AN ICT STRATEGY TO SUPPORT A PATIENT-CENTRED APPROACH TO DIABETES CARE

BY ANASTASIA PETRATOS

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AN ICT STRATEGY TO SUPPORT A PATIENT-CENTRED APPROACH TO DIABETES CARE

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ABSTRACT

Factors such as poverty, ethnicity, socio-economic status, poor infrastructure and governance, etc., are some of the reasons that effective and proven prevention and treatment interventions for most of the major causes of mortality and morbidity in the developing world continue to fail. Chronic diseases require complex interventions that these countries simply cannot maintain.

Diabetes mellitus (DM) is a chronic disease that is on the rise worldwide. This disease is a lifestyle disease, which means, that it is brought on by poor health habits. Statistics show that 285 million (6.4%) people aged between 20 and 79 years will be affected by Diabetes in 2010 and a staggering 439 million (7.7%) by 2030. This is a projected growth of 69% in developing countries and 20% in developed countries.

The findings from studies conducted from 1993 to 2003 in Sub-Saharan Africa, particularly in South Africa, around the health care services for diabetes highlights many challenges. Sadly, the challenges 10 years after that study, are very similar. The conditions of people with Diabetes can be improved through regular monitoring of patients, improvement and monitoring of health care provided, education on healthy lifestyle, as well as education on the importance of adherence to treatment plans for the successful management of the condition. The diabetes endemic in South Africa is exacerbated by the manual functions that are performed in all aspects of monitoring and management of the disease. With the advancements that have been made in ICT and the many apps that already exist for healthcare, it is sensible to state that ICT can assist in the monitoring and management of diabetes.

Another factor that is considered is that of patient-centred care. The huge number of people who need acute care and treatment in hospitals and clinics have forced a previously caring environment, to turn into a cold, almost production line affair. The sick wait in long queues and are ushered in and out of the consulting rooms as fast as possible without even as much as a "hallo". This has left a void in the healthcare delivery to South Africans which should never have been removed in the first place, namely patient-centred care. This means that the patient is at the centre of the treatment and fully involved in the decisions about his/her health. Every patient deserves to be recognised as a human-being and treated with dignity and respect. Treatment plans for long term chronic care patients such as diabetics, should be thoroughly discussed with the patient and they should believe and comit themselves to the

treatment plan. These plans are life-long and require dedication and as it is vital that patients are part of decision making and understand fully what they are expected to do. Bearing this in mind, this study has investigated the needs and care plans for people with diabetes. Specialist in the field of diabetes were interviewed and recognised care plans for diabetes such as those from WHO, IDF and SEMSDA were studied. This study also established, that by practising a patient-centred approach the adherence to a treatment plan is likely to be higher. The strategy developed involves the person with diabetes, the healthcare worker and the support structure in the care plan of the diabetic. The use of ICT as part of the solution must consider the patient-centred requirements for using IT so that the people using the strategy are comfortable and not intimidated by the technology.

The need to incorporate e-health into governments' healthcare plans has been growing over the last decade. The GSMA conducted research into mobile health opportunities in South Africa and found that SA now has a penetration of 98% and that this is the ideal medium to address the inaccessibility and inequality of healthcare in SA. The causes identified as playing a major role in the rise in diabetes were identified and it was determined that through the implementation of an ICT strategy for diabetes care, many of these can be addressed. These include the use of technology for, improved monitoring and management, increased diabetes awareness and education, and promotion of healthy lifestyle. The study focuses on the self-management aspect of diabetes and produces a strategy that incorporates various ICT solutions that would assist in the daily aspects of diabetes care, as well as follow a patient-centred approach to diabetes care.

This strategy developed in this study does not need any intervention from government as it is driven by the people who have diabetes and their healthcare workers, with the aid of the technology that they currently have on hand.

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LIST OF ABBREVIATIONS

A&E wards	**Accident and Emergency wards**
ADA	American Diabetes Association
BRICS countries	Brazil, Russia, India, China, South Africa
CDE	The Centre for Diabetes and Endocrinology
CDL	Chronic Disease of Lifestyle
DALY	Disability Adjusted Life Years
DAWN	Diabetes Attitudes, Wishes and Needs
DM	Diabetes Mellitus
DS	Design Science
DSR	Design science research
DSR	Design Science Research
DSS	Decision Support System
ECG	Electrocardiogram
EU	European Union
GBD	Global Burden of Disease
GDM	Gestational Diabetes Mellitus
GDP	Gross Domestic Product
GP	General Practitioner
HIMSS	Health Information and Management Systems Society
HIV/AIDS	Human Immunodeficiency Virus Infection and Acquired Immune Deficiency Syndrome
ICDM	Integrated Chronic Disease Management
ICT	Information Communication Technology

ICT4H	Information and communication technology for health
IDF	International Diabetes Federation
IOPA	International Alliance of Patients' Organization
IS	Information Systems
IT	Information Technology
ITU	International telecommunication Union
MDG	Millennium Development Goals
MRC	Medical Research Council
NCD	Non-Communicable Disease
NDOH	National Department of Health
NIH	National Institute of Health
NMMU	Nelson Mandela Metropolitan University
OECD countries	Organization for Economic Co-operation and Development
PAHO	Pan-American Health Organization
PDA	Personal Digital Assistants
SADHS	South African Demographic and Health Survey
SANLAM	South African Health Insurance company
SEMSDA	Society of Endocrinology, Metabolism and Diabetes of South Africa
TB	Tuberculosis
UN	United nations
US	United States
WHO	World Health Organization

TERMINOLOGY	
App (s)	Software application (s) that are used on mobile platforms, such as cellphones or tablets
ECG	An Electrocardiogram is a test that checks for problems with the electric activities of the heart
e-Health	The use of information and communication technologies (ICT) in healthcare; traditional desktop applications for use in the healthcare sector
GSMA	Represents the interests of mobile operators worldwide. It includes almost 800 operators with more than 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations with an interest in mobile technology. The GSMA also produces industry-leading events, whereby information is shared regarding mobile technology, as well as its impact on other sectors.
ITU	The United Nations' specialized agency for information and communication technologies
Joslin Diabetes Center	Joslin Diabetes Center is based in Boston, Massachusetts and undertakes diabetes research, clinical care, education and health and wellness programs on a global scale. Joslin is dedicated to ensuring that people with diabetes live long, healthy lives; and it offers real progress in preventing and curing diabetes. Joslin is an independent, non-profit institution affiliated with the Harvard Medical School; and it is recognised worldwide for deriving innovative solutions in diabetes prevention, research, education, and care.
JISC	(formerly the Joint Information Systems Committee) is a United Kingdom not-for-profit company, whose role is to support post-16 and higher education, and research, by providing relevant and useful advice, digital resources and network and technology services, while researching and developing new technologies and ways of working. It is funded by a combination of the UK further and higher education-funding bodies, and individual higher education institutions.

McKinsey & Company	McKinsey & Company is a management consulting firm. For more than 75 years, its mission has been to help clients achieve distinctive, substantial, and lasting improvements in their performance. From its most senior leader to the newest consultant, McKinsey works with its clients to realize their performance potential. McKinsey helps companies worldwide define their strategies, strengthen their organizations, and improve their operations. Its clients include more than half of the world's top 200 companies, as well as companies with the potential to reach the top. McKinsey also helps a diverse range of government institutions and non-profit organizations with their management challenges.
mHealth	This is the term used for healthcare practices that are supported by mobile devices.
MTN	MTN is a South African based, multinational telecommunications operator that has over 229.2 million subscribers across its markets in 21 countries in Africa and the Middle East. (MTN, n.d.).
ROCHE	Roche is a leading healthcare company, based in Switzerland, that has for over 100 years been active in the discovery, development, manufacture and marketing of healthcare solutions worldwide.
Wi-Fi	Wi-Fi is the name of a popular wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections (Beal, n.d.).

1 Research Scope

1.1 Introduction

This study provides an ICT strategy to support patient-centred diabetes care that can be implemented within the South African healthcare sector. The study investigates three main concepts, namely: diabetes; patient-centred care; and information communication technology (ICT) use in the healthcare sector. The next section gives a background to the scope of the research.

1.2 Background

The first area of focus of this study is diabetes. Diabetes is a non-communicable disease (NCD); and as such, it necessitates a brief overview of NCDs and their impact on society. This overview demonstrates the relationship between NCDs and the disease burden. It also demonstrates why diabetes fits into this category of diseases.

1.2.1 Non-communicable diseases and the disease burden

Non-communicable diseases (NCDs) are defined as diseases that are not passed from person to person; and they are also known as chronic diseases because of their long duration and slow progression (WHO, 2015). The major non-communicable diseases (NCDs) are listed as cardiovascular diseases, diabetes, chronic respiratory conditions, as well as cancer (Human Science Research Council, 2013).

The World Health Organization (WHO) describes the global disease burden as being the statistical measure indicating the loss of years of healthy life through a disabling disease in a specified population, as measured in disability-adjusted life years (DALYs). Non-communicable diseases have a direct impact on the disease burden; as these types of illness, because of their duration, often cause multiple or compounded problems in patients who already require chronic care (Mayosi B., Flisher, A. J., Lalloo, U. G., Sitas, F., Tollman, S. M. & Bradshaw, D, 2009).

According to the World Health Organization (WHO) (Media Centre: Non-Communicable Diseases, n.d.) and Bloom (Bloom, D., Cafiero, E., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L. & Fathima, S. E., 2011), these non-communicable diseases share the same major modifiable risk factors, namely: tobacco use, physical inactivity, unhealthy diets and harmful use of alcohol. The risk factors can be altered by the person; hence, NCDs are also referred to as chronic diseases of lifestyle (CDL) (Bloom, et al., 2011).

The WHO fact sheet on the Global Health situation and trends for 1955 - 2025 (World Health Organization, 1998), warned that in developing countries, the prevalence of NCDs will continue growing; as the economies of these countries grow. This warning also included the fact that previous diseases that were found mostly among the affluent and developed countries are increasing in the developing countries; and they pose a double-disease burden on already-struggling countries. The NCDs that are reaching epidemic proportions worldwide are repeatedly listed as cardio-vascular disease, Type 2 Diabetes, cancer and chronic lung disease (Mayosi, et al., 2009).

The WHO fact sheet on non-communicable diseases last updated in January 2015 states the following (WHO, 2015):

- NCDs kill 38 million people each year;
- Almost three quarters of NCD deaths - 28 million - occur in low- and middle-income countries;
- Sixteen million NCD deaths occur before the age of 70; 82% of these "premature" deaths occurred in low- and middle-income countries;
- Cardiovascular diseases account for most NCD deaths, or 17.5 million people annually, followed by cancers (8.2 million), respiratory diseases (4 million), and diabetes (1.5 million);
- These 4 groups of diseases account for 82% of all NCD deaths;
- Tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets all increase the risk of dying from a NCD.

The NCD alliance group, of which South Africa became a member in 2014, was formed in May 2009; and it consists of an alliance of four international federations (NCD Alliance Group, 2009). These have a network of over 2000 organizations representing cardiovascular disease, diabetes, cancer, and chronic respiratory diseases.

The Lancet NCD action group and the NCD alliance released a report on the priority actions for the non-communicable disease crises, in which it stated that, the progress that has been achieved worldwide with regard to economic growth, health and living standards in the past century, was under threat by a crisis created by man, namely, that of climate change, finance and food insecurities, and the crises in non-communicable diseases (NCDs) (Beaglehole, R., Bonita, R., Horton, R., Adams, C., Alleyne, …; Lancet NCD Action Group; NCD Alliance, 2011).

The South African landscape shows the same statistical pattern as the global trend for NCD, with cardiovascular disease having the highest number, followed by cancer, diabetes and respiratory disease (Human Science Research Council, 2013).

People in South Africa (SA) are getting lifestyle diseases in their 40s and 50s; and many are undiagnosed and untreated, and consequently dying prematurely from NCDs, such as high blood pressure, strokes and diabetes (Child, 2012). Stassen (2014), states that with urbanization comes the change from one's normally active lifestyle in rural areas, to a more sedentary lifestyle in urban areas. This also goes hand-in-hand with a change to the fast-food world of city life.

The WHO report of 2004 stated that 28% of the disease burden of South Africa is caused by NCDs; and that this is two to three times higher than that of developed countries (Mayosi, et al., 2009). The South African government adopted the Brazzaville Declaration on Non-communicable Disease Prevention and Control in the WHO African region, whereby the undersigned governments committed themselves to the strengthening of institutional capacities for NCD prevention and control (Human Science Research Council, 2013). Based on this, the SA government released its strategic plan for the prevention and control of NCDs for 2013 – 2017.

Rotherum-Borus (Rotherum-Borus, M.J., Tomlinson, M., Gwegwe, M., Comulada, W. S., Kaufman, N., Keim, M., 2012) states that there are 2.6 million people affected with diabetes in South Africa; and in 2005 this was the sixth-leading cause of death in South Africa; while HIV/AIDS was tenth. South Africans not only live in a developing world, but they also have traditional beliefs that make being overweight desirable and acceptable (Rotherum-Borus, et al., 2012). This is another factor in the increasing occurrence of diabetes. According to a study conducted at the University of Witwatersrand's School of Public Health, South Africans are on the path of overtaking the United States in terms of obesity; and they already have 25% of rural teenagers being overweight or obese (Child, 2012).

The overall prevalence of overweight and obese people in South Africa is more than 29% for men and 56% for women (Goedecke, Jennings, & Lambert, 2014).

Appendix A shows that diabetes is the second-highest cause of death in people above the age of 45 in South Africa (Statistics South Africa, 2013). It therefore has a huge impact on the global disease burden.

1.2.2 What is diabetes?

Diabetes mellitus (DM) is a chronic lifestyle disease, which means that it is brought on by poor health habits (Brown M. A., 2012). Statistics show that 285 million (6.4%) people aged between 20 and 79 years will be affected by diabetes in 2010, and a staggering 439 million (7.7%) by 2030, which demonstrates a projected growth of 69% in developing countries and 20% in developed countries (Shaw, Sicree, & Zimmet, 2009).

The daily newspaper, The New Age, reported on 15 May 2014 that 50% of people living with diabetes worldwide are undiagnosed. This figure rises to a staggering 82% in Africa. (Mdletshe, 2014). On 28 February 2013, Health24's headline read: "Diabetes 'tsunami' hits South Africa" (Otterman, 2013). Dr Larry Distiller, who is the founder and managing director of the Centre for Diabetes and Endocrinology in Johannesburg, was quoted in that article saying that "three and a half million South Africans suffer from diabetes" and that "another five million have pre-diabetic conditions".

Diabetes Mellitus (DM), more commonly referred to simply as "diabetes", is a chronic metabolic disease. It is characterised by elevated blood glucose, known as hyperglycaemia; and it is associated with an absolute or relevant deficiency in the secretion and/or action of insulin (PAHO, About Diabetes, 2012). This effectively means that the pancreas does not produce enough insulin; or the body cannot use effectively the insulin that is produced.

The types of diabetes and their characteristics are (Brown M. A., 2012; WHO, 2013; PAHO, 2012):

1. *Type 1 Diabetes* is when the body does not produce sufficient insulin. This is the most common type of childhood diabetes; and it is an auto-immune condition, whereby the body turns on itself and destroys the beta-cells of the pancreas that produce the blood sugar-lowering hormone, insulin. It affects 10% – 15% of people with diabetes; and it has a high risk of complications – due to the extended time-period of the disease. The causes of this type of diabetes are unknown; and there is currently no knowledge of preventive measures. People with type 1 diabetes require daily doses of insulin and lifelong care; but otherwise, they can live a normal life.

2. *Type 2 Diabetes* occurs in 80% – 90% of diabetic patients; and it is caused by the body not producing insulin, or being resistant to insulin. This type of diabetes is mostly preventable; and it is often associated with excess weight and an inactive lifestyle. The symptoms of Type 2 Diabetes are very subtle and often missed. This

leads to the disease being diagnosed at a late stage, resulting in it being described as a disease of the middle-aged. The number of children with Type 2 Diabetes is also on the increase, and has reached alarming numbers. Type 2 Diabetes has serious complications associated with it, such as cardiovascular ailments, kidney damage, blindness and amputations. These complications are often caused because of the lateness of the diagnosis. It becomes progressively serious; since the disease frequently remains undetected or untreated.

3. *Type 3 Diabetes* is gestational in nature; and it occurs during pregnancy, due to the hormonal changes in some women's bodies that affect the usage of insulin. This type of diabetes normally disappears after pregnancy.

It is also important to note that diabetes is a chronic and costly condition, for which there is at present no cure (Brown M. A., 2012).

Diabetes Mellitus can be prevented in high-risk individuals through interventions, such as education, lifestyle changes and support (Whittemore, D'Eramo Melkus, & Grey, 2004). According to the research results for the global healthcare expenditure on diabetes for 2010 and 2030, (Zhang, P., Zhang, X., Brown, J., Vistisen, D., Sicree, R., Shaw, J. & Nichols, G, 2010), the countries that have diabetes management and prevention strategies in place are the countries with the most money; while those less affluent countries, with a greater need for such a strategy, do not have the money available for this kind of expenditure. As much as 91% of the total world health expenditure on diabetes is in developed countries; while only 9% is in developing countries. Only 0.3% of this expenditure will be from the African region.

There is a clear disparity between the expenditure of countries with a high prevalence of diabetes and that of developing countries where the epidemic is growing.

1.2.3   Why Type 2 Diabetes was chosen for this study

There are more than 246 million people worldwide with diabetes; and it is estimated that over 380 million people will have diabetes by 2025 – if nothing is done to control the epidemic (ROCHE, 2009). In South Africa, recent data have indicated a decline in the number of HIV/AIDS mortality rates, and a longer life expectancy for people with HIV/AIDS, because of the successful implementation of an anti-retroviral program. This is in contrast with diabetes that is on the increase, due to the ageing population and the risk factors associated with diabetes also being sharply on the rise (Levitt, Krisela, Dave, & Bradshaw, 2011).

The South African government has recognised the huge impact that diabetes has on the economy of the country; as the disease burden is significant. In order to try and combat the growth of diabetes, the government took a stand in 2006; and it drafted a national guideline for the management and control of NCD (National Department of Health, 2006). However, Mayosi (2009), identified barriers to the implementation of the guidelines. These barriers included; i) the lack of dissemination, ii) the lack of monitoring, iii) the lack of assessing the management and control of chronic disease, and the iv) lack of adequate skills of clinic staff to deal with NCDs. Furthermore, the effect of the many community-based interventions, such as Community Health Intervention Programme, Woolworth's Health Promotion Programme and the Vuka South Africa Move for health initiative, have not been monitored; so, therefore, it remains relatively unknown.

According to a report by Daan du Toit (2012), Senior SA Science and Technology representative to the European Union (EU), the Medical Research Council (MRC) has targeted diabetes as its number-one NCD priority for intervention; and it is looking at focusing one of their research areas on the effects of lifestyle, specifically diet, from pre-natal to adulthood on Type 2 Diabetes.

Type 2 Diabetes was chosen for this study for the following reasons (Human Science Research Council, 2013; Du Toit, 2012):

1. In line with government goals;
    i. Addressing the need to combat diabetes is in line with the millennium development goals (MDG), to which the South African government has pledged commitment. Specifically, this is aligned to MDG 6;
    ii. Choosing diabetes as a field of study is in line with the government's goal to increase research in the field of non-communicable diseases.
2. Lowering the disease burden;
    i. Premature deaths caused by Type 2 Diabetes can be prevented;
    ii. Early detection would decrease medical complications and lead to longevity;
    iii. Preventing premature deaths caused by type 2 diabetes would lessen the burden of disease on the country.
3. It is a preventable condition
    i. Diabetes is caused by modifiable risk factors; and thus, the risk can be reduced by changing one's bad habits;
    ii. Unhealthy lifestyle choices lead to premature deaths.

iii.   Healthy lifestyle will lower risks of obesity.

1.2.4   Overview of patient-centred care

The second area of the study is patient-centred care. It has been argued that medical practice is increasingly dehumanised, dominated by impersonal technologies and economic constraints (Haslam, 2007). According to Neighbour (1987), the traditional approach to caring for a patient is called the "biomedical model". In this approach to care, the patient reports an illness and the illness is treated, based on the signs and symptoms reported, via a standard set of procedures that are in line with curing the particular illness, whilst remaining emotionally neutral. Thus, in the traditional approach, the doctor makes the decision with minimal consultation on the form of the treatment with the patient.

Scher (2012) published an article in which he differentiates between patient-centric care and patient-centred care. In the article, Scher states that the National Institute of Health (NIH) agrees that patient-centric healthcare is at work when the information or communication between the patient and the healthcare worker is initiated by the patient. This means that the wireless technologies that support this are built on the premise that the data would originate with the patient and be sent to the healthcare practitioner; who would then interpret the data and make a decision on how to continue with treatment, or initiate an intervention.

This approach to healthcare requires the patient to take full responsibility for initiating his/her continued care.

Patient-centred care has been well researched and advocated over the past 30 years; but little consensus has been reached on an absolute definition for the term (Mead & Bower, 2000). A definition given by Scher (2012) states that patient-centred care is *"healthcare that establishes a partnership among practitioners, patients and their families (when appropriate) to ensure that decisions respect patients' wants, needs, preferences and solicit [the] patient's input on the education and support they need, to make decisions and participate in their own care"*. This concept moves the focus away from the doctors' requirements and their controlled methods of care, to that of the patients' needs and a participatory-care plan (Bardes, 2012).

The patient-centred health review done by the International Alliance of Patients' Organizations (IOPA) (2004), shows that various studies indicate that there is a positive link between patient-centred care and the care outcome. These studies span from 1992 – 2001; and they were based on literature studies, as well as field studies.

This study, consequently, uses a patient-centred approach to diabetes care that encourages a partnership in the treatment of patients, rather than the patient-initiated communication of a patient-centric approach.

1.2.5   ICT in relation to mHealth and e-health for this study

The third area of study for this research project is that of the use of information communication technology (ICT) in healthcare. According to Giles (2016), the common understanding of the term ICT is that it is an abbreviation for "Information Communication Technology" and can be understood in two ways. The first is looking at two types of technologies, Information Technology and Communication Technology; whereas the concepts of information and communication are dependent on the technology. The second way is to view each word in the concept as an individual concept, namely, information, communication, and technology. This infers that information and communication do not necessarily have to be electronic, that is using technology, but could also be something like the spoken word or a document. It also infers that Information Technology and Communication Technology are concepts that form part of the acronym. This gives the acronym a much wider scope.

For the purpose of this study, the term ICT implies the wider meaning.

According to Sood (Sood, S., Mbarika, V., Jugoo, S., Dookhy, R., Doarn, C. R., Prakash, N. & Merrell, R. C, 2007), the experiences of early tele-medicine applications led to the belief that this was an unreliable and unaffordable technology. However, the rapid developments in information and communication technology (ICT) have proved this to be the contrary, as the development of more reliable technology provided a solid base for health applications using ICT.

As with patient-centred care, there is no one exact definition for mHealth; but there is a consensus amongst all researchers that mHealth is also thought of in a positive manner; and it ultimately alleviates specific healthcare constraints (Istepanian & Lacal, 2003). In its infancy, mHealth was seen as the evolution from e-Health systems that were traditional desktop platforms, to wireless and mobile technologies, which led to the simple definition that mHealth is "*mobile computing, medical sensor, and communication technologies for health-care*" (Istepanian, Jovanov, & Zhang, 2004).

Istepanian (2004) predicted that the developments in wireless communication integrated with developments in universal and wearable technologies would have a radical impact on future

healthcare deliveries. A study by Istepanian (2014) showed the many benefits of using technology for healthcare. The study also determined that although many of the mHealth services are restricted to pilot studies and adoptions in small pockets, mHealth was here to stay; and it will have even further prolific effects on healthcare in the future, especially for chronic disease management, hospital management processes, Accidents and Emergency (A&E) wards and elderly and home-care services.

It is clear from the discussion, that mHealth cannot be implemented without ICT; whereas ICT strategies are possible without mobile devices. The two terms are closely related and both have the commonality of the use of technology. For the purpose of this study, the terms ICT strategy and, technology use, are used interchangeably. The terms are understood to mean the use of technology in healthcare; and thus, they are not limited to the use of mobile devices only.

The next section identifies the gaps in the knowledge that led to the rationale for this study.

1.3   Research Problem Description

This section identifies the problem areas in the research area; and it explains why the study is being conducted.

1.3.1   Overview

Many factors have led to the increase of diabetes; although the high percentage in increased obesity and the dramatic increase in urbanisation are the biggest contributing factors (Parvaz, Kawar, & El Nahas, 2007). People are moving from rural areas into urban areas – in an attempt to find a better life. However, this better life poses the threat of an unhealthier life style; as the foods in the western diet contain more sugars, fats and salt, and the sedentary nature of western lifestyle leads to higher levels of inactivity (Mbanya & Ramiya, 2006).

De Mendoza's (2009) study regarding diabetes management for patients in the Cacadu District of the Eastern Cape, indicated that patients in South Africa are often not in close proximity to formal healthcare facilities; and this poses many challenges. De Mendoza indicated that access to these clinics is often difficult; as the patients need to walk long distances to get there. This also means that they do not go to the clinics often to get the regular care they need. Clinics also tend to be staffed by healthcare workers, rather than by qualified doctors; and therefore, the care that patients receive is not always of the best

quality, leading to misdiagnoses of conditions that are in the early stages, and treatment of the symptoms rather than treatment of the disease itself.

The findings from studies conducted from 1993 to 2003 in Sub-Saharan Africa (Whiting, Hayes, & Unwin, 2003), particularly in South Africa, on the healthcare services for diabetes highlights challenges, such as:

- Patient's clinic visits are infrequent;
- Consultation times are short;
- Staffing levels are inadequate; and staff's knowledge is inappropriately used;
- Staff are poorly or inadequately trained, or both; and no continuous training programs exist;
- Monitoring and evaluation of the complications of diabetes are lacking;
- Referral systems are non-existent;
- And many more.

The challenges 10 years after that study are very similar (Goudge, Gilson, Russel, Gumede, & Mills, 2009; Levitt, Krisela, Dave, & Bradshaw, 2011):

- Limited access to trained healthcare practitioners;
- Support from community healthcare workers for patients with non-communicable diseases is seldom available;
- Shortages of required medication often prevail;
- Complications of the disease are often not sought – only the current symptoms are treated;
- Continuity of care is lacking.

The conditions of people with diabetes can be improved through regular self-monitoring of patients, improvement and monitoring of the healthcare provided, education on healthy lifestyles, as well as education on the importance of adherence to the management of the disease (Brown M. A., 2015; Goedecke, Jennings, & Lambert, 2014; IDF: Global Guidelines for Type 2 Diabetes, 2012).

According to Kahn (Kahn, Yang, & Kahn, 2010), the dual burden of disease in developing countries is crippling the healthcare sector, as well as the economy of developing countries. Non-communicable diseases require special care strategies and complex solutions, such as (Kahn, Yang, & Kahn, 2010):

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- Early, broad-based community interventions due to the long dormancy period of chronic illness;

- Behavioural and lifestyle changes;

- Complex strategies with multiple and ongoing care;

- Chronic medication, which has cost implications, as well as self-care requirements.

These strategies could benefit from the use of ICT; as this technology can be accessed over large geographical areas; and educational or relevant text messages can be sent to encourage lifestyle changes; the internet can be accessed for health tips and advice; emails can be used to strengthen communication and help with continuous interaction; and reminders can be sent for prescription renewals and the collection of medicines (Kahn, Yang, & Kahn, 2010).

The financial implications of the use of technology in healthcare have also been carefully studied; as initial indications were that this would not be viable, due to the high cost of the technology involved (Istepanian, Jovanov, & Zhang, 2004). However, the cost of technology has decreased over the years, making devices, such as cell phones, affordable – even to the poorest (GSMA, 2012). A study conducted by IOPA (2004) on patient-centred care indicated that there are many barriers that need to be overcome – particularly in developing countries.

1.3.2   Problem statement

From the literature studies conducted, it was found that the monitoring and management of diabetes is a complex task; and it fails for many reasons (Brown M. A., 2015; Mayosi, et al., 2009). The implementation of the national diabetes guidelines faces many barriers (Mayosi, et al., 2009). ICT initiatives that have been implemented are successful on small pilot studies only; and they never grow, due to the lack of a strategy that could guide and support the project on a bigger scale (Istepanian, m-health: a decade of evolution and impact on services and global health, 2014). Studies done in 2003 by Bauman et al. (IAPO, 2004) indicated that patient-centred care leads to patient satisfaction, engagement and task orientation, quality of life, a reduction in anxiety, and increased doctor satisfaction and efficiency, leading to fewer referrals and less clinical tests.

Based on this, the problem statement for this research is as follows:

There is the lack of an ICT Strategy to Support a Patient-centred Approach to Diabetes Care.

1.4 Research Questions

1.4.1 Main research question

> What are the requirements of an ICT strategy for the support of a patient-centred approach to the care of diabetic patients?

1.4.2 Sub-research questions

1. What is diabetes and what are the requirements for diabetes care?
2. What are the requirements for patient-centred care?
3. How is diabetes treatment currently supported?

1.5 Relevance and Scope of Research

The research focuses on one non-communicable chronic disease, namely, Diabetes Mellitus Type 2. The research is confined to the Eastern Cape; and it is conducted in collaboration with various medical professionals in the diabetes field, as well as support staff involved in diabetes care. The study focuses on the care required by diabetic patients in all areas of the healthcare system. The treatment for people with diabetes should be the same – irrespective of whether they are in the public or private healthcare sector.

Having said that, the setting for the evaluation of the strategy is in the public sector. This sector is where the low-income earners find themselves; people with diabetes in the public health sector experience more barriers to ICT access than those in the private sector. The reason for basing the study in the public sector is also to address bettering the needs of the majority of the population with regard to diabetes care.

The relevance of this research to the general population is to assist people with diabetes, in particular low-income earners, who have difficulty in accessing healthcare. The research strives to find solutions to the problems that this income bracket experiences in managing and controlling, as well as preventing, diabetes by finding innovative methods of using ICT to help them cope with their illness. Furthermore, it should serve as a guide that can be implemented in public and private care to improve the adherence to treatment plans for people with diabetes.

For the purpose of ethical clearance, the researcher consulted with the ethics committee of the Nelson Mandela Metropolitan University (NMMU), in order to receive ethical clearance for

this study. Further details about this are given in section 2.9. The relevant documentation is attached as Appendix B.

The study is conducted through interviews with experts in the field; and only data relevant to this study is used. At no time, was the personal or private information of the participants revealed; the data is strictly of a qualitative nature; and no personal information is divulged.

1.6 The Research Process

This study follows the Design-Science Research Strategy.

1.6.1 Research philosophy

All research follows the same path: A topic is identified; a literature review is conducted; the questions to be answered are carefully planned; and the research method(s) to be used to achieve the objectives is decided upon before implementing the methodology; and then, lastly, the writing up of the findings is presented in a detailed report (Yin, 1987).

A research philosophy is the development of one's knowledge in a particular field, and the way in which this shapes one's questions, assumptions and findings in that field (Saunders, Lewis, & Thornhill, 2012).

This study follows interpretivism; as this allows the researcher to conduct research amongst people, and bear in mind their role as social actors. The role of the people participating in the research partly determines how the envisaged strategy would have to look, in order for it to be successfully implemented by these participants.

An in-depth literature review is done, in order to understand the disease, and how it is currently monitored and managed. Interviews are conducted in conjunction with diabetes experts, in order to obtain an understanding of how diabetes is experienced by people with the disease, as well as, how it is monitored and managed by healthcare practitioners and patients. This is used to create the outline for the educational content required in the strategy, in order to support the management and adherence aspects of diabetes; thus, the qualitative approach is used.

1.6.2 Research design

The research design is the plan that the researcher follows, in order to generate answers to the research questions that are identified. This plan contains the questions that must be answered, who provides the data required, how the data is collected and analysed, what ethical issues

are to be considered when collecting the data, and what possible problems one may encounter in the process (Saunders, Lewis, & Thornhill, 2012).

There are various methods whereby one can conduct social science research. These include: Case studies, surveys, experiments, the analysis of the archived information, and many others (Yin, 1987).

Design Science (DS) is a research paradigm that is suited for engineering, architecture, arts and other design-oriented fields. This study provides a suggested solution to a real-world problem; and consequently, it is very well suited to Design-Science Research (Indulska & Recker, 2008). This study follows the Design-Science Research (DSR) paradigm and adhere to the seven guidelines, as defined by Hevner (Hevner & Chatterjee, 2010).

According to the design-science framework, a study has to be relevant to the needs of a specific environment, whilst developing a solution that is based on sound theoretical and practical foundations. The research is in line with these requirements; and therefore, the researcher follows the design-science methodology in the quest to solve the problem of the lack of a strategy, to support a patient-centred approach to diabetes, via an ICT solution.

1.6.3   Research strategy, data collection and analysis

A strategy is the implementation of a plan to achieve a previously identified goal (Saunders, Lewis, & Thornhill, 2012). Design science involves a laborious process that involves creating an artefact to solve a previously identified problem, to make a contribution to research, to evaluate the designs, and to inform the people involved of the results (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007 - 2008). The strategy to produce an artefact follows the design-science framework.

To produce the artefact, a study of the relevance is done through interviews with diabetes experts in the private and public healthcare sectors of Port Elizabeth. The data is collected to analyse the problems experienced by patients, as well as the healthcare practitioners. The interviews focus on the knowledge patients have about diabetes, as well as the access to healthcare for people with diabetes. A sound knowledge base is built through the studying of literature studies of previously implemented projects attempting to manage and prevent diabetes. The use of mobile devices in healthcare, as well as the structures that are in place to support mobile health, are investigated, to determine whether an ICT solution using technology is viable. Furthermore, the healthcare infrastructure itself, particularly at the

point-of-service for diabetes patients, is evaluated to determine where the artefact being developed would have the largest positive impact.

With all the data collected and analysed, and with a sound knowledge base, the researcher developes a strategy that is used to monitor and manage diabetes in a local community clinic setting more effectively. This strategy can be replicated amongst many communities, clinics and hospitals; and it should assist in reversing the prevalence of diabetes in South Africa.

1.7   Proposed Chapter Outline

The chapters that are envisaged to form part of this thesis are:

Chapter 1: Introduction – This covers the motivation and relevance of the study.

Chapter 2: The research methodology – The researcher's philosophy and methods are outlined here. The data-collection process is also outlined; and a motivation is provided for design science and its suitability for this study.

Chapter 3: The diabetes landscape – This chapter covers the literature review conducted with regard to Diabetes Type 2; and how it is supported in SA. The requirements for diabetes care are also outlined here.

Chapter 4: A Review of patient-centred care – This chapter investigates the requirements for patient-centred care. This is to ensure that the requirements for patient-centred care form part of the diabetes care outcomes of this strategy.

Chapter 5: The use of ICT for diabetes care - This chapter presents evidence on the current use of ICT strategies in healthcare, as well as the successes and failures.

Chapter 6: Theoretical foundation of strategy formulation - The components of a strategy are discussed and the strategy-formulation process for this study is outlined.

Chapter 7: Data collection and presentation - The data-collection process is described in this chapter. This includes the interviews, as well as environmental assessment. The raw data are presented in this chapter.

Chapter 8: Data Analysis and findings - The data analysis is shown in this chapter; and the findings of the literature reviews, the interviews and the environmental assessment are combined in this chapter.

Chapter 9: ICT strategy formulation - The strategy formulation is provided in this chapter. The sub-objectives, guiding policies and action plans are also presented here.

Chapter 10: Applicability of strategy - The strategy implementation is presented by means of a scenario and the requirements for evaluating the strategy implementation are presented.

<u>Chapter 11:</u> Conclusions and reflections - The study's conclusions are drawn here; and a reflection on the research, as well as possible future research, is highlighted in this final chapter.

The chapter layout for this thesis is illustrated in Figure 1-1.
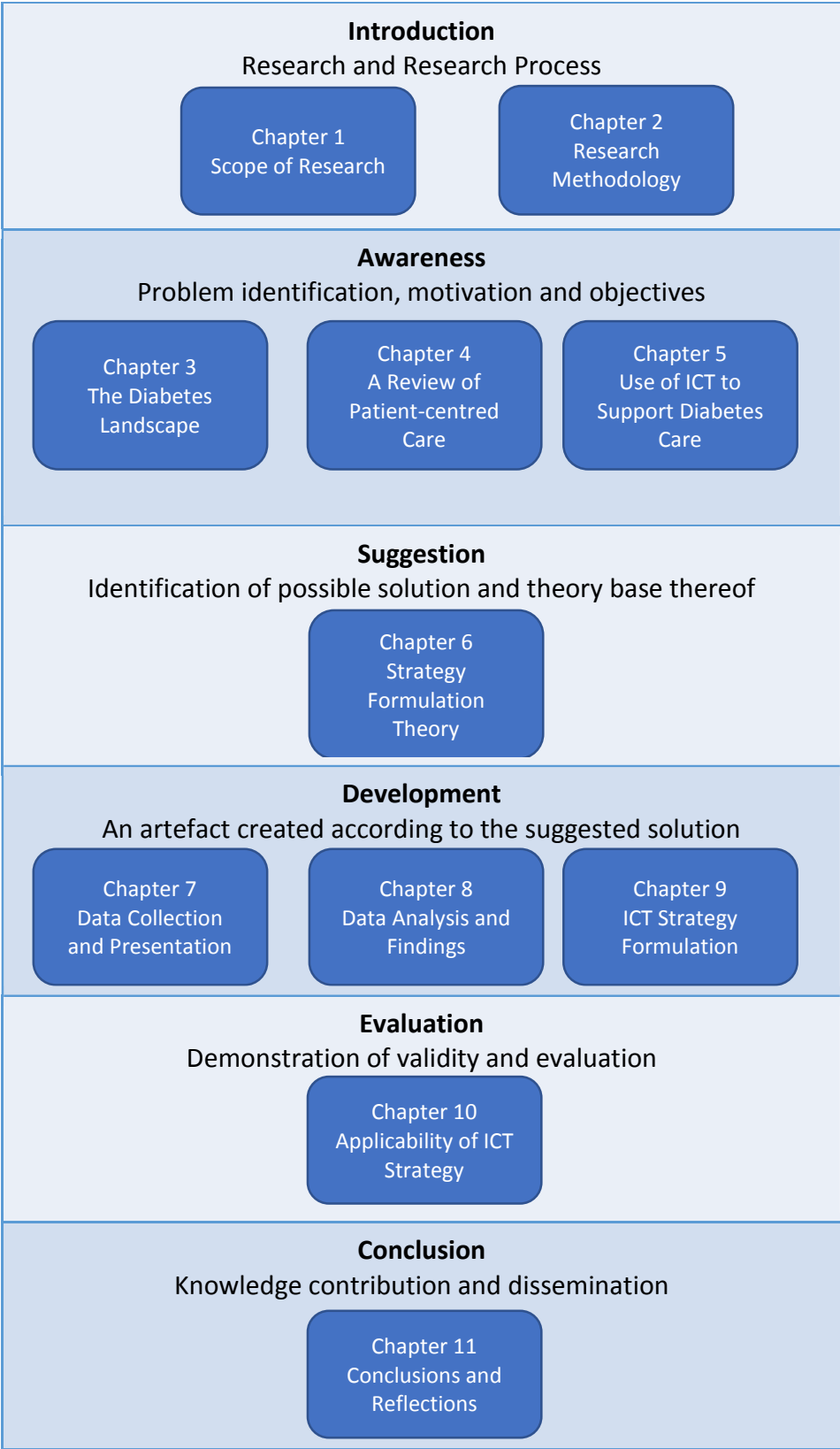
Figure 1-1: Thesis Chapter Layout

2   The Research Methodology

Introduction	
Introduction	
Research and Research Process	
Chapter 1	Chapter 2
Scope of Research	Research Methodology

Awareness
Problem identification, motivation and objectives

Chapter 3	Chapter 4	Chapter 5
The Diabetes Landscape	A Review of Patient-centred Care	Use of ICT to Support Diabetes Care

Suggestion
Identification of possible solution and theory base thereof

Chapter 6
Strategy Formulation Theory

Development
An artefact created according to the suggested solution

Chapter 7	Chapter 8	Chapter 9
Data Collection and Presentation	Data Analysis and Findings	ICT Strategy Formulation

Evaluation
Demonstration of validity and evaluation

Chapter 10
Applicability of ICT Strategy

Conclusion
Knowledge contribution and dissemination

Chapter 11
Conclusions and Reflections

Chapter 2
Research Methodology

2.1   Introduction
2.2   Research Paradigms and Philosophical Assumptions
2.2.1   Philosophical assumptions
2.2.2   The research paradigms
2.2.3   Research paradigms and philosophies' assumptions applicable to this study
2.3   Research Strategies
2.4   A General Overview of the Design-Science Research Strategy
2.4.1   Design-science research products
2.4.2   Knowledge-building and the cognitive processes in design-science research
2.4.3   The DSR process by Peffers et al., 2008
2.4.4   The DSR process by Vaishnavi and Keuchler
2.4.5   Artefact evaluation in DSR

2.5   The Design-Science Research-Strategy Mapped to this Study
2.5.1   Chapter mapping of this study to DSR
2.6   Methods of Data Collection and Analysis
2.7   Methods of evaluation of the

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2.1 Introduction

According to Yin (1987), all research follows the same path, namely, the identification of a topic to study, or a problem to solve, and conducting the literature review, in order to build the researcher's knowledge about that topic. This is followed by carefully planning the questions to be answered and the objectives of the study. Thereafter, deciding which research methods to use to achieve these objectives and implementing the methodology, follows. The research is concluded with the last step, namely, the writing up of the findings in a report.

In this chapter, the choice of research methods is discussed. These methods are used to achieve the objectives of this study, namely, designing an ICT strategy to support patient-centred diabetes care. The process taken to ensure credible results is discussed.

In this chapter, section 2.2 looks at general research paradigms and philosophies. In section 2.3, an overview of the general research strategies is presented; while section 2.4 discusses the various design science research (DSR) strategies. Section 2.5 presents the DSR suited for this study. Section 2.6 presents the methods of data collection and analysis; whilst section 2.7 presents the methods of evaluation. The ethical considerations for this study are discussed in section 2.8. The chapter concludes with a summary in section 2.9.

2.2 Research Paradigms and Philosophical Assumptions

Creswell and Plano Clark (2011) state that Thomas Kuhn first defined the term paradigm in 1970, as a set of generalisations, beliefs and values of a community of specialists. This definition today is synonymous with the term "worldview" (Creswell & Plano Clark, 2011). Research paradigms are shaped by the assumptions of the researchers about the reality encountered during the research (Saunders, Lewis, & Thornhill, 2012). These assumptions are the philosophy adopted by the researcher and the way the researcher sees the world. This relates to the development of knowledge and the nature of that knowledge.

2.2.1 Philosophical assumptions

There are four philosophical assumptions that can influence how researchers conduct their research, namely, (Creswell & Plano Clark, 2011; Vaishnavi & Keuchler, 2013):

1. *Ontological assumptions* that refer to the nature, or the understanding of reality;
2. *Epistemological assumptions* that refer to the nature of the knowledge, or the ways of exploring knowledge;

3. *Axiological assumptions* that refer to the role of values in the study; and these values would be ethics and aesthetics;

4. *Methodological assumptions* that refer to the process of the research and comprise the general strategy or methods used to undertake the research project.

2.2.2 The research paradigms

The main paradigms that have been identified over the years that are used in research are defined in the literature as follows (Creswell & Plano Clark, 2011; Vaishnavi & Keuchler, 2013):

1. *The Positivist paradigm* that infers that there is one single reality only; and this is used mainly in quantitative approaches. This means that only observable data are analysed; and no consideration is given to values or emotions. Scientific experiments and the evaluation of hypotheses fit into this paradigm.

2. *The Interpretive paradigm* that infers that there are multiple realities that are founded on the subjective views of the participants; and as such, they are shaped by one's social interactions. Interpretivism takes the world's views into account; and it assumes that every person has an experience, belief, attitude and set of values that must be considered, when conducting research.

3. *The Realist paradigm* that lends itself to scientific research. It lies midway between positivism and interpretivism – in the sense that researchers with this philosophy acknowledge that human factors could influence the behaviour of entities; and they then need to expose those factors.

4. *The Pragmatic paradigm* that has a mixed-views approach, and is set in making things work practically. The focus here is on the consequences of the research, rather than on the methods. This paradigm uses mixed methods to obtain and analyse the data. Design science has its roots in the pragmatic paradigm; as its reality must be practical and suited to multiple worlds – and most of all, it is socio-technologically enabling.

2.2.3 Research paradigms and philosophies' assumptions applicable to this study

The ontological perspective of this thesis is that of understanding a reality in context, through an interpretation of those population views that are dynamic; as they are influenced by contexts in time. Ontological multiple realities in context, which are socially constructed and dynamic, exist according to the experiences of the person with diabetes, the cultural traditions

and customs, as well as the particular point of service for the diabetic's care. This study does not use positivism; as there are no fixed realities that are precisely measurable. Design Science and interpretivism offer multiple realities. They differ in that interpretivism offers dynamic realities; whilst design science offers multiple static views of reality that are socio-technology enabled.

The epistemological point of this research is subjective; as it depends on the person with diabetes and the particular healthcare practitioner's use of technology. Methodologically, the data are collected and analysed qualitatively through in-context semi-structured interviews. An artefact is built through reflection.

From an axiological point of view, design-science research creates utility and understanding; while interpretivism offers a contextual understanding. Table 2-1 summarises the paradigms and philosophical assumptions that are most suited to the field of Information Systems. Each element was considered and compared to the needs of this study. The highlighted blocks are the ones that are best suited.

Table 2-1 Philosophical assumptions and Research paradigms Source: (Vaishnavi & Keuchler, 2013; Creswell & Plano Clark, 2011)

	Positivism: Highly Structured Methodology	**Interpretivism:** Researcher must understand the role of the human	**Realism:**	**Design Science:** Must be practical
Ontology: the nature of reality	Single reality, probabilistic, external and independent of social factors	Socially constructed, subjective, may change, multiple realities	Real existence	Multiple realities, contextually situated alternative world-states, Socio-technologically enabled
Epistemology: what constitutes acceptable knowledge	Objective, focus on law-like generalizations, detached observer	Subjective meanings and social phenomena, focus on details, reality and subjective motivations	Knowledge can be acquired scientifically	Knowing through making, construction within context, iterative circumscription
Axiology: the role of values in research	Value- free way, prediction, objective stance is held	Value bound, researcher is part of study and subjective	Hidden social facts influence behaviour	Control, creation, progress, understanding
Methodology: the process of research	Highly structured, large samples, quantitative, statistical	Small samples, in depth investigations, qualitative		Developmental, measure impacts of artefact

In the next section, the various approaches to developing the theory of the study are looked at.

2.3 Research Strategies

Following a research strategy means that there is a plan-of-action in place that is followed to achieve a goal or answer the research questions (Saunders, Lewis, & Thornhill, 2012; Yin, 1987). The type of strategy to employ depends on the research questions asked, the extent of control that the researcher has over events, and the degree of focus on current, as opposed to historical events (Yin, 1987). There are various strategies with which one can conduct social-science research. Case studies, focus groups, ethnography, action research, documents and artefacts (design science) are usually employed in qualitative studies that are more inclined towards the interpretivist approach (Saunders, Lewis, & Thornhill, 2012; Hevner & Chatterjee, 2010). Experiments, testing, modelling and simulation, as well as theorem proving are more qualitative and positivist (Vaishnavi & Keuchler, 2013; Creswell & Plano Clark, 2011).

Observation and surveys can be used in most types of research approaches (Creswell & Plano Clark, 2011). This study has employed design and creation, thus design science, to produce a strategy. This research is multi-disciplinary in nature; and therefore it uses literature reviews, semi-structured interviews and generalisation to gain an understanding of the phenomenon in context.

The main objective of this research is to design an ICT strategy; this incorporates design-science research (DSR), or creation and design, as DSR focuses on the production of artefacts. DSR is a problem-solving strategy aimed at building and evaluating artefacts to address real-life situations (Hevner & Chatterjee, 2010).

The next section presents the design-science research as a strategy; and it shows how it fits in with this study.

2.4 A General Overview of the Design-Science Research Strategy

Design-science research was propelled to the fore in information systems (IS) research through a paper written by Hevner et al. in 2004. Since then, there have been many discussions and much controversy surrounding this strategy (Hevner & Chatterjee, 2010; Indulska & Recker, 2008). Many studies have since shown that this is indeed a research strategy that is suited to IS research (Gregor & Hevner, 2013).

Design-science research involves the creation of artefacts to solve real-world problems through knowledge building, as well as the analysis of the use and impact of the artefact, in

order to understand better a specific aspect of information systems (March & Smith, 1995; Vaishnavi & Keuchler, 2013). It provides a knowledge contribution in the form of Invention, Improvement, Routine Design and Expectation (Gregor & Hevner, 2013).

As seen in section 2.2.3, design science is a paradigm that comprises the design of original or inventive artefacts, and the study of the usage of artefacts to enhance and understand the socio-technological context. DSR is an additional way of complementing the positivist and interpretivist philosophies for conducting research in IS (Vaishnavi & Keuchler, 2013). DSR can be either a paradigm or a research approach.

Hevner presented seven guidelines that provide best-practice principles for conducting research within a specific domain. These guidelines are illustrated in Table 2-2:

Table 2-2 DSR guidelines Source: (Hevner & Chatterjee, 2010)

Guideline	Description
Guideline 1: Design as an Artefact	DSR creates innovative, purposeful artefacts.
Guideline 2: Problem Relevance	Develop domain specific technology-based solutions to address identified problems.
Guideline 3: Design Evaluation	To demonstrate rigorously the utility, quality, and efficiency of a design artifact using well-executed evaluation methods.
Guideline 4: Research Contributions	DSR must deliver clear and verifiable, novel and innovative contributions effectively in areas of the design artifact, design foundations, and/or design methodologies.
Guideline 5: Research Rigor	DSR relies upon the application of rigorous methods in both the building and evaluation of the artefact. The artefact must be rigorously defined, formally presented, coherent, and internally consistent.
Guideline 6: Design as a Research Process	The search for an effective artefact requires using available resources to get the desired results, while satisfying the laws in the problem environment.
Guideline 7: Communication of Research	DSR must be published effectively both to technology-oriented as well as management-oriented audiences.

There are multiple-design science-research (DSR) strategies that have been developed since the early 1990s. The notable ones are those developed by Vaishnavi & Keuchler, 2004, Hefner at al. 2004; Peffers, Tuunanem, Rotherberger & Chatterjee, 2008; and Jabardeen 2009.

In the following sections, the various outputs that could be produced through DSR are discussed.

2.4.1 Design-science research products

Designing artefacts is an activity that has taken place for many centuries. These artefacts were not only found in the scientific environment, but also in the day-to-day activities of many populations. In this thesis, the term artefact refers to an artificial product produced as a result of acquired knowledge through research, with the aim of improving a real-world situation. This artefact creation, which is the output of the study, is termed "the science of the artificial" (Simon, 1996).

Outputs produced through DSR can take on different forms (Vaishnavi & Keuchler, 2013; Hevner & Chatterjee, 2010; March & Smith, 1995):

- *Constructs:* These refer to the language and vocabulary used in a specific domain. These constructs define the terms used when describing and thinking about the various tasks, such as entities, attributes and relationships. These constructs are developed and change; as the research process progresses.
- *Models:* These refer to the statements explaining the relationship between constructs, or simply an explanation of how things are. The purpose or use of the model is important in design-science research.
- *Methods:* These refer to the set of steps required to perform a certain task; and they are often used in transition from one model to another in the course of problem solving. In design science, the method can often be the object of the study.
- *Instantiation:* This is the realisation of an artefact in the environment, for which it was created. DSR is pro-active in nature; and thus, the instances often precede the complete articulation vocabulary and the model it embodies.
- *Better theories:* These have a two-pronged effect, namely, that the building of an artefact can be an experimental demonstration of a method; and the theoretical value an artefact can bring, be it successful or unsuccessful in its application, has a huge value in DSR.

Vaishnavi and Keuchler (2015) further improved their initial theories and added frameworks, architectures, design principles and design theories to the list of possible outcomes of DSR.

2.4.2 Knowledge-building and the cognitive processes in design-science research

Knowledge is generated and accumulated through action; and then judging the impact of the action. This then gives new insights and the action can be adjusted and repeated, until a satisfactory outcome is achieved. The cognitive processes that can be employed are

abduction, deduction, induction, reflection and abstraction (Vaishnavi & Keuchler, 2013; Saunders, Lewis, & Thornhill, 2012).

- *Abduction* is the use of existing knowledge to suggest a solution to a problem. The existing knowledge may not be complete; but it yields enough information for an initial attempt at the solution.
- *Deduction* takes place when the researcher tests generalised ideas or theories, and then comes up with a specific idea or theory that is an improvement on the original.
- *Induction* is the use of qualitative data to create a conceptual strategy through known premises.
- *Reflection* allows the researcher time to review, rethink and learn from the iterative processes in the progression of the research.
- *Abstraction* is the result of reflection. This means that reflecting on an artefact and its impact, leads to a conclusion that furthers the knowledge contribution in the study.

2.4.3   The DSR process by Peffers et al., 2008

Peffers (Peffers, K; Tuunanen, T; Gengler, C. E; Rossi, M; Hui, W; Virtanen, V; Bragge, J, 2006) used the literature of previous methodologies to derive this DSR. Some literature studies that influenced this process were those of Nunamaker et al. (1991), Rossi and Stein (2003) and Hevner et al. (2004).

This DSR process consists of six steps:

1. *Problem identification and motivation* involves the definition of a specific research problem, as well as justifying the value of the solution. It is important in this step to know the problem and the importance of its solution.
2. *The objectives of the solution* are defined by looking at the problem and the success of current solutions to the problem. The objectives can be quantitative or qualitative, and would be prescribed by the objectives of the solution.
3. *Design and development* are concerned with the actual creation or invention of the artificial solution to the problem. This would require knowledge of the artefact's functionality, its composition and structure, in order to move from the objectives of the study to the design and development of the solution.
4. *Demonstration* involves experimentation, simulation, proof, or other appropriate activity to use the artefact, in order to demonstrate its usefulness.

5. *Evaluation* is the observation and measurement of the artefact with respect to how well it supports the solution to the problem. This evaluation can include quantitative performance measures, client feedback or simulations. The outcome of the evaluation determines whether there is a need to do an iteration of the design and development of the artefact, or whether improvement to this should rather be left for a further project.

6. *Communication* is the step that summarises the study. The researcher communicates the problem, the suggested solutions and the outcomes of the demonstration(s) and evaluation(s) to other researchers and other stakeholders, if need be.

These steps are structured in nominal sequential order; however, the researcher may choose not to conduct the steps sequentially, and rather to enter the research process at any step that is seen to be appropriate. Entry points would depend on the researcher's view and knowledge at the onset of the study; and these could be:

- *Problem-centred,* where the observation of a problem or the outputs of a previous study showed the need for a solution to be developed.

- *Objective centred,* where previous experiments and experience showed that solutions fell short of the hopes of the client.

- *Design and development,* where an artefact may not have been thoroughly thought through; or it has been implemented in another research domain.

- *Observation* of a practical solution that was successful results in a "backward" approach to designing a solution.

Figure 2-1 illustrates the Peffers' Design-Science Research process; and it is clear that there are multiple points of entry to a research project.
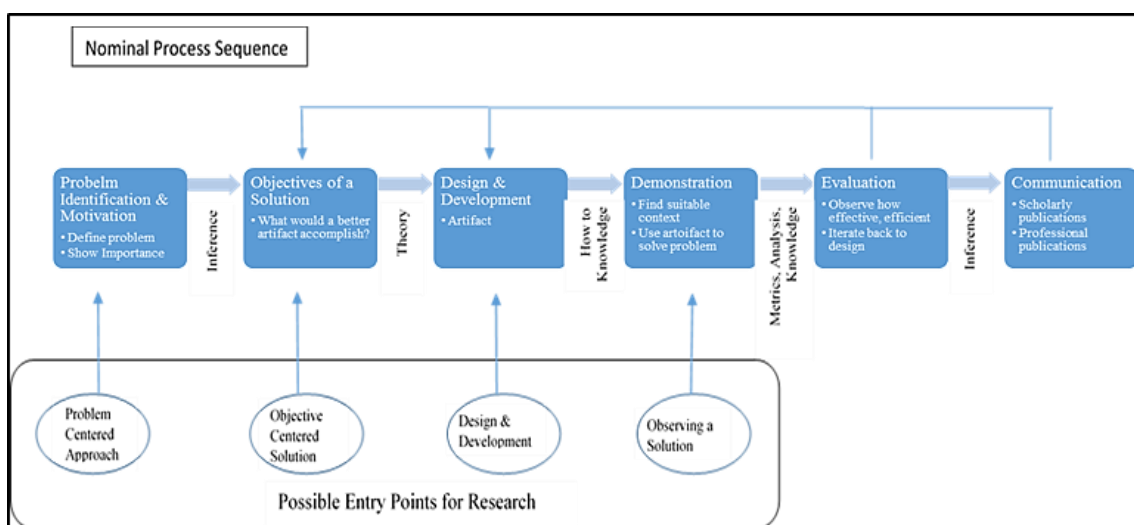
Figure 2-1 Peffers' DSR Source: (Peffers, et al., 2006)

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2.4.4 The DSR process by Vaishnavi and Keuchler

In 2013, Vaishnavi and Keuchler undertook further investigations into the DSR methodology; and they devised an alternate to Peffers' DSR process. The DSR methodology relies heavily on the knowledge contribution aspect. The fact that this knowledge contribution is the key focus in DSR is what makes it so different from the original model. This DSR methodology consists of five phases:

1. *Awareness of a problem* can come from many sources, including new developments in industry, the emergence of a new field of study, or an observation of a situation in a specific area or community. This awareness leads to a formal or informal proposal for a new research effort.

2. *Suggestion* follows awareness; since a tentative design must be made, based on the proposal of a possible solution to the problem. This tentative design phase is the creative phase of the research process; and it requires investing a considerable amount of effort in understanding the problem and the functionality of the output that resolves the problem, or changes the situation. It could even result in these findings leading to the halting or setting aside of further research on the idea.

3. *Development* is where the design is realised; once the artefact is developed and implemented. This artefact could take on many forms, such as software development, or the development of an algorithm to construct a formal prototype. The novelty is in the design of the artefact and in its functionality.

4. *Evaluation* uses criteria that have been explicitly laid out in the problem-awareness stage to hypothesise on the behaviour of the artefact and its impact on the environment in which it functions. This evaluation leads to a further knowledge contribution that is used as an input into another round of suggestion, hence the circumscription. The next round of suggestions now starts with new information and the limitations of the previous version of the artefact are noted. The next development cycle can then yield an improved artefact.

5. *Conclusion* could refer to the end of the research or the end of this particular cycle, where the outputs are to be used for further investigation and projects in the future. In this phase, the behaviour of the artefact is written up and the deviations due to the multiple cycles are noted. The knowledge gained through this process could be said to be facts that have been learned and can be re-applied; or it could be behaviour that can be repeatedly invoked. This would mean the knowledge gained is "firm". Where the

knowledge gained shows anomalies in behaviour that cannot be explained and needs further investigation; the knowledge is said to have "loose ends". The researcher must share the knowledge learnt and contribute to the knowledge base by writing up all the findings and sharing the research with other researchers in the field of study.

In Figure 2-2, the DSR methodology, as described by Vaishnavi and Keuchler and the knowledge contribution factor is clearly indicated (2013).
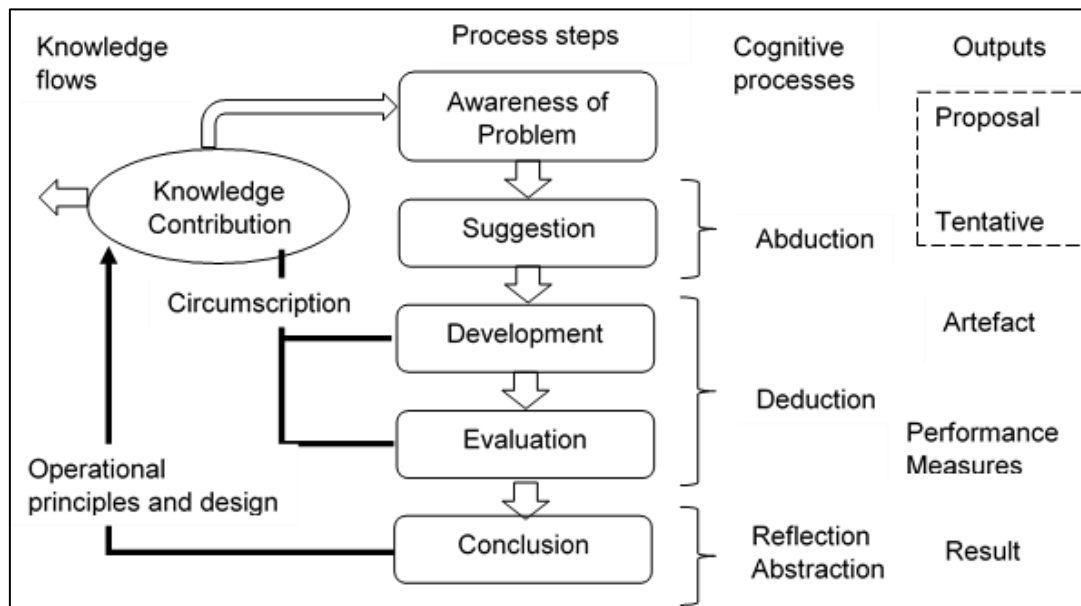
Figure 2-2 DSR as defined by Vaishnavi & Keuchler Source: (2013)

Upon comparing the DSR methodology of Vaishnavi and Keuchler to that of the DSR process model of Peffers et al., it is clear that they are very similar. Vaishnavi and Keuchler had combined the first two phases defined by Peffers, namely: i) The identification of the problem and the motivation of the study; and ii) the definition of the objectives of the solution, into one phase, which is the awareness phase. The demonstration and evaluation phase form the evaluation phase of Vaishnavi and Kuechler's methodology; and lastly, the conclusion phase is renamed as the communication phase.

All the presented DSR methodologies or processes emphasise the importance of evaluation; hence, it is presented in the next section.

2.4.5 Artefact evaluation in DSR

Evaluation of the artefact is required to determine whether any progress has been made upon implementing the artefact (March & Smith, 1995). Table 2-3 is adapted from Hevner et al. (2010); and it illustrates various evaluation methods.

Table 2-3: Possible Evaluation Methods in DSR Source: (Hevner & Chatterjee, 2010)

Evaluation Method	Description	Motivation for application in this study
Observation	**Case Study:** Study artefact in business environment.	Similar frameworks were reviewed in the literature study but this strategy cannot be implemented in practice.
	Field Study: Monitor use of artefact in multiple environments.	This would take an enormous amount of time and would not be practical for the purpose of completing the study in an acceptable timeframe.
Analytical	**Static Analysis:** Examine artefact structure for static qualities (complexity).	The artefact is qualitative thus statistical analysis is not possible.
	Architecture Analysis: Study fit of artefact into a technical IS perspective.	The strategy is of theoretical nature and thus architectural analysis is not possible.
	Optimization: Demonstrate optimal properties of artefact or provide optimal bounds on artefact behaviour.	There is no optimization requirements in this study.
	Dynamic Analysis: Study artefact for dynamic attributes (performance).	There are no performance requirements in this study.
Experimental	**Controlled Experiment:** Study artefact in controlled environment for qualities (usability).	The environment that the strategy is implemented in cannot be controlled as various participants are required and their manner of interaction cannot be controlled.
	Simulation: Execute the artefact with artificial data.	No data can be produced artificially as the strategy is theoretical in nature.
Testing	**Functional Testing:** Execute artefact interface to discover failures and identify defects.	The strategy cannot be tested for functionality as it requires a technical component and that is not part of this study.
	Structural Testing: Perform coverage testing of some metric (execution paths) in the artefact's implementation.	The strategy is too abstract for structural testing.
Descriptive	**Informed Argument:** Use information from the knowledge base (relevant research) to build convincing argument for the artefact's utility	Evidence can be generated to determine the functionality of the strategy and the relevance and generalisability of it can be validated through literature as well as discussion with experts. The information from this can also be used as input to the next cycle of refinement of the strategy.
	Scenarios: Construct detailed scenarios around the artefact to demonstrate its utility.	The strategy can also be evaluated by building scenarios and allowing experts to criticise the strategy and evaluate the evidence of the output against the knowledge base and as such provide improvements and defendable generalisations that lead to the objective of the study. Due to time constraints this will not be done.

2.5 The Design-Science Research-Strategy Mapped to this Study

The DSR methodology applied to this study is that of Vaishnavi and Keuchler (2013); and it consists of five phases. The phases are: Awareness of the problem, suggestion, development, evaluation and conclusion. As discussed above, there is also rigour involved in the DSR methodology, which necessitates that some phases become iterative, in order to produce the

desired output (Vaishnavi & Keuchler, 2013). The circumscriptions and the other details required are discussed in each phase, as deemed appropriate for this study.

This research follows the following five phases, as required in the DSR methodology:

1. *Awareness of a problem:* In this phase, a wide literature study is conducted, in order to establish the underlying reasons for mHealth to be such a highly discussed topic in the diabetes community. The literature review revealed that diabetes is becoming an endemic for various reasons; and that mHealth solutions could assist in managing and monitoring patients with diabetes (Holtz & Lauckner, 2012; Kahn, Yang, & Kahn, 2010). In fact, diabetes is growing so fast that it formed one of the main parts of the United Nations (UN) high-level talks on combating NCDs (WHO, 2008). It also falls within the boundaries of the 6th Millennium Development Goal that states "combat HIV/AIDS, malaria and other diseases" (WHO, 2000). The literature review also showed that many projects are small and one-off; whilst a study is in place, and that these pilot projects never seem to be replicated, or implemented on a broader base to assist communities outside of the scope of the initial study (Istepanian, m-health: a decade of evolution and impact on services and global health, 2014). Further readings indicated that there is no strategy to assist in developing pilot projects into successful large-scale projects that can benefit a wider community and even change the landscape of diabetes in the country. In consultation with diabetes experts, it was found, amongst other things, that there is a need for closer monitoring and managing of the disease on a day-to-day basis – without the patients having to be face-to-face with the health practitioner. The literature review and discussions also show an increase in a patient-centred approach to self-care; and, as such, the researcher incorporated this as part of the study.

   The output of the problem awareness phase is formulised as:

   > There is a Lack of an ICT Strategy
   > to Support a Patient-centred Approach to Diabetes Care

   The goal of implementing the ICT strategy is to improve the situation at clinics/hospitals/point-of-care for people with diabetes.

2. *Suggestion:* Based on the literature study and the interviews held with experts, the suggestion is to develop an artefact that can help achieve the goals of the proposal.

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The proposed solution is that of a strategy that incorporates the use of ICT; while also supporting patient-centred diabetes care.

3. *Development:* This requires using the knowledge from the literature study and the interviews conducted to create the strategy. Precise and detailed descriptions of the various steps, components and actions required must be developed, in order to ensure that technology can successfully be used by diabetes patients, without losing the "human touch".

4. *Evaluation:* This phase is required to confirm the applicability of the new artifact to its purpose. This study uses descriptive evaluation by applying validation through literature, as well as the feedback by experts interviewed. The study also uses generalization through scenario building to indicate the utility of the strategy as time constraints do not allow for a longitudinal study.

5. *Conclusion:* This phase is the final phase for this research; and the strategy is considered good enough to perform its function in the context for which it was created. The knowledge gained is written up as the output of this doctoral thesis; and it is to be shared in a journal article and a conference paper.

2.5.1 Chapter mapping of this study to DSR

The research process of this study is mapped, according to Vaishnavi and Keuchler's DSR, and illustrated in Figure 2-3.
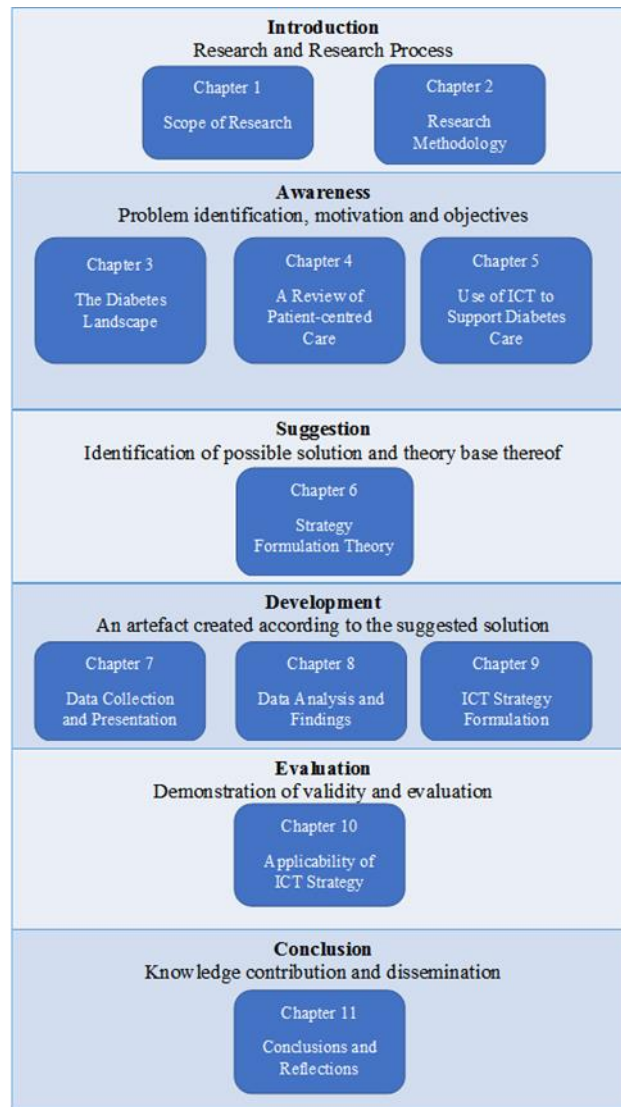
Figure 2-3 Chapter Mapping to DSR according to Vaishnavi & Keuchler

The awareness of this research comes from the upsurge in using technology in the care of people with chronic conditions, as well as an emergence in the field of healthcare relating to the high prevalence of diabetes. Diabetes is sharply on the increase; and in order to address this, it is necessary to study the diabetes landscape, in order to determine what the requirements are for diabetes; care and what other factors are causing this increase. The suggested literature review revealed multiple reasons for the increase in diabetes; but it also showed that further awareness needs to be built around the use of technology and mHealth in diabetes care. The awareness of patient-centredness was brought to the fore, when looking at diabetes care; and thus, it warranted further investigation.

The development requirements regarding diabetes are that a strategy needs to be in place, to help reduce the prevalence thereof. The awareness through literature reviews, as well as the suggestions and developments in this area are discussed in Chapter 3. Chapter 4 looks at the

awareness, as well as the suggestions and development with regard to patient-centred care. The literature reviews, suggestions and development required with regard to the use of ICT in diabetes care are discussed in Chapter 5. The requirement from the development of the ICT/mHealth research, showed that a strategy needs to be in place; and thus a further awareness topic had to be added to ensure that the components and requirements for a strategy are in place. These are discussed in Chapter 6. The awareness and suggestions are further strengthened through the data collection and the environmental assessment that are presented in Chapters 7 and 8.

The evaluation of the functionality and applicability of the strategy is done in Chapters 9 and 10; and the conclusions and communications of the research are presented in Chapter 11.

2.6 Methods of Data Collection and Analysis

In order to answer research questions; it is necessary to use various instruments to gather the data required to build the researcher's knowledge and to allow for an appropriate and educated answer to be reached. These instruments are dependent on the type of knowledge the researcher requires to answer the question; and they could be qualitative or quantitative. Quantitative data are normally measurable data that are expressed in numbers; whilst qualitative data are descriptive and expressed in everyday language (Yin, 1987). This section looks at the appropriate instruments for use in this study; and it motivates their appropriateness.

Table 2-4 Methods of data capturing   Source: (Yin, 1987)

1. Interviews		
Advantages	**Disadvantages**	**Applicability to this study**
• There is direct feedback from the respondent • Probes provide an opportunity for more information and therefore usually yield richest data, details, new insights • Allow the interviewer to clarify questions • Can use observation as another evaluation method • Allow interviewer to be flexible in administering interview to particular individuals or circumstances	• Expensive and time consuming • Interviewers must have good communication skills • Interviewee may distort information to please the interviewer • Probing for more information may lead to inconsistencies among the interviews • There is chance of an interviewer error or bias • Lots of information may be difficult to analyse	• Possible tool • Advantages outweigh disadvantages as this tool allows for direct access to highly knowledgeable participants who can assist with solving the issues faced in the real world

2. The Literature Review		
Advantages	**Disadvantages**	**Applicability to this study**
• It saves time since secondary data can readily be available on line • Provide a context for the research • Justify the research • Ensure the research hasn't been done before • Show where the research fits into the existing body of knowledge • Enable the researcher to learn from previous theory on the subject • Illustrate how the subject has been studied previously • Highlight flaws in previous research • Outline gaps in previous research • Show that the work is adding to the understanding and knowledge of the field • Help refine, refocus or even change the topic	• Data that was collected for a different purpose may be inappropriate and irrelevant during the current study • Lack of control over data quality (Saunders et al., 2009) Government and other official institutions are often give a guarantee of quality data, but it is not always the case.	• This is a very appropriate tool as data can be gathered with ease from sources from around the world as well as from all three areas that this study focusses on namely diabetes, mHealth and patient-centred guidelines • This builds the knowledge of the researcher to ensure that a thorough understanding of the field is obtained • This ensures that a solution elsewhere does not exist and that this study is bringing new knowledge to the field

3. Expert Validation		
Advantages	**Disadvantages**	**Applicability to this study**
• They may provide new ideas and insights • They may increase the credibility of research findings and process • The use of expert reviews may allow the researcher to pursue strategies and approaches that make inherent sense for the context • Experts may make it possible for the researcher to formally or informally benchmark against other, similar systems and/or contexts.	• It is a challenge to identify reliable criteria for selecting experts to involve in the expert review process. • An expert may be working in a different environment hence diminishing the expert's observations and recommendations • Experts' subjectivity and prior experience may affect the outcome of the expert review process Soliciting insight from experts is can be expensive	• This allows for experts in the field to give input as well as evaluate the findings and make suggestions as to where the strategy can be improved throughout the design

Various methods of data collection were used in this study. The argumentative nature of this study leads to an inductive approach to research; and as such, it requires the collection of qualitative data. The understanding of diabetes, its landscape, as well as how to monitor and manage diabetic patients is needed, in order to ensure that the strategy created fulfils the requirements for these patients. A detailed description of the diabetes landscape is discussed in Chapter 3. The knowledge gained from the use of ICT in diabetes care is discussed in Chapter 4. The findings regarding a patient-centred approach to healthcare, as well as frameworks that are currently in place, helped shape the design and development of the final strategy; and these are discussed in Chapter 5. The requirements of strategy formulation are discussed in Chapter 6.

2.7   Methods of evaluation of the artefact

The purpose of the evaluation stage is to demonstrate the applicability of the developed strategy to the problem domain. The utility, quality and efficacy of the strategy is rigorously established by using well implemented evaluation methods (Hevner A. R., 2007). The strategy is evaluated against the criteria established in the awareness phase. The evaluation is discussed in Chapter 10 in the form of a scenario.

2.8   Ethical Considerations for this Study

Ethical considerations are required, in order to ensure that the study conducted does not in any way harm the participants, animals or the environment – by the collection of data, the

publication of the findings – or in any other way. It is also a way to ensure that all work done is transparent through the accessibility of the findings and that participation was conducted truthfully and voluntarily (Hofstee, 2006).

The research provided in this thesis complies with the ethics policy of the Nelson Mandela Metropolitan University (NMMU). The study included extensive investigations through literature reviews and analysis, as well as interviews with various experts in the field of healthcare.

Ethical consent is assured as the respondents were given an overview of the objectives of the study; and they then made an informed choice to voluntarily participate in the interview sessions.

The user's anonymity is secured; as the responses and the consent forms are stored separately from each other; and there is no link between the interview sheet and the consent form. No personal information was gathered; and thus, the privacy of the interviewees was not violated.

The study does not involve any research on humans, animals or the environment. A copy of the NMMU ethical compliance form is attached as Appendix B.

2.9 Conclusion

Data collection methods applied to this study:

Interviews:

Interviews with experts constitute a manner of collecting the data directly from the person, who has been identified as having the required knowledge or information for the study to be conducted successfully; but also credibly (Hofstee, 2006).

Discussions were held with various experts in the healthcare field; since this was the field less familiar to the researcher, as well as the field that was crucial to the success of the strategy. The experts had to provide input to the current state-of-affairs in clinics and hospitals as pertaining to diabetic patients. These interviews also were important to highlight factors, such as the problems and needs that diabetic patients have with regard to managing and monitoring their illness. Information regarding ICT use by health carers of diabetics was also investigated. These factors must be directly addressed in the creation of the strategy.

The semi-structured interview questions are attached as Appendix C of this thesis.

Literature Reviews:

This is used to provide a theoretical basis for the researcher, as well as a survey of work done in the same field. An analysis of that work, showing any gaps, weaknesses and potential new research areas, can then be done, based on the knowledge the researcher has built up through the literature reviews (Hofstee, 2006). In design science, the literature review reveals almost simultaneously, an understanding of the phenomenon, as well as an initial design of the artefact (Vaishnavi & Keuchler, 2013). The literature review for this study included publications in two main areas, namely, healthcare and information-communication technology (ICT). The literature readings were found in newspaper articles, conference papers, journals, books and websites. Healthcare topics relevant to this study were broad-based and looked at various non-communicable diseases; but the focus was specifically on diabetes, for example, why diabetes is on the rise, what treatments and care are required for diabetes patients, as well as existing strategies aiming to assist in diabetes care. The literature review on diabetes is discussed in Chapter 3. Patient-centredness was also a topic well researched and it is discussed in Chapter 4. Various patient-centred care frameworks were compared and examples of implementation in the South African context were studied. In the field of ICT, the topics covered readings on various types of mobile strategies in a number of fields; but they focused on mobile strategies for health, specifically diabetes; and literature reviews on pilot projects that were implemented were studied, and existing frameworks using ICT strategies for health were also reviewed. The literature reviews with regard to ICT in healthcare is discussed in Chapter 5.

Expert Interviews:

Interviews with experts is a manner of collecting data directly from the person who has been identified as having the required knowledge or information, for the study to be conducted successfully, but also credibly (Hofstee, 2006). Discussions were held with various experts in the healthcare field; this was the second field in this multi-disciplinary project that was to be crucial to the success of the strategy. The experts had to provide input to the current state-of-affairs in clinics and hospitals, as pertaining to diabetic patients. These interviews also were important to highlight factors, such as the problems and needs that diabetic patients have with regard to managing and monitoring their illness. Information regarding ICT use by health carers of diabetics was also investigated. These factors must be directly addressed in the creation of the strategy.

2.10 Summary

In this chapter, the Design-Science research methodology was discussed; and the reason for using this methodology was motivated.

The research paradigms and philosophies were discussed in section 2.2 and an overview to the research strategies was given in section 2.3. The various stages of the methodology were explained; and they were also mapped to the research objectives of this study (section 2.5). The method of data gathering and the analysis of the data were further discussed in section 2.6.

It was clear in the discussions that the DSR methodology has been widely accepted for use in information systems research; and it has been refined through the years, providing guidelines and steps to be followed by the researcher, in order to ensure that the study is done scientifically and yields credible results.

The methodology followed raised awareness, as the research progressed, of the various areas that need to be investigated, in order to achieve the final strategy. These areas include studying the diabetes landscape and the special needs of diabetics, the use of ICT in healthcare, as well as a patient-centred approach to healthcare. Each one of these "awareness areas" is discussed in the chapters to follow. The first is the diabetes landscape, which is discussed in Chapter 3.

3 The Diabetes Landscape

Introduction
Research and Research Process

Chapter 1 — Scope of Research

Chapter 2 — Research Methodology

Awareness
Problem identification, motivation and objectives

Chapter 3 — The Diabetes Landscape

Chapter 4 — A Review of Patient-centred Care

Chapter 5 — Use of ICT to Support Diabetes Care

Suggestion
Identification of possible solution and theory base thereof

Chapter 6 — Strategy Formulation Theory

Development
An artefact created according to the suggested solution

Chapter 7 — Data Collection and Presentation

Chapter 8 — Data Analysis and Findings

Chapter 9 — ICT Strategy Formulation

Evaluation
Demonstration of validity and evaluation

Chapter 10 — Applicability of ICT Strategy

Conclusion
Knowledge contribution and dissemination

Chapter 11 — Conclusions and Reflections

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3 The Diabetes Landscape

3.1 Introduction

3.2 Characteristics of Diabetes

3.2.1 The requirements for successful diabetes care

3.3 Diabetes in the South African Context

3.3.1 The status of diabetes in South Africa

3.3.2 How diabetes is managed in the SA public health sector and possible barriers

3.4 Conclusion

3.1 Introduction

This chapter is the first of three chapters that form part of the Awareness phase of the study, according to DSR. The focus in this chapter is on Diabetes Mellitus (DM). The characteristics of DM are discussed in section 3.2 and the status of diabetes in South AFr8ica is discussed in section 3.3. The chapter concludes with suggestions for further investigations that would lead to achieving the objectives of providing a strategy whereby diabetes patients can successfully manage their condition.

3.2 Characteristics of Diabetes

Diabetes Mellitus (DM), more commonly referred to simply as "diabetes", is a chronic metabolic disease that is characterised by an elevated blood glucose level, known as hyperglycaemia; and it is associated with an absolute or relevant deficiency in the secretion and/or action of insulin (PAHO, About Diabetes, 2012). This effectively means that the pancreas does not produce enough insulin; or the body cannot use the insulin produced effectively. (PAHO, About Diabetes, 2012).

As discussed in Chapter 1, The World Health Organisation (WHO) defines three main types of diabetes (Brown M. A., 2015; WHO, 2013):

- *Type 1 Diabetes* is when the body does not produce sufficient insulin. This is the most common type of childhood diabetes; and it is an autoimmune condition, whereby the body turns on itself and destroys the beta cells of the pancreas that produce the blood sugar-lowering hormone, insulin.

- *Type 2 Diabetes* occurs in 80% – 90% of diabetes patients; and it is caused by the body not producing insulin or being resistant to insulin. This type of diabetes is mostly preventable; and it is often associated with excess weight and an inactive lifestyle.

- *Type 3 Diabetes* is gestational in nature; and it occurs during pregnancy due to the hormonal changes in some women's bodies that affect the usage of insulin.

Table 3-1 shows some of the key characteristics of diabetes, as listed by the Centre for Diabetes and Endocrinology (CDE) (Brown M. A., 2015).

Table 3-1: Characteristics of diabetes   Source: (Brown M. A., 2015)

Diabetes Characteristic	Brief description
Common	• 8% – 10% of SA patients have diabetes
Costly	• People with diagnosed diabetes have 2.3% higher costs for care • Indirect costs, such as absenteeism, reduced productivity and premature deaths
Challenging	• People do not have a general feeling of well-being • Anxiousness over weight • Higher rates of eating disorders • Higher rates of depression
No Cure	• Currently no cure
Chronic	• Lifelong condition • Daily care and control required
Condition	• Controlled diabetes is not a disease; it is a condition • People with diabetes are well, not sick
Classification Type 2	• Complex condition • Serious condition • Progressive condition • Associated with poor diet • Associated with lack of exercise • Associated with overweight and obesity • No longer restricted to older people

The general population has various needs in terms of diabetes; and these can be split into 5 sections (Endocrine Health Network, 2008):

1. *General population*: People who are not directly affected by diabetes: The needs are to make people aware of diabetes and to promote a healthy lifestyle.

2. *High-risk population*: Early detection is beneficial to people who are at high risk; and this group requires an awareness of diabetes, as well as how to change or adapt, in order to lower the risk of progressing to full-blown diabetes.

3. *Newly diagnosed people with diabetes:* This group requires knowledge in terms of lifestyle changes that need to be addressed, as well as education on the possible complications and the need for future screening.

4. *Long-Term diabetes:* People at this stage, need to know what lifestyle changes to make to avoid complications; and they need to recognise the importance of early detection. They need to be educated about the risk of complications and the importance of adherence to treatment plans.

5. *People with complications from diabetes:* People at this stage, require education on the risk factors that could escalate the condition, resulting subsequently in acute complications.

The next section looks more closely at what the requirements are for diabetes care.

3.2.1 The requirements for successful diabetes care

In accordance with the focus of this study, this section looks at the requirements for successful diabetes care for people with Type 2 Diabetes. As indicated in the previous section, diabetes is a chronic condition for which there is no cure (Brown M. A., 2015). According to Brown (2012), the symptoms of Type 2 Diabetes are very subtle and often missed. This leads to the disease being diagnosed at a late stage, resulting in it being described as a disease of the middle-aged population group. The number of children with Type 2 Diabetes is also on the increase; and it has reached alarming numbers.

According to Amod (Amod, A., Ascott-Evans, B. H., Berg, G. I., Blom, D. J., Brown, S. L., Carrihill, M. M., Dave, J.A., Distiller, L.A., 2012), a national guideline removes ignorance as a defence against lack of service delivery. Many guidelines have been developed that provide a framework for training healthcare professionals, guiding rational management decisions, and limiting wastage of scarce resources on treatments and technologies that are outdated or dangerous.

Some of the guidelines for diabetes care are listed below:

1. The 2012 SEMDSA Guideline for the Management of Type 2 Diabetes – The Society for Endocrinology, Metabolism and Diabetes of South Africa has a comprehensive guideline (2012).
2. The 2005 International Diabetes Federation (IDF) Global guideline for Type 2 Diabetes was updated in 2012 (IDF: Global Guidelines for Type 2 Diabetes, 2012).
3. American Diabetes Association (ADA) guidelines for Diabetes care (Diabetes Management Guidelines, 2015).
4. NICE clinical guideline for the management of Type 2 Diabetes (Diabetes: Guidelines, 2015).

Table 3-2 indicates that, although these guidelines differ slightly, they all have a majority of overlapping concepts.

Table 3-2 General diabetes care guidelines

	SEMSDA	IDF	NICE	ADA
Screening and diagnosis	✓	✓	✓	✓
Care delivery		✓		
Education	✓	✓	✓	
Psychological care		✓		✓
Lifestyle management	✓	✓	✓	✓
Glucose control levels	✓	✓	✓	✓
Clinical monitoring		✓		
Self-monitoring		✓		✓
Glucose control therapy		✓	✓	
Blood pressure control	✓	✓	✓	✓
Cardiovascular risk protection	✓	✓	✓	✓
Eye screening	✓	✓	✓	✓
Kidney damage	✓	✓	✓	✓
Foot care	✓	✓	✓	✓
Nerve damage	✓	✓	✓	✓
Older people	✓	✓		✓
In-patient care	✓	✓	✓	

According to the International Diabetes Federation, typical complications of diabetes include (IDF, n.d.):

- Cardiovascular disease – This the most common cause of death in people with diabetes. High blood pressure, high cholesterol, high blood glucose, and other risk factors contribute to increasing the risk of cardiovascular complications.

- Eye Disease – Consistently high levels of blood glucose, together with high blood pressure and high cholesterol levels, are the main causes of diabetic retinopathy. Blindness is a high possibility for people with uncontrolled diabetes.

- Kidney Failure – This is caused by damage to the small blood vessels in the kidneys, leading to the kidneys becoming less efficient, or to fail altogether. Kidney disease or diabetic nephropathy, is much more common in people with diabetes than in those without diabetes.

- Nerve disease – Damage to the nerves throughout the body (diabetic neuropathy) can be caused when blood glucose and blood pressure are too high. This can lead to problems with digestion, erectile dysfunction, and many more problems. The most commonly affected areas are the extremities, and in particular the feet. Nerve damage in these areas is called peripheral neuropathy; and it can lead to pain, tingling, and loss of feeling. Loss of feeling is particularly important; because it can allow injuries to go unnoticed, leading to serious infections and possible amputations. People with

diabetes carry a risk of amputation that may be more than 25 times greater than that of people without diabetes.

- Infections – People with diabetes are more prone to infections.

Brown (2015) states that diabetes is a chronic and complex condition that requires multiple strategies. One of the main aspects of diabetes care is that it relies very much on self-management and monitoring of one's condition. According to WHO, healthcare system factors that influence one's health status would include, the social and economic environment, the physical environment, and the person's individual characteristics and behaviours (WHO).

Having seen all the possible complications associated with diabetes, a reasonable conclusion would be, that in order to care for people with diabetes, complications and the risk factors that lead to these complications should also be addressed, and not only the diabetes itself. Furthermore, the complications are so varied and so unique in their manifestation, that a team of doctors and specialists would be required, and not merely one healthcare practitioner.

Dr Elliot Proctor Joslin, was the pioneer in diabetes care; and as early as the 1920s, he promoted team care and self-management as the success factors in fighting diabetes (Joslin Diabetes Center, n.d.). Many of the principles that he discovered and promoted are still in place today; and they are used by organizations, such as WHO, IDF, CDE and many others.

Table 3-3 lists some of the key factors in diabetes care that are listed on the websites of various recognised diabetes organizations.

Table 3-3: Diabetes care key factors

Care Factor	JDC[1]	WHO[2]	IDF[3]	CDE[4]	DSA[5]
1. Healthy Eating	✓	✓	✓	✓	✓
2. Being Active	✓	✓	✓	✓	✓
3. Monitoring	✓	✓	✓	✓	✓
4. Taking Medication	✓	✓	✓	✓	✓
5. Problem Solving	✓			✓	
6. Risk Reduction	✓	✓	✓	✓	✓
7. Healthy Coping	✓		✓	✓	
8. Achieve and maintain healthy body weight		✓	✓	✓	

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[1] Joslin Diabetes Centre
[2] World Health Organization
[3] International Diabetes Federation
[4] Centre for Diabetes and Endocrinology
[5] Diabetes South Africa

There is a plethora of websites providing information to people with diabetes, as well as those who are caring for and/or living with persons with diabetes. These are all useful in assisting with self-care for people with diabetes; and they are designed for diabetics. All of these websites have one basic point of departure in managing the condition, namely, getting to know more about diabetes and identifying the factors that led to the person's diabetes. Figure 3-1 and Figure 3-2 illustrate just some of the websites that were viewed, which emphasise the need to be knowledgeable about diabetes, in order to manage it correctly.
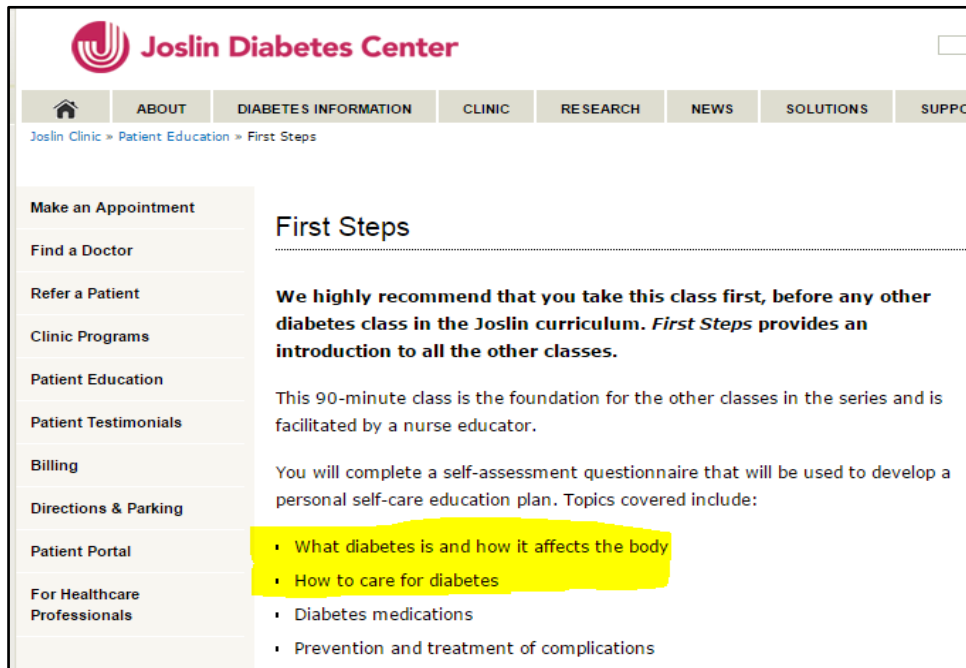
Figure 3-1 First Steps to diabetes care Source: http://www.joslin.org/care/first_steps.html
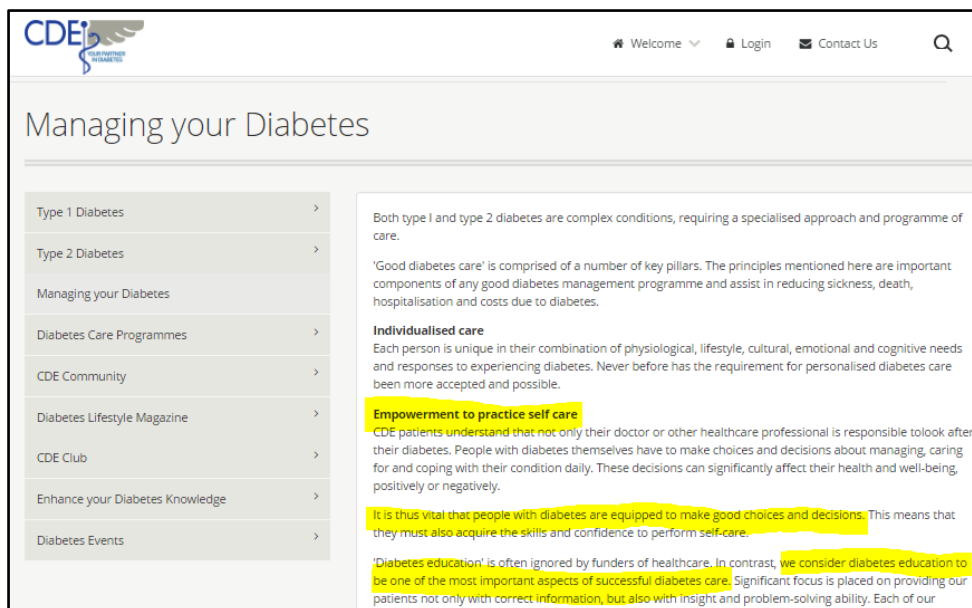
Figure 3-2 Managing your diabetes Source: http://www.cdediabetes.co.za/home/diabetes/managing-diabetes.html

It is relatively easy to navigate through the websites of choice; and a person with diabetes can have easy access to expert advice on how to live with diabetes. The websites, such as *www.onetouch.com* also sometimes offer tools for logging the various measurements required daily, such as blood glucose etc.; or alternately, they explain how to draw up a logbook. These types of education and care programs are available to people with diabetes, who have access to the internet and are educated enough to be able to find these programs and follow them with the help of their healthcare practitioners. The people with diabetes, who have low literacy levels and/or no access to the internet would not have the benefit of these websites. These are also normally the low-income earners. In the next section, the diabetes landscape in South Africa is studied, in order to find out how diabetes is currently monitored and managed.

3.3 Diabetes in the South African Context

Type 2 Diabetes is a result of poor nutritional habits and low activity levels. Amelia Waxman (2003), of WHO states that these factors are directly related to rapid urbanisation and westernisation; and that two thirds of the estimated 177 million people affected by Type 2 Diabetes live in the developing world.

In this section, diabetes in the South African context is discussed, as well as the current barriers to diabetes care in the healthcare system in South Africa.

3.3.1 The status of diabetes in South Africa

The findings from studies conducted from 1993 to 2003 by Whiting, Hayes and Unwin (2003) in Sub-Saharan Africa, particularly in South Africa, on the available healthcare services for diabetes painted a very poor picture. These studies showed that a structured organised diabetes healthcare system is lacking. Many people with diabetes are managed by traditional healthcare workers and general practitioners, who are inadequately integrated into the primary healthcare system. Many of the challenges faced by diabetes patients are related to the accessibility of healthcare facilities, as well as the procedures followed by the carers. Many procedures are still performed manually, such as the capturing of patients' data on data cards, the lack of procedures to assist in the managing of the disease when a patient is not under direct medical care.

In South Africa, there are 2.6 million people affected with diabetes; and in 2005, this was the sixth leading cause of death in South Africa; while HIV/AIDS was tenth (Rotherum-Borus, et al., 2012). South Africans not only live in a developing world; but they also have traditional

beliefs that make being overweight desirable. This is another factor causing an increase in the occurrence of diabetes (Rotherum-Borus, et al., 2012; Levitt, Krisela, Dave, & Bradshaw, 2011). According to a study conducted at the University of Witwatersrand's School of Public health (Child, 2012), South Africans are on the path of overtaking the United States in terms of obesity; and already SA has 25% of rural teenagers that are overweight, or obese. The overall prevalence of overweight and obese people in South Africa is more than 29% for men and 56% for women (Child, 2012).

Table 3-4: Obesity prevalence in SA Source: (Goedecke, Jennings, & Lambert, 2014)

Country	Sex	Age in Years						
		5-14	15-29	30-44	45-59	60-69	70-79	80+
Cameroon	M		23.7	24.4	24			
	F		24.6	24.8	25			
Ethiopia	M	14.2	17.5	18.3	18	18	17.9	19.8
	F	14.5	18.9	18.6	17.3	16.7	17.6	18.6
Gambia	M		19.6	20.5	20.9	21	20	
	F		21	21.9	21.8	21.3	20.9	
Ghana	M							
	F		21.8	22.4	21.4			
Kenya	M							
	F		21.7	22.3	22			
Malawi	M				19.8	19.8	19.7	
	F				20.5	20.5	19.6	
Mali	M		18.9	20.5	20.8	20.3	19.6	20.2
	F		19.9	21.1	20.6	20	19.5	20.8
Nigeria	M		19.8	20.9	21.5			
	F		21	21.8	20.3			
Senegal	M		18.2	19.9	21	20.7	19.8	19.2
	F		19.6	21.4	22.1	22.2	21.3	20.7
Seychelles	M		22.9	23.5	23.1	23.2		
	F		23.2	25.7	27.2	27.5		
South Africa	M	13.8	21.5	24.2	25.3	24.8	24.4	
	F	14	24.4	28.5	29.9	28.8	27.7	
Tanzania	M							
	F		21.8	22.3	21.6			
Zimbabwe	M	15.3	19.5	20.8	21	21	20.1	20
	F	15.4	21.3	23	23.5	21.8	20.5	20.3

According to Goedecke, Jennings and Lambert (2014), the first South African Demographic and Health Survey (SADHS), was undertaken in 1998, and published in 2002; and it included a sample of 13 089 South Africans aged 15-95 years old. The results highlighted the influence of age, gender and demographics, as well as ethnicity and socio-economic status, on the prevalence of obesity. As shown in Table 3-4, this is higher than many other African countries. Significant to this study is the fact that urban women were more inclined to be obese than rural women; and the fact that obesity increases with age. Both these factors, urbanization and the ageing population, are listed as factors that influence the increase in diabetes (Zhang, et al., 2010; Azevedo & Alla, 2008).

In the next section, a brief look into the SA healthcare system is taken and possible problems that exist for people with diabetes are noted.

3.3.2 How diabetes is managed in the SA public health sector and possible barriers

The Constitution of South Africa states that all the people in the country have a right to good health and access to healthcare, which means that the State has to keep working towards realising this. According to Coovadia (Coovadia, H., Jewkes, R., Barron, P., Sanders, D., McIntyre, D., 2009), even after 20 years of democracy, the healthcare sector still faces many inequalities. Amongst these are inequalities amongst race, provinces and gender that will require large amounts of money from government, for health, education and social services, before these inequalities can be reduced. The South African government is faced with challenges of equalising the imbalance of healthcare for the insured and the uninsured. This imbalance is also confirmed by the GSMA (2012).

Coovadia et al. (2009) also state that not only are the poorer people having to face a financial burden of getting healthcare; but they also face huge problems of access to healthcare. Human resources in the healthcare sector are also a huge problem – with an inadequate number of doctors and nurses in the public health sector. More than 79% of doctors work in the private sector; and there are less than 110 nurses per 100 000 patients in the public sector.

More than 50 years ago, most people with diabetes were treated in hospitals by specialists; but today, with the epidemic status of Type 2 Diabetes, the shortage of healthcare funding, and the limited resources, this specialised care is no longer possible for most people (Mbanya & Ramiaya, 2006).

According to the WHO (The determinants of health, n.d.), healthcare system factors that influence one's health status would include, the social and economic environment, the physical environment, and the person's individual characteristics and lifestyle.

In South Africa, the environment of the majority of people with diabetes face the following barriers (Azevedo & Alla, 2008; Human Science Research Council, 2013):

1. Inadequate infrastructure;
2. Irregular supply of medicine;
3. Unaffordable insulin, oral hypoglycaemic agents and anti-hypertensive medication;
4. Disproportionate distribution of healthcare facilities;
5. Lack of information and clear roles for members of diabetes healthcare teams;
6. Lack of appropriate and locally adapted diabetes education programmes for people with diabetes and healthcare professionals;
7. Lack of government support or subsidy, resulting in unaffordable costs.

Many studies have been conducted over the past decade that assess the healthcare services for diabetes, particularly in South Africa; and some of the studies' findings are listed below (Whiting, Hayes, & Unwin, 2003; Levitt, Krisela, Dave, & Bradshaw, 2011):

1. Patients' attendance is low;
2. Consultation times are short, resulting in little or no time for patient education;
3. Staffing levels are inadequate; and staff with knowledge are underutilized;
4. Staff are poorly or inadequately trained or both; and there hardly exists any continuous education;
5. Monitoring and evaluation of diabetes complications are not systematic;
6. The control of blood glucose and blood pressure is poor and inadequate;
7. Referral systems are lacking;
8. Education of people with diabetes is almost non-existent.
9. Overall organisation of the clinics is not satisfactory;
10. Record keeping is poor;
11. If treatment guidelines are available, they are hardly used and not up-to-date;
12. Often experience stock-outs of medications.

Having said this, Whiting et al. (2003), however, noted that although South Africa does have national guidelines for the treatment of diabetes, it has not made a significant difference in healthcare for people with diabetes; as it seems to have been disseminated; but it has not been adequately implemented. It is also noted that South Africa is one of the few African countries that has addressed the re-distribution of healthcare.

Azavedo (2008) and Whiting et al. (Whiting, Hayes, & Unwin, Challenges to healthcare for diabetes in Africa, 2003) state that most of the problems experienced by people with diabetes in South Africa are due to the fact that the South African healthcare system is geared to treating acute patients, rather than chronic disease patients. Chronic disease patients need regular and frequent visits to healthcare practitioners for proper monitoring and maintenance of their condition. The South African healthcare system is under huge pressure from just the acute patients; so additional visits by people with diabetes would be an added burden on the already-strained system. However, to treat successfully people with diabetes, the South African healthcare system would have to adopt a chronic-care system, in adition to the acute care system.

Asmall (2014) states that The Department of Health has a drive towards establishing "Ideal Clinics" for Integrated Care-Disease Management (ICDM) geared towards conditions, such as diabetes. The aim is to provide a much-needed service to people who have to live with long-term conditions. The SA government, in its bid to aid the reduction of non-communicable diseases launched an Integrated Chronic Disease Management Model to be implemented, in order for clinics to achieve "Ideal Clinic" status. Figure 3-3 shows the various components that play a role in chronic care; and how they relate to each other through various activities and outcomes.
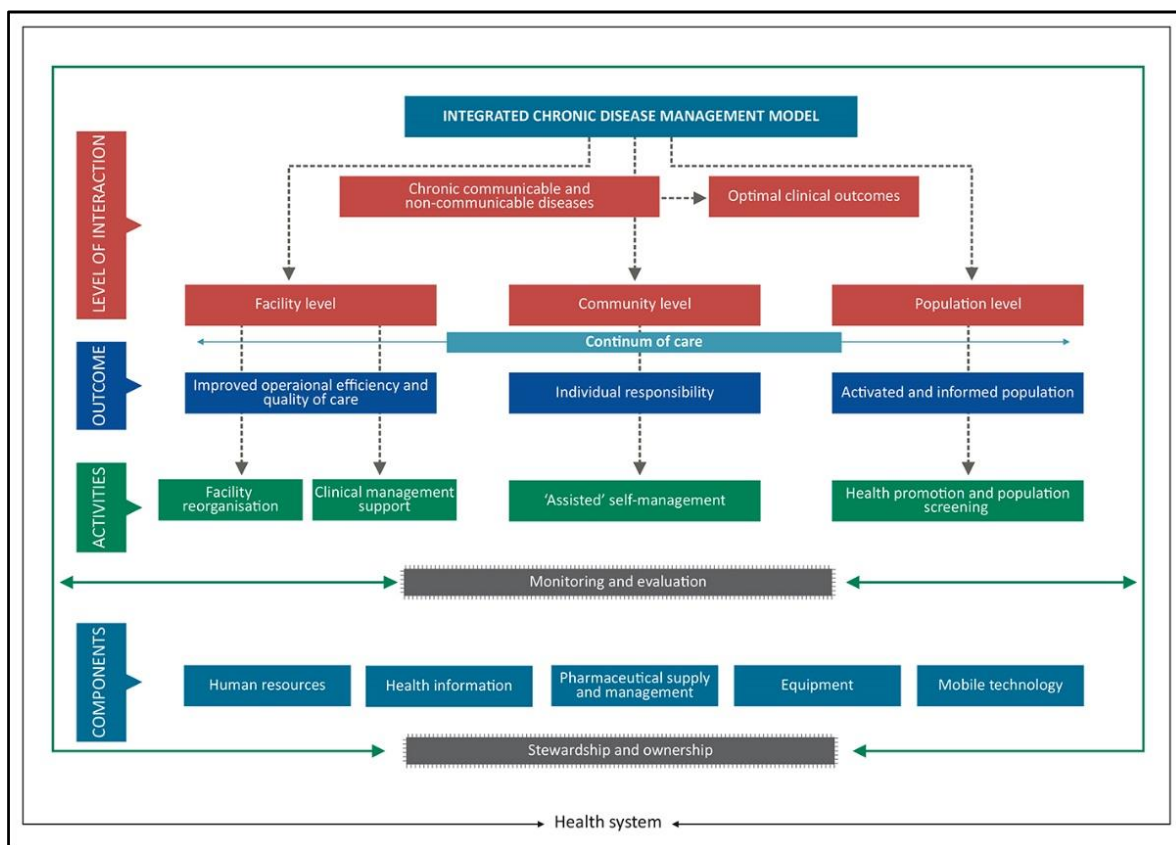
Figure 3-3: ICDM Model Source: (Asmall, 2014)

This model shows that activities, such as monitoring and evaluation for assisted self-management and educational activities for health promotion could lead to improved operational efficiency and quality care, individual responsibility, as well as an activated and informed population. This model is used in Chapter 10 to indicate the areas that can be enhanced by using an ICT strategy to support patient-centred diabetes care.

As mentioned in Chapter 1, Type 2 Diabetes was chosen for this study; because it is in line with government goals to combat NCDs and to increase research in this area, to assist in

lowering the number of premature deaths and the disease burden caused by diabetes; and also because it is a lifestyle disease which is preventable.

Although the requirements for diabetes care are discussed in this chapter, it is necessary to conduct an investigation into the requirements for patient-centred care. These requirements are discussed in the next chapter.

3.4 Conclusion

Section 3.2.1 shows that there are many general guidelines for diabetes care – from the doctor or healthcare providers' view. These are internationally recognised guides that have many care factors in common. The barriers addressed in section 3.3.2, however, state that these guidelines are not used in hospitals and clinics for many reasons, such as not being knowledgeable about the guidelines, or not having access to the support and infrastructure required by the guidelines, in order for them to be successfully implemented. This study focuses on the diabetes-care requirements that relate to health-care providers at the point of service delivery; as this is within the scope of the study. These are: Care delivery, Education, Lifestyle management, Glucose control levels, Clinical monitoring, Self-monitoring, and Blood-pressure control.

The factors that relate to a person with diabetes are listed in Table 3.3. These 8 key factors to consider for successful diabetes care are not always followed by diabetic patients; and the reasons are indicated in section 3.3.2. The factors that can be addressed by this study include: Healthy Eating, Being Active, Monitoring, Taking Medication, Risk Reduction, poor knowledge of diabetes.

These factors are investigated in the interviews to be conducted; and they are discussed in Chapter 7.

3.5 Summary

In this chapter, diabetes was shown to be an ever-increasing condition that affects the lives of many people worldwide. Of the three types of diabetes, Type 2 Diabetes is rising at the fastest rate, leading to the highest burden of disease, and causing many pre-mature deaths globally. This condition is preventable through healthy lifestyle choices, as well as controllable for those who have it; but there is still no cure. These are the reasons that have led to diabetes being the focus of research in so many countries around the world. The characteristics and requirements were discussed in section 3.2.

In South Africa, diabetes type 2 is also reaching epidemic proportions, leading to a huge burden in the healthcare system. The status of diabetes in SA was discussed in section 3.3 as well as the requirements for diabetes care. The SA healthcare system is mainly geared to the treatment of acute diabetes, rather than the chronic illness; and it also differentiates between people who have medical aids and those who do not. This differentiation means that a small portion of the population have the highest access to the best facilities; while the general population has to use public healthcare that is often not as good as that of the private sector. The public sector is strained with regard to the number of healthcare professionals, consultation time with patients and other medical resources. This leads to people with diabetes not getting the correct care, such as education on their condition and the medicines they take; how lifestyle choices can help them control their condition; what complications to be aware of; thus they struggle to keep their diabetes controlled and then end up with severe complications, with some of these even leading to death. The barriers to diabetes care were discussed in section 3.3.2.

The ICT strategy for patient-centred diabetes care developed through this study needs to address people with diabetes in the private sector, as well as the public healthcare sector. The strategy must cover the general diabetes requirements for the person with diabetes, as well as the requirements for the healthcare worker who takes care of diabetics. A further consideration is that the people involved in diabetes care (patients and carers), come from different backgrounds and have different levels of literacy. Using technology as part of the strategy means that people in different geographical areas have different levels of access to technology; and this must be considered. Thus, this study needs to look at how to provide basic education on diabetes care, as well as how to manage and monitor the condition, based on the available technology and the level of education of the patient and the diabetes carer. There is also a necessity to investigate the requirements for patient-centred care, in order to establish how this links up with diabetes care.

In the following chapter, patient-centred care is investigated, in order to determine how it can assist with improving diabetes care and adherence to treatment.

4   A Review of Patient-Centred Care
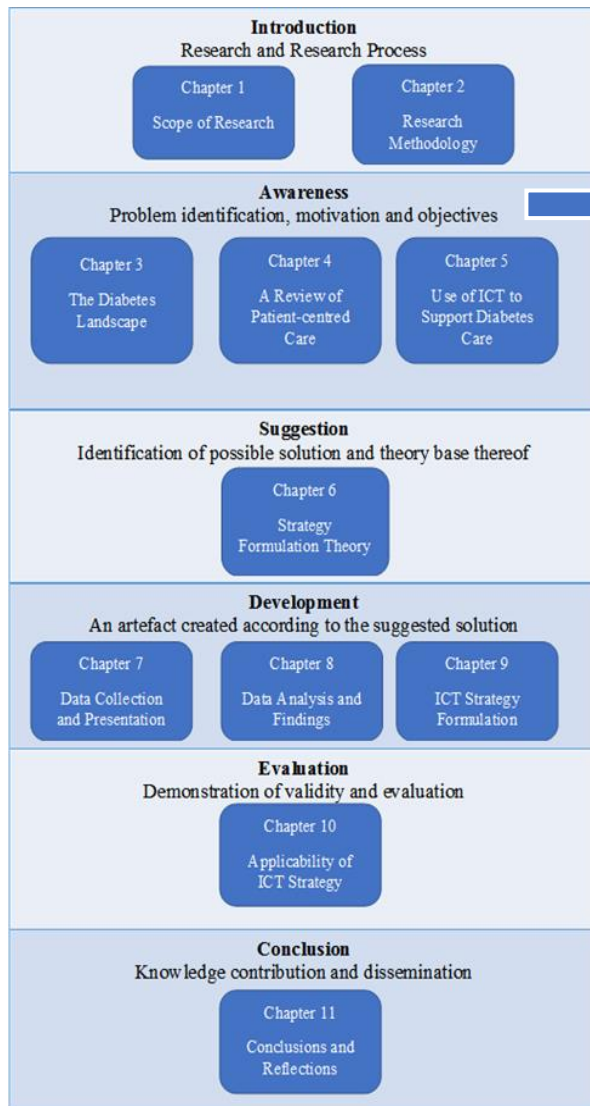
Chapter 4
A Review of Patient-Centred Care

4.1   Introduction

4.2   Factors that Influence Patient-centred Care

4.3   Review of Existing Patient-centred Care Frameworks

4.3.1   World Health Organization, 2003
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4.6   Barriers to Patient-centred Care

4.7   Conclusion

4.1 Introduction

It is argued that medical practice is increasingly dehumanised, dominated by impersonal technologies and economic constraints (Haslam, 2007).

In this chapter, a motivation is provided for selecting patient-centred care as part of this study. Various patient-centred care factors are discussed in section 4.2; and in section 4.3 existing frameworks for patient-centred care are discussed. Patient-centred guidelines in the South African context are discussed in section 4.4. In sections 4.5 and 4.6, the advantages of, and barriers to, patient-centred care are discussed. The applicability and considerations of technology in patient-centred care are presented in section 4.7. The chapter's conclusion and summary are presented in sections 4.8 and 4.9.

4.2 Factors that Influence Patient-centred Care

As indicated in Chapter 1, there is no clear definition of patient-centred care. Table 4-1 illustrates some of the definitions and commonalities in defining patient-centred care.

Table 4-1: Understanding of Patient-centred care Source: (IAPO, 2004; Mead & Bower, 2000)

Origin	Definition/understanding
Edith Balint, 1969	"Understanding the patient as a unique human being"
McWhinney,1989	"the physician tries to enter the patient's world, to see the illness through the patient's eyes"
Laine and Davidoff, 1996	"closely congruent with, and responsive to patients' wants, needs and preferences"
Johnstone & Cooper, 1997	"a construct that advocates simple care at the bedside in the acute care setting by focussing on the expected outcomes for the patient rather than the multiplicity of tasks of each department"
Mallet, 1996	"placing patients at the centre of the system of care and developing good services that revolve around them
Lipkin, Quill & Napodano, 1984; Grol, de Maeseneer, Whitfield & Mokkink, 1990; Winefield, Murrell, Cliford & Farmer, 1996	Giving information to patients and involving them in decision making

The table shows that although there is no specific definition for patient-centred care, the common factor is that the patient's experience of the disease is important; and that the patient plays a pivotal role in the decision regarding treatment.

Table 4-1 illustrates that, although there is no specific definition for patient-centred care, the common factor is the patient's experience of the disease and the pivotal role the patient has in the decision regarding treatment. From this, one can deduce that every patient brings with him/her an individual and unique experience, based on various socio-economic factors, cultural beliefs and various other factors. A study done in 2000, identified factors that influence patient-centredness, as experienced in the general practice of medicine (Mead & Bower, 2000). Figure 4-1 illustrates the various factors influencing patient-centred care.
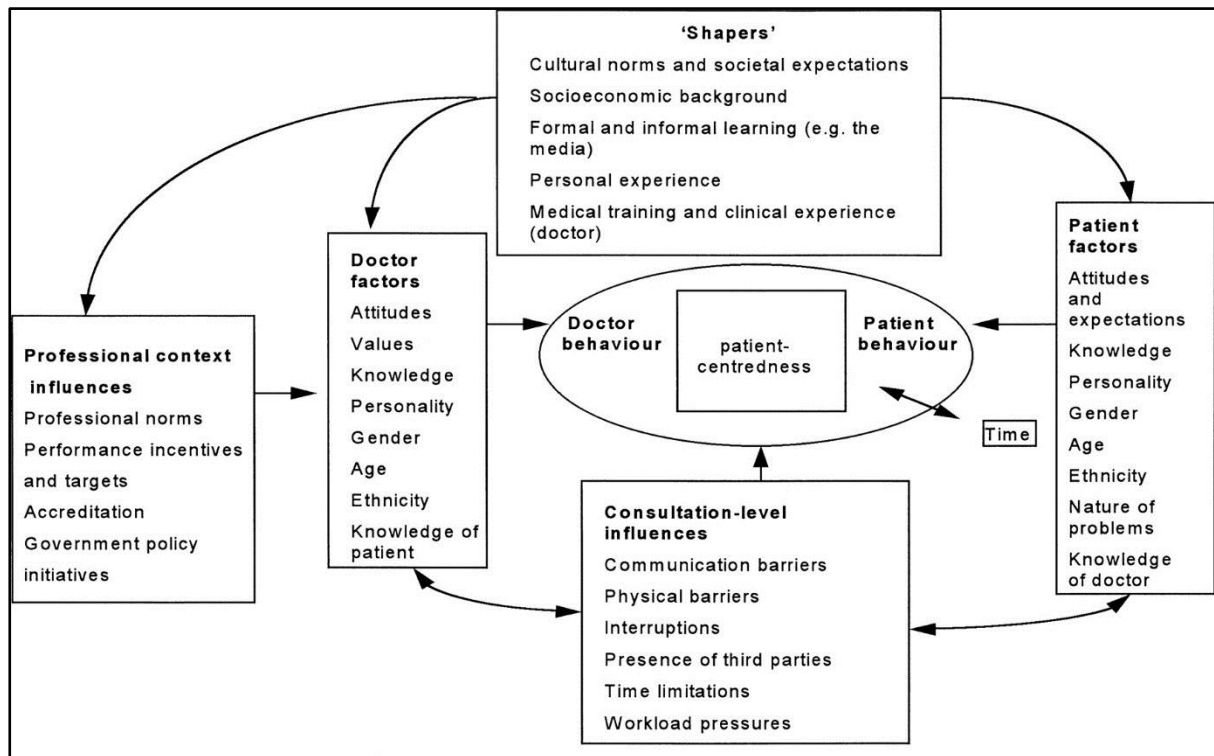
Figure 4-1: Factors influencing patient-centredness Source: (Mead & Bower, 2000)

This diagram clearly indicates that patient-centred care is a holistic approach that takes a multitude of factors into consideration, when engaging in the treatment of a patient. Patient-centred care moves the focus away from the doctors' requirements and their controlled methods of care, to that of the patients' needs and a participatory-care plan (Bardes, 2012).

4.3 Review of Existing Patient-centred Care Frameworks

There are a number of patient-centred definitions, as mentioned in the previous section. These definitions are expanded and used as the basis for many patient-centred frameworks in the healthcare sector. In the next section, some of these frameworks are illustrated. It is important to note that there is a lack of patient-centred care frameworks developed in South Africa.

4.3.1 World Health Organization, 2003

The World Health Organization (WHO), guided by the International alliance of Patients' Organizations, (IAPO) lists the principles of good patient-centred care, as follows (IAPO, 2004):

- Develop a treatment partnership with your patient;
- Focus on your patient's concerns and priorities;
- Use the 5 A's: Assess, Advise, Agree, Assist, and Arrange;
- Educate patient on disease and support self-management;
- Organise proactive follow up;
- Involve "expert patients", peer education and support staff in your health facility;
- Link the patient to community-based resources and support;
- Use written information – registers, Treatment Plan, treatment cards, and written information for patients – to document, monitor and remind;
- Work as a clinical team;
- Assure continuity of care.

4.3.2 The Picker Institute

The Picker Institute defines patient-centred care as "a model in which the providers partner with patients and families, to identify and satisfy the full range of a patient's needs and preferences" (Planetree and Picker Institute, 2008). The Picker institute and the Commonwealth Fund, together with researchers from Harvard Medical School, used a wide range of focus groups that included recently discharged patients, family members, physicians and non-physician hospital staff, as well as a review of the pertinent literature to define the primary dimensions of patient-centred care. These are (Planetree and Picker Institute, 2008):

- Respect for patients' values, preferences and expressed needs;
- Co-ordination and integration of care;
- Information, communication and education;
- Physical comfort;
- Emotional support and alleviation of fear and anxiety;
- Involvement of family and friends;
- Transition across service boundaries and continuity of care;
- Access to care.

4.3.3 Mead and Bower

Mead and Bower's study identified the 1995 definition by Stewart et al. to be the most comprehensive. Stewart et al. identified six interconnecting components, as part of the framework, namely (Mead & Bower, 2000):

- Exploring both the disease and the illness experience;
- Understanding the whole person;
- Finding common ground regarding management;
- Incorporating prevention and health promotion;
- Enhancing the doctor-patient relationship;
- Being "realistic" about personal limitations and issues, such as the availability of time and resources.

Through an empirical literature study in 2000, Mead and Bowers created a conceptual framework for patient-centredness that had 5 dimensions (Mead & Bower, 2000):

- Biopsychosocial perspectives – a perspective on illness that includes consideration of social and psychological, as well as the biomedical factors;
- The patient as a person – understanding the personal meaning of the illness for each individual patient;
- Sharing power and responsibility – sensitivity to patients' preferences for information and shared decision-making and responding appropriately to these factors;
- The Therapeutic alliance – developing common therapeutic goals and enhancing the personal bond between doctor and patient;
- The doctor as a person – awareness of the influence of the personal qualities and subjectivity of the doctor in the practice of medicine.

According to Mead and Bower (2000), these five dimensions originate in the social and behavioural sciences; but they are very relevant; as the patient-centred concept was developed through the general practice of medicine that found a strong bond with these dimensions.

Table 4-2, is a combination of the above definitions of patient-centredness, in order to give a wide overview of the common understanding regarding patient-centred frameworks.

Table 4-2: Comparison of patient-centred framework components

	Stewart, Brown et al. (1995)	Picker Institute (1993)	Mead and Bower (2000)
Exploring the disease and the illness experience	✓	✓	✓
Understanding the whole person	✓	✓	✓
Finding common ground regarding management	✓	✓	✓
Incorporating prevention and health promotion	✓	✓	✓
Enhancing the doctor-patient relationship	✓	✓	✓
Being "realistic" about personal limitations and issues such as the availability of time and resources		✓	✓
Involvement of family and friends		✓	
Transition and continuity		✓	
Access to care		✓	
The doctor as a person			✓

The interview responses, as discussed in Chapter 7, indicate the patient-centred nature of diabetes hospitals and/clinics with reference to the components, according to the Mead and Bower principles. In the following section, patient-centred care in the South African context is discussed. Thereafter, the study investigates whether technology can assist in patient-centred care without losing the "humanity" of this approach to care.

4.4 Patient-centred Care Feature in South African Healthcare

In this section, patient-centred care in South Africa (SA) is reviewed for evidence of it being implemented in both the private sector and the public sector. Advantages to a patient-centred approach is visited, as well as a look at possible barriers in the South African context.

4.4.1 Patient-centredness in the private sector

This section shows where patient-centred care is practised in South Africa. Although there are many guidelines for diabetes care, the researcher failed to find evidence of specific implemented patient-centred frameworks for diabetes care in South Africa. By looking at the literature in this regard, it was found that the Centre for Diabetes and Endocrinology (CDE), is in one institution that follows best practice in patient-centred care. The centre is located in Johannesburg, South Africa, but there are also affiliated branches throughout the country. Visiting their website showed that there are exact steps and guidelines that should be

followed by staff and patients, in order to receive the best possible treatment. The next section illustrates the patient-centred guidelines that are used by the Centre for Diabetes and Endocrinology (CDE), as this was the most appropriate example found.

The homepage of the CDE states clearly that it is "Your Partner in Diabetes" – and that is the foundation of patient-centred care. The website is split into 4 sections. One each for people with diabetes, healthcare practitioners, healthcare funders, and the last one for corporates and employers. Figure 4-2 shows the home page of the CDE.
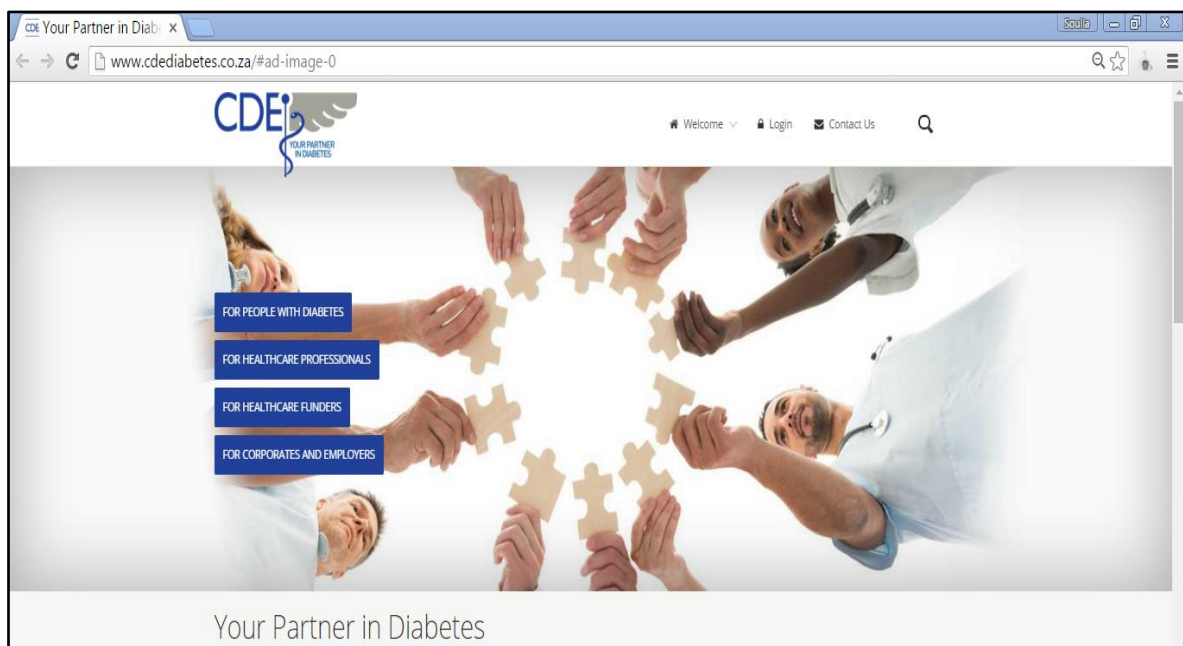
Figure 4-2: CDE Diabetes Homepage Source: www.cdediabetes.co.za

According to the CDE website (CDE - Your Partner in Diabetes, n.d.), the CDE was launched in 1995, in order to provide a comprehensive and complete diabetes treatment and management programme, which allowed for the implementation of correct and appropriate diabetes-care principles. The centre had a total of 13 patients in its first month; and it has expanded to the point, where, 20 years later, there have been thousands of patients treated through the various CDE centres across South Africa.

The CDE website indicates that the CDE uses the Society for Endocrinology, Metabolism and Diabetes of South Africa (SEMSDA) guidelines, as a care guide for treating people with diabetes. It also states that the CDE offers a wide range of doctors and/or specialists on-site that are equipped to handle the complications that may arise from a mismanaged treatment plan or non-compliance with the treatment plan. The following is a list of benefits and

services provided at the CDE, for those who are on the diabetes-care programme (CDE - Your Partner in Diabetes, n.d.):

- Consultations with a CDE diabetes-accredited doctor;
- Diabetes education and mentoring;
- Annual consultation with a CDE-accredited dietician;
- All the important laboratory tests for diabetes;
- A blood glucose meter and strips for self-testing;
- Diabetes medication, including all the latest diabetes therapies;
- Diabetes specialist advice provided to your treating doctor;
- Referral for foot screening (podiatrist) and eye screening (ophthalmologist)
- A 24-hour diabetes-emergency hotline.

The "Managing your diabetes" page on the CDE website explains to people with diabetes that each person's condition is unique, but still requires the same fundamental principles to be adhered to, in order to reduce the risk of sickness, hospitalization, increased medical costs and death due to diabetes. These fundamental concepts are (CDE, n.d.):

- Individualized care;
- Empowerment to manage self-care;
- Team-care and support;
- Ongoing monitoring;
- Attention to the three cornerstones of diabetes care, which are: Remaining active and taking exercise, healthy, mindful and sustainable eating, and the appropriate medication at the right dose and at the right times.

The most important aspect of CDE with regard to patient-centred care is the statement on its page for managing diabetes "…importantly, the doctor is not the head of this team – it is the person with diabetes and the family…"

4.4.2 Patient-centredness in the public sector

Little evidence was found in the literature to show that patient-centred guidelines and working groups are active; and no evidence was found of it actually being implemented. This was also in line with the findings of Whiting (Whiting, Hayes, & Unwin, Challenges to healthcare for diabetes in Africa, 2003) in his study on healthcare challenges for diabetes care in Africa, where South Africa was one of the countries investigated.

In the next section, some of the advantages of patient-centred care are discussed; and thereafter, the barriers encountered in implementing this are discussed.

4.5   The advantages of Patient-centred Care

The patient-centred health review done by the International Alliance of Patients' Organizations (IAPO) in 2004 shows that various studies, spanning from 1992 – 2001, indicate that there is a positive link between patient-centred care and the care outcome (IAPO, 2004). These studies were based on literature studies, as well as field studies. Furthermore, the study (IAPO, 2004) indicates that patient-centred care leads to patient satisfaction, engagement and task orientation, quality of life, a reduction in anxiety, and increased doctor satisfaction and efficiency, leading to fewer referrals and less clinical tests.

Another study was conducted by Mirzaei (Mirzaei, M., Aspin, C., Essue, B., Jeon, J.-h., Dugdale, P., Usherwood, T. & Leeder, S (2013), to improve health outcomes for people with chronic conditions, by adopting a patient-centred care approach. This study showed that many of the negative comments that formed part of the feedback that they received during their study, could be avoided – by involving the patient more in the treatment plan. The negative comments included participants indicating that frustrations about not understanding the treatment plan could be avoided if the treatment plan is written in simple layman's language that the patient understands; and this would lead to better adherence. The participants also indicated that education with regard to the condition, and how exercise or food affects this, should be interactive and interesting to patients, rather than just pamphlets to read in their own time.

The interviewees also expressed the need to look at a better chronic-care model. Despite the negative comments during Mirzaei's (2013) study, all the participants seemed to be very positive about being part of their own treatment plan.

4.6   Barriers to Patient-centred Care

It has been very difficult to provide evidence of patient-centred care being practised in the South African health sector. The literature has shown that some private clinics and hospitals do have that in the forefront on their websites; but the researcher could not emphatically provide evidence that this was being enforced. In the public sector, there was little or no evidence in the literature to show that a patient-centred approach is being practised in the public healthcare. The only evidence was that of small research projects. This raises the

question that if patient-centred care is so highly researched and promoted by so many in the healthcare sector, why is it not practised on a larger scale?

This section looks at some of the barriers that have been identified. Although these barriers are not specific to South Africa, it is accepted that they would influence the South African landscape, together with possible barriers that may be found to be unique to the country. These barriers, as described in the patient-centred review by the International Alliance of Patients' Organizations (IAPO), are (IAPO, 2004):

1. No specific definition of patient-centred care leads to healthcare practitioners' not knowing exactly what is expected of them;
2. The healthcare focus is on clinical aspects and the cost-effectiveness of care, as well as a focus on public healthcare overall, rather than focusing on an individual.
3. The structure of the healthcare system does not allow for lengthy consultation times or effective resources. The lack of funds and low staffing numbers lead to low morale that affects the practice of patient-centred care negatively; as it is seen as expensive and overstretching the service.
4. The integration of healthcare and other aspects of life are not seen as a whole, but rather treated as separate entities. This is not ideal; as a patient's life ultimately influences their health and vice versa. The focus must change from treating a disease and its general symptoms, to focusing on the uniqueness that this disease may bring to every person's life.
5. Communication and partnership between the healthcare practitioner and the patient requires that both parties listen to each other, speak freely, and ask questions when they need to. This communication and partnership must also stretch into the ranks of the policy-makers and the managers of the practice.
6. Information-sharing at present does not allow the patients to receive all the information that they require. If information is shared, it is normally in medical terms that go above the patient's level, for example, the information pamphlet inside medication. Information should be clear and understandable, relevant and tailored in content, culturally and linguistically, in an appropriate format, requiring that the reader review or become involved; and it should be pilot-tested on key audiences to ensure that it is effective.

7. Attitudinal change would be required to engage fully in patient-centred care; as it is based on mutual trust, communication and partnerships that require a "power shift" away from the current practices.

8. Involvement of family and friends is one of the characteristics of patient-centred care; but this is a barrier; as it requires commitment in terms of time, and frequently money also. It also requires that the family and friends have the required confidence, knowledge and ability to participate in the discussions.

9. Patients' rights vary between, and even within countries; and this is a barrier that is difficult to overcome, in order for all the aspects of a patient's healthcare to be considered.

The barriers mentioned above must be addressed, when creating the ICT strategy for patient-centred diabetes care.

4.7 Conclusion

In this chapter the factors influencing patient-centred care were discussed in section 4.2 and clearly indicated the multitude of factors that should be considered when working in a patient-centred care environment to ensure a holistic approach to diabetes.

There are many frameworks for patient-centred care; but these are not being fully implemented in the South African healthcare sector. Only one private institution was found that implements patient-centred care. It is evident that patient-centred care enhances adherence. The barriers to patient-centred care that form part of this study include:

- The healthcare focus not focusing on the individual;
- The structure of the healthcare system does not allow for lengthy consultation time or effective resources;
- the integration of healthcare, and other aspects of life, are not seen as a whole;
- Communication and partnership between the healthcare practitioner and the patient need to improve;
- Information-sharing at present does not allow the patients to receive all the information required;
- Information should be clear and understandable;
- Attitudinal change would be required, in order to engage fully in patient-centred care.

The involvement of family and friends requires commitment in terms of time, and frequently money also. It also requires that the family and friends have the necessary confidence, knowledge and ability to participate.

There is a need to look at how technology can be used without compromising patient-centred care.

4.8 Summary

For centuries, the care and compassion of the healthcare practitioner as often the only "treatment" available to the sick. Through years of improving treatment and the advances of technology, in order to find the ultimate cure, the needs of the patient have been inadvertently overlooked by the healthcare worker. The input of the patient and the support structures, family and friends, have been eliminated; and the care involved following the authoritarian leadership of the healthcare provider has become the important issue. In 1988, the emphasis was brought back to treating patients with "humanity and care" – when the Picker Institute did a study on the requirements and the impact of patient-centred care over many years. The outcome of this study in 1993 resulted in eight basic principles that are required for a patient-centred approach to care (section 4.3.2). Since then, there has been an improvement and return to the "human touch", when treating the ill.

The need to share decision-making in the treatment plan of people, especially those with long-term/chronic conditions has been well documented and accepted widely in the healthcare environment. Today, this patient-centred approach to healthcare is still being widely researched; and it is an area that many countries and their governments are striving to achieve.

In the South African context, it is clear that the healthcare offered in the private and public sectors differs vastly; but it is also clear that within the private and public sectors there are also differences in the approach to care (section 4.4). However, amongst all this ambiguity, there is one very definite and clear message, namely, that patient-centred care for all people with diabetes should follow the same general guidelines, in order for it to be successful. The advantages of patient-centred care are of such a nature that the possible barriers to implementing this approach should be addressed; and efforts should be made to implement patient-centred care. In other words, the patient should be treated, and not the disease.

In the next chapter, a review of the use of ICT in healthcare, particularly in diabetes care, is presented.

5   The Use of ICT to Support Diabetes Care

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The Use of ICT to Support Diabetes Care

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5.1 Introduction

Tele-medicine was the term first used almost 40 years ago, to describe the use of telecommunication and information technology in health practice, where the most common medium of delivery was through interactive video (Grigsby & Sanders, 1998). According to Sood (2007), the experiences of early tele-medicine applications led to the belief that this was an unreliable and unaffordable technology. However, the rapid developments in information and communication technology (ICT) proved this to be incorrect; as the development of more reliable technology provided a solid base for health applications, using ICT.

It is clear from the discussion in Chapter 1, that mHealth cannot be implemented without ICT; whereas ICT strategies are possible without mobile devices. The two terms are closely related and both have the commonality of the use of technology. For the purpose of this study, the terms ICT strategy and technology use, are used interchangeably. The terms are understood to mean the use of technology in healthcare; and thus, they are not limited to the use of mobile devices only.

In this chapter, the role of ICT in diabetes care is discussed in section 5.2; and broad examples of ICT strategies globally are presented. The status of ICT for diabetes care is discussed in section 5.3; and lastly, in section 5.4, the considerations for using ICT in SA for enhancing diabetes care are investigated. The chapter conclusions and summary are presented in sections 5.5 and 5.6.

5.2 The Use of ICT in Diabetes Care

In this section, the study shows the impact that ICT usage has on healthcare, and the surge in ICT projects globally. The role of ICT in diabetes care, in particular, is also investigated.

5.2.1 The rise of ICT use globally

The ITU World Telecommunication (ITU: Development, 2015) released its latest facts and figures on ICT globally in 2015. This report shows that the Mobile broadband is the most dynamic market segment; and penetration reached 47% globally in 2015. This is a 12-fold increase on the 2007 figures. In Figure 5-1, the global developments in ICT have been captured. The two lines that stand out are the one indicating the increase in mobile-cellular subscriptions and the other indicating the sharp increase in mobile-internet subscriptions.
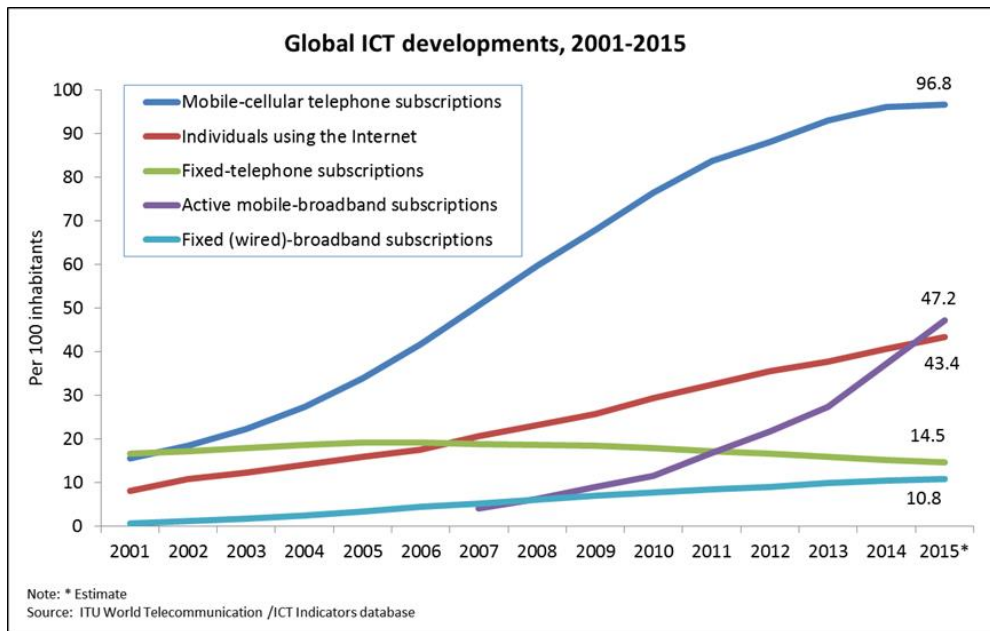
Figure 5-1 ITU report for Global ICT growth   Source: (ITU: Development, 2015)

It is clear from the graph that one of the most disruptive technologies since the advent of the internet is that of mobile technology.

In order to understand the impact that this phenomenon has had on diabetes care, it is important to first look at the overall affect ICT has on healthcare. Developments in the field of science and medicine have led to an ever-increasing life-expectation for the populations of the world (Koncar, 2009; Kwan, 2012). However, according to Khan et al. (2010), and the GSMA (2010), healthcare in the developing world still remains a challenge. They state that the challenge is not only because of the double-disease burden, but also because of the lack of infrastructure, healthcare workers, a reliable supply chain for medication and support, as well as the lack of education on good health practices in the rural areas.

According to a report released by GSMA (2014) there were 2.2 billion mobile internet subscribers, which represents about 30% of the global population. In 2014, at the GSMA Mobile 360-Africa event, the forecast was made that by 2020, mobile internet users will soar to 3.8 billion, which will be about half the world's population. It is expected that nearly all of these additional users will be from the developing world. These are the very same countries that are faced with poor healthcare delivery, a steady growth in communicable diseases (such as HIV/AIDS and TB) and chronic/non-communicable diseases (such as heart disease and diabetes) that are fast reaching epidemic proportions.

The growth of ICT in healthcare is clear through the recent data from the Healthcare Information and Management Systems Society (HIMSS) that shows that 80% of physicians

surveyed possess tablet devices (HIMSS, 2013). According to Congdon (2013), it is also clear that ICT adoption does not end with the clinician; as providers are involving patients in ICT usage, with 1/3 of healthcare organizations allowing patients to access health information by using their mobile device.

5.2.2 The impact of ICT in the global-healthcare sector

As discussed in Chapter 1, mHealth is the link between ICT use and healthcare for this study. As such it is required to investigate mHealth in context to this research. A study was conducted over the past decade to determine whether mHealth applications had indeed impacted services and global health (Istepanian, m-health: a decade of evolution and impact on services and global health, 2014). The study revealed the following:

- The introduction of the smartphone in 2007 played an influential role in the evolution of mHealth, particularly on the front of monitoring health and wellbeing,
- That in October 2013, there were 43 689 apps under the health/medical banner, of which, 23 682 were considered to be within genuine healthcare categories,
- That smart apps are an offshoot of mHealth and not the main thing,
- That healthcare using mHealth is widely used and recognised by the WHO, providing mHealth in 9 different service categories.

The study also determined some shortfalls in mHealth, namely (Istepanian, m-health: a decade of evolution and impact on services and global health, 2014):

- That the large number of apps available have watered-down the wider view and influences of mHealth,
- That many of the mHealth services are restricted to pilot studies and adoptions in small pockets that need to be widely scaled up.

Kahn et al. (2010) stated that the dual burden of disease in developing countries is crippling the healthcare sector, as well as the economy of developing countries. Non-communicable diseases require special care strategies and complex solutions, such as (Kahn, Yang, & Kahn, 2010):

- Early, broad-based community interventions, due to the long dormancy period of chronic illness;
- Behavioural and lifestyle changes;
- Complex strategies with multiple and ongoing care;

- Chronic medication, which has cost implications, as well as self-care requirements;

These interventions could benefit from the use of ICT; as the technology can be accessed over large geographical areas; and educational or relevant text messages can be sent to encourage lifestyle changes; the internet can be accessed for health tips and advice; emails can be used to strengthen communication and help with continuous interaction; and reminders can be sent for prescription renewals and the collection of medicines (Kahn, Yang, & Kahn, 2010).

The financial implications of technology use in healthcare have also been carefully studied; as initial indications were that this would not be viable, due to the high cost of the technology involved (Istepanian, Jovanov, & Zhang, 2004). However, the cost of technology has decreased over the years making devices, such as cell phones, affordable – even to the poorest (GSMA, 2012).

It has been said that the US could reach the 25% mark of GDP for healthcare by 2030. This is highly unsustainable and could put tremendous pressure on fiscal balances, consumer spending and employer liabilities. Currently, 30% of the disease cost in the US is attributed to chronic disease (McKinsey and Company, 2010).

Research suggests that there are four major factors that drive healthcare cost increases worldwide (McKinsey and Company, 2010; Congdon, 2013):

1. *Ageing populations.* In 1950, one in twelve Americans was over 60 years old; by 2050, this ratio is expected to rise to one in five. This trend is also visible in other developed countries; as chronic diseases grow in proportion to the growth in the aged population. Chronic diseases are affected by lifestyle choices, are long-lasting, and costly to manage. Developing markets are also seeing an increase in the chronic conditions; as the population's age increases; and as the lifestyle becomes more westernised.

2. *Medical procedure costs.* As medical knowledge and technology become more sophisticated, the complexity and cost of hospital procedures seem to increase unless significant innovations in delivery models are applied.

3. *Resource constraints.* Healthcare resources are not unlimited; and neither are they equally distributed. Physicians in the developed markets seem to be increasingly choosing more lucrative career specializations over generalist primary-care practice; whilst in developing markets, physicians are often in short supply and more experienced physicians are to be found mostly in major urban centres.

4. *Patient empowerment.* Particularly in markets with broad Internet access, available in-depth information on medical conditions and their treatment has enhanced patients' knowledge, generating an increasingly consumerist attitude towards medicine and higher expectations regarding treatment.

Since developing countries have an ever-increasing number of chronic diseases, this implies that the disease burden for these already-battling economies would have the potential to cripple the country completely.

Research statistics from the McKinsey and Company Report indicates that the healthcare sector needs to embrace technology in the same way that other business sectors have, in order to attain the many benefits that come with it (mHealth: A new Vision for Healthcare, 2010). One of the most important benefits is that of finances. Figure 5-2 below shows the results found when considering the cost implications of mHealth on diabetes, chronic heart failure and chronic obstructive pulmonary disease in the Organization for Economic co-operation and Development (OECD) in Brazil, Russia, India, and China, South Africa (BRICS countries).

Potential cost savings in OECD and BRIC countries for chronic diseases from mHealth is USD 175 - 210 billion

Potential healthcare savings, based on 2007 actual expenditure
USD billions p.a.

Chronic disease accounts for two-thirds of expenditure[1]

Potential savings on healthcare utilization from remote monitoring[2]

- Direct spend on chronic disease accounts for half of healthcare expenditure[3]
- Remote monitoring cuts direct healthcare expenditure by 10 - 12% based on reduced hospitalization, nursing care, and ER visits[2]

5,260 | 3,500 | 1,750 | 175 - 210 | 1,540 - 1,575
67% | 50%

Total healthcare expenditure | Chronic disease expenditure | Direct chronic disease expenditure | Potential savings from RHM | Potential direct chronic expenditure

1 Agency for Healthcare Research and Quality, US Department of Health and Human Services
2 Based on case studies in diabetes, chronic heart failure, and chronic obstructive pulmonary disease
3 Includes provider visits, hospital inpatient stays, nursing care, home health, prescribed medication
SOURCE: AHRQ; EIU World database; McKinsey

Figure 5-2: Cost Implications of mHealth on NCDs in OECD and BRIC countries Source: (McKinsey and Company, 2010)

Table 5-1 shows some of the ways in which technology can transform the face of healthcare and reduce the cost of care.

Table 5-1 Use of technology in healthcare Source: (McKinsey and Company, 2010)

From Traditional Healthcare delivery	to a New World Paradigm
Patient visits the physician or the ER, taking time off from work when he/she feels serious symptoms	Patient calls caregiver at his/her convenience any time of day/week as soon as symptoms begin
Physician interviews patient in person and conducts a typical hands-on examination	Physician speaks to patient over phone, relying also on data from biometric sensors (m-stethoscope, smartphone-based ultrasound, etc.)
Physician prescribes medicine and hopes patient takes it at prescribed times	SMS reminders ensure that patient takes medicine as prescribed; can report side effects, etc. in real time
Patient gets well and goes back to potentially unhealthy lifestyle	Patient can be monitored remotely and advised if conditions worsen or if lifestyle elements negatively impact the situation
Chronic shortage of (specialized) medical talent	Patient can access global medical expertise in a connected world

The use of technology promises many benefits for the healthcare sector; and it includes (GSMA, 2010; Congdon, 2013; Schweitzer & Synowiec, 2012):

- Better Communication with patients;
    - Better service at clinics as less face-to-face visits are required
    - Closer contact with healthcare practitioners
- Improved patient access to quality healthcare;
    - Closer monitoring of patients with regard to early warning systems for deteriorating conditions
    - Faster diagnosis
    - Eliminates need for frequent clinic visits
- Benefits to the society;
    - Improved life expectancy,
    - Quicker diagnostics of potential epidemics and management of associated risk,
    - Better insight into the causes of certain diseases,
    - Greater and quicker information-sharing to identify appropriate treatments,
    - Reduced absences from work.

This study identifies ICT strategies that can bring these advantages to people with diabetes in South Africa.

The next section looks at some mHealth projects that exist around the world. This is done being mindful that mHealth is the term used for technological interventions in healthcare; and that mHealth is not possible without ICT.

5.2.3 Current mHealth projects globally

WHO conducted a study on mobile-health applications for the most prevalent conditions in the world (Martinez-Perez, de la Torre-Diez, & Lopez-Coronado, 2013). These were identified as anaemia, hearing loss, migraine, low vision, asthma, Diabetes Mellitus, osteoarthritis and unipolar depressive disorders. They found more than 100 commercial apps for migraine and asthma, and more than 1 000 commercial apps for diabetes and depression. The other illnesses had less than 100 commercial apps available.

As seen in the discussion and examples above, ICT is widely used in many areas of healthcare. mHealth is not just mobile phone apps; but also any mobile device that allows for intervention through the use of information communication technology in the healthcare of people. The following section focuses on the global impact of technology use in diabetes care; and some applications used for diabetes care around the world are illustrated.

5.2.4 The role of technology in global diabetes care

Type 2 Diabetes is a chronic disease and a lifestyle disease, which means that the disease cannot just be managed successfully, but also prevented (Brown M. A., 2015). In this section, the role of technology specifically relating to diabetes in the global landscape is discussed.

According to Bellazzi (2008), diabetes has been in the centre of information technology in healthcare for over 20 years. Studies have shown that diabetes was one of the first chronic diseases, where telemedicine, the "forefather" of mHealth, was used for supporting and managing the disease. This has made diabetes the most widely tested disease by telemedicine, e-Health and consumer health applications. A study of twenty years of telemedicine in the management of chronic disease has shown it to have a positive impact on diabetes management (Wooten, 2012). Bellazzi (2008) states that the focus on past ICT applications for diabetes was mainly on insulin management; but the focus has shifted towards patient-empowerment. One such mHealth example is the Diabetes-Information Profile model that uses the internet to build a patient's profile and progressively to update it, as the patient interacts with the system. This allows certain learning topics to be prioritized, and also patient visits to be tailored to the patient's current profile.

Klonoff (2013) conducted a study into the various mHealth applications for diabetes. He states that mHealth applications for diabetes include those for monitoring the disease, mobile decision support apps for patients, software applications for diabetes-data streams, to assist with analysing real-time data for better decision-making and clinical decision-support

systems (DSS) for diabetes requiring interaction from clinicians before making decisions. He indicates that his study led to the conclusion that mHealth is transforming healthcare and that it is likely to be the "next big thing" in healthcare for diabetes.

In the next section, a brief overview of some of the common diabetes applications are discussed.

5.2.5   A review of ICT applications for diabetes

A typical scenario for diabetes care using technology (mHealth), would require data from a blood glucose monitor to pass through five steps, before reaching a health practitioner in a remote area. These steps are: i) Collect, ii) transmit, iii) analyse, iv) store and v) present the data (Arsand, E., Froisland, D. H., Skrovseth, S. O., Chomutare, T., Tatara, N., Hartvigsen, G., Tufano, James, T., 2012; Klonoff, 2013).

In this section, some of these studies on diabetes and the use of technology are used to illustrate how the use of technology has impacted diabetes care.

- A study conducted in 2012 reviewed 21 articles written between 2000 and 2010 on the use of mobile phones in diabetes monitoring and management (Holtz & Lauckner, 2012). The study was conducted from the patient's perspective; and it showed that positive trends were noticed, such as improved self-efficacy and self-management behaviours.

- Another study conducted by Brown and Saint (2013) focused on the cost-effectiveness of mobile health for diabetes, specifically in the US, Brazil and India, where the diabetes-disease burden is high. This study showed that the use of technology could avert the explosive rise in diabetes through proactive monitoring and education on the disease. It also showed that technology interventions can decrease the cost of care in remote areas, where travelling costs cause the cost of care to increase dramatically. Travelling cost increases; because both the patients, as well as the expert health practitioners have to travel to clinics.

- A study conducted by Tan (2014) indicating the role of eHealth and mHealth in diabetes care in Holland concluded that both e-Health and mHealth have made a significant impact on the relationship between nurses and patients with regard to the demands for knowledge, care and service.

- GSMA (GSMA & PWC, 2012) conducted a survey entitled: "Touching lives through mobile health", where an assessment was made of global-market opportunities. The results showed that mobile health has many economic benefits for businesses, as well as

government. The study also showed that mHealth is widely used in successful prevention, diagnosis, treatment, and the monitoring of chronic disease.

Table 5-2 lists some of the mHealth applications relating to diabetes used in the global landscape. These applications could be in a research environment or in practical implementations through healthcare organisations or commercial applications.

Table 5-2: Summary of applications used in diabetes care

mHealth Application	Purpose of Application	Findings	Recommendations	Country (Reference)
Glucose Buddy	Allows diabetics to enter glucose numbers, carbohydrate consumption, insulin dosages and activities	Commercial app used by over 7 million people		Worldwide (mHealth: Mobile Health Applications, n.d.)
Automatic Transfer of Blood Glucose Data	Designed to assist children in uploading their BG data directly from their monitor to their parent's phone via Bluetooth	Successful	Parents requested even more interaction through the mobile device	Norway (Blake, 2008)
Few touch Application (FTA) – The diabetes Diary	To Receive BG data direct from patients mobile diary's into electronic health record systems	Easy to use system and charts are easily understand-able to patients, data is easy to show to healthcare provider, encourages reflection	Investigate how the app can be integrated into the primary healthcare sector so it can be up-scaled	Norway (Arsand, et al., 2012)
My Glucohealth Wireless	Tracks glucose data and transmits it to family members or carers assisting with patients disease management			US, Australia (Pederson, 2010; Dolan, 2009)
Handy Logs	App that tracks glucose levels, fitness, calorie intake and blood pressure			Worldwide app (Baker, Merz, & Ruder, 2010)
Health Pal	Small portable dedicated device used to collect data from wireless glucose meters, blood pressure monitors, pulse oximeters and weight scales and data gets sent to cloud for patients and physicians to view.			(Brown & Saint, 2013)

The studies listed in the table not only yielded the positive results already mentioned, but also listed some areas of concern and suggested ways, in which to go forward, regarding the use of technology in diabetes care.

5.3 The Status of ICT in Diabetes Care in South Africa

According to GSMA (2012), the healthcare system in South Africa is referred to as two-tiered, having a large private sector that serves the higher-income minority, and a public sector that serves the majority of the population. The South African government is faced with challenges of equalising the imbalance of healthcare for the insured and the uninsured. The challenges of the South African healthcare sector must be tackled with a view beyond the present, and should look to the future and embrace innovative new system designs, which reduce cost, extend the reach and ultimately improve the health of the South African population.

The need to incorporate e-health into governments' healthcare plans has been growing over the last decade (Koncar, 2009). The Zimbabwean (ICT Correspondent, 2011), reported that South Africa is taking the lead in mHealth projects. mHealth, however, has its own stumbling blocks to overcome; in order to be up-scaled successfully from pilot studies to fully fledged and replicated projects countrywide (Istepanian, m-health: a decade of evolution and impact on services and global health, 2014). To effect this, the Deputy Minister of Health is driving the implementation of the National Department of Health's e-Health/ICT4H Strategy, and has a steering committee in place with six working groups (Ritchie, 2012).

Many businesses in South Africa are also attempting to assist in improving the service delivery of healthcare. SANLAM, SAs leading financial services provider, is working with MTN, a leading SA mobile operator, to roll out 11 products in 22 countries throughout Africa. These would allow people to determine their ailments, self-medicate, or see a doctor based on 3 600 diagnostic profiles (ICT Correspondent, 2011).

Although this study is on an ICT strategy for patient-centred diabetes care, it is important to note, that for the context of this research, it is necessary to look at mHealth projects; as these show the use of ICT in healthcare. mHealth, and thus the use of technology, has through many studies and reports proven to offer big opportunities for the future.

GSMA conducted a study with regard to mHealth opportunities in South Africa that indicated that mHealth would have a positive impact on healthcare in South Africa (GSMA, 2012). mHealth strategies are not possible without the use of ICT; and therefore, it is deemed important to look at the mHealth applications that relate to diabetes care. The next section looks at ICT interventions in South Africa through the mHealth applications that focus on diabetes care.

5.3.1 ICT interventions for diabetes in South Africa

Bellazzi (2008) writes in his report on Telemedicine and Diabetes management that a strong interest has developed since the 1970s to design and implement ICT systems to support diabetes for patients with electronic-patient records, decision-support systems and telemedicine.

Dolan (2009) reports that in 2009, Entra Health Services launched the first commercially available phone app for people with diabetes. It includes Entra's MyGlucoHealth meter, Bluetooth technology and the user's mobile plan to transfer the patient's test results to a portal that can be accessed by the patient and the patient's health practitioner. There are a number of mHealth projects and mHealth applications used in South Africa; but there have been very few that could be identified as being directed to diabetes care (Royal Tropical Institute, 2011). mHealth projects, not only in the field of diabetes, that are found in many developing countries are pilot studies; and they do not seem to be successfully implemented on a large scale (Leon & Schneider, 2012; Marshall, Lewis, & Whittaker, 2013). Some of the reasons for this failure are listed as follows: The lack of integration in healthcare systems; uncertainty of roles of those involved in the intervention; lack of skills to use technology; and a lack of guidance on how to upscale the project (Aranda-Jan, Mohutsiwa-Dibe, & Loukanova, 2014).

In the next section, the considerations to be made when using ICT for the enhancement of patient-centred diabetes care are discussed.

5.4 Considerations for Using Technology to Support Diabetes Care in South Africa

This study aims to create a strategy that enhances the delivery of patient-centred diabetes care through the use of ICT. The study also focuses on the needs and conditions of people in South Africa, which is still a developing country; and presents many practical challenges.

Bridges (2005) states that the use of ICT for socio-economic development is commonplace; however, it fails to deliver on its potential; since sustainable and replicable initiatives fail, due to bureaucracy or the lack of support by local residents. The Bridges Real Access/ Real Impact (RA/RI) framework is a holistic and integrated strategy that provides a roadmap to improve the way that ICT is integrated into healthcare, education, government services and other programs in environments that are developing. As such, it plays a role in helping this research develop an ICT strategy that can be successfully implemented.

In the next section, the methodologies of the RA/RI framework are briefly discussed to illustrate its applicability to this study.

5.4.1 The Real Access criteria

According to Bridges (2005), the Real Access criteria are concerned with ICT access and use, as well as the "soft" aspects regarding ICT. These criteria are used to ensure that the interaction between the technology and the person using the technology are acceptable; and that the use of the technological strategy is also sustainable. There are twelve access criteria to consider (Bridges, 2005):

1. Physical Access to technology

Identify whether there is access to technology; and if so, what technology. Identify the factors that affect access; and what this project can do to help ensure ICT availability and access.

2. Appropriateness of technology

Ensure that the correct type of technology is being used for the particular task at hand.

3. Affordability of technology and technology use

Identify whether the proposed technology is affordable, in particular, for that community.

4. Human capacity and training

Identify whether the people for whom the project is being developed have the required training; and whether they know how to use the technology. If not, then one must identify what training is available; and ascertain how the project can assist in ensuring that the people get the appropriate training for the technology to be used in the project.

5. Locally relevant content, applications and services

Establish whether there is local content available; and whether the content is available in different languages. Determine whether the project would create the relevant content required and/or improve on the current local content.

6. Integration into daily routines

Establish whether the use of technology would be an added burden, or whether it is integrated into the daily lives of the people who are using it.

7. Socio-cultural factors

The socio-cultural factors that may limit the use of ICT, as well as socio-cultural factors that may impact the project positively, must be determined. Ways in which the project could assist in enabling ICT usage must be identified.

8. Trust in technology

This is to ensure that people have confidence in the technology that they are using, and understand the implications that using the technology might have.

9. Local economic environment

It is important to know what the local economic environment is like; as it will have an impact on the use of ICT, as well as the sustainability of the project.

10. Macro-economic environment

It is important to note what areas of macro-economic environment affect the project; and whether the project in turn would have an effect on the macro-economic environment.

11. Legal and regulatory framework

The laws of the country with regard to ICT and technology usage must be known, in order to provide an ICT solution that is within the parameters of the law.

12. *Political will and public support*

The public needs to support the use of ICT in the project, in order for it to be sustainable. The public should also be aware of the overarching government strategies to promote ICT use for the empowering of people. Government should also have the political will to promote ICT4D.

The Bridges RA/RI framework is ideally suited for this study; as the project is designed to improve the delivery of health services to people with diabetes – by introducing technology that the patient and the carer have on hand to aid in their diabetes care.

In order for the strategy to be patient-centred, it is necessary to also consider the effects that technology usage has on the people for whom this strategy is intended. The next section looks at the patient-centred approaches to data and technology.

5.5 Patient-centred Approach to Data and Technology

This study is multi-disciplinary; since it combines technology with healthcare. It is important to know how technology can fit into a patient-centred approach. One does not want to lose the human touch of patient-centred care through the introduction of technology.

Using IT in healthcare has the potential to change the patient from being a passive recipient of care, to being actively involved in making informed choices about the healthcare plan he/she will embark on (Demiris, G., Afrin, L. B., Speedie, S., Courtney, K. L., Sondhi, M., … Lynch, C., 2008). The Picker Institute (Planetree and Picker Institute, 2008) acknowledges the role that technology can play in enhancing the experience of the patient, the healthcare practitioner, as well as family involved in the care of the patient. It also cautions against the possible barrier that technology can create, if it is misused.

The various factors to be taken into consideration, as required by the Picker Institute, when applying technology to a patient-centred approach to healthcare are discussed in the sections below.

5.5.1 Going from data to information

According to the Picker Institute (Planetree and Picker Institute, 2008), the general practice is that data are gathered and transferred to healthcare practitioners who then wade through the data – without much thought for the specific patient's circumstances. The information that the healthcare practitioner derives from the data is clinical, quantitative and impersonal. The Picker Institute (2008) requires that in a patient-centred environment, the healthcare practitioner not only assesses the clinical status of the patient, but rather conducts a much wider assessment that includes emotions and other factors.

The Picker Institute (2008) also states that in a patient-centred environment, the data representation is as important as the data analysis and the use of the data. Reports to patients should be appropriately designed for easy understanding; and reports to healthcare staff can be at a higher level (Planetree and Picker Institute, 2008).

5.5.2 Technology to improve continuous care

The guidelines of the Picker Institute (2008) also state that frequently, patients visit different healthcare centres where their history is not known. Their care is then compromised; as the patient may not disclose fully the current medication taken or the reason for being ill. If hospitals discharge information, such as the medication provided and test results can be

printed or electronically provided to the patient or local healthcare, a more informed and accurate assessment can be made, to ensure better continuity of care.

5.5.3 Technology for prevention and health promotion

The Picker Institute (2008) guidelines state that technology can also be used to promote effective communication by providing computer access: either on fixed line, or Wi-Fi for patients when they visit the clinic. This access can assist in the education of patients by using interactive-computer programs/games, educational videos and sound clips, as well as motivational talks and health tips. It can also be used to encourage participation in health programs, such as walking, eating or exercise programmes.

5.5.4 Technology for enhancing the doctor-patient relationship

Patient-centred care is "high-touch" and requires "soft skills"; but this does not mean it has to be low-tech. The technology just has to be used correctly, in order to ensure that it does not change the look and feel of the patient-centred approach. With regard to the doctor-patient relationship, technology can be applied to enhance communication between doctor and patient that would lead to a better relationship. It should not let the patient feel that he/she is getting less attention than in a face-to-face situation; and the level of interaction with the technology should be acceptable to the patient and the doctor.

5.5.5 Technology for the patient

Technology should be applied in a manner that is unobtrusive, and within the grasp and affordability of the patient. The technology used should be part of the person's routine, and not an extra burden. It should not be a financial burden; and the technology strategy should be adapted to suit the patient. The manner in which the technology operates, as well as any expectations from the user side, and limitations from the technology side, should be well understood by the patient and the carer, in order to avoid miscommunication or expectations beyond the scope of the technological aspect.

It is clear that a wide variety of structures must be in place to help healthcare practitioners and all staff involved in using ICT; so that the technology does not become the barrier to the "human touch".

The next section brings together the conclusions from the literature reviews, in order to identify the strategy required.

The next section looks at identifying and motivating a suitable solution. This is done by looking at the areas identified in the literature-review chapters that should be considered in the way forward.

5.6 Identification and motivation for ICT strategy required

In order to satisfy the objectives of this study, three main areas were investigated, namely, diabetes, patient-centred care and the use of ICT. The relationship between these areas is evident via the literature reviews (Chapters 3 – 5). Each literature review chapter identified aspects that must be considered in the proposed ICT solution. These aspects must be combined, in order to ensure that the ICT strategy suggested helps support a patient-centred approach to diabetes care.

The common aspect that is clear is that there is a lack of knowledge about how to implement the guidelines; there is a lack of knowledge about diabetes, as well as patient-centred care requirements; and lastly, there is a lack of guidelines on how to upscale ICT projects.

The suggested solution is to create a strategy that would address how ICT can support patient-centred diabetes care. The motivation is that with a clear strategy that spell out how to do certain tasks, and when to do them, the main barrier of not having guidelines to upscale ICT projects would be overcome. The strategy should address the many aspects; and the initial points to consider are listed below. These, however, do not comprise the complete list; and this could change as the study progresses.

- The strategy must make use of existing infrastructure and technology, in order to overcome the barrier of waiting for external funds or government intervention.
- The strategy must consider the technology to be unobtrusive; and it must adhere to patient-centred requirements, as mentioned in section 5.5.
- The strategy must consider the ways in which people with diabetes can be supported by using the available technology, in order to improve their adherence to diabetes treatment plans, as well as to improve their knowledge of the condition.
- The strategy must also support those healthcare practitioners who care for diabetics.
- The strategy must address diabetes education and awareness programs;
- The strategy must cater for different levels of technology skills and literacy levels.
- The strategy must consider the requirements for good diabetes care.
- The strategy must be suitable to the private and public healthcare sectors.
- The strategy must be replicable and scalable.

5.7 Summary

In Section 5.2, the rise of technology and its reach in the healthcare domain is clearly indicated. Section 5.3, however, shows that the uptake and application of strategies for diabetes care in South Africa are lacking. With the increase in the prevalence of chronic diseases, which have placed a huge burden on healthcare practitioners, the lack of funding to adequately support chronically ill patients, and the inaccessibility to healthcare for patients, mobile ICT solutions could pose a huge benefit. The use of ICT in helathcare was discussed in section 5.2. However, pilot studies have failed to mature – due to the lack of funds to sustain them after the research is concluded, as well as the lack of guidelines to take a strategy or pilot project to maturity in a larger environment.

This chapter also shows that ICT strategies are bigger than simple mobile-phone apps. It encompasses technology, healthcare plans, as well as the "human factor" and the impact on the user of the technology (section 5.2). The considerations of using technology are also mentioned in section 5.4 and 5.5; and one should ensure that these considerations are addressed, in order to ensure that the use of technology does not impede or conflict with the patient-centred care of people with diabetes. It is also imperative that the effect the technology would have on relationships between patients, health carers and families be studied, in order to ensure that patient-centredness is maintained.

In the next section, the requirements for a strategy formulation approach are established; and the components for the successful implementation of an ICT strategy for delivering patient-centred diabetes care are identified.

6 The Theoretical Foundation of Strategy Formulation

Introduction
Research and Research Process

Chapter 1	Chapter 2
Scope of Research	Research Methodology

Awareness
Problem identification, motivation and objectives

Chapter 3	Chapter 4	Chapter 5
The Diabetes Landscape	A Review of Patient-centred Care	Use of ICT to Support Diabetes Care

Suggestion
Identification of possible solution and theory base thereof

Chapter 6
Strategy Formulation Theory

Development
An artefact created according to the suggested solution

Chapter 7	Chapter 8	Chapter 9
Data Collection and Presentation	Data Analysis and Findings	ICT Strategy Formulation

Evaluation
Demonstration of validity and evaluation

Chapter 10
Applicability of ICT Strategy

Conclusion
Knowledge contribution and dissemination

Chapter 11
Conclusions and Reflections

Chapter 6
The Theoretical Foundation of Strategy Formulation

6.1 Introduction

6.2 The Concept of a Strategy

6.3 Theoretical Foundation for the Strategy-Formulation Process
6.3.1 General strategy approach
6.3.2 Daft's strategic-formulation approach
6.3.3 The Saylor Foundation approach
6.3.4 Goldman and Nieuwenhuizen strategy process

6.4 Summary of Various Strategy-Formulation Processes

6.5 Strategy-Formulation Considerations for an ICT Strategy

6.6 The Strategic Process for This Study
6.6.1 Objectives
6.6.2 Environmental assessment
6.6.3 Strategy formulation
6.6.4 Strategy implementation
6.6.5 Strategy evaluation

6.7 Conclusion

6.8 Summary

6.1 Introduction

The output from the literature review chapters, which formed part of the awareness phase of this research, suggested that a possible solution to the lack of guidelines for patient-centred diabetes care could be addressed through the adoption of a strategy. This chapter therefore, forms part of the suggestion phase; and it requires that research be done into various existing strategies, in order to build a sound theoretical foundation for the strategy process.

In the first section (section 6.2), the concepts of a strategy are discussed. This is followed by the theoretical foundation for the formulation of the strategy in section 6.3. Section 6.4 summarises the various strategy-formulation processes; and in section 6.5, considerations for an ICT strategy are presented.. Section 6.6 indicates the components of the strategy for this study; and a motivation is provided for the development of this particular strategy. The conclusion and the summary follow in sections 6.7 and 6.8.

6.2 The Concept of a Strategy

A strategy is defined in the Oxford dictionary (British & World English: Strategy) as: "A plan of action designed to achieve a long-term or overall aim". This definition indicates two distinct concepts, namely, that of a plan of action, and, a long-term goal. By employing a strategy, one has a bridge between the means and the ends (Nickols, 2012).

Henry Mintzburg (Mind Tools Editorial Team) described a strategy as having 5 Ps, namely, Plan, Ploy, Pattern, Position and Perspective. From this definition, he states that to plan or ploy is a deliberate action that is taken once off; but to sustain your strategy you need a pattern of activities. These comprise daily repetitive tasks to ensure that the strategy stays on track. You also need to position yourself; since you need to do a background analysis of your environment and knowing where you fit in. Having positioned yourself; you are now able to effect a change in the vision or perspective of your own environment and that around you.

In 1972, William F. Glueck defined a strategy as a unified, comprehensive, and integrated plan that relates the strategic advantages of the firm to the challenges of the environment. (Barnat, n.d.). Porter (What is Strategy? Porter 1996, 2010) emphasises that operational effectiveness and strategic positioning differ, in that strategic positioning requires that things be done differently or uniquely, in order to sustain a strategy. A strategy is influenced by its actions and the environment in which it exists. Porter focuses the strategy on the competitive forces and the strategies. Rumelt (2011) defines a strategy as a coherent set of analysis,

concepts, arguments and actions that respond to a high-stakes challenge. Rumelt also states that strategy can only be successful if it has a logical structure or kernel; and all the elements in the kernel are present. These elements comprise a diagnosis, a guiding policy and a coherent plan of action.

There are many definitions of a strategy; but all the definitions indicate that there is not only one aspect to consider when defining a strategy. All of the definitions and descriptions that were investigated for a strategy, clearly indicate that there are common concepts shared by the various schools of thought. These concepts are:

- a broad overview or plan that looks at the internal and external factors;
- the challenges of the environment must be considered;
- a clear set of action must be included; and
- it must look at sustainability over the long term.

In the next section, the theoretical foundation of a strategy-formulation process is discussed. After the background on various formulation approaches has been introduced, the method for this research is presented; and the reasons for choosing are also explained.

6.3 Theoretical Foundation for the Strategy-Formulation Process

Strategy formulation forces an organization to look carefully at the changing environment and to be prepared for any possible changes that may occur (Saylor Academy, 2013).

Karami (2012) states that the stages of strategic management are threefold. Firstly, awareness of where the organisation's internal strengths and weaknesses are identified, as well as an awareness of threats and opportunities from the external environment. This is followed by a strategy formulation, which includes considerations of diversification, resource allocation, entry into international markets and joint ventures and partnerships. The third stage is strategy implementation. This includes creating the right environment for the strategy formulation to be executed. This environment is created via a supportive organizational culture, employee commitment, and discipline and leadership from management.

In the next section, variations of the above process are investigated, in order to establish the best fit for this study.

6.3.1 General strategy approach

The general strategic management processes that take place comprise six consecutive steps identified by the Saylor Foundation (2013), as follows:
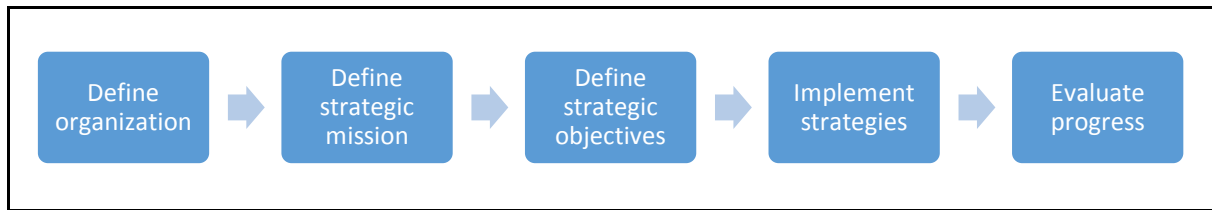
Figure 6-1 General Strategy formulation approach Source: (Saylor Academy, 2013)

Step 1: Define the organization

In this step, you need to identify who your customers are and whether your product satisfies their needs.

Step 2: Define the strategic mission

This is the guide for delivering the organization's plans; and it is the long-term perspective of where the organization sees itself. It underpins the ethos and values that a company has.

Step 3: Define the strategic objectives

The strategic objectives are achieved by giving each individual his own objectives and targets to achieve. These individuals must be made aware of their contribution to the strategic objectives of the organization as a whole.

Step 4: Define the competitive strategy

The organization needs to establish where it sits in the environment and also to identify how it would react to external competitive factors. It should also determine what its resources are; and how they are distributed.

Step 5: Implement strategies

A strategy is of no use if it is merely formulated and not implemented or put to action. The tactics required for the success of the strategy are what determines how it is implemented.

Step 6: Evaluate progress

Regular evaluation of the organization's progress is vital to ensure the success of the strategy. If during the evaluation, it is found that there are certain goals that are not being met, the strategy must be adaptable and flexible enough to accommodate a change in tactics.

6.3.2 Daft's strategic-formulation approach

Daft (2003) listed the strategic process as having three main areas, each of which can be broken down into smaller tasks, in order to achieve a successful strategy. The three areas are listed below and illustrated in Figure 6-2 (Daft, 2003):
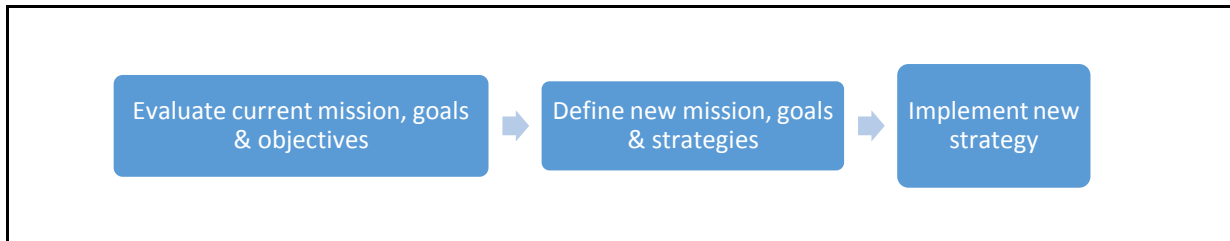
Figure 6-2: Daft Strategic Formulation approach Source: (Daft, 2003)

Area 1: A company must evaluate its current missions, goals and strategies

This involves scanning the internal environment to identify the core competencies of the company, its internal values and its synergy with its partners.

Area 2: Define new mission, goals and strategies

This step is where the organization's future goals are defined and the steps needed to meet these goals are underpinned through various tactics. The formulation of the strategy in terms of corporate, business and functional strategy must be clearly spelt out.

Area 3: Implementation of the new strategy

The implementation of the strategy requires leadership, employee participation, structural design, the allocation of resources, information and control systems. This is a dynamic step and requires constant feedback and adjustments, in order to ensure that the strategy stays on its course.

6.3.3 The Saylor Foundation approach

This approach is discussed in this section; and it is depicted in Figure 6-3 (Saylor Academy, 2013).
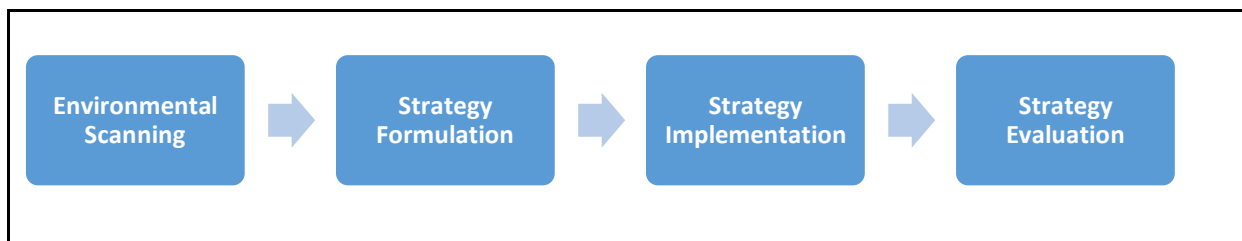
Figure 6-3: Saylor Academy Strategic Formulation Approach Source: (Saylor Academy, 2013)

Step 1: Environmental Scanning

This is the process of collecting, analysing and providing information for strategic purposes. It helps in evaluating the internal and external factors influencing an organization.

Step 2: Strategy Formulation

This is the process of deciding the best course of action for realizing the organizational objectives, and hence achieving the organizational purpose.

Step 3: Strategy Implementation

This step implies making the strategy work, as intended, or putting the organization's chosen strategy into action.

Step 4: Strategy Evaluation

This is the final step of the strategy-management process. Evaluation makes sure that the organizational strategy, as well as its implementation, meets the organizational objectives.

6.3.4 Goldman and Nieuwenhuizen strategy process

Goldman and Nieuwenhuizen (2006) suggested the formulation approach, as indicated in the Figure 6-4.
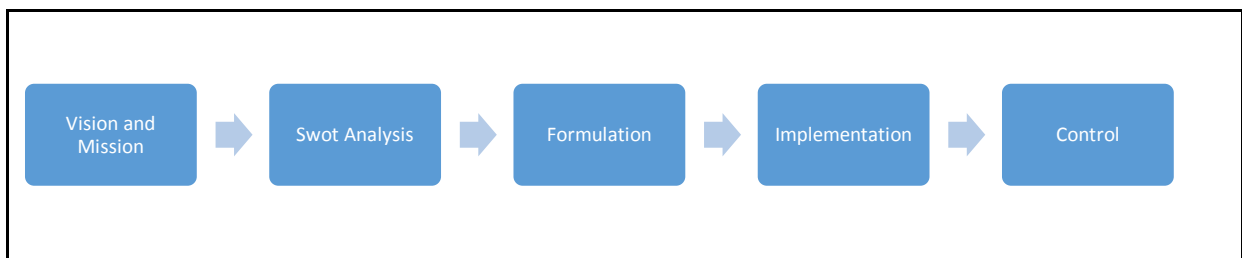
Figure 6-4: Goldman & Nieuwenhuizen Strategic-Formulation Approach Source: (Goldman & Nieuwenhuizen, 2006)

Step 1: Vision and Mission

The vision is the ultimate ambition of where the organization would like to be. Although it is future-oriented, it must also allow for flexibility. It is what gives the organization its sense of purpose and its long-term direction.

The mission is the purpose statement of what the organization is doing to achieve its vision. The mission defines why the organization exists, for whom it exists, and how it hopes to achieve its goals. The mission identifies the products, the type of customer it caters for, and the quality guarantees it makes. It also indicates how a company views its employees and their value to the organization, the management ethos, as well as the style of the company, and lastly the social and environmental responsibility of the organization.

Step 2: Swot Analysis

The "SWOT" analysis is the term used when an organization investigates the internal and external factors that affect it by studying the Strengths, Weaknesses, Opportunities and Threats those factors pose. The importance of a SWOT analysis is that it helps an organization to exploit the opportunities it encounters and to apply its strengths, whilst offsetting threats and correcting the weaknesses that have been identified.

Step 3: Strategy Formulation

After reviewing the information obtained from the SWOT analysis, the organization mission must be converted into specific plans, in order to put the direction of the organization into action. This means that the problems identified, the targets set, the actions and processes required to achieve the goals must be defined. The goals must be achievable, measurable, have a timeframe, and able to be used as a yardstick in all key areas. Strategic formulation does not only deal with the crafting of actions; but it also creates the overall strategy, which can be used to pursue the actions.

Step 4: Strategy Implementation

Strategy implementation is the development of detailed, short-term plans for carrying out the projects agreed on in the strategy formulation. It involves obtaining resources, creating structures, and defining action plans and the processes to be followed, in order to achieve the set objectives. It requires precise co-ordination; as it takes place as a problem-solving action.

Step 5: Control

This phase is important; as it is the actions in this phase that will determine whether an organization is on-track to meet its goals. It is also through continuous checking and monitoring during the implementation that any changes in the environment are identified; and decisions can be made on whether the implementation needs to adapt to these environmental changes.

6.4 Summary of Various Strategy-Formulation Processes

The strategy-formulation processes discussed in section 6.3, all have distinct steps to follow. Although the steps may vary in terms of the depth and detail that the various approaches describe, they all have similar and overlapping concepts. The steps all start with the organization determining where it wants to be. This means that the organization must set specific, measurable, attainable and time-specific objectives/goals that it wants to achieve. Next, the organization must decide where it currently fits into the environment. In order to know this, the organization needs to conduct an internal investigation into all the internal

strengths and weaknesses, in order to capitalise on the strengths and to remedy the weaknesses. In order to understand where the organization stands, it also needs to know who its competitors are, and what influence the external factors have on the organization.

After analysing the current state of affairs, the organization must formulate its strategy in terms of an exact logical structure that acts as a guide to develop the strategy. Once the strategy is formulated, it must be implemented through execution of the pre-defined coherent sets of actions identified in the strategy formulation. The final step is to evaluate or take control of the implementation.

Thus, we can see that all the approaches start with looking at where the organization is, identifying where it wants to be, and how it should get there, and how to use monitoring to maintain its course. The literature also shows that the first two steps are sometimes swopped; but nevertheless, they are always included. Figure 6-5 depicts the steps of the strategy formulation, as combined by the researcher.
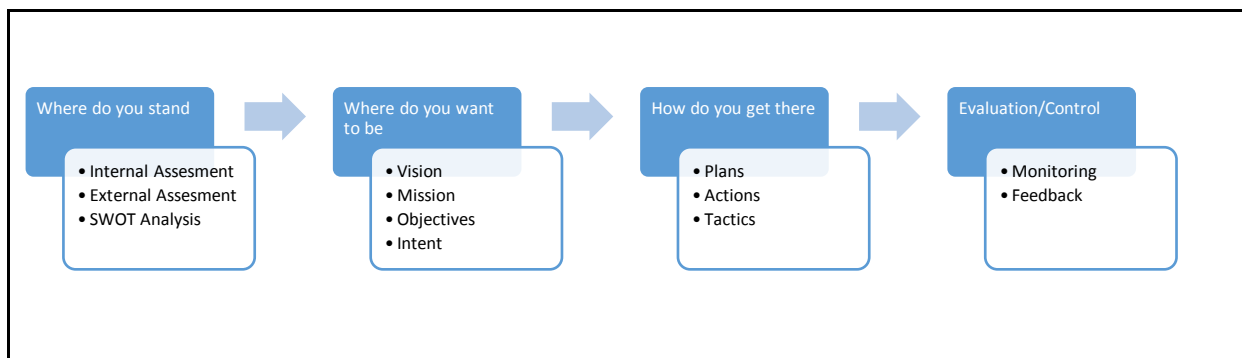
Figure 6-5: Combined Strategy Formulation

In the next section, the strategy formulation process followed by this study is explained.

6.5 Strategy-Formulation Considerations for an ICT Strategy

Whilst strategy has moved from a concept on the battlefields to a common term in the business world, it should also be recognised that ICT has a huge impact on strategy. According to the University of Nottingham (Toolkit: Strategic ICT), there have been many attempts to create ICT strategies for businesses and/or to map the strategy formulations to acceptable ICT strategies. Governments, world banks, health organizations, schools and tertiary institutions all have ICT strategies. It is important to note that these ICT strategies come from the corporate strategy; and they have, as their overriding purpose, the delivery of the corporate strategy (Duke, Jordan, & Powell, 2008). This implies that the same basic

principles should be applied when developing ICT strategies, as those for corporate or organizational strategies.

In this study, the ICT strategy is led by various strategies set by the government of South Africa (SA) that are within the scope of this research. As such, this strategy does not aim to establish its own vision and mission, but instead aligns itself with the vision and mission of the SA Government.

The SA government indicated its commitment to stem the increase of non-communicable disease by adopting the United Nations Millennium Declaration that has 8 Millennium Development Goals (MDG) for the combating of HIV/AIDS, malaria and other diseases; it is known as MDG 6 (Information Services Section - Research Unit, Parliament of the Republic of South Africa and the United Nations Development Programme (UNDP), 2011). A further commitment by the SA government is shown in its National Development Plan launched in 2012, whereby the government promises to promote active lifestyles and balanced diets; and to control alcohol abuse to reduce non-communicable diseases (National Development Plan 2030: Health, 2012).

The 2030 Development plan also has various Strategic-Infrastructural Projects (SIP) of which SIP 15 speaks to expanding access to communication technology. In particular, it states that the government wants to provide broadband coverage to all households by 2020; and that the government will co-invest in ICT infrastructure for township and rural access, as well as for e-government, school and health connectivity (National Infrastructure Plan, 2012).

The main objective of this research is to devise an ICT strategy to support patient-centred diabetes care. This should be possible by using the current technologies, and not require the external interventions mentioned. These overarching goals of the government, however, could advance this project should they be implemented. In the meantime, this project assists people by making use of the available technologies.

The next section looks at various concepts that have been presented in the strategy-formulation process models discussed in section 6.3; and it identifies the components most appropriate for devising a strategy-formulation process that is relevant to this study.

6.6 The Strategic Process for This Study

The various strategy processes that are discussed in section 6.3 are all linear in their approach. This sequential manner to strategy formulation does not satisfy the needs of this

study; and therefore it necessitates the need to devise an adaptation of the general strategy-formulation process. The adaptation is required; because there is a need for a non-linear approach to the objective setting and environmental assessment. This non-linear approach is required due to the fact that the study started out with some objectives already set out, before identifying the factors in the environment that could affect the objectives. By following the steps for strategy formulation, it should become evident that the objectives need to be refined. It may also happen that possible new objectives could also be defined. The literature review showed that there were no strategies with an iterative process, as required for this study; hence, the researcher had to devise an adapted strategy-formulation process.

The strategy-formulation process used as part of this study is shown in Figure 6-6; and it depicts the researcher's adaptation from various literature studies. There are four phases in the newly defined strategy process. Phase 1 is the setting of objectives and environmental assessment. This corresponds to the steps from Daft's strategy as well as the Saylor foundation (Section 6.3.2 and Section 6.3.3). This are the pre-formulation steps required to fully understand what the objectives are, and how the strategy fits into the environment, in which it is implemented. In this process, it is clear that the objectives and environmental assessment have a direct influence on each other. This is an iterative approach, which starts with a main objective that is used to analyse an environment. The findings of the environmental analysis are then used to determine further objectives that should result in satisfying the main goal.

Phase 2 is the formulation of the strategy. This requires that each sub-objective identified is diagnosed in terms of what causes the problem. Each diagnosis requires the development of a high-level guiding policy to guide the stakeholders with regard to how to overcome the problem. A detailed action plan is also required to complete the formulation phase. This corresponds to the requirement in Goldman and Nieuwenhuizen's strategic process theory (Section 6.3.4).The output of this study is the strategy itself, which is a product of phase 2. Phases 3 and 4 are the implementation and evaluation phases; and they require the identification of the stakeholders and their roles, as well as the manner in which feedback and monitoring of the strategy are handled. An overview of each phase is described in the next section.

6.6.1   Objectives

The strategic formulation chosen for this study starts with defining the objectives of the strategy. The objectives are explicit, measurable and time-bound; and they guide the overall

direction and path to be taken. There is no explicit vision or mission for this study, rather the various strategic policies of the government and the department of health with regard to non-communicable disease, and specifically diabetes, is used for this study. The objectives are the driving force that moves the sector forward towards overcoming the challenges and achieving the desired long-term goals.

The steps to define the objective are explained in the delineation of the study and the main objective is identified in Chapter 1:

This research aims to develop an ICT strategy that aids in supporting a patient-centred approach to diabetes care.

The objectives of the strategy must be in line with this; and they are refined in sections 9.3 and 9.4.

6.6.2 Environmental assessment

In this stage of the strategic process, the internal and external factors that have an effect on diabetes are studied. For the purpose of this study, the internal and external factors relating to the use of ICT in diabetes care is the focal point of the assessment. The assessment for this study is done through interviews with stakeholders in the diabetes field. This step could possibly result in sub-objectives that should be met, in order to achieve the main objective of the strategy.

The environmental assessment is discussed in Chapter 7. The findings of the environmental assessment must be validated; and this is done through triangulation of the findings of the literature reviews, and the interviews. This cross-referencing is discussed in detail in Chapter 8; and the results thereof yield the details required to formulate the ICT strategy for patient-centred diabetes care.

6.6.3 Strategy formulation

Rumelt (2011) called the strategy formulation the "kernel" of the strategy approach. He stated that there are three elements to take into account to ensure the quality of the strategy, namely, diagnosis, the guiding policy and a set of coherent actions.

For this study, strategy formulation is Phase 2 of the process. Each sub-objective identified is addressed by the diagnosis that would indicate the critical aspects from the environmental assessment, the obstacles that must be overcome and a thorough understanding of the situation as a whole.

The guiding policies are the policies that organise the various actions to be taken into a focused, and co-ordinated effort. This helps establish collaboration, co-ordination and the sharing of information amongst the stakeholders, in order to deliver patient-centred ICT care to people with diabetes. The guiding policies are the broader solution to the problem diagnosed.

A set of coherent actions are the exact steps, policies, resources commitments and actions that are designed to facilitate the guiding policies. These are the actual actions that must be taken by the various role players, in order to transform the goals into actionable objectives.

The formulation of the strategy is discussed in Chapter 9. Each sub-objective is diagnosed and a guiding policy is developed as a high-level guide to the problem. The action plan of the policy gives detailed steps on how to solve the problem.

6.6.4 Strategy implementation

Phase 3 of the process is the strategy implementation. This involves executing the set of coherent actions by following the guiding principles and performing the actions identified in the strategy-formulation stage. The implementation stage involves all the stakeholders that have been identified in the environmental-assessment stage. Implementation ensures that the guiding policies fit into the context of using ICT to deliver patient-centred care to diabetes patients. This step involves deployment of the strategy into the health sector and involving all the stakeholders, so that they are aware of their role in this strategy. It means changing the method of care/service delivery to people with diabetes – by following the strategy devised. It means that the role of the healthcare practitioner, as well as that of the people with diabetes must change.

The strategy implementation is discussed in Chapter 10, where a scenario is used to identify the stakeholders and their roles, as well as the action plan that they need to perform.

6.6.5 Strategy evaluation

This step is the last in the strategy process; and it allows all the elements to be linked together and criticised for their effectiveness in achieving the objectives set out. It also supports the success of the strategy by allowing for continual assessment, feedback and possible re-alignment or corrections to take place. The implementation stage evaluates how well the set of coherent actions has satisfied the devised strategy; and it identifies any gaps that should be addressed. A possible measurement matrix or tool to use in this step, is identified. The strategy evaluation is discussed in detail in Chapter 10.

6.7 Conclusion

The study of the various theoretical models of the strategy-formulation process, in section 6.3, indicated that:

1. All strategy processes follow the same steps, albeit some are more detailed than others are; or they may differ in sequence.
2. All strategies must indicate
   a. where the project currently stands
   b. where the project wants to be,
   c. how to get there, and
   d. how to evaluate its success.
3. A strategy process suitable to this study is developed, allowing for an iterative approach to objective setting and environmental assessment.
4. The strategy must address how ICT can support diabetes and patient-centred care.
5. This strategy is driven by the overarching vision and mission of the government of South Africa, in order to lower the prevalence of diabetes.

The strategy process for this study is depicted in figure 6.6 and the chapters that relate to the various steps are also indicated.
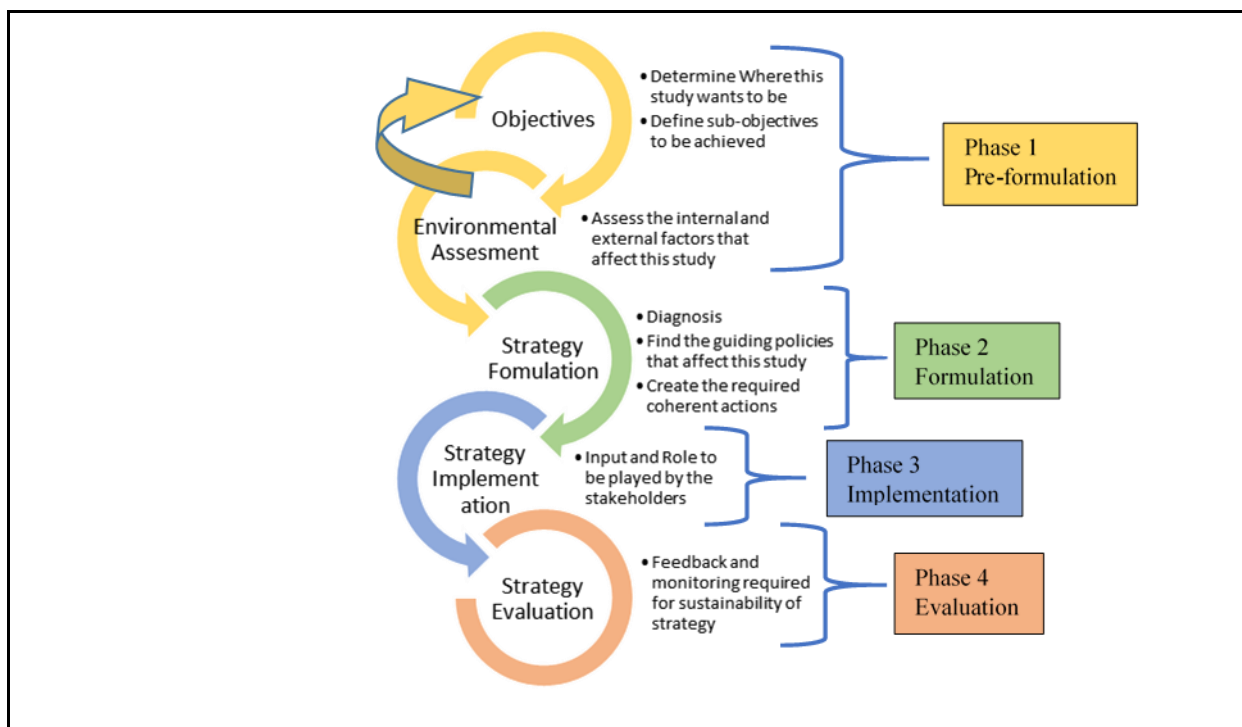
Figure 6-6: Strategy Process for this Study

6.8   Summary

In this chapter, the various theoretical models for devising a strategic-formulation approach have been discussed. This theoretical background allowed the researcher to devise a strategy-formulation approach that is suited to this study. The motivation behind the strategy approach suggested was discussed, in addition to a broad overview of what it addresses in each stage.

The strategy process shows that there are four phases involved for this study. Phase 1 consists of two steps, namely, that of setting initial objectives, and then performing an environmental assessment that would help identify further sub-objectives needed to satisfy the main objective. Phase 2 is the formulation phase; and it requires an exact diagnosis of the problem, as well as high-level guiding policies on how to solve the problem. The guiding policies must point to exact and detailed action plans that must be implemented. Phase 3 is the implementation of the strategy, as formulated in phase 2; and it requires that the stakeholders and role-players of each action plan be identified and notified of the role they have to play in the strategy implementation. The final phase is the evaluation phase; and it requires that some measurement of the performance is done through feedback and monitoring of the process.

These four phases are discussed in the next couple of chapters, starting with Phase 1, in Chapter 7; that is to define objectives through the data collection and the environmental assessment.
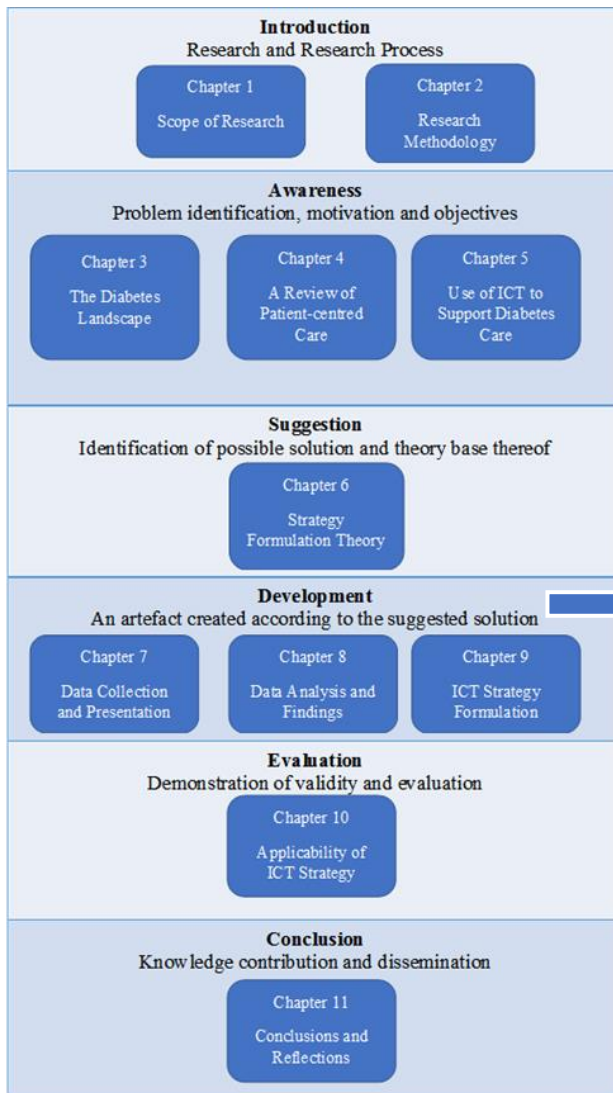
Chapter 7
Data Collection and Presentation

7.1   Introduction

7.2   Objective Setting

7.3   Environmental Assessment
7.3.1   The Data Collection
7.3.2   Identification of interviewees
7.3.3   Profile of the interviewees
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7.4   Consolidated Raw Data
7.4.1   What are the requirements for successful diabetes care?
7.4.2   The availability of a patient's health records
7.4.3   Type of technology currently used in diabetes monitoring and management
7.4.4   Current patient-centredness in the work place
7.4.5   Staff care and wellness
7.4.6   Other additional comments

7.5   General Summary of Data Collection

7.6   Summary

7.1 Introduction

In this chapter, the first step towards developing the artefact is presented. This step is also part of the objective setting and environmental assessment, as discussed in Section 6.6.1. The environmental assessment is required, in order to establish any sub-objectives that must be met to satisfy the main objective of the study, as determined in chapter 1. The method of data collection is explained in section 7.3; and the consolidated data are presented in section 7.4. In section 7.5, the data from the interview sessions are collated; and the general opinions from the interviewed experts are presented.

The main aim of the study is to investigate the use of ICT in patient-centred diabetes care. The data collection and their subsequent analysis form part of the objective-setting phase of the strategy. The environmental assessment aids to define the sub-objectives required to achieve the main objective. These two steps are the pre-formulation steps; and they are required to ensure that the strategy is in line with the initial objective, as set out in Chapter 1, as well as to identify any further objectives that a literature review might have failed to identify, to its neutral nature.

7.2 Objective Setting

The objectives of the study have been discussed in Chapter 1. This section serves to examine the objectives of the strategy – in line with the strategic process, in order to ensure that these are in line with the objectives of the study. As shown in Chapter 3, Figure 3-3, the SA government – in its bid to aid the reduction of non-communicable diseases – launched an Integrated Chronic Disease Management Model to be implemented, in order for clinics to achieve "Ideal Clinic" status. This model shows that for the purpose of this study, the environmental factors to consider span the entire model at all the levels. There would be interaction at the community level, and with the monitoring and evaluation activities for assisted self-management, and at the level of health promotion that would lead to an improved operational efficiency and quality care, individual responsibility, as well as an activated and informed population.

The components that would be affected by this strategy are mobile technology, as well as health information.

7.3 Environmental Assessment

Phase 1 of the strategy process requires that an environmental analysis be performed, in order to understand better the environment in which the study lies. In this section, the internal and external environmental factors that play a role in the treatment of people with diabetes are explored. The use of, or the failure to use, ICT in the treatment is also investigated. The outcome of this analysis leads to sub-objectives that should assist in achieving the main objective of this study, and thence to the strategy formulation.

In order to understand the environment better in which a person with diabetes lives, both the private sector and the public health sector are examined. The examination consists of the data collection, in the form of semi-structured interviews, with experts in the fields of diabetes care, people with diabetes, as well as those living with people with diabetes (Chapter 6).

7.3.1 The Data Collection

The data collection was done through semi-structured interviews with experts in the field of diabetes care, people with diabetes, as well as persons living with a diabetic person. Ethical clearance was received by the NMMU ethics committee, based on the protection of the anonymity of the persons being interviewed and the participants giving their consent to participate willingly in the interviews, knowing that they may withdraw freely should they so wish at any point. The information required for this study would be sufficient without having to interview people with diabetes who are a vulnerable group. The ethical clearance certificate is attached as Appendix B.

The next section briefly explains how the interviewees were selected and how the interviews were then conducted.

7.3.2 Identification of interviewees

In the initial stages of this study, many articles were read for the purpose of gaining information on diabetes. It became clear that diabetes was a complex condition requiring a variety of interventions and medical care from many different doctors and specialists. The researcher ensured that the people interviewed covered the range of various medical care options required by the diabetics; as this would give a broad picture of what is involved in diabetes care. The South African Diabetes Association was contacted to assist in the identification of suitable interviewees.

The participants that were willing to participate included:

- Diabetes educators – in the private and public health sectors

- Nurses working with specialist diabetes doctors in the private sector

- Doctors working in public healthcare focusing on chronic diseases

- Doctors in private healthcare

- Dieticians in academia with diabetes expertise

- Optometrists in private healthcare

- Persons with diabetes who run a support group

- Persons living with a diabetic person

- Academics in the health sciences, who focus on diabetes research

7.3.3 Profile of the interviewees

There were nine interviewees, who participated in the research. A breakdown of the profile of the interviewees, as captured on the consent form, is in Table 7-1:

Table 7-1 Interviewee Profile

Experts	Occupation	Years of experience/	Functions relating to diabetes	Current health sector/ Other Experience	Gender
E1	Dietician/ diabetes educator	4	Primary healthcare diabetes educator, diabetes research, public diabetes awareness programmes	Private and public health sector	Male
E2	Diabetes Nurse/Educator	11	Discuss Treatment plan, Assist with medical aid queries	Private/Public Health Sector	Female
E3	Optometrist	15	Eye Care	Private Health sector	Male
E4	Doctor	>30	Patient consultation, diabetes treatment plan, diabetes education, referrals	Public/Private Health Sector	Female
E5	Doctor	>25	Endocrinology specialist, consultation, diabetes treatment plan, referrals	Private/Public Health Sector	Male
E6	Academic (Dietetics)	>25	Academic expert, Diabetic lifestyle planning, diabetes research	Higher Education/Private and Public Healthcare Sector	Female
E7	Academic (Diabetes)	>25	Academic expert, diabetes research	Higher Education sector/Private and public healthcare sector	Female
E8	Support group Leader	>25	Diabetes educator, public awareness	South African Diabetes	Male

			campaigns	Association	
E9	Person living with person with diabetes	>25	Diabetes educator, awareness campaigns, support group member	South African Diabetes Association	Female

As presented in the table, the experts' years of experienced ranged from 4 years to more than 30 years; and they all have high levels of expertise in the field of diabetes. The doctor in the private sector (E5) is internationally recognised for his work in the field of diabetes, as well as for the patient-centred approach of the facility that he runs. All of the experts are South African, and have medical qualifications – except for the support group leader (E8) and the person living with a person with diabetes (E9). There was no need to interview people with diabetes as the information required for this study would be easily obtained through the interviewees identified above. The focus is on treatment guidelines and as such people with diabetes often do not have the required knowledge in this area.

Although some of the medical experts currently work in the private health sector, or in academia, they had all, at some stage, been exposed to the public healthcare sector. The research is focusing on the South African landscape; and as such, the selection of the interviewees intentionally would exclude experts from outside the SA borders. The interviewees were selected for their expertise in the field of diabetes, and for their knowledge of the private and public healthcare sectors of people with diabetes. The researcher also intentionally, did not select people from the general population of the country, as the study focuses on current practices and procedures; and this information is readily available from the experts interviewed. The researcher also felt that the level of literacy and diabetes knowledge of the general population would prevent them from answering many of the crucial questions.

7.3.4 Interview methods

The participants were requested to sign a consent form (Appendix D) at the onset of the interview. The interviews were semi-structured and all the interviewees received the same basic questions. The responses of the interviewees led to discussion or further questions, depending on the particular person's field of work. The interviews varied in length from 30 minutes to 90 minutes, depending on the time constraints of the participants, and also on the information that they were sharing. Some of the interviews were voice-recorded and then transcribed on to a hardcopy; whilst the responses of the participants who did not give consent to be recorded, were directly captured on paper.

The responses of the 9 interviewees (n = 9) have been collated; and they are reflected in the following section.

7.4   Consolidated Raw Data

The semi-structured interview data is attached as Appendix E.

In some cases, the questions were not answered by all the participants. The following is a summary of the responses to the various questions.

7.4.1   What are the requirements for successful diabetes care?

The first section of the interview concentrates on the requirements for successful diabetes care. A total of eight questions are asked in this regard; and the interviewees responded in terms of their own experiences.

7.3.1 The Requirements for successful diabetes care		
Q1	*In your position what are the most important aspects to successful diabetes care:* - Patient education about diabetes was the most important factor relating to diabetes care (All respondents) - Educating basic carers was also mentioned by most (E1,E2, E4- E9) - Commitment to a change in lifestyle was essential (All respondents) - Acceptance of the condition (E1, E8, E9) - Medicating correctly (All respondents) - Lifetime commitment to lifestyle change (All respondents)	
Q2	*How do traditional beliefs and/or misconceptions affect the aspects above?* - Being overweight is a sign of health and wealth thus very difficult to convince African people with diabetes to lose weight (All respondents) - Don't trust glucometers that store data and see it as a spy tool referred to as an "Impimpi" (E4, E6) - Use traditional herbs and medicines such as aloe and stop using prescribed drugs rather than using them in conjunction with prescribed medicines (E1, E4, E6-E9) - When the symptoms ease they believe they are healed and stop medication until next low point is reached (E1, E4–E9)	
Q3	*How does a patient's diabetes knowledge and level of understanding affect the treatment of diabetes?* The response to this was unanimous amongst the people interviewed in that they all agreed that the more you know the better you can take care of yourself. They also agreed that knowledge is not enough to ensure consistent self-care and adherence and that this only came with commitment to lifestyle change.	
Q4	*How do you educate afflicted patients about diabetes?* - Conversation maps and support groups but this happened very seldom (E1, E4, E7) - In the private sector, they take time with each patient to discuss individual needs and ways forward. They also in addition advice patients to attend Diabetes SA monthly talks (E2, E5) - The diabetes educators worked in both private and public health and made use of talks and discussions as well as questions and answer sessions at these talks (E1, E8, E9) - In the public sector doctors have minimum time and focussed on the current problem of the patient and the medication to be taken. Some explanation is given if the diabetes medicine changes to ensure the patient that it is the same or better than the previous one (E4, E6, E7) - The doctors in the private sector spend time with individuals or have their own diabetes nurse who does the education with each patient (E1, E2, E5)	

	• The South African Diabetes association holds monthly meetings where members are addressed by experts in the field of diabetes and educated on various topics in order to raise diabetes awareness. They also do home visits where people are educated on a one-on-one basis about the condition and how to care for oneself (E1, E8, E9) • Patients have to often seek their own source of information e.g. websites but don't always know which sites to trust (E1, E2, E5, E6, E8, E9) • There needs to be a bigger push from government (E1, E2, E4, E6-E9)	
Q5	*How do you ensure that patients adhere to their treatment plan?* • This is very difficult for all to do (All respondents) • Patients are encouraged in the private sector to keep in touch with their diabetes educator or nurse in case of difficulty (E1,E2,E5) • Sometimes text messages are used as reminders for visits(E2, E3, E5) • Support groups use text and private calls to help (E8, E9) • In the public sector adherence to treatment plan is not followed up(E4, E6-E9)	
Q6	*What process or cycle of actions lead to a patient seeing you and where do they go to after your consultation with them?* • In the private sector normally patients have been diagnosed by a GP and request a specialist thereafter. This specialist doctor will then refer the person with diabetes to any other medical consultant needed e.g. ophthalmologist, podiatrist, dietician etc. If other complications do not arise then the patient sees the diabetes nurse or educator. (All respondents) • In the public sector patients are diagnosed very late and already have many complications. Visits to the various doctors take very long and often require multiple visits to the hospital. (All Respondents)	
Q7	*How often should a patient visit you and do they adhere to this?* All patients should see the doctor at least once a month or a minimum of twice a year according to diabetes guidelines. • In the public sector patients come when they need medicine or have a new complication. These visits are not regular but rather sporadic due to the difficulties experienced in getting to a medical facility. Visits to specialist only happen on referral, which means that the patient has already experienced some form of complication. Long time-lapses occur between referral and seeing a specialist unless the patient is admitted. (E1, E2, E4-E9) • In the private sector, visits are more regular; but they are often determined by the type of medical aid the person has and what is covered. People do not want to pay out of pocket for visits (E1, E2, E5, E8, E9) • Number of visits to specialists in private healthcare are set by medical aids (E1, E2, E8, E9) • Public healthcare responds to acute cases for referral to specialists (All respondents)	
Q8	*Do you practice any form of preventative action with regard to diabetes e.g. discuss how diabetes can be avoided with high risk patients or run education programs?* • There is no preventative action in the public sector or the private sector. The people treated by the doctors already have been diagnosed. Doctors in both sectors stated that there is a need for education on diabetes to aid in early detection and to avoid complications that come with the lateness of the diagnosis. There are no mechanisms in place to allow for early detection or to identify high-risk people. (All respondents) • The members of the South African Diabetes association mentioned that they encourage their members to bring guests with to the monthly talks irrespective if the guest has diabetes or not and in this manner try and make people aware of diabetes (E1, E8, E9)	

7.4.2 To what extent does a partnership exist between the patient and the interviewee?

This section determines the extent to which there is a **partnership** between the patient and the interviewee, when working on a treatment plan.

7.3.2 Partnership between patient and healthcare practitioner		
Q1	*In your position, what type of relationship do you think is important to have between you and the patient?* • The most important type of relationship to have is that of mutual trust and respect (All respondents)	
Q2	*Do you ask what treatment the patient wants done, is there a discussion about various diabetes treatment options with the patient or is it more a case of giving the patient instructions of what to do?* • In the public sector it is strictly a case of this is what you have to do and when you have to do it. There is no discussion about treatment options. (All respondents) • In the private sector there is a slight collaboration between doctor and patient but mostly patients are not knowledgeable enough to request specific treatments so they do follow the doctor's advice.(E1, E2, E5, E6)	
Q3	*Do you, together with the patient, agree on a way forward for the treatment plan and how is this treatment plan conveyed to the patient?* • In the public healthcare sector the treatment plan is explained verbally and the patient is expected to follow it. Sometimes additional literature, such as pamphlets, is distributed to patients (E4, E6) • In the private sector the treatment plan is explained verbally and the patient is expected to follow it, however additional literature is provided in most cases and frequent consultation and guidance is given by the diabetes nurses.(E2, E5, E6)	
Q4	*Are there processes in place to reinforce and assess the understanding of the information and instructions provided to the patient before leaving the clinic?* • Most private healthcare providers that specialise in diabetes care have a nurse or diabetes educator that can explain anything further to the patient and can also consult with the patient at a later stage.(E1, E2) • In the public sector, there is no way to reinforce the instructions. (E4, E6, E8, E9)	
Q5	*Are there any tools available to help the patient manage his/her medication, appointments and other health specific needs?* • In the private sector, some of the doctors' advise the patients to use mobile applications that assist with reminders and tracking of condition but this is not a widespread practice. Some of the doctors also make use of SMS notifications to patients to remind them of their next visit.(E2, E3, E5, E8, E9) • In the public sector, there is no assistance for managing the condition outside the hospital or clinic.(E4, E6, E8, E9)	

7.4.3 Communication between carer and patient

This section determines the **communication** between the patient and the healthcare practitioner. This relates to the amount of understanding there exists of the patient's illness, his/her experiences and his/her environment as a whole.

7.3.3 Communication between patient and healthcare practitioner		
Q1	*Are patients encouraged to ask questions about their diabetes?* • In the private sector, they are encouraged but it is found that the patients don't really know what to ask. Many patients will rather take to the internet where they can google something without feeling stupid.(E1, E2, E4, E5, E8, E9) • There is no time to allow patients to ask questions and even if there was time their level of knowledge and understanding is such that they do not know what to ask.(All respondents)	
Q2	*Do you know the roles of the various carers and family members of a patient?* This question was answered by all but only the dietician (E6) and diabetes nurses in the private sector (E2) were really the ones who knew the role of the people around the patient. One doctor in the private sector (E5) also knew the roles.	
Q3	Is *there an accurate track-record of patients' visits and progress?* • Yes, in the private sector the various clinics and private practices have computer systems that keep good records as well as track the readings/numbers of patients' well(E1, E2, E3, E5) • In the public sector this was a big problem. If blood glucose was monitored and showed a spike or dip it did not have any comments explaining this, so one did not know why it occurred. The filing of paper work was also done very poorly which led to files being lost or misplaced. If a file was found after some time then it had gaps of information missing in it for the period pf time that the patient still visited the hospital or clinic without access to his/her file. (E1, E4, E6-E9)	
Q4	*Would you contact a patient if he/she should miss an appointment or is overdue for medication?* • This only happened in some cases in the private sector where the diabetes nurse would follow up on the patient (E1, E2). • This did not happen at all in the public sector.(All respondents) • The auxiliary medical carers such as the optometrist did not follow up if a patient did not return for a visit. (E3)	
Q5	*Are the families of patients encouraged to ask questions? If so how and when can they do so?* • This rarely happens (All respondents) and the only participants that encouraged family involvement were all affiliated to the same private health sector organisation.	
Q6	*Is there a process in place to disclose unanticipated outcomes to patients and families?* • This was not something that the health carers in private or public sector have considered.(All respondents)	

7.4.4

7.4.5 Other factors influencing patient-centredness in the workplace

This section determines **other factors** that determine the patient-centredness of the healthcare environment, or the practice in which the interviewees are involved.

	7.3.4 Other factors determining patient-centred care	
Q1	*In your position, is it important to listen to and understand the patient's emotional needs?* • This was important to the diabetes nurses and educators, as well as to the private healthcare doctors. (e1, E2, E5) • The optometrist did not find this relevant. (E3) • The public sector nurses and doctors also saw the need for this but because of the shortage of resources such as time and human capacity they often did not spend as much time as they should. (E4) • The psychologists would be the ones that would spend most of the time listening to and analysing the emotional needs of patients. (All respondents) • The person with diabetes as well as the person living with that person thought it was of utmost importance that the emotional state of the patient be understood at each visit. (E8, E9)	
Q2	*Do you enquire about the patient's goals in monitoring and maintaining diabetes?* • This was done by the private sector nurses and diabetes educators. (E1, E2) • In the public sector, this was not done but doctors and nurses try and explain the importance of monitoring and maintaining the condition. It is difficult to set goals such as weight-loss when the culture does not understand the negative impact of being overweight has on a person. (E1-E4, E8)	
Q3	*Do you give advice on where to go to for group support for diabetics?* • The private sector encourages people with diabetes to join the SA Diabetes Association and other recognised support groups. They also refer to recognised internet sites for reference and information but general "Googling" is discouraged because of the many misconceptions and untruths on the internet. Social-media groups that are not led by a diabetes expert are also discouraged. (E1, E2, E4-E9) • In the public sector there are support groups in the hospitals and clinics and patients are encouraged to join but the attendance is not very good. (E4, E6, E7)	
Q4	*Do you help diabetics plan ahead so the patient can cope in difficult times?* This was only found in one of the private organisations that focus on diabetes care. (E2,E5)	
Q5	*Do you try to make patients feel important?* • Yes, this was foremost in the minds of the private health carers across the board. (All the respondents) • It was also positive in the public healthcare sector as the doctors and nurses in the hospital try and make a personal connection that helps the patient feel important e.g. to greet by name or in their own language (E4, E6, E7)	
Q6	*Do you know patients by name?* • In the private healthcare sector this is more prevalent as the person goes to the same healthcare provider at all times. (E2,E3,E5,E8,E9) • In the public sector, this is difficult; as there are not only a huge number of patients; but their visits are also not regular and even if they were, the person tending to them on the day of their visit, is not necessarily a healthcare practitioner that has treated them before. It is encouraged though to address the person by his name, if at all possible. (E4,E6,E7) • At support groups the names are known to the members and new members are introduced as they arrive (E1,E8,E9)	

Q7	*How often have you contacted patients after a visit to see how they were doing?*	
	• This does not happen in the public sector (E4) and seldom happens in the private sector. (E2,E5)	
	• The doctors and diabetes nurses in the private sector will follow up only in extreme cases and even then, it is a rare occasion. (E2)	
	• Support group leaders are more involved with the person's progress and work on a more personal level than doctors do. (E8, E9)	
Q8	*Can patients make requests for when certain procedures will be performed, to accommodate their personal schedule?*	
	• In the private sector, this is indeed very possible; but in the public sector it is not possible at all. (All respondents)	
Q9	*Are there resources available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing?*	
	• In both sectors this was not happening. (All respondents)	
Q10	*Are any free health –related lectures or wellness clinics regularly offered to the public?*	
	• The SA Diabetes Association offers monthly talks to members and non-members alike. One is encouraged to join up and the membership is nominal. These lectures take place mainly in the cities but there are many chapters in a particular city and these serve the low income areas as well. (E1, E8, E9)	
	• Conversation groups in public sector but not well attended (E4)	

7.4.6 The availability of a patient's health records

This section looks at the availability of a patient's personal health information during consultation, as well as access to the records thereafter. The total number of interviewees that participated is nine (n=9); although some of the questions were not answered by all the participants.

7.3.5 The availability of patients' health records		YES	NO	SOMETIMES
Q1	*Is there a process in place by which patients and family can request additional information on their diagnosis or treatment?*	2	2	
Q2	*Do patients have access to their medical record during consultation and is the information explained to them?*	2	2	
Q3	*Could patients view their records at any time with a healthcare worker?*	1	3	1
Q4	*Would patients be allowed to add their own notes to their medical record?*		3	
Q5	*Are there materials available to educate patients regarding medical records for all levels of readers and in various languages?*		1	3

7.4.7 Type of technology currently used in diabetes monitoring and management

This section deals with the type of technology used to assist the interviewees with managing and monitoring the patients' disease. Interviewees were asked to indicate their most comfortable feeling with a 5, and their least comfortable with a 1. If the interviewees do not have access to any technological devices, they could indicate this by placing their answer as a 0. The number of interviewees that participated is nine (n=9); but in some cases not all the questions were answered.

7.3.6 Type of technology used in diabetes monitoring and management		5	4	3	2	1	0
Q1	*I am familiar with using a cell phone e.g. calls and text*	8					
Q2	*I am familiar with a smart phone e.g. calls and text*	8					
Q3	*I am familiar with a portable device such as a tablet*	8					
Q4	*I have used a computer or laptop*	6					
Q5	*I use my phone for internet e.g. Facebook*	6					
Q6	*I do internet/cell phone banking*	6					
Q7	*I trust that my information on my cell phone is secure*	2	2	1			
Q8	*I would not be against using my mobile device (cell/tablet) phone to communicate with my patients*	4	1	1			
Q9	*I would find it useful to communicate with my patients via a mobile device phone or tablet*	7		1			
Q10	*I would find it useful to share information with a patient on my mobile device(cell/tablet)*	6					
Q11	*I would be comfortable using my personal device to interact with patients*	4		2			
Q12	*I would need an incentive or "compensation" before I use my personal phone to interact with patients*		4	1			
Q13	*I would only use a mobile device that has been supplied to me for interaction with patients*		8				

7.4.8   Current patient-centredness in the work place

The clinical environment in which the interviewees currently find themselves needs to be evaluated, in order to determine how much of a patient-centred approach it follows. The answers would help identify the strong and weak points of the environment; so that these can be used as input to the proposed strategy.

The questions were answered in terms of the interviewees' general practice. If the interviewee feels that he/she abides by the guidelines, or that the statement reflects what is practised, then the answer is indicated as "Yes"; but if the interviewee feels that the statement is not always true, then the answer is "sometimes"; and if the statement is not true, then they answer "No". If the interviewee is unaware of a particular practice taking place, then the answer is "I don't know". Not all the participants (n=9) chose to answer all the questions. The answers are captured below.

7.3.7 Evaluation of patient-centredness of current work environment		YES	SOMETIMES	NO	I don't know
Q1	*In my environment it is important that the clinic's commitment to patient-centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission statement, core values)*	3		4	
Q2	*A patient and family advisory council meets regularly and actively provides input to the clinic leadership*		2		
Q3	*Patients and family have been invited to share their*	2		3	

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	experiences with the clinic in focus groups				
Q4	*Patients and family participate on clinic committees*	1	4		
Q5	*The input provided by patients and families is used to guide the clinic's strategic direction*		3		
Q6	*Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools*	1	3		
Q7	*Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for improvement*	1	3		
Q8	*Opportunities exists for both formal and informal interaction between leadership and staff*	3	3		
Q9	*Opportunities exist for leadership to interact directly with patients and families*	2	2		
Q10	*Managers are held accountable for "walking the talk" of patient-centred care*	3	1		
Q11	*Board members are provided with opportunities to interact directly with patients and families*		2		

This table shows that there is a lack of patient-centred care and little knowledge of what it entails.

7.4.9 Staff care and wellness

This section deals with the staff of the clinic and the care given to them. The interviewees are asked to indicate whether they agree or disagree with the statements. Not all the participants answered all the questions; so, only the given responses are recorded.

7.3.8 Staff care and wellness		AGREE	NO	SOMETIMES
Q1	*Staff's stress-reduction and wellness needs are addressed*		2	
Q2	*Staff are routinely acknowledged for their good work by leaders, peers and patients and families*		1	1
Q3	*Staff have opportunities to provide input into ways to improve the working environment*		1	
Q4	*Space is available for staff to relax between patients and/cases*		1	
Q5	*Support is offered to staff involved in adverse events*		1	
Q6	*Healthy food is available to staff (at own cost)*		1	
Q7	*Healthy food is available to staff (at clinic cost)*		1	

This table cleasrly shows that staff are responsible for their own welfare in the workplace. This is in contrast to patient-centred care.

7.4.10 Other additional comments

In this section, the interviewees were asked to mention anything that they felt at this point was not covered in the interview relating to diabetes care, or anything else they wanted to make the researcher aware of.

7.3.9 Other comments	
C1	All the interviewees indicated that education is the most important aspect of diabetes care. They felt that awareness of diabetes should be increased from a high level such as a government intervention or partnership similar to the cancer awareness e.g. "big walk for cancer" initiative or "HIV/AIDS" day. Government has signed many agreements but do not action them
C2	Some of the interviewees indicated that the companies benefitting from contracts/tenders from the government, should also play a role in diabetes education from awareness, to healthy lifestyle incentives as well as education about the medication prescribed.
C3	All interviewees indicated that technology strategies would be beneficial no matter how big or small they were; as it would promote basic requirements, such as compliance and monitoring. They all stated that they have observed that all their patients have a basic cell phone and that most have smartphones.
C4	Most interviewees indicated that government needs to fund diabetes as it does HIV/AIDS and Cancer
C5	One interviewee indicated that the long queues at public health clinics and hospitals should be used productively for example eye screening can be easily done with the right technology and needs very little training to take a picture of the eye. This will help detect eye problems before the symptoms manifest themselves.
C6	Waiting time can be used for educational purposes e.g. viewing of educational videos/DVDs

This table clearly indicates that the staff working with people with diabetes are passionate about their work and would be able to do so much more if there was a greater emphasis put on diabetes awareness and education.

7.5 General Summary of Data Collection

Table 7-2 presents a summary of the data from the interview sessions, as concluded by the researcher.

Table 7-2 Summary of Interview data

Factors in line with this study	Problems identified	Possible advantages	Barriers to the strategy
• Governement promotes research in this field • Guidelines exist • Wide usage of mobile technology • Availibility of educational linformation • Infrastructure exists • Learn from private sector	• Lack of knowledeg by carers and people with diabetes • Change of organization procedures • Enforcing commitment to implementation of strategy • Success of the strategy relies on behaviour/lifestyle change of people with diabetes • Frequent change in tenders/medicines • Lack of continous care	• Willingness to use technology • Creating awareness and education wrt diabetes • Improved service to people with diabetes • Improved communication between patient and carer • Improved adherence to treatment plan • Further research opportunity to improve and sustain the strategy	• Sustainability of this strategy over the long term • Acceptance of the strategy by the health care practioners • Affordability of strategy • Diabetes morbidity rate increase

7.6 Summary

The strategy process developed in Chapter 6 consists of 4 distinct phases.
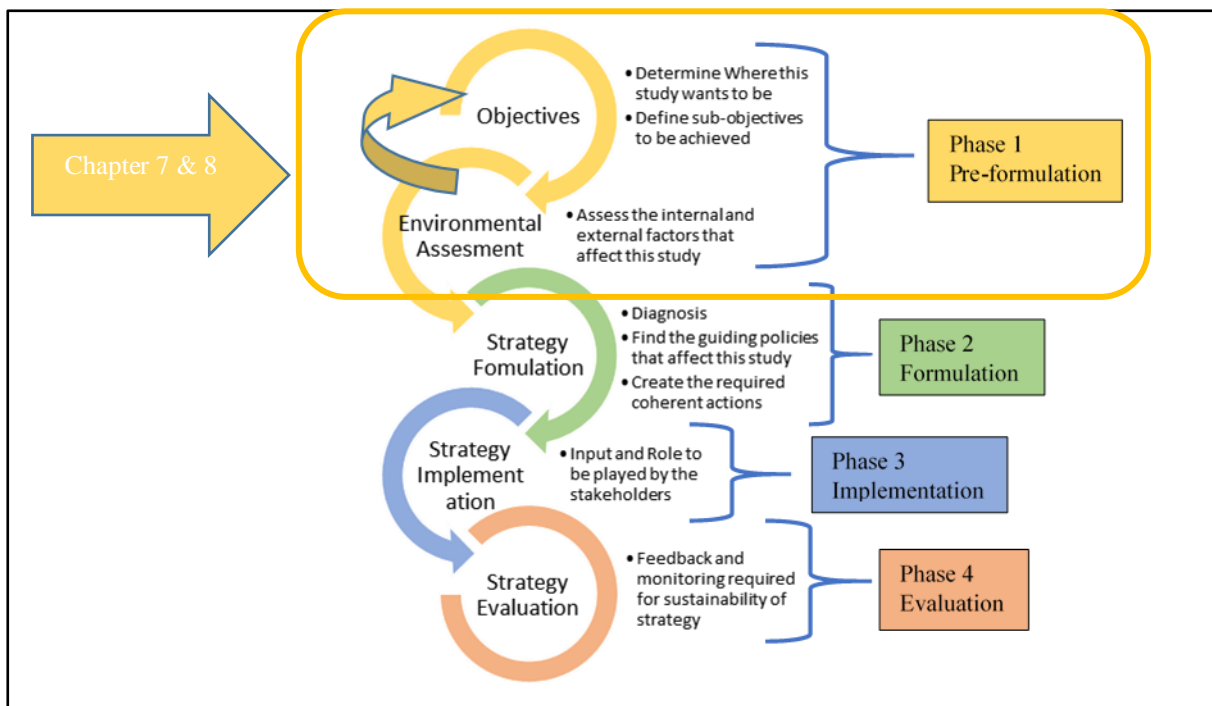
Figure 7-1 Strategy-Formulation Process for this study

Phase 1 requires that the overall main objective is identified, and that an environmental assessment is then conducted to identify the sub-objectives required to achieve the main objective. The main objective is to address the lack of an ICT strategy for diabetes care; and by examining the internal and external factors that affect this area; it is possible to identify smaller sub-objectives to attain this goal.

In this process, it is clear that the objectives and environmental assessment have a direct influence on each other; and that this is an iterative approach that starts with a main objective that is used to analyse an environment; and the findings are then used to determine further objectives that would result in satisfying the main goal. The objective set out in Chapter 1 states that this research aims to develop an ICT strategy that aids in successfully supporting a patient-centred approach to diabetes. The specific objectives that were initially identified (in Chapter 1) are:

- ❖ To determine the factors that are related to diabetes care;
- ❖ To understand patient-centred care in the context of diabetes care in SA;
- ❖ To understand how an ICT strategy can assist in diabetes care.

Environmental analysis of the internal and external factors that affect a person with diabetes, as well as the literature reviews on diabetes, patient-centred care and ICT strategies in health, are required, in order to identify other influences that were initially not considered. The following chapter discusses the data analysis, the literature review findings, as well as the environmental assessment findings, in order to further refine/identify the sub-objectives of this study.

8   Data Analysis and Findings
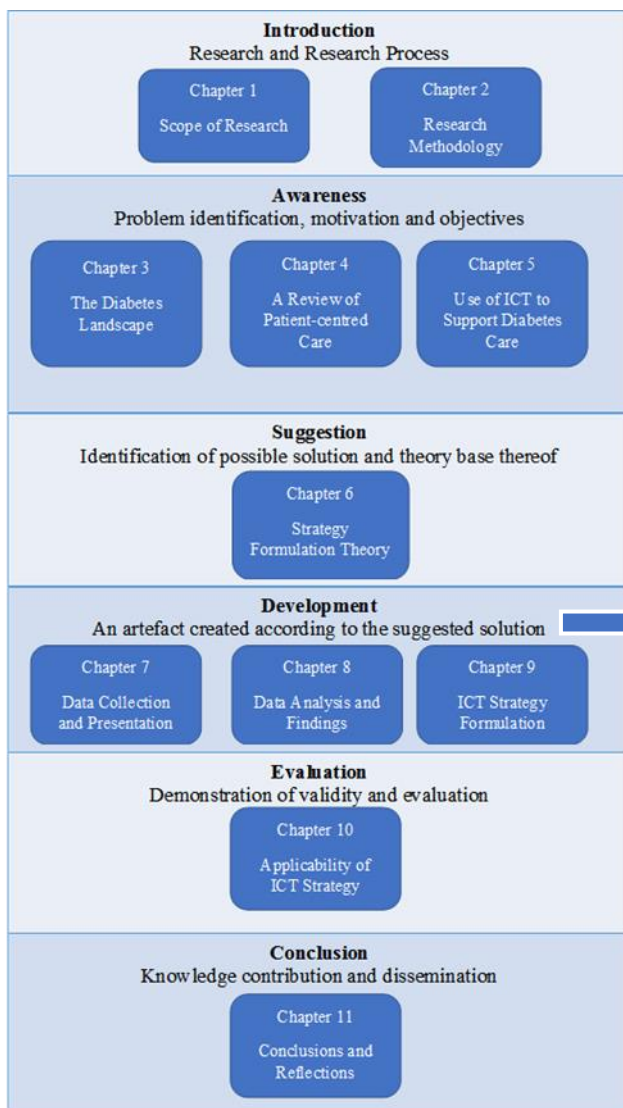
Chapter 8
Data Analysis and Findings

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8.1 Introduction

This chapter examines the findings of the data collected through the interviews, as well as the findings of the environmental assessment. The data findings are cross-referenced with those of the literature studies for validation. The analysis and the triangulation should result in a high-level outline of the strategy components. These will serve as input for the detailed strategy formulation in Chapter 9.

The interview questions were based on the requirements for diabetes care and the framework for a patient-centred approach. The analysis was done bearing these requirements in mind, whilst also looking it how ICT is used, or not used, at various stages of care, and the impact that it has on the surveyed diabetes environment.

This data analysis is part of the pre-formulation phase of the strategy as illustrated in Figure 7-1 Strategy-Formulation Process for this study.

8.1.1 The requirements for successful diabetes care

The first section of the interview concentrated on the requirements for successful diabetes care, as viewed from the perspective of the interviewee and his/her role in diabetes care.

The interviewees were asked to indicate what they thought was the most important factor for successful diabetes care (Section 7.3.1 Q1). All the respondents indicated that patient education was the most important factor for successful diabetes care. They also stated that this was not possible to obtain if the carers themselves are lacking in diabetes knowledge. Medicating correctly is also important; and the carers need to explain to the person with diabetes why it is important to take the correct dosage at the correct time.

The interviewees were asked to comment on how traditions and beliefs affect the success of the diabetes treatment plan (Section 7.3.1 Q2). It was stated that education on diabetes could also go a long way in eradicating the many misconceptions about traditional medicines and their role in diabetes care. Carers can explain that traditional medicines need to be disclosed to the carers; so that they can also be aware of them, and advise the patient accordingly. Carers do not discourage the use of traditional medicines; but they should encourage the patients to use them alongside their other medicines.

Education on the importance of monitoring regularly would also help to understand that equipment, such as Glucometers that store all the data must be trusted as important tools for people with diabetes, rather than being seen as a "spy tool".

The interviewees were asked how the person with the knowledge of diabetes and the level of understanding affects the treatment of diabetes (Section 7.3.1 Q3). All the interviewees responded that the level of understanding of diabetes is crucial in the successful treatment of diabetes. They said that the more one knows, the better one is equipped to take care of oneself. The interviewees also all stated that knowledge alone is not enough; and that acceptance of the condition and a commitment to a lifestyle change were fundamental in the treatment of diabetes. When asked how do they go about educating the patient on diabetes (Section 7.3.1 Q4), the answers varied. Education and the awareness of diabetes in the public sector are minimal, due to the staff, as well as time constraints in the public sector.

In the public sector, clinical staff and hospital staff have tried to implement educational sessions with patients; but these are frequently poorly attended. In the private sector, diabetes awareness and education are more in the fore; as diabetes educators, as well as diabetes nurses, can be consulted by people in the private health sector. The interviewees in this sector indicated that although the opportunity is there, very few people take this up. There is also more education amongst the people in the private sector; as they have better access to the internet, which they can use as a source of information. It is clear that both the public and private healthcare sectors needed to do much more in this regard.

Diabetes is a very complex condition; and it requires not only adherence to a treatment plan over the long term, but daily monitoring and measurement of glucose levels. The interviewees were asked how they ensure that the treatment plan is adhered to (Section 7.3.1 Q5). The interviewees stated that it requires commitment from the person with diabetes to stick to the treatment plan. Often, without full understanding of the consequences of not adhering to the treatment plan, patients do not make this commitment – thence leading to severe complications. Adherence is also reliant on the patient keeping his/her appointments and visits on a regular basis, as well as reporting any extraordinary measurements. This was addressed in Section 7.3.1 Q7; and the interviewees indicated that regular visits are limited in the private health sector; as medical aids do not provide for a sufficient number of visits.

The interviewees that commented on the public sector indicated that people often only come to a clinic or hospital when they don't feel well. Some of the interviewees in the private sector indicated that they sometimes use text messages to remind patients of their next visit. This simple intervention, however, is not easily implemented in the public sector; as the carers are reluctant to incur this cost on their personal devices; since they do not get

reimbursed for this expense. Failure to keep to visits and appointments can lead to complications that have a severe impact on the patient.

In the private sector, the complications are more easily avoided than in the public sector; as specialists are more easily accessible to people who visit diabetes centres. In the public sector, visits to specialists can entail a waiting period of months; and this also increases the risk of complications.

Section 7.3.1 Q6 deals with the process that leads a patient to the hospital or clinic, and where they go to from there. In both the public and private healthcare sectors, people only get to the diabetes clinic or hospital once they have already been diagnosed with diabetes. In the private health sector, many patients see their general practitioner. Some do seek out specialist diabetes doctors; or they are advised to visit these specialists. In the public health sector, diabetics have to make visits to the closest clinic or hospital; but they are seldom referred to diabetes specialists. Some of the clinics are fortunate to have diabetes champion nurses, or a separate division for chronic diseases. The section for chronic diseases is often stigmatised as HIV/AIDS centres; and diabetics and other patients often express their discomfort when visiting this section of the hospital or clinic.

The interviewees were asked if they practised any form of preventive action for diabetes (Section 7.3.1 Q8). The interviewees indicated that early warning symptoms are not easy to spot; and people are frequently unaware that they have a pre-diabetic condition, or are at high risk. The minimum is done at consultation levels to promote diabetes awareness; yet, this is one of the factors that the interviewees listed as being important in the successful treatment of diabetes. Diabetes awareness is a factor that the respondents indicated should be addressed; and they stated that if government were serious about addressing the diabetes epidemic, they should also create big drives, such as those for HIV/AIDS and Cancer.

Through awareness of diabetes, people can start to educate themselves and avoid becoming diabetic; as they would be able to recognise the symptoms, as well as identifying the risk factors. The South African Diabetes Association encourages members to bring non-diabetics to meetings with them, in order to raise awareness of diabetes, and also to encourage support for the person with diabetes.

The main factor that emerged as having a big influence on diabetes care in this section of the interview was diabetes education and awareness. The second factor was adherence to the

treatment plan. It is important to note though that it was also stated that education alone is not enough without a commitment to the treatment plan.

8.1.2 Partnership between carer and person with diabetes

In this section of the interview, the focus was very much on the relationship between the person with diabetes and the healthcare practitioner (Section 7.3.2). It is important to establish this relationship; as this would have a direct effect on the patient-centred aspect of diabetes care.

The first question posed was on the type of relationship that interviewees thought was required with the patient (Section 7.3.2 Q1). The respondents indicated that it was vitally important that a relationship of mutual trust and respect should exist between themselves and the person with diabetes. They stated that this relationship determines the outcome of the treatment. As in any non-medical relationship, it is mutually beneficial for people to trust and respect each other, in order to reach any amicable agreements. In a patient-doctor relationship this is even more so. If a patient does not trust the doctor, they may not comply with the requirements of the treatment; or they may fail to disclose any other symptoms – for fear of being treated harshly for their non-adherence. The respondents also indicated that although there is a problem in the public sector with regard to continuous care; and patients do not always get to see the same carer, they strive to create a feeling of caring and trust by attempting to personalise visits by at least referring to a person by name.

The method for choosing a treatment plan (Section 7.3.2 Q2), as well as the way forward with that treatment plan (Section 7.3.3 Q3, Q4), was also investigated. When it comes to treatment options, the public sector is very prescriptive; and it rarely, if ever consults with patients regarding their preferences. In the private sector, this is a little more evident; as the patient normally has a good relationship with a specialist diabetes nurse, who discusses various options with the patient. Although very few patients have enough knowledge to make suggestions; they are, however, given choices for their treatment plan. The treatment plan is delivered verbally to the patients; and in some instances in the public health sector, there are some additional pamphlets handed to the patients in their own language. Some of the pamphlets are visual, in order to help those who cannot read.

In the private sector, the treatment plan is delivered in a report format and meticulous detail is shared with the patient. Patients also have access to diabetes nurses for further queries.

The interviewees were asked if there were any tools available to help with adherence to the treatment plan, for example tools to help the patient manage medication, visits and other health needs (Section 7.3.2 Q5). Adherence to the treatment plan also requires keeping all the doctor's appointments and clinic visits. There are many reasons in the public sector for non-compliance with this part of the treatment plan; and accessibility is the biggest factor. Patients have to travel distances; but they also have to spend the entire day to see a healthcare practitioner. The majority of the time spent on that day is spent on moving from one area of the clinic or hospital to another, and then waiting in queues.

The actual consultation takes a maximum 15 minutes. Should the patient need to be referred to a specialist, they have to return on another day many weeks in the future; and they often need to go to another hospital. There is nothing in place in the public health sector to help the person with diabetes to manage their condition. This is in vast contrast to the private sector, where a visit takes an hour; and the patient literally spends most of that time in consultation with the doctor or diabetes nurse.

In the private sector, many of the diabetes nurses make use of mobile phones to remind people of their appointments, or to advise them of any changes that could affect their schedule, in order to avoid long waiting times. Often the diabetes nurse has an emergency number that patients may call for emergency assistance. If it is required that a patient be referred to a specialist, it is sometime possible to see a specialist on the same day, and frequently in the same building.

This section of the interview clearly showed the disparity between a patient-centred approach in the public sector and that in the private sector. It was evident that the private sector was very much geared towards a patient-centred approach; and, although not all the factors that are required to be patient-centred were found at all the centres; the majority of these factors were indeed evident. This leads to better adherence to the treatment plan in the private sector.

It was also clear that there is the lack of a strong bond between the carers and the person with diabetes in the public sector. This is because of a lack of continuous care, as well as the limitations on consultation time spent with a patient. This, together with the authoritarian approach towards patients, leads to non-adherence to the treatment plan.

8.1.3 Communication between patient and healthcare practitioner

Section 3 of the interview focused on the communication that exists between the patient and the healthcare practitioner with regard to diabetes as a whole. The data for this section of the interview are shown in Section 7.3.3.

The interviewees were asked whether patients are encouraged to ask questions about their diabetes (Section 7.3.3 Q1). It was evident from the interviews that the communication in the private sector goes beyond that of discussing diabetes alone in consultations. There is enough time to focus on other areas that affect the diabetes treatment plan, such as depression, support from family members and friends, as well as education on diabetes as a whole. Patients are encouraged to ask questions; and they are also well informed when visiting the doctor; as they have looked up various issues on the Internet. The type of communication that patients have with the various doctors they have visited also differed in the sense that they were much more comfortable in discussing issues with dieticians and diabetes nurses than with the auxiliary healthcare practitioners, such as the eye specialist. Many practices in the private sector make use of technology for communicating appointments, and for following up on missed visits.

In the public sector, there is no time for in-depth discussions; and sometimes the doctors have to actually treat the patient for another superficial illness that at the time presents itself with physical symptoms, rather than focusing just on the diabetes issues. This is because the patient is not very concerned about diabetes; since it appears to have no side-effects or symptoms. Patients do not ask questions about diabetes; as they do not know what to ask.

The interviewees were asked whether they are aware of the various roles that carers and family members have with the patient (Section 7.3.3 Q2). Most of the interviewees were not aware of the support structures that the patient has. The dietician and the diabetes nurses thought it was very important to know who the support the structures are; and what role they played in the care of the patient. They stated that they were aware of these people and their roles. The doctor in the private health sector also stated that he knew the roles of the support structures.

The interviewees were asked whether there was an accurate track-record of the patients' visits and progress (Section 7.3.3 Q3). With regard to record-keeping; in the private sector, this is done meticulously and stored on computers. Though it is not always on a shared database, it is easy to share the patient's data with any other doctor or specialist; and this is

often done via email. Record-keeping in the public sector is below par, and frequently, it is not done at all. There are missing facts on the data-capturing sheets; and often the hand-written patient records are illegible. These files are misplaced for long periods of time; and then they reappear. The "missing file" and the new file are never consolidated, in order to reflect the complete picture. A patient would then sometimes receive the new file, and sometimes the old file, when making a visit to the hospital or clinic. This leads to extremely poor information about the patient and his/her progress.

Interviewees were asked if they follow up on missed appointments, or whether a person is overdue on collection of their medication (Section 7.3.3 Q4). The interviewees commented in the negative and only the diabetes nurse in the private sector stated that she would sometimes follow up on missed appointments.

The interviewees were asked whether family members were encouraged to ask questions; and if so, how and when could they do so (Section 7.3.3 Q5). This seldom happened; and the only interviewees who stated that this would happen occasionally were from the same private health-sector organization.

The interviewees also indicated that there was no process in place to disclose unanticipated outcomes to patients and families (Section 7.3.3 Q6).

8.1.4 Patient-centred factors in the practice

This section of the interview looked at various factors that could affect patient-centred care in the hospital/clinic or practice where the interviewee was employed.

The first question (section 7.3.4 Q1) established what the respondent's view was of the patient's emotional needs. The very obvious response from the interviewees stated that for the psychologist, it was of the utmost importance to know where the patient stands emotionally; and it was also stated that this emotional need differs from visit to visit; and that, as a psychologist, you have to deal with the emotions before anything else. This was the case in both the private and public sector. The auxiliary specialist in both sectors also did not feel that it was required of him to get involved with the emotional needs of a patient. The optometrist in the private sector, however, did specify that it was not because of being unsympathetic, but rather because he was not equipped to deal with such issues. He also stated that he was always compassionate towards his patients; and that his very empathetic lady at his front-desk always gives an ear to the people who need to express themselves; and she then makes him aware of any issues. The emotional needs of patients were seen as very

important by the diabetes educators, diabetes nurses, and also by the private healthcare doctors.

In the public sector, the nurses and carers recognise the importance of the emotional needs of patients; but they are limited by their knowledge on how to deal with such issues, as well as the restricted consultation times; and consequently, they do not engage in this matter. It is important to note that the person with diabetes felt that it was of major importance that their emotional state be considered at each and every visit. Only one private institution with a specific focus on patient-centred diabetes care indicated that they provide help to diabetics to plan ahead; so that they could cope in difficult times (Section 7.3.4 Q4).

Interviewees were asked whether they enquire about the patient's goals in monitoring and maintaining diabetes (Section 7.3.4 Q2). Discussions on the patient's goals in monitoring and maintaining diabetes takes place with diabetes nurses and educators in the private sector, and very seldom, if at all in the public sector. The reason stated by those in the public health sector was because they found it very hard to set weight-loss goals when talking to people whose culture and tradition is that of admiring overweight people.

The interviewees responded that group support is encouraged in both the private and public sector (Section 7.3.4 Q3). These group-support meetings are held on a monthly basis by the South African Diabetes Association; and they are open to all. Although support groups are well attended in the suburbs (private sector), the number of attendees is far below the number of people who have diabetes. In the poorer communities, the attendance is also very good; but again; it fails to reflect the number of people with diabetes. At public clinics and hospitals, the support-group meetings are few and far between – making it hard for a person who misses a meeting to then try to attend another one. There are few or no free lectures or education on diabetes and lifestyles outside these support groups.

Patient-centred care focuses on the patient, and the questions posed for making a patient feel important (Section 7.3.4 Q5) and knowing his/her name (Section 7.3.4 Q6). Such questions were met with enthusiasm by the interviewees. These questions were answered by all the participants, affirming that it was vital that the patient be made to feel important. In the public sector, this is not always possible; but simple strategies, such as greeting a person in their language and by name helped in the matter. In the private sector, it was easy to make a person feel important; since they visit the same doctor frequently and a relationship is established in which a patient is not only known by name, but other family members may be known to the doctor, and by referring to them, the patient feels important.

The interviewees were asked whether they contacted patients after a visit, to see how they were doing (Section 7.3.4 Q7). Following up on patients after a visit also makes them feel important and cared for. This is something that happens to a small extent in the private sector; however, it is mainly done by the diabetes nurses and only in cases of emergency. Text messages are sent to a patient to find out how they are coping. Following up on a patient's progress is unheard of in the public sector.

The question on accommodating the patients' needs regarding appointments and procedures (Section 7.3.4 Q7) was also seen as a way of making a person feel important. In the private sector, this is something that is done all the time; as people with diabetes schedule their appointments as and when it suits them. In the public sector, this is not possible. Patients visit the hospital or clinic, as they need to; and they also wait in long queues. Appointments made mean very little; and often it is a first-come first-serve basis.

The interviewees were asked whether there were resources available to educate patients and staff on different cultural beliefs/traditions (Section 7.3.4 Q9). Knowing a person's traditions and beliefs also helps make a person feel important. It is very seldom in the private sector that a person would get asked about traditions or cultures; as it is still very much an authoritarian way of treating patients. Even in the patient-centred organization, questions relating directly to traditions and beliefs are considered taboo. In the public sector, there is no regard for traditions and beliefs. There are no resources available for this type of education.

Question 10 (Section 7.3.4) was to establish whether there were any free health-related or wellness clinics that were regularly offered to the public. The only positive response was from the South African Diabetes Association (SADA), which offered monthly talks in various areas around the city (suburbs and poorer communities). Although the talks were free, one is required to pay a nominal annual membership fee. The SADA also encourages members to bring non-members with them – as a way of spreading diabetes awareness. They also distribute online newsletters to members.

8.1.5 The availability of a patient's health information

In section 5 of the interview, the access to a patient's health information was investigated. The first question was on requesting additional information on the diagnosis or treatment (Section 7.3.5 Q1). The results showed that there were some cases (private sector), where this was possible; and there were others where this was not possible at all (public sector). The same response was noted for the question on whether patients have access to their medical

records during consultation; and whether the information was explained to them (Section 7.3.4 Q2). It was found that in the private sector, it is more acceptable to look at your health record with your doctor (Section 7.3.4 Q3); but this is not generally something that actually happens. In the public sector, viewing your health record is not allowed. In both sectors, it is not the practice to allow patients to make notes in their medical records (Section 7.3.4 Q4). Education on medical records was not available in the public sector at all; and in the private sector, there is a possibility to discuss your medical record with your diabetes nurse or doctor, who would then explain it to you (Section 7.3.4 Q5).

The responses from this section of the interview clearly show that access to medical records is problematic to patients.

8.1.6   Use of technology to assist in managing and monitoring diabetes

This section looks at the use of technology by the interviewees in diabetes care. It is important to know the level of familiarity with mobile technology, in order to establish whether this is a viable platform to deliver diabetes care.

The questions regarding the level of the use of mobile technology showed that all the respondents were very comfortable with the use of mobile phones, smart phones and tablets. Most of the respondents also used a mobile device, laptop or desktop computer to perform tasks, such as mobile banking and accessing the social media.

The question regarding whether respondents found the technology to be secure, or not, was met with varying degree of scepticism; but the majority either felt very secure or reasonably secure when using their devices.

When asked about using technology to communicate with patients; all the respondents were in favour of communicating or sharing information by using technology. When asked whether they would do so using their own device, 67% indicated that they would do so without hesitation; while 33% were on the middle road. No respondent rejected this intervention totally. When given the option between using their own device and a device supplied to them; all the respondents would prefer to use a phone supplied to them. As many as 67% indicated that they would prefer to be compensated for using their own phone. All the interviewees indicated that technology strategies would be beneficial – no matter how big or small; as they would help with compliance and monitoring. They also all stated that they had observed that all their patients have a basic mobile phone; while most of them had smart phones.

8.1.7   Staff care

Section 8 of the survey deals with the staff at the points of care; and how they are treated. The responses to this section were very concerning; as it seems that even though a practice or clinic is patient-centred, there are none or very few facilities that tend to the staff needs. There are no facilities to address staff-stress reduction and wellness; and staff seldom have the opportunity to improve their working environment. In the private practice, this is not seen as a big deal; as the staff are able to leave the facility for a lunch break; but in the public sector, the hospitals and clinics are often far from malls or places of serenity. This means that staff often do not leave their desk for a lunch break. There are no meals provided at any of the respondent's place of work; and the staff need to supply their own meals and snacks for the day. There seems to be little support for staff, who experience hardship at home. Although this is beyond the scope of this study, it is important to understand the circumstances, under which the healthcare practitioners work.

8.2   Summarised Interview Data Findings

In this section, a summary is provided of the feedback received from the data collection. For the purpose of the study, the main areas to look at are the requirements for diabetes care, patient-centredness and the use of technology during diabetes treatment. Table 8-1 summarises the positive and negative aspects that were found during the interview sessions; and it focuses on the three areas of the study, as mentioned above. All the comments made have been captured and the sentiments that were expressed by more than one interviewee are only indicated once.

Table 8-1 Summary of interviewees' responses in terms of the requirements for diabetes care patient-centred care & the use of technology during diabetes treatment

	Positives	Negatives
Requirements for Diabetes Care	• Guidelines do exist on international and national levels • Integrated care exists in private sector • Qualified and expert carers are within the borders of this country • Public healthcare sector (government) recognises diabetes as an epidemic	• Guidelines are followed only to the extent of delivering treatment for known diabetes patients (no monitoring/education) • Integrated care does not exist in public health sector • Shortage of expert carers and/or access to expert carers in the public sector • Shortfall of medication and inconsistency of suppliers • General diabetes awareness and diabetes education lacking in both sectors • Lack of communication channel between people with diabetes and their healthcare providers • Lack of monitoring progress of people with diabetes • Lack of detailed analysis/explanation of measurements • Lack of education regarding medication and non-adherence • Health sector is geared to acute care and not chronic care • Patients have to endure long queues in the public sector • Continued development of health carers is lacking • Lack of patient commitment to lifestyle change/long term adherence • Lack of industry commitment to assist in awareness and education programmes
	Positives	**Negatives**
Requirements for Patient-centredness	• Guidelines do exist • Guidelines are used in some private sector settings • Government recognises the need for changing to a chronic treatment approach that is more patient-centred than an acute treatment approach • Many doctors and carers in public healthcare are attempting to engage more with patients than before	• Guidelines are not enforced • Patient values and cultures not considered • Healthcare sector is geared to acute care and not chronic care • Patients have to endure long queues in the public sector • Patient input is not requested when working on strategies • Staff facilities are lacking • Patient-centred care does not form part of evaluation process of healthcare practitioners • Patient-centred care is not a priority as time constraints exist due to high patient volumes in public as well as private sector
Use of Technology in Diabetes Care	• Minimal use in private sector • Technology mostly used for record keeping in private sector • Small degree of integrated care that allows for patient data to be shared in the private sector but only if doctors are linked to the same	• Not used in public health sector • Access to technology could be difficult in public health sector • No fully integrated system in private sector to share patient data • Technology is available but not used due to lack of funds to support the use thereof (example re-imbursing carers for using their own devices)

	organisation • Most patients (including poor communities) have access to a cell phone • Most people are comfortable with the use of mobile technology • Most people are receptive to the use of mobile devices in the diabetes treatment plan	

8.2.1 Themes emerging from interviews

Looking at the data gathered through the interviews held with the various stake-holders; it is clear that distinct themes emerged with regard to the use of ICT in patient-centred diabetes care. This section presents the themes and outcomes that are used to formulate the strategy in the chapter to follow.

8.2.2 Themes that work in favour of this research

1. The diabetes epidemic is recognised

The South African government, as well as international governments and healthcare organizations, have recognised diabetes as an epidemic; and they have pledged their support to reduce the mortality rates caused by diabetes.

2. Patient-centred care is revived

Many doctors and other healthcare professionals are seeing the value in being patient-centred in their approach to healthcare; and they are trying to use it, as they best can.

3. Guidelines exists

There are national, as well as international, guidelines for diabetes care, as well as patient-centred care. These guidelines are well known; and people in the healthcare sector are aware of them.

8.2.3 Emerging barriers

1. Diabetes is not funded by government to the extent that it should be.

Interviewees felt that the prevention of diabetes would benefit greatly through big government initiatives, similar to those for HIV/Aids.

2. There is a lack of diabetes education and awareness.

There is a lack of knowledge about diabetes itself amongst diagnosed with diabetes. They do not seem to understand that the condition requires a complete lifestyle change; and if they do, they only change for a short while, and do not commit to long-term changes. The healthcare workers also have a lack of specialist diabetes knowledge; as they do not receive specialised training. There is also no continuous education for the healthcare workers – to assist them in acquiring diabetes knowledge.

3. Guidelines are not actioned.

Although many guidelines exist, these are not enforced for various reasons. On the public health front, there is a lack of knowledge about how to enforce the guidelines. This means that diabetes care is often sub-standard.

4. There is a lack of patient-centred care.

   a. No continuous and integrated care

   People visiting public clinics and hospitals do not always get to see the same carer; and because their data are not captured correctly, they often have to repeat what they have already stated on previous visits. Referrals to specialists in public clinics/hospitals are a painstaking experience for people with diabetes; as it requires multiple visits and long queues.

   b. There is a lack of communication between carers and patients.

   Consistent and regular feedback and monitoring does not happen. Patients also miss their appointments, which means that there are gaps in the treatment, and also a lack of care in emergency/unusual circumstances.

   c. There is a lack of understanding of different cultures and traditions.

   Carers do not have the time to engage in conversation on traditions and cultures; and how they affect the treatment plan. Patients therefore, are told what to do; and frequently, they do not follow the plan; because it conflicts with their traditions.

5. There is a lack of technological strategies in diabetes care

It is clear from the interviews that there are several positive themes that can be built on to strengthen the case of adequate diabetes care; but it is also clear that there is a serious gap in the healthcare sector, with regard to using technology to support patient-centred diabetes care.

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8.3 Analysis of Diabetes-Care Requirements

This section focuses on the information collected from the literature reviews and the feedback collected from the semi-structured interviews conducted with experts in the field of diabetes care, in order to answer the main research question posed in Chapter 1. The main aim of the study is to investigate the requirements for a patient-centred approach to diabetes care, and how technology can be used to improve this care. The three main areas of this research, namely: diabetes, patient-centred care, and the use of technology, are investigated. This chapter shows the correlation between the literature studies that have been conducted and the experiences of the experts in the field.

8.3.1 Requirements for diabetes care

The components listed in Table 8-2 indicate the requirements for the successful care of diabetes, as listed by various diabetes organizations both nationally and internationally. These requirements are compared with the opinions of the interviewed experts for validation at ground level. This information is needed, in order to address the sub-research questions regarding the requirements for diabetes care.

Table 8-2 Diabetes care requirements

	Literature Review	Section	Expert Opinion
Screening and diagnosis	IDF: Global Guidelines for Type 2 Diabetes, 2012, The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012 GSMA, 2012	3.3.2 4.2.3	
Care delivery	IDF: Global Guidelines for Type 2 Diabetes, 2012 Kahn, Yang, & Kahn, 2010 Brown, 2015	3.3.2 4.2.3 5.4.1	7.3.9 C3
Education	IDF: Global Guidelines for Type 2 Diabetes, 2012 The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012	3.3.2	7.3.1 Q1 7.3.9 C3 7.4.1
Psychological care	IDF: Global Guidelines for Type 2 Diabetes, 2012	3.3.2	7.3.4 Q1
Lifestyle management	IDF: Global Guidelines for Type 2 Diabetes, 2012 The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012 Brown, 2015	3.3.2 3.3.1	7.3.4 Q3, Q10
Glucose control levels	IDF: Global Guidelines for Type 2 Diabetes, 2012 The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012 (Brown, 2015)	3.3.3 5.4.1	7.4.8
Clinical monitoring	IDF: Global Guidelines for Type 2 Diabetes, 2012	3.3.2	
Self-monitoring	IDF: Global Guidelines for Type 2 Diabetes, 2012	3.3.2	
Glucose control therapy	IDF: Global Guidelines for Type 2 Diabetes, 2012	3.3.2	

Blood pressure control	IDF: Global Guidelines for Type 2 Diabetes, 2012 The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012	3.3.2	
Cardiovascular risk protection	IDF: Global Guidelines for Type 2 Diabetes, 2012	3.3.2	
Eye screening	The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012	3.3.2	7.4.8
Kidney damage	IDF: Global Guidelines for Type 2 Diabetes, 2012 The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012	3.3.2	
Foot care	IDF: Global Guidelines for Type 2 Diabetes, 2012 The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012 Brown, 2015	3.3.2 5.4.1	7.4.8
Nerve damage	IDF: Global Guidelines for Type 2 Diabetes, 2012 The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012	3.3.2	7.4.8
Older people	IDF: Global Guidelines for Type 2 Diabetes, 2012 The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012	3.3.2	
In-patient care	IDF: Global Guidelines for Type 2 Diabetes, 2012 The 2012 SEMDSA Guideline for the Management of Diabetes Type 2 (Revised) , 2012	3.3.2	

8.3.2 Challenges in the care of diabetes

Table 8-3 indicates the barriers regarding diabetes care; and it addresses the sub-research question relating to the increase of diabetes, as well as how diabetes is currently being supported.

Table 8-3 Barriers to diabetes care

Barrier	Literature review	Section	Expert opinion
Inadequate infrastructure	Azevedo & Alla, 2008 Kahn, Yang, & Kahn, 2010	3.4.3 4.2.2	7.3.6 Q12, Q13
Irregular supply of medicine	Azevedo & Alla, 2008	3.4.3	
Unaffordable insulin, oral hypoglycaemic agents and anti-hypertensive	Azevedo & Alla, 2008	3.4.3	
Disproportionate distribution of healthcare facilities	Azevedo & Alla, 2008 Coovadia, Jewkes, et al. 2009 GSMA, 2012	3.4.3 3.4.2 3.4.2	7.3.1 Q4, Q7 7.3.2 Q4
Lack of information and clear roles for members with diabetes healthcare teams	Azevedo & Alla, 2008	3.4.3	7.3.3 Q2
Lack of appropriate and locally adapted diabetes education programmes for people with diabetes and healthcare professionals	Azevedo & Alla, 2008	3.4.3 7.3.1 Q1	
Lack of government support or subsidy, resulting in unaffordable costs	Azevedo & Alla, 2008 Mbanya & Ramiaya, 2006	3.4.3 3.4.2	
Patients' attendance is low	Whiting, Hayes, & Unwin, 2003 Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	7.3.1 Q7

Consultation times are short, resulting in little or no time for patient education	Whiting, Hayes, & Unwin, 2003 Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	7.3.1 Q1
Staffing levels are inadequate and staff with knowledge are underutilized	Whiting, Hayes, & Unwin, 2003 Levitt, Krisela, Dave, & Bradshaw, 2011 Coovadia, Jewkes et al. 2009	3.4.3 3.4.2	
Staff are poorly or inadequately trained or both and there hardly exists any continuous education	Whiting, Hayes, & Unwin, 2003 Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	7.3.1 Q1
Monitoring and evaluation of diabetes complications are not systematic	Whiting, Hayes, & Unwin, 2003 Levitt, Krisela, Dave, & Bradshaw, 2011 Kahn, Yang, & Kahn, 2010	3.4.3 4.2.3	
The control of blood glucose and blood pressure is poor and inadequate	Whiting, Hayes, & Unwin, 2003 Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	
Referral systems are lacking	Whiting, Hayes, & Unwin, 2003 Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	7.3.1 Q7
Education of people with diabetes is almost non-existent	Whiting, Hayes, & Unwin, 2003 Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	7.3.1 Q1
Overall organisation of the clinics is not satisfactory	Whiting, Hayes, & Unwin, 2003 Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	7.4.8
Record keeping is poor	Whiting, Hayes, & Unwin, 2003, Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	7.4.8
If treatment guidelines are available, they are hardly used and not up to date	Whiting, Hayes, & Unwin, 2003, Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	7.4.8
Often experience stock-outs of medications	Whiting, Hayes, & Unwin, 2003, Levitt, Krisela, Dave, & Bradshaw, 2011	3.4.3	7.4.8

8.3.3 Findings for diabetes care

As can be seen from the diabetes requirements and the diabetes barriers, the public health sector in South Africa is far from addressing the requirements for successful diabetes care; and indeed, there are tremendous barriers in addressing the needs of people with diabetes. The literature reviews listed many factors that present themselves in the South African context, as barriers to healthcare. Each of these barriers had been encountered in practice by the interviewees who participated in the study.

In the private sector, clearly more attention is given to the requirements for successful diabetes care. Experts in diabetes have formed specialised clinics; or, alternatively, they make it known that they specialise in diabetes care, thereby making it easy for somebody with diabetes to get the correct treatment by an expert in the field. Patients who prefer to visit their

local GP can do so; and if required, the GP will send them to a specialist; and then resume their treatment again afterwards. The interviewees in the private sector recognised the problems that exist in the public sector with regard to acute care vs chronic care, as well as with regard to the level of education of the staff in primary healthcare. All of this has an effect on how diabetics are treated.

The interviewees were in agreement that the lack of diabetes education and awareness is the largest contributing factor for poor diabetes care and non-adherence to treatment plans. The huge escalation in the late diagnosis of diabetes leads to large-scale implications, such as cost of care, complications and even death. The interviewees were all in agreement that diabetes needs to be addressed at the service-delivery point i.e. ground level, as soon as possible; as government interventions are few and far between; since the SA government is more focused on HIV/AIDS and cancer.

8.4 Analysis of Patient-centred Care Requirements

This section deals with the second focus of the study, namely, patient-centred care. It looks at what the literature states is required for patient-centred care; and it also looks at what the experts in the field have experienced in this regard.

8.4.1 Factors affecting patient-centred care

Table 8-4 addresses the factors that affect patient-centred care.

Table 8-4 Factors affecting patient-centred care

	Literature Review	Section	Expert Opinion
Exploring the disease and the illness experience	Stewart, Brown et al. (1995) Picker Institute (1993) Mead and Bower (2000)	5.3.2 5.3.3 5.3.4 5.7.1	7.3.2 Q2, Q3, Q4
Understanding the whole person	Stewart, Brown et al. (1995) Picker Institute (1993) Mead and Bower (2000)	5.3.2 5.3.3 5.3.4 5.7.2	7.3.2 Q1
Finding common ground regarding management	Stewart, Brown et al. (1995) Picker Institute (1993) Mead and Bower (2000)		7.3.2 Q2, Q3
Incorporating prevention and health promotion	Stewart, Brown et al. (1995) Picker Institute (1993) Mead and Bower (2000)		7.3.1 Q2, Q4, Q8
Enhancing the doctor-patient relationship	Stewart, Brown et al. (1995) Picker Institute (1993) Mead and Bower (2000)		7.3.3 Q1

Being "realistic" about personal limitations and issues such as the availability of time and resources	Picker Institute (1993) Bridges, 2005	5.3.1 5.6 4.4.1.4	7.3.2 Q5
Involvement of family and friends	Picker Institute (1993)	5.3.1 5.6	7.3.1 Q 7.3.3 Q2, Q5
Transition and continuity	Picker Institute (1993)	5.3.1 5.6	7.3.1 Q3, Q5 –Q7 7.3.4 Q4
Access to care	Picker Institute (1993)	5.3.1 5.6	7.3.1 Q6 7.3.2 Q5
The doctor as a person	Mead and Bower (2000)	5.3.3	7.3.3 Q4

8.4.2 Barriers to Patient-centred Care

These barriers, as described in the patient-centred review by the International Alliance of Patients' Organizations (IAPO), (2004) are addressed when creating the ICT strategy for this study. The opinion of the interviewees shows how patient-centred care is experienced in the public and private healthcare systems. The barriers to patient-centred care are indicated in Table 8-5.

Table 8-5 Barriers to patient-centred care

	Literature Review	Section	Expert Opinion
No specific definition of patient-centre care leads to healthcare practitioners' not knowing exactly what is expected of them	IAPO, (2004)	5.6	7.3.1 Q6, Q7
The healthcare focus is on clinical and cost-effectiveness of care as well as a focus on public healthcare overall rather than focusing on an individual.	IAPO, (2004) GMSA, 2012	5.6 3.4.2	7.3.1 Q4
The structure of the healthcare system does not allow for lengthy consultation times or effective resources.	IAPO, (2004) Whiting, Hayes, & Unwin, 2003	5.6 3.4.3	7.3.1 Q4
Integration of healthcare and other aspects of life is not seen as a whole; but they are rather treated as separate entities.	IAPO, (2004) Planetree and Picker Institute, 2008	5.6 5.3.2	7.3.1 Q6
Communication and partnership between the healthcare practitioner and the patient requires that both parties listen to each other, speak freely, and ask questions when they need to.	IAPO, (2004) WHO, 2013 Stewart et al.,	5.6 5.3.1 5.3.3	7.3.2 Q2
Information sharing at present does not allow the patients to receive all the information that they require.	IAPO, (2004) Bardes, 2012	5.6 5.2	7.3.7 Q6, Q10
Attitudinal change will be required to engage fully in patient-centred care, as it is based on mutual trust, communication and partnerships that will require a "power shift" from the current practices.	IAPO, (2004) Planetree and Picker Institute, 2008	5.3.2	

| Involvement of family and friends is one of the characteristics of patient-centred care; but this is a barrier; as it requires commitment in terms of time and often also money. | IAPO, (2004) | 5.6 | |
| Patients' rights vary and this is a barrier that is difficult to overcome, in order for all the aspects of a patient's healthcare to be properly considered. | IAPO, (2004) | | |

8.4.3   Findings for patient-centred care

The interviewees were very opinionated with regard to the treatment of patients in the public healthcare sector; and although they try their best to implement, at the very least, a congenial approach to their patients, the time constraints imposed on them – due to a lack of sufficient staff – inhibits them from following a patient-centred approach. Furthermore, the authoritarian approach is required; as the public have little knowledge about their condition; and thus, they have to follow instructions rather that participate in discussions about their treatment. The public healthcare sector is also short-staffed and healthcare practitioners and carers are often transferred between clinics and hospitals, making it very difficult to form a trusting relationship with the patient.

In the private sector, patient-centred care is more evident; and although not all the factors are considered, private healthcare is most definitely more geared towards good diabetes care. There is a relationship between patients and their doctors, and consultation with patients regarding treatment also takes place. Patients in the private sector are more likely to get integrated care through a network of specialists.

8.5   Technology in Patient-centred Diabetes Care

This section is crucial to the study; as this is how ICT can be used to assist in diabetes care, whilst keeping in mind that technology itself can be perceived as an "impersonal tool", in a patient-centred environment.

8.5.1   Technology use in diabetes care

The Real Access criteria are concerned with ICT access and use, as well as the "soft" aspects regarding ICT. These criteria predict why ICT projects in development often fail, as well as highlighting the factors that contribute to the successes of these projects (Bridges, 2005). The experiences of the interviewees is used to address the question regarding how ICT is currently used in diabetes care. Table 8-6 shows where the discussions regarding the use of ICT in diabetes care occur.

Table 8-6 Use of ICT in diabetes care

	Literature Review	Section	Expert Opinion
Physical Access to technology	Bridges, 2005	4.4.1	7.3.6 Q7 – Q11
Appropriateness of technology	Bridges, 2005	4.4.1	7.3.6 Q6 – Q11
	Congdon, 2013	4.2.2	
	Istepanian, 2014	4.2.3	
Affordability of technology and technology use	Bridges, 2005	4.4.1	7.3.6 Q8, Q11 – Q13
	McKinsey and Company, 2010	4.2.3	
Human capacity and training	Bridges, 2005	4.4.1	7.3.6 Q1 – Q6
	McKinsey and Company, 2010	4.2.3	
Locally relevant content, applications and services	Bridges, 2005	4.4.1	7.3.6 Q10
	Demiris, et al., 2008	5.7.6	
Integration into daily routines	Bridges, 2005	4.4.1	7.3.6 Q11
	Kahn, Yang, & Kahn, 2010	4.2.3	
Socio-cultural factors	Bridges, 2005	4.4.1	
	GSMA, 2012	4.2.3	
Trust in technology	Bridges, 2005	4.4.1	7.3.6 Q7
Local economic environment	Bridges, 2005	4.4.1	7.3.6 Q12, Q13
Macro-economic environment	Bridges, 2005	4.4.1	
Legal and regulatory framework	Bridges, 2005	4.4.1	
Political will and public support	Bridges, 2005	4.4.1	7.3.6 Q11, Q13

8.5.2 Findings for technology

Table 5-1 (McKinsey and Company, 2010), has been modified to add the interviewees' comments, and to illustrate the possibilities for using technology in diabetes care. This is depicted in Table 8-7.

Table 8-7 Possibilities for ICT use in diabetes care

From Traditional Healthcare delivery	ICT in diabetes care
Patient visits the physician or the ER, taking time off from work when he/she feels serious symptoms	Patient can communicate with caregiver using own device regarding unusual measurements or emergency
Physician interviews patient in person and conducts a typical hands-on examination	Healthcare practitioners can send text messages or voice messages in response to captured blood glucose measurements shared via diabetes patient's device
Physician prescribes medicine and hopes patient takes it at prescribed times	Healthcare practitioners can send text reminders regarding medication and visits or follow up to encourage adherence to treatment plan
Patient gets well and goes back to potentially unhealthy lifestyle	Patients can be monitored more closely and their diabetes management can be aided by lifestyle education and awareness through their own ICT devices
Chronic shortage of (specialized) medical talent	Patient can get educational information via technology on hand. Clinic workers can get training through online/electronic sources on their own devices.

The interviewees in the public sector confirmed that they did not use technology to its full potential. They stated that if technology were available, it would be used only by those who know how to capture data, and solely for that purpose. Most of the hospitals and clinics that the interviewees were involved in still use paper records and files for patients. With regard to using technology for diabetes treatment, such as receiving blood glucose readings, or for patient-centred care, such as text reminders to visit the clinic, the interviewees all stated that they do not use technology; as it would place financial constraints on them; since there is no technology at the public hospitals or clinics that can be used for this purpose. All interviewees at the public sector stated that they could clearly see how technology could help them with diabetes care, as well as with being more patient-centred; and they also said that they would not be opposed to using technology.

The interviewees in the private sector confirmed the findings of the literature reviews with regard to technology-enhancing diabetes care, as well as playing a role in patient-centredness. Medical records were much more accurate; and they were also easily shared for integrated care. Text reminders made patients feel important and added to the patient-centredness of the clinic or hospital. This could be improved even further – if there were devices or incentives that alleviated the financial impact on the interviewee.

8.6 Factors that Influence Patient-centred Care Mapped to Diabetes Needs

In section 3.2.1, the various requirements for the successful treatment of diabetes were discussed, whilst section 4.2 looked at the requirements for patient-centred care. In this section, the factors that influence patient-centred care are mapped to the diabetes requirements, as set out by the International Diabetes Federation (IDF) (Global Guidelines for Type 2 Diabetes, 2012).

In Table 8-8, the overall shapers of patient-centred care are mapped to diabetes-care requirements and the problems that have been identified are also indicated.

Table 8-8 Overall Shapers of patient-centred care mapped to diabetes requirements

	Factor: Shapers	Diabetes requirement	Problem	Suggestion
1.	Cultural norms and expectations	CD1[6]: Offer care with sensitivity to cultural wishes and desires. ED4: Ensure that education is accessible to all people with diabetes taking into account culture, ethnicity, psychosocial and disability issues, perhaps delivering education in a community or local diabetes centre, and in different languages LS9[7]: Introduce physical activity gradually based on the individual's willingness and ability and setting individualised and specific goals.	Diet is high carb diet Being overweight is a sign of health and wealth Distrust of blood monitoring devices("Impimpi") Need for a quick fix E-health strategy of South Africa Health for all	Educate on good diet and healthy lifestyle Must make a change in belief of overweight is good Monitor the implementation of the e-health strategy Hold government accountable for health for all
2.	Socio economic background	CD7: Organise care around the person with diabetes.	Literacy levels are low Financial state is poor Access to healthcare is difficult	
3.	Formal and informal learning	ED1[8]: Make structured patient education an integral part of management of all people with Type 2 Diabetes ED5: Use techniques of active learning adapted to personal choices and learning styles LS2: Provide access to dietician or other healthcare professional trained in the principles of nutrition at or around time of diagnosis, offering one initial consultation with two or three follow up sessions individually or in groups LS11: Provide guidelines for adjusting medication and/ or adding carbohydrates for physical activity	Continues education on diabetes for professionals is non existent	Formal curriculum for doctors and nurses must have a separate focussed section on diabetes that is continually updated Group sessions for patients Word of mouth teaching Media campaigns Support groups
4.	Personal experience	PS2[9]: Explore the social situation, attitudes beliefs and worries related to diabetes	Access problems Long queues Short consultations Lack of cultural understanding Miscommunication regarding medicines Different staff different advice Emergency appointments are very difficult Non-compliance (Forget to take meds, don't go to appointments) Limited to med aid covered meds/consultations/specialists	Need healthcare to be revamped Doctors must get trained on cultures and beliefs of their communities Need continuous care Trackers and reminders to assist with compliance Non-prescriptive cover to ensure proper diabetes care

[6] Care Delivery
[7] Life style
[8] Education
[9] Psychological

5.	Medical training and clinical expertise (doctor)	ED3: Include on education teams a health-care professional with specialist training in diabetes and delivery of education for people with diabetes	Staff on ground are not well trained No continuous training Conflicting information given to people with regard their medicines and their condition	Training regarding diabetes should be part of official nursing/medical training Training should be continuous to ensure that everybody knows latest treatments or problems discovered Must follow National Care plan

The Table illustrates how the patient-centred care factors referred to as "shapers" have an overarching effect on the patients' experience of care. This factor has to do with the person and the environment directly surrounding him/her. The first shaper is that of a person's values and beliefs, which must be taken into account; and for diabetes care, this factor speaks to care delivery, where a patient's cultural beliefs and value system must be taken into consideration, when developing a care plan. The socio-economic factor speaks to the environment in which the patient finds him/herself; and it must be considered during care delivery. The formal and informal shapers speak to educating people with diabetes: not only about the condition, but also as regards their lifestyle. Different types of learning environments need to be established, to cater for those people, many of whom may be illiterate. Furthermore, the education needs to extend to the carers; as they are the ones who would be the first point of contact with the patient.

Personal experience as a shaper is very important as everybody sees things through their own eyes, and what is important to them at the time. This also means that different beliefs and cultures must be acceptable in the treatment of the patient. The medical expert or doctor plays a vital role in shaping the patient's experience; as the medical expert is the one in direct contact with the patient. It is important that the medical expert is indeed an expert, and is confident in the area of diabetes care.

The influences that doctors have on patient-centred care are mapped to diabetes care; and they are discussed in Table 8-9.

Table 8-9 Doctor factors influences on patient-centred care mapped to diabetes care

	Doctor Factors	Diabetes requirement	Problem	Suggestion
1.	Attitude and Values	PS1: In communicating with a person with diabetes, adopt a whole-person approach and respect that person's central role in their care	Short abrupt visits More acute care with authoritarian manner than patient-centred care No consultative approach Reactive not proactive/preventative Most doctors do care but have time limits and pressure to get through high volume of patients	Need to gear to multidisciplinary patient-centred care
2.	Knowledge	ED2: Use an appropriately trained multidisciplinary team to provide education to groups of people with diabetes or individuals if groups are unsuitable	Few doctors with diabetes knowledge	Must have continuous education on diabetes specifically
3.	Personality		Requires good listener and empathy with patient	Encourage patient-centred attitude
4.	Gender			
5.	Age		Older doctors use older methods	Must update doctors often
6.	Ethnicity			
7.	Knowledge of patient	SM1[10]: Self-monitoring of blood glucose (SMBG) should be available for all newly diagnosed people with Type 2 Diabetes as an integral part of self-management education.	Can cause conflict between doctor and patient if patient knows a lot and information may be from unreliable sources	Build mutual respect and understanding of each other

The factors that doctors bring to patient-centred care are very important; as they represent the face of the care received. Doctors must look at the person as a whole, and not only look at the symptom or ailment in front of them at the time of consultation. For diabetes care, it is essential that the team of doctors be experienced in diabetes care, and indeed function as a team. The person with diabetes must not be treated in isolation of other medical practitioners who tend them. The personality, age, ethnicity and gender of the doctor are factors that must be taken into consideration; but there are also other factors that cannot be changed. The knowledge that the patient brings to the consultation is also important; as patients with better literacy skills can better inform themselves; and they may come with challenging questions to the doctor. In other cases, literate patients may actually want to obtain more information than

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[10] Self-Management

the doctors are willing to share. It is important to have a trusting relationship between patient and doctor; so that the best treatment plan van be developed to fit each individual patient.

The professional context also influences patient-centred care; and that is mapped to diabetes care (in Table 8-10).

Table 8-10 Professional Context Influences of patient-centred-care mapped to diabetes care

	Professional Context Influences	Diabetes requirement	Problem	Suggestion
1.	Professional norms	SM2: SMBG (meter and strips) on an ongoing basis should be available to those on insulin treatment ES1[11]: Ensure that the examination of people with Type 2 Diabetes is performed around the time of diagnosis and then annually as part of a formal recall process.	Acute vs Chronic Care Focus is on current problem/symptom General practitioners General care	Change care to focus on chronic Use protocol driven diabetes care Use multidisciplinary teams Encourage holistic approach Need personalised more focused care
2.	Performance incentives and targets	SM5: Structured assessments of self-monitoring skills, the quality and use made of the results obtained, and of the equipment used, should be made annually	No measurement of successes and no recording of reasons for success	Use experts as local leaders and give them incentives to do the measurements and recordings
3.	Accreditation			Private and public care to be certified diabetes clinics Must be patient-centred Must be monitored and held accountable
4.	Government policy initiatives		Care delivery plan MDG Medicine's availability not stable and frequent changes due to tenders changing Must reform hospitals and clinics to chronic care + patient-centredness	Record all diabetes patients Use government tenders "winners" to aid in funding diabetes education NHS to cover ALL diabetes care to aid in prevention of complications(allow more visits to multiple types of doctors) Government should enforce more reliable tenders Must change fragmentation of care

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[11] Eye Screening

Influences that come from the professional context include professional norms, incentives, accreditation and government policies. Professional norms are required to ensure that the minimum care is given to patients; and the diabetes-care guidelines show that essential care requires that a person with diabetes must at least have access to glucose strips and glucose meters; and at least have an annual visit to a hospital/clinic for follow-up procedures. Incentives are a way of ensuring that norms and practices are implemented. In diabetes care, these incentives need to be put in place for both the carers and for the person with diabetes.

Every patient that is treated, brings with him/her their own experiences, personalities and these therefore have an influence on patient-centred care. These patient factors are mapped to diabetes care in Table 8-11.

Table 8-11 Patient Factors influencing patient-centred care mapped to diabetes care

	Patient Factors	**Diabetes requirement**	**Problem**	**Suggestion**
1.	Attitude and expectations	CD4: Agree on a care plan with each person with diabetes LS7: For people choosing to use fixed insulin regiments advise consistent carbohydrate intake at meals. IN3[12]: Provide education, including continuing lifestyle management and appropriate self-monitoring. Explain that the doses of insulin are low for safety reasons but that eventual dose requirement is expected to be 50-100 units per day. Initiate insulin therapy before poor glucose control develops. FT3[13]: Agree to a foot-care plan based on the findings of annual review with each person with diabetes CH3[14]: Provide initial care appropriate to age and developmental stage including counselling, diabetes	Mentality towards diabetes is that of sickness or disease rather than chronic condition Patients often are depressed Small current tangible problems seem to take precedence at visits rather than diabetes that is relatively "pain free" Patients only use medication when they think they need it Don't realise the need for multidisciplinary care Expect decent care Want a quick fix rather than long term solution	Ongoing counselling and group sessions for psychological needs must be addressed Education on behaviour change rather than quick fixes Must be educated on acute vs chronic conditions
2.	Knowledge	ED1: Make structured patient education an integral part of all people with Type 2 Diabetes LS4: Individualise advice on food\meals to match needs, preference and culture LS5: Advise control of foods with high amounts of sugars, fats, or alcohol LS7: Offer education on assessment of carbohydrate content of different food types LS8: Provide advice on the use of foods in the prevention and management of hypoglycaemia where appropriate. FT2: Discuss the reasons for foot review with each person with diabetes as part of the foot-care educational process.	Low knowledge of diabetes Low knowledge of medication Little knowledge about diet and exercise Patients record readings but don't know how to analyse results	Education should be in lay terms Interactive education is better Teaching should also be visually for non-readers Educate re advantages of active lifestyle Must have access to dieticians

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[12] Insulin
[13] Foot Care
[14] Children

3.	Personality	CH3: Provide initial care appropriate to age and developmental stage including lifestyle counselling		
4.	Gender	PR2[15]: Offer pre-pregnancy advice to all women identified as possibility of pregnancy. PR6: Review understanding of management of diabetes in pregnancy, current drug therapy, blood glucose control, diabetes complications and presence of other medical conditions	Gestational diabetes knowledge is low Knowledge of how to care for yourself as a diabetic during pregnancy is low	Improve knowledge of gestational diabetes
5.	Age		All are vulnerable as diabetes is not restricted to age	Must educate all on how to avoid/prevent diabetes
6.	Ethnicity		Certain ethnicity has tendency to diabetes	Educate re ethic risks
7.	Nature of problems	LS1: Advise people with type 2 diabetes that lifestyle modification, by changing patterns of eating and physical activity, can be effective in controlling many of the adverse risk factors found in the condition. LS12: For weight reduction in people with Type 2 Diabetes who are obese, it may be appropriate to consider weight loss medications as adjunct therapy. BP4[16]: Initiate a trial of lifestyle modification alone with appropriate education for 3 months aiming to reduce calorie intake, salt intake, alcohol intake and inactivity	Chronic condition Controllable Stressful Lifestyle condition	Treat as a whole person problem and understand chronic condition
8.	Knowledge of doctor		Doctor does not know whole person wrt medical history, beliefs and culture Doctor does not know family or other support structures	Must have mind set shift wrt how to work with people as a whole Education re cultural beliefs and traditions Must get involved with support structure of patients

The patient factors are vast; and they begin with the expectations and attitude of the patients towards their diabetes. The patient must be in agreement with the treatment plan that is suggested; and must be made aware of the specifics that relate to the patient, in particular, rather than to diabetes in general. An example would be to give children/teenagers relevant counselling on diabetes. It is also important that the correct lifestyle adjustments are

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[15] Pregnancy
[16] Blood Pressure

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discussed and accepted by the patient, in order to ensure better adherence; as the nature of the problem plays a big role in the treatment plan. The doctor-patient factor here is with regard to the knowledge that the doctor has of the patient. This relates to the patient's support structures and cultural beliefs, as well as the patient's level of education. All of this is important; so that the doctor can deliver the correct level of information that is acceptable and in line with the traditions and cultures, so that the patient and the support structure can benefit. The age, gender and ethnicity of the patient all play a role; but they are not the main factors in the case of people with diabetes. Exceptions would be females, who are pregnant as they need a particular diabetes-care plan.

The level of consultation has a direct impact on patient-centred care; and this is mapped to the requirements for diabetes care in Table 8-12.

Table 8-12 Consultation level influences on patient-centred care mapped to diabetes care requirements

	Consultation level influences	**Diabetes requirement**	**Problem**	**Suggestion**
1.	Communication barriers	CD11: Consider how people with diabetes, acting as experts and knowing their limitations might be involved on supporting their local healthcare team ES2: Discuss the reason for eye examination with the person with diabetes	Language Culture Literacy (non-readers) Patients consult and believe internet	Multilingual visual and audio education Possibility of interpreters during consultations Point to credible diabetes sites
2.	Physical barriers	CD10: Provide telephone contact between visits LS3: Provide ongoing counselling and assessments yearly as a routine or more often as required or requested and when medication is changed	Distance Transport Financial Geographical location	Mobile clinics in remote areas
3.	Interruptions	LS6: Integrate drug therapy where needed into the individuals chosen lifestyle CH3: Provide continuing care and support including lifestyle measures in context of the family	Not same doctor/nurse Missing of appointments Missing of medication Financial constraints Restrictions of med aids Conflicting medications	Must have continuous care Reminders for visits and meds Med aids must adjust to diabetes needs Education on medication and consequences of missing them

4.	Presence of third party	ED2: Where desired include a family member or friend CH3: Provide diabetes education with the family of children with diabetes	Holistic approach missing – single isolated doctors' visits Need for multiple doctors to be present (also speaks to geographical boundaries) No interpreters No family support	Encourage holistic approach and multidisciplinary team work from doctors Encourage family support
5.	Time limitations	ED6: Use modern communication technologies to advance methods of delivery of diabetes education ES5: Specialist referral required on same day for sudden loss of vision or evidence of retinal detachment	Short visits require long waiting in queues Lack of sufficient healthcare professionals Only do basic checks and results in late detection	Need more carers at ground level Can do education/ other screening while in queues
6.	Workload pressures		Short staffed facilities require staff to work extra hard Sometimes medicines are not available Added workload due to change in medicine supplied by government due to re-educating/explain/reassuring patients that new meds are good	Funds should be made available for decent tea rooms or rest places for staff in the work place

When it comes to the consultational factors that affect patient-centred care, it is very clear that diabetes patients need to be treated different to people who are visiting clinics or hospitals for acute care. Chronic diseases, such as diabetes require a team of doctors and the patient needs to be made aware of this. Furthermore, barriers, such as access to healthcare and time limitations on visits, have a direct impact on people with diabetes; as it is imperative that they visit the healthcare practitioner more regularly; and that they get a full and proper consultation to ensure that the possible complications are avoided.

8.7 Conclusion

Having conducted a concise literature review and receiving feedback and comments from experts in the field of diabetes that allowed the cross-referencing of the literature review with lived experience, it is now possible to identify the suggested sub-objectives, and thus the components of an ICT strategy for a patient-centred approach to diabetes care.

Suggested components of the strategy derived are:

1. To ensure that ICT is used by healthcare practitioners in diabetes care. This includes:

   a. Upskilling of the carers

   b. Education on customs, culture and traditions

   c. Communication with diabetic on routine feedback or emergency assistance

   d. To enhance continuous care by forming a relationship with the patient

   e. To enable integrated care by improving record-keeping and sharing

   f. To access, implement and monitor a diabetes-care plan for the patient

2. To ensure that ICT is used by people with diabetes in the self-management of diabetes.

   a. Educating people with diabetes on lifestyle, diabetes misconceptions, cultural and traditional beliefs and diabetes, and general diabetes information

   b. Education on medication, monitoring and reporting, as part of self-management

   c. Communication with carer on routine feedback or emergency assistance

   d. Communication with support groups or social media groups

3. To ensure that ICT is used in clinics/hospitals for diabetes education and awareness

   a. General diabetes awareness for public, high risk and undiagnosed people

   b. Awareness through promotion of diabetes campaigns

8.8   Summary

The data collection and the analysis discussed in this chapter form part of the requirements that need to be fulfilled in the pre-formulation phase of strategy design. (**Error! Reference source not found.**). The analysis indicate that there are many problems in the treatment of people with diabetes. These are not only in the public sector, as expected, but also to a lesser extent in the private sector. Although many problems were identified, the main concern is twofold, namely: a lack of diabetes awareness and education, and a lack of adherence. This is also in line with the findings of the literature review conducted at the onset of this study. The outcome of the interviews also indicates that the people working in the field of diabetes care are receptive to the uptake of information communication technology, to assist them in better

serving people with diabetes. This leads to the conclusion that there is a scope for improving the care of people with diabetes by using technology, whilst maintaining a patient-centred approach.

In the next chapter, the strategy formulation is done, in order to ensure that each of the components (sub-objectives) identified are addressed by the strategy.

9   ICT Strategy Formulation
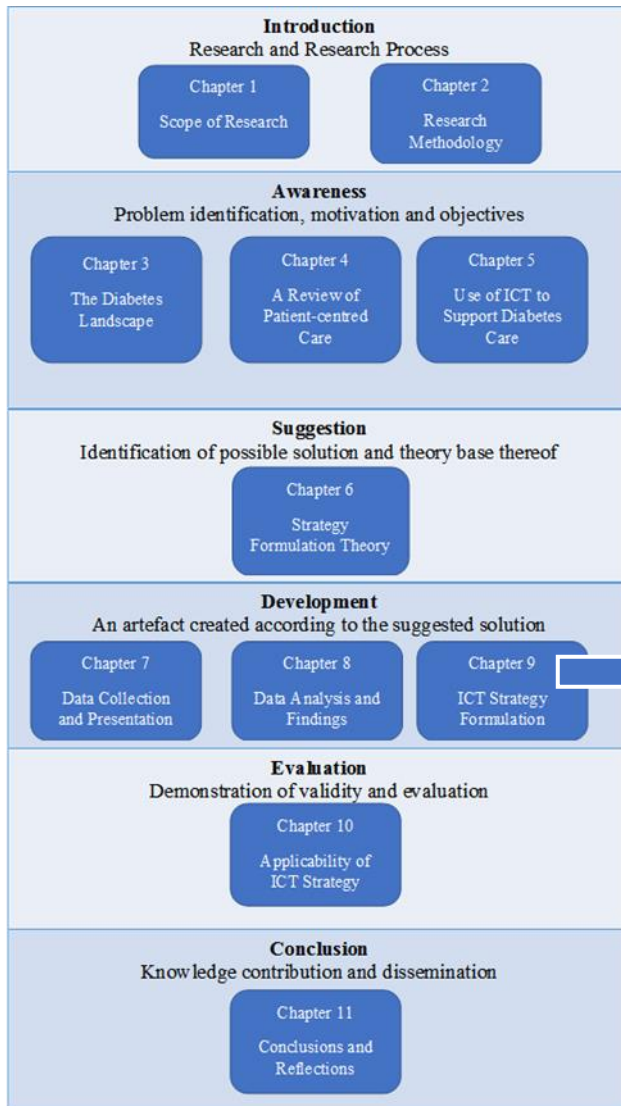
9   ICT Strategy Formulation

9.1   Introduction

9.2   Component 1: To ensure that ICT is used by Healthcare Practitioners in Diabetes Care
9.2.1   Diagnosis for ICT use by healthcare workers
9.2.2   Guiding policy for ICT use by healthcare workers
9.2.3   Action plans for ICT use by healthcare workers
9.2.4   Summary of ICT use by healthcare practitioners

9.3   Component 2: To ensure that ICT is used by People with Diabetes in the Self-management of Diabetes
9.3.1   Diagnosis of ICT use by people with diabetes
9.3.2   Guiding policy for ICT use for people with diabetes
9.3.3   Action plan for use by people with diabetes
9.3.4   Summary of ensuring ICT use by people with diabetes

9.4   Component 3: To ensure that ICT is used in Clinics/hospitals for Diabetes Education and Awareness
9.4.1   Diagnosis for use of ICT in clinics/hospitals
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9.4.3   Action for use of ICT in clinics/hospitals
9.4.4   Summary of using ICT at clinics/hospitals for diabetes education and awareness

9.5   Conclusion

9.6   Summary

9.1 Introduction

This chapter is the final step in the creation of the artefact, namely an ICT strategy to support patient-centred diabetes care. The steps leading up thereto, were those of objective setting and environmental assessment; and they were discussed in detail in Chapters 7 and 8.

The components of the strategy are identified in Chapter 8. These are based on the emerging themes identified through the objective setting and environmental assessment process. The components are:

1. *To ensure that ICT is used by healthcare practitioners in diabetes care.*

   This includes addressing matters regarding:

   a. The upskilling of carers

   b. Education on the customs, culture and traditions

   c. Communication with the diabetic on routine feedback or emergency assistance

   d. To enhance continuous care by forming a relationship with the patient

   e. To enable integrated care by improving record keeping and sharing

   f. To access, implement and monitor a diabetes-care plan of the patient

2. *To ensure that ICT is used by people with diabetes in the self-management of their diabetes.*

   This includes addressing matters such as:

   a. Educating people with diabetes on lifestyle, diabetes misconceptions, cultural and traditional beliefs and diabetes, as well as general diabetes information

   b. Education on medication, monitoring and reporting as part of self-management

   c. Communication with carer on routine feedback or emergency assistance

   d. Communication with support groups or social media groups

3. *To ensure that ICT is used in clinics/hospitals for diabetes education and awareness.*

   This includes addressing:

   a. General diabetes awareness for public, high risk and undiagnosed people visiting clinics/hospitals

   b. Awareness through the promotion of diabetes campaigns

In the following sections, each component identified is looked at in terms of diagnosing the problem, finding a guiding policy to address it, and describing the exact steps to take.

9.2   Component 1: To ensure that ICT is used by Healthcare Practitioners in Diabetes Care

One of the components identified after the environmental assessment was to ensure that healthcare workers use the ICT that is available to them to its full potential, in order to upskill themselves and improve their service to people with diabetes. Figure 9-1 indicates the diagnosis, the guiding policy and the action needed for this component.
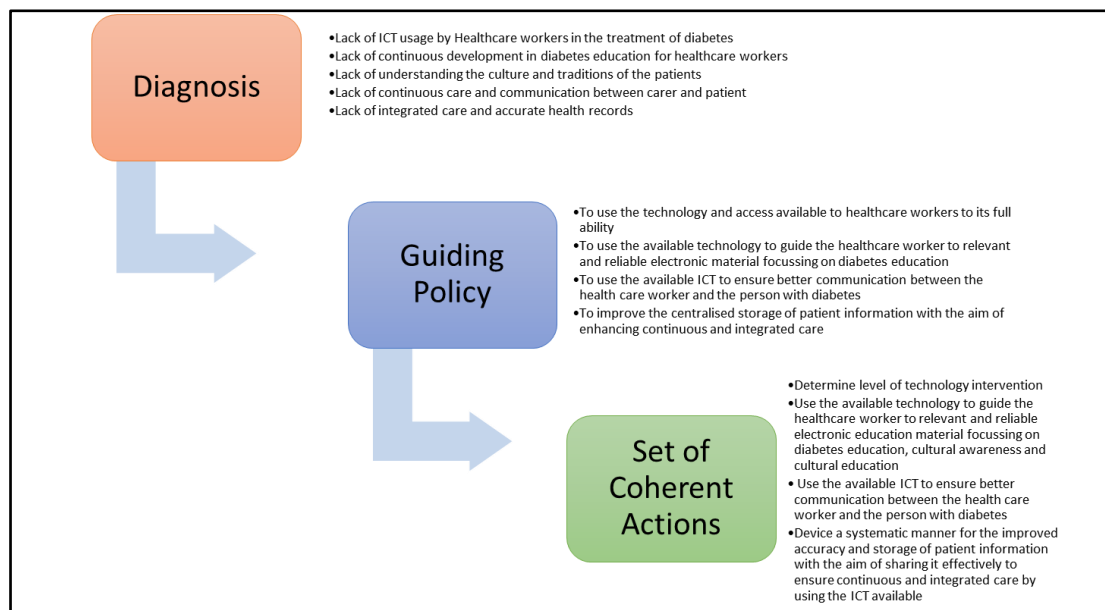
Figure 9-1 Component 1: Diagnosis, Guiding Policy and Action plan

Each of the elements in the diagram are discussed in detail in the following sections.

9.2.1   Diagnosis for ICT use by healthcare workers

The results of the environmental assessment provided pertinent and reliable information to assess the current status of ICT integration and usage by healthcare workers in the diabetes

environment. The challenges, gaps and weaknesses of the current infrastructure, human resources, and the use of ICT were reported in section 6.2.4.

1. Diagnosis 1: Access

Lack of ICT usage by Healthcare workers in the treatment of diabetes

The first diagnosis is with regard to access to ICT; and it frequently reveals that the majority of healthcare workers are not making use of ICT in the treatment of diabetes; and those few who are, do not use it to its full potential. The factor leading to this lack of ICT usage, is that healthcare workers are not provided with equipment to enhance their use of technology; and they are reluctant to use their own devices; as it is at their own cost. Healthcare workers could be encouraged to use their own devices, if such devices are not provided, and incentives can be given to alleviate their costs.

2. Diagnosis 2: Education

Lack of continuous development in diabetes education for healthcare workers

Little or no advice is given with regard to furthering the healthcare workers' diabetes education. Healthcare workers rely on their basic knowledge and training; and they are not specialising in the condition itself. Any further education is very basic, and is obtained from the same reading material (pamphlets) as that given to the patients. Healthcare workers could have access to live online education material, if the infrastructure and technological devices were available.

3. Diagnosis 3: Education

Failure to understand the culture and traditions of the patients

The third diagnosis relating to healthcare workers is that they frequently do not understand the culture and traditions of the patients; and they do not have the time during visits to engage with patients on this topic. If a relationship is built up between a carer and the patient, it is often not sustained; as carers are often rotated or redeployed to other areas. Continuous communication between the patient and the healthcare worker can improve, by using the technology on hand. This could have a positive impact on understanding each other's cultures better, and thus build a strong relationship between the carer and the patient. Cultural awareness can also be enhanced via electronic educational material.

4. Diagnosis 4: Communication

Lack of continuous care and communication between carer and patient

Continuous care is often affected by healthcare workers being transferred to other units in public clinics; and this negatively impacts continuous care. This means that there is no bond between the carer and the person with diabetes; and frequently this affects the trust factor that is so important for the adherence to a long-term treatment plan. Visits are also short; and there is no time for communicating effectively. Carers also do not communicate with patients regarding their progress between visits; and this makes the monitoring of adherence difficult.

5. Diagnosis 5: Healthcare records

Lack of integrated care and accurate health records

Integrated care is another weakness that was diagnosed; since the referrals to specialist care are normally in reaction to a complication that has risen, and not just preventive. It is also difficult for people in the public sectors to get an appointment with specialists; and often this requires returning on another day, weeks or months later, often resulting in the complication increasing in severity. Patient records are not well kept; and the data are seldom shared amongst the various carers, doctors and specialists. The patient information needs to be captured in detail, stored and shared amongst all levels of carers – in order to ensure continuous and integrated care. By using ICT to capture, store and share information, a more accurate reflection of the patient's status is recorded and shared; and that leads to better care.

9.2.2 Guiding policy for ICT use by healthcare workers

Guiding Policy 1: Access

The guiding policy to ensure ICT usage by healthcare workers treating people with diabetes looks at the access available and reveals:

To use the technology and access available to healthcare workers to their full potential.

Enhancing access to ICT is critical to successful diabetes care. Challenges, such as internet access, mobile phones and the lack of computerization in the healthcare sector point to problems with access. The lack of access has a negative impact on the treatment of people with diabetes; and this calls for government to implement strategies that can improve access. The guiding policy to boost access for this study, however, does not rely on government intervention, but rather focuses on what the current situation and availability comprise. The strategy is focused on ground-level diabetes treatment.

The type of technology and access determine the type of strategy to implement.

Guiding Policy 2: Upskilling of healthcare worker

The guiding policy that addresses the upskilling of healthcare workers is:

To use the available technology to guide the healthcare worker to relevant and reliable electronic material focusing on diabetes education.

The furthering of education and knowledge for healthcare workers is based on the ICT strategies possible, depending on the technology that they have on hand. Ensuring that healthcare workers provide the best care to people with diabetes means that the carers must have an in-depth understanding of the condition, as well as always being aware of the latest treatments available. Healthcare workers can have the relevant information available to them – by ensuring that they know how to access this – using the available technologies.

The healthcare worker must know where to find the electronic information and the various platforms, which are: android and the web-based information that is available.

Guiding Policy 3: Cultural education for healthcare workers

The guiding policy to assist in a better understanding of cultures and traditions is:

To use the available technology to guide the healthcare worker to relevant and reliable electronic material focusing on cultural awareness and education.

This type of education is essential, as a part of a patient-centred approach; and it has also proven to assist in adherence to long-term treatment plans.

Guiding Policy 4: Communication for healthcare worker

The guiding policy for healthcare workers regarding communication with their patients is identified as:

To use the available ICT to ensure better communication between the healthcare worker and the person with diabetes.

The diagnosis of healthcare workers and their use of ICT indicated that there is a failure to use technology for communication purposes. This leads to delays in the reporting of abnormal blood glucose readings to healthcare workers, people with diabetes not getting the right treatment or advice at the right time, and additionally an overall loss of confidence in the treatment plan. This lack of communication can have a disastrous impact on the person

with diabetes; as the incorrect dosage of insulin, or not administering insulin at all, can lead to a "diabetic coma" and even death.

Guiding Policy 5: Healthcare records

The guiding principle that would address continuous and integrated care is identified as:

> To improve the centralised storage of patient information with the aim of enhancing continuous and integrated care.

Another area that was diagnosed as problematic, due to the absence of an ICT strategy, was that of continuous and integrated care. Continuous and integrated care calls for centralised data storage and data sharing; but also at the same time, multiple access points for data capturing and retrieving. The lack of continuous and integrated care means that people with diabetes often have to repeat information several times to various carers – leading to misinterpretation or misunderstandings. It also means that the various doctors and specialists caring for the same person do not work as a team; but they rather look at the isolated or relevant problem in their area of expertise. This can lead to prescribing medications that may clash, contradicting other information and general poor treatment of the person.

9.2.3   Action plans for ICT use by healthcare workers

Action Plan 1: Access

> AP1: Determine the level of technology and access available *to healthcare workers and patients*.

In the absence of immediate government intervention regarding access, the action plan for Access Guiding Principle 1 should provide a route to follow in the current circumstances.

The route depends on the level of access. The three levels for this study are: Low Tech, Medium Tech and High Tech. To implement the correct action plan, the first step is to identify the level of ICT available. This level is determined by the type of device available, as well as the current status of access to the Internet. The outcome is determined by both the healthcare worker, as well as the patient's device and access capabilities, in order to ensure that the appropriate ICT strategy is implemented. A number of questions have to be asked; and the answers lead to the appropriate level of ICT intervention to be implemented. The action plan for determining the access level for healthcare workers and people with diabetes is depicted in Figure 9-2.
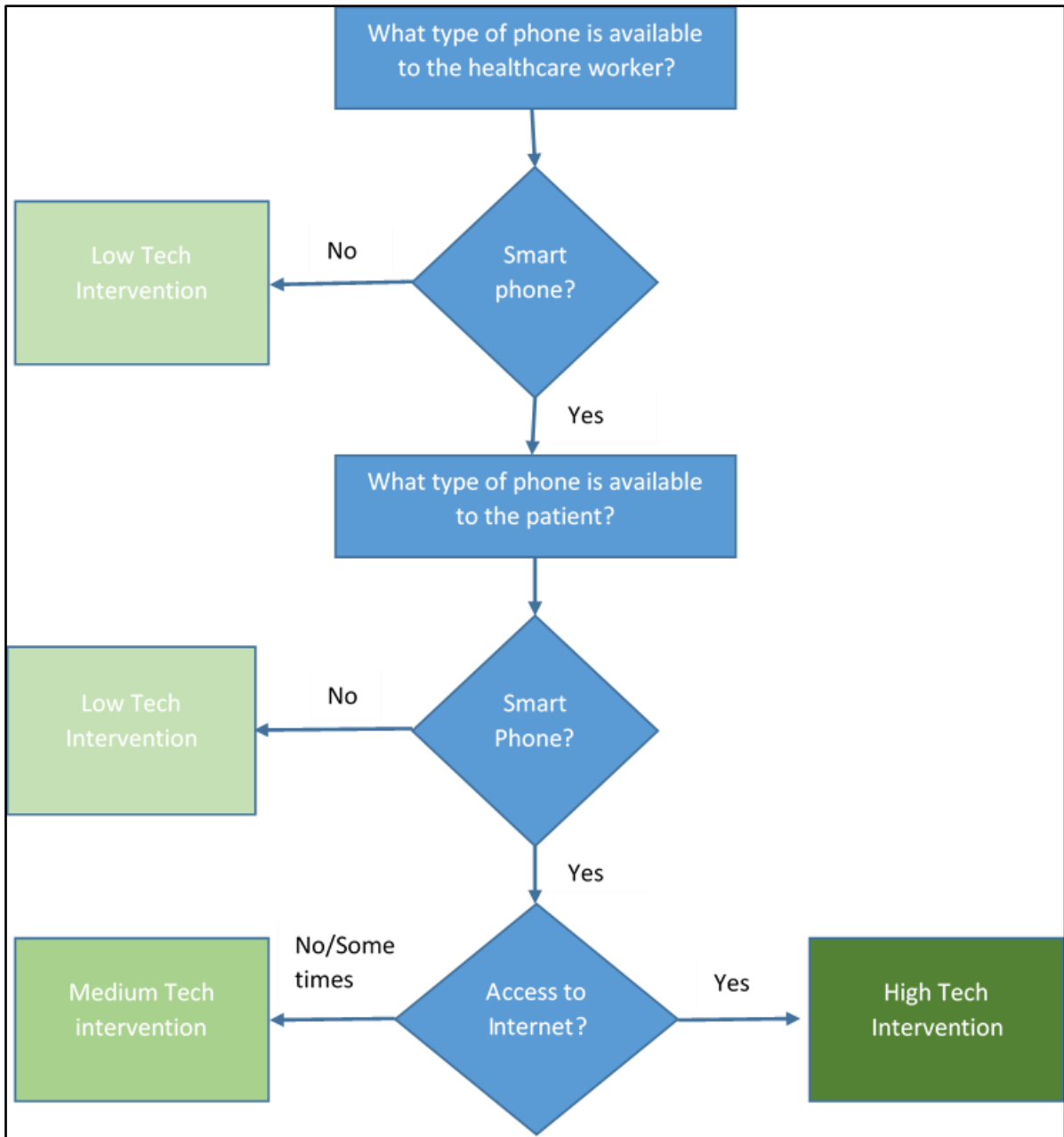
Figure 9-2 AP1: Steps to determine level of technology intervention

Once the level of access has been determined, there are further action plans to follow, in order to conclude the requirements of the ICT strategy for patient-centred diabetes care. These action plans would be to ensure that the healthcare worker is obtaining the correct educational material for upskilling themselves, to ensure that communication with the patient is taking place, in order for continuous treatment to be successful, to enhance integrated care by capturing the data in a predefined manner and sharing the data.

Action Plan 2: Upskilling healthcare workers:

The Healthcare Guiding Policies show that there are two levels of upskilling or education required for healthcare workers. The first guiding policy addresses the lack of diabetes education; while the second addresses the lack of cultural awareness and education. Both these policies can be implemented by using the same action plan. The action plan is formulated as:

H2: Continuous diabetes and cultural-awareness education

The upskilling of carers through ICT interventions can take on many forms. Although the strategy itself relies on the outcome of AP1, the action plan to follow is generic; as it is not bound to a specific technology. This action plan (H2) requires that the following steps are followed:

1. Determine the level of technology available (AP1).
2. Determine whether the clinic provides incentives/re-imbursements for using your own devices.
3. Determine who the diabetes champion/mentor is in your clinic.
4. Obtain information from the supervisor/diabetes champion in the centre regarding educational material that you can access yourself.
5. Sign up for the educational program, as determined by the supervisor, in order to obtain material from mentors/diabetes champions.
6. Report to the necessary person regarding your progress or re-imbursement requirements.

There are a number of examples listed in Table 9-1, indicating the types of ICT interventions that can be used.

Table 9-1 Examples of ICT interventions for upskilling healthcare workers

Diabetes Education and cultural awareness education	Low Tech	Medium Tech	High Tech
Short educational messages from a mentor (daily)	✓	✓	✓
Basic pictures or diagrams explain one simple concept (daily)	✓	✓	✓
Voice message explaining one concept (daily)	✓	✓	✓
Educational Video clip (daily)		✓	✓
Hyperlinks to recognised diabetes education web sites (weekly)		✓	✓
Possible on-line certification courses (monthly)			✓
Can set up chat groups on cell phone whereby educational tips are shared (e.g. WhatsApp group) (as required)			✓
Chat groups can be set up via email whereby educational tips are shared (as required)			✓

The suggestions in the table are only examples and are meant as a guide to possible ideas or interventions.

Action Plan 2: Improving communication between healthcare workers and patients

H3: Use the available ICT to ensure better communication between the healthcare worker and the person with diabetes.

Communication between the healthcare workers and people with diabetes is of vital importance to successful diabetes care. There are two types of communication that must take place. The first is regular communication, for example, for education and monitoring purposes. The second is emergency communication, for example, when abnormal glucose levels are measured, or the person with diabetes has an unrelated medical emergency that requires treatment that could interfere with, or be hindered by, the insulin treatment. It is important that the patient be engaged in the decision to use ICT for communication, as part of the treatment plan.

The type of intervention depends on the access and technology available to both the worker and the person with diabetes. This requires that the following steps are followed:

1. Determine the level of intervention (AP1).
2. Record the patients' technology level on the patient information card.
3. Explain how the technology intervention can assist in the diabetes care.
4. Explain the requirements, expectations and rules of engagement, so that the patient is aware of his/her role/responsibility in the technology intervention.
5. Obtain the patient's permission to engage in technology intervention.

6. The patient can sign a pledge of commitment to using technology, as part of the treatment plan.
7. Give the patient a copy of the pledge as a reminder and motivation to stick to the plan.
8. Ensure that the patient knows how to use the technology available for the intervention required.
9. Set up the initial settings on the patient's device, as required.

The following is a list of examples of possible communication interventions and their frequency (indicated in brackets). This is not a complete list; and it serves only to give some initial ideas to help the healthcare workers improve their communication with the patients.

- SMS communication must be used for regular feedback regarding glucose levels (daily)

- SMS communication must be used for irregular/abnormal glucose levels, in order to provide immediate assistance (as required)

- SMS communication can be sent/received for educational/motivational messages (daily)

- Reminders can be created to ensure that medication is taken and blood glucose monitoring is done (daily)

- Reminders can be sent, so that follow-up visits are not forgotten/ignored (as required)

- Voice messaging can be used for feedback to carer, as well as to communicate short educational/motivational messages, as part of a support group (weekly)

- Video clips teaching patients about diabetes care, such as how to inject insulin, or what type of food to avoid, can be received from carers (monthly)

- Groups can be formed for disseminating educational messages and the promotion of awareness campaigns (as required)

Action Plan 4: Improving patient information records for enhanced integrated care

In order to improve the quality and storage of patient records, it is important to determine the level of technology available at the clinic/hospital. The technology available also has a role to play in the method that patients' record-sharing amongst healthcare practitioners takes place.

Although different clinics/hospitals may have varying levels of connectivity, accessibility and devices, this action plan is independent of devices and can be adapted to suit the clinic/hospital. The steps are indicated in Figure 9-3:
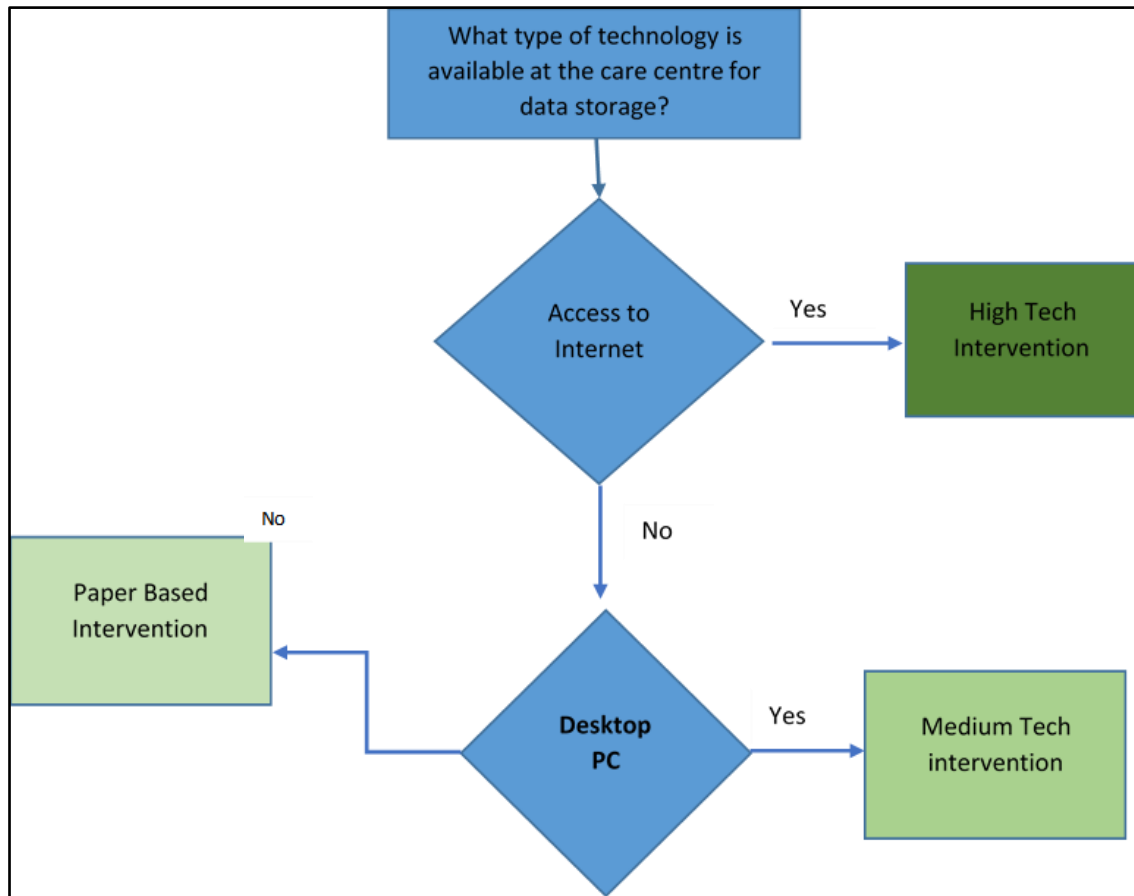
Figure 9-3 AP2: Steps to determine level of technology used for patient record storage

The clinic/hospital has to establish its own methods for record-keeping, in line with the technology available. These methods must address the problems that were identified, such as inaccurate and incomplete data, and inadequate storage methods that make the losing of files possible, and access to retrieving the files very difficult.

Possible solutions for low-tech intervention would be to establish ways with which to ensure that the data are captured correctly and fully. The patient records also have to be stored meticulously. The medium-tech solution would be to use a local health information system to capture and store the patient information. A high-tech solution would involve storing information on the Cloud for easy access, and sharing amongst authorised healthcare workers. These steps are beyond the scope of this study; and they must be developed by each clinic – to suit their practices.

The action plan that is derived is technology-independent; and it can still be implemented to assist in improving the accuracy of patient information and the improving of storage and the retrieval of patient records. The action plan that corresponds to this is:

H4: Improve accuracy and storage of patient information with the aim of sharing it effectively, in order to ensure continuous and integrated care by using the ICT available.

The steps to enhance patient record-keeping and integrated care pose the greatest challenge; since the clinic/hospital's method of data capturing and storage is, in itself, a factor to consider. The steps are not absolute; as this would depend on the practice at each clinic/hospital. The proposed steps for H4 are:

1. Determine the level of technology at the clinic/hospital (AP2).
2. Patient details should be captured meticulously in a predetermined manner and stored appropriately.
3. Train the healthcare workers on how to use the patient-information system in the clinic, irrespective of whether it is paper-based or technology-enhanced.
4. Use checklists to ensure that the steps are followed.
5. Regularly monitor the record-keeping process, to ensure that it is done adequately.
6. Devise incentives that would promote accurate and complete record-keeping by the healthcare workers.
7. Obtain feedback from patients and healthcare workers, in order to determine where improvements can be made.

Depending on the intervention required, the following are examples that can be implemented:

Low-tech solution

i. Staff must be trained on how to complete the patient forms accurately and thoroughly;
ii. Capture and store the data on paper files in a pre-determined order;
iii. Use photos of the file or hard copies of the file for distributing information to another doctor or specialist, and to the patient.

Medium-Tech solution

i. Staff must be trained on how to use the computer;
ii. Staff must be trained on how to capture the required patient information accurately and completely;
iii. Staff must be trained on how to store and retrieve files.

iv. If the Internet is not available, records should be stored centrally, where authorised staff have access to them;

v. User codes and passwords are required to access the patient records, in order to prevent unauthorized use of information;

vi. Patient records can be emailed to doctors and specialists that work with that particular patient for integrated care.

High-tech solutions

i. Data records can be saved on a network/the cloud for easy access;

ii. Staff must be trained on how to use the computer;

iii. Staff must be trained on how to capture the required patient information accurately and completely;

iv. Staff must be trained on how to store and retrieve files;

v. Security measure must be in place to ensure that there is no unauthorized use of the data.

9.2.4 Summary of ICT use by healthcare practitioners

This section shows that healthcare practitioners are able to improve the care for people with diabetes via the use of the available technology. There is no need for government intervention at this stage; but there is a need for commitment at the local clinic or hospital for assistance in carrying the cost of using a carer's own device, as well as incentives to motivate the use of devices at hand for diabetes care. Healthcare workers can use the technology on hand; and they can do so willingly – with the right motivation and incentives from their supervisors.

A summary of the strategy to ensure that healthcare practitioners use ICT in diabetes care is shown in Figure 9-4.
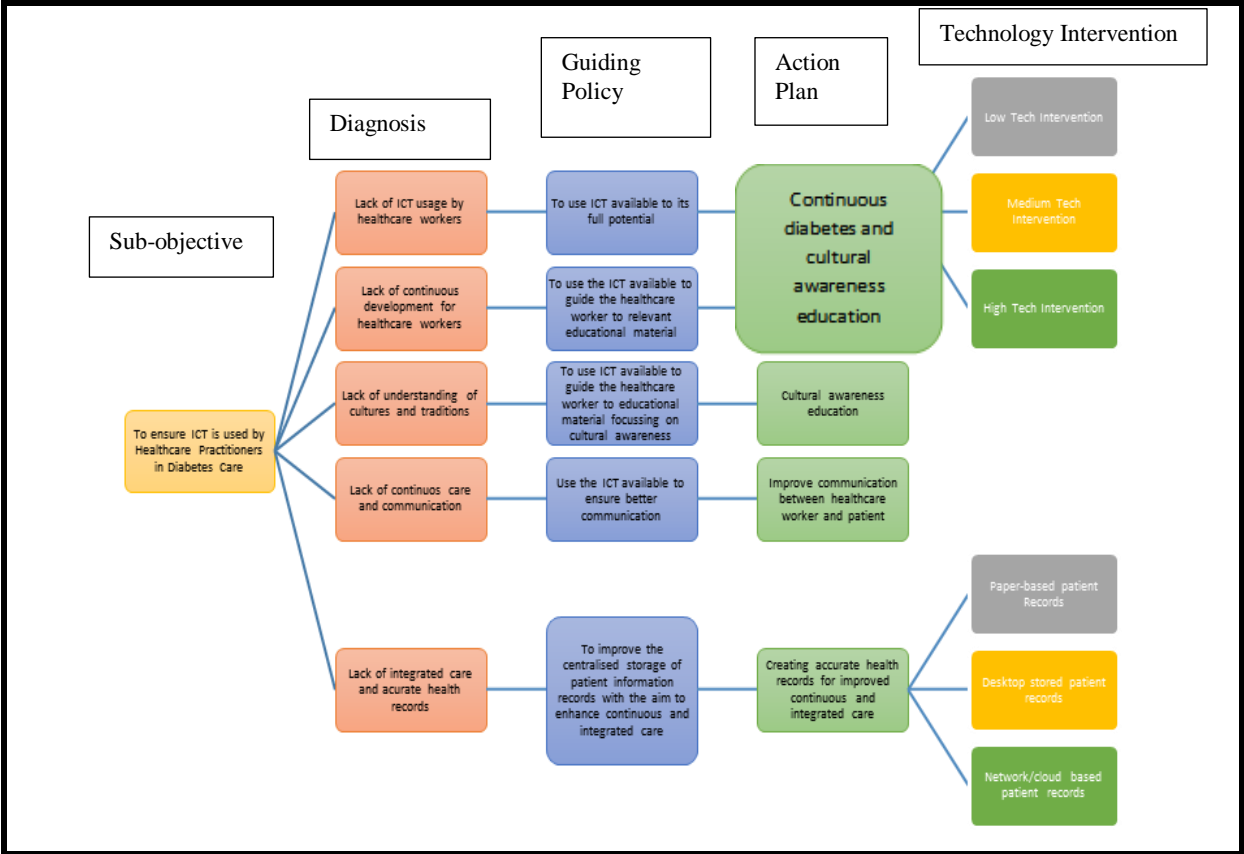
Figure 9-4 Strategy to ensure ICT is used by healthcare practitioners in diabetes care

9.3 Component 2: To ensure that ICT is used by People with Diabetes in the Self-management of Diabetes

The second component of the strategy relates to the person with diabetes; and it strives to provide better diabetes care by using the ICT technology available to the patient to its full capacity. This means that the problem areas must be identified; and the use of ICT must be implemented, in order to alleviate these problems. Figure 9-5 depicts an overview of the the second component.
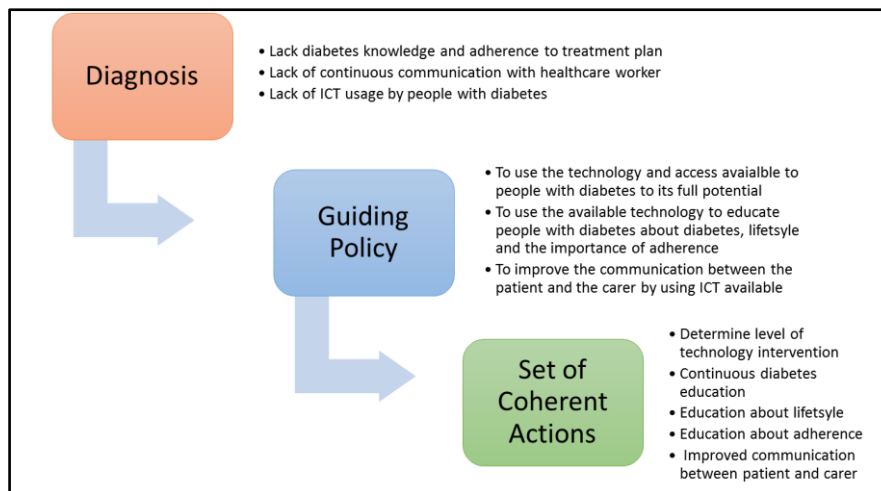
Figure 9-5 Component 2: Diagnosis, guiding policy and action plan

In the section below, a diagnosis is made of the areas where ICT could/would make an impact, in order to devise a strategy for patient-centred diabetes care.

9.3.1 Diagnosis of ICT use by people with diabetes

The environmental assessment of the factors that affect a person with diabetes was conducted; and the findings are reported in detail in section 7.4.2 and section 8.6.3. The diagnosis shows that the areas of concern are related to the access to technology, knowledge and awareness of diabetes, adherence to the treatment plans and communication with the carers.

Diagnosis 1: Patient education and adherence

Lack of diabetes knowledge and adherence to a treatment plan

The first problem area diagnosed was that people with diabetes not only did not have the knowledge regarding diabetes itself; but they also lacked knowledge on what led to the onset of their diabetes. Patients do not understand how lifestyles affect the condition; and they do not see how their traditions and beliefs can affect diabetes. People with diabetes have to adhere to a long-term treatment plan that effectively requires a complete change in lifestyle. This is a very difficult task, especially when considering that the healthy foods are more costly than their starchier unhealthy counterparts.

People do not necessarily adhere to their medication regime; but they rather treat themselves when they "don't feel well". This leads to a seesaw effect in their glucose levels, rather than maintaining a healthy balance over the long term. Education on dosage changes or new medication does not happen; as the duration of consultations does not allow for it. Although an attempt is made to educate people through support groups on various topics, such as

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medication, healthy eating, the importance of regular exercise and many more, such sessions are generally not well attended. Many of the issues mentioned with regard to diabetes education and awareness can be addressed through the better use of the ICT available to people with diabetes.

Diagnosis 2: Patient communication with educated people.

Lack of continuous communication with healthcare worker

Communication with healthcare workers is erratic; as appointments are not kept due to the inconvenience of long waiting hours at clinics or the lack of transport to clinics. People with diabetes have no way of communicating their glucose results to carers, except when visiting clinics. This is dangerous; as trends are not always noticed on time; and this could lead to complications. A standard way of reporting should be generated for people with various types of technology available, in order to assist in the capturing of their readings, as well as reporting the results to the carers. Communication protocols for routine, as well as emergency situations must be set up.

Diagnosis 3: Patient use of ICT

Lack of ICT usage by people with diabetes

With regard to access to ICT, the diagnosis reveals that the majority of people with diabetes have access to some form of communication technology, be it a cellphone, a smart phone, or PC. The diagnosis, however, also reveals that they are not making use of ICT to assist them in the adherence to their treatment plan, education on diabetes or communication with healthcare workers. The factor leading to this lack of ICT usage, is that healthcare workers are not provided with equipment to enhance their use of technology; and they are reluctant to use their own devices; as this costs them. This affects the person with diabetes; as both parties should be committed to an ICT strategy, in order for it to work fully. Healthcare workers could be encouraged to use their own devices if devices are not provided; and incentives should be given to alleviate their costs. People with diabetes should be encouraged to use the ICT at hand; and education should take place to show how the benefits of using technology far outweighs the possible small financial cost it may entail.

The type of strategy would depend on the type of technology available.

9.3.2   Guiding policy for ICT use for people with diabetes

Guiding Policy 1: Access

The guiding policy to ensure ICT usage by people with diabetes would be adequate use and effective access to the technologies available. This is a similar guiding policy, as that described for healthcare workers.

> To use ICT available to *people with diabetes* to its full potential

Enhancing access to ICT is critical for enhancing self-monitoring and adherence to the diabetes-treatment plan. Challenges, such as internet access, mobile phones and the lack of computerization in the healthcare sector point to problems with access. The lack of access has a negative impact on the treatment of people with diabetes; and it calls for government to implement strategies that can boost access.

The guiding policy is to boost access for this study. However, this would not rely on government intervention; but it should rather focus on what the current situation and availability is; since the strategy is focused on the ground-level treatment of diabetes.

As indicated, the diagnosis shows that most people with diabetes have access to some form of ICT or mobile device.

Guiding Policy 2: Patient education for people with diabetes

The guiding policy with regard to ICT usage by people with diabetes – in order to improve knowledge and awareness about diabetes – is formulated as:

> To use the available technology to educate people on diabetes, lifestyle and the importance of adherence to the program.

Diagnosis of the factors affecting people with diabetes was identified as the biggest problem. The lack of knowledge on diabetes and the reasons why it may manifest itself. People do not know why diabetes starts; they do not recognise it is a potential "killer", and that it is a life-long condition that requires a lifetime commitment to a healthy lifestyle, in order to avoid further complications. By using the available technologies, a suitable approach can be identified to educate people with diabetes on the various factors that affect them. These include healthy eating plans, suggested exercise routines, as well as early detection and adherence to treatment plans.

Guiding Policy 3: Patient-guiding policy for communication

The diabetes guideline for improving communication between the person with diabetes and the healthcare worker is identified as:

To improve communication between the patient and the carer, by using the ICT available.

Further diagnosis of the environment surrounding people with diabetes indicates that there is a lack of communication between the healthcare worker and the person with diabetes; as most of the communication takes place only at the time of consultation. This is a cause for concern, especially in terms of emergencies. Technology can be used to interact and build support structures amongst those who are not in close proximity to clinics or carers. The use of technology can also assist in improving routine reporting and aid in the early detection of negative trends that could lead to complications.

9.3.3 Action plan for use by people with diabetes

Action Plan 1: Determine the level of technology available

This action plan is the same as the action plan for healthcare workers.

AP1: Determine the level of technology and access available *to healthcare workers and patients*.

The technology available to the healthcare worker and the patient are interdependent on one another; and as such, the first action plan to follow is that of determining the level of interaction possible between the healthcare worker and the person with diabetes. The steps are listed in Figure 9-2 AP1: Steps to determine level of technology intervention.

Once the level of technology intervention that is possible is known, then the correct path of action can be taken to meet the other requirements for an ICT strategy for patient-centred diabetes care. The level of technology does not prescribe to the action plan itself, but rather to the steps within the plan.

Action plan 2: Upskilling people with diabetes

P2 : Continuous diabetes, lifestyle and adherence education

A critical factor identified is the need for education and awareness on diabetes. Various interventions that can be used to assist in educating people with diabetes about their condition, the requirements for a successful treatment plan, early warning symptoms for complications, and many more. These depend on the ICT level of intervention possible for

that patient. The appropriate level must be identified through AP1, before continuing to the actionable steps. The appropriate level for the implementation of each step is also listed.

Diabetes patients need to be encouraged to engage in improving their knowledge about the condition, as well as the factors that contribute to complications and the decreased levels of health. In order to do so, the patients need to be encouraged by the healthcare workers, or alternately they need to approach their healthcare workers to find out how this can be done through technology.

Diabetes education can take the form of any of the following ICT interventions; but firstly, there needs to be a commitment to this step from the patient. The steps to follow for the use of ICT for diabetes education (P2) are:

1. Determine the level of technology intervention available (AP1).
2. Determine whether the clinic/carer can assist with the diabetes education.
3. Enter into an agreement with your healthcare provider, to engage in diabetes education, as required.
4. If the clinic/carer has a pledge in place, then undersign the pledge, as a sign of your commitment.
5. Maintain contact with your healthcare worker with regard to your diabetes education
6. Access your educational material, as provided.
7. Keep a log or record of the material that you access.
8. Complete the required logbook for your healthcare worker regarding your diabetes education.

Depending on the level of intervention, the following are some examples of educational material that can be accessed. This is not an exhaustive list, but merely to give an idea of the type of intervention that can be employed.

- Short educational messages from a healthcare worker, diabetes educator, diabetes nurse or doctor with regard to general diabetes facts;
- Short educational messages from a healthcare worker, diabetes educator, diabetes nurse, dietician, fitness trainer or doctor with regard to lifestyle, and its effect on diabetes.
- Basic pictures or diagrams to explain one simple concept;
- Receive a voice message explaining one concept;
- Educational Video clip;

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- Hyperlinks to recognise diabetes education websites for people with diabetes can be shared;

- Hyperlinks to recognise healthy lifestyle and personal fitness websites for people with diabetes can be shared;

- Reputable sites that encourage behavioural changes and give advice on how to sustain these changes can be shared;

- Give permission to join a chat group on cellphone whereby educational tips are shared amongst people that know each other (e.g. WhatsApp group);

- Give permission to join chat groups via email, whereby educational tips are shared amongst people that know each other;

- Give permission to join chat groups that can be used to promote local diabetes functions and awareness programs;

- Chat groups can be set up via email, whereby encouragement and motivation to adherence are shared.

Action Plan 3: Communication between patient and healthcare worker

The communication intervention is the same as that for healthcare workers; as both parties must agree to the plan of action, and the various protocols to follow, in order for this to be successful.

P3: To improve communication between the patient and the carer by using the ICT available.

The action plan is formulated from the person with diabetes as a point of view. The communication action plan is listed as.

1. Determine the level of intervention (AP1).
2. Ensure that your technology level is captured on the patient information card.
3. Learn how the technology intervention can assist in the diabetes care.
4. Understand the requirements, expectations and rules of engagement, so the patient is aware of his/her role/responsibility in the technology intervention.
5. Give permission to engage in technology intervention.
6. Sign a pledge of commitment to using technology, as part of the treatment plan.
7. Ensure that the patient knows how to use the technology available for the intervention required.

The following is a list of examples of possible communication interventions. This is not a complete list; and it serves only to give some initial ideas to help the healthcare workers improve communication with the patients.

- SMS communication must be used for regular feedback regarding glucose levels (daily);

- SMS communication must be used for irregular/abnormal glucose levels, in order to provide immediate assistance (as required);

- SMS communication can be received for educational/motivational messages (daily);

- Reminders can be created to ensure that the medication is taken and blood glucose monitoring is done (daily);

- Reminders can be set up; so that follow-up visits are not forgotten/ignored (as required);

- Voice messaging can be used for feedback to carer (weekly);

- Video clips teaching patient about diabetes care, such as how to inject insulin, or what type of food to avoid, can be received from the carers (monthly);

- Groups can be formed for disseminating educational messages and the promotion of awareness campaigns (as required).

9.3.4 Summary of ensuring ICT use by people with diabetes

This section shows that people with diabetes can be assisted in the management and monitoring of diabetes through using the technology that is available to them. People with diabetes have to be shown the benefits of using technology, for example, to relay unusual readings to their carer, or to ask for emergency assistance. The strategy is depicted in Figure 9-4.
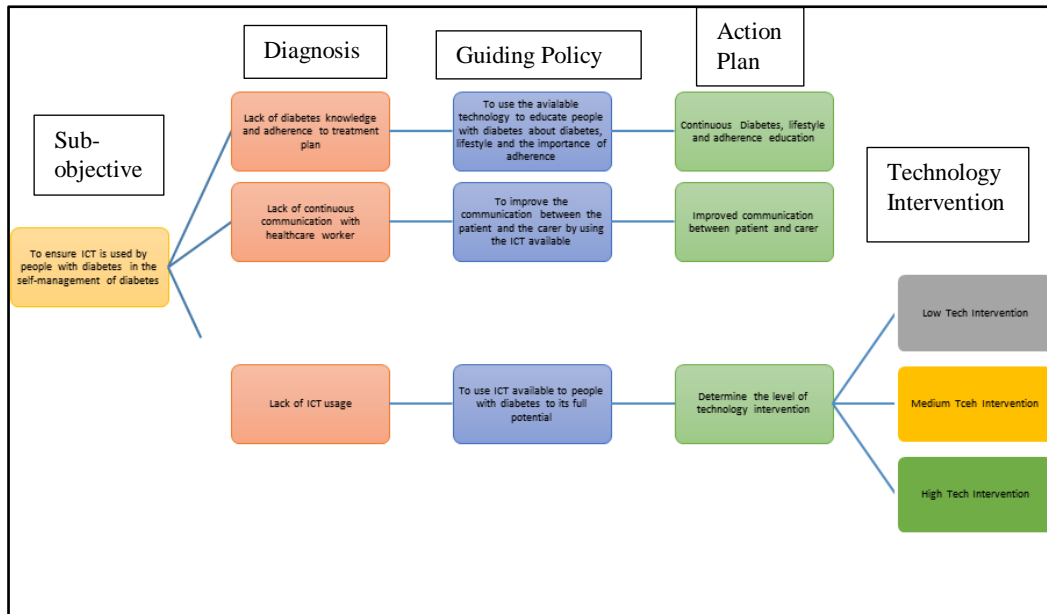
Figure 9-6 Strategy to ensure ICT is used by people with diabetes in the self-management of diabetes

9.4 Component 3: To ensure that ICT is used in Clinics/hospitals for Diabetes Education and Awareness

General diabetes awareness for public, high-risk and undiagnosed people plays a role in the increasing prevalence of diabetes. It is, therefore, important to increase the lack of awareness and education on diabetes and the related risk factors. The overview of achieving this is depicted in Figure 9-7.
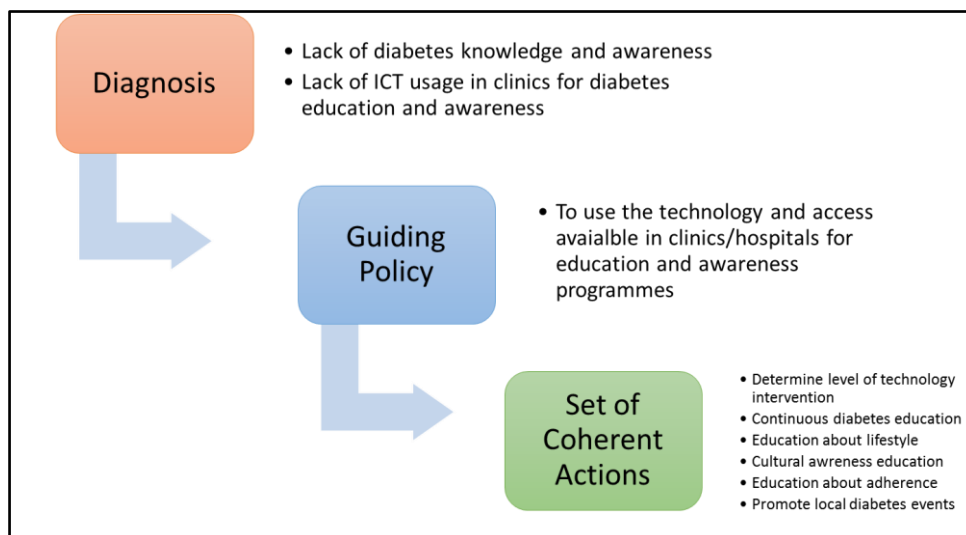
Figure 9-7 Component 3: Diagnosis, guiding policy and action plan

9.4.1 Diagnosis for use of ICT in clinics/hospitals

Clinic/ Hospital Diagnosis: Lack of ICT use in clinics/hospitals for diabetes education and awareness

The South African government, and particularly the Department of Health, are very much aware of the diabetes epidemic; and they have set their sights on decreasing mortality due to non-communicable disease. However, there is still not much done to promote the awareness of diabetes amongst the general population. The Department of Health is still very much focused on HIV/AIDS, heart disease and cancer, despite funds being available for diabetes education and awareness. National events are arranged for both HIV/AIDS and cancer; television adverts are used to promote prevention of HIV/AIDS; and healthy lifestyles are promoted for heart disease. Nothing at this scale is seen for diabetes – even though it is one of the biggest killers in South Africa.

The diagnosis for public awareness and education on diabetes shows a lack of education and awareness about the condition.

Furthermore, ICT is not used to promote awareness and education about diabetes at the service points, such as clinics and hospitals. A vast number of pre-diabetic people and high-risk people can be made aware of diabetes and its risk factors by using ICT strategies at clinics and hospitals. Alternate strategies can also be suggested to people who have access to technology, such as cellphones or PCs, as indicated in the guiding policies and action plans for healthcare workers and people with diabetes.

9.4.2 Guiding Policy for use of ICT in clinics/hospitals

The policies for action-awareness campaigns and government and business interventions is beyond the scope of this study; as the intention is to provide a strategy that can be implemented almost immediately.

To use the ICT available in clinics/hospitals for diabetes education and awareness programs.

The guiding policy to address the education and awareness of non-diabetics is to use the technology and access available in clinics/hospitals for education and awareness programmes.

The type of strategy is determined by the type of technology available at the clinic or hospital. For mobile interventions, the type of device and access must be identified as

previously discussed in 9.4.1. Furthermore, other technology interventions must be identified for the points of service.

9.4.3 Action for use of ICT in clinics/hospitals

In order to put the guiding policy of ensuring that the technology and access available at clinics and hospitals is put to action, the main action plan is to determine the type of technology available at these points of service.

AP 3: Determine the level of technology available in the clinic/hospital

AP3 must be implemented, in order to identify the level of technology available to a clinic for the use of ICT for public education and awareness of diabetes. The steps for AP3 are indicated in Figure 9-8.
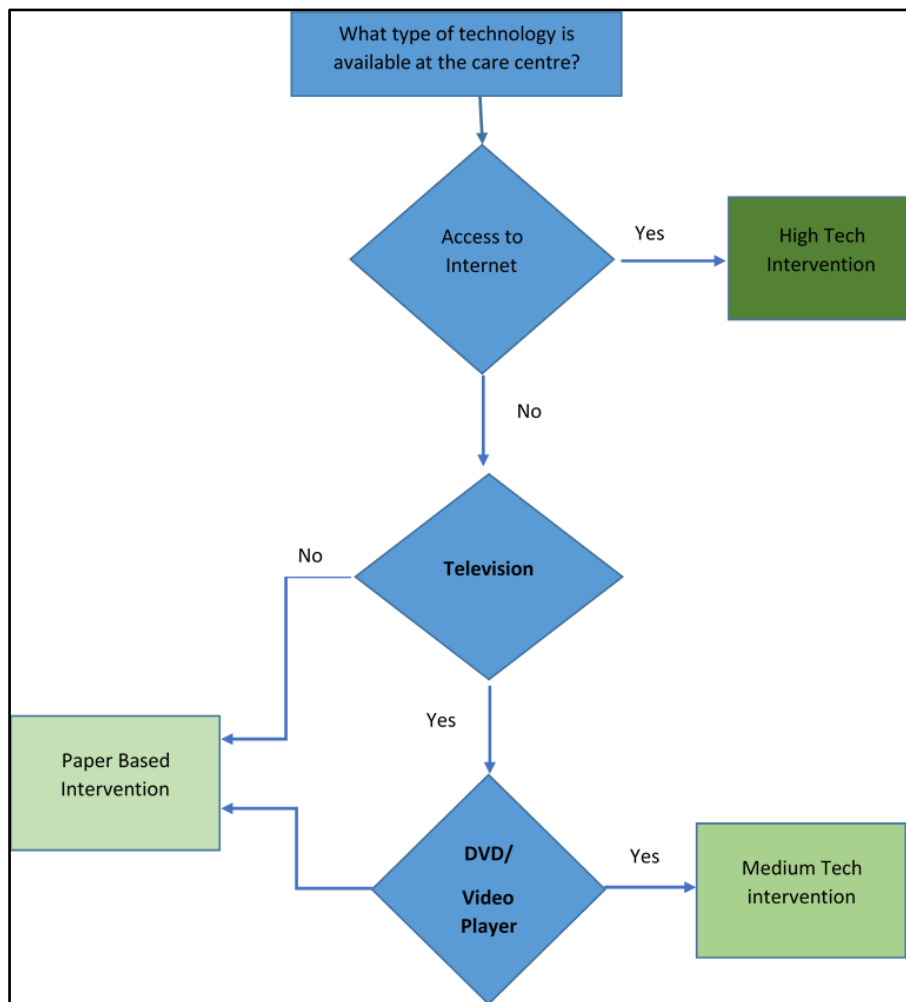
Figure 9-8 Steps to determine the level of intervention at clinic/hospital

Each one of the levels of intervention needs to be unpacked further, to ensure that effective steps are in place for the technology on hand.

Clinics must determine the level of technology available to them, and actively use this to engage with people in the clinic. The waiting room is a good area to use media, such as videos and DVDs for educational purposes, or to engage with the community through educational talks by community leaders or diabetes champions. The person involved in executing this action plan would be a senior, such as a clinic supervisor or doctor in charge; since this action would affect all the people visiting the clinic – and not just diabetics. Furthermore, it is implemented in a public/general area, and not in a consulting room.

The steps for actions required in clinics (C1) are formulated as:

1. Determine the level of technology intervention available (AP3).
2. Identify diabetes champion/community leader to develop/ create educational material.
3. Create a roster for staff responsible for the activation of daily material.
4. Place the material where it is accessible to patients for easy reference purposes.
5. Clearly indicate the steps that a patient should follow to access electronic material on a shared clinic PC.
6. Clearly indicate the steps required for those who wish to access the facility's Internet (password and length of time allowed).
7. Clearly identify recommended websites for those who wish to access these on their own devices, while in the clinic.
8. Ensure that the material is available in multiple languages that suit the community.
9. If there is a log or record to keep of the material that is used, then complete the log as required.

Some examples of how to implement this access plan are listed in the next paragraph. These are merely ideas and not absolute steps; since these need to be determined at each clinic/hospital, in order to be in line with their practices and policies. This is not a complete list, but rather examples to assist in identifying possible solutions.

Low-Level Intervention:

Clinics/hospitals with no access to the internet or to a TV monitor can be assisted by paper-based interventions, such as posters and pamphlets, and even by having someone address the people who are in the waiting rooms. This is a suggestion that forms part of the strategy; even

though it is not using technology. Cellphones can be used to take pictures of posters and short educational messages; and these can be revisited even when away from the clinic.

Clinics/hospitals that have TV screens and DVD players/video players would fall into this level. Recordings can be played of educational TV programs, or of people giving lectures on diabetes awareness and education. The TV can also be used to advertise community/local events that relate to lifestyles or diabetes. If there are PCs available in a communal area without any internet access, these PCs can serve as viewing devices; and people can use earphones to listen to and access pre-loaded videos/educational material.

High-level interventions:

These are for the clinics/hospitals that have either Wi-Fi access for the community, or that have fixed Internet lines. Diabetes education and awareness can take place via the mobile device of the patients by sharing links to educational material that can be accessed and downloaded, while at the clinic for immediate viewing or for storage for later viewing. Fixed line access can make use of PCs that people can sit at to link to the internet to get information from recommended sites.

9.4.4 Summary of using ICT at clinics/hospitals for diabetes education and awareness

This section shows that there are possible ways of using ICT in clinics/hospitals to address the general diabetes education and awareness of people in the community. No external funds are required to make this possible; and they can be implemented immediately with a small team of committed healthcare workers at a clinic/hospital which can develop/identify educational material for sharing with the general population visiting the clinic/hospital. This aids in the early detection of complications, as well as the identification of people who are at a high risk of diabetes. The strategy for using technology in clinics and hospitals for the support of patient-centred diabetes care is illustrated in Figure 9-9.
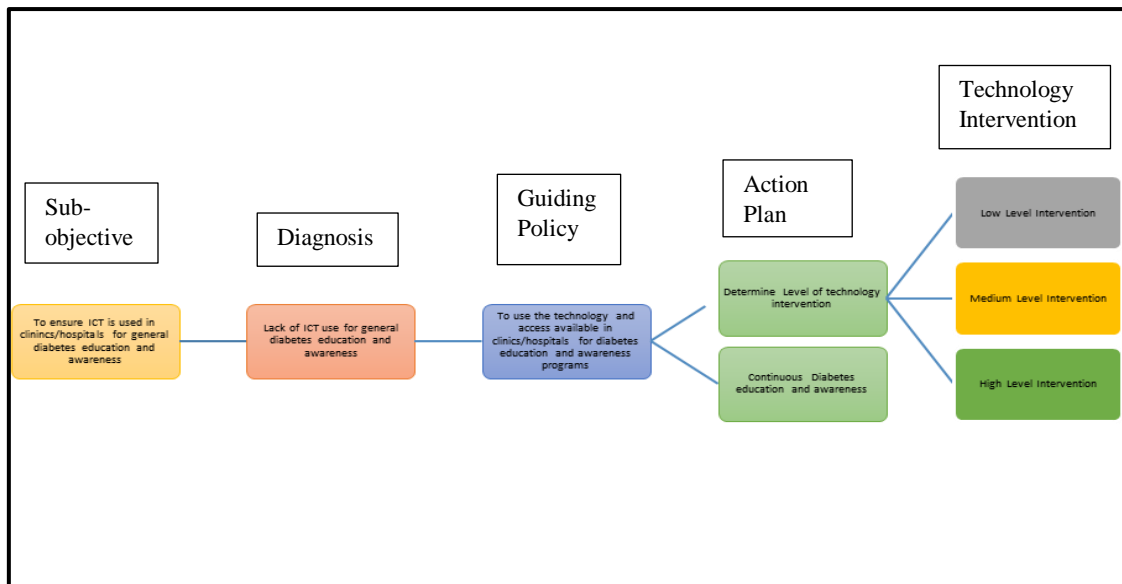
Figure 9-9 Component 3: Strategy to ensure that ICT is used in clinics/hospitals for diabetes education and awareness

9.5 Conclusion

The concluding remarks for this chapter are:

- The strategy can be implemented with minimum intervention from government and external stakeholders;

- The clinics/hospitals would have to be committed to this strategy, and lay down possible incentives to motivate healthcare workers to use their own devices when implementing this strategy;

- The use of this strategy can reach the wider community for diabetes education and awareness.

9.6 Summary

In this chapter, the strategy formulation of the ICT strategy to support patient-centred diabetes care (Phase 2), as depicted in Figure 9-10, is discussed. Strategy formulation requires that each component/sub-objective be looked at in terms of diagnosing the problem, finding a guiding policy to address it broadly, and describing the exact steps to take to achieve the objective.
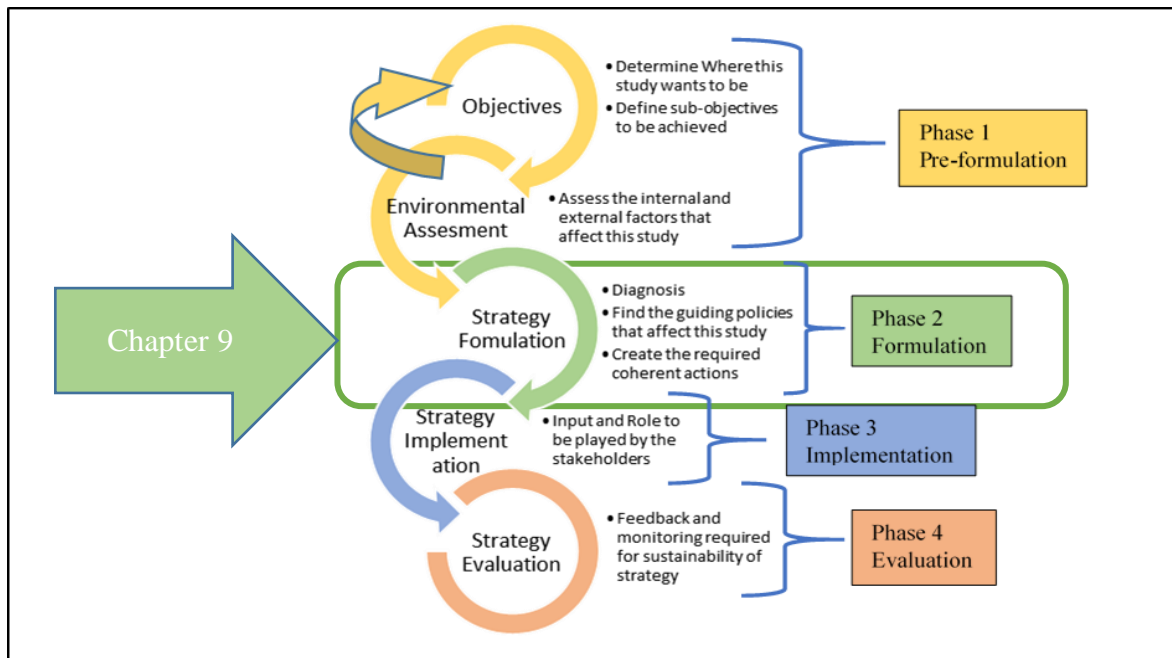
Figure 9-10 Strategy process for this study

The problems were diagnosed and overarching guiding policies were devised to steer the strategy in the correct direction. The action plans that were developed show the steps to take, in order to achieve the required results. In the following chapter, the implementation and evaluation of the strategy process is discussed.

10.1 Introduction

This section is the final phase of the artefact development and is concerned with the applicability of the strategy. The purpose of this is to guide the user to ensure the strategy is used effectively. This chapter discusses how the strategy should be executed or implemented in the healthcare sector, where people with diabetes are being treated.

Strategy implementation involves short-term plans for carrying out the projects agreed on in the strategy formulation. It involves obtaining resources, creating structures, and defining action plans and processes to be followed, in order to achieve the set objectives. It requires precise co-ordination, as it takes place as a problem-solving action. The implementation of a strategy also identifies the role-players for each sub-objective; and it explains the steps they must take, and what resources must be in place, in order to action a specific sub-objective.

The implementation of this strategy requires the interaction of the three components, as identified in Chapter 8, namely, the healthcare worker, the person with diabetes and the diabetes clinics/hospitals.

10.2 Users and/or stakeholders of the strategy

In order for the strategy implementation to be successful, it is necessary to get the buy-in of the entire spectrum of healthcare workers involved in treating people with diabetes, as well as the support structures of the patients with diabetes.

The stakeholders who are using this strategy in their roles as healthcare workers include, but are not limited to:

- Medical staff at clinics and hospitals

- Administrative staff at clinics/hospitals

- Carers

- Dieticians

- Diabetes educators

- Specialist diabetes nurses

- Specialists in the various areas, in which complications with diabetes could arise, such as the ophthalmologist, the podiatrist etc.

- Lifestyle coaches and fitness/personal trainers

- Diabetes champions/mentors

The involvement of these stakeholders ensures that the treatment plan for the person with diabetes is in line with the requirements set out by global diabetes guidelines, as well as local government policies. These are the people who are involved with setting up the diabetes protocols in the workplace, and who will explain them to other staff, as well as to the person with diabetes. These protocols could lead to better healthcare delivery and could ultimately save lives in emergency situations that currently are being lost. The stakeholders listed above normally are more literate than the people with whom they consult. They should thus ensure that the person knows how to use the technology intervention and understands the implications of the intervention.

The adherence to a long-term treatment plan is in the hands of the person with diabetes and their support structure. Commitment to this is not easy; and encouragement and motivation are required. The stakeholders therefore that would be involved in the implementation of this component would be the:

- Person with diabetes

- Family and friend support structure

- Community leaders

- Full spectrum of healthcare providers

It is imperative that the person with diabetes understands his/her role in the ICT strategy chosen to assist in his/her diabetes care. Without the patient's commitment to the technology strategy, it cannot be sustained; and a possible decrease in healthcare delivery may occur.

The need for awareness and education of diabetes stretches across five sections of the general population, as discussed in section 3.3. It is important that this strategy reaches as many of those levels as possible, and in particular, people with diabetes and those who are at high risk. Furthermore, it needs to reach the general public who are not even aware of what diabetes is; and how it is caused. This lack of information and knowledge leads to an increase in the prevalence of diabetes. The general public are in need of education and awareness programs on diabetes.

The government, together with private companies and other stakeholders, are required to engage in a partnership to assist in the promotion of diabetes education and the awareness thereof. This strategy, however, does not require any government interventions; as it is based

on the technology on hand at a clinic/hospital. The waiting rooms/areas are identified as ideal areas to get information out to people who are sitting around for hours before they can see a doctor. The stakeholders in the third component would be:

- The administrative staff of the clinic/hospital;
- The diabetes nurses/experts;
- Community leaders/diabetes champions;

In the next section, a scenario is sketched using the strategy developed for ICT use in patient-centred diabetes care.

10.3 Strategy Scenario/walkthrough

In this section, a scenario is sketched to generalise the use of the ICT strategy for patient-centred diabetes care, as developed in Chapter 9. This scenario shows examples of possible interventions in the implementation of this strategy. The Integrated Chronic Disease model of Asmall (2014) is used to demonstrate the various levels, at which the strategy impacts on diabetes care. The stakeholders, as identified in the previous section, form part of the scenario; and their roles and responsibilities are clearly shown. The aim of this study was not just to distinguish between the public and private healthcare sector; and therefore, the strategy is applicable to both sectors in the South African healthcare landscape. The scenario, however, is based on the public healthcare setting. As the requirements for diabetes care are universal, this strategy can be just as easily implemented in the private sector.
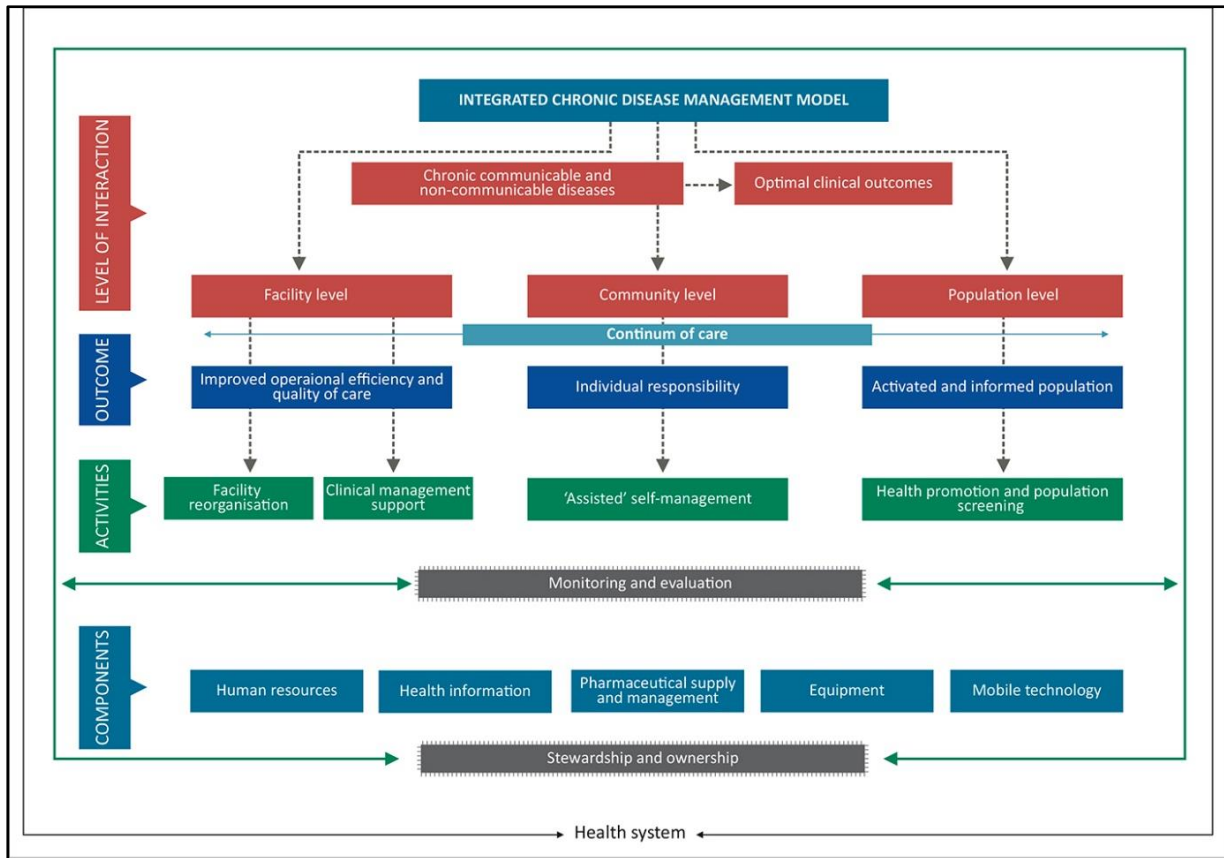
Figure 10-1 ICDM Source: (Asmall, 2014)

Considering the Ideal Clinical Model, the various levels of interaction that are affected, when implementing an ICT strategy for patient-centred diabetes care. The various activities performed and their outcomes would be a generalisation of events at a clinic/hospital for diabetes care.

10.3.1 Implementation steps/requirements

For the strategy to be implemented at the facility level there are basic steps that should take place in preparation thereof. These include, but are not confined to:

1. The administration of the hospital should be consulted and informed of the strategy.
2. The administration must commit to the strategy and the various changes it brings with regard to how certain tasks are conducted.
3. The staff must be consulted and informed of the advantages of the strategy.
4. Concerns that staff may have such as additional costs incurred by using their own devices should be addressed and possible incentives should be agreed upon.
5. Staff must confirm their commitment to the use of the strategy.
6. Staff should be trained on how to use the technology on hand.
7. Staff should be trained on how to follow the required action plans of the strategy.

8. Training material must be understandable and easily accessible to staff for future reference.

9. Once the administration and staff are committee to the strategy the commitment of patients must be obtained as required in the strategy.

The various stakeholders and participants who action the strategy are now ready to engage actively in their workplace with their patients in order to ensure ICT is used to support a patient-centred approach to diabetes care.

10.3.2 Strategy Scenario at the facility level

The scenario makes use of general procedures that take place at a clinic/hospital and shows a sequential flow of events. The projected changes on the facility activities, including facility re-organization, as well as clinical-management support, are shown in the table. The improved operational efficiency and quality of care are also indicated.

The scenario in Table 10-1 indicates a likely flow of events for a patient visiting a diabetes facility. The table illustrates the possible route a person will take from the time they enter the clinic/hospital, through to consultation and eventual dismissal.

Table 10-1 Patient visit at facility level scenario

	Facility Level Activities	Improved Operational efficiency and quality of care
Strategy Scenario for Patient visiting a diabetes facility		
Arrival	People with diabetes report to the doctor or carer directly; as the records are electronic. In cases where the records are still paper-based the patient needs to first collect the files. Any amendments or updates regarding patient details are captured by the administrative staff upon arrival. The technology that the patient has available is also captured upon arrival.	No waiting in queues to collect files. If paper system then the improved storage methods make records easier to retrieve. Accuracy of records improves continuous care
Waiting Room	People in the waiting room receive educational material regarding diabetes and cultural awareness. Depending on the technology available people waiting can either view paper based educational pamphlets/posters, view educational videos/DVD, interact with a PC that has a fixed line and have access to diabetes education and awareness information, use the available Wi-Fi to get information on the patient's own phone. There could also be a diabetes champion /community leader on hand to speak to /interact with people regarding diabetes and cultural matters that effect their treatment.	Diabetes education and cultural awareness takes place with high impact and reach in the community but with low cost/expenses.
Consultation	Upon entering the room, the patient is greeted by name and made to feel important.	Enhanced patient-centredness
	The patients current condition is assessed and the patients overall wellbeing is determined as well as screening for complications.	Improves diabetes care as this helps with early detection and minimizes complications that may occur
	Patients receive information about their condition and how their cultural beliefs can influence their treatment. Patients are encouraged to ask questions and engage in the discussion about the various treatment plans. Patients have a say in their treatment and the treatment plan must be mutually agreed upon.	Improves diabetes knowledge and understanding of treatment plan. Improves adherence.
	The patient information is captured fully and accurately. The patient information sheet allows for comments and extra information that is specific to that patient.	Enhances patient record accuracy and patient-centred care. Enhances continuous care.
Dismissal	The carer determines whether the patient is participating in enhanced diabetes care through the use of technology. If so the correct technological intervention is explained and followed. If not the patient is requested to participate. If the patient agrees, the process is explained to the patient and a pledge is signed.	The strategy use is encouraged by obtaining as many healthcare workers and patients to participate.
	All the initial settings are checked for the technology intervention required.	The strategy adherence is improved if all the technological settings are in place before the patient leaves
	Reminders are set before the patient leaves to remind the patient as well as the carer of the next visit.	Any possible interventions that can be pre-set are done to enhance adherence.
	The requirements of the technology intervention are explained to the patient and clear instructions are given in order for the patient to be able to participate. These instructions are also paper based for future referencing.	Adherence is enhanced if the patient knows the interface to use and knows how to set the required settings on the device.

At the facility level, it is important to utilise fully the human resources (HR) that are available. It is important that the people know the role that they play, and commit to the ICT strategy for patient-centred diabetes care. Table 10-2 shows how the HR at a facility using this strategy would possibly perform these tasks.

Table 10-2 Human Resources scenario at facility level

Scenario for Human Resources Component		
	Human Resources on facility level	Improved HR and quality of care
Education	Healthcare practitioners can improve their knowledge by using the technology available to them at the facility they serve. If there is Wi-Fi connectivity, they can access educational material and download it to their mobile device for studying at a later stage. If there is fixed line connectivity they can utilize the PC to up-skill themselves on diabetes or cultural awareness Healthcare workers can use the technology on hand to access diabetes educational material as well as cultural and tradition awareness materials to up-skill themselves.	Improved diabetes education results in improved diabetes care. Improved cultural awareness relates to improved patient-centred care. Confidence of carers increases and they feel an important part of the treatment plan.
Communication	Healthcare workers keep in touch with patients for regular monitoring and feedback. Text or email messages are used to communicate with patients. Patients do not have to come in to the centre and this releases the pressures on the workers while at the same time improving the monitoring of patients. Healthcare workers communicate emergency procedures to patients in these cases immediately rather than having a patient have to come in to the hospital under dire circumstances and sometimes even not make it to the hospital at all. These emergency protocols could be in the form of text or voice messages. Healthcare workers can easily follow up on patients that miss visits through SMS for example.	Improved communication with patients with regard to regular monitoring helps with adherence to the treatment plan. It also reduces the pressures of regular visits in an already busy environment. Improved diabetes care is a result of immediately communicating unusual or emergency situations to the healthcare workers. Human resources are utilised fully and can result in saving lives in emergency situations.
Continuous Care	The staff are trained regarding how to use the technology available to store accurate and complete health records. The staff also teach the patients how to use their technology for improved continuous care. This may involve setting of reminders and initial settings on the patients' device to assist in the uptake of technology in diabetes care.	The storage of these records are meticulous and this helps with easy retrieval and access to records. This leads to less demands on HR for retrieval of patient records and a more effective service to patients.

The table shows that facilities that use this strategy will have to change the way in which they perform their tasks in the clinic/hospital.

The type of data captured and how they are stored is a very important part of diabetes care. Inaccurate or incomplete data could, for example, result in missing the early warning signs of

complications. Table 10-3 illustrates a scenario relating to patient-health information, and how it is captured, stored and shared amongst the various doctors involved in the care of a diabetic patient.

Table 10-3 Health Information scenario

Scenario for Health Information		
	Health Information on facilities level	Improved Health Information and quality of care
Continuous Care	Healthcare workers are taught how to complete the patient information accurately and fully. The method of data capturing depends on the technology available. If computerised systems are used the people capturing the data must know how to use the system. If paper based systems are used the healthcare workers still need to be taught how to capture the data correctly as well as any additional information on the patient information sheet. Information such as cultures and customs must also be captured as this is vital to adherence to the treatment plan. The method of storage must also be explained and regular follow-ups must be done to ensure that records are stored correctly.	Continuous care enhances diabetes care as patients' records are accurate and complete. Information regarding customs and cultures on patient records assists in the patient-centred approach as well as to improve adherence to diabetes care.
Integrated Care	The level of technology determines the access to a patient's records. Patients who are referred to secondary doctors/ specialists in a low-tech environment must have copies of their records to take to the secondary doctor. This copy can be hard copy or photos of the record on the patient's cell phone. Patient records that are stored electronically, but not in a central area must be emailed or shared with the secondary doctor through the available technology. Patient records that are stored centrally can be accessed by the secondary doctor directly.	Easy sharing of patient records leads to better diabetes care and is in line with a patient-centred approach where the patient must be seen as a whole and not just for the current symptom.

10.3.3 Strategy scenario at the community level

The second level of impact that is made by the ICT strategy for patient-centred diabetes care is at the community level. People with diabetes form part of a community; and as such, the customs and traditions of that community have a direct effect on the diabetes-treatment plan. Community leaders can play an active role in sharing the customs and traditions with others, as well as explaining how they could affect diabetes. The literacy levels of a community also have an impact on the type of intervention that can be implemented. Furthermore, the technology available in the community also plays a role in the type of strategy that is required to assist people with diabetes in a specific environment/community.

The support structure outside the clinic/hospital involves friends and family from the community. The type of strategy has to also coincide with what they have available. Table

10-4 shows how the ICT strategy for patient-centred diabetes care affects the person with diabetes, as well as the community in which they live.

Table 10-4 Strategy scenario at community level

Strategy Scenario at the community level		
	Individual Responsibility	Assisted Self-management
Arrival at facility	People with diabetes report the technology that they have available to the healthcare administrative staff to capture on their patient record.	Patients ensure that their data is correct and up to date. This improves continuous and integrated care.
Waiting Room	People in the waiting room receive educational material regarding diabetes and cultural awareness. The person in the waiting room must actively engage in the educational material supplied. The educational material is available in multiple formats to support various literacy levels and technology levels, as well as multiple languages to ensure it is understood properly. Educational material is in the form of videos or posters in the low-tech interventions. In medium and high tech interventions, patients are required to use the internet available to access information on their devices or on shared facility devices. It is important that patients know where to get this information and it should be clearly displayed in the waiting area for example hyperlinks to educational sites can be listed.	Diabetes education and cultural awareness takes place with high impact and reach in the community. This helps the person understand their condition, risk factors and the impact of traditions on diabetes. People who do not have diabetes are also aware of the risk factors through this education and this helps with early detection and also with the prevention of diabetes.
Consultation	Patients and their family and friends are encouraged to ask questions and engage in the discussion about the various treatment plans. Patients have a say in their treatment and the treatment plan must be mutually agreed upon. The friends and family are made aware of the positive impact that the use of technology can have on diabetes care.	Patients that have better diabetes knowledge can ask better questions and actively engage in the consultation and treatment plan. This helps with adherence and improves diabetes care.
Dismissal	The carer determines whether the patient is participating in enhanced diabetes care through the use of technology. If so, the correct technological intervention is explained and followed. If not the patient is requested to participate. If the patient agrees, the process is explained to the patient and a pledge is signed.	ICT use is encouraged by obtaining as many healthcare workers and patients to participate. By asking the patient to sign a pledge, it makes them feel important and accountable, and thus helps motivate them to stay on the plan.
Initial technology requirements	All the initial settings are checked for the technology intervention required. The patient is taught how to use the technology and the impact it can have on diabetes care.	The strategy adherence is improved if all the technological settings are in place before the patient leaves. This helps to ensure that the intervention is in place and the patient does not have to have problems/excuses for non-compliance.
	Reminders are set before the patient leaves. These are to remind the patient as well as the carer of the next visit.	Any possible interventions that can be pre-set are done to enhance adherence.
	The requirements of the technology intervention are explained to the patient and clear instructions are given in order for the patient to be able to participate. These instructions are also paper based for future referencing.	Adherence is enhanced if the patient knows the interface to use and knows how to set the required settings on the device.

Home care Communication of measurements	The person with diabetes must regularly monitor their glucose levels and share it with the healthcare worker as pre-determined. Unusual and emergency situations must immediately be reported to avoid complications. Reminders and communication channels must be set. Examples include to set reminders on device calendar for measuring readings and taking medication, SMS can be used to contact carer in unusual circumstances, email join chat group.	This improves adherence as well as communication between carer and patient. The relationship is strengthened between the patient and the carer, and this helps with the patient-centredness of the strategy.
Education	Diabetes educational material must be accessed as suggested by the healthcare worker. Depending on the technology available, patients either receive educational material; or they need to access it themselves via the internet.	Improved diabetes education and awareness leads to better adherence of the treatment plan.
Lifestyle	Lifestyle adjustments must be made and maintained. Depending on the level of technology, this can be tracked through an electronic device, or alternately by a manual record. Lifestyle includes monitoring food intake and activity levels.	Improved lifestyle leads to decreased risk of complications and deaths.
Culture and traditions	A change in lifestyle requires that cultures and traditions that are detrimental to diabetes care be minimised and if possible completely avoided. It is important that the person with diabetes discloses any contradictions that customs may have to their diabetes care to their healthcare worker.	Making the healthcare worker aware of customs and traditions that conflict with diabetes care, helps with better planning and adherence.
Support structure	The friends and family must help maintain adherence to treatment plans. Sometimes they are responsible for cooking or taking the person to the clinic. They could also be responsible for the medication of the patient.	The friends and family learn from the educational material at clinics and hospitals and are able to understand the needs of a person with diabetes. They can know the importance of food, exercise and correct medication and encourage good behaviour. Through their own knowledge building, they can also ensure that they follow a healthy lifestyle to avoid diabetes.

10.3.4 Strategy scenario at population level

Although this strategy is focused on the point of service for people with diabetes, such as clinics and hospitals, it is clear that a replication of this strategy amongst many communities would aid in the overall fight against diabetes in South Africa. It would lead to a more informed population on diabetes, as well as the cultures and traditions that impact diabetes. The improved diabetes knowledge would encourage a healthier lifestyle; and it should benefit people with diabetes, as well as those without the disease.

By using the appropriate ICT strategy at multiple points of service, an improvement could be achieved in the service delivery to people with diabetes. This would be achieved through improved patient record-keeping, improved understanding and relationships amongst healthcare workers and diabetics, and most importantly, improved care through continuous

education of the healthcare workers. This strategy also focuses on how people are treated at their points of service, and as such, an improvement should be seen in patient-centredness. Patients would feel important and have a shared responsibility in their treatment plan.

In the next section, a summary is provided showing the various stakeholders and their roles and responsibilities in the implementation of the strategy.

10.4 Summary of Implementation Strategy

The manner in which the various stakeholders interact in this strategy is the only factor that would determine the success or failure of this strategy. Factors, such as availability, finances etc. are all within the hands of the stakeholders involved in this strategy. This is what gives the strategy its strength. People want better care and better health, and even without external aid, this strategy should be available. .

Table 10-5 and Table 10-6 show how the different stakeholders interact, and what their roles are at different times. These tables are not exhaustive; and they do not include other possible roles and responsibilities. Table 10-5 shows the roles and responsibilities for the implementation of ICT use by healthcare practitioners:

Table 10-5 Examples of roles and responsibilities for implementation of the ICT strategy by healthcare practitioners

Responsibility of:	What	How	When	Why
Clinic supervisor	• Identify level of technology for carer • Identify level of technology for patient • Identify level of technology for clinic/hospital	• AP1 • AP1 • AP2	• On day 1 of employment • On visit • Once off	In order to record what devices are available so that the correct technological intervention can be applied
Diabetes champion /mentor	• Identify suitable educational tools	• Books • Online resources • Experience	• As required in Action Plan	For dissemination to carers in order to ensure continuous diabetes care and specialist knowledge
Mentor/ Community Leader	• Identify/create suitable cultural awareness tools	• Engage with staff	• As required in Action Plan	To provide carers with knowledge regarding cultures/traditions
Healthcare practitioner/ Carer	• Identify Suitable communication methods in line with technology available	• AP1	• As indicated in Action plan	To improve communication between carers and patients in order to enhance relationships and improve continuous

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				care and patient-centredness
Healthcare practitioner/ carer	• Identify patient data capturing method	• AP2 • H3	• To be done at each visit	To improve completeness and accuracy of patient records for continuous and integrated care
Healthcare practitioner/ carer	• Identify data sharing method	• AP2 • H3	• To be done each time a patient receives a referral	To improve integrated care

The table shows that there will be a required change in the steps taken when treating people with diabetes.

Table 10-6 indicates the roles and responsibilities in the implementation of ICT use by people with diabetes:

Table 10-6 Roles and responsibilities of people with diabetes

Responsibility of:	**What**	**How**	**When**	**Why**
Carer & Patient	• Identify technology available	• AP1	• At first visit of patient and then if changes occur in future	To identify level of technology intervention available to patient
Diabetes champion/ Healthcare practitioner/ Mentor	• Create pledge for patients to sign	• In line with clinic policy + AP1	• At inception of strategy	To encourage patient commitment to diabetes awareness, education and adherence
Patient & Carer	• Commit to diabetes education through technology available	• Sign Pledge	• At first visit	To improve diabetes knowledge of patient
Patient	• Commit to improved adherence through use of technology at hand	• Sign pledge	• To be done at first visit	To improve management and monitoring of condition by using ICT technology for communication
Healthcare practitioner/ carer	• Identify data sharing method	• AP1 • AP2	• To be done each time a patient receives a referral	To improve integrated care

The table above shows the recommended steps that a patient will need to be aware of in this strategy.

10.5 Strategy-Implementation Evaluation

This would indicate the steps to take to ensure that the strategy is maintained; and to ensure the sustainability of the strategy. This also allows the stakeholders to be held accountable for the implementation of the strategy. The following section presents examples of checklists that can be used as tools to ensure that the strategy is followed correctly.

10.5.1 Checklist for healthcare practitioners/carers

The clinic supervisors or administrative leaders would be the people required to initiate the strategy implementation for their facility, as well as for the healthcare workers themselves. Their commitment and drive is vital to the successful use of ICT in a patient-centred diabetes care clinic. Table 10-7 is a checklist that can be used by supervisors to help guide them to follow all the steps in the strategy, as well as to identify who is accountable for the various action plans that need to be implemented.

Table 10-7 Clinic supervisor checklist

Checklist for clinic supervisor	
Endorse the strategy by discussing its advantages with the staff to ensure staff buy-in.	
Determine level of technology in clinic	
Address matters of concern such as training required as well as possibility of re-imbursing staff for using their own devices	
Ensure staff are given the time to train and learn what is required for the strategy implementation	
Identify champions who can assist in driving the strategy as well as help with sub sequent training	
Ensure that the training material as well as other documentation for daily tasks are easily accessible to staff to avoid frustration	
Perform action plan to educated patients in the clinic setting (waiting room)	
Develop/distribute the patient pledge to using ICT	
Devise incentives/re-imbursement for use of own devices by healthcare workers	
Draw up/distribute data capturing, storage and sharing protocols	
Train staff regarding ICT strategy and the various requirements (patient-centred care, cultural awareness)	
Device a cultural awareness program (community leader can assist)	

The checklist in Table 10-8 assists in the processing of a patient upon arrival at the clinic, as well as to ensure that the patients' records are captured and stored correctly.

Table 10-8 Checklist for administrative staff

Checklist for administrative staff	
Staff must attend training and ensure that they are knowledgeable about the various requirements for each action plan	
Record/Confirm patient contact details with patient	
Record/confirm access and technology available to patient	
Explain ICT strategy advantages to patient	
Sign patient up for intervention/Give patient pledge for signing	
Capture complete patient information after consultation (include any notes or additional comments where applicable)	
Store patient record as required	
Clearly capture whether the patient is referred to secondary doctor	
Patient record is shared with secondary doctor if applicable	

The checklist for the person with whom the patient is consulting looks at those aspects that ensure that the patient-centredness is adhered to. It also addresses the diabetes-care requirements. The person consulting could be a doctor, nurse or healthcare worker in the clinic. An example of a checklist for consulting practitioners is shown in Table 10-9.

Table 10-9 Checklist for consulting practitioner

Checklist for consulting practitioner (doctor/nurse/carer)	
Greet patient by name	
Explain the current situation wrt diabetes status of the patient clearly	
Enquire about factors that make adherence to treatment difficult (e.g. cultures and traditions)	
Explain any new medication	
Discuss treatment plan and agree to it with patient	
Check for any complications	
Is patient referred to secondary doctor	
Confirm patient understands the technology intervention applicable	
Set up any possible device settings before patient leaves the rooms	
Capture complete patient information after consultation (include any notes or additional comments where applicable)	

10.5.2 Checklists for people with diabetes

The checklist for the person with diabetes is essential to aid in the self-management of diabetes. This checklist addresses things like, reminders regarding visits and medication, as well as commitment to the use of the ICT strategy.

Table 10-10 Checklist for person with diabetes

Checklist for self-management	
Record/Confirm contact details with carer	
Record/confirm access and technology available to patient	
Sign pledge to use ICT strategy	
Obtain communication protocol and rules for engagement with healthcare worker	
Set reminders	
Obtain educational material on diabetes care	
Obtain education al material on cultural awareness and education	
Obtain material on lifestyle and adherence	
Contact support group	
Join the chat groups as referred to by your healthcare worker	

10.6 Conclusion

This chapter leads to the conclusion that this ICT strategy is viable for immediate implementation, and that with the aid of committed stakeholders, it can assist in improving the patient-centred approach to diabetes care.

10.7 Summary

This chapter has presented the strategic approach aimed at addressing the lack of a strategy for ICT use in patient-centred diabetes care. Chapter 7 indicates that the strategy formulation for this study, was based on a thorough literature review of the various definitions and approaches to strategy formulation, which were then adapted and combined to create the approach best suited for this study. The strategy formulation devised for this study was then applied to the diabetes landscape, whilst being mindful of the patient-centred requirements discussed in Chapter 5. The strategy focused on the real state of healthcare and the use of ICT for diabetes care; and thus, the action plans and implementation thereof included stakeholders who are working within the diabetes field.

The strategy diagnosed three key areas, for which a set of guiding policies were constructed. The guiding policies looked at the sub-objectives in each key area; and as such, they resulted in five guiding policies. Each guiding policy has an action plan that explains exactly what should be in place, for each action plan to be implemented successfully. By making the action plan patient-centred, and using the technology at hand, rather than waiting for government or other interventions, the action plans can commence almost immediately; and it would be more easily acceptable by the people for whom they were designed. By having a good uptake

on the action plan, the service delivery to people with diabetes would improve; and adherence to diabetes treatments should improve.

Figure 10-2 illustrates how the chapter fits into the strategic process.
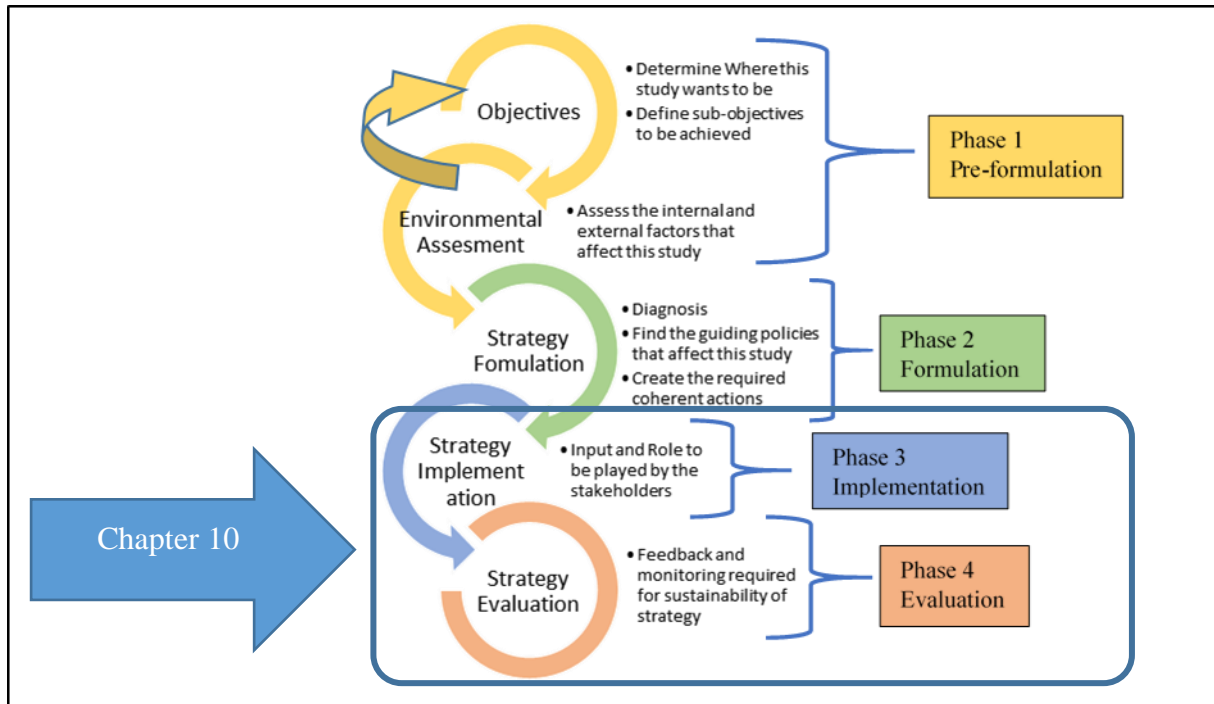
Figure 10-2 Strategy process for this study

11 Conclusions and Reflections

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Scope of Research

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Research Methodology

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Problem identification, motivation and objectives

Chapter 3
The Diabetes Landscape

Chapter 4
A Review of Patient-centred Care

Chapter 5
Use of ICT to Support Diabetes Care

Suggestion
Identification of possible solution and theory base thereof

Chapter 6
Strategy Formulation Theory

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An artefact created according to the suggested solution

Chapter 7
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Chapter 11
Conclusions and Reflections

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11.1 Introduction

The main purpose of this study was to develop an ICT strategy for patient-centred diabetes care. This research was undertaken in response to an identified need which indicated that there was a lack of clear guidance as to how to implement ICT-driven diabetes care at the service point of people with diabetes. In addition to this, it became clear that the healthcare sector is very strained, with few staff and other resources available. Furthermore, the healthcare sector is primarily focused on acute care, rather than on chronic care. These factors result in a rushed, impersonal approach to treatment, rather than a patient-centred approach.

This final chapter revisits the aims and objectives, provides answers to the research questions and concludes with reflections and future research. To this end, Section 10.2 provides a general overview of the side. The research process that was used in the study is outlined in Section 10.3 followed by the practical and theoretical contributions of the study. The chapter concludes with future research recommendations and lessons learnt.

11.2 Research Overview

In order to answer the research questions and meet the objectives that were set out in Chapter 1, a total of 11 chapters are presented in this study. These are illustrated in Figure 11-1.

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Figure 11-1 Thesis Chapter Overview

Chapter 1 introduces the study area and indicates the scope of the research area. The brief background readings are used to indicate the severity of the disease burden caused by non-

communicable diseases such as diabetes. The problem identified through the background readings is discussed in section 1.3 and the research questions and objectives are shown in section 1.4. The relevance of the research is indicated in section 1.5.

Chapter 2 presents the methodological considerations that guided this study. An overview of research paradigms and philosophical assumptions is given in section 2.2 and the paradigm and assumptions relevant to this study are also discussed. The Design Science Research Strategy (DSR) is discussed in section 2.4 and the DSR strategy is also mapped to this study in section 2.5. The motivation for using Design Science in this study was found to be suitable, since an artefact was created.

The literature review is presented in Chapters 3, through to 6. These chapters covered each of the focus areas of the study. In Chapter 3, the diabetes landscape is investigated. The factors required for successful diabetes care are presented (section 3.2), as well as the barriers experienced (section 3.3.2). The status of Diabetes in the South African context is discussed in section 3.3.1.

Chapter 4 presents the requirements for patient-centred care in section 4.2, and various recognised frameworks are presented in section 4.3. The advantages of patient-centred care are presented in section 4.5, as well as the barriers impeding the implementation thereof, in section 4.6.

In Chapter 5, the use of ICT in diabetes care is investigated in section 5.2, and this includes mHealth projects in diabetes care. The status of ICT in diabetes care on South Africa is discussed in section 5.3, as well as the considerations for using technology to support diabetes care in SA (section 5.4).

Chapter 6 considers the theoretical foundation for the strategy formulation process (section 6.3) and presents various models. Strategy formulation considerations for an ICT strategy are presented in Section 6.5. The formulization of an ICT strategy for this study is presented in section 6.6.

In Chapter 7, the data-collection method and presentation of the data is discussed. The environmental assessment is discussed in section 7.3 and includes the profile of the participants. The interview data is also presented in section 7.4.

Chapter 8 presents the interview data analysis in section 8.2. Furthermore the interview findings (section 8.3) are mapped to the requirements for diabetes care in order to ensure that

the findings are consolidated with the needs to show where there is a gap in the needs that could be addressed in this study (section 8.4). The analysis of patient-centered care requirements and factors influencing the use of technology for patient-centred care are discussed in section 8.5 and section 8.6 respectively.

Chapter 9 addresses the strategy formulation and the requirements of the strategy by identifying a problem in terms of a diagnosis, a guiding policy, and lastly an action plan. Through diagnosis a problem was identified and then a guiding policy is presented showing an overview of how to solve the problem. Lastly an action plan is presented, that shows the steps needed to implement the guiding policy.

Chapter 10 discusses the applicability of the strategy. A scenario is used, in section 10.3, to "replicate" the real world in order to establish how well the strategy fits the requirement. The "Ideal Clinic" model was used and the scenario is based on the various levels represented in the model where this strategy has an effect. The tools developed to assist in the implementation of the strategy are presented in section 10.5.

The following section of this chapter focuses on the reflections of the researcher with regard to the main research question; and provides the conclusions to this study, as well as identifying some possible future research projects.

11.3 Reflections on the Research Questions and Process

In order to answer the main research question, this research engaged in an interpretivist approach, as described by Creswell and Plano Clark (2011) and Viashnavi and Keuchler (2015). This section summarises the research by revisiting the research questions as well as the respective techniques that were used to answer the research questions.

11.3.1 Research questions revisited

The research questions and the techniques used to address them are discussed next.

Sub Research question 1:

What is diabetes and what are the requirements for diabetes care?

This research question is addressed in Chapter 3 through a literature review. Therefore, in reply to the research question, it was found that diabetes is a complex condition that requires multiple interventions and a team of different carers. It was also found that the status of diabetes care in SA requires much improvement and that there is a need to investigate patient-centre care.

The characteristics of diabetes are discussed and illustrated in Table 3.1, section 3.2. The factors that lead to the increased prevalence of diabetes were identified. It is clear that longevity together with urbanization is leading to the increase in diabetes. The latter is also directly related to poor lifestyle and westernised diet. The diabetes care key factors listed in Table 3.3, section 3.2.1, shows the lifestyle factors that can lead to improved diabetes health. These lifestyle choices are identified as factors that can be controlled and modified and should therefore be made part of the strategy. The diabetes care guidelines listed in Table 3.2, section 3.2.1, indicates that diabetes requires multiple interventions and various teams of healthcare workers to successfully manage diabetes. This complex net of medical teams required to care properly for people with diabetes led to a brief look at the status of diabetes care in South Africa (section 3.3.1). The overview of diabetes care led the researcher to also probe the factors required in patient-centred care.

Sub Research Question 2:

What are the requirements for patient-centred care?

This research question is addressed in Chapter 4. Therefore, in reply to the research question, it was found that the SA healthcare system has many challenges that affect the service delivery and thus negatively impacts on the patient-centeredness of diabetes care. There is no evidence of patient centred care being practiced in the public health sector and only one institution in the private sector was identified as having a patient-centred approach.

The requirements for patient-centred care were investigated (section 4.2) as research indicated that this approach leads to an increased adherence to treatment plans. The various patient-centred frameworks are discussed in sections 4.3.1 through to section 4.3.4, and are listed in Table 4.2. Patient-centred care in South Africa is discussed in section 4.4 and it was found that there was no evidence of this in the public healthcare sector, and only one institution was found in the private sector that claims to be implementing this approach. The barriers that were identified in patient-centered care (section 4.6), although not specific to SA, spoke directly to the problems experienced in the South African healthcare sector. These include factors such as; the structure of the healthcare system does not allow for lengthy consolidation, integration of healthcare and other aspects of life are not seen as a whole, and many more. It is clear that the ICT strategy created must be mindful of these barriers in order to be successful.

This research question is addressed partly in Chapter 3 and also in Chapter 5. In reply to this research question, it was found that in the public healthcare sector, people with chronic conditions such as diabetes, are treated in the same manner as those with an acute condition. There are very few clinics that specialise in diabetes (or any chronic care) in the public healthcare sector and there are many barriers to diabetes care. When it comes to using technology to support diabetes care, it was found that there is a huge surge towards using technology, however, at the same time pilot projects do not seem to be replicated, nor do they reach maturity after a project is concluded. Many benefits arise from using technology but there are also many barriers, especially in developing countries.

Section 3.3 discusses diabetes in the South African context and in section 3.3.2 the discussion is about how diabetes is managed in the SA healthcare sector. The SA healthcare infrastructure is clearly not suited to providing care to those who have chronic conditions such as diabetes. It was also found that the government is aware of the problems with chronic care and have created an "ideal clinic" model that assists in assuring clinics are focussed on chronic care by working towards achieving this status.

In Chapter 5 the use of ICT in healthcare is studied. The successes and failures of mHealth applications for diabetes are investigated as mHealth is not possible without ICT use. In this chapter it was clear that ICT is growing in the healthcare space (section 5.2.2) and is beneficial to the healthcare sector. Table 5.1, section 5.2.2, shows how traditional healthcare delivery can be improved with the use of ICT. It is also evident that the pilot projects do not mature due to a lack of a strategy to guide the people who are part of the pilot, in how to continue without the presence of the initiators of the project. Table 5.2, section 5.2.5, illustrates some applications where ICT was used for diabetes care. The status of ICT in diabetes care in SA is discussed in section 5.3 and it shows that pilot studies do not seem to grow to successfully implemented large scale projects. In section 5.4 the considerations for using ICT interventions are discussed and in section 5.5 the focus is on using ICT, whilst still remaining patient-centred. These two sections show the way forward in the study with regard to ensuring that the strategy developed addresses the points made here. Thus they helped to guide the development of the interview questions as well as the design of the strategy to ensure that ICT is used without compromising the patient-centredness or the "human touch".

The purpose of this study was to develop an ICT strategy that supports a patient-centred approach to diabetes care. In response to the primary research question, it was indicated that there currently was no ICT strategy that exists to support a patient-centred approach to diabetes care.

The problem under investigation involves a complex ICT intervention for diabetes which is a chronic disease. The nature of this study is complex in the sense that it is multidisciplinary in that it combines ICT and healthcare; and in addition to that, it is also requires that people must make an attitudinal change. In order to make a positive contribution to diabetes care in SA it was required to investigate the current status regarding the treatment of people with diabetes. This led to a further investigation into patient-centred care as it was shown that this approach leads to better adherence of long term treatment plans. The diabetes care components of this study are part Chapter 3, and the additional layer, patient-centredness, is covered in Chapter 4.

The investigations regarding the use of ICT for diabetes care are discussed in Chapter 5. Because technology is often regarded as being impersonal it is vital to have investigated ways to use ICT without losing the "human touch" and this was done in chapter 5. Section 5.7 shows the requirements for the ICT strategy for this study.

The requirements for a strategy were discussed in Chapter 6 and the strategic process for this study was also shown in section 6.6. The expert interviews were presented in Chapter 7 and the findings in Chapter 8. The findings were used to create the desired artefact, in this case the ICT strategy, in Chapter 9 and the applicability of the artifact was evaluated in Chapter 10.

The following section addresses the significance and contributions of this research.

11.4 Significance and Contributions of Research

The aim of this study was to provide an ICT strategy to support patient-centred diabetes care. Therefore, the significance of this study is that it focused on diabetes, and how ICT can assist in the daily monitoring and management required for good diabetes care, whilst still remaining patient-centred. By providing a strategy that can be implemented without the need

for any government/external assistance, it is more likely to be used by clinics and hospitals. By providing this strategy directly to people with diabetes, means that they can better monitor and manage their condition in collaboration with their carers, and, in so doing, avoid complications, and ultimately also curb the prevalence of diabetes.

The contributions of this study are:

1. A generic process for the formulation of an ICT strategy;
2. The instruments to determine the landscape for the preparation to develop a strategy;
3. The ICT strategy for diabetes;
4. The steps to use the strategy.

These theoretical, as well practical contributions, and how they fit into the DSR for this study, are illustrated in Figure 11-2.
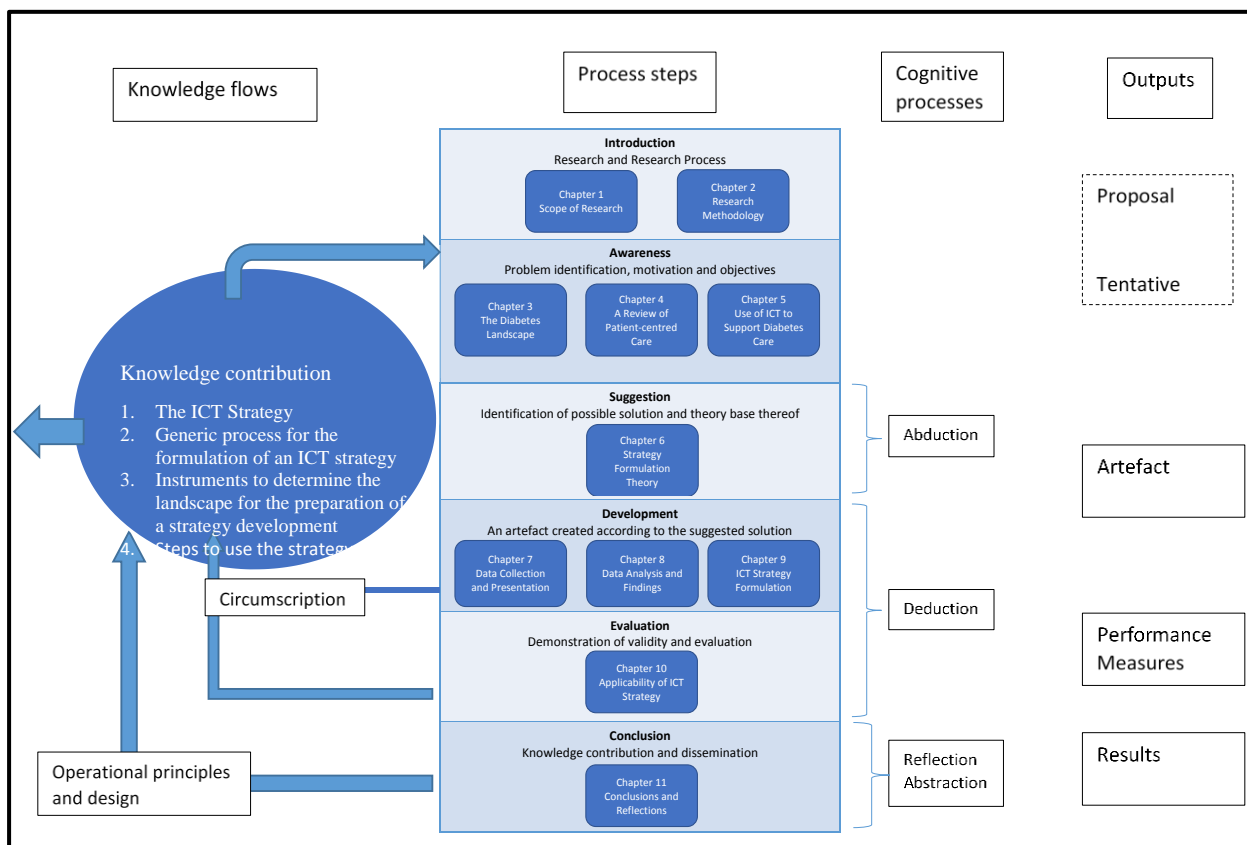
Figure 11-2: Contributions of this study

Each of the knowledge contributions from this study are discussed in the following section.

11.4.1 The Generic Strategy Process for this study

The practical contributions of this study include the strategy-formulation process. This is discussed in Chapter 6; and it shows the steps to follow for formulating an ICT strategy for

diabetes care. It could be adopted and used in other areas, wherever chronic diseases require a strategy-formulation.

The considerations for an ICT strategy were investigated and discussed in section 6.4. It was clear that ICT strategies should support the main goal and overall strategies of the business and not be developed in isolation. The same principles would apply to formulate an ICT strategy as for any other business strategy but it would have to be in line with the overall strategy. To formulate this ICT strategy it was necessary to bear in mind the overarching goals/strategies of the SA government and Department of Health. These include achieving the Millennium Development goals (particularly MDG 6 that speaks to chronic diseases), The National Development Plan 2030 which speaks to promoting active and healthy lifestyles, and The National Infrastructure Plan which speaks to wider accessibility to ICT infrastructure.

The adaptation of the formulation process from the strategies that were studied, in section 6.3, was required since an exact match with the diabetes landscape was not found. The strategies that exist are very linear; and in the environment that this strategy is to be implemented, an approach was required that allowed for multiple passes of the environmental assessment and objective setting. The strategy formulation for this study is discussed in section 6.6. The suggestion was that clear objectives could not always be set up-front; and also that they change, once the people using the strategy actually become involved. This phase is identified as the pre-formulation phase in Figure 9-10 Strategy process for this study.

The generic process provides a guide to ICT strategy formulation for future projects and can be adapted to other chronic diseases.

11.4.2 Supporting Instruments when Formulating a Strategy

In order to formulate the strategy it is important that adequate preparation for the strategy development is done by studying the landscape in which the strategy is used. The instrument used for this preparation is a unique set of questions for the semi-structured interviews. The questions covers aspects related to diabetes care requirements (section 7.4.1), patient centred care (section 7.4.2 to 7.4.5, 7.4.7 and 7.4.8), and the use of technology in diabetes care (section 7.4.6). The set of questions are attached as Appendix C.

The interview questions can be used when implementing the strategy in various settings, in order to determine the adherence or shortcomings with regard to diabetes and patient-centred care. These questions can be adapted to other chronic conditions.

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11.4.3 The ICT Strategy for Diabetes

The strategy itself is the primary contribution; and its implementation was illustrated through a scenario setting in Chapter 10. The checklists that emerged can be used and adapted to suit other chronic diseases that intend to use this strategy.

The strategy is a result of the diagnoses, guiding policies and action plans discussed in section 9.2 – 9.4.

The link between the three main factors, namely, the requirements for diabetes care, patient-centred care and the use of ICT, was considered throughout the development of the Guiding Policies and Action Plans to solve the underlying diagnostic results. This is the formulation of the strategy and discussed Chapter 9.

The formulation of the strategy required investigating the problem and making a diagnosis of the problem. A suggested wide solution is proposed through a guiding policy and lastly, the exact action required to address the problem diagnosed is given in a detailed action plan.

The following areas were identified as objectives for the study in order to perform the required formulation:

- To ensure that ICT is used by healthcare practitioners in diabetes care (section 9.2)

- To ensure that ICT is used by people with diabetes in the self-management of diabetes (section 9.3)

- To ensure that ICT is used in clinics and hospitals for diabetes and education awareness (section 9.4)

Each one of these followed the formulation process as mentioned resulting in various diagnosis, guiding policies and action plans.

The first component of this strategy is to ensure that ICT is used by healthcare practitioners in diabetes care (section 9.2). The strategy required consist of 5 Guiding policies and 4 Action plans and these are illustrated in Figure 11-3.
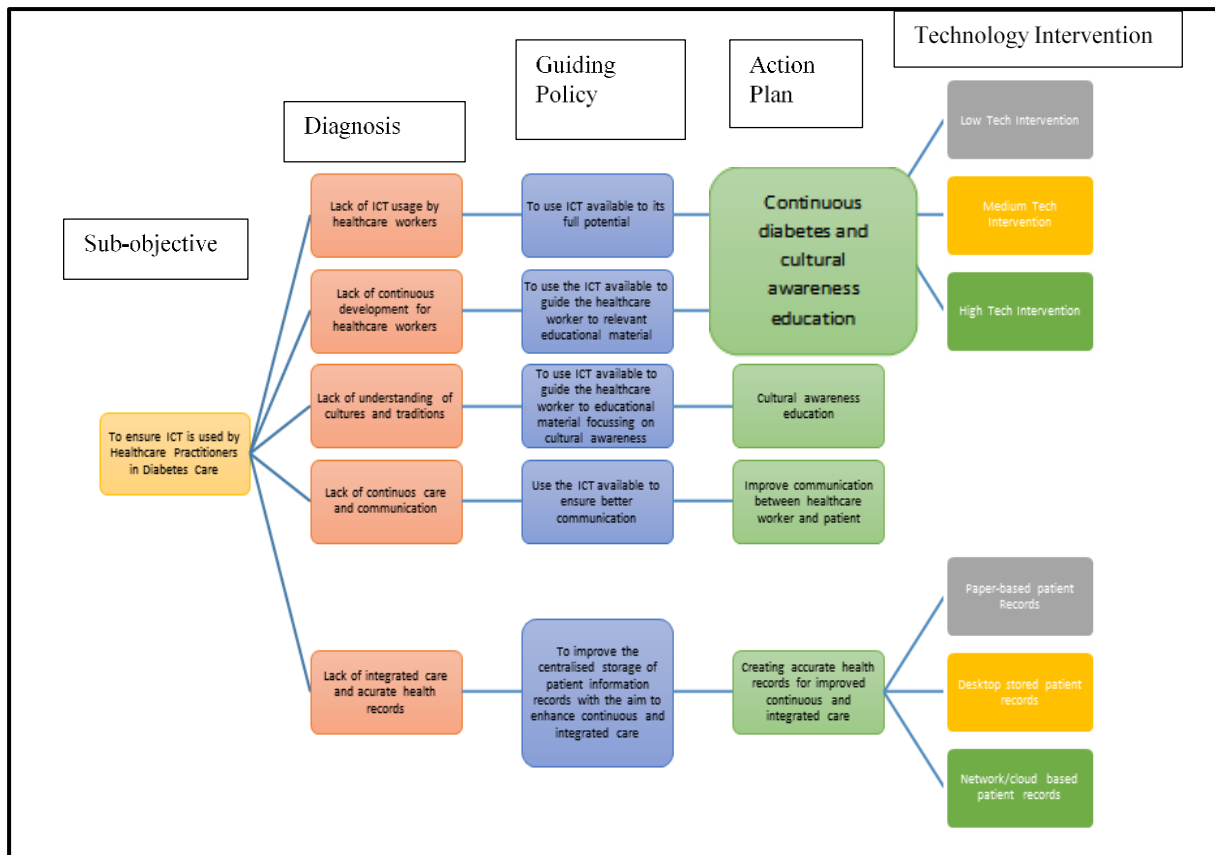
Figure 11-3: ICT Strategy for Healthcare practitioners

The second component of this strategy was to ensure that ICT is used by people with diabetes in the self-management of diabetes (section 9.3). The strategy for this includes 3 Guiding policies and 3 Action plans. This component of the strategy is illustrated in Figure 11-5.
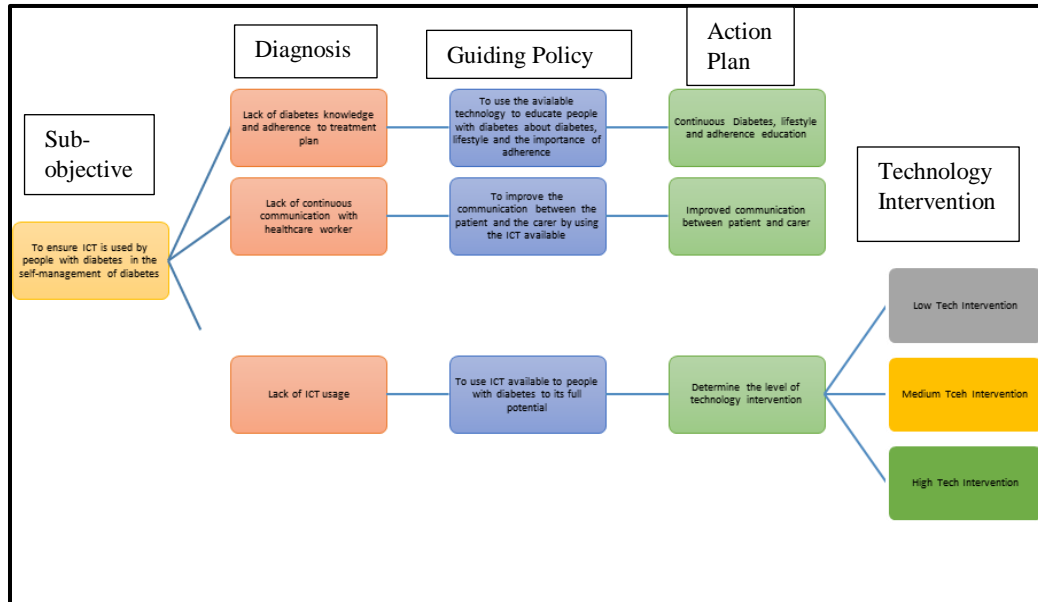
Figure 11-4: ICT strategy for ICT use for people with diabetes

The third objective of this strategy is to ensure that ICT is used in clinics and hospitals for diabetes and education awareness (section 9.4). The strategy to deploy includes 1 Guiding policy and 2 Action plans.
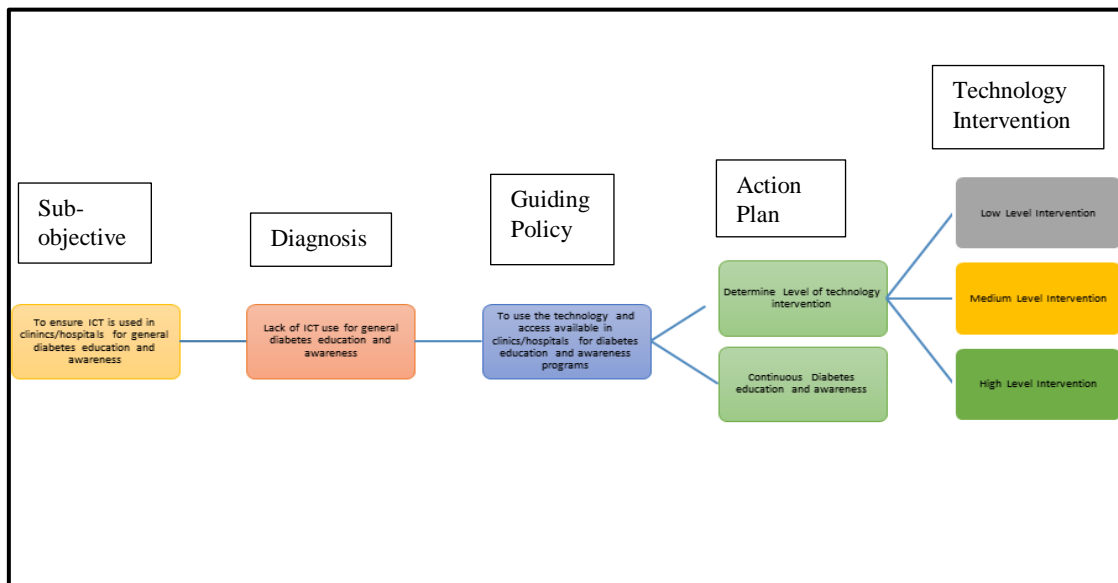
Figure 11-5: ICT Strategy for use in clinics/hospitals

The ICT strategy provides the following:

- Diagnosis of problem situations

- Guiding policies that provide a broad solution to the problem

- Action plans that should be followed to address the problem.

11.4.4 How to use the ICT Strategy

The ICT strategy must follow certain steps in order to be implemented effectively. These steps are found in the various action plans that were developed. There are different steps to be followed by the various stakeholders. Checklists were developed to assist in implementing the strategy.

Clinic Supervisors:

These are the people who are required to endorse the implementation of the strategy, train the staff who are going to use the strategy, as well as monitor the performance of the strategy in order to identify successes as well as possible adaptions required where there are weaknesses.

Checklist for clinic supervisor	
Endorse the strategy by discussing its advantages with the staff to ensure staff buy-in.	
Determine level of technology in clinic	
Address matters of concern such as training required as well as possibility of re-imbursing staff for using their own devices	
Ensure staff are given the time to train and learn what is required for the strategy implementation	
Identify champions who can assist in driving the strategy as well as help with sub sequent training	
Ensure that the training material as well as other documentation for daily tasks are easily accessible to staff to avoid frustration	
Perform action plan to educated patients in the clinic setting (waiting room)	
Develop/distribute the patient pledge to using ICT	
Devise incentives/re-imbursement for use of own devices by healthcare workers	
Draw up/distribute data capturing, storage and sharing protocols	
Train staff regarding ICT strategy and the various requirements (patient-centred care, cultural awareness)	
Device a cultural awareness program (community leader can assist)	

Administrative staff:

These are the members of staff responsible for the patient records. This could include staff at different levels for example a nurse capturing data on a record or an office worker who files/stores or distributes these files. The steps to follow are:

Checklist for administrative staff	
Staff must attend training and ensure that they are knowledgeable about the various requirements for each action plan	
Record/Confirm patient contact details with patient	
Record/confirm access and technology available to patient	
Explain ICT strategy advantages to patient	
Sign patient up for intervention/Give patient pledge for signing	
Capture complete patient information after consultation (include any notes or additional comments where applicable)	
Store patient record as required	
Clearly capture whether the patient is referred to secondary doctor	
Patient record is shared with secondary doctor if applicable	

Consulting practitioner:

This could be a doctor, diabetes nurse, carer or anybody responsible for consulting with the patient in the clinic/hospital. The steps to follow are:

Checklist for consulting practitioner (doctor/nurse/carer)	
Greet patient by name	
Explain the current situation wrt diabetes status of the patient clearly	
Enquire about factors that make adherence to treatment difficult (e.g. cultures and traditions)	
Explain any new medication	
Discuss treatment plan and agree to it with patient	
Check for any complications	
If a patient is referred to a secondary doctor clearly explain why and capture the information on the patient record	
Healthcare workers must be enthusiastic and knowledgeable when discussing this strategy with patients	
Confirm patient understands the technology intervention applicable	
Set up any possible device settings before patient leaves the rooms	
Capture complete patient information after consultation (include any notes or additional comments where applicable)	

The person with diabetes:

This is anybody who visits the clinic who is already diagnosed with diabetes. The steps to follow are:

Checklist for self-management	
Record/Confirm contact details with carer	
Record/confirm access and technology available to patient	
Sign pledge to use ICT strategy	
Obtain communication protocol and rules for engagement with healthcare worker	
Set reminders	
Obtain educational material on diabetes care	
Obtain education al material on cultural awareness and education	
Obtain material on lifestyle and adherence	
Contact support group	
Join the chat groups as referred to by your healthcare worker	

The checklist are guidelines and serve as a starting point for clinics/hospitals and they may require to be adapted to fully suit the environment in which they are used so as to ensure that they do not contradict the clinic/hospital protocols.

11.5 Reflection

The reflections on the study are provided from three perspectives namely: scientific, methodological and substantive.

11.5.1 Scientific Reflection

The problems relating to successful diabetes care were discussed in Chapter 3 of this study. It was found that the SA healthcare system is ruthlessly inadequate to deal with patients who require chronic care, as the system is focussed on acute care. There are huge volumes of people who need daily care for acute illnesses and the system to handle these cases is severely strained for many reasons. Chronic care patients, such as people with diabetes, have to endure the same gruelling experience to visit a doctor or healthcare worker, and as they have to have regular visits, they often skip/miss them due to the lengthy process involved. This failure to monitor and manage diabetes leads to severe complications and even death, as well as increased disease burden and increased prevalence of diabetes. It was also found that there is a lack of knowledge by both the carers, as well as the general population, regarding diabetes. Diabetes care in relation to patient-centred care was also discussed in Chapter 4,

where it was then established that there was no evidence of patient-centred care in the public health system and only one institution in the private healthcare sector that practices patient-centred care. The implementation of a strategy for monitoring and managing diabetes, across all the various healthcare practitioners involved with a particular patient, assists in supporting diabetes care. The education and awareness of diabetes that forms part of the strategy aids in improving the lives of those people with diabetes as well as those who are at risk of diabetes.

The barriers relating to failures of most ICT strategies to grow beyond pilot studies were introduced and discussed in this study. It was found in Chapter 5 that there is no strategy to guide ICT pilot projects to maturity and growth to the point where they can be successfully replicated after the project initiators leave the study site. It was also found in Chapter 5 that there are barriers to using technology in diabetes care especially, while considering a patient-centred approach. It was indicated that it was important to ensure that the ICT strategy developed does not infringe on a person's lifestyle, but rather form part of it, in order to keep the "human touch" of the technology used. The ICT strategy was developed whilst being mindful of the requirements for using technology in a patient-centred care environment.

The ICT strategy to support patient-centred diabetes care, provides a solution to the identified problem by assisting the healthcare worker, the person with diabetes as well as general clinics/hospitals, with the process and practices involved in introducing a new method of treating people with diabetes in a manner that promotes collaboration of care, over the long-term.

11.5.2 Methodological reflection

This study involves a multi-disciplinary approach of bringing together the disciplines of health and ICT. This involved inferences from information systems, computer sciences, business management as well as sociology and human nature studies. In the health landscape the focus is on diabetes care as well as a patient-centred approach to care. In the ICT landscape the focus is on a strategy (using business models) that can take a pilot project through to maturity and eventually allow it to be replicated country wide. It was also imperative that the technology used in this strategy is available to the people on the ground, without requiring further interventions from government or other external finances.

A qualitative approach was adopted for data collection and expert interviews were used as a tool together with literature reviews. Evaluation took place in the form of generalisation and through scenario setting. Whilst there were no empirical/experimental aspects deployed the

motivation for this is discussed in the study. The DSR method used has also been motivated and discussed in the study.

11.5.3 Substantive reflection

The scope associated with the combination of the healthcare and ICT disciplines was very wide. The process of scoping and delineation was not a simple task. The scope also focused on a discipline within a discipline, namely that of patient-centred care within healthcare.

The manner in which Type 2 Diabetes was selected as the chronic disease to focus on was discussed. The selection of an ICT strategy as the solution also led to a small amount of research involving business strategies. This was also motivated and discussed in the study.

Whilst ICT and technology are ever-changing, the strategy developed focussed on non-specific devices or generic solutions to the problem. This means that the strategy is designed to be sustainable over the long-term irrespective of the changes in technology in the near future.

11.6 Limitations of the Research Study

The limitations of the study include the lack of involvement of diabetes experts, when validating the artefact, and the fact that the artefact that was created was not implemented.

Participants were selected as part of convenience sampling and based on availability of experts. The study did not involve the users of the artefact when doing a conceptual validation. The case for the strategy was done by the researcher, who implemented the strategy in the field of the study based on the facts that were gathered through the expert interviews and the literature studies.

The strategy was validated but not implemented. As a result of time limitations, the strategy developed could not be implemented and tested with the intended users. The scenario setting, however, was a realistic and true reflection of the reality that people with diabetes and their healthcare practitioners face. This was an exploratory study that focused on identifying an ICT strategy that used the interventions that can be implemented with immediate effect – to assist in the patient-centred care of people with diabetes.

11.7 Future Work

The areas that have been identified in this study for future work include the following:

- Implementation of strategy supported by monitoring and evaluation of the impact of the strategy.

  In this study, Chapter 9 provides a conceptual-strategy implementation of the proposed ICT strategy for patient-centred diabetes care. It would be of great significance, if this strategy could be implemented as a pilot study in one of the clinics/hospitals that treat people with diabetes. The findings and feedback could lead to a further refinement of this strategy and assist in the upscaling and implementation of it on a nationwide basis.

- Development of suitable ICT interventions to support the strategy.

  The guiding policies developed in sections 9.4.1.2, 9.4.2.2 and 9.4.3.2 require the dissemination of diabetes awareness and education information. A future project that makes use of expert recommendations on various websites and articles that are of use to diabetes people would be valuable; as this would make it easier to implement the strategy, if there were a list of recommended sites, rather than each clinic/hospital doing their own research and recommendations. The guiding policy developed for education and awareness of diabetes requires that short messages be sent to healthcare practitioners and also to diabetics, in order to improve their knowledge on diabetes. If these messages could be created and stored with the help of diabetes experts; then it would be easily accessible and easy to share.

- Implementation of the ICT interventions followed by a longitudinal study to determine the impact of the ICT interventions.

  A future study, that would show the strengths and weaknesses of this strategy, would be to compare the diabetes health of people with diabetes that were monitored before the use of this strategy, to their diabetes health after implementation of this strategy over a period of time.

- After refinement of the strategy, generalisation to other non-communicable diseases.

  The strategy was designed in such a manner that it could be adapted to other chronic diseases. Adapting this strategy to support other chronic diseases could help in providing better healthcare for people with chronic diseases.

11.8 Lessons Learned

During the course of this study, it was evident that people with diabetes are in dire need of effective diabetes care. It is clear from the sharp rise in the prevalence of diabetes that current treatment plans, interventions and awareness projects are not helping in the battle against diabetes. It was also clear in the study that mHealth research projects exist; but they are never scaled up after the project is completed. All the promises by government to make a difference are backed by guidelines and frameworks; but none of these are physically implemented at the point of service for people with diabetes.

A second observation is that although access to technology is sighted as the reason for not using technology/mHealth interventions, the technology that is available is not utilised to its full capacity; or it is not utilised at all.

The third lesson learnt was that healthcare practitioners, as well as people with diabetes, were keen on using technology to assist in the diabetes care plan; but they were not doing so; as they did not know what to do. The other reason for the failure to use ICT strategies was that the use of technology always incurs a financial burden.

The study also showed that patient-centred care is enjoying an upsurge, with healthcare professionals recognising the importance of showing that they care for the patient; since the patient is not just a number. Even in the public sector, where there is a huge demand on the healthcare practitioner's time, it was evident that there is a need to make patients feel important and cared for.

The lessons learnt kept this study thus, focused on a strategy that could have immediate and direct impact at the point of service for people with diabetes. It looked at what technologies are at hand; and how they could be fully utilised with minimum financial burden, whilst at the same time, maintaining a patient-centred approach.

A final observation is that although this study was focused on what can be done with immediate effect, and without any interventions or help from business and government, it is important to recognise that the commitment by these stakeholders would make a remarkable difference to the implementation of this study; as without it, the financial burden of using technology would lie with the clinics, hospitals, healthcare practitioners and patients.

11.9 Summary

This study has focused on providing an ICT strategy for patient-centred diabetes care (see Chapter 9). In order to achieve this, factors that impact on patient-centred diabetes care were identified through the literature review (Chapters 3 through to 5). Furthermore, the data were collected from and analysed, in order to provide validation from the experts (Chapters 7 and 8). In this chapter, a summary is presented of what was involved throughout the research. An overview is presented in section 9.2; whilst section 9.3 reflects on the research question and the research process. The theoretical and practical contributions of this study are presented in section 9.4. The limitations of the study are presented in section 9.5; and possible future research opportunities are presented in section 9.6. The lessons learnt in this study are presented in section 9.7.

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Appendix A: Causes of death

Causes of death (based on ICD-10)	0			1–14			15–44			45–64			65+		
	Rank	Number	%	Rank	Number	%	Rank	Number	%	Rank	Number	%	Rank	Number	%
Respiratory and cardiovascular disorders specific to the perinatal period (P20-P29)	1	3 727	14,3	...	...	...	...	...	...	...	...	...	...	...	...
Intestinal infectious diseases (A00-A09)	2	3 591	13,8	1	1 946	14,1	6	3 946	2,8	...	...	...	10	3 352	2,3
Influenza and pneumonia (J09-J18)	3	2 343	9,0	2	1 244	9,0	4	7 274	5,2	5	6 032	4,7	5	6 749	4,6
Disorders related to length of gestation and fetal growth (P05-P08)	4	1 422	5,5	...	...	...	...	...	...	...	...	...	...	...	...
Other disorders originating in the perinatal period (P90-P96)	5	1 346	5,2	...	...	...	...	...	...	...	...	...	...	...	...
Infections specific to the perinatal period (P35-P39)	6	1 085	4,2	...	...	...	...	...	...	...	...	...	...	...	...
Fetus and new-born affected by maternal factors and by complications of pregnancy, labour and delivery (P00-P04)	7	833	3,2	...	...	...	...	...	...	...	...	...	...	...	...
Malnutrition (E40-E46)	8	701	2,7	4	636	4,6	...	...	...	...	...	...	...	...	...
Other acute lower respiratory infections (J20-J22)	9	513	2,0	9	260	1,9	...	...	...	...	...	...	...	...	...
Other viral diseases (B25-B34)	10	466	1,8	6	343	2,5	3	8 501	6,0	10	3 759	2,9	...	...	...
Tuberculosis (A15-A19)	...	...	...	3	754	5,5	1	21 521	15,2	1	13 380	10,5	9	4 491	3,1
Human immunodeficiency virus [HIV] disease (B20-B24)	...	...	...	5	460	3,3	2	15 201	10,8	4	6 361	5,0	...	...	...
Inflammatory diseases of the central nervous system (G00-G09)	...	...	...	7	336	2,4	8	2 361	1,7	...	...	...	...	...	...
Other forms of heart disease (I30-I52)	...	...	...	8	297	2,2	7	3 102	2,2	6	5 813	4,5	3	11 664	8,0
Cerebral palsy and other paralytic syndromes (G80-G83)	...	...	...	10	234	1,7	...	...	...	...	...	...	...	...	...
Certain disorders involving the immune mechanism (D80-D89)	...	...	...	...	...	...	5	4 692	3,3	...	...	...	...	...	...
Cerebrovascular diseases (I60-I69)	...	...	...	...	...	...	9	1 911	1,4	3	6 662	5,2	1	13 778	9,4
Protozoal diseases (B50-B64)	...	...	...	...	...	...	10	1 666	1,2	...	...	...	...	...	...
Diabetes mellitus (E10-E14)	...	...	...	...	...	...	...	...	...	2	8 265	6,5	2	12 415	8,5
Hypertensive diseases (I10-I15)	...	...	...	...	...	...	...	...	...	7	4 813	3,8	4	10 833	7,4
Chronic lower respiratory diseases (J40-J47)	...	...	...	...	...	...	...	...	...	8	4 397	3,4	7	6 332	4,3
Malignant neoplasm of digestive organs (C15-C26)	...	...	...	...	...	...	...	...	...	9	3 795	3,0	8	4 710	3,2
Ischaemic heart diseases (I20-I25)	...	...	...	...	...	...	...	...	...	...	...	...	6	6 678	4,6
Other natural causes		9 097	35,0		5 703	41,3		41 548	29,4		55 934	43,8		61 132	41,8
Non-natural causes		869	3,3		3 531	25,6		29 492	20,9		8 620	6,7		4 233	2,9
All causes		25 993	100,0		15 744	100		141 215	100,0		127 831	100,0		146 367	100,0

*Including deaths due to *MDR-TB* and *XDR-TB*.   ...Category not in top ten.

Source: (Statistics South Africa, 2013)

Appendix B: Ethics Clearance

Nelson Mandela
Metropolitan
University

for tomorrow

FACULTY OF ENGINEERING,
BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

Ref: [H15-ENG-ITe-002]

25 August 2015

Prof Darelle van Greunen
Faculty: EBEIT
Department: Information Technology
Room R254
North Campus

Dear Prof van Greunen

A mHealth framework for a patient-centred approach to diabetes

PRP: Darelle van Greunen
PI: Anastasia (Sue) Petratos

Your above-entitled application for ethics approval served at the EBEIT Faculty Research Ethics Committee (Human).

We take pleasure in informing you that the application was approved by the Committee.

The ethics clearance reference number is H15-ENG-ITe-002 and is valid for three years. Please inform the Faculty REC-H, if any changes (particularly in the methodology) occur during this time.

We wish you well with the project. Please inform your co-investigators of the outcome, and convey our best wishes.

Yours sincerely,

Prof Gerrit J. Crafford
Chairperson: Faculty Research Ethics Committee (Human)

Appendix C: Semi-structured Interview Questions

A semi-structured interview to determine the needs for a patient-centred approach to diabetes

This interview is part of a doctoral study to develop a mHealth framework for a patient-centred approach to Diabetes. The results of the interview will be used to assist in creating the desired environment for the care of diabetes patients for the monitoring and management of their illness in a successful manner over a long period of time.

This interview will gather information about:

- The general care that is required for diabetes patients
- What the situation currently is with regard to diabetes care in clinics and hospitals
- Understanding the concept of patient-centred care and how it should be adapted to the diabetic
- Current use of technology, specifically mobile devices in caring for patients
- Critical aspects of caring for diabetics.

ALL INFORMATION WILL BE KEPT CONFIDENTIAL.

I hereby **grant** permission for the interview to be recorded ☐

I hereby **decline** permission for the interview to be recorded ☐

Signature: _____

Position Held and/or place of work:
_____

Number of years of experience: _____

Functions relating to diabetes patients: _____

_____

Section 1:

This section will concentrate on what the requirements are for successful diabetes care.

1	In your position what are the most important aspects to successful diabetes care:	
	• - _____ ____	
	• _____ ____	
	• _____	

2	How do traditional beliefs and/or misconceptions affect the aspects above?	
3	How does a patient's diabetes knowledge and level of understanding affect the treatment of diabetes?	
4	How do you educate afflicted patients about diabetes?	
5	How do you ensure that patients adhere to their treatment plan?	
6	What process or cycle of actions lead to a patient seeing you and where do they go to after your consultation with them?	
7	How often should a patient visit you and do they adhere to this?	
8	Do you practice any form of preventative action with regard to diabetes e.g. discuss how diabetes can be avoided with high risk patients or run education programs?	

Section 2:

This section will determine the extent to which there is a **partnership** between the patient and yourself when working on a treatment plan.

1.	In your position, what type of relationship do you think is important to have between you and the patient?	
2.	Do you ask what treatment the patient wants done, is there a discussion about various diabetes treatment options with the patient or is it more a case of giving the patient instructions of what to do?	

3.	Do you, together with the patient, agree on a way forward for the treatment plan and how is this treatment plan conveyed to the patient?	
4.	Are there processes in place to reinforce and assess the understanding of the information and instructions provided to the patient before leaving the clinic?	
5.	Are there any tools available to help the patient manage his/her medication, appointments and other health specific needs?	

Section 3:

This section will determine the **communication** between the patient and the health care practitioner. This will determine the amount of understanding there exists of the patients' illness, his/her experiences and his/her environment as a whole.

1.	Are patients encouraged to ask questions about their diabetes?	
2.	Do you know the roles of the various carers and family members of a patient?	
3.	Is there an accurate track record of patients' visits and progress?	
4.	Would you contact a patient if he/she should miss an appointment or is overdue for medication?	
5.	Are the families of patients encouraged to ask questions? If so how and when can they do so?	
6.	Is there a process in place to disclose unanticipated outcomes to patients and families?	

Section 4:

This section will determine **other factors** that determine the patient-centeredness of your healthcare practice.

1.	In your position, is it important to listen to and understands the patient's emotional needs?	
2.	Do you enquire about the patient's goals in monitoring and maintaining diabetes?	
3.	Do you give advice on where to go to for group support for diabetics?	
4.	Do you help diabetics plan ahead so the patient can cope in difficult times?	
5.	Do you try and make patients feel important?	
6.	Do you know patients by name?	
7.	How often have you contacted patients after a visit to see how they were doing?	
8.	Can patients make requests for when certain procedures will be performed, to accommodate their personal schedule?	
9.	Are there resources available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing?	
10	Are any free health –related lectures or wellness clinics regularly offered to the public?	

Section 5:

This section looks at the availability of a patient's personal health information.

		YES	NO	SOMETIMES
1	Is there a process in place by which patients and family can request additional information on their diagnosis or treatment?			
2	Do patients have access to their medical record during consultation and is the information explained to them?			
3	Could patients view their records at any time with a healthcare worker?			
4	Would patients be allowed to add their own notes to their medical record?			
5	Are there materials available to educate patients regarding medical records for all levels of readers and in various languages?			

Section 6:

This section deals with the type of technology you could use to assist you with managing and monitoring your patients' disease. Indicate your most comfortable feeling 5 and your worst with 1. If you do not have access to a device then place your answer as a 0.

		5	4	3	2	1	0
1	I am familiar with using a cell phone e.g. calls and text						
2	I am familiar with a smart phone e.g. calls and text						
3	I am familiar with a portable device such as a tablet						
4	I have used a computer or laptop						
5	I use my phone for internet e.g. Facebook						
6	I do internet/cell phone banking						
7	I trust that my information on my cell phone is secure						
8	I would not be against using my mobile device (cell/tablet) phone to communicate with my patients						
9	I would find it useful to communicate with my patients via a mobile device phone or tablet						
10	I would find it useful to share information with a patient on my mobile device(cell/tablet)						
11	I would be comfortable using my personal device to interact with patients						
12	I would need an incentive or "compensation" before I use my personal phone to interact with patients						
13	I would only use a mobile device that has been supplied to me for interaction with patients						

Section 7:

The clinic environment that you currently find yourself in needs to be evaluated to determine how much of a patient-centred approach it follows. Your answers will help identify the strong and weak points of your environment so that these can be used as input to the proposed framework.

You can answer the question below in terms of your general practice. If you feel that you abide by or that the statement reflects what is practised then you must answer Yes, if you feel that the statement is not always true then answer "sometimes" and if the statement is not true then you answer "No". If you are unaware of a particular practice taking place then answer "I don't know".

	YES	SOMETIMES	NO	I don't know
In my environment it is important that the clinic's commitment to patient-centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission statement, core values)				
A patient and family advisory council meets regularly and actively provides input to the clinic leadership				
Patients and family have been invited to share their experiences with the clinic in focus groups				
Patients and family participate on clinic committees				
The input provided by patients and families is used to guide the clinic's strategic direction				
Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools				
Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for improvement				
Opportunities exists for both formal and informal interaction between leadership and staff				
Opportunities exist for leadership to interact directly with patients and families				
Managers are held accountable for "walking the talk" of patient-centred care				
Board members are provided with opportunities to interact directly with patients and families				

Section 8:

This section deals with the staff of the clinic and the care given to them. Please indicate whether you agree or disagree with a statement below. If you are unsure of the statement please indicate that in the column "Sometimes"

	AGREE	NO	SOMETIMES
Staff's stress-reduction and wellness needs are addressed			
Staff are routinely acknowledged for their good work by leaders, peers and patients and families			
Staff have opportunities to provide input into ways to improve the working environment			
Space is available for staff to relax between patients and/cases			
Support is offered to staff involved in adverse events			
Healthy food is available to staff (at own cost)			
Healthy food is available to staff (at clinic cost)			

Section 9:

Is there anything that you would like to add or feel is important to this study with regard to diabetes, patient-centred care or mobile health?

_____-
_____
_____
_____
_____
_____
_____
_____
_____

Thank you for your participation and your willingness to take time out of your schedule for this.

Appendix D: Pre-amble and Consent Form

NELSON MANDELA METROPOLITAN UNIVERSITY
INFORMATION AND INFORMED CONSENT FORM

RESEARCHER'S DETAILS	
Title of the research project	**An mHealth Framework to Support a Patient-Centred approach to Diabetes**
Researcher	**Anastasia Petratos (Sue), Email: sue.petratos@nmmu.ac.za Tel: 041 504 3638**
Institution	**Faculty of Engineering, Built Environment and Information Technology, School of Information Technology Communication, Department of Applied Informatics**
Ethics Clearance number	**This survey has received clearance by the EBEIT Ethics committee (H15-ENG-ITe-002). The chairperson Dr Gerrit Crafford may be contacted for any queries on 041 504 2153 or at gerrit.crafford@nmmu.ac.za**

INTRODUCTION AND METHOD		
2.1	**Aim:**	This interview conducted is part of a doctoral study to develop a mHealth framework to support a Patient-centred approach to Diabetes. The results of the survey will be used to assist in creating the desired environment for the care of diabetes patients as well as for the monitoring and management of their illness using mobile technology in a successful manner over a long period of time. This interview will gather information about: • The general care that is required for diabetes patients • What the situation currently is with regard to diabetes care in clinics and hospitals • Understanding the concept of patient-centred care and how it should be adapted to the diabetic • Current use of technology, specifically mobile devices in caring for patients • Critical aspects of caring for diabetics
2.2	**Procedures:**	The interview will take approximately 45 minutes to complete. Participants will voluntarily partake in the interview and may withdraw at any point without fear of reprisal or impact on the receipt of medical care. Participants will be requested to grant/decline permission for recording the interview.
2.3	**Risks:**	There are no risks involved in completing the interview.
2.4	**Possible benefits:**	There are no benefits to participating in the interview other than assisting with the data collection for this study, which will lead to enhancing the knowledge of successfully implementing a mHealth Framework for supporting Diabetes patients.
2.5	**Confidentiality:**	The identity of participants will not be revealed in any discussion, description or scientific publications by the investigators. The consent forms and responses will be stored separately and in a locked cabinet in the promoter's office and on a password protected PC.
2.6	**Access to findings:**	Any new information or benefit that develops during the course of the study will be shared as part of the outcomes of the study in the completed thesis and as possible journal articles or conference papers.

DECLARATION BY PARTICIPANT	
I, the participant and the undersigned	(full names)
ID number	

I HEREBY VOLUNTARILY CONSENT TO PARTICIPATE IN THE ABOVE-MENTIONED PROJECT:		
Signed/confirmed at	on	20

	Signature of witness:
Signature or right thumb print of participant	Full name of witness:

Appendix E: Interview Data

Appendix 1C

A semi-structured interview to determine the needs for a patient-centred approach to diabetes

This interview is part of a doctoral study to develop a mHealth framework for a patient-centred approach to Diabetes. The results of the interview will be used to assist in creating the desired environment for the care of diabetes patients for the monitoring and management of their illness in a successful manner over a long period of time.

This interview will gather information about:

- The general care that is required for diabetes patients
- What the situation currently is with regard to diabetes care in clinics and hospitals

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Interviewee E1

Dietician/diabetes educator

Section 1:

This section will concentrate on what the requirements are for successful diabetes care.

1	In your position what are the most important aspects to successful diabetes care: • Patient ownership • Education • Understanding XX • Early detection – Type • Demand created by HP • Footcare • Injecting BC BP	
2	How do traditional beliefs and/or misconceptions affect the aspects above? Believe if overweight, don't have av ds	

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3	How does a patient's diabetes knowledge and level of understanding affect the treatment of diabetes? *Don't have any knowledge, don't understand why they have diabetes / why they must change lifestyle.*	
4	How do you educate afflicted patients about diabetes? *Talks, one on one visits*	
5	How do you ensure that patients adhere to their treatment plan? *Adherence is terrible. Check how much insulin comes back.*	
6	What process or cycle of actions lead to a patient seeing you and where do they go to after your consultation with them?	
7	How often should a patient visit you and do they adhere to this? *Keep track of progress, can't get them to comply. Show results.*	
8	Do you practice any form of preventative action with regard to diabetes e.g. discuss how diabetes can be avoided with high risk patients or run education programs? *Not at this stage – too many current diabetics to treat.*	

Section 2:

This section will determine the extent to which there is a **partnership** between the patient and yourself when working on a treatment plan.

1.	In your position, what type of relationship do you think is important to have between you and the patient? *remain passive, listen*	
2.	Do you ask what treatment the patient wants done, is there a discussion about various diabetes treatment options with the patient or is it more a case of giving the patient instructions of what to do? *NO*	
3.	Do you, together with the patient, agree on a way forward for the treatment plan and how is this treatment plan conveyed to the patient? *NO*	
4.	Are there processes in place to reinforce and assess the understanding of the information and instructions provided to the patient before leaving the clinic? *NO*	

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3.	Do you give advice on where to go to for group support for diabetics?	
4.	Do you help diabetics plan ahead so the patient can cope in difficult times?	
5.	Do you try and make patients feel important?	
6.	Do you know patients by name?	
7.	How often have you contacted patients after a visit to see how they were doing?	
8.	Can patients make requests for when certain procedures will be performed, to accommodate their personal schedule?	
9.	Are there resources available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing?	
10.	Are any free health –related lectures or wellness clinics regularly offered to the public?	

Section 5:

Audit in house – no accurate + complete patient records

This section looks at the availability of a patient's personal health information.

		YES	NO	SOMETIMES
1	Is there a process in place by which patients and family can request additional information on their diagnosis or treatment?		X	
2	Do patients have access to their medical record during consultation and is the information explained to them?		X	
3	Could patients view their records at any time with a healthcare worker?		X	
4	Would patients be allowed to add their own notes to their medical record? *Missing dates*		X	
5	Are there materials available to educate patients regarding medical records for all levels of readers and in various languages?		X	

Don't stabilise patient ally – no quality care

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Section 6:

This section deals with the type of technology you could use to assist you with managing and monitoring your patients' disease. Indicate your most comfortable feeling 5 and your worst with 1. If you do not have access to a device then place your answer as a 0.

		5	4	3	2	1	0
1	I am familiar with using a cell phone e.g. calls and text						
2	I am familiar with a smart phone e.g. calls and text						
3	I am familiar with a portable device such as a tablet						
4	I have used a computer or laptop						
5	I use my phone for internet e.g. Facebook						
6	I do internet/cell phone banking						
7	I trust that my information on my cell phone is secure			ı			
8	I would not be against using my mobile device (cell/tablet) phone to communicate with my patients		\				
9	I would find it useful to communicate with my patients via a mobile device phone or tablet	\					
10	I would find it useful to share information with a patient on my mobile device(cell/tablet)	\					
11	I would be comfortable using my personal device to interact with patients			ʏ			
12	I would need an incentive or "compensation" before I use my personal phone to interact with patients		\				
13	I would only use a mobile device that has been supplied to me for interaction with patients	ʏ					

Section 7:

The clinic environment that you currently find yourself in needs to be evaluated to determine how much of a patient-centred approach it follows. Your answers will help identify the strong and weak points of your environment so that these can be used as input to the proposed framework.

You can answer the question below in terms of your general practice. If you feel that you abide by or that the statement reflects what is practised then you must answer Yes, if you feel that the statement is not always true then answer "sometimes" and if the statement is not true then you answer "No". If you are unaware of a particular practice taking place then answer "I don't know".

	YES	SOMETIMES	NO	I don't know
In my environment it is important that the clinic's commitment to patient-centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission statement, core values)	✓			
A patient and family advisory council meets regularly and actively provides input to the clinic leadership		—		
Patients and family have been invited to share their experiences with the clinic in focus groups	✓			
Patients and family participate on clinic committees	✓			
The input provided by patients and families is used to guide the clinic's strategic direction			—	—
Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools		—	—	

Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for improvement			`	
Opportunities exists for both formal and informal interaction between leadership and staff			✓	
Opportunities exist for leadership to interact directly with patients and families			✓	
Managers are held accountable for "walking the talk" of patient-centred care *Doesn't happen*			`	
Board members are provided with opportunities to interact directly with patients and families			✓	

Section 8:

This section deals with the staff of the clinic and the care given to them. Please indicate whether you agree or disagree with a statement below. If you are unsure of the statement please indicate that in the column "Sometimes"

	AGREE	NO	SOMETIMES
Staff's stress-reduction and wellness needs are addressed		X	
Staff are routinely acknowledged for their good work by leaders, peers and patients and families		Y	
Staff have opportunities to provide input into ways to improve the working environment		✓	
Space is available for staff to relax between patients and/cases		Y	
Support is offered to staff involved in adverse events		Y	
Healthy food is available to staff (at own cost)		Y	
Healthy food is available to staff (at clinic cost)		X	

lack of work ethic, compassion + (care) Over worked / under educated

Section 9:

Is there anything that you would like to add or feel is important to this study with regard to diabetes, patient-centred care or mobile health?   *at the time must be noted*

What is NB to patient, Motivational coaching to education

App must create its own demand - Share info - competitive edge

Thank you for your participation and your willingness to take time out of your schedule for this.

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Appendix 1b

A semi-structured interview to determine the needs for a patient-centred approach to diabetes

This interview is part of a doctoral study to develop a mHealth framework for a patient-centred approach to Diabetes. The results of the interview will be used to assist in creating the desired environment for the care of diabetes patients for the monitoring and management of their illness in a successful manner over a long period of time.

This interview will gather information about:

- The general care that is required for diabetes patients
- What the situation currently is with regard to diabetes care in clinics and hospitals
- Understanding the concept of patient-centred care and how it should be adapted to the

---

Interviewee E2

Diabetes Nurse/Educator

Section 1:

This section will concentrate on what the requirements are for successful diabetes care.

1	In your position what are the most important aspects to successful diabetes care:	
	• Basic education for carers primary importance	
	• Funds — must get State bodies to commit financially	
	• Make Diabetes awareness as big as HIV awareness	
	• Don't only track but also analyse why reading is what it is	S
	• _____	
	• _____	
	• _____	
2	How do traditional beliefs and/or misconceptions affect the aspects above? Culturally obesity is good — even nurses are overweight this does not help cause if you preach it you must do it Food is NB to black culture so fat will always stay Must work on medication education to at least control clrn	
3	How does a patient's diabetes knowledge and level of understanding affect the	

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treatment of diabetes. If they know why they doing something it is easier to stick to it

4	How do you educate afflicted patients about diabetes? Very personalised approach in private clinic – time also problem as have to adapt for each patient
5	How do you ensure that patients adhere to their treatment plan? Very difficult include family – team approach – sometimes hardwords work better then soft approach. Behavioural change is hard. They test only when they feel bad instead of daily at varied times.
6	What process or cycle of actions lead to a patient seeing you and where do they go to after your consultation with them? Mostly private patients already diagnosed work closely with ophthalmologist, dietician, biokineticist
7	How often should a patient visit you and do they adhere to this? Difficult as med aid limits visits but at least 2x per year. Constant contact is important so patients have my cell number
8	Do you practice any form of preventative action with regard to diabetes e.g. discuss how diabetes can be avoided with high risk patients or run education programs? Advise to attend DSA – no time for edu program. Here is where med firms can help by offering info about the meds to public.

Section 2:

This section will determine the extent to which there is a **partnership** between the patient and yourself when working on a treatment plan.

1.	In your position, what type of relationship do you think is important to have between you and the patient? Trust + understanding (also emotional understanding)
2.	Do you ask what treatment the patient wants done, is there a discussion about various diabetes treatment options with the patient or is it more a case of giving the patient instructions of what to do? Work together but mostly do what nurses say. Have to also comply with med aid prescriptions so often have to source meds for patient
3.	Do you, together with the patient, agree on a way forward for the treatment plan and how is this treatment plan conveyed to the patient? Yes – clearly discussed – also with family – must be a practical approach – patient must know it is "YOUR DIABETES"
4.	Are there processes in place to reinforce and assess the understanding of the information and instructions provided to the patient before leaving the clinic? No but can call nurse – guidelines are handed to patient
5.	Are there any tools available to help the patient manage his/her medication, appointments and other health specific needs? Only direct SMS with patient + nurse if patient initiates communication

Section 3:

This section will determine the communication between the patient and the health care practitioner. This will determine the amount of understanding there exists of the patients' illness, his/her experiences and his/her environment as a whole.

1.	Are patients encouraged to ask questions about their diabetes? Very much so but often dont know what to ask	
2.	Do you know the roles of the various carers and family members of a patient? Mostly	
3.	Is there an accurate track record of patients' visits and progress? Yes – all is computerised – also use downloadable software from glaucometer	
4.	Would you contact a patient if he/she should miss an appointment or is overdue for medication? Sometimes	
5.	Are the families of patients encouraged to ask questions? If so how and when can they do so? By app	
6.	Is there a process in place to disclose unanticipated outcomes to patients and families? Not really	

Section 4:

This section will determine **other factors** that determine the patient-centeredness of your healthcare practice.

1.	In your position, is it important to listen to and understands the patient's emotional needs? Always – Sometimes hard to focus on diabetes when other problems exist	
2.	Do you enquire about the patient's goals in monitoring and maintaining diabetes? Focus on the treatment + Medication routine mainly	
3.	Do you give advice on where to go to for group support for diabetics? Suggest DSA	

4.	Do you help diabetics plan ahead so the patient can cope in difficult times?		
5.	Do you try and make patients feel important? Yes		
6.	Do you know patients by name? YES		
7.	How often have you contacted patients after a visit to see how they were doing? Seldom but in severe cases – mostly patient	must initiate	
	communication		
8.	Can patients make requests for when certain procedures will be performed, to accommodate their personal schedule? Yes		
9.	Are there resources available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing? Self taught through	rough	and sends
	experience + conferences – Doc very pro-active		
	nurse on training		
10.	Are any free health –related lectures or wellness clinics regularly offered to the public? DSA		

Section 5:

This section looks at the availability of a patient's personal health information.

		YES	NO	SOMETIMES
1	Is there a process in place by which patients and family can request additional information on their diagnosis or treatment?	X		
2	Do patients have access to their medical record during consultation and is the information explained to them?	X		
3	Could patients view their records at any time with a healthcare worker?	X		
4	Would patients be allowed to add their own notes to their medical record?		X	
5	Are there materials available to educate patients regarding medical records for all levels of readers and in various languages?		X	

Section 6:

This section deals with the type of technology you could use to assist you with managing and monitoring your patients' disease. Indicate your most comfortable feeling 5 and your worst with 1. If you do not have access to a device then place your answer as a 0.

		5	4	3	2	1	0
1	I am familiar with using a cell phone e.g. calls and text	X					
2	I am familiar with a smart phone e.g. calls and text	X					
3	I am familiar with a portable device such as a tablet	X					
4	I have used a computer or laptop *)nd*						
5	I use my phone for internet e.g. Facebook *{ N ct*						
6	I do internet/cell phone banking *{ co~*						
7	I trust that my information on my cell phone is secure *)*						
8	I would not be against using my mobile device (cell/tablet) phone to communicate with my patients	X					
9	I would find it useful to communicate with my patients via a mobile device phone or tablet	X					
10	I would find it useful to share information with a patient on my mobile device(cell/tablet)	X					
11	I would be comfortable using my personal device to interact with patients	X					
12	I would need an incentive or "compensation" before I use my personal phone to interact with patients		Not necessarily but it helps financially				
13	I would only use a mobile device that has been supplied to me for interaction with patients	X					

Section 7:

The clinic environment that you currently find yourself in needs to be evaluated to determine how much of a patient-centred approach it follows. Your answers will help identify the strong and weak points of your environment so that these can be used as input to the proposed framework.

You can answer the question below in terms of your general practice. If you feel that you abide by or that the statement reflects what is practised then you must answer Yes, if you feel that the statement is not always true then answer "sometimes" and if the statement is not true then you answer "No". If you are unaware of a particular practice taking place then answer "I don't know".

	YES	SOMETIMES	NO	I don't know
In my environment it is important that the clinic's commitment to patient-centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission statement, core values)		X		
A patient and family advisory council meets regularly and actively provides input to the clinic leadership			X	
Patients and family have been invited to share their experiences with the clinic in focus groups		X		
Patients and family participate on clinic committees			X	
The input provided by patients and families is used to guide the clinic's strategic direction			X	
Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools			X	
Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for			X	

improvement				
Opportunities exists for both formal and informal interaction between leadership and staff	✓			
Opportunities exist for leadership to interact directly with patients and families	✓			
Managers are held accountable for "walking the talk" of patient-centred care	✓			
Board members are provided with opportunities to interact directly with patients and families				

Section 8:

This section deals with the staff of the clinic and the care given to them. Please indicate whether you agree or disagree with a statement below. If you are unsure of the statement please indicate that in the column "Sometimes"

	AGREE	NO	SOMETIMES
Staff's stress-reduction and wellness needs are addressed			✓
Staff are routinely acknowledged for their good work by leaders, peers and patients and families	✓		
Staff have opportunities to provide input into ways to improve the working environment			✓
Space is available for staff to relax between patients and/cases	office		
Support is offered to staff involved in adverse events			
Healthy food is available to staff (at own cost) } bring own			
Healthy food is available to staff (at clinic cost) } meals small clinic			

Section 9:

Is there anything that you would like to add or feel is important to this study with regard to diabetes, patient-centred care or mobile health?

Big companies must sign commitment to gov dept. Tenders won must also make fin contribution towards educating public on the meds they supply to clinics. Use people in community to help with regular Monitoring between clinic visits + ensure they are educated in what to d. Bringing edu on diabetes at schools + in nurses + doc training. Make a huge diabetes campaign. Do NOT let medaids decide what treatments patients can + can't use.

Thank you for your participation and your willingness to take time out of your schedule for this.

E2

Basic edu for carers
No dedicated training
Time even problem in private sector

Start at students in HE
Intern year education Zuma nurses

Culturally — big and even nurses are
Food is important to them fat will stay
But at least take meds correct

Education through Med firms

State tenders can be asked to make funds available
to understand insulin — Med firms must make
effort to teach people about the medic
Dedication to state from medical companies

Use people in the community eg Some are important
to handle glucometers + take responsibility

DSA + nurses on diabetes (ROCHE)
Not only diabetes day

Family members also included. Practical implementation
Must be team approach
Individual targets
Men think they weak if they ~~test~~ use insulin
erectile dysfunction

Private sector different
Docter - educater - patient - educater - docter
Ask patient about current procedures
Then send to various other specialists eg Biokinetics,
Opthomologist, Dietician

Whatsapp + Sms are private

Private ⇒ medical aids dictate what treatments to use
without paying M. Eg discovery would say you allowed
to use only this or that make of insulin.
or gives limits on funds + Specific pharmacies
So Sister assists in finding/sourcing providers

Keep track personally and compare to expected
targets - testing does not help - action does -
Analyse what you do - take treatment, sugest
watch pattern - try + explain / think why your
pattern looks like that
"YOUR DDABETES" No need to die of diabetes
One can see when you hit home
limited visits problem - fax, email / sms results.
Visits are 2 a year but constant contact
is important
Must get behavioral change - test only when feeling bad.

Understand why then better compliance
Individualised.

Computerised in this practice + stored in files

Trends — low ones more problematic

Appendix 1b

A semi-structured interview to determine the needs for a patient-centred approach to diabetes

This interview is part of a doctoral study to develop a mHealth framework for a patient-centred approach to Diabetes. The results of the interview will be used to assist in creating the desired environment for the care of diabetes patients for the monitoring and management of their illness in a successful manner over a long period of time.

This interview will gather information about:

- The general care that is required for diabetes patients

Interviewee E3

Optometrist

Section 1:

This section will concentrate on what the requirements are for successful diabetes care.

1	In your position what are the most important aspects to successful diabetes care: • Qualified nurses • Education of patients • Commitment to control from patients • • • •	
2	How do traditional beliefs and/or misconceptions affect the aspects above? African people see obesity ~~of a sign~~ as a sign of health + wealth. Difficult to control condition with meds only. Often stop taking meds	
3	How does a patient's diabetes knowledge and level of understanding affect the	

	treatment of diabetes?	
	They must understand to comply.	
4	How do you educate afflicted patients about diabetes? Not really - just tell them to stick to what doc says.	
5	How do you ensure that patients adhere to their treatment plan? No - don't get involved in treatment.	
6	What process or cycle of actions lead to a patient seeing you and where do they go to after your consultation with them? Normally already diagnosed and come from their practitioner. If not then they are adviced to go to their GP	
7	How often should a patient visit you and do they adhere to this? 2 x /year but they don't due to medaid only paying for every 2nd year.	
8	Do you practice any form of preventative action with regard to diabetes e.g. discuss how diabetes can be avoided with high risk patients or run education programs? No	

Section 2:

This section will determine the extent to which there is a partnership between the patient and yourself when working on a treatment plan.

1.	In your position, what type of relationship do you think is important to have between you and the patient? Trust	
2.	Do you ask what treatment the patient wants done, is there a discussion about various diabetes treatment options with the patient or is it more a case of giving the patient instructions of what to do? N/A	
3.	Do you, together with the patient, agree on a way forward for the treatment plan and how is this treatment plan conveyed to the patient? N/A	
4.	Are there processes in place to reinforce and assess the understanding of the information and instructions provided to the patient before leaving the clinic? N/A	
5.	Are there any tools available to help the patient manage his/her medication, appointments and other health specific needs? use SMS system to remind patients to visit for checkup	

Section 3:

This section will determine the **communication** between the patient and the health care practitioner. This will determine the amount of understanding there exists of the patients' illness, his/her experiences and his/her environment as a whole.

1.	Are patients encouraged to ask questions about their diabetes? N/A	
2.	Do you know the roles of the various carers and family members of a patient? N/A	
3.	Is there an accurate track record of patients' visits and progress? Yes w r t the eye-care + condition.	
4.	Would you contact a patient if he/she should miss an appointment or is overdue for medication? SMS gives report if delivery fails so can contact them in other ways to remind them of visit	
5.	Are the families of patients encouraged to ask questions? If so how and when can they do so? N/A	
6.	Is there a process in place to disclose unanticipated outcomes to patients and families? N/A	

Section 4:

This section will determine **other factors** that determine the patient-centeredness of your healthcare practice.

1.	In your position, is it important to listen to and understands the patient's emotional needs? Sometimes but seldom that involved	
2.	Do you enquire about the patient's goals in monitoring and maintaining diabetes? No	
3.	Do you give advice on where to go to for group support for diabetics? No	

4.	Do you help diabetics plan ahead so the patient can cope in difficult times? *N/A*	
5.	Do you try and make patients feel important? *In this practice-Yes*	
6.	Do you know patients by name? *Yes*	
7.	How often have you contacted patients after a visit to see how they were doing? *N/A*	
8.	Can patients make requests for when certain procedures will be performed, to accommodate their personal schedule? *WRT eye care - yes*	
9.	Are there resources available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing? *N/A*	
10.	Are any free health –related lectures or wellness clinics regularly offered to the public? *NO*	

Section 5:

This section looks at the availability of a patient's personal health information.

		YES	NO	SOMETIMES
1	Is there a process in place by which patients and family can request additional information on their diagnosis or treatment?	X		
2	Do patients have access to their medical record during consultation and is the information explained to them?	X		
3	Could patients view their records at any time with a healthcare worker?	X		
4	Would patients be allowed to add their own notes to their medical record?		X	
5	Are there materials available to educate patients regarding medical records for all levels of readers and in various languages?		X	

Section 6:

This section deals with the type of technology you could use to assist you with managing and monitoring your patients' disease. Indicate your most comfortable feeling 5 and your worst with 1. If you do not have access to a device then place your answer as a 0.

		5	4	3	2	1	0
1	I am familiar with using a cell phone e.g. calls and text	y					
2	I am familiar with a smart phone e.g. calls and text	X					
3	I am familiar with a portable device such as a tablet	y					
4	I have used a computer or laptop	y					
5	I use my phone for internet e.g. Facebook	y					
6	I do internet/cell phone banking	y					
7	I trust that my information on my cell phone is secure	y					
8	I would not be against using my mobile device (cell/tablet) phone to communicate with my patients	X					
9	I would find it useful to communicate with my patients via a mobile device phone or tablet	y					
10	I would find it useful to share information with a patient on my mobile device(cell/tablet)	√					
11	I would be comfortable using my personal device to interact with patients	X					
12	I would need an incentive or "compensation" before I use my personal phone to interact with patients	μ					X
13	I would only use a mobile device that has been supplied to me for interaction with patients	X					

Section 7:

The clinic environment that you currently find yourself in needs to be evaluated to determine how much of a patient-centred approach it follows. Your answers will help identify the strong and weak points of your environment so that these can be used as input to the proposed framework.

You can answer the question below in terms of your general practice. If you feel that you abide by or that the statement reflects what is practised then you must answer Yes, if you feel that the statement is not always true then answer "sometimes" and if the statement is not true then you answer "No". If you are unaware of a particular practice taking place then answer "I don't know".

	YES	SOMETIMES	NO	I don't know	
In my environment it is important that the clinic's commitment to patient-centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission statement, core values)					N/A
A patient and family advisory council meets regularly and actively provides input to the clinic leadership					N/A
Patients and family have been invited to share their experiences with the clinic in focus groups					N/A
Patients and family participate on clinic committees The input provided by patients and families is used to guide the clinic's strategic direction					
Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools					
Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for					

improvement				
Opportunities exists for both formal and informal interaction between leadership and staff				
Opportunities exist for leadership to interact directly with patients and families				
Managers are held accountable for "walking the talk" of patient-centred care				
Board members are provided with opportunities to interact directly with patients and families				

Section 8:   N|A

This section deals with the staff of the clinic and the care given to them. Please indicate whether you agree or disagree with a statement below. If you are unsure of the statement please indicate that in the column "Sometimes"

	AGREE	NO	SOMETIMES
Staff's stress-reduction and wellness needs are addressed			
Staff are routinely acknowledged for their good work by leaders, peers and patients and families			
Staff have opportunities to provide input into ways to improve the working environment			
Space is available for staff to relax between patients and/cases			
Support is offered to staff involved in adverse events			
Healthy food is available to staff (at own cost)			
Healthy food is available to staff (at clinic cost)			

Section 9:

Is there anything that you would like to add or feel is important to this study with regard to diabetes, patient-centred care or mobile health?

Should screen all patients @ public hospitals for glaucoma
Easy test, can train nurses + receptionist
Use the time people spend sitting waiting to better
health care

Thank you for your participation and your willingness to take time out of your schedule for this.

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E3

Normally know they have dm.
Primary health care provider.
Basic Bloodsugar test @ pharmacy and then go to
GP.
Qualified nurses.
Must control it well.
Grading system for eye care.
Ideally retinal exam annually
Medicaid problematic
Diabetic programs in some cases.
Opthomologist can treat big problems.
Sooner diagnosis better.

Tech ⇒ SMS + delivery report.
    can eliminate the failed numbers.
  Educate on laptop. Ipad apps.

Retinal cameras for photos + screening done
abnormal can be picked up quick
Basic screening + glaucoma screening

Know their meds + their numbers
why

Front staff well educated.
Obesity — sign health + wealth

Appendix 1b

A semi-structured interview to determine the needs for a patient-centred approach to diabetes

This interview is part of a doctoral study to develop a mHealth framework for a patient-centred approach to Diabetes. The results of the interview will be used to assist in creating the desired environment for the care of diabetes patients for the monitoring and management of their illness in a successful manner over a long period of time.

This interview will gather information about:

- The general care that is required for diabetes patients
- What the situation currently is with regard to diabetes care in clinics and hospitals
- Understanding the concept of patient-centred care and how it should be adapted to the diabetic

Interviewee E4

Doctor

Section 1:

This section will concentrate on what the requirements are for successful diabetes care.

1	In your position what are the most important aspects to successful diabetes care:	
	• Understanding condition	
	• INFORMATION	
	• SELF MANAGEMENT	
	•	
	•	
	•	
	•	
2	How do traditional beliefs and/or misconceptions affect the aspects above?	
	SA fat is sign of wealth + health	

3	How does a patient's diabetes knowledge and level of understanding affect the treatment of diabetes? *Very important to understand the relationship between intake + DM*	
4	How do you educate afflicted patients about diabetes? *Support groups, Diabetes guidelines, Medication board*	
5	How do you ensure that patients adhere to their treatment plan? *Can't but try t motivate*	
6	What process or cycle of actions lead to a patient seeing you and where do they go to after your consultation with them? *First fetch files – depends on how they are as may be sent to other departments for care eg blood test / eye screening*	
7	How often should a patient visit you and do they adhere to this? *Not regular visits –*	
8	Do you practice any form of preventative action with regard to diabetes e.g. discuss how diabetes can be avoided with high risk patients or run education programs? *Not really most already have diabetes*	

Section 2:

This section will determine the extent to which there is a **partnership** between the patient and yourself when working on a treatment plan.

1.	In your position, what type of relationship do you think is important to have between you and the patient? *Trust*	
2.	Do you ask what treatment the patient wants done, is there a discussion about various diabetes treatment options with the patient or is it more a case of giving the patient instructions of what to do? *No*	
3.	Do you, together with the patient, agree on a way forward for the treatment plan and how is this treatment plan conveyed to the patient? *No – instructional plan*	
4.	Are there processes in place to reinforce and assess the understanding of the information and instructions provided to the patient before leaving the clinic?	

5.	Are there any tools available to help the patient manage his/her medication, appointments and other health specific needs? No	

Section 3:

This section will determine the **communication** between the patient and the health care practitioner. This will determine the amount of understanding there exists of the patients' illness, his/her experiences and his/her environment as a whole.

1.	Are patients encouraged to ask questions about their diabetes?	
2.	Do you know the roles of the various carers and family members of a patient? No	
3.	Is there an accurate track record of patients' visits and progress? Mostly	
4.	Would you contact a patient if he/she should miss an appointment or is overdue for medication? No	
5.	Are the families of patients encouraged to ask questions? If so how and when can they do so? No	
6.	Is there a process in place to disclose unanticipated outcomes to patients and families? No	

Section 4:

This section will determine **other factors** that determine the patient-centeredness of your healthcare practice.

	1.	In your position, is it important to listen to and understands the patient's emotional needs? Yes	
	2.	Do you enquire about the patient's goals in monitoring and maintaining diabetes? Yes	

3.	Do you give advice on where to go to for group support for diabetics? *Yes*	
4.	Do you help diabetics plan ahead so the patient can cope in difficult times?	
5.	Do you try and make patients feel important? *Yes*	
6.	Do you know patients by name? *Yes*	
7.	How often have you contacted patients after a visit to see how they were doing?	
8.	Can patients make requests for when certain procedures will be performed, to accommodate their personal schedule?	
9.	Are there resources available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing?	
10	Are any free health –related lectures or wellness clinics regularly offered to the public? *Support group – diabetes day.*	

Section 5:

This section looks at the availability of a patient's personal health information.

		YES	NO	SOMETIMES
1	Is there a process in place by which patients and family can request additional information on their diagnosis or treatment?		. .	
2	Do patients have access to their medical record during consultation and is the information explained to them?		＼	
3	Could patients view their records at any time with a healthcare worker?		X	
4	Would patients be allowed to add their own notes to their medical record?		X	
5	Are there materials available to educate patients regarding medical records for all levels of readers and in various languages?			X

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Section 6:

This section deals with the type of technology you could use to assist you with managing and monitoring your patients' disease. Indicate your most comfortable feeling 5 and your worst with 1. If you do not have access to a device then place your answer as a 0.

		5	4	3	2	1	0
1	I am familiar with using a cell phone e.g. calls and text						
2	I am familiar with a smart phone e.g. calls and text						
3	I am familiar with a portable device such as a tablet						
4	I have used a computer or laptop						
5	I use my phone for internet e.g. Facebook						
6	I do internet/cell phone banking						
7	I trust that my information on my cell phone is secure	X					
8	I would not be against using my mobile device (cell/tablet) phone to communicate with my patients			X			
9	I would find it useful to communicate with my patients via a mobile device phone or tablet			X			
10	I would find it useful to share information with a patient on my mobile device(cell/tablet)	X					
11	I would be comfortable using my personal device to interact with patients			X			
12	I would need an incentive or "compensation" before I use my personal phone to interact with patients			X			
13	I would only use a mobile device that has been supplied to me for interaction with patients	X					

Most have cell phones

Section 7:

The clinic environment that you currently find yourself in needs to be evaluated to determine how much of a patient-centred approach it follows. Your answers will help identify the strong and weak points of your environment so that these can be used as input to the proposed framework.

You can answer the question below in terms of your general practice. If you feel that you abide by or that the statement reflects what is practised then you must answer Yes, if you feel that the statement is not always true then answer "sometimes" and if the statement is not true then you answer "No". If you are unaware of a particular practice taking place then answer "I don't know".

	YES	SOMETIMES	NO	I don't know
In my environment it is important that the clinic's commitment to patient-centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission statement, core values)		X		
A patient and family advisory council meets regularly and actively provides input to the clinic leadership			X	
Patients and family have been invited to share their experiences with the clinic in focus groups		X		
Patients and family participate on clinic committees			'	
The input provided by patients and families is used to guide the clinic's strategic direction			X	
Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools			X *But promote it*	

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Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for improvement			\	
Opportunities exists for both formal and informal interaction between leadership and staff			✗	
Opportunities exist for leadership to interact directly with patients and families			✗	
Managers are held accountable for "walking the talk" of patient-centred care		✗		
Board members are provided with opportunities to interact directly with patients and families			✗	

Section 8:

This section deals with the staff of the clinic and the care given to them. Please indicate whether you agree or disagree with a statement below. If you are unsure of the statement please indicate that in the column "Sometimes"

	AGREE	NO	SOMETIMES
Staff's stress-reduction and wellness needs are addressed		✗	
Staff are routinely acknowledged for their good work by leaders, peers and patients and families			✓
Staff have opportunities to provide input into ways to improve the working environment		✓	
Space is available for staff to relax between patients and/cases		✗	
Support is offered to staff involved in adverse events		✗	
Healthy food is available to staff (at own cost)		✓	
Healthy food is available to staff (at clinic cost)		✗	

Overworked – Need More training

Section 9:

Is there anything that you would like to add or feel is important to this study with regard to diabetes, patient-centred care or mobile health?

Staff education is important
Staff must also lose weight to be more believable

Thank you for your participation and your willingness to take time out of your schedule for this.

Condition + self mngmnt
INFORMATION!!
 Self management
 How to make them responsible.
Reason — troublespot
Cross the board - self mngmt week.

Dr CH guidelines
M Health ⟹ care givers   SIAMBA
 Education of nursing staff.
 Small bits of information + feedback - how did
  it change - practical things
Basic road to health booklet.

Patien Centred
educate - remember small part
Conscious decision of actions

 Together with trad meds Aloe
Trad fraud is high churn.

Difficult to adopt diet to patient.
Portion size.

Obesity — School lunches + tuckshops — various juice

Re-education + support. - Sustainability.
Positive re-inforcement.

Embarrassed, guilt
spy imform p

Teach specific - think before test what
caused test results - repeat or why and how to change.

No symptoms so not sick,
Not taking as prescribed.

Support groups - dont be judgemental

They are stressed about condition - Not putting positive

Start at bottom
Nursing sisters start.

Diabetes room - Conversation reps - time-motivation

refresher courses of healthcare

Appendix 1b

A semi-structured interview to determine the needs for a patient-centred approach to diabetes

This interview is part of a doctoral study to develop a mHealth framework for a patient-centred approach to Diabetes. The results of the interview will be used to assist in creating the desired environment for the care of diabetes patients for the monitoring and management of their illness in a successful manner over a long period of time.

This interview will gather information about:

- The general care that is required for diabetes patients
- What the situation currently is with regard to diabetes care in clinics and hospitals

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Interviewee E5

Doctor

Section 1:

This section will concentrate on what the requirements are for successful diabetes care.

1	In your position what are the most important aspects to successful diabetes care:	
	• Many Common guidelines • Understanding of Diabetes • Education must start at schools	
2	How do traditional beliefs and/or misconceptions affect the aspects above? People with Diabetes are not sick SA => 90% of population believe fat is good HIV/AIDS = thin	

3	How does a patient's diabetes knowledge and level of understanding affect the treatment of diabetes? *Very important - if you understand you have ability to change but change is difficult*	
4	How do you educate afflicted patients about diabetes? *Always two-way conversation*	
5	How do you ensure that patients adhere to their treatment plan? *Can't must come from the person* *Respect goes a long way in compliance*	
6	What process or cycle of actions lead to a patient seeing you and where do they go to after your consultation with them? *Private clinic - all care on premises*	
7	How often should a patient visit you and do they adhere to this? *Most adhere - SMS reminders*	
8	Do you practice any form of preventative action with regard to diabetes e.g. discuss how diabetes can be avoided with high risk patients or run education programs? *YES*	

Section 2:

This section will determine the extent to which there is a **partnership** between the patient and yourself when working on a treatment plan.

1.	In your position, what type of relationship do you think is important to have between you and the patient? *Trust + Respect*	
2.	Do you ask what treatment the patient wants done, is there a discussion about various diabetes treatment options with the patient or is it more a case of giving the patient instructions of what to do? *Always explain, ask for feedback + then discuss together what can + can't be done + work towards end/goal*	
3.	Do you, together with the patient, agree on a way forward for the treatment plan and how is this treatment plan conveyed to the patient? *Yes — thoroughly explained + opportunity to ask questions given*	
4.	Are there processes in place to reinforce and assess the understanding of the information and instructions provided to the patient before leaving the clinic? *In consultation*	

| 5. | Are there any tools available to help the patient manage his/her medication, appointments and other health specific needs?
 guidelines, newsletters, SMS reminders | |

Section 3:

This section will determine the **communication** between the patient and the health care practitioner. This will determine the amount of understanding there exists of the patients' illness, his/her experiences and his/her environment as a whole.

1.	Are patients encouraged to ask questions about their diabetes? Y	
2.	Do you know the roles of the various carers and family members of a patient? Y but ultimately it is the persons responsibility - easy to blame others	
3.	Is there an accurate track record of patients' visits and progress? Y	
4.	Would you contact a patient if he/she should miss an appointment or is overdue for medication? Y	
5.	Are the families of patients encouraged to ask questions? If so how and when can they do so? NA not discussed	
6.	Is there a process in place to disclose unanticipated outcomes to patients and families? Not discussed	

Section 4:

This section will determine **other factors** that determine the patient-centeredness of your healthcare practice.

| 1. | In your position, is it important to listen to and understands the patient's emotional needs?
 Y | |
| 2. | Do you enquire about the patient's goals in monitoring and maintaining diabetes? | Y |

3.	Do you give advice on where to go to for group support for diabetics? Y		
4.	Do you help diabetics plan ahead so the patient can cope in difficult times? Aor discussed		
5.	Do you try and make patients feel important? Always		
6.	Do you know patients by name? YES		
7.	How often have you contacted patients after a visit to see how they were doing? not asked		
8.	Can patients make requests for when certain procedures will be performed, to accommodate their personal schedule? Y		
9.	Are there resources available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing? Y		
10	Are any free health –related lectures or wellness clinics regularly offered to the public? Y		

Section 5: Not asked

This section looks at the availability of a patient's personal health information.

		YES	NO	SOMETIMES
1	Is there a process in place by which patients and family can request additional information on their diagnosis or treatment?	ᐟ		
2	Do patients have access to their medical record during consultation and is the information explained to them?	✓		
3	Could patients view their records at any time with a healthcare worker?			✓
4	Would patients be allowed to add their own notes to their medical record?		✓	
5	Are there materials available to educate patients regarding medical records for all levels of readers and in various languages?			✓

Section 6:

This section deals with the type of technology you could use to assist you with managing and monitoring your patients' disease. Indicate your most comfortable feeling 5 and your worst with 1. If you do not have access to a device then place your answer as a 0.   *uses technology – email / questions*

		5	4	3	2	1	0
1	I am familiar with using a cell phone e.g. calls and text	✓					
2	I am familiar with a smart phone e.g. calls and text	✓					
3	I am familiar with a portable device such as a tablet	✓					
4	I have used a computer or laptop	✓					
5	I use my phone for internet e.g. Facebook	✓					
6	I do internet/cell phone banking	✓					
7	I trust that my information on my cell phone is secure		✓				
8	I would not be against using my mobile device (cell/tablet) phone to communicate with my patients	✓					
9	I would find it useful to communicate with my patients via a mobile device phone or tablet	✓					
10	I would find it useful to share information with a patient on my mobile device(cell/tablet)	✓					
11	I would be comfortable using my personal device to interact with patients	✓					
12	I would need an incentive or "compensation" before I use my personal phone to interact with patients		✓				
13	I would only use a mobile device that has been supplied to me for interaction with patients	✓					

Section 7:

The clinic environment that you currently find yourself in needs to be evaluated to determine how much of a patient-centred approach it follows. Your answers will help identify the strong and weak points of your environment so that these can be used as input to the proposed framework.

You can answer the question below in terms of your general practice. If you feel that you abide by or that the statement reflects what is practised then you must answer Yes, if you feel that the statement is not always true then answer "sometimes" and if the statement is not true then you answer "No". If you are unaware of a particular practice taking place then answer "I don't know".

	YES	SOMETIMES	NO	I don't know
In my environment it is important that the clinic's commitment to patient-centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission statement, core values)	Y			
A patient and family advisory council meets regularly and actively provides input to the clinic leadership	Not asked			
Patients and family have been invited to share their experiences with the clinic in focus groups	Not asked			
Patients and family participate on clinic committees				
The input provided by patients and families is used to guide the clinic's strategic direction				
Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools	Y			

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Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for improvement				
Opportunities exists for both formal and informal interaction between leadership and staff	y			
Opportunities exist for leadership to interact directly with patients and families	y			
Managers are held accountable for "walking the talk" of patient-centred care	y			
Board members are provided with opportunities to interact directly with patients and families	not asked			

Section 8:

This section deals with the staff of the clinic and the care given to them. Please indicate whether you agree or disagree with a statement below. If you are unsure of the statement please indicate that in the column "Sometimes"   not asked

	AGREE	NO	SOMETIMES
Staff's stress-reduction and wellness needs are addressed			
Staff are routinely acknowledged for their good work by leaders, peers and patients and families			
Staff have opportunities to provide input into ways to improve the working environment			
Space is available for staff to relax between patients and/cases			
Support is offered to staff involved in adverse events			
Healthy food is available to staff (at own cost)			
Healthy food is available to staff (at clinic cost)			

Section 9:

Is there anything that you would like to add or feel is important to this study with regard to diabetes, patient-centred care or mobile health?

_____
_____
_____
_____
_____
_____
_____

Thank you for your participation and your willingness to take time out of your schedule for this.

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ES

Guidelines national — (SEMDA)

Chronic med => different to accute — many phases
SA focus on accute <— whats wrong   chronic — long term
                       do this for 3 days   educating
                       all ok   understanding
Patient not worried but patient sees, & commitment
about long tas only problem more pressing

very different.

★ Educational component

     NOT allowed to use
a "diabetic, disease suffering from" — 4 People with
     are not sick, can control diabetes, make them feel they have control   diabetes

Halley Berry, Sharon Stone

                    visits to clinic or doc on average
2-3 hrs/years — self management skills — non existent
     education limited but acquired knowledge is
     not factor of behavior change — accountability +
     responsibility

Dr Jocelyn "diabetic who knows the most
lives the longest" but ~~true~~ + not
                              true +
true — must be motivated to change
Health care does not look at a persons
Motive/beliefs/world view/socialization — just
condition
CDE always
Respect the patient — very patient
     centred approach => ask permission
     "health coaching" to make them take
responsible.
          Have everything that is required to.
how do you feel about...

POCHACA" stages
          change of change

Stages of change # behaviour many phases

Rheumatoid Arthritis is foremost because of pain => poor diabetes control because
of pain => must show link between DM + RA - all lifestyle diseases
diabetes

traditional views => 3rd fattest nation in
world // phrase used is "diabesity"
Want lose wait 9/10 SA view ideal
body image as fat => 90% of population do not want to be thin
Previously disadv society, being ~~disease~~ see obesity as being a
"social status badge" - I was pre disadv now
am rich look how big I...
HIV/AIDS = thin
Education must explain what diabetes is and that everybody
has insulin but how your body works with it is NB!
Each patient is insulin resistance reverse
risk - ask how do you feel about that
Healthy + unhealthy weight loss must be explained
Give information on why people get diabetes + no symptoms
till too late
Healthier food choices must be made to be attra...

2 min aweg in public per visit

1 hour CDE - take time to know person + environm...
discuss with patient not talk down or instru...

Gov won't give att to DM as to HIV AIDS

Cost is high => Many complications + many regular
visits required - HCare infrastruct c...
handle it

Treating People like diabetics does not help public He...
people are told they are sick + will die

Must prese... ... and as ... - ...

Model ⟹ look at it

Pros + Cons of a condition eg smoke
to be thin, to be social - people always
bad behaviour but little motivation to change — a reason to co...

A decisional balance is this going to

benefit me? ⟹ Must be able to see how it will
affect personal situation

Illiteracy — give exact numbers from
0 to 40 units not just say 20%

Language, hearing, cultural ⟵ must overcome these
                                    issues
                                    if person can't hear/unders
                                    how can they comply

Vision must be respect of each person
be deliverable of service —   ^ must

Know HUMANS look at patient
  experience — always respect patient
first.
Not Howzit but How are you? and mean
I see you in all your humanity   it
Tell me about yourself
  What do you want me to care

Do the day to day things but also
  always why are you here today
        Mission of visit must be achieved.
If person Respected - will place trust in health car...
is
with trust comes
                    reflection + self aware...

E5

Johari Window — include some of this in study

Enlarge Public space — show more Sa
more + they matching is very import[ant]
matching

time constraint —

By appointment —

Direct[A] Private Clinic.

DM Programme —

Up front medaid payments so people don't l[ike]
to submit and feel bad to use medaid

Opthe-mology — CDE 210 branches country wide
physio
Phsycologys covered   but very low profile

Deliberate attempt 2 md only to Sweden.
lesson DM success rate is

Southern Hemisphere is largest success rate — think
(is good as it works — Most payments not amputees — no public
care — patients have taken responsibility
HIV got organised and forced you hard

Diabetes apathy →.
CDE uses
sms reminders
would like
• explaining apps
• untruths spred on social media eg snacks to be controlled
• would want to use mHealth more

Appendix 1C

A Survey to determine the health practitioner's experience in a patient-centred approach to diabetes

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Interviewee **E6**

Academic (dietetics)

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various areas in the Nelson Mandela Metropole

Section 1:

This section will determine the extent to which there is a **partnership** between the patient and the doctor when working on a treatment plan.

Answer the questions below by indicating your practice in the last six months towards your patients. Your highest positive experience must be indicated with a 5 and your lowest unsatisfactory experience must be indicated with a 1.

		1	2	3	4	5
1.	The doctor/clinic nurse was interested in hearing what the patient thinks.					
2.	The doctor/clinic nurse was interested in hearing what treatment the patient wanted done					
3.	The doctor/clinic nurse discussed the diabetes treatment options with the patient					
4.	The doctor/clinic nurse together with the patient agreed on a way forward for the treatment plan					
5.	Treatment plan is written in a language that the patient understands					
6.	Tools are available to help the patient manage his/her medication, appointments and other health care needs					
7.	Processes are in place to reinforce and assess the understanding of the information and instructions provided to the patient before leaving the clinic					

Section 2:

This section will determine the **communication** between the patient and the health care practitioner. This will determine the amount of understanding there exists of the patients' illness, his/her experiences and his/her environment as a whole.

Answer the questions below by indicating how important each statement is to you and what you would like to encourage in your practice. Your highest positive experience must be indicated with a 5 and your lowest unsatisfactory experience must be indicated with a 1.

		1	2	3	4	5
1.	Patients are encouraged to ask questions about their disease					
2.	Doctors/clinic staff know the roles of the various carers and family members of a patient					
3.	The doctor/clinic practitioners have an accurate track record of patients" visits and progress					
4.	The doctor/clinic nurse will contact a patient if he/she should miss an appointment or is overdue for medication					
5.	Patients and families are encouraged to ask questions and systems are in place to capture the questions if no one is available to answer them					

Section 3:

This section will determine **other factors** that determine the patient-centeredness of your healthcare practice.

Answer the questions below by indicating how important each statement is to you and what you would like to encourage in your practice. Your highest positive experience must be indicated with a 5 and your lowest unsatisfactory experience must be indicated with a 1.

		1	2	3	4	5
1.	The doctor/clinic nurse listens to and understands the patient's emotional needs					
2.	The doctor/clinic nurse asked about the patient's goals in monitoring and maintaining diabetes					
3.	The doctor/clinic nurse gave advise on where to go to for group support for diabetics or other chronic illness					
4.	The doctor/clinic nurse helped plan ahead so the patient can cope in difficult times					
5.	The doctor/patient clinic staff make patients feel important					
6.	The doctor/clinic staff know patients by name					
7.	The doctor/clinic staff have contacted patients after a visit to see how they were doing					
8.	Patients are able to make requests for when certain procedures will be performed, to accommodate their personal schedule					
9.	Resources are available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing					
10	Free health –related lectures, wellness clinics are routinely offered to the public					

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Section 4:

This section looks at the availability of a patient's personal health information.

Please answer "yes" if a patient's information is readily available or "no" if you never give a patient the opportunity to review his/her information. If only certain information is made available to a patient then you must answer "sometimes"

	YES	NO	SOMETIMES
A process is in place by which patients and family can request additional information on their diagnosis or treatment			
Patients have access to their medical record during consultation and the information is explained to them			
Patients are made aware that they can request to view their records at any time with a healthcare worker			
Patients are allowed to add their own notes to their medical record			
Materials to educate patients regarding medical records are available for all levels of readers and in various languages			
Patients and family have access to a consumer health library			
A process is in place to disclose unanticipated outcomes to patients and families			

public concern is very high because on reality

Section 5:

This section deals with the type of technology you could use to assist you with managing and monitoring your patients' disease. Indicate your most comfortable feeling 5 and your worst with 1. If you do not have access to a device then place your answer as a 0.

	5	4	3	2	1	0
I am familiar with using a cell phone e.g. calls and text						
I am familiar with a smart phone e.g. calls and text						
I am familiar with a portable device such as a tablet						
I have used a computer or laptop						
I use my phone for internet e.g. Facebook / Google						
I do internet/cell phone banking						
I trust that my information on my cell phone is secure						
I would not be against using my mobile device (cell/tablet) phone to communicate with my patients						
I would find it useful to communicate with my patients via a mobile device phone or tablet						
I would find it useful to share information with a patient on my mobile device(cell/tablet)						

use of own phone !)

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Section 6:

The clinic environment that you currently find yourself in needs to be evaluated to determine how much of a patient-centred approach it follows and to determine where the improvements need to be implemented. Your answers will help identify the strong and weak points of your clinic so that the service delivery can improve and align with patient-centred approach.

You can answer the question below in terms of your general practice. If you feel that your clinic abides by or that the statement reflects what is practised then you must answer Yes, if you feel that the statement is not always true then answer "sometimes" and if the statement is not true then you answer "No". If you are unaware of a particular practice taking place then answer "I don't know".

	YES	SOMETIMES	NO	I don't know
The clinic's commitment to patient centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission statement, core values)				
A patient and family advisory council meets regularly and actively provides input to the clinic leadership				
Patients and family have been invited to share their experiences with the clinic in focus groups				
Patients and family participate on clinic committees				
The input provided by patients and families is used to guide the clinic's strategic direction				
Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools				
Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for improvement				
Opportunities exists for both formal and informal interaction between leadership and staff				
Opportunities exist for leadership to interact directly with patients and families				
Managers are held accountable for "walking the talk" of patient-centred care				
Board members are provided with opportunities to interact directly with patients and families —Community board members.				

comments (Important

Section 7:

This section deals with the staff of the clinic and the care given to them. Please indicate whether you agree or disagree with a statement below. If you are unsure of the statement please indicate that in the column "Sometimes" *contextual... not hospital wards, would like per family...*

	AGREE	NO	SOMETIMES
Staff's stress-reduction and wellness needs are addressed			
Staff are routinely acknowledged for their good work by leaders, peers and patients and families			
Staff have opportunities to provide input into ways to improve the working environment			
Space is available for staff to relax between patients and/cases			
Support is offered to staff involved in adverse events			
Healthy food is available to staff (at own cost)			
Healthy food is available to staff (at clinic cost)			

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patient-centred approach to diabetes

This interview is part of a doctoral study to develop a mHealth framework for a patient-centred approach to Diabetes. The results of the interview will be more focused in creating the correct environment for the care of diabetes patients on the initial stage and management in their diabetes successful manner over a long period of time.

This interview will gather information about:

- The general care that is required for diabetes patients
- What the situation currently is with regard to diabetes care in clinics and hospitals
- Understanding the concept of patient-centred care and how it should be adapted to the diabetic
- Current use of technology, specifically mobile devices in caring for patients
- Critical aspects of caring for diabetics.

ALL INFORMATION WILL BE KEPT CONFIDENTIAL.

Interviewee E7

Academic (Diabetes)

This section will concentrate on what the requirements are for successful diabetes care.

1	In your position what are the most important aspects to successful diabetes care:	
	• Education	
	• Lifestyle	
	•	
	•	
	•	
	•	
	•	
2	How do traditional beliefs and/or misconceptions affect the aspects above? Beliefs such as fat is good and sign of wealth — also that alcohol does not affect Medication — or worse that alcohol is medicine	

3.	Do you give advice on where to go to for group support for diabetics?	
4.	Do you help diabetics plan ahead so the patient can cope in difficult times?	
5.	Do you try and make patients feel important? Yes, always try remember names + small details	
6.	Do you know patients by name? Not always	
7.	How often have you contacted patients after a visit to see how they were doing? seldom	
8.	Can patients make requests for when certain procedures will be performed, to accommodate their personal schedule? No - Public sector dictates when	
9.	Are there resources available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing? No — it is important aspect but does not happen	
10.	Are any free health –related lectures or wellness clinics regularly offered to the public? Only through Diabetes SA - in some clinics but not succesful	

Section 5:

This section looks at the availability of a patient's personal health information.

		YES	NO	SOMETIMES
1	Is there a process in place by which patients and family can request additional information on their diagnosis or treatment?		X	
2	Do patients have access to their medical record during consultation and is the information explained to them?		X	
3	Could patients view their records at any time with a healthcare worker?		X	
4	Would patients be allowed to add their own notes to their medical record?		X	
5	Are there materials available to educate patients regarding medical records for all levels of readers and in various languages?			X pamphlets

Section 6:

This section deals with the type of technology you could use to assist you with managing and monitoring your patients' disease. Indicate your most comfortable feeling 5 and your worst with 1. If you do not have access to a device then place your answer as a 0.

		5	4	3	2	1	0
1	I am familiar with using a cell phone e.g. calls and text	✓					
2	I am familiar with a smart phone e.g. calls and text	✓					
3	I am familiar with a portable device such as a tablet	✓					
4	I have used a computer or laptop	✓					
5	I use my phone for internet e.g. Facebook	✓					
6	I do internet/cell phone banking	✓					
7	I trust that my information on my cell phone is secure	✓					
8	I would not be against using my mobile device (cell/tablet) phone to communicate with my patients	✓					
9	I would find it useful to communicate with my patients via a mobile device phone or tablet	✓					
10	I would find it useful to share information with a patient on my mobile device(cell/tablet)	✓					
11	I would be comfortable using my personal device to interact with patients	✓					
12	I would need an incentive or "compensation" before I use my personal phone to interact with patients	✓					
13	I would only use a mobile device that has been supplied to me for interaction with patients	✓					

Section 7:

The clinic environment that you currently find yourself in needs to be evaluated to determine how much of a patient-centred approach it follows. Your answers will help identify the strong and weak points of your environment so that these can be used as input to the proposed framework.

You can answer the question below in terms of your general practice. If you feel that you abide by or that the statement reflects what is practised then you must answer Yes, if you feel that the statement is not always true then answer "sometimes" and if the statement is not true then you answer "No". If you are unaware of a particular practice taking place then answer "I don't know".

	YES	SOMETIMES	NO	I don't know
In my environment it is important that the clinic's commitment to patient-centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission statement, core values)			N/A	
A patient and family advisory council meets regularly and actively provides input to the clinic leadership				N/A
Patients and family have been invited to share their experiences with the clinic in focus groups				N/A
Patients and family participate on clinic committees				
The input provided by patients and families is used to guide the clinic's strategic direction				N/A
Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools				N/A

Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for improvement				
Opportunities exists for both formal and informal interaction between leadership and staff		N/A		
Opportunities exist for leadership to interact directly with patients and families				
Managers are held accountable for "walking the talk" of patient-centred care				
Board members are provided with opportunities to interact directly with patients and families				

Section 8:

This section deals with the staff of the clinic and the care given to them. Please indicate whether you agree or disagree with a statement below. If you are unsure of the statement please indicate that in the column "Sometimes"

	AGREE	NO	SOMETIMES
Staff's stress-reduction and wellness needs are addressed			
Staff are routinely acknowledged for their good work by leaders, peers and patients and families			
Staff have opportunities to provide input into ways to improve the working environment	N	A	
Space is available for staff to relax between patients and/cases			
Support is offered to staff involved in adverse events			
Healthy food is available to staff (at own cost)			
Healthy food is available to staff (at clinic cost)			

Section 9:

Is there anything that you would like to add or feel is important to this study with regard to diabetes, patient-centred care or mobile health?

It is an illness that deserves for more attention. Needs funding. Can be controlled so very sad that so many afflicted.

_____

_____

_____

_____

Thank you for your participation and your willingness to take time out of your schedule for this.

A semi-structured interview to determine the needs for a patient-centred approach to diabetes

Interviewee **E8**

Support Group Leader

Interviewee **E9**

Person living with person with diabetes

Section 1:

This section will concentrate on what the requirements are for successful diabetes care.

1	In your position what are the most important aspects to successful diabetes care: • Acceptance of condition • Education • Awareness • Commitment to self care • _____ • _____ • _____ • _____	
2	How do traditional beliefs and/or misconceptions affect the aspects above? Fat is healthy.	

3	How does a patient's diabetes knowledge and level of understanding affect the treatment of diabetes? Understanding is very important	
4	How do you educate afflicted patients about diabetes? Support groups, talks by doctors, dieticians opthomologists etc	
5	How do you ensure that patients adhere to their treatment plan? Very difficult — have to sometimes give tough love	
6	What process or cycle of actions lead to a patient seeing you and where do they go to after your consultation with them? Sometimes dont know where else to go - especially when first diagnosed — Members call when need help	
7	How often should a patient visit you and do they adhere to this? Voluntary	
8	Do you practice any form of preventative action with regard to diabetes e.g. discuss how diabetes can be avoided with high risk patients or run education programs? Yes — many non-diabetics attend talks too	

Section 2:

This section will determine the extent to which there is a **partnership** between the patient and yourself when working on a treatment plan.

1.	In your position, what type of relationship do you think is important to have between you and the patient? Not in this area but we do advise what to do and visit homes if invited	
2.	Do you ask what treatment the patient wants done, is there a discussion about various diabetes treatment options with the patient or is it more a case of giving the patient instructions of what to do? No - doctors do this	
3.	Do you, together with the patient, agree on a way forward for the treatment plan and how is this treatment plan conveyed to the patient? I try make things clearer but don't interfere with doctor's advice	
4.	Are there processes in place to reinforce and assess the understanding of the information and instructions provided to the patient before leaving the clinic? —	

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| 5. | Are there any tools available to help the patient manage his/her medication, appointments and other health specific needs?
No - have social media but much better info media then Mngmnt tool | edu |

Section 3:

This section will determine the **communication** between the patient and the health care practitioner. This will determine the amount of understanding there exists of the patients' illness, his/her experiences and his/her environment as a whole.

1.	Are patients encouraged to ask questions about their diabetes? YES	
2.	Do you know the roles of the various carers and family members of a patient? Most of them	
3.	Is there an accurate track record of patients' visits and progress? No - people lie so when one checks the meter ready you can see what they did but did not record officially	
4.	Would you contact a patient if he/she should miss an appointment or is overdue for medication? Very supportive role as volenteers so we do what we can	
5.	Are the families of patients encouraged to ask questions? If so how and when can they do so? Yes, telephonic, email, Social media	
6.	Is there a process in place to disclose unanticipated outcomes to patients and families? N/A	

Section 4:

This section will determine **other factors** that determine the patient-centeredness of your healthcare practice.

| 1. | In your position, is it important to listen to and understands the patient's emotional needs? Very important | |
| 2. | Do you enquire about the patient's goals in monitoring and maintaining diabetes?
Yes - and offer to help in any way but must accept own health responsibilities | |

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3.	Do you give advice on where to go to for group support for diabetics? *Yes*		
4.	Do you help diabetics plan ahead so the patient can cope in difficult times? *Yes*		
5.	Do you try and make patients feel important? *Yes*		
6.	Do you know patients by name? *Mostly*		
7.	How often have you contacted patients after a visit to see how they were doing? *Often*		
8.	Can patients make requests for when certain procedures will be performed, to accommodate their personal schedule? *N/A*		
9.	Are there resources available to staff to educate patients and staff on different cultural beliefs/traditions relating to health and healing? *only Magazines of DSA online*		
10.	Are any free health –related lectures or wellness clinics regularly offered to the public? *Yes*		

Section 5:

This section looks at the availability of a patient's personal health information. *N/A*

		YES	NO	SOMETIMES
1	Is there a process in place by which patients and family can request additional information on their diagnosis or treatment?			
2	Do patients have access to their medical record during consultation and is the information explained to them?			
3	Could patients view their records at any time with a healthcare worker?			
4	Would patients be allowed to add their own notes to their medical record?			
5	Are there materials available to educate patients regarding medical records for all levels of readers and in various languages?			

Section 6:

This section deals with the type of technology you could use to assist you with managing and monitoring your patients' disease. Indicate your most comfortable feeling 5 and your worst with 1. If you do not have access to a device then place your answer as a 0.

		5	4	3	2	1	0
1	I am familiar with using a cell phone e.g. calls and text						
2	I am familiar with a smart phone e.g. calls and text						
3	I am familiar with a portable device such as a tablet						
4	I have used a computer or laptop						
5	I use my phone for internet e.g. Facebook						
6	I do internet/cell phone banking						
7	I trust that my information on my cell phone is secure		X				
8	I would not be against using my mobile device (cell/tablet) phone to communicate with my patients	X					
9	I would find it useful to communicate with my patients via a mobile device phone or tablet	X					
10	I would find it useful to share information with a patient on my mobile device(cell/tablet)	X					
11	I would be comfortable using my personal device to interact with patients	X					
12	I would need an incentive or "compensation" before I use my personal phone to interact with patients		X				
13	I would only use a mobile device that has been supplied to me for interaction with patients	X					

Section 7:

The clinic environment that you currently find yourself in needs to be evaluated to determine how much of a patient-centred approach it follows. Your answers will help identify the strong and weak points of your environment so that these can be used as input to the proposed framework.

You can answer the question below in terms of your general practice. If you feel that you abide by or that the statement reflects what is practised then you must answer Yes, if you feel that the statement is not always true then answer "sometimes" and if the statement is not true then you answer "No". If you are unaware of a particular practice taking place then answer "I don't know".

	YES	SOMETIMES	NO	I don't know
In my environment it is important that the clinic's commitment to patient-centred care is formally and consistently communicated with patients, families, staff, leadership and medical staff (e.g. mission N/A statement, core values)		DSA has mission	vision	
A patient and family advisory council meets regularly and actively provides input to the clinic leadership				
Patients and family have been invited to share their experiences with the clinic in focus groups	X			
Patients and family participate on clinic committees	X			
The input provided by patients and families is used to guide the clinic's strategic direction				
Patient-centred behaviour expectations are included in all job descriptions and performance evaluation tools				

Staff at all levels, clinical and non-clinical, have the opportunity to voice their ideas and suggestions for improvement				
Opportunities exists for both formal and informal interaction between leadership and staff	✓	A Certoff hour oversches		
Opportunities exist for leadership to interact directly with patients and families				
Managers are held accountable for "walking the talk" of patient-centred care				
Board members are provided with opportunities to interact directly with patients and families				

Section 8:

This section deals with the staff of the clinic and the care given to them. Please indicate whether you agree or disagree with a statement below. If you are unsure of the statement please indicate that in the column "Sometimes"   u lA   all volunteers

	AGREE	NO	SOMETIMES
Staff's stress-reduction and wellness needs are addressed			
Staff are routinely acknowledged for their good work by leaders, peers and patients and families			
Staff have opportunities to provide input into ways to improve the working environment			
Space is available for staff to relax between patients and/cases			
Support is offered to staff involved in adverse events			
Healthy food is available to staff (at own cost)			
Healthy food is available to staff (at clinic cost)			

Section 9:

Is there anything that you would like to add or feel is important to this study with regard to diabetes, patient-centred care or mobile health?

_____
_____
_____
_____
_____
_____
_____

Thank you for your participation and your willingness to take time out of your schedule for this.

E8 + E9 (simultaneous interview)

Acceptance
Daughter - 25yrs age - type 1
Symptoms not known
Educate + Awareness of symptoms
No history in family yet got Diabetes at age 10
DSA Motto is to
Encourages healthy lifestyle to control condition
Monthly meetings
Aug 30 / group
Encourage family + friends
Awareness - factory + films educational visits + talks - ten invited
In schools 2016 Nationwide Denim for diabetes
Ignorance type2 Must spread awareness as for HIV/Aids - More people die from Di
Type1 unknown onms that awakes in childhood
Change from years ago in treatment management - rigid   was very difficult
Much freer now with insulin + can control better - tablets still problem
Teenagers battle More - self concience - rebel - don't want to be different
Person self management - hard to stick to it - obese children already
            community to   not cool even worse to
                                                                            have DM
parents struggle More with acceptence then kids diagnosed
Must visit regularly - 3months or 6 months - monthly for sick
GP knows little about the diabetes - just gives meds and asks to come
                                                back in 6 months - GPs also need
Finances Stops visits + care - very expensive, lots of specialist care
                            more training on DM
25% of clinics cant take care of patients - Dont have knowledge
            received from visits to clinic   Dont have time
Complaints not complete info - don't know doc/nurse that couldnt help
                                                not supervised to do all tasks
Health dept helped — one good story - DSA sent person to a doc
Motivation   story related to DoH + they
                                        helped her as she had no
                                        family
Difficult in poorer areas thr02away chickn skin that is thrown away
Food is starchy traditionally
Now Diabetes attending meetings

Old age retirement homes — meals not Diabetes friendly

Interesting ⇒ Matrons old age facilities must be targetted

Both very important

Home carers — must be educated in Diabcare

Test result not Monitored — Remarks allow control

"You are best doc for diabetes"

Medical aids don't cover everything.

Some pay pens not consumables or other way.

Ophthalmologist ⎫
Podiatrist   ⎬   CDE is good model
Dietician ⎭

Fad diets bad — Moderation of everything.

Med, exercise + diet — 3 legged approach to DM

SMS reminders   ⎫
Whatsapp groups   ⎬ none are very interactive
Facebook has pages for info   best is th CDA group
Dogs with diabetes ⎭

Operation protocols — nil per mouth ⎫ People are scared
Anaesthetist   ⎬ when having to go to
                           ⎭ theatre

False info + adverts — cure for diabetes — NO CURE!! ⎫
Controlled Not cured   ⎬ google
No two persons the same — google.   problem
Use IDF or SADA   ⎭
Use in conjuction with Meds

R30/year Membership fee to get DM drive going

(Larry Distiller) CDE

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Government must understand that
Basic care must be 1st class - so that complications
can be prevented. -
AIDS/HIV - highlighted   DM not highlighted
Morally not ~~prep~~ reason to be ashamed if you have DM so should
Hearing problems - eyes, feet, kidneys, high BP all complication
easier to id then HIV
Simple example sugar water for education
TB + AIDS Most attention
Cancer - a little
DM None
Type 2 don't get strips - strips cheaper than
handling complications

Not "ladies + gents" but "friends"
Tough love