementary assessments of PCCs' alignment with the CCM from the perspectives of the providers and receivers of care. However, the results of each instrument and how they are mapped should be interpreted with caution. The findings of this study underscore the importance of considering the organisational structure of the healthcare system and the adaptation of cultural/social factors.

The ACIC inadequately defined the cultural and policy factors when it was used to assess the extent of alignment of services for people with diabetes at primary healthcare centres with the CCM. It is difficult to transfer knowledge between countries by employing an instrument from a different healthcare system without adapting it to the cultural peculiarities of the country in which it is to be used. The USA and the Saudi healthcare systems are not organised in the same way; therefore, some of the items on the ACIC cannot be comprehended in the same way because they are unique to the US system. The ACIC was developed by the Quality

Improvement Collaboratives to focus on chronic illness care for people in the USA (Bonomi et al., 2002; Steinhaeuser et al., 2011).

The translation of the ACIC was not simple, and the translation team tried to adapt the survey as far as possible to fit in with the Saudi healthcare system. For example, components like “incentives”, “benefits”, and “regional health plans” were not applicable, but were kept for completeness of the survey. However, they scored high by the participants even though they did not exist. At the same time, other components like “organisational goals for chronic care”, “overall organisational leadership in chronic illness care”, “appointment system”, and “follow-up” were adjusted regionally or culturally compared to how they were originally intended. Although this could create a problem for assessing and implementing the CCM in Saudi Arabia or countries with a similar structure of care (i.e., centralised healthcare system), the ACIC could be used as a process evaluation instrument to improve the quality of care in countries with a decentralised healthcare system.

The PACIC-5A focuses on patients’ perspectives of care, but does not assess all elements of the CCM. Though it was developed to complement the ACIC by providing a patient perspective on chronic care related to the CCM, its scales do not map perfectly with the six elements of the CCM (Glasgow et al., 2005). It is justifiable that some elements in the CCM cannot be assessed from patients’ perspectives. Glasgow et al. (2005) identified two elements that were difficult to assess from the patients’ perspective: “organisation of healthcare delivery system” and “clinical information system”.

In the PACIC-5A, “Follow-up/Coordination” was not clearly defined regarding how it could map with other elements of the CCM; rather, it was considered as “important for most CCM components” (Glasgow et al., 2005). “Patient activation”, “Goal setting”, and “Problem-solving/Contextual” mapped perfectly with the “self-management support” element in the CCM. Moreover, the “5As” model for behaviour change (assess, advise, agree, assist, arrange) was adapted and mapped with self-management support. However, PACIC-5A’s incompatibility with all elements of the ACIC does not mean that its use is not appropriate to reflect on the quality of services from patients’ perspectives. On the contrary, the questions directed to patients through the PACIC-5A could help to understand different elements in care; however, its focus was mainly on one element, which is self-management support.

Overall, the quantitative surveys showed high scores; however, some were for components that were not present (e.g., benefits and peer support). In other elements, the consistency with the

CCM was with a regionally or culturally adjusted version of the CCM, rather than the original version. This creates a problem for implementation and determining the difference between adapting the CCM to a specific situation or culture and enforcing the CCM as intended.

7.3 Implications for diabetes care in Saudi Arabia

7.3.1 Implications for practice

The study suggested that the CCM can be used in PCCs to examine the six elements, but it lacks the components at the policy and cultural levels. Evidence from the literature reported improved care when adopting the CCM, but its effectiveness has not been examined in the MENA region. Yet, the use of the CCM as a framework in this study and the integration of the mixed methods helped to highlight the different aspects to be examined in the current healthcare system. This study may provide valuable insights for decision-makers in the Ministry of Health who may consider implementing innovative interventions to improve primary care services for people with diabetes.

The vertical integration of PCCs with other levels of care was weak. The integration includes linking primary health centres with hospitals, specialised centres for diabetes, and home care through a unified electronic system. Since the electronic system exists but is decentralised, efforts to link it between the different tiers of care may be an important factor in facilitating the transition of patients between primary and specialised care more quickly and effectively. In addition, it contributes to the continuity of medical care and the prevention of resource wastage by providing detailed information that the care provider can view during the patient encounter. This facilitates the feedback process, which is ineffective or almost non-existent in the current system.

The national appointment system facilitated access to PCCs, but it was a burden on healthcare professionals who had to shift from reactive care to proactive care by organising the appointment system in line with societal customs. The flexibility of the appointment system can be maintained with older patients, but this does not mean to neglect to inform patients about the importance of attending on time. In addition, the appointment system can be made more stringent by involving family members who care for older patients with diabetes and educating them about the harm of missing an appointment or not showing up on time. Moreover, it is preferable to activate the appointment reminder system through phone communication or text messages before the appointment, and notify the medical team in the event of a patient's inability to attend or wish to postpone the appointment. In addition, one of the proposed solutions is the establishment of walk-in clinics, where patients can attend without prior appointments.

Healthcare professionals need support to make appropriate decisions when providing care for people with diabetes. This support does not solely rely on the availability of guidelines, but by incorporating them in practice. One possible approach is intensifying training for healthcare professionals in primary care centres, especially as they are the first line of communication with patients. This includes doctors, nurses, and health educators so that training is targeted and based on need, such as focusing on integrating evidence-based guidelines for diabetes for workers in chronic disease clinics, or health education for workers in health education clinics. This training may not be limited to attending training courses, which may exist currently but are not sufficient, but include distance training (online) or the involvement of diabetes specialists to contribute to the development of quality primary care and support decision-making. Developing human resource skills may contribute to building trust among all parties and enhancing medical care for people with diabetes without adding a burden onto one party over another.

The role of community partnership with people with diabetes in PCCs was weak. It is necessary to activate the role of community partnership and link patients with external resources through active coordination between the healthcare system, the community services, and people with diabetes. For this type of community partnership to occur, it is worth looking first for community organisations that support diabetes in the region, which may not exist at first. Therefore, a multi-sectoral collaboration of the relevant sectors may be the starting point for identifying the currently available resources and striving to develop an effective partnership between all parties so that patients can benefit from them.

Self-management support is baseless without addressing social and cultural factors. Hence, developing self-management support means being commensurate with the customs and traditions of Arab society, especially regarding eating habits and physical activity. This may include educating health practitioners about community habits within the previously mentioned training courses, and educating patients about the most appropriate ways to overcome unhealthy habits. Since the religious factor has a significant impact in shaping Arab culture, there is a need for dialogue with religious organisations to dissolve the misconceptions related to religion and health, and spread awareness among members of society in mosques, schools, and public places. It is also important to cooperate with religious leaders and well-known religious figures to remind people of what the Islamic religion teaches about following an appropriate healthy diet and exercise, and stress the importance of medical guidance, as it does not conflict with religious concepts if it is correctly understood. What helps in conveying this message are religious publications, television interviews, and the Friday sermon, attended by many worshippers.

Managers in PCCs were regarded as insufficiently qualified, and the role of females in leadership was missing. It is essential to empower leaders through appropriate training and appointment based on qualifications and reconsidering women’s empowerment in leadership positions, which is in line with the Kingdom’s Vision 2030.

The use of the PACIC-5A and ACIC as assessment tools to improve care are not enough to compare performance and define the strengths and weaknesses in the healthcare system. Both surveys are self-reported, and the findings from this study suggest systematic over-scoring, possibly due to the cultural issues of respect and loyalty (i.e., social desirability bias). Nevertheless, the ACIC can be used for reflections on the healthcare system and the PACIC-5A for feedback from patients on the provided services; nevertheless, the findings from these questionnaires should be interpreted with caution.

Finally, and as part of supporting people with diabetes to be more active, decision-makers in the MoH could consider cooperating with the relevant authorities to develop residential neighbourhoods and provide suitable places for walking by providing parks and sidewalks suitable for this purpose. In addition, establishing convenient indoor locations to exercise with a non-profit approach will also encourage patients to maintain physical activity on an ongoing basis.

7.3.2 Implications for policy and future research

The management and control of diabetes in PCCs remains a challenge for health policy and decision makers. While the CCM outlined the six elements that are worth assessing in PCCs, stressing the importance of the active interaction between providers and patients to improve the outcomes of diabetes, there are areas that need further exploration and assessment. The following recommendations could assist in improving the current primary care services for people with diabetes in Saudi Arabia, according to the results of this study. It is worth noting that the targets for these recommendations are policy and decision makers in the Ministry of Health, and researchers interested in using the CCM in PCCs.

The assessment tools related to the CCM can be used for initial assessment to reflect on the services (ACIC) or to obtain feedback from patients (PACIC-5A) through the lenses of the model, but they may need to be changed or modified to adapt to the structure of the healthcare system and the culture of people in Saudi Arabia. In the Netherlands, a short version of the ACIC was developed for a Dutch disease management programme and was found to be a good alternative to the original tool (Cramm et al., 2011). While the adaptations were made to make the survey easier to use, it could support the idea that some subcomponents in the survey were not necessary.

The assessment and implementation of the different elements in the CCM could be useful to improve disease-related outcomes and to reduce the utilisation of healthcare services, but it seems that the aim of the model is to align with the organisation's goals rather than focusing more heavily on patient-centred outcomes (e.g., coping skills) or supporting patient capacity by providing practical resources (e.g., reframe patients' biography to fulfil obligations with an existing chronic condition). Thus, it is recommended that the model be modified to embrace the concepts of patient capacity in order to provide more comprehensive care to patients. At the very least, interventions could focus on the resources required to support these capacities. In other words, the model aimed to build patient capacity through education, but there is still a need to address issues such as financial constraints and problematic monthly visits.

Prioritising the areas that need to be strengthened by involving healthcare professionals and decision makers is a useful strategy. This could be limited to one or more elements of the CCM according to different factors, such as available resources, willingness to change, and support from leaders. This includes, but is not limited to, supporting delivery design and decision support by the implementation of evidence-based guidelines on follow-up visits and increasing access to HbA1c testing in PCCs.

There is a need to conduct more studies to examine and comprehend the sociocultural circumstances that influence diabetes care from the perspective of patients and their families. Conducting field studies from selected regions in Saudi Arabia (e.g., north, west, and east) to see whether discrepancies exist, and which strategies might work for different population groups in the Kingdom, is certainly recommended. It is suggested that the scope of the studies be expanded to capture the policy and cultural factors, along with the six elements in the CCM.

It may be more suitable to adopt the expanded model of the chronic care model (ECCM) or the Innovative Care for Chronic Conditions (ICCC) (sections 1.4.2.2.2, 1.4.2.2.3); these both pay more attention to the missing areas acknowledged in the CCM in this study, but they preserve the inclusion of the six elements.

It is recommended that the feasibility of implementing the ECCM or ICCC models is assessed by conducting before/after intervention in selected centres. This may include, but is not limited to, resources (funds, personnel) and the acceptability of adopting the model by healthcare professionals.

Including patients in the assessment of the strengths and limitations of the current PCCs will help to address them in future implementations.

7.4 Strengths and limitations of the study

This study has several strengths and limitations, which will be described in the following sections.

7.4.1 Strengths

This thesis used the CCM as the theoretical framework, an internationally recognised model and a widely utilised framework for planning and providing care for people with chronic conditions, including diabetes (Baptista et al., 2016; Si et al., 2008). It introduced a practical approach to assess the primary care services for people with diabetes in the Saudi healthcare system through its six elements. It uses a systematic approach to restructure care, and several studies reported its effectiveness in improving the quality of care after its implementation (Bongaerts et al., 2017; Mangione-Smith et al., 2005; Si et al., 2008; Stellefson et al., 2013).

The narrative review of the use and implementation of the CMM in the MENA region was conducted first. Gaps in the knowledge were identified in its use in the region, and these guided the empirical work. The identified studies revealed that CCM use is intermittent, with only a few studies carefully examining its different aspects. As a result, the CCM was employed in this study to address all elements of the model for diabetes care in the Saudi primary healthcare system using a systematic approach.

Since the region in which the study was conducted contains two large health sectors, with each sector including 11 health centres, all centres in the first sector were selected to conduct the research, and seven centres in the second sector were selected to conduct the pilot study to test the validity and reliability for the translated survey (ACIC-Arabic). Including all PCCs allowed the exploration of the six elements of the model within and between all centres from both patients' and healthcare professionals' perspectives, as well as enabling conclusions to be drawn that are transferable to similar settings in the Kingdom.

It was difficult to recruit female participants in this study due to the cultural restrictions in Saudi Arabia. However, a female health practitioner was secured in each centre to help collect responses from participants to overcome the challenge of collecting data from the female section. The assistant was asked to distribute the survey to the participants who fulfilled the inclusion criteria, and was instructed not to explain or help to answer any of the questions.

The questionnaires used in this study were pre-existing questionnaires developed to assess the six elements of the CCM. The PACIC-5A survey has a valid and reliable Arabic translated version of the original English questionnaire (Alharbi, 2018; Alharbi et al., 2021). The ACIC survey was translated into Arabic and culturally adapted for validity and reliability in this study. The translation and validation of the ACIC was a strength of this study, as it is the first to be translated into a widely used language in the MENA region and it will be made available for use in future research.

This study was also the first to use both the PACIC-5A and the ACIC to assess primary care services in the MENA region. All previous studies used either the ACIC or PACIC-5A, but none combined both in one study. This combination of the two questionnaires helped to evaluate the services provided to diabetic patients through the responses of patients and health practitioners in the same centre, which helped to better understand these two different perspectives.

A further explanation of the findings from surveys was achieved through semi-structured interviews. These one-to-one interviews were with health practitioners in PCCs who had previously participated in filling out the ACIC questionnaire, and other participants who were in administrative positions within the health centres or in the General Directorate for health affairs in the region. This diversity in the selection of participants had a clear impact on clarifying the areas for improvement and the obstacles to applying this model in the Saudi health system, considering the difference between the eastern and western systems and Saudi society's social and cultural factors.

Finally, the integration of the results provided an overall picture resulting from the use of multiple methods to study the possibility of applying the model in the Saudi health system, and a deeper understanding of the different – and sometimes conflicting – results. This, in turn, helped to better compare the results with other studies and offer recommendations for improvement that are consistent with the context of the Saudi health system to ultimately serve all parties, whether directors, healthcare professionals, or patients.

7.4.2 Limitations

The first limitation was that the narrative review included published studies in English, while some publications are likely to be in other languages, especially in North Africa. However, the results from the literature search did not recognise studies in other languages that specifically describe the CCM.

The study was conducted in one city in Saudi Arabia, thus hindering the generalisability of the findings. However, this study included all PCCs in the region, and it was the most suitable option to conduct interviews in one location.

The patient sample size was moderate (n=237) and was relatively small for healthcare professionals (n=27). However, the patients' responses were mainly to reflect on the services, and they were selected during a time when the sampling was more achievable (response rate 75.5%). On the other hand, healthcare professionals were recruited from all centres and the sampling was limited to physicians, but the response rate was 82%.

The quantitative approach used questionnaires, where the results could not capture the participants' understanding or represent their perspective. While usually survey questions are standardised, it might be difficult to ask anything more than reasonably generic questions that a wide range of individuals would understand. Thus, it may be difficult to understand a particular phenomenon due to the lack of depth when using a questionnaire. However, conducting personal interviews helped explore the results of the questionnaires in more depth, as the questions were more flexible, particularly since they dealt with the same topic as the questionnaires.

The convenience sampling of people with diabetes may cause a selection bias, which prevents the generalisability of the findings. However, the study aimed to assess the services provided to patients, not to examine their characteristics. In addition, the researcher tried to select specific days to distribute the PACIC-5A on which the target population (i.e., people with diabetes) were available. This helped to reduce the non-response rate, because the rejection to participate was expected.

While this research integrated both surveys and interviews with healthcare professionals, it was not able to include interviews with patients. First, this is because of the focus on the implementation of each element, which would be difficult to assess from the patients' perspective (e.g., organisation of care). Second, it was considered in planning that, as with the professionals, the interviews could have involved challenging patients' accuracy in reporting on the care they received. This was considered to be inappropriate without prior knowledge of the three questions in this thesis (PACIC scores, ACIC, and practitioner interviews). Third, recruitment difficulties were anticipated for people with diabetes, which ultimately became impossible with the COVID-19 pandemic.

In the analysis of the qualitative interviews, the facilitators and barriers were identified mainly due to the frequency of reporting (i) by the participants, and (ii) in the literature. Although some researchers argue that the assumption of "frequency equals importance" is problematic and imperfect, others consider that frequently reported factors are likely to be true in reality. Even to the researchers who acknowledged it as problematic, it is still considered the best method to identify "key" factors as facilitators or barriers (Bach-Mortensen and Verboom, 2020; Wändell et al., 2018).

Due to the COVID-19 pandemic during the primary data collection period, it was impossible conduct face-to-face interviews, and the personal interviews were conducted online.

7.5 Conclusion

This study was the first of its kind to explore how the CCM was adopted in Saudi Arabia and the MENA region, and to what extent the PCCs services for people with diabetes were aligned with the CCM in one city, and what could be the potential facilitators and barriers toward its implementation. This was achieved using both assessment tools together ACIC and PACIC-5A, followed by semi-structured interviews. This mixed methods study concluded that the CCM is a multi-faceted intervention that can be used to improve quality of care in primary care centres, but its assessment tools failed to address a number of key policy and cultural issues which are important in a Saudi Arabian or Middle Eastern setting. For future research, this study's findings lay the foundations for assessment studies in which the success of this model's implementation is evaluated using the necessary analysis that takes specific local contextual aspects into account.

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Appendices

Appendix 1

https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools

Appendix 2

https://www.nice.org.uk/process/pmg4/chapter/Appendix-H-Quality-appraisal-checklist-qualitative-studies

Appendix 3

Adobe Acrobat
Document

Appendix 4

Adobe Acrobat
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Appendix 5

Adobe Acrobat
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Appendix 6

Adobe Acrobat
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Appendix 7

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Appendix 8

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