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Quality improvement of the diabetes disease management program at Rx Health, a managed care organisation in South Africa

Murove, Charlton

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Quality improvement of the diabetes disease management program at Rx Health, a managed care organisation in South Africa

Charlton Murove



Project Supervisor: Prof Latifat Ibisomi

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment for the degree of Master of Science in Epidemiology in the field of Implementation Science.

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Declaration

I, Charlton Murove, declare that this research report is my own work, compiled under supervision of Prof Latifat Ibisomi. The report is being submitted in partial fulfilment of the requirements for the degree of Master of Science in Epidemiology in the field of Implementation Science at the University of the Witwatersrand, Johannesburg. This research has not been submitted previously for any degree or examination to any other institution.



Charlton Murove

Date: 3 September 2020 in Johannesburg

I certify that this study has the approval of the Human Research Ethics committee of the University of the Witwatersrand, Johannesburg, South Africa. The study ethics number is M180141



Charlton Murove

Date: 3 September 2020 in Johannesburg

Abstract

Background: The prevalence of diabetes mellitus has been on the increase worldwide increasing from 108 million in 1980 to 422 million in 2014. In 2012, diabetes mellitus caused approximately 1.5 million deaths and an additional 2.2 million deaths in related illness worldwide. In South Africa, similar trends have been observed with an estimated 3.85 million people suffering from diabetes mellitus in 2015. Diabetes mellitus, if managed well, may be controlled and the effects of diabetes can be minimised. If not properly managed, diabetes leads to damage to the nervous system, eyes, kidneys, and eventual death. To effectively manage diabetics, there are some monitoring tests that should carried out on all diabetic patients, such as the cholesterol, creatinine, and the glycated hemoglobin tests.

Across the medical schemes registered in South Africa there were approximately 490 000 diabetics in 2017. Medical schemes may contract managed care organisations to put in place focused disease management programs. Rx Health, the study site, is a managed care organisation contracted to manage diabetics on-behalf of a registered medical scheme in South Africa.

Data reported by the Council for Medical Schemes indicates that the proportion of diabetics receiving these monitoring tests is very low for the industry (28% for total cholesterol, 50% for creatinine and 27% for glycated hemoglobin in 2017) and significantly lower for Rx Health (1% for total cholesterol, 1.7% for creatinine and 1.1% for glycated hemoglobin) in the same year. The quality of care for diabetics at Rx Health is suboptimal and if left in its current state the health impact would be catastrophic for the patients.

Objectives: This study had three objectives, exploring the barriers to care at Rx Health, developing change ideas to improve coverage ratios and implementing at least two change ideas and testing for the impact of each change.

Methods: This study was an exploratory study that investigated the barriers to care at Rx Health using in-depth interviews. Since the team at Rx Health is small, almost all those involved in care of diabetics were interviewed. The one-on-one interviews were conducted at Rx Health, recorded, and later transcribed. Thematic analysis was used to analyse the interview

responses and the findings were shared with the quality improvement team. The quality improvement team populated the driver diagram, identifying possible change ideas. The same team then populated the impact effort matrix and selected two change ideas for implementation. After the implementation of the selected change ideas, the coverage ratios of the three monitoring tests were compared pre and post implementation of the change ideas. The run charts were used to establish if the implemented change ideas led to an improvement in the coverage ratios.

Results: The study identified several barriers to care such as IT system limitations, fragmentated care and poor benefit design. Some barriers were at Rx Health and others were at the medical scheme, providers and other organisations involved in patient care. The overall design of the care for diabetics at Rx Health had weaknesses, the medical scheme did not provide enough benefits for the diabetics. There is insufficient sharing of vital patient data between the medical scheme, the administrator, the pathology laboratories and Rx Health. The identification of diabetics is reactive rather than proactive. Furthermore, Rx Health is internally focused with minimum interaction with external parties such as other managed care organisations and regulators.

The selected change ideas were provider communication through a letter informing the providers to conduct the appropriate monitoring tests and patient reminders through short message service to encourage patients to go for their monitoring tests. The implemented change ideas did not indicate an increase in the coverage ratios. The run charts did not indicate a shift in the coverage ratio for the creatinine and the glycated hemoglobin monitoring tests while total cholesterol test had a decrease in the coverage ratios.

Conclusion: The care for diabetics is essential in the management of diabetics to manage the impact of the condition. It is vital that Rx Health follows a systematic way of improving the care it provides to its patients. The other organisations (the medical scheme, providers, and the administrator) involved in the care of diabetics must be brought into the discussion to deal with some of the structural challenges highlighted.

Acknowledgements

I would like to express my heart felt gratitude to my project supervisor Prof. Latifat Ibisomi for her guidance and support during this project. I would also like to extend my appreciation to the organisations, The Board of Healthcare Funders and the Council for Medical Schemes for the support and sponsorship of my studies.

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List of Acronyms

BMI	Body Mass Index
CMS	Council for Medical Schemes
CDE	Centre for Diabetes and Endocrinology
CCM	Chronic Care Model
CFIR	Consolidated Framework for Implementation Research
DM	Diabetes Mellitus
DMP	Disease Management Programs
MCO	Managed Care Organisation
PDSA	Plan Do Study Act
QI	Quality Improvement
SEMDSA	Society for Endocrinology, Metabolism and Diabetes of South Africa
WHO	World Health Organisation

Definition of key concepts

Driver Diagrams

The driver diagram is a tool for building testable hypotheses encompassing shared beliefs about what structures and processes are needed to improve a system (1). It includes several levels explaining the cause of the improvement aim. It provides a structured way of formulating improvement strategies.

Impact effort matrix

This is a tool to assist in decision making through allowing users to rank options in terms of expected impact and perceived easiness to implement a change. This matrix has four quadrants and users may implement ideas which are in the quadrant with high impact and low effort to implement.

Run charts

Run charts are a graphical tool used to monitor how a process performs over time especially when there is limited time and data for analysis (2). This is a plot of the object being observed of time, with annotations of when interventions take place. The key feature is determination if a process is random or non-random. A random process indicates that the process is not changing, therefore the intervention is not impacting the process.

1. Introduction

This chapter discusses the background of the study and investigates the available literature on the subject matter of the study. This chapter starts off by discussing diabetes mellitus and how it should be treated and managed. The chapter provides the specific context at Rx Health, discussing the problem being investigated and the justification for the study. The objectives of this study are also laid out in this chapter.

1.1 Background

The World Health Organisation (WHO) defines diabetes mellitus (DM) as a chronic condition in which either the pancreas does not produce enough insulin (a hormone that regulates blood sugar, or glucose), or when the body cannot effectively use the insulin it produces (3). This definition includes both Type 1 and Type 2 diabetes. The WHO reports that DM caused approximately 1.5 million deaths and a further 2.2 million deaths in related illnesses in 2012 and about 422 million people worldwide were living with diabetes in 2014 translating into a prevalence of 8.5% (3).

The number of diabetics has been increasing over time. It was 108 million in 1980 and was estimated to be 422 million in 2014, this trend is expected to continue (3). The Centre for Diabetes and Endocrinology (CDE) in South Africa estimates that 3.85 million South African residents suffered from diabetes mellitus in 2015 (4). In South Africa, diabetics access healthcare through either the public or the private healthcare systems.

Only 8.92 million South Africans had access to private healthcare through medical schemes in 2018 (5). The South African population was estimated at 58.8 million in 2019 (6), suggesting only 15.2% of the population were medical scheme beneficiaries. In 2017, the prevalence of diabetes mellitus was 54.62 per 1 000 beneficiaries covered by medical schemes in South Africa. This includes both type 1 and type 2 diabetes with approximately 90% being type 2 (5). This means approximately 490 000 medical scheme beneficiaries are diabetic. Similar to global trends, the prevalence of diabetes among medical scheme beneficiaries continues to grow – DM type 2 prevalence grew by 53.8% from 2010 to 2015 (7).

In 2015, at least 15% of diabetics covered by medical schemes have been hospitalised at least once for a period of more than 24 hours, while the rate of re-admissions is 74% (8). During the year 2017, medical schemes spent at least R2.250 billion in healthcare expenditure for diabetic patients (9). The bulk of this expenditure was in hospital claims suggesting significant complications due to diabetes (9,10).

A managed care organisation (MCO) is an accredited organisation that implements strategies aimed at controlling cost, improving access and assuring high level of quality care is provided to beneficiaries covered by medical schemes (11). Among other functions, MCOs are contracted by medical schemes to run Disease Management Programs (DMP) on their behalf. Effective chronic disease management is an intervention which can help reduce the incidence of hospital admissions as well as the cost of hospital episodes (12).

To assess the impact of disease management on the care of diabetics, there is a need to understand what disease management involves. Schrijvers et al proposed a definition of disease management after reviewing other definitions. His definition includes essential elements of disease management such as, clinically appropriate interventions to manage or prevent chronic diseases implemented by a multi-disciplinary team in a systematic way (13). Disease management programmes should therefore be run in a systematic way, include coordinated care and manage and/or prevent chronic conditions. Furthermore, disease management programs should seek to identify chronic patients and promote self-management by the patients (13). The relationship between the medical scheme, the manged care organisation and the patients is rather complex.

Figure 1.1 summarises the private provision of healthcare in terms of diabetes care where a managed care organisation is contracted by a medical scheme. The medical scheme is a non-profit organisation registered in South Africa that contracted Rx Health to manage its chronic patients that are beneficiaries of the scheme. The chronic patients managed by Rx Health on behalf of the medical scheme include diabetics. The Council for Medical Schemes (CMS) is the regulatory body for medical schemes and their service providers such as administrators and managed care organisations in South Africa.

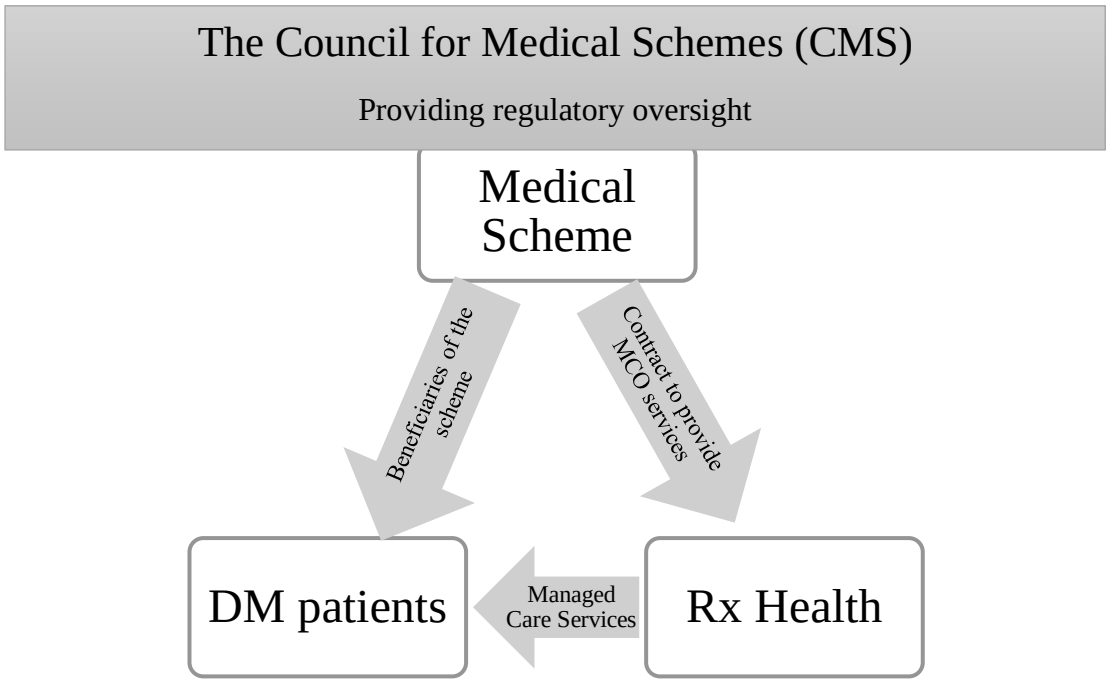


Figure 1.1: Relationship between the medical scheme, DM patients and Rx Health

The CMS publishes an industry report on an annual basis which includes the coverage ratios of several chronic conditions, including diabetes, for each registered medical scheme in South Africa. Coverage ratios are the proportion of registered chronic patients receiving the appropriate level of care. The coverage ratios are based on agreed upon process indicators that are accepted best practice for care of specified chronic conditions.

The coverage ratios of DM patients include chronic medication and monitoring tests to measure the extent of disease activity. These monitoring tests are important for effective disease management as they indicate the level of disease activity in DM patients thereby allowing care providers to intervene appropriately. The results of these monitoring tests help healthcare providers institute appropriate interventions among diabetic patients to bring the disease under control. It is expected that if the appropriate care is provided, then the coverage ratios should be close to 100% as these monitoring tests provide the basis from which providers would institute appropriate level of care among the DM patients.

Published industry reports from the Council for Medical Schemes suggest that currently the effectiveness of Disease Management Programs is very poor (8). Although improving, the coverage ratios of monitoring tests on diabetics is still low. The coverage ratios of monitoring

tests on DM Type 2 patients in 2013 were 36.8%, 18.3% and 21,3% for creatinine, HbA1c and total cholesterol tests respectively – increasing to 50%, 27% and 28% for the same tests in 2017 (9). Table 1 summarises the coverage ratios of diabetic beneficiaries in South African medical schemes from 2013 to 2017 as reported by the CMS.

Table 1.1: Industry coverage ratios of monitoring tests on diabetics

Process Indicator	2013	2014	2015	2016	2017
Blood glucose (HbA1c)	18.3%	25.7%	25.8%	26.0%	27.0%
Kidney function (Creatinine)	36.8%	31.3%	32.3%	47.0%	50.0%
Cholesterol (total cholesterol)	21.3%	23.3%	23.8%	26.0%	28.0%

* Source: CMS reports; Annual Report 2017/2018, Quality of Care in Medical Schemes in financial years 2014 and 2015 & Quality of Care in Medical Schemes in financial years 2013 and 2014

1.2 Problem statement

The coverage ratios of the monitoring tests of beneficiaries managed by Rx Health were very low. The coverage ratios were 1.7%, and 1.0% for the creatinine and total cholesterol tests respectively for DM Type 2 patients during the year 2017. Similarly in 2017, the coverage ratios for the DM Type 1 patients for HbA1c and cholesterol tests were 2.2% and 1.1% respectively (9). In 2018, the coverage ratios for type 2 diabetes were 2.5%, and 3.4% for the creatinine and total HbA1c tests respectively (5). The coverage ratios for diabetics managed by Rx Health are significantly lower than the industry averages in Table 1.1.

The low coverage ratios of diabetes monitoring tests indicate inadequate quality of care for diabetic patients managed by Rx Health. Without effective management of diabetes, the disease progression will be aggressive, leading to damage to major organs thereby decreasing the quality of life of diabetics. For medical schemes, this has very high cost implications as the cost of care for diabetics increases with disease progression. There may be more hospital admissions, and longer stays in hospital for such patients.

Since MCOs have a specific task to facilitate appropriate care in a cost-effective way, it is important to understand barriers to care at Rx Health. It is necessary to investigate factors leading to such low coverage ratios and develop appropriate strategies to improve the level of care of DM patients managed by Rx Health.

1.3 Research question, aim and objectives

1.3.1 Research question

What are the barriers to achieving optimal coverage ratios of diabetic patients registered on the Diabetes Disease Management Program at Rx Health and how can the coverage ratios be improved?

1.3.2 Aim

To explore barriers to achieving optimal coverage ratios of monitoring tests for patients registered on the Diabetes Disease Management Program at Rx Health and to establish effective strategies for improving the coverage ratios.

1.3.3 Objectives

Objective 1: Explore MCO barriers to achieving optimal coverage ratios.

Objective 2: Develop feasible and appropriate strategies to improve coverage ratios.

Objective 3: Implement identified coverage ratios improvement strategies and carry out small test of change.

1.4 Justification

Several studies have demonstrated the benefits of effective management of diabetic patients including reduced disease progression, lower utilisation of health services reduced and healthcare expenditure (12,14–16). Improving the coverage ratios of monitoring tests is the first step to improving quality of care of diabetic patients. Improving the quality of care provided to diabetics is essential as it will translate to better quality of life for patients and significant savings on healthcare expenditure by medical schemes.

It is therefore important to investigate the barriers to care at Rx Health leading to suboptimal coverage ratios in the care of diabetic patients managed by Rx Health. Quality improvement

interventions must be put in place to improve these coverage ratios to provide better care for the diabetics managed by Rx Health.

1.5 Literature review

1.5.1 Diabetes Mellitus

Diabetes mellitus is a chronic medical condition in which blood sugar levels are elevated, this may be due to impaired insulin secretion or insulin resistance or both (3,17). There are two main types of diabetes, diabetes mellitus type 1 and diabetes mellitus type 2 with the latter comprising approximately 90% of all diabetics (18). Type 1 diabetes is when there is insufficient insulin produced either due to autoimmune disorders and damage to the pancreas while type 2 diabetes is mostly due to insulin resistance and disorders in insulin secretion (17,18).

Uncontrolled diabetes leads to elevated levels of blood glucose known as hyperglycaemia. Hyperglycaemia is associated with long term damage to organs including eyes, kidneys and nerves, eventually leading to death (14,18). People living with diabetes are more prone to other diseases such as cardiac peripheral arterial and cerebrovascular disease (18).

In the South African medical schemes environment, costs of treating diabetes have been reported to be R2.25 billion in 2017 and these costs are largely due to hospitalisation (9). Other studies outside South Africa have demonstrated that the cost of treating diabetics can be quite high if treatment and care is left too late. High blood glucose levels increase the odds of diabetics being hospitalised and such hospital episodes tend to be more costly (12,19).

Effective management of diabetes through reduction in glaucoma levels is associated with lower cost of diabetes care (15). Furthermore, Wenger *et al* in 2001 demonstrated that lower HbA1c levels are associated with significant cost savings noticeable in the first and second year of interventions (16).

In south Africa, there are several studies that have focussed on chronic care though these have focused mostly on public health and low resource settings(20–22). Clause et al studied barriers

to care among patients with non-communicable diseases and HIV (20). In another study in low income urban areas, Mendenhall et al studied patient experience among diabetic patients (22). Pinchevsky et al studied the difference in diabetes care provided in public health care compared to private health care (23). In this study private patients received more intervention but the outcomes between private and public patients were not statistically different (23). There are few studies that have focused on diabetes care in private healthcare provision in South Africa, more specifically none focusing on barriers to care at managed care organisations in South Africa.

1.5.1.1 Guidelines for managing diabetes

The Council for Medical Schemes, the regulatory body for medical schemes and managed care organisations has guidelines on patient management (8,24). These guidelines are similar to guidelines for care in other countries, Table 1.2 lists standard guidelines that are to be followed in managing diabetics (8,19,25–27). These are the minimum interventions that must be followed for managing diabetes patients.

Table 1.2: Recommended episodes of care in diabetes management

Indicator	Frequency	Test	Purpose
Blood glucose	2 times a year	HbA1c	To monitor blood glucose levels
Kidney function	Once a year	Creatinine	To check if there is damage to kidneys
Cholesterol	Once a year	LDL	To monitor blood cholesterol levels
Eye Exam	Once a year		To check if there is damage to eyes
Nerve Exam	Once a year		To check if there is damage to nerves
Feet Exam	Once a year		To check if there is damage to peripheral limbs

* Source: CMS report - Quality of Care in medical schemes in financial years 2014 and 2015

These guidelines inform the type of interventions that must be provided for diabetic patients, they do not inform the framework for structuring care for many patients. It is important that there is a systematic way for managing diabetic patients from the perspective of managed care organisations.

1.5.1.2 Framework for managing diabetics

Diabetes is a complex condition which requires a systematic approach to providing care (18,27). A systematic review by K. Knight highlighted the importance of systematic management of diabetes. The study showed that when diabetes was managed in a systemic way, there were improvements in clinical makers for diabetes which were statistically significant (19).

The chronic care model (CCM) is a systematic approach developed to structure management of chronic conditions such as diabetes (28). This model identifies six key features of chronic care which are healthcare organisations, self-management support, decision support, coordination of care, clinical information systems, community resources and policies (29). The CCM has been used widely to structure diabetes care (30,31). A systematic review testing the success of the CCM on type 2 diabetics was conducted in 2013 (30). This review demonstrated that the CCM improved clinical makers and process indicators for diabetic patients. A randomised control trail in China also demonstrated positive outcome following the implementation of the CCM on diabetes type 2 patients (32). Figure 1.3 is a framework illustrating how these factors are integrated in the care of diabetics at the MCO:

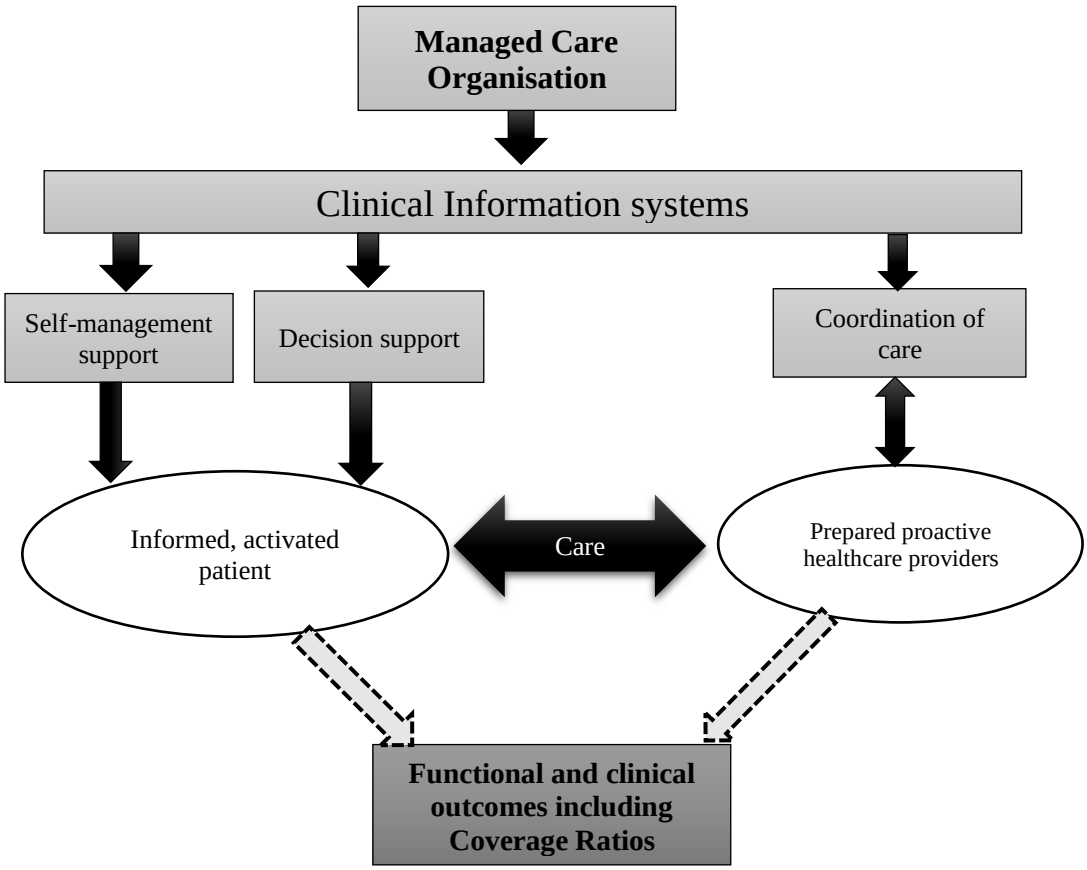


Figure 1.2: Model of Care for chronic patients at MCOs
This care model is adapted from Baptista *et al* (33)

Community resources and policies refer to existing external components that may aid with chronic care. These are less likely to be influenced at micro level but rather at a broader policy level. Community resources relates to the availability of public facilities for exercise, diabetes support groups and other community-based resources. On the policy side, this includes government policies such as the introduction of sugar tax in an attempt to reduce sugar consumption (34).

The role of healthcare organisations is fulfilled by both MCOs and medical schemes with medical schemes providing financial resources to purchase health services for beneficiaries. The MCOs ensure that the beneficiaries receive appropriate care at the right time, removing barriers to care, as well as providing self-management and decision support to patients (29).

MCOs need strong clinical information systems to ensure that patients receive appropriate clinical care. Clinical information systems collect, store and manage patient data to facilitate better care for patients. Such systems must include complete patient records and must be readily accessible to the MCO's clinicians to enable good decision making (28). These systems must also be robust enough to facilitate proper coordination of care if a patient is seeing different healthcare providers. This is especially necessary for patients with multiple chronic conditions.

Coordination of care is vital in the management of chronic conditions. A patient is best treated when a healthcare provider has access to all his/her complete medical history and information. In cases where patients have multiple chronic conditions, they end up being treated by several specialists. If care is fragmented and there is no coordination, this could lead to sub-optimal outcomes for patients. In 2014, Tricco *et al* demonstrated the benefits of having coordinated care as it led to lower rates of utilisation of health services thereby saving costs (35). Besides having effective clinical information systems in place, MCOs need to include patient focused interventions to facilitate decision support and self-management.

Management of chronic disease starts with the patient. If the patient is to avoid the long-term effects of the disease, then their daily decisions must reduce the disease progression. It is with this understanding that many interventions have focused on how the patient can self-manage

their own condition. In 2011, Sperl-Hillen *et al*, carried out a study to investigate the effectiveness of various interventions to help individuals manage their own condition (36).

Interventions that target the life style of patients have been found to be effective in the management of diabetes (37). The diabetic patient must be taught how to manage their diet - often with assistance from a dietician. Recommendations are that a diabetic must visit a dietician at least once a year for assistance with managing their diet (38). Lifestyle changes is a key patient factor to diabetes management.

The Centre for Disease and Endocrinology (CDE) is a managed care organisation in South Africa. The CDE managed care program has a strong emphasis on working with providers treating their diabetic patients. The CDE requires that a provider treating diabetics under their care attend an extensive training program and also attend annual refresher training courses (39). The success of their disease management program is largely attributable to this training (39).

Despite the available evidence on guidelines for diabetes management and models of structuring diabetes care, there is evidence of care for diabetes patients at Rx Health (5,10). There is need to understand the barriers to care and the CFIR is a useful framework for exploring implementation barriers.

1.5.2 Consolidated framework for implementation research (CFIR)

From the consistently low coverage ratios in Table 1.1, it can be adduced that there are significant barriers to care for diabetic patients. Given the recommended care for diabetics and the framework of structuring chronic care at the MCO level, it's important to understand the barriers that exist at Rx Health leading to low coverage ratios.

The consolidated framework for implementation research (CFIR) is a useful tool for investigating barriers to care. The CFIR has five main constructs that are intervention characteristics, outer setting, inner setting, individual characteristics and the implementation process (40). Figure 1.3 shows the CFIR framework.

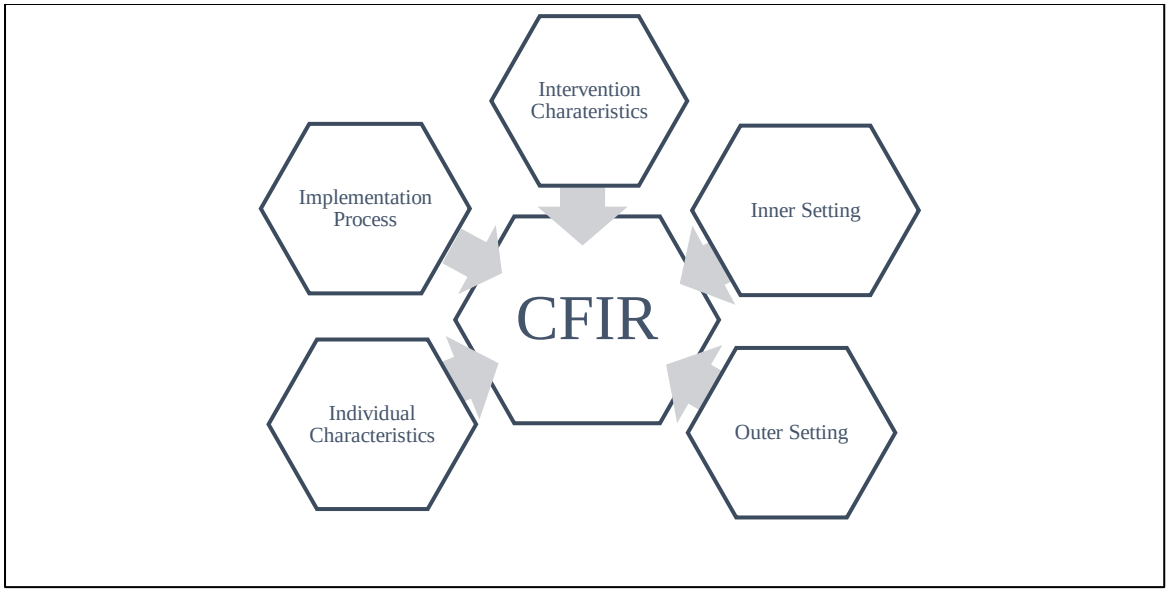


Figure 1.3: The consolidated framework for implementation research

1.5.2.1 Intervention characteristics

The intervention characteristics are key components of the intervention, the source of intervention, effectiveness, adaptability, complexity and the cost of intervention. It is important that the intervention is viewed positively by stakeholders implementing it for implementation success. The Chronic Care Model is a useful model for assessing the intervention - this has been used extensively for organising care for diabetics (30,32,41). The American Diabetes Association recommends the Chronic Care Model (CCM) to structure care for diabetics (27).

1.5.2.2 The outer setting

The outer setting is defined as the external environment in which the organisation operates and includes economic, political and social context (42). The outer setting includes the extent to which Rx Health responds to external stakeholders, thus demonstrating the value it provides to diabetics on the medical scheme, the employer groups and the CMS. The CMS has emphasised the need to demonstrate the value of managed care and has been working with medical schemes and other stakeholders in developing a framework (8). Such a framework would essentially guide and motivate the managed care organisations to implement changes and improve coverage ratios to align with this regulatory imperative. Furthermore, the reports from the CMS

should make both medical schemes and managed care organisations be more aware of their coverage ratios compared to other schemes.

1.5.2.3 The inner setting

Inner settings focus on how Rx Health is structured around composition of teams and units within the organisation. The type and level of communication within the organisation, organisational culture and the implementation climate contribute to the success of implementing any intervention (40).

1.5.2.4 The individual characteristics

The individual characteristics refer to individuals at Rx Health that are involved in the care of diabetic patients. Individuals' characteristics such as knowledge and beliefs about the disease as well as about the intervention, self-efficacy and the individual's attitude towards the way they work, play a critical role in how well an intervention will be implemented. The skills, competencies and experience of individual also play a major role in the success of the implementation process (43). Individuals who are more engaged with an organisation they work for are more likely to embrace and implement an intervention (40,44).

1.5.2.5 The implementation process

The last construct – implementation process focuses on the planning, engaging, executing and reflecting, plus evaluation (40). The planning must incorporate steps to ensure effective diabetics' care through capacity building (45). The process must include key individuals at Rx Health involved in diabetics' care and the communication must be clear as implementation takes place. The diabetics' care must be executed as planned and in the process evaluation of the success of implementation must be undertaken. This helps maintain interest in the intervention.

1.5.3 Health Quality Improvement

Batalden *et al* defined quality improvement as a continuous process requiring combined effort from healthcare providers, patients, health funders, researchers, planners and educators to make changes that lead to better patient outcomes, health systems and professional development (46). Three common strategies used for quality improvement are Lean, Six-sigma and plan do study act (PDSA). The common feature of these methods is having a measure of quality. In this study, the coverage ratio is the indicator of quality.

Six-sigma is a quality improvement strategy which aims to minimise variation in a process, reduce costs and eliminate defects in a process (47). A process is monitored to identify both common cause variation and specific cause variation. Common cause variation is inherent in an optimal process, but specific cause variation is investigated further and then eliminated. Elimination of specific cause variation improves the process.

The Institute of Health Improvement describes Lean quality improvement strategies as strategies that focus on eliminating wastage in a process in the 2005 white paper (48). Lean quality improvement strategies were adopted to heath care from manufacturing processes. Lean strategies identify all components of a process and determine if the components of the process are adding value to the consumer. If any part of the process does not benefit the consumer then that process is considered wastage and then it is eliminated (48).

The PDSA cycle is the most commonly used method of quality improvement (47). This method involves trying out changes on a small scale and testing if these changes improve the health quality measure before rolling out the changes on a full scale. Figure 1.4 summaries the PDSA method of health improvement.

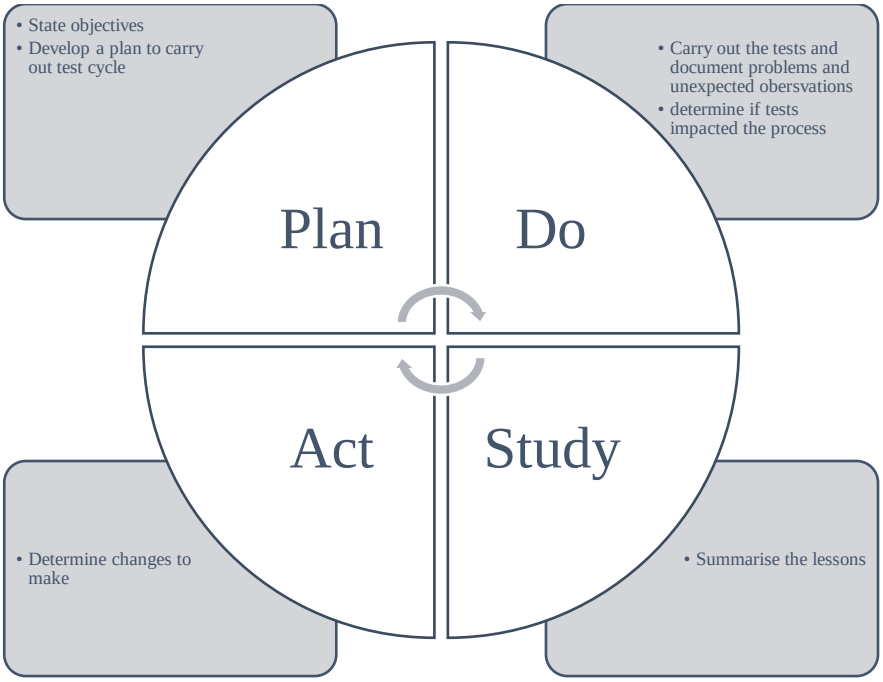


Figure 1.4: Plan Do Study Act Cycle
Adapted from Langley *et al* (49).

1.5.4 Study framework

Figure 1.5 provides a summary of the study framework. This provides an overview of how key components of disease management are related and how the barriers to care at Rx Health will be explored using tools documented in literature.

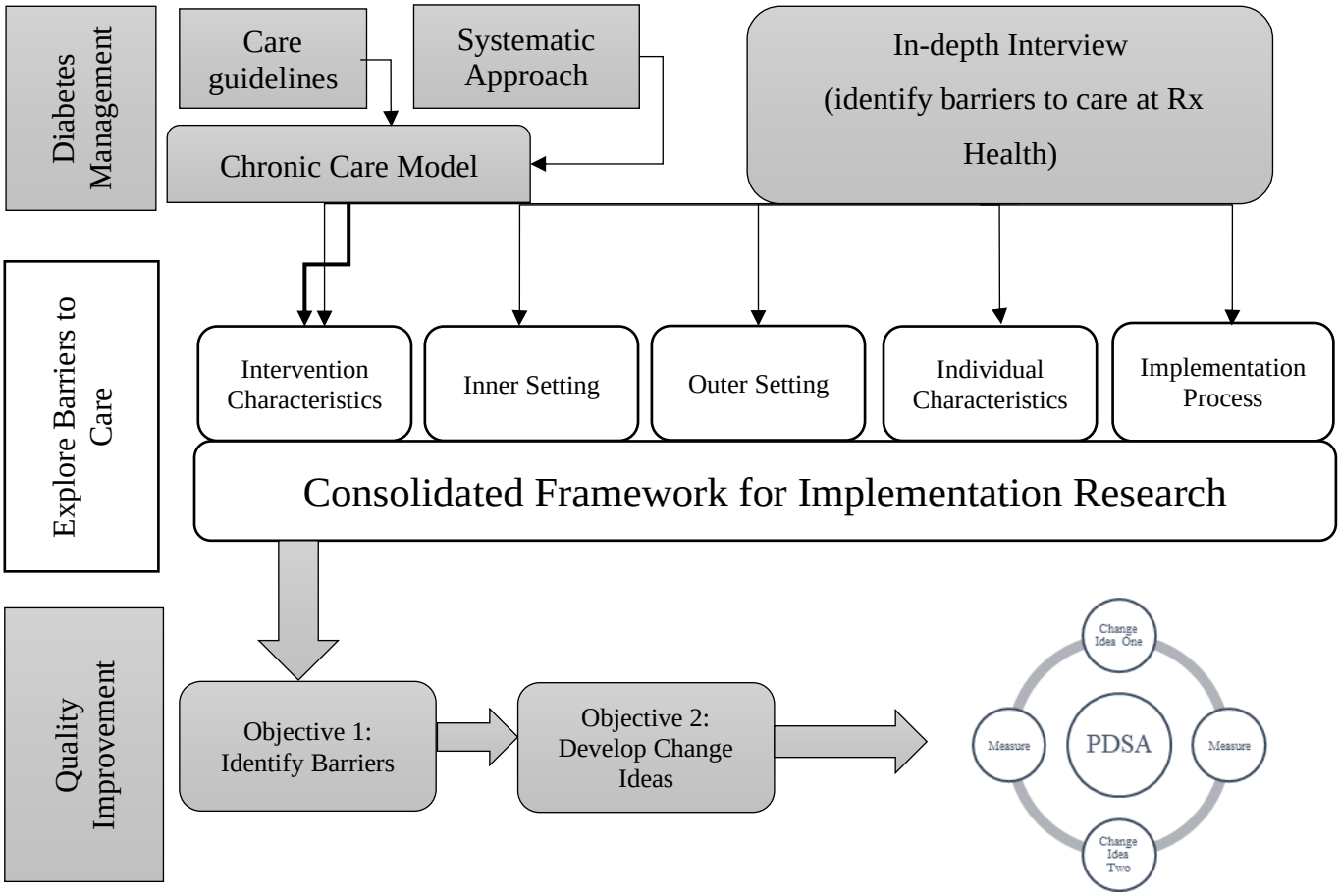


Figure 1.5: Study framework

Disease management is a complex process which requires interrelated processes and involves coordination among several stakeholders. The CCM provides a documented framework broadly accepted to manage chronic conditions. The CCM requires best practice guidelines on treating and managing specific chronic conditions. The CCM is required to be put in place in a systematic way when implementing a disease management program.

Exploring barriers at Rx Health will be achieved through in-depth interviews with those involved in diabetes care at Rx Health. The CFIR provides a useful framework of exploring barriers to care at Rx Health as the five domains are explored during the interviews.

Once barriers are identified, a systematic approach must be used to implement changes and test the effectiveness of the change ideas. The PDSA is a useful tool to for improving the performance of the system (47).

2. Methodology

This chapter summarises the approach taken in this study. The chapter commences by discussing where and how the study is carried out. This chapter also provides details of who is involved in the study and their roles and contributions. The tools and methods used to collect data and analyse the data is also discussed in this chapter.

2.1 Study setting

This study was conducted at Rx Health, a managed care organisation in South Africa managing the beneficiaries of the medical scheme, which are mostly resident in South Africa across the nine provinces. This medical scheme had 30 373 principal members and 63 599 dependants in December 2018 (5). The principal members and dependants constitute the membership of the medical scheme. A certain proportion of the medical scheme membership is chronic (includes diabetics), and Rx Health is contracted to manage these patients.

2.2 Study Design

This study used the exploratory qualitative study design to achieve the objective. This study design is useful where the subject of the study is not understood without any pre-conceived ideas being placed on the phenomena of the study. This study design is suitable for this type of study.

2.3 Study population

The Rx Health team working on diabetes disease management is small. It comprises three departments namely Administration, Information Technology (IT) and the Pharmacy Departments. The clinicians are part of the administration team and are supported by a medical advisor, a general medical practitioner who is not employed by Rx Health but contracted to provide ongoing support.

The interviewees were the case manager, health monitor, administrative assistant, the pharmacy benefits manager, business analyst and the business systems analyst. This included

the entire staff complement involved in diabetes care – the pharmacy support staff were not interviewed. The clinical manager explained that they had recently joined Rx Health and were still in training.

Table 2.1: Interviewees at Rx Health

Role	Duties	Contribution to Study
Clinical Manager	Team Leader	Not Interviewed
Case Manager	High Risk Patient Management	Responded to administration team questioner
Health Monitor	Patient Contact	Responded to administration team questioner
Administrative Assistant	Uploading Data on System	Responded to administration team questioner
Pharmacy Manager	Manage Drug Utilisation	Responded to administration team questioner
Business Analyst	IT System Maintenance	Responded to IT questioner
Business System Analyst	IT System Development	Responded to IT questioner
Pharmacy Support Staff	Patient Contact	Not Interviewed

The Clinical Manager is responsible for over-seeing the clinical functions at Rx Health including coordinating with the IT department and pharmacy department. The Case Manager reports to the clinical manager and has the responsibility of over-seeing the Health Monitor and the Administrative Assistant. These three constitute the administration team.

The Health Monitor is a chronic disease counsellor while the Administrative Assistant is responsible for uploading pathology test results onto the system. The Case Manager is responsible for managing high risk patients and coordinating care with the Medical Advisor contracted to Rx Health.

The Pharmacy Manager over sees the pharmacy support staff and is responsible for monitoring the utilisation of medicines. There are two Pharmacy Support staff and these three constitute the pharmacy department and all report to the Clinical Manager.

The IT department is made up of the Business Analyst and the Business System Analyst. The Business Analyst is responsible for maintenance of IT systems and drawing reports from the

system. The Business System Analyst monitors the IT systems and matches system specifications to the users' requirements.

2.4 Methods, tools and analysis

The principal investigator held a meeting with the project coordinator at Rx Health to initiate the study. The purpose of the meeting was to explain the purpose and the process of the research to the project coordinator. The study population was also identified during this meeting. The research coordinator identified all the employees at Rx Health who were involved in the care of diabetics. The dates of the interviews were set during this meeting.

The overall approach to the study is summarised in Figure 2.1

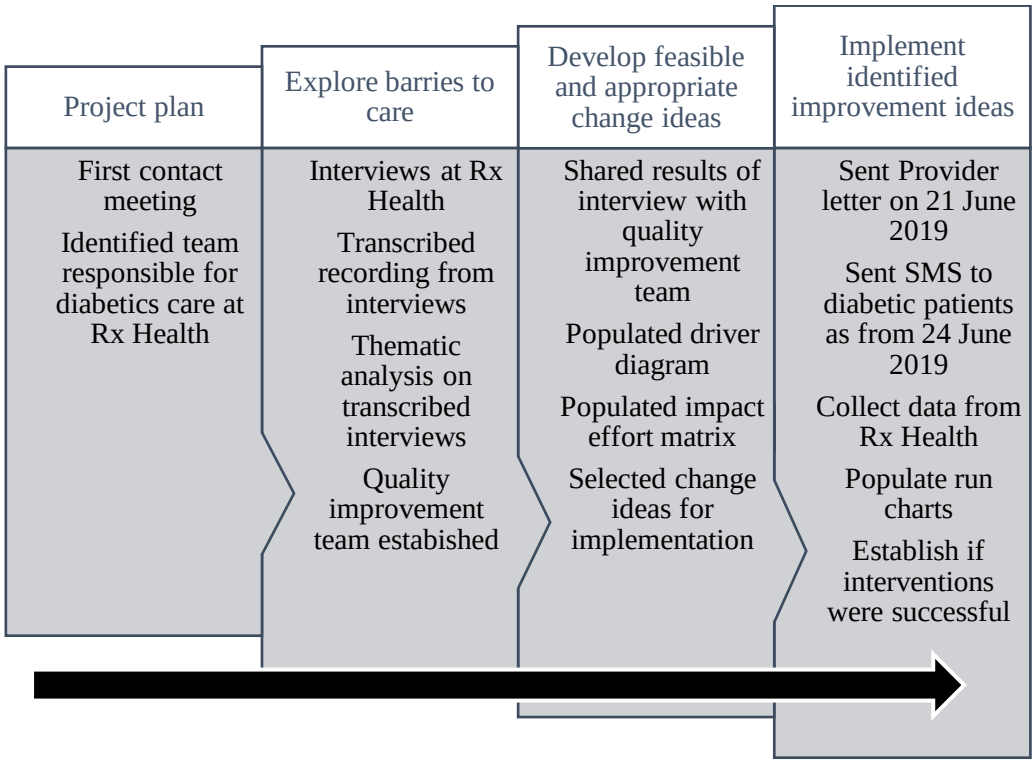


Figure 2.1: Summary of study procedure

2.4.1 Objective 1: Explore MCO barriers to achieving optimal coverage ratios

Interviews were conducted with individuals involved in the care of diabetic patients at Rx Health to collect data and information related to Objective 1. The in-depth interviews were conducted during working hours in a separate meeting room at Rx Health offices. The

respondents were asked to freely respond to broad questions around how care is provided at Rx Health. Each interviewee was interviewed separately, and the interviews ranged from 30 minutes to an hour. The interviews were recorded and later transcribed to allow for better analysis of the interview results. The transcribed notes were not shared with the respondents for confirmation. The interview notes were compared to the transcribed records for consistency.

Thematic analysis was conducted using the transcribed interview notes. The five stage process in Hacket et al was followed to analyse the transcripts (50). Each transcript was read picking out the most important themes, these were highlighted on each transcript. These themes were then collated onto a single document. Thereafter the consolidated document with the themes was compared to the interview questions. The transcripts were read one more time comparing each to the consolidated document ensuring there are no additional themes that were missed in the consolidated document. The consolidated document was updated after reading each transcript for the second time. From this updated document, the main themes, those that were most common across the respondents were extracted and summarised.

The interview guide was developed using the Consolidated Framework for Implementation Research construct. There were two sets of interview guides, one for the administration team responsible for diabetes care and the other for the information technology staff responsible for the IT systems used by the administration team. The interview guides are shown in Appendix 2.

The interviewer had no prior interactions with any of the interviewees. The interviewer was previously employed by the Council for Medical Schemes and at the time of the interviews, was employed by an industry association for medical schemes.

2.4.2 Objective 2: Develop feasible and appropriate strategies to improve coverage ratios

After the interview recordings were transcribed and analysed, the findings were documented and presented to the quality improvement (QI) team at Rx Health. A comprehensive summary of the processes of care is discussed in Appendix 3. The team consisted of the case manager, health monitor, pharmacy manager and the business analyst.

After the findings were documented and presented to the QI team, there was a group discussion on the findings. Possible change ideas to address the barriers identified in objective one were discussed and documented. To identify possible change ideas a driver diagram was used by the QI team.

The driver diagram is a tool for building testable hypotheses and is populated by a team. It encompasses the shared beliefs about what structures and process are needed to improve a system (1).The QI team identified three primary drivers for low coverage ratios; lack of member education, inadequate training of providers and patients' inability to set up appointments with providers. The driver diagram, shown in Appendix 4, was populated by the quality improvement team thereby identifying change ideas to improve coverage ratios.

The change ideas developed by the quality improvement team were placed in an impact effort matrix by the quality improvement team to identify the change of ideas for implementation. The impact effort matrix was populated following a focused group discussion by the quality improvement team. The team classified each idea in terms of how easy it was for them to implement given their understanding and knowledge of their organisation. The quality improvement team also discussed their expectations of the impact of each change idea based on their experience. The impact effort matrix is where each change idea is appropriately placed in terms of relative easiness to implement (effort) and the likely impact the change idea will produce. The highest win ideas are those that have a high impact while the effort of implementing the change idea is very low. The impact effort matrix that was populated is shown in Table 3.2.

The quality improvement team decided to implement provider education and member education and communication. The QI team decided to send a letter to the providers reminding them about the diabetes care guidelines and notifying the providers that the benefits would be funded by the scheme. The member communication would be sending out short message service reminders to beneficiaries that were due for monitoring tests. These short message service reminders would be automated on the system and sent out once a month before each test is due to every diabetic patient.

2.4.3 Objective 3: Implement identified quality improvement strategies and carry out small tests of change

Rx Health prepared a letter for providers explaining to the targeted health care service providers that they are to conduct the monitoring tests as per set guidelines. The letter was prepared by the clinical manager with the assistance of the medical advisor. The letter also notified the providers that the medical scheme would pay for these tests. This letter was sent by email to the providers only once on the 21st of June 2019.

The member education and communication were done via automated short message service reminders to diabetic patients explaining the importance of the monitoring tests and a reminder of when the next test is due. These short message service reminders were sent to patients who were due for a monitoring test in the following month. The clinical manager prepared the content of the messages to patients. The short message service reminders were switched on in the system with effect from 21 June 2019.

The PDSA was used to determine the success of the quality improvement effort. The two selected change ideas were implemented, and the impact of the changes was observed over six weeks. Run charts were used to monitor the process and hence establish if the change ideas improved coverage ratios.

The coverage ratios of the diabetic patients were monitored before and after implementing change ideas. Data for calculating coverage ratios was provided by the administrators of the medical scheme to Rx Health who in turn provided this to the principal investigator. This data is routinely collected since it is used for paying claims by the medical scheme. This data was used to calculate the coverage ratios. The coverage ratio was calculated as:

$$coverage\ ratio = \frac{\text{number of diabetic patients receiving test}}{\text{total number of registered diabetic patients}}$$

Run charts are a graphical tool used to monitor how a process performs over time by determining if a process is random or not. In this case, the coverage ratios are plotted over time.

A non-random process indicates a change in the quality improvement process. There are two common tests to determine if a process has improved post implementation; shift and trend tests.

An unusually long run of data points above or below the median is called a shift (51). To establish a shift in a process, at least 6 consecutive data points above or below the median are required, while a trend is established when there are at least 5 consecutive data points in a specific direction (2). To apply these tests appropriately, one has to ensure that there are sufficient number of runs (2).

A run is the number of data points above or below the median, this can be calculated as the number of crossings of the median plus one. If the number of runs is too little or too much then the process is non-random (2,51). There are established tables for determining the minimum number of runs depending on the valid data points for the process (2,51).

According to the implementation plan, the first change idea, provider communication, was to be implemented on 3 June 2019. The next change idea, short message service reminders, was due for implementation on 15 July 2019, six weeks after the first change idea. The data on the monitoring tests take at least four months to reflect on the administration system therefore it would be time consuming to wait for results of the first change idea before implementing the second test of change.

2.5 Limitations

Time constraints were a major challenge, only two change ideas were implemented during the study. The change in coverage ratios is noted after the pathology laboratories submit claims to the medical schemes for the specific tests. These laboratories may take up to four months before submitting the claims. Therefore, the impact of change of each change idea take up to four months to reflect on the claims system of the medical scheme, therefore the second PDSA cycle had to be instituted before the results of the first were obtained.

2.6 Ethical Considerations

Written permission to undertake the study was submitted for ethical review to the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg. Ethical approval was obtained before commencement of the study – M180141. A copy of the ethics approval is in Appendix 1.

Participants for this research submitted signed consent forms to participate in the study and consent for recording the interviews. Before each interview, the principal investigator explained the processes and objectives of the project. The respondents were asked to complete the consent forms in Appendix 5. Permission was also sought from the respondents to record the interviews.

3. Results

This chapter provides the results of the study in terms of each objective; from objective one to objective three. This chapter discusses the barriers to care at Rx Health, the change ideas generated and those selected for implementation. The chapter concludes by discussing the coverage ratios before and post implementation.

3.1 Barriers to care at Rx Health

Table 3.1 provides a summary of the barriers to care at Rx Health.

Table 3.1: Themes and barriers to care

Theme	**Theme**	**Barriers to Care**
Intervention Characteristics: 3.1.1	Fragmentation	Many organisations involved in care, poor coordination of care
	Provider education	Unwillingness to share patient information, lack of knowledge on benefits and care guidelines
	Patient factors	Unawareness on self-management, lack of awareness of benefits, patients difficult to reach, mobile nature of patients
	Information Systems	Insufficient fields to capture data, no automated reminders, manual upload of data
Outer setting: 3.1.2	Rx Health, employee engagement	Lack of awareness of expectations from regulators, unaware of competitor performance
Inner Setting: 3.1.3	Rx Health, employee engagement	Skills development, feedback from management, performance incentives to staff
Individual Characteristics: 3.1.4		No barrier identified
Implementation process: 3.1.5	Contracting arrangements	Insufficient sharing of information, poor benefit design, lack of patient screening

3.1.1 Intervention characteristics

This section summarises the Rx Health disease management program. This helped identify gaps in care for diabetics at Rx Health.

Healthcare organisations

Rx Health is not the only healthcare organisation involved in the care of diabetics for the beneficiaries of the medical scheme. The medical scheme also contracts another organisation to administer the medical scheme (the administrator). The diabetics on the medical scheme also use pathology laboratories where samples for monitoring tests are sent for pathology tests. The pathology labs are reluctant to share the information with Rx Health.

> *"Labs don't want to give us information, they want us to pay for it"* – Respondent 5

To mitigate this challenge, Rx Health must ask treating providers for the pathology results. In some instances, the providers may be unwilling to provide the patient information and then Rx Health has to obtain the pathology results from the patient. The third respondent explained:

> *" then, some doctors, doesn't want, to give us the information without the member's consent. So, then we have to phone the member back again, so the member has to go and get everything"* – Respondent 3

The medical scheme's design of benefits had some limitations. In some instances, the patients had to pay healthcare service providers out of pocket. This created a barrier to care as patients would not always get the necessary care. The patients did not always have cash available for out of pocket payments. Furthermore, the benefit design on the medical scheme does not cover specialist consultations which are necessary for the patients to access necessary diagnosis and monitoring tests. The benefit design by the scheme is a key determinant of how patients seek care.

> *"I think we have to look at treatment basket, for our…to affordable and standard members. Let me use an example. The programme registration require a lung function test for an asthmatic patient. So off you go to the doctor, you get to your doctor, your doctor don't have the apparatus, so what does he do? He does a specialist referral for you. So now you use your benefit,.."* – Respondent 1.

Information Systems

There is one information system at Rx Health that is used in the process of diabetes management. This disease management information system is also used in the management of other chronic conditions. This system is accessible to everyone involved in diabetes care - the administration department, pharmacy department and the medical advisor. Some respondents explained that the system is not fit for purpose expressing a view that:

> *"Unfortunately, our system is not working for us, it's working against us, currently……. So, the system was developed for HIV, not for chronic disease"* – Respondent 1

The history of the system is summarised through one responded who explained:

> *"Uh, so, the system we initially bought was not an HIV system. It was more a pharmacy benefit management system. So, it was for dispensing medication but all conditions were available on the system. What we then did is, because we only had one disease management programme at the time, which was HIV, we developed for HIV."* – Respondent 5

The disease management information system has some challenges, these include manual entry when updating patient records.

> *"We don't get results from labs that is already pulled into the profile, No. If we don't get a hard copy that we capture our self then, we don't have it. It is a manual process"* – Respondent 2

There is a limit on the number of fields which the system may accommodate on each patient record. So, the patient information is incomplete in most cases. The first respondent explained in detail the limitation of the data fields available to capture important information:

> *"There is currently under the results not even one, uh, result that are captured that is the baseline indicator for a cardiac patient. Say for instance there is 10 fields, neh, six of those fields are for HIV, I've got…I've got Cholesterol, HDL, LDL Triglycerides and uh Blood Pressure and HbA1c and a full blood count, I've got six and I've only covered hypertension and hyperlipidaemia. I've got no indications under my results to give an indicator to say 'this is a managed' 'unmanaged' or 'intermediate' patient because it all needs development and development costs money."* – Respondent 1

Furthermore, the system does not set up follow-up dates to assist with patient management. The users have to setup follow-up dates for patients using email reminders. This manual process is time consuming for the users as they must switch between the system and using Microsoft Outlook. In summary, the system does not provide a holistic view of the patient information, thus inhibiting optimal care. The sixth respondent said:

> *"It does have in the workflow a reminder, yes. But we do with high cost cases we put special reminders on our email calendars to remind us in the morning when you come in, this is what you need to attend to."* – Respondent 6

Healthcare providers

There are many providers treating diabetics that are managed by Rx Health. These providers are spread across the country and they operate in practices that are structured differently. Rx Health generally has good relationships with the bigger group practices as there are more patients coming into their rooms for follow-ups and thereby creating familiar and standardised procedures for coordinating care. The second respondent summarised the relationship well, they said:

> *"Uh, so far it's good because we are getting a good feedback, so we actually are building a good relationship, uh because some of the providers are also able to change their systems so we can access what we require, for example pathology results, instead of us contacting the members often, we are able to get the results."* – Respondent 2

There are however challenges with the smaller practices which view the interventions from Rx Health as an administrative burden.

> *"With them it's an excellent relationship but unfortunately with the smaller doctors that you maybe have a contact once in six months, you can't expect them to know you. And get the same response and feedback from them. They are the ones that would come and say I've already sent to 'the administrator, get it from them' they don't understand that you can't get it, we have to get it from them, from Doctor."* - Respondent 1

The fragmented arrangement between the administrator and Rx Health under-taking managed care arrangements compound this problem. There are many points of contact with the providers, the pharmacy department, the disease management department at Rx Health and the

administrator of the scheme. This unstructured way of dealing with providers leads to some of the challenges in relationships with the providers.

Coordination of care

The fragmentation of managed care and administration contracts present coordination challenges. In some instances, this confuses the treating providers who must relate to both Rx Health and the administrator, thereby creating further challenges for Rx Health. The coordination of care among the healthcare organisations was poor, it was characterised by poor sharing of patient information making effective management of diabetics difficult. The challenges of poor care coordination were spelt out by the first respondent:

> *"I think, it should not be fragmentized, that's how I currently experience it. Because there are rules and regulations being made outside that impacts it. So, for me if you say you're gonna run a managed healthcare programme, it must be with the input of, what does the law say, and with Council of Medical Schemes …"* - Respondent 1

Care coordination is further complicated by the mobile membership of the medical scheme which mostly consists of migrant labourers. In most cases, these patients are treated by two or more providers, one while at work and the other when they are at their hometowns. The flow of information between these treating providers is often difficult. The disease management system at Rx Health can only load one primary provider for each patient, complicating the situation even further.

> *"And also with our system, because we can only capture one provider. But if it is a patient that has got asthma. I cannot capture a doctor for him at his place of work and at his place at home. I can only capture one."* - Respondent 1

Patient education

Rx Health invests a lot of time in explaining the management of diabetes to the patients. Upon registration of the chronic condition there are at least two patient contacts to explain their condition to the patients. In addition to these efforts there are suggestions to include more patient education.

> *"Like we send out welcome packages, uh, like a refill kit, like a medicine kit. I would send out a nice little kit, the diabetic kit, like a booklet or something and like a chocolate bar or something they can, they are allowed to eat. To make them interested in reading*

through everything and understanding everything that, cause some doctors don't explain everything in deep." – Respondent 3

The patients managed by Rx Health are mobile and a significant portion work in shifts. The patients also change their numbers frequently making patient contact difficult. This makes it difficult to contact them to provide self-management support and remind them to go for monitoring tests.

"Uh, our members because they are in the mining industry, are most of them from the lower income. So they do a lot of the, uh, pay as you go kind of phones. So, every three months there's a different phone number, and the number doesn't get updated." – Respondent 6

Patient outcome monitoring

There is limited monitoring of the outcomes at Rx Health. The outcomes are reported in an unstructured way. This is through patient feedback after a successful intervention. The feedback from the bulk of the patients under Rx Health's care is unknown.

"*We do, uhm I mean, there are some patients who will, send an email or because we don't have formal channels of survey. Out of their own goodwill they'll send an email and say I had such a great.."* – Respondent 5

3.1.2 Outer setting

There is limited awareness of the external environment at Rx Health. Those involved in patient care are unaware of the expectations of the CMS, the regulatory body for the medical schemes, administrators and managed care organisations in South Africa, specifically in relation to quality of care of chronic patients. Most respondents indicated that they were unclear of the expectations of the CMS on diabetes care.

"I'm gonna be honest with you, I don't know." – Respondent 6

There is also limited appreciation of what similar organisations do in the managed care space. Furthermore, there are no channels to update employees on the overall performance of Rx Health and how it is positioned in the market in relation to other managed care organisations.

Most respondents said they had no knowledge of what similar organisations are doing, most respondents just said *"No"*.

> *"No, I don't know."*– Respondent 3

3.1.3 Inner setting

The inner setting at Rx Health seems relatively strong, the organisational structure is geared for providing care. There are clear roles and responsibilities for all employees involved in diabetes care. There are also clear escalation channels which are accessible to the employees should it be necessary. Both formal and informal channels of communication are accessible to the employees.

> *"we always have scheduled meetings, we try to keep it professional, whether, it is formal or not formal. And we, uhm, take down minutes. As what was discussed and what was the outcomes. Each one sign to it and we keep record of those."* – Respondent 6

What may be lacking internally is communication on the performance of the organisation. The respondents were not aware if Rx Health was doing well or not.

> *"No… that also, it takes me back to a feedback from the top level, so, I believe that there are meetings that they are attending but I don't get feedback."* – Respondent 2

The interviewees also expressed that the implementation climate was not optimal. For instance – there were no employee rewards or incentives for good performance. There was no feedback loop from management for the employees in relation to how they performed as individuals. All the respondents said there were no incentives for good performance.

> *"No, there used to… it would be great actually if that is still in place because it gives the uhm employees something to work against or to work for to see my hard work is actually paid off."* – Respondent 6

The respondents also expressed the desire for further training to perform their jobs better. Most of those interviewed indicated that they had not attended any external conference or meetings related to diabetes in the last year. They also indicated that they had not recently received any training on diabetes management from any external party.

"Uh, one needs to be empowered to do the job well, it won't always be a fact of me doing references and asking questions, so we have like training for services out there, which I think, uh, staff members working on such chronic conditions need to be empowered." – Respondent 2

3.1.4 Individual characteristics

The employees interviewed at Rx Health mostly felt they received enough training to do their work well. Their own assessment of their competences was mostly positive. They said they had received enough training to do their work – though they would not turn down any further training opportunities.

"Training is very important you can never get enough training." – Respondent 6

The employees interviewed were clear of their roles and responsibilities, they were also aware how their duties impacted on the lives of the patients and Rx Health. All the interviewees said they were making a positive impact to Rx Health – the responses to this question were emphatic and very positive.

"Uh, based on myself because I know I am a hard worker, so, I believe the company having me around it's also a benefit". – Respondent 2

3.1.5 Implementation process

Most interviewees expressed that the contracting between the medical scheme and its service providers as well as setting up of the disease management program were ineffective. The administration of the medical scheme is carried out by the administrator while Rx Health is responsible for disease management. This arrangement was done without explicit allowance for the free flow of information and data between the administrator and Rx Health.

Furthermore, the contractual arrangements of the medical scheme and Rx Health do not require screening and identifying diabetics proactively.

"Cause I think there're a lot of members who are walking around undiagnosed, first of all. And uhm, those who are diagnosed but are not enrolled on the programme. So, I think a major focus needs to be on screening."– Respondent 5

The diabetics are only identified after they suffer from diabetes related complications requiring either hospital admission or chronic medicine.

> *"It depends, some of them is admitted in the hospital and then, that's only then find out that they've got diabetes."* – Respondent 3

> *"we phone the members and find out, alright, what we see that you tried to get this medication, it was rejected, how can we assist with these. And there's where we pick up the complex cases where a doctor prescribed out of formulary medication."* – Respondent 6

The other hindrance to successful implementation is the inadequate benefits offered to the medical scheme beneficiaries. The beneficiaries fail to access care in several instances as they must pay out of pocket for certain procedures and consultations that are required before they register on the disease management program.

> *"I phone the member again. And then the conversation starts 'why must I use my benefits for you, if you want do it, you pay for it, number one. Number two is, the primary consultation, the lung function, with an ECG is supposed to be paid by, uh, the administrator but now their provider can't give the service then it goes to specialist, which is the scheme's responsibility. "*– Respondent 1

On the upside, the respondents acknowledged that the structure of the disease management program at Rx Health was good, but it was not being implemented as planned. There was a deep sense that they could do better in the management of chronic patients.

> *"Not really, we are doing as much we can, with, with, the knowledge we have, the accessibility to drugs, the accessibility, to, uh, treating providers, and the willingness of the member, member not willing to do his part we cannot, enforce it, ya."* – Respondent 4

3.2 Change ideas developed to improve coverage ratios

Based on the barriers highlighted in 3.1, the quality improvement team developed possible change ideas (solutions) to address the issues identified using a driver diagram. The driver diagram that was completed is shown in Appendix 4. The primary drivers leading to low coverage ratios were: lack of patient education, inadequate training for healthcare providers and patients failing to set up doctors' appointments. These drivers were used to develop change ideas presented in Table 3.1

Table 3.2: Change ideas proposed

	Change Idea	**Impact of change**
1	Send short message service to patients reminding them to go for monitoring tests	Patients are aware of when they should go for monitoring
2	Get phone numbers of a close relative or friend of the patient	Makes it easier to keep contact with the patient
3	Make appointments for patients	Makes it easier for patient to receive monitoring tests
4	Remind the treating providers to carry out the monitoring tests	Ensures all monitoring tests are carried out
5	Create and share a dashboard of the team's performance	Improves team awareness of the organisational performance
6	Provide regular feedback from management	Creates a culture where employees feel important
7	Get approval for access to patient information up front on registration on the disease management program	Makes clinical records more complete
8	Review process of contacting treating providers to avoid repetition	Improves relationship with the providers
9	Propose benefit changes on the medical scheme to ensure screening and access to tertiary providers	Improves access to benefits needed for proper disease management
10	Review contract arrangements between the medical scheme and the administrator to allow access of patient information	Improves coordination of care among healthcare organisations
11	Send staff for further training	Improves and develops staff and improves individuals' perceptions of themselves
12	Send staff to conferences/workshops on diabetes care	Increases awareness of outer setting

In developing change ideas, the quality improvement team considered the primary drivers. The change ideas developed addressed the need for patients to be aware and able to go for monitoring tests and providers carrying out these monitoring tests. The developed change ideas are listed in Table 3.1 and were placed on the impact effort matrix to identify change ideas for implementation.

Table 3.3: Impact effort matrix

	Impact		
Effort	• Review contract arrangements between the medical scheme and the administrator to allow access of patient information	• Make appointments for patients	**High**
	• Review process of contacting treating providers to avoid repetition	• Send staff for further training	
	• Get approval for access to patient information up front on registration on the disease management program	• Send staff to conferences/workshops on diabetes care	
	• Send short message service to patients reminding them to go for monitoring tests	• Get phone numbers of a close relative or friend of the patient	**Low**
	• Remind the treating providers to carry out the monitoring tests	• Create and share a dashboard of the team's performance	
	• Propose benefit changes on the medical scheme to ensure screening and access to tertiary providers	• Provide regular feedback from management	
	High	**Low**	

The impact effort matrix in Table 3.2 shows the placement of each change idea in terms of relative ease to implement (effort) and the likely impact the change idea will produce. The highest win ideas are those that have a high impact while the effort of implementing the change idea is very low. The quality improvement team had in-depth discussion about each change idea before placing it in the appropriate quadrant. The quality improvement team selected provider education and member education and communication for implementation.

The quality improvement team decided to implement provider education as the first change. It was decided that from a process point of view, it is better to communicate with the providers first so that subsequent interventions that involve the patient would be more helpful. Rx Health identified providers who are most consulted by the diabetic patients (80%) and then sent communication to the providers with the organisations' expectations on the care of diabetics. A copy of the provider communication is in Appendix 6.

The next change implemented was member education and reminders. Rx Health identified all the diabetics that were due for monitoring tests and short message service reminders were sent to these patients. They were reminded that it is important that they receive these monitoring tests and that they should be sent a month before the monitoring tests are due. These short

message service reminders were automated in the system and would be a permanent arrangement. The short messages services were not shared by Rx Health for confidentiality reasons.

3.3 Results of implemented change ideas

Rx Health did not implement the change ideas as proposed by the implementation team. No explanation was provided for this. They instead implemented both change ideas at the same time. Rx Health sent communication out to the providers on the 21st of June 2019, i.e. week 25 of 2019. At the same time Rx Health initiated short message service reminders to diabetic patients to go for the monitoring tests.

The data for diabetics going for monitoring tests post implementation of the change ideas was provided in November 2019. The run charts for each monitoring test 12 weeks before implementation and 12 weeks after implementation are shown in Figures 3.1 to 3.3. The median was calculated using coverage ratios from week 15 to week 26, before the implementation of tests of change.

3.3.1 Process change after change ideas – Creatinine

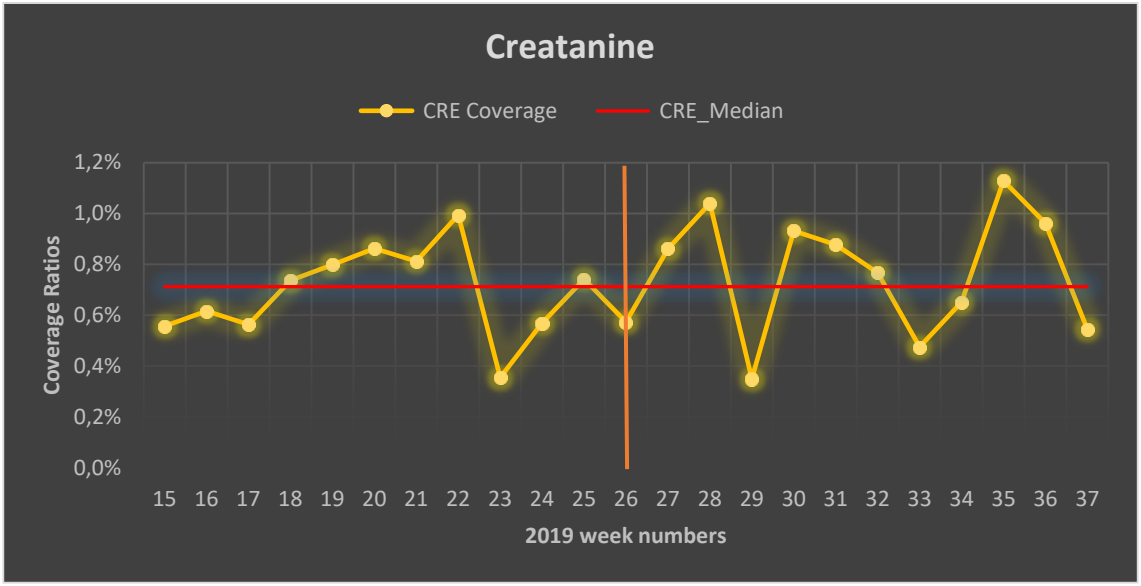


Figure 3.1: Creatinine ratio test coverage ratio run chart

The changes were implemented on the last day of week 25, therefore post implementation process coverage ratios are from week 26 going forward. The run chart in Figure 3.1 shows there is no evidence of a shift, a trend or any change in the process post implementation of changes. There are insufficient consecutive data points above the median (a maximum of 3 less than the six required) to suggest a shift in the process.

There are two data points on the median, week 18 and week 25, therefore there are 21 data points that may be used on the run chart in Figure 3.1. The number of runs on the run chart is 8, therefore using the table in Appendix 7, one may conclude that the process is random. A process with 21 data points that has 8 runs is a random process. A similar conclusion when one uses then number of runs is obtained as before when the shift and trend tests were used. It can be concluded therefore that the change ideas implemented did not impact the process.

3.3.2 Process change after change ideas – HbA1c

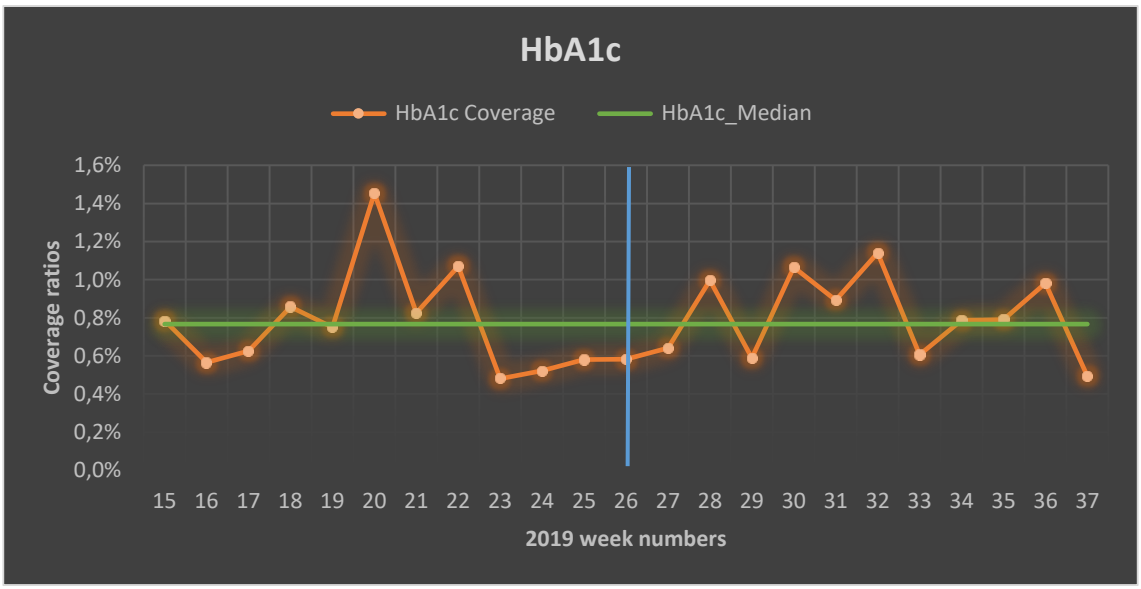


Figure 3.2: HbA1c test coverage ratio run chart

The same conclusion derived from figure 3.1 applies for figure 3.2. There is no evidence of a shift, trend or any change in the process post implementation of changes. The maximum number of consecutive data points above or below the median (after week 26) is 3; not enough to make a shift. There is a run from week 23 to week 28 but this starts before week 26 so the change may not be attributable to change ideas implemented. It can be concluded that the change ideas implemented did not impact the process.

For the HbA1c coverage ratios, there were four data points on the median, weeks 15, 19, 34 and 35. There are 19 data points that may be used on the run chart in Figure 3.2. The number of runs on the run chart is 9, therefore using the table in Appendix 7, one may conclude that the process is random. This conclusion is similar using the shift and trend test as before.

3.3.3 Process change after change ideas - LDL

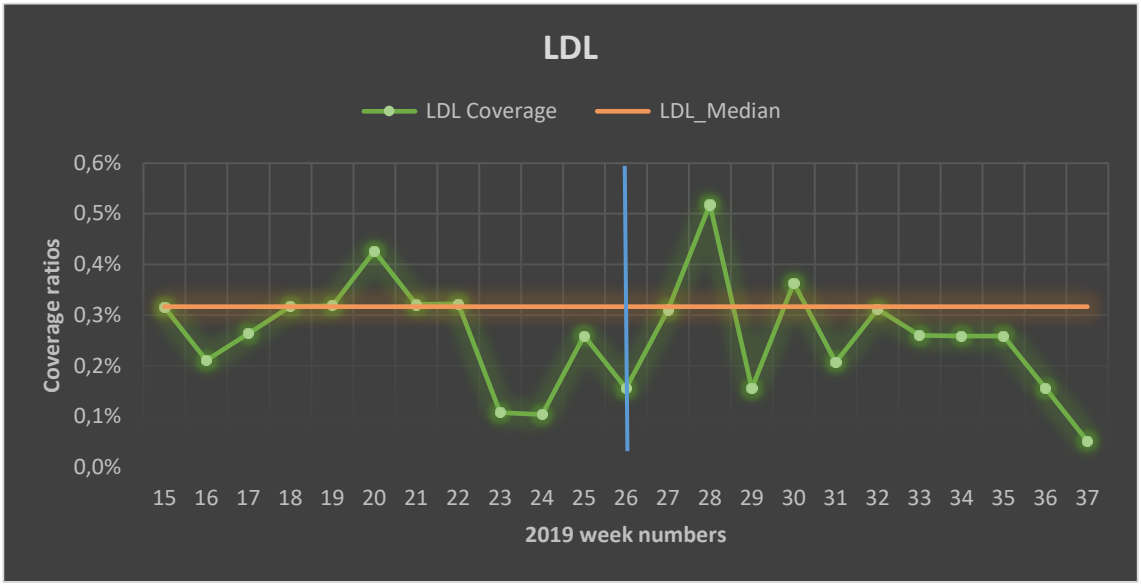


Figure 3.3: LDL test coverage ratio run chart

The LDL run chart (Figure 3.3) has 7 data points on the median leaving only 16 data points that may be used. The number of runs on the run chart is 7, therefore using the table in Appendix 7, one may conclude that the process is random.

However, when one analyses the process post implementation (after week 25), a shift is visible from week 31. All the data point after week 30 are below the median, with only week 32 lying on the median, there are six consecutive data points below the median. One may conclude that, the run chart for the LDL monitoring test shows that there was a shift in the trend, the shift was however in the opposite direction from the objective of the improvement exercise. The coverage ratio of the LDL test on the diabetics decreased.

4. Discussion and conclusions

This chapter discusses the findings of the study. It starts with a brief discussion of the barriers to achieving optimal coverage ratios at Rx Health, then a discussion of the change ideas established by the quality improvement team and then the effects of the change ideas tested. The chapter concludes by discussion of major findings and proposing recommendations.

4.1 Summary of findings

This study explored barriers to achieving optimal coverage ratios of monitoring tests for diabetics managed by Rx Health, developed strategies to improve the coverage ratio and tested for effectiveness of two of such strategies. There were serval barriers to care which are experienced at multiple levels of care by distinct parties involved in patient care. The selected change ideas were both targeted at communicating the need for patient monitoring at both providers and patients. These change ideas were implemented simultaneously but the coverage ratios did not improve as expected.

4.1.1 Barriers to care

Key components of the CCM are being implemented at Rx Health, but with limited success. Some of the challenges at Rx Health are limited human resource capacity, IT system challenges and a fragmented program of care that compromises the effectiveness of the disease management program. There are also challenges that are largely related to the external environment such as difficulty in contacting patients, limited access to patient records and poor benefit design by the medical scheme.

Fragmentation

The medical scheme is the organisation with the responsibility for ensuring quality care for the patients. The medical scheme has contacted several healthcare organisations to fulfil different but related functions in pursuit of its objective. The scheme has not allowed for efficient and sufficient coordination between the contracted parties.

The fragmentation leads to duplication functions among the contracted parties. Some healthcare providers are frustrated that they must provide data and information to multiple parties for the same patient. This is consistent with other studies; fragmentation was found to be a barrier to care on a study of barriers to care in non-communicable diseases in South Africa by Clouse *et al* (20,52). The HIV program for mother and child post childbirth was fragmented, mother and child visits were on different days increasing barriers to care for both mother and child (20).

Contracting arrangements

The benefit design on the scheme has been cited as a barrier to care; sometimes patients must pay out of pocket to access the required care. The scheme benefits are such that a patient must pay out of pocket before a diagnosis of diabetes is confirmed. The patients may not always have the financial resources to do so. This means patients may not receive the monitoring tests as required. Such financial barriers have also been identified as reasons why patients do not receive appropriate care (53,54). Wood et al found that patients did not receive enough primary care for non-communicable diseases because they did not have sufficient financial resources to travel for primary care visits (54).

At Rx Health, the identification of diabetic patients is left late, and they are only registered as diabetics when they have developed significant complications requiring medication and/or hospitalisation. This creates a scenario where Rx Health spends a disproportionate amount of time managing complex patients, neglecting the "controlled" patients who need reminders to go for monitoring tests.

Information systems

Information systems are a key component of providing care in managed care organisations. Rx Health uses one information system which is accessible to all employees involved in patient care – this is a positive. All chronic conditions managed at Rx Health are also on this platform which is a powerful feature as fragmentation of systems is avoided.

However, the IT system itself has several challenges; there are insufficient data fields to capture all the vital patient details, the lack of fields to capture the multiple treating healthcare providers and inflexibility in setting up reminders and follow up dates. The IT system also has some

components that are not automated; at times users must manually upload data onto patient records. Poor information systems have been found to be a barrier to care in other studies in South Africa (21). In a study to improve the management of non-communicable diseases in rural Limpopo province of South Africa, Maimela et al, found that the lack of a clinical information system was a barrier to effective care at some sites (21).

Employee engagement at Rx Health

Rx Health is internally focused. The staff at Rx Health rarely attend external conferences, go for training outside the organisation and have limited awareness of the regulatory environment in which they operate. There is also limited awareness of what similar organisations are doing in relation to chronic disease management. Similarly, the organisation structure and employee engagement have been identified as a significant barrier to effective care in other studies in South Africa. Maimela *et al* found that staff shortages, inadequate training of care givers and poor information flow at health facilities were barriers to care (21).

Provider education

In some instances, there is a disconnect between the practice of providers and the expected standards of care. Their providers do not provide monitoring tests as they should even when they see the patients. Rx Health suspects the providers are unaware of the benefit offered by the scheme and may not recommend the tests as they suspect the patient may have to pay out of pocket. The lack of training and poor dissemination of information and guidelines to providers has been identified as a barrier to care (21,54).

Patient factors

There are several patient factors identified that are barriers to care. The lack of patient education was one of them; the knowledge on self-management and its benefits and lack of awareness of the benefit offering by their medical scheme. Some patients are unaware that the scheme pays for the consultation and the related monitoring tests for all registered diabetic patients. The lack of knowledge was identified as a barrier to care for diabetics in other studies in South Africa (52,55). Wollum et al highlights lack of knowledge on self-management was a barrier to care amoung chronic patients, in a study to understand the prevalence and barriers to care on non-communicable diseases (52).

The patients managed by Rx Health are also difficult to contact, sometimes it is due to them changing their contact numbers regularly and not updating their contact details with Rx Health. The other reason is due to the patients' nature of work. A significant portion work in shifts at mines – their working hours do not always tally with normal business hours at Rx Health and even when they are at work, they will be in areas with no cell phone reception.

4.1.2 Change ideas developed

The change ideas developed with the QI team addressed the barriers above. The approach taken in coming up with change ideas is consistent with other studies, Harel et al, describes several approaches that a quality improvement team may adopt in coming up with change ideas (56). Harel et al describes tools such as the swimlane diagrams, driver diagrams and focus group discussions that are used to generate change ideas. They also note that other approaches may also be used such as root cause analysis in generating change ideas (56).

There are some which are outside the scope of Rx Health such as the fragmented arrangements and contract arrangements of the medical scheme. To address such barriers, the QI team put forward recommendations to the medical scheme to review these processes to be more efficient.

The QI team also developed specific change ideas that are within the control of Rx Health, ranging from IT system changes to provider education, patient education as well as the review of internal process. The expected impact of the change ideas was varied as well as the effort to implement the change ideas. This focused group discussion is consistent with approaches highlighted by Harel et al in selecting change ideas for implementation (56).

The highest win change ideas had the highest impact with minimum effort, and these were: provider communication, patient education and the proposal to improve the benefit offering by the scheme to screen for diabetic patients. The change ideas selected for implementation were provider communication through a letter explaining expected care guidelines and benefits offered by the scheme. The patients were sent short message service reminders to go for monitoring tests. These were sent a month before the test was due and the short message service reminders were automated on the system.

4.1.3 Tests of change

The implementation of the identified change ideas was not according to plan; perhaps this was due to poor understanding of the quality improvement process at Rx Health. The change ideas were implemented simultaneously and thus the results do not identify the effects of each change idea separately.

There was no improvement in the coverage ratios for the diabetic patients. The run charts indicate that the process did not change post implementation. It is important to understand why the process change did not take place as anticipated. It would be helpful for Rx Health to investigate if this was due to the change ideas not being implement correctly or if the change ideas were not effective.

Failure to follow implementation plans has been shown to impact implementation negatively in previous studies (57). A systematic review, Durlak et al, investigated the relationship between the quality of implementation and the implementation outcomes. In short they found when implantation quality is poor, implementation of intervention is not according to plan, the outcomes of intervention are often poor (58). The coverage ratios that did not improve because of the implemented change ideas may be partly attributed to failures in implementation process.

4.2 Limitations of the study

There are several limitations to this study; time constraints were identified earlier on. It takes a long time to wait for the results of implementing any change idea. This makes implementation of a small test of change difficult.

The implementation of the change ideas was not according to plan. This make is difficult to test the impact of each change idea independently. While it can be argued that implementing two change ideas at the same time should provide a bigger impact on the changed, a structured processes of implementing one change at a time may have help the quality improvement team build a more structured approach to quality improvement.

The study did not provide for checking the validity of the implementation process. Rx Health prepared the provider communication and distributed it to the providers. There was no mechanism provided to ensure that the intended communication did reach the treating providers. Similarly, with patients, there was no feedback loop to note that the patients did indeed receive the messages as intended.

The other constraint of the study is that key stakeholders to improve coverage ratios for patients were not included in the study. The healthcare providers prescribe monitoring tests and were not part of the study. Perhaps there are barriers they experienced to improving coverage ratios. The administrator and the medical scheme are also key stakeholders in providing care to diabetics and these organisations were not part of the quality improvement project.

4.3 Recommendations

4.3.1 Rx health

Rx Health staff heavily rely on their IT systems for their operations. This is in line with CCM discussed earlier. The staff can only be efficient to the extent that the system allows them to be so. There is need for more data fields on the system to capture test results, all the treating providers and automated reminders for instance. The other IT system challenges identified must be addressed; this will assist in optimising efficiencies and eventually improve the quality of care for diabetic patients. Rx Health must put in place a structured approach to improve systems and must involve system users in the process.

Rx Health is internally focused, the absence of the external focus presents a strong barrier to implementing the CCM in an effective way. There is no benchmarking carried out with other managed care organisations of any form. It will be more helpful if Rx Health exposed more of its staff to the external environment. This helps improve the implementation environment.

Quality improvement is an ongoing process which must be included in the business of Rx Health. It is recommended that Rx Health takes a structured approach to quality improvement and bring this to the core of its activity. Presently due to the challenges highlighted there is more focus on solving problems and challenges that arise in operations and less on how to

improve the overall effectiveness of Rx Health. A more proactive rather that reactive approach is required as other studies have found (59).

The quality improvement team identified several change ideas that may be implemented by Rx Health to improve the coverage ratios and the quality of care of diabetic patients. It is recommended that the quality improvement process continues in a systematic way by implementing these change ideas. Wood *et al* recommended that health facilities in Malawi embark on a continuous quality improvement journey as they care for their chronic patients (54).

4.3.2 Medical scheme

The fragmentation of care presents challenges which should have been addressed up front at the contracting stage. The poor benefit design must also be addressed up front and the limitation to patient records should be dealt with at the contracting stage. The benefit design on the medical scheme must be improved to ensure that there are enough benefits to provide effective diabetes management.

The medical scheme must review arrangements between the administrator and Rx Health to ensure there is enough sharing of information and data for effective disease management. These interventions would go a long way to reducing the effects of fragmented care and creating access to benefits at the right time. Other studies have recommended better sharing of information and reducing fragmentation as a strategy to improve quality of care (20).

The process of identifying chronic patients at Rx Health and the scheme is rather reactive and inappropriate. Diabetics are identified after an adverse event related to diabetes such as hospitalisation or chronic medication claims. This places Rx Health in a position where it must manage diabetics with disease progression in the late stages. Rx Health and the medical scheme must review the process of diabetes identification and allow for some screening of the medical scheme population. This recommendation is in line with other studies that recommended moving away from a curative approach and rather focus on a preventative approach (59).

4.3.3 The Council for Medical Schemes

The regulatory body for most of the healthcare organisations providing care in the private healthcare in South Africa, the CMS must provide more oversight over how care is provided. Both the administrator and Rx Health are regulated by the CMS. The arrangement of the medical scheme, Rx Health and the administrator is not unique, there are further similar arrangements in South Africa. When a medical scheme contracts multiple parties to provide care, the CMS must ensure that the barriers to care are limited or reduced due to the fragmented arrangements. During the accreditation/licencing process for the managed care organisations and administrators, the CMS must ensure there is sufficient integration among such related parties. Other studies have also recommended a move towards integrated care in the management of chronic diseases including diabetes (59).

Diabetes Mellitus is part of the Prescribed Minimum Benefits that must be paid for in full (subject to some conditions) by medical schemes as set out in the Regulations of the Medical Schemes Act (the Act) (60). The CMS' function is to ensure medical schemes comply with this Act, therefore the benefit design of all schemes must include benefits to provide for the care of diabetes starting from diagnosis to treatment. The barrier identified of no benefit for diagnosis should therefore not be evident if there is compliance with the Act.

4.4 Need for further research

This study explored barriers to care from the perspective of Rx Health. The study noted that there are more organisations and stakeholders that are involved in the care for diabetics. The barriers to care need to be explored from the perspective of the healthcare providers, the medical scheme, the patients, and the pathology laboratories. This will provide a more holistic view of the barriers to achieving optimal coverage ratios.

The implemented change ideas did not increase the coverage ratio as anticipated. It is unclear if the change ideas were in appropriate or were not implemented correctly. Further research is required to test these change ideas while monitoring implementation effectiveness. The other change ideas need to be tested to verify their effectiveness.

4.5 Contribution to field of study

The CFIR was a useful framework to explore barriers to care. Its wider use in similar studies is needed to increase its application as a tool for identifying implementation gaps.

The CCM is a useful framework for understanding how chronic disease management programs should be run from the perspective of managed care organisations. Indeed, all components of the CCM exist at Rx Health. There are however some components of the CCM that require improvement.

The tools used in implementation research, the swimlane diagram, driver diagram and the impact effort matrix were useful for describing and explaining the process of care, developing change ideas and selecting change ideas for implementation. This is consistent with other implementation research projects.

4.6 Conclusion

The study has identified several barriers to care for diabetes patients at Rx Health. This has allowed Rx Health to reflect on their processes with a view to improving quality of care. Rx Health has taken some steps to improve the quality of care for patients under their care. While the study has not been able to demonstrate improvements in the quality of care though increases in coverage ratios, Rx Health has initiated the process to improve their processes of care, potentially these will result in better coverage ratios over time.

Some of the barriers to achieving optimal coverage ratios must be addressed by the medical scheme to improve the care of patients. The scheme needs to ensure there is proactive screening of patients; this allows for timely care for patients. The medical scheme must also review its benefit offering to include appropriate benefits for diabetics and better communicate these benefits to providers and beneficiaries.

The regulatory body, the CMS needs to review its regulatory practices to ensure the effects of fragmented arrangements do not compromise the care beneficiaries receive across medical

schemes. The CMS needs to provide better oversight on the benefits offered by medical schemes to ensure full compliance with the Act, thus improving care for beneficiaries.

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Appendix 1: Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R14/49 Mr Charlton Murove

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M180141

NAME: (Principal Investigator)	Mr Charlton Murove
DEPARTMENT:	School of Public Health A Managed Care Organisation
PROJECT TITLE:	Quality Improvement of the Diabetes Disease Management Program at RX Health, a managed care organisation in South Africa
DATE CONSIDERED:	26/01/2018
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr Latifat Ibisomi
APPROVED BY:	Professor CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	22/08/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in January and will therefore be due in the month of January each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date 28 August 2018

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix 2A: Interview guide for administration team

General Questions
For record purposes please specify your year of birth.
For record purposes please specify your gender.
For record purposes please specify your job title.
When did you start working at Rx Health?
Please state your job description.

Intervention Characteristics	Inner Setting	Outer Setting	Individual Characteristics	Process
Describe your understanding of Rx Health's process of care.	Describe your organisational structure.	Please summarise the overall feedback you receive from patients.	In your understanding, how should a MCO manage chronic patients?	Describe how patient care is organised at Rx Health.
How do patients contact Rx Health for any form of assistance?	Describe what you normally do before calling a patient?	Is there any form of training you received in the last year on diabetes care?	Follow-up question to preceding question: What other way(s)/model(s) of managing chronic patients is/are there?	How many people are involved in this plan of care?
Describe the relationship of Rx Health and healthcare providers.	How does Rx Health manage complex patients? An example of a complex patient would a be a patient with multiple chronic conditions.	Is there any conference or workshop on diabetes you attended in the last year on diabetes care?	What type of training would make you better in your position?	In your view is the care of diabetics taking place as planned? Please substantiate your response.

	Who is responsible for solving complex problems?	Can you summarise your understanding of CMS perspectives on diabetes care.	Is there any other thing your organisation can do for you to make you do your job better?	How are complex problems resolved?
	How are work related matters discussed?		How would you Describe your contribution to Rx Health?	
	How do you think care for diabetics may be improved?			
	How is the performance of Rx Health on patient care shared?			
	How are best performing employees rewarded?			

Appendix 2B: Interview guide for information technology/systems team

General Questions
For record purposes please specify your year of birth.
For record purposes please specify your gender.
For record purposes please specify your job title.
When did you start working at Rx Health?
Please state your job description.

Intervention Characteristics	Inner Setting	Outer Setting	Individual Characteristics	Process
Describe your understanding of Rx Health's process of care.	Describe your organisational structure.	Is there any form of training you received in the last year?	In your understanding, how should a MCO manage chronic patients?	Describe how patient care is organised at Rx Health.
How do patients contact Rx Health for any form of assistance?	How does Rx Health manage complex patients? An example of a complex patient would a be a patient with multiple chronic conditions.	Is there any conference or workshop you attended in the last year?	Follow-up question to preceding question: What other way(s)/model(s) of managing chronic patients is/are there?	In your view is the care of diabetics taking place as planned? Please substantiate your response.
Describe the relationship of Rx Health and healthcare providers.	Who is responsible for solving complex problems?	Can you summarise your understanding of CMS perspectives on diabetes care.	What type of training would make you better in your position?	How are complex problems resolved?

	How are work related matters discussed?		Is there any other thing your organisation can do for you to make you do your job better?	
	How do you think care for diabetics may be improved?		How would you Describe your contribution to Rx Health?	
	How is the performance of Rx Health on patient care shared?			
	How are best performing employees rewarded?			

Appendix 3: Process map at Rx Health

The swimlane diagrams were used to map the processes of care at Rx Health. This diagram helps explain the responsibilities of individuals in a process. This shows the process follow and key decision points along a process. The diamonds represent decision points along the process.

There were two process flows; one for new registrations of newly diagnosed beneficiaries and the other for existing diabetics. The same team works on both processes. Figure 6 represents the process follow for the registration of new diabetic patients.

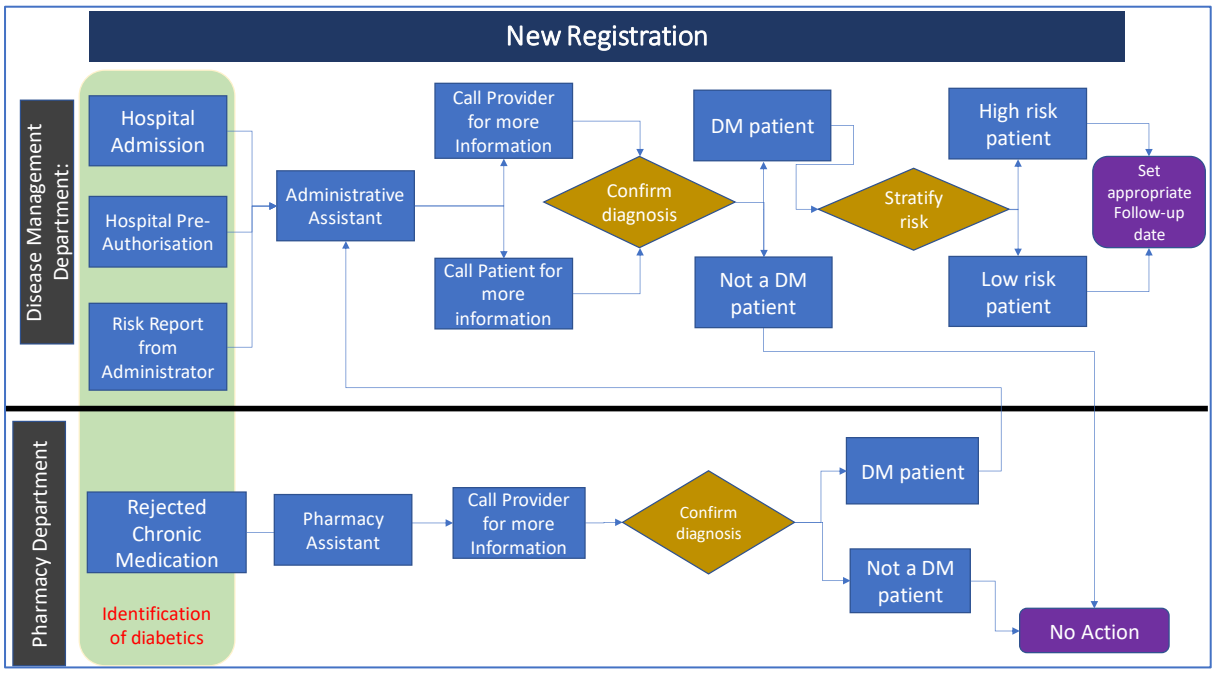


Figure A.1: Process for registering new DM patients

The registration process is initiated when a potential diabetic patient is identified. The diabetics are identified through hospital admissions, pre-authorisations for hospital admissions, risk reports from the administrator and declined diabetes chronic medicine claims.

Once a potential diabetic is flagged, the administrative assistant calls both the patient and the treating provider to confirm the diagnosis. If the potential patient is flagged through declined chronic medication, it is the pharmacy assistant who calls the provider. For confirmed

diabetics, the pharmacy department refers the case to the administrative assistant. As a result, two calls may have to be made to the treating provider.

When the diabetes diagnosis is confirmed, the administrative assistant classifies this patient as either a high risk patient or low risk patient and then sets an appropriate follow-up date on the system.

Figure 7 represents the process follow for registered diabetic patients.

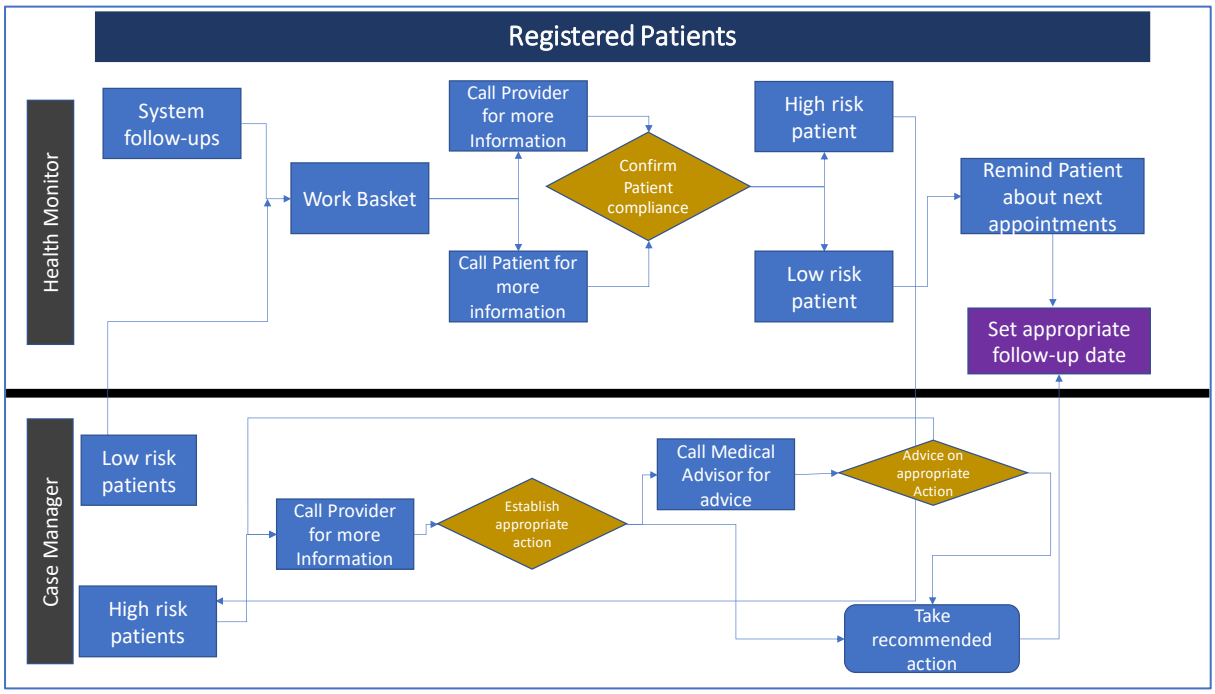


Figure A.2: Process for managing registered DM patients

For the registered diabetic patients, the follow-up process is two-tiered. One for diabetic patients classified as high risk and the other for low risk patients. For the high risk patients, the case manager handles the communication and may involve the medical advisor for clinical support. The complex patients were described as those who have multiple chronic conditions and patients suffering from medication side effects.

The low risk patients are handled by the health monitor. Low risk patients are often compliant with their medication and treatment plans. The health monitor calls the patients and reminds them about their appointments. As part of the call, the health monitor may re-classify some

patients as high risk in cases where they do not follow treatment plans. The patients re-classified as high risk are escalated to the case manager for appropriate intervention.

Appendix 4: Driver diagram

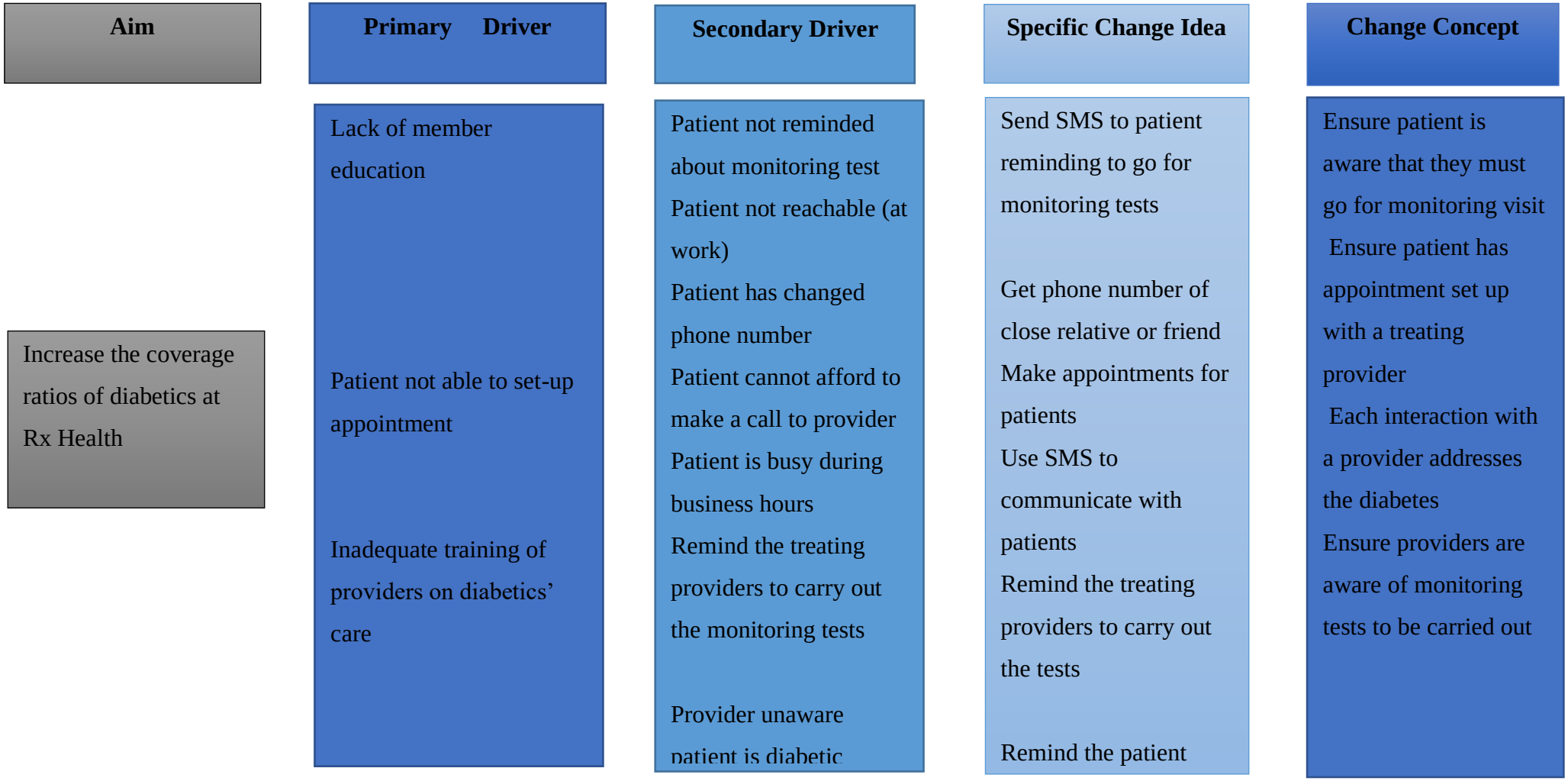


Figure A.3: Driver Diagram for Improving coverage ratios

Appendix 5: Consent forms

Participant's Consent Form

Research Project Topic**:** Quality Improvement of the Diabetes Disease Management Program at Rx Health, a managed care organisation in South Africa.

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project called: *Quality Improvement of the Diabetes Disease Management Program at Rx Health, a managed care organisation in South Africa.*

I, _____ give my consent for the following:

Permission to review/collect documents/artifacts	**Circle one**
Permission to be interviewed	
I would like to be interviewed for this study.	YES/NO
I know that I can stop the interview at any time and don't have to answer all the questions asked.	YES/NO

Informed Consent

I understand that:

- my name and information will be kept confidential and safe and that my name will not be revealed,
- I do not have to answer every question and can withdraw from the study at any time,
- I can ask not to be audiotaped, and
- all the data collected during this study will be destroyed within 2-6 years after completion of my project.

Sign_____Date_____

Recording Consent Form

Quality Improvement of the Diabetes Disease Management Program at Rx Health, a managed care organisation in South Africa

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Participant Declaration:

In addition to the signed informed consent, I hereby confirm that I am aware that this interview will be recorded, and the recording will be safely kept for a minimum of 2 years. I therefore consent for the tape recorder to be used during my interview.

_____	_____	_____
Name of Participant	Signature	Date

Researcher Statement:

I hereby declare that the information gathered using the recording device is for purposes of gathering information efficiently and will be used for transcribing purposes only. The recording device will be securely protected and information kept confidential.

_____	_____	_____
Name of Researcher	Signature	Date

Appendix 6: Provider communication from Rx Health

Dear Service Provider

Rx Health is the Managed Health Care organization appointed by [redacted] Medical Scheme to provide the Disease Management programme for diabetes care. We provide appropriate and cost-effective medical aid solutions to ensure that beneficiaries receive optimal medical care.

Please note that the diabetes management program is **not a capitation program.** As per [redacted] Scheme rules; ICD-10 fine codes e.g. E11.7 and tariff codes must be supplied for all PMB related claims. **Claims** will continue to be processed as per normal and all patients will remain under the care of their current treating doctor.

RX Health's Diabetes Management team aim to support your patient to achieve the best possible outcomes and improve the self-management of your patient's diabetes and co-morbid conditions.

Goals of the programme

- Ensure effective appropriate medical care is delivered.
- Ensure that beneficiaries are supported to make optimal and appropriate use of their available medical scheme benefits.
- Educate and provide excellent patient support by professional development, evidence-based practice, and quality improvement activities to ensure optimal treatment outcomes.
- Apply continued guidelines for the comprehensive management of beneficiaries registered for chronic medication.

Elements of the programme

- Diagnostic screening
- Consultations
- Monitoring pathology
- Monitoring device
- Medicine on formulary
- Appropriate care for diabetes emergencies
- Diabetic foot care
- Diabetes dietary advice
- Eye care

Medicine prescribed for the treatment of the condition that is **not on the formulary** needs to be motivated and will be referred to the medical advisor for clinical review

Formularies refers to

- Mediscor ChroniLine standard formulary: link http://www.mediscor.net/formularly_lookup_t.html
- Universal: Email chronicmedicine@universal.co.za Call center 086 011 1900 Office 011 208 1100

The Diabetes Programme is developed to provide access to the PMB level of care for the beneficiaries of the Scheme. Diabetes is a chronic illness that require continuous medical care to prevent acute complications and management of the co-morbid conditions e.g. hypertension, CVD, etc.

For registered members, annual follow up monitoring is required to ensure our member is well controlled on treatment and sustain lifestyle changes. Please forward the related test results and investigations to Rx Health's Pharmaceutical Management department at pharmaceutical.management@rxhealth.co.za.

Yours sincerely,

Rx Health Managed Care
Call center 0861 083 084
Fax 0866 702 623

Appendix 7: Randomness test for run charts

Total number of data points on the run chart that do not fall on the median	Lower limit for the number of runs (< than this number runs is 'too few')	Upper limit for the number of runs (> than this number runs is 'too many')
10	3	9
11	3	10
12	3	11
13	4	11
14	4	12
15	5	12
16	5	13
17	5	13
18	6	14
19	6	15
20	6	16
21	7	16
22	7	17
23	7	17
24	8	18
25	8	18
26	9	19
27	10	19
28	10	20
29	10	20
30	11	21
31	11	22
32	11	23
33	12	23

* From Perla *et al*, 2011