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Compliance of medical practitioners with diabetic treatment guidelines at Dr Yusuf Dadoo Hospital, West Rand Health District Gauteng

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COMPLIANCE OF MEDICAL PRACTITIONERS WITH DIABETIC TREATMENT GUIDELINES AT DR YUSUF DADOO HOSPITAL, WEST RAND HEALTH DISTRICT GAUTENG

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Johannesburg, 2022

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DECLARATION

I, NJ OHANSON, hereby declare that this research is my own unaided work, except where due acknowledgement for assistance received has been made. It is being submitted for the degree of Master of Family Medicine at the University of the Witwatersrand, Johannesburg. It has not been submitted previously for any other degree or examination at this or any other university.



Signed …….. (Signature of candidate)

Date: December 2022



Signed **.....**

Dr D Pretorius (Supervisor)

Date: December 2022

`

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This author also extends a sincere thanks to the clerks of Dr Yusuf Dadoo Hospital who assisted in the retrieval of patient records which made the data for this project a success.

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DEDICATION

I dedicate this research report to my family, particularly my Mom, for all the unconditional support and understanding of the sacrifices required for the completion of this work.

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TABLE OF CONTENTS

DECLARATION ii
ACKNOWLEDGEMENT.....iii
DEDICATION.....iv
LIST OF FIGURES vi
LIST OF TABLES.....vii
NOMENCLATURE.....viii
COMPLIANCE OF MEDICAL PRACTITIONERS WITH DIABETIC TREATMENT GUIDELINES AT DR YUSUF DADDO HOSPITAL WEST RAND HEALTH DISTRICT GAUTENG…….…… ix
ABSTRACT..... **Error! Bookmark not defined.**
INTRODUCTION ..... **Error! Bookmark not defined.**
METHODS AND DESIGN..... **Error! Bookmark not defined.**
RESULTS: ..... **Error! Bookmark not defined.**
DISCUSSION..... **Error! Bookmark not defined.**
CONCLUSION..... **Error! Bookmark not defined.**
REFERENCES ..... **Error! Bookmark not defined.**
ARTICLE REQUIREMENT……21
Acknowledgment……...21
Competing Interests…….……..21
Authors contribution……..…….21
Funding Information…….……...21
Data Availability……..21
Disclaimer ……...21
APPENDICES……...….22
Appendix I: Data collection tool…….22
Appendix II: Patient Information and Consent forms…….…….25
Appendix III: SEMDSA organisation of care ……..……30
Appendix IV: Ethical Clearance certificate ……..……32
Appendix V: Permissions……..……..33
Appendix VI: Turnitin report…….……35
Appendix VII: Proof reading certificate…….……36
Appendix IX: Research proposal……...37

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LIST OF FIGURES

Figure 1: Multi-layered consequence of non-compliance with DM guideline

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LIST OF TABLES

Table 1: Patient profile as documented in the reviewed file……6

Table 2: Documented routine examination in reviewed files……..7

Table 3: Documented number of examinations in reviewed files……..7

Table 4: Documented routine investigations, glycaemic and target organ damage in reviewed files……8

Table 5: Adequacy of diabetes control according to SEMDSA guidelines of 2017……..9

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NOMENCLATURE

ARV	:	antiretrovirals
BMI	:	Body Mass Index
COPD	:	Chronic Obstructive pulmonary disease
DHIS	:	District Health Information System
DM	:	diabetes mellitus
DPN	:	Diabetic Peripheral neuropathy
ECG	:	Electrocardiogram
IDF	:	International Diabetes Federation
LDL	:	low density lipoprotein
OPD	:	Out-patient Department
SEMDSA	:	Society Endocrinology Metabolism and Diabetes South Africa
SSA	:	Sub-Saharan Africa

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Compliance of medical practitioners with diabetic treatment guidelines in Dr Yusuf Dadoo Hospital, West Rand Health District, Gauteng.

An article submitted according to the style guide and requirements of the **African Journal of Primary Health Care & Family Medicine** (PHCFM).

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Abstract

Background: Diabetes (DM) is a common chronic condition. The prevalence is increasing globally and has become a common health care problem associated with multiple complications. Guidelines have been formulated to standardise care among people living with DM, with aim of optimising patient care and thus minimising the complications.

Aim: The aim of this study was to assess how well health care practitioners in Dr Yusuf Dadoo Hospital complied with the most recent diabetic treatment guideline, SEMDSA 2017.

Setting: This **s**tudy was conducted in the out-patient department of Dr Yusuf Dadoo hospital in the Westrand Health district of Gauteng.

Methods: A retrospective cross-sectional review of patient record living with diabetes was done. Three hundred and twenty-three Record of patients seen from August 2019 to December 2019 were reviewed and some of the basic variables were assessed according to the most recent diabetic treatment guidelines SEMDSA 2017.

Results: files were audited in 4 main categories. Comorbidities, Examinations. Investigations, presence of complications. In terms of monitoring parameters, only 40(12.4%) had HbA1c assessed 6monthly, with annual creatinine assessed in 179(55.4%) and lipogram 154(47.7%) of patients. More than 70% of patients had uncontrolled glycaemia. More than 70% of patients had uncontrolled glycaemia. The most frequently documented target organ screening/examinations were foot related at 8.7% (28) and all of them had established complications. Only 2 people were screened for erectile dysfunction.

Conclusion: Adherence to DM treatment guidelines was found to be poor. Monitoring and control parameters were infrequently done as per guideline recommendation. The resultant effect are poor glycaemic control and therefore numerous complications. The study site and thus the West rand needs targeted strategies to improve medical practitioner adherence to guidelines including adequate interpretation of results, timely intervention, when necessary, as a way to improve DM care and thus minimise the risk of complications amongst patients in the district

Keywords: Adherence; Compliance; Diabetes; Medical practitioners; treatment guidelines; SEMDSA guidelines

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INTRODUCTION

There has been a rise in the prevalence of diabetes mellitus (DM) in Africa and sub-Saharan Africa (SSA) due to increasing urbanisation and economic development.[1] About 415 million people are living with DM globally and the estimated national prevalence in South Africa is estimated at 15.25%.[2]

The rise in prevalence in Africa and Sub-Saharan Africa (SSA) could probably be due to the increasing urbanization and economic development in the region.[3] The increase in rural-urban migration has also led to changes in food and diet. The difference in dietary trends has moved from fresh foods to over-processed and canned food.[4] There is also a corresponding increase in a sedentary lifestyle, which predisposes to obesity as a significant risk factor for diabetes.[4] The current HIV epidemic in Sub-Saharan Africa (SSA) and with associated increasing use of Anti-Retroviral therapy (ARVs) also increased the risk of insulin resistance.[5] Furthermore, the effect of the COVID 19-pandemic with it's seemingly bidirectional relationship with diabetes, increase the number of patients living with diabetes in South Africa.[6] In addition, the presence of DM significantly increases the risk of severe disease and mortality compared to people without DM.[7]

A systematic review of 49 articles assessing the quality of primary care on diabetic outcomes has, found that high-quality primary health care was associated with clinical guideline compliance that also significantly reduced hospital admissions and complications for people living with DM.[8] Quality clinical care is important and therefore the question was raised to what extent did doctors comply with guidelines in the management of patients living with diabetes in West Rand Health District, Gauteng.

Guidelines have been formulated in various countries globally to standardise, improve, and optimise the quality of care for patients with diabetes mellitus. Clinical guidelines are systematically developed recommendations that assist medical practitioners in making informed clinical decisions to improve the management of diabetes. They are derived by synthesising high-quality scientific evidence regarding specific aspects of patient care.[9] Benefits and risks are weighed against the evidence gathered and recommendations are translated into guidelines. The objectives of clinical care guidelines, therefore, are to standardise and ensure uniformity of patient care, thereby

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improving the quality of patient care and minimising risks.[9,10] Health care compliance therefore refers to the process of abiding with all legal, professional and ethical standards in health care.[11]

In South Africa, the Society for Endocrinology Metabolism and Diabetes South Africa (SEMDSA) has formulated clinical guidelines to provide guidance on the most appropriate management for people with diabetes. In addition, clinical guideline on DM, enhance diabetes prevention efforts, reduce the burden and complications of the disease and inform clinical decisions made by health care practitioners.[12] Although clinical guidelines on diabetes are readily available in various clinical settings in South Africa, despite the advances in scientific evidence based clinical recommendations, several studies show that physicians adhered poorly with diabetic treatment guidelines.[13,14] Treatment gaps have been found in various other studies regarding the management of DM among patients locally and abroad, and they have also been found to be associated with poor adherence with clinical guidelines.[15,16]

In Norway and Switzerland, the researchers discovered significant discrepancies between the laid down clinical guidelines and the practices of healthcare practitioners.[17,18] In addition, the Diab–Africa project, done across six countries in sub-Saharan Africa, has found that less than half of patients had glycaemic levels and monitoring parameters assessed in the study year.[19] Similarly, Kibirige et al[20] in Uganda has found that glycaemic, blood pressure control and screening for diabetic complications were poorly done by healthcare workers.

In two South African studies, it was found that healthcare practitioners complied poorly with the recommended diabetes treatment guidelines. In a district hospital in KwaZulu-Natal, poor health outcomes were mainly contributed to poor adherence with the current diabetic guidelines.[21,21] In Kwa-Zulu Natal only 25% of patients had their HbA1c levels done the preceding year, and in Tshwane, Pretoria, there was infrequent monitoring of glycaemia in terms of the audited files (half of which had no blood glucose recorded, and more than 80% had no urine testing done).[20,22] The National Development Plan aimed already in 2017 to reduce the disease burden to manageable levels and decrease medico-legal risks and litigation.[23, 24] Guidelines protect doctors and following it curb costs by decreasing the burden of disease and its complications,

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preventing additional diagnostic examinations, and simultaneously decrease the risk of litigation.[23, 24]

The researcher observed clinical inconsistencies, and sub-optimal patient care in her workplace that were anecdotally attributed to possible poor adherence to clinical guidelines, burn out and excessive workloads. The concern is that a lack of standardised care would lead to numerous complications among these patients which by itself is not only to the detriment of the patient, but also increases the work burden. The need to assess adherence to guidelines was identified. In addition, this seems to be the first study assessing adherence with the guidelines in this district. The aim of this study, therefore, was to assess how well medical practitioners working at a district hospital in Westrand adhered with the most recent diabetic treatment guidelines (SEMDSA 2017).[12]

METHODS AND DESIGN

Study design: A retrospective cross-sectional review of patient records was done..

Setting: The setting was the Out-patient Department (OPD) of Dr Yusuf Dadoo Hospital, Krugersdorp, in the Mogale Municipality in the West Rand Health District of Gauteng with a population of about 383 864 (according to the 2016 population survey). An average of 10−15 patients with diabetes are seen daily at this OPD.

Sampling: The target population are adult patients living with diabetes attending regular follow-up at the OPD at this hospital. The files of patients living with diabetes older than 18 years at this OPD clinic between April 2018 and March 2019 were estimated to be about 2112 per annum by the District Health Information System (DHIS) information. The sample was calculated with Epi-info software version 7[25] using a confidence interval of 95% and a sample error of 5%, 343 files were reviewed while 20 files were discarded based on the exclusion criteria.

The records of patients seen from 1st August 2019 to 31st December 2019 were eligible for review. Convenience sampling - a non-probability sampling method, was used where every file on the Diabetes OPD register was audited in a consecutive manner until the sample size was reached. As patients consulted more than once during the sampling period; repeat files were only captured once and the most recent version

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during the selected period, was audited. The most basic variables were assessed according to the most recent diabetic treatment guidelines SEMDSA 2017.[11] The SEMDSA guidelines was used as the gold standard for DM care. The core aspects measured in this study, is incorporated in hospital guidelines and thus evidence-based diabetes management.

Selection was done using the diabetes daily register of patients in the OPD**.** Medical records of patients that presented for ambulatory care and who were diagnosed for at least one year with diabetes were included in the study. Files of patients seen during weekends and pregnant diabetics were excluded from the study. Files not meeting inclusion criteria were discarded for the research and the next file was selected until sample size was reached. Where a file could not be traced, the next file was selected.

Data collection and tools: The OPD register was used as a primary source of patient records, whereafter the administrative staff were asked to retrieve files. The researcher then assessed whether the files met the inclusion criteria, and a tracking list was completed. When a file met the inclusion criteria, the researcher included this in the data collection list; thereafter the file was marked as being audited and returned to the archives. The 2017 SEMDSA[11] guideline was used to develop the tool and variables were extracted from the document. The patient profile of reviewed documents included the following variables selected from the guideline:

- Co-morbid conditions
- Presence of complications
- Routine examination: for feet, blood pressure, waist circumference, Body Mass Index (BMI), weight
- Medications
- Routine Investigations to screen for presence of target organ damage: i.e., glucose testing at each visit, 3-6 monthly HbA1c, annual lipogram, annual serum creatinine and eGFR, urine dipsticks, urine albumin creatinine ratio

Data Analysis: Data were captured onto an Excel spreadsheet and analysed using STATA vs 16. Descriptive analyses were used to summarise the data, and results were presented in tables.

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Limitations: Convenience samples have low external validity or generalizability, therefor the study must be interpreted within the context of the study. Using files in a consecutive manner limited sampling, selection and researcher bias that are common in convenience sampling. Failure to document examination or investigation findings were reported as not done, even if the patient might have had the benefit of the service, as this study reflects on recorded data.

Ethical Considerations: Permission to conduct the study was obtained from the Human Medical Ethics Committee University of the Witwatersrand (M200117) and the Gauteng Health Research Committee Database (GP_202007_010). No identifiers of persons were used; thus, all data were anonymous and confidential. As the study was a retrospective record review of archived files, patient consent was not required. Data will be stored safely for a period of two years after publication of the results, after which it will be discarded in a safe manner.

RESULTS:

Three hundred and forty-three files were reviewed, while the 20 files that did not meet the inclusion criteria were discarded. Therefore, three hundred and twenty-three patient files were reviewed. This translates to the records of 165 (51%) women and 158 (48.9%) men who were reviewed (Table I). The mean age of the patients was 60 and more than half (195; 60.4%) were unemployed.

In terms of co-morbidity, hypertension was the most frequently documented condition (Table I). Two hundred and eighty **(**86.7%) patients lived with hypertension, 27 (8.4%) had arthritis, 23 (7.1%) had gout; 21 (31.7%) had asthma, and chronic obstructive disease (COPD) as co-morbidities. In addition, one hundred and eighty patients 180/323 (55.7%) were taking oral cholesterol-lowering therapy. This is shown in Table 1.

Table 1: patients profile as documented in the reviewed files(n=323)

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Demographics	Categories	frequency	Percentage
Gender	Women	165	51.1
	Men	158	48.9
Employment	Employed	128	39.6
	Unemployed	195	60.3
Hypertension	Yes	280	86.7
Current medication	Oral agents	187	57.9
	Insulin only	35	10.8
	Oral & insulin	144	44.6
	Simvastatin	180	55.7

`Further, it should also be noted that only 36/323 (11%) patients were referred to annual eye assessment to either optometry or ophthalmology, but the results of assessments were not documented in patient records. Although documented foot examinations were done, they were for only 28/323 (8.7%) of patients. In addition, the SEMDSA guideline requires referral to a dietician, and adequate health education by the attending physician; however, only 129 (39.9%) patients were referred to a dietician and 204 (63.4%) had documented health education.

In terms of the documented routine examinations, the analyses of all the files reviewed (100%) had blood pressure measurements done and recorded. However, other examinations – foot exam, fundoscopy, weight, BMI and injection sites were markedly absent (see Table 2).

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Table 2: Documented routine examinations in reviewed files (n=323)

Examination	Frequency	Percent
Blood pressure	322	99.7
BMI	38	11.8
Weight	37	11.5
Fundoscopy	36	11.1
Foot exam	28	8.7
Waist Circumference	8	2.5
Injection Sites	7	2.20

BMI: Body Mass Index

In addition, the most frequently documented complication was diabetic foot complications which included (neuropathy, foot- ulcers, gangrene) for 28 (8.7%) patients. Cardiovascular and renal complications (nephropathy) were also common (see Table 3).

Table 3: Documented number of complications in reviewed files (n= 323)

Complication	Frequency	Percentage (%)
Foot complications	28	8.7
Cardiovascular	24	7.4
Nephropathy	22	6.8
Retinopathy	19	5.9
Erectile dysfunction	2	3.7
Others	3	0.9
Unknown	225	69.7

In the performance of routine investigations and screening for target organ damage, at each clinic visit, 99% of all patients had blood glucose checked and documented at each clinic visit. One hundred and sixty-four (50.65%) patients had HbA1c checked the previous year, and of these only 14 (4.3%) had levels <7%. Six-monthly HbA1c

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was done for 40 (12.4%) patients and only three patients had their HbA1c assessed more than twice that same year (Table 4).

One hundred and fifty-four 154(47%) of patients had an annual lipogram test. Ninety nine of these 154(64%) had TC levels less than 4,5mmol/l. LDL test results were consistently greater than 1.8mmol/l in 62.3% of these patients. More than half of patients had serum creatinine and eGFR measured and documented. Of these only 51% had normal results. One hundred and sixty-four 164(50.6%) patients had Urine dipsticks done, but only 11 of these patients had urine albumin-creatinine ratios assessed.

Table 4: Documented routine investigations, glycaemic and target organ damage in reviewed files (n=323

Examinations	Done(n)	Percentage
HGT	322	99.7
3 monthly HbA1c	3	0.9
6 monthly HbA1c	40	12.4
Annual HbA1c	164	50.8
Annual serum creatinine	179	55.4
Annual Lipogram	154	47.7
Urine dipsticks	164	50.8
Urine Albumin: creatinine ratio	11	3.4

HbA1c: glycated haemoglobin test

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Table 5: Adequacy of Diabetes control according to SEMDSA 2017

Indicator	SEMDSA CUT OFF	NUMBER ABOVE CUT OFF	PROPORTION (%)	Mean (SD)	Median	Range
HbA1c	≥7	111/164	67.6%	9.54 (2.23)	9.60	15.95
Serum creatinine	≥ 90	87/179	48.6%	81.20 (38.06)	78.00	3.04
Total cholesterol	≥ 4.45	55/154	35.7%	4.45 (1.05)	4.30	6.01
LDL	> 1.8	96/154	62.3%	2.28 (0.41)	2.35	5.34
HDL	≤ 1.2	100/154	64.7%	1.28 (0.41)	1.30	1.91

HbA1c: glycated haemoglobin test

LDL: Low density lipoprotein

HDL: High density lipoprotein

DISCUSSION

In this study, the compliance of doctors with diabetic treatment guidelines in the management of diabetic patients in a district hospital are explored. The results show poor compliance across various aspects of the SEMDSA guidelines. Markers of control and other process-of-care indicators were either not being done or not being documented.

According to the International Diabetes Federation (IDF),[1] DM is on the increase in low-income countries. The consequences of poor compliance with diabetic treatment guidelines are increases in morbidity and mortality, resulting in poorer outcomes.

Glycaemic control as measured by Hba1c is the single most important factor in assessing the control in diabetic patients because it has a strong predictive value for diabetic complications and is thus the best indicator of the effectiveness of diabetes care.[26] Most of the research on diabetes has shown that diabetic complications are directly related to glycaemic levels and the prevalence of diabetic complications sharply and significantly increase as the glycaemic levels rise. [27] The recommended glycaemic target is 7%, and every 1% above this level has been associated with a 38% to 40% higher risk of micro and macrovascular complications, as well as death.[27,

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[28] The finding of this study in terms of glycaemic monitoring and control, therefore, also shows that irregular monitoring is likely to contribute to poor glycaemic control.

The fact that this study shows inadequate assessment and monitoring of glycaemic control could mean increased risk of complications in these patients. These negative findings are similar to various local studies in South Africa and many countries in the African continent.[14,21,22] Research suggested that low income countries, for example Mexico also have poor compliance to guidelines.[29] In contrast, in high income countries, glycaemic monitoring in USA and Europe was done at recommended intervals showing a higher compliance rate with guidelines.[30 31] Developed countries have a higher doctor to patient ratio that could contribute to more time per consultation and probably better adherence and /or documentation of the consult. The researcher acknowledges the differences in health care systems and resources in these countries, but also hypothesized that a more structured approach to diabetic patient care and a lower patient-to-doctor ratio compared to their South African counterparts can contributed to better adherence and management of DM in developed countries.

The consequence of poor glycaemic monitoring and control are complications. Diabetic foot problems were the most common complication found in this study and it is interesting to note that all patients who had a documented foot exam had abnormal findings. The SEMDSA guidelines were designed to prevent, and limit complications when regular screening is done. However, in this present study, it is unclear if the foot exams were done due to complaints or following guidelines. Even though the present study did not establish the duration of DM, the risk of diabetic peripheral neuropathy (DPN) increases with the duration of diabetes and it's presence is associated with the presence of microalbuminuria and diabetic kidney dysfunction.[33] Further, one in every five individuals living with diabetes is likely to have diabetic neuropathy, with the risk of severe neuropathy evolving to amputations in about 6% of the diabetic population.[33,34] In addition, peripheral neuropathy causing DM foot problems have been associated with sexual dysfunction in men. Thus, lack of screening in diabetic peripheral neuropathy could suggest patients with ED were missed.[35] It is thus imperative that medical practitioners strengthen and improve the evaluation and diagnosis of DPN, in addition to familiarising themselves with essential aspects of the

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Diabetic foot exam details found in the SEMDSA guideline. This is because timely screening by regular foot examinations will enable earlier detection of foot problems and the instituting of timeous interventions.

Interestingly, even though more than 50% were male patients, only two patients had erectile dysfunction (ED) documented. However, sexual dysfunction cuts across gender lines and is a commonly missed symptom in patients with chronic conditions.[36] Further, ED is common among people living with DM, and an additional biomarker for coronary events.[37] The prevalence of ED is estimated to be as high as 70% in Africa, and the risk increases with just one year of being diabetic and is made worse in the setting of poor glycaemic controls.[38] During consultations with patients, sexual history is often not taken by healthcare workers; thus patients living with sexual dysfunction are missed. In a study done to assess care among patients living with chronic disease in the Northwest Province of South Africa, the examination of sexual dysfunction was found to be grossly neglected. Nearly all the male patients had sexual dysfunction and more than 80% of the female patients had symptoms suggestive of sexual dysfunction.[39] In other studies done by Pretorius et al, sexual symptoms were investigated by way of enquiry in only two patients of the total number consulted.[40,41] This, therefore, indicates that a significant number of patients with ED may have been missed or alternatively not being documented and, therefore, they are most likely not receiving the care they deserve. This healthcare check warrants the appropriate regular screening and intervention for sexual dysfunction in all patients living with DM regardless of sex. Developing effective communication skills and adequate training of healthcare workers to enable them to identify patients with sexual dysfunction would be a positive step in eliciting this complication and institute targeted treatment in people living with DM.

Significantly, the increasing prevalence of DM has inadvertently led to an increase in diabetic kidney disease. Microalbuminuria is often used as an early marker for diabetic kidney disease detected via the urine albumin-creatinine ratio (Urine ACr) and proteinuria (urine dipsticks) as the hallmark of kidney disease.[42] Besides glycaemic monitoring, renal function monitoring has been identified as the main factor in the preventing the development of renal failure.[43] Furthermore, in the presence of diabetes, there is a more rapid decline in renal function worsening with poor control. This complication could be minimised in the first place if the Urine Albumin-Creatine

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test is combined with other aspects of the kidney function test, as it is a useful way to identify early kidney dysfunction, institute treatment and slow down further decline. Basic urine dipsticks can be used to minimize cost, by regular screening and thus identify patients who need the urine ACS testing thereby identifying patients with Diabetic kidney disease early. cheaper and basic urine dipsticks are done and appropriately interpreted.

However, given the low inclination to screen for microalbuminuria among patients in this present study, combined with the setting of poor glycaemic controls, it is very likely that many patients with progressive diabetic renal failure are being missed who could have benefited from early referral to nephrologists to slow progression to end stage renal disease. The findings of this study are limited to adherence with a guideline; however, the consequence of non-compliance is multi-layered. The findings of this study are to be seen in the direct and indirect implications of non-adherence with guidelines, as shown in Figure 1.

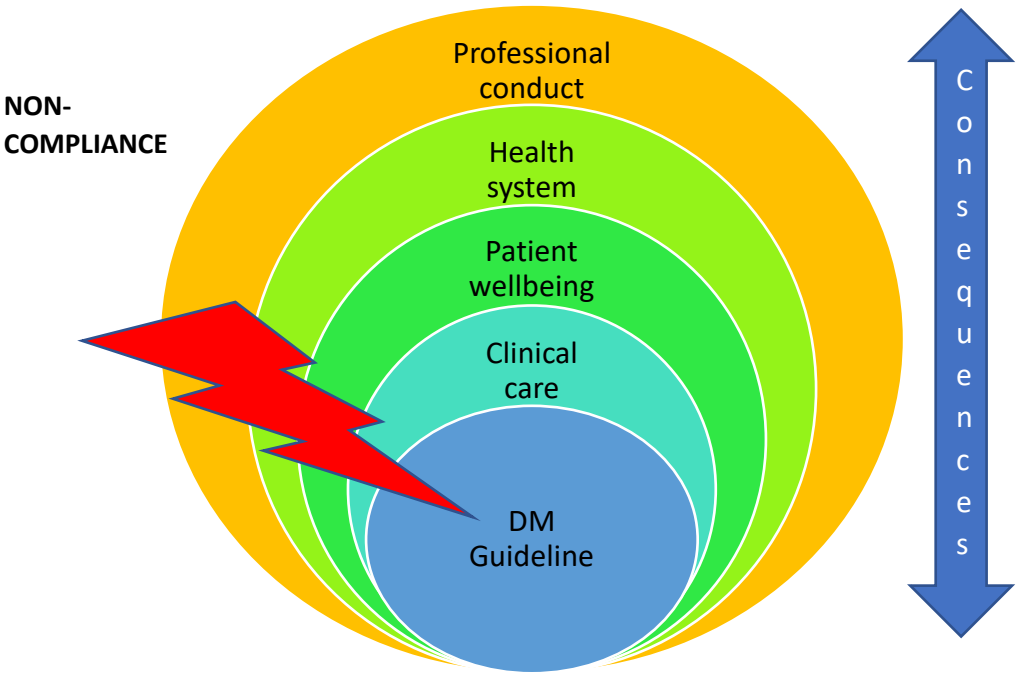


Figure 1: Multi-layered consequence of non-compliance with DM guidelines.

The findings of this study have a huge impact on not only clinical care as discussed, but also on patients' wellbeing, the health system and the healthcare providers' professionalism, For the patient there is an increase in missed workdays leading to

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job losses, increase in the number of years lost due to resulting disability and overall, a reduction in quality of life.[44] Not only is a patient failed, but an entire family and eventually a community. The effects are also not lost on the health care worker who are open to litigation on account of substandard care.[45 23 24] It may be that care was given but if not documented could be interpreted legally as not done.[46] Besides, the effect on the health care system is enormous. The financial cost needed to care for DM patients with complications from DM, such as prosthesis for foot amputees, dialysis for renal complications to name a few exerts further burden on the already strained health care system.[47] Adequate care given to patients by complying with guidelines could help minimise these negative consequences.

This study highlighted the non-adherence of health workers with diabetic treatment guidelines in a Westrand district hospital. Physician related factors and health care system were identified to contribute to poor adherence with treatment guidelines by medical practitioners as well as the guideline implementation process,.[48] So upon reflection, the researcher could relate some of these factors identified in other research contributing to poor adherence, also could apply to this study, such as inadequate numbers of staff; professional failure to keep up with latest guidelines; excessive patient load; overburdened health care workers resulting in burnout; poor organisation, and patient flow. These in the researcher's opinion can be mitigated by the medical practitioners updating themselves with latest clinical guidelines, implementing a booking system in the health care system to prevent clogging of patients on certain days, ensuring that guidelines are widely disseminated and readily available to medical practitioners.

In addition, it is imperative that there is a review of how treatment guidelines are implemented, disseminated, and utilised to improve patient management and outcomes. Therefore, recommendations from this study include more studies required to assess possible barriers to adherence with guidelines by medical practitioners and encourage regular quality improvement cycles to improve medical-practitioner actions. Following the outcome of this research in the Westrand, the district has undertook a quality improvement project in the district to improve Hba1c and DM management in all 54 facilities in the district including the research site.

CONCLUSIONS

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Adherence with DM guidelines were poor in this study despite evidence that guidelines ensure good standard of care, decreased the risk for complications and generally provided better health outcomes for patient. Not following guidelines put the patient and the profession at risk.

ARTICLE REQUIREMENTS

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Data Availability statement: The datasets generated during and/or analysed during the current study are available upon reasonable request.

Disclaimer: The views expressed in the submitted article are my own and not an official position of the institution.

REFERENCES

1. Pouya Saeedi, Petersohn I, Salpea P et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes Res Clin Pract [Internet]. 2019 [cited 2021 Oct 5]; 157:107843. Available from: https://doi.org/10.1016/j.diabres.2019.107843

`

2. Pheiffer C, Pillay-van Wyk V, Turawa E, Levitt N, Kengne AP, Bradshaw D. Prevalence of Type 2 Diabetes in South Africa: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health[internet]. 2021[cited 2022 June 18];18(11):5868. Available from: https://doi.org/10.3390/ijerph18115868

3. Ramachandran A, Snehalatha C, Latha E, Manoharan M, Vijay V. Impacts of urbanisation on the lifestyle and on the prevalence of diabetes in native Asian Indian population. Diabetes Res Clin Pract [Internet]. 1999 [cited 2022 Oct 25];44(3):207–13. Available from: https://doi.org/10.1016/S0168-8227(99)00024-8

4. Kolb H, Martin S. Environmental/lifestyle factors in the pathogenesis and prevention of type 2 diabetes. BMC Med [Internet]. 2017 [cited 2022 Oct 20];15(1):131. Available from: https://doi.org/10.1186/s12916-017-0901-x

5. Pedro MN, Rocha GZ, Guadagnini D et al. Insulin Resistance in HIV-Patients: Causes and Consequences. Front Endocrinol [Internet]. 2018 [cited 2022 Apr 20];9. Available from: https://doi.org/10.3389/fendo.2018.00514

6. Lima-Martínez MM, Carrera Boada C, Madera-Silva MD, Marín W, Contreras M. COVID-19 and diabetes: A bidirectional relationship. Clin E Investig En Arterioscler Publicacion Of Soc Espanola Arterioscler. 2021[cited 2021 June 26];33(3):151–7. Available from: https://doi.org/10.1016/j.arteri.2020.10.001

7. Wu Z hong, Tang Y, Cheng Q. Diabetes increases the mortality of patients with COVID-19: a meta-analysis. Acta Diabetol [Internet]. 2021 [cited 2022 Jun 18];58(2):139–44. Available from: https://doi.org/10.1007/s00592-020-01546-0

8. van Loenen T, van den Berg MJ, Westert GP, Faber MJ. Organizational aspects of primary care related to avoidable hospitalization: a systematic review. Fam Pract. 2014 [cited 2021 August 26] ;31(5):502–16. Available from: https://doi.org/10.1093/fampra/cmu053

9. Wollersheim H, Burgers J, Grol R. - 2005 - Clinical guidelines to improve patient care.pdf [Internet]. 2005[cited 2022 Oct 20];63(6):1-6. Available from: https://repository.ubn.ru.nl/bitstream/handle/2066/48763/48763.pdf

10. Mendoza C, Kraemer P, Herrera P, Burdiles P, Sepúlveda D, Núñez E, et al. [Clinical guidelines using the GRADE system (Grading of Recommendations Assessment, Development and Evaluation)]. Rev Med Chil [Internet]. 2017 Nov 1 [cited 2022 Jul 7];145(11):1463–70. Available from: https://doi.org/10.4067/s0034-98872017001101463

11. Defining Healthcare Compliance: What Does it Really Mean? | [Internet]. Strategic Management Services, LLC. [cited 2022 Dec 14]. Available from: https://www.compliance.com/resources/defining-healthcare-compliance/

12. The Society for Endocrinology Metabolism and Diabetes of South Africa Type 2 Diabetes guidelines. 2017 SEMDSA Guideline for the management of Type 2 diabetes mellitus. Jemdsa. 2017; 22(1): S1-S196. [Internet]. [cited 2021 Dec 5]. Available from: http://www.kznhealth.gov.za/family/SEMDS-2017-Guidelines.pdf

`

13. Klisiewicz AM, Raal F. Sub-optimal management of type 2 diabetes mellitus - a local audit : original research. J Endocrinol Metab Diabetes South Afr [Internet]. 2009 [cited 2022 Mar 26];14(1):13–6. Available from: https://journals.co.za/doi/abs/10.10520/EJC64185

14. Pinchevsky Y, Butkow N, Raal FJ, Chirwa T. The implementation of guidelines in a South African population with type 2 diabetes: original research. J Endocrinol Metab Diabetes South Afr [Internet]. 2013[cited 2022 Mar 26];18(3):154–8. Available from: https://journals.co.za/doi/abs/10.10520/EJC146741

15. Pinchevsky Y, Butkow N, Chirwa T, Raal F. Treatment Gaps Found in the Management of Type 2 Diabetes at a Community Health Centre in Johannesburg, South Africa. J Diabetes Res [Internet]. 2017 [cited 2022 Mar 26];2017:e9536025. Available from: https://doi.org/10.1155/2017/9536025

16. Piotie PN, Webb EM, Rheeder P. Suboptimal control for patients with type 2 diabetes in the Central Chronic Medicine Dispensing programme in South Africa. Afr J Prim Health Care Fam Med [Internet]. 2021 Mar 24 [cited 2022 Mar 23];13(1):2648. Available from: https://doi.org/10.4102/phcfm.v13i1.2648

17. Hetlevik I, Holmen J, Midthjell K. Treatment of diabetes mellitus - physicians' adherence to clinical guidelines in Norway. Scand J Prim Health Care [Internet]. 1997 [cited 2021 Dec 5];15(4):193–7. Available from: https://doi.org/10.3109/02813439709035027

18. Schimke KE, Renström F, Meier S, Stettler C, Brändle M. Compliance with guidelines for disease management in diabetes: results from the SwissDiab Registry. BMJ Open Diabetes Res Care [Internet]. 2018 [cited 2021 Dec 5];6(1):e000454. Available from: https://doi.org/10.1136/bmjdrc-2017-000454

19. Sobngwi E, Ndour-Mbaye M, Boateng KA et al. Type 2 diabetes control and complications in specialised diabetes care centres of six sub-Saharan African countries: The Diabcare Africa study. Diabetes Res Clin Pract [Internet]. 2012[cited 2022 Mar 26];95(1):30–6. Available from: https://doi.org/10.1016/j.diabres.2011.10.018

20. Kibirige D, Atuhe D, Sebunya R, Mwebaze R. Suboptimal glycaemic and blood pressure control and screening for diabetic complications in adult ambulatory diabetic patients in Uganda: a retrospective study from a developing country. J Diabetes Metab Disord [Internet]. 2014 [cited 2021 Dec 5];13(1):40. Available from: https://doi.org/10.1186/2251-6581-13-40

21. Igbojiaku OJ, Ross A, Harbor OC. Compliance with diabetes guidelines at a regional hospital in KwaZulu-Natal, South Africa: original research. Afr J Prim Health Care Fam Med [Internet]. 2013 [cited 2022 Mar 23];5(1):1–5. Available from: https://doi.org/10.1186/2251-6581-13-40

22. Webb EM, Rheeder P, Van Zyl DG. Diabetes care and complications in primary care in the Tshwane district of South Africa. Prim Care Diabetes [Internet]. 2015 [cited 2022 Mar 23];9(2):147–54. Available from: https://doi.org/10.1016/j.pcd.2014.05.002

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23. ip33_prj141_Medico-legal.pdf [Internet]. [cited 2022 Nov 6]. Available from: https://www.justice.gov.za/salrc/ipapers/ip33_prj141_Medico-legal.pdf

24. dp154-prj141-Medico-Legal-Claims.pdf [Internet]. [cited 2022 Nov 6]. Available from: https://www.justice.gov.za/salrc/dpapers/dp154-prj141-Medico-Legal-Claims.pdf

25. Epi Info™ | CDC [Internet]. 2022 [cited 2022 Dec 14]. Available from: https://www.cdc.gov/epiinfo/index.html

26. Sherwani SI, Khan HA, Ekhzaimy A, Masood A, Sakharkar MK. Significance of HbA1c Test in Diagnosis and Prognosis of Diabetic Patients. Biomark Insights [Internet]. 2016 Jan[cited 2022 Jun 9];11:BMI.S38440. Available from: https://doi.org/10.4137/BMI.S38440

27. Luo M, Lim WY, Tan CS et al. Longitudinal trends in HbA1c and associations with comorbidity and all-cause mortality in Asian patients with type 2 diabetes: A cohort study. Diabetes Res Clin Pract [Internet]. 2017 [cited 2022 Jun 9];133:69–77. Available from: https://doi.org/10.1016/j.diabres.2017.08.013

28. Zoungas S, Chalmers J, Ninomiya T et al. Association of HbA1c levels with vascular complications and death in patients with type 2 diabetes: evidence of glycaemic thresholds. Diabetologia [Internet]. 2012 Mar 1 [cited 2022 Jun 18];55(3):636–43. Available from: https://doi.org/10.1007/s00125-011-2404-1

29. Flores-Hernández S, Saturno-Hernández PJ, Reyes-Morales H. Quality of Diabetes Care: The Challenges of an Increasing Epidemic in Mexico. Results from Two National Health Surveys (2006 and 2012). Meyre D, editor. PLOS ONE [Internet]. 2015 [cited 2022 Mar 17];10(7):e0133958. Available from: https://doi.org/10.1371/journal.pone.0133958

30. Ali MK, Bullard KM, Saaddine JB, Cowie CC, Imperatore G, Gregg EW. Achievement of Goals in U.S. Diabetes Care, 1999–2010. N Engl J Med [Internet]. 2013[cited 2022 Mar 23];368(17):1613–24. Available from: https://doi.org/10.1056/NEJMsa1213829

31. Stone MA, Charpentier G, Doggen K, et al. Quality of Care of People With Type 2 Diabetes in Eight European Countries: Findings from the Guideline Adherence to Enhance Care (GUIDANCE) study. Diabetes Care [Internet]. 2013 [cited 2022 Mar 23];36(9):2628–38. Available from: https://doi.org/10.2337/dc12-1759

32. Boniol M,Kunjumen T, Nair TS, Siyam A, Campbell J, Diallo K. The global health workforce and distribution in 2020and 2030: a threat to equity and universal health coverage? BMJ Glob Health. 2022[cited 2022 nov 10];7(6):e009316 Available from: https://doi.org/10.1136/bmjgh-2022-009316

33. Nisar MU, Asad A, Waqas A, Ali N, Nisar A, Qayyum MA, et al. Association of Diabetic Neuropathy with Duration of Type 2 Diabetes and Glycemic Control. Cureus [Internet]. 2015[cited 2022 Jul 7];7(8). Available from: https://doi.org/10.7759/cureus.302

34. Bansal D, Gudala K, Muthyala H, Esam HP, Nayakallu R, Bhansali A. Prevalence and risk factors of development of peripheral diabetic neuropathy in type 2 diabetes mellitus in a

tertiary care setting. J Diabetes Investig [Internet]. 2014 [cited 2022 Jun 15];5(6):714–21. Available from: https://doi.org/10.1111/jdi.12223

35. Penson DF, Wessells H. Erectile Dysfunction in Diabetic Patients. Diabetes Spectr [Internet]. 2004[cited 2022 Nov 6];17(4):225–30. Available from: https://doi.org/10.2337/diaspect.17.4.225

36. Pretorius D, Couper ID, Mlambo MG. Sexual history taking by doctors in primary care in Northwest province, South Africa: Patients at risk of sexual dysfunction overlooked. Afr J Prim Health Care Fam Med [Internet]. 2022 [cited 2022 Jun 15];14(1):9. Available from: https://doi.org/10.1016/j.esxm.2021.100389

37. Zhao B, Hong Z, Wei Y, Yu D, Xu J, Zhang W. Erectile Dysfunction Predicts Cardiovascular Events as an Independent Risk Factor: A Systematic Review and Meta-Analysis. J Sex Med [Internet]. 2019 [cited 2022 Jul 7];16(7):1005–17. Available from: https://doi.org/10.1097/MD.0000000000000534

38. Shiferaw WS, Akalu TY, Aynalem YA. Prevalence of Erectile Dysfunction in Patients with Diabetes Mellitus and Its Association with Body Mass Index and Glycated Hemoglobin in Africa: A Systematic Review and Meta-Analysis. Int J Endocrinol [Internet]. 2020 [cited 2022 Mar 26];2020:1–10. Available from: https://doi.org/10.1155/2020/5148370

39. Pretorius D, Couper ID, Mlambo MG. Neglected sexual dysfunction symptoms amongst chronic patients during routine consultations in rural clinics in the North West province. Afr J Prim Health Care Amp Fam Med [Internet]. 2021 [cited 2022 Jun 15];13(1):1–7. Available from: https://doi.org/10.4102/phcfm.v13i1.2850

40. Pretorius D, Couper I, Mlambo M. Sexual History Taking: Perspectives on Doctor-Patient Interactions During Routine Consultations in Rural Primary Care in South Africa. Sex Med [Internet]. 2021[cited 2022 Jun 15];9(4):100389. Available from: https://doi.org/10.1016/j.esxm.2021.100389

41. Pretorius D, Mlambo MG, Couper ID. Perspectives on sexual history taking in routine primary care consultations in North West, South Africa: Disconnect between patients and doctors. Afr J Prim Health Care Fam Med [Internet]. 2022 [cited 2022 Jun 15];14(1):10. Available from: https://doi.org/10.4102/phcfm.v14i1.3286

42. Griffin TP, O'Shea PM, Smyth A, Islam MN, Wall D, Ferguson J, et al. Burden of chronic kidney disease and rapid decline in renal function among adults attending a hospital-based diabetes center in Northern Europe. BMJ Open Diabetes Res Care [Internet]. 2021[cited 2022 Mar 26];9(1):e002125. Available from: https://doi.org/10.1136/bmjdrc-2021-002125

43. Tuttle KR, Bakris GL, Bilous RW, Chiang JL, de Boer IH, Goldstein-Fuchs J, et al. Diabetic Kidney Disease: A Report From an ADA Consensus Conference. Diabetes Care [Internet]. 2014 [cited 2022 Mar 26];37(10):2864–83. Available from: https://doi.org/10.2337/dc14-1296

`

44. Rodríguez-Almagro J, García-Manzanares Á, Lucendo AJ, Hernández-Martínez A. Health-related quality of life in diabetes mellitus and its social, demographic and clinical determinants: A nationwide cross-sectional survey. J Clin Nurs [Internet]. 2018 [cited 2022 Jul 6];27(21–22):4212–23. Available from: https://doi.org/10.1111/jocn.14624

45. Lewis K. Professionalism – A Medico-Legal Perspective. Prim Dent J [Internet]. 2021 [cited 2022 Jul 8];10(2):51–6. Available from: https://doi.org/10.1177/20501684211018573

46. Yankowsky KW. Avoiding Unnecessary Litigation: Communication and Documentation. Adv Skin Wound Care [Internet]. 2017 Feb [cited 2022 Jul 8];30(2):66–70. Available from: https://doi.org/10.1097/01.ASW.0000511697.33786.fa

47. The Cost of Diabetes Care—An Elephant in the Room | Diabetes Care | American Diabetes Association [Internet]. 2018[cited 2022 Jul 9]. Available from: https://doi.org/10.1186/s12992-017-0318-5

48. Hashmi N, Khan S. Adherence To Diabetes Mellitus Treatment Guidelines From Theory To Practice: The Missing Link. J Ayub Med Coll Abbottabad JAMC. 2016[Accessed 2022 N0ov 06];28:802–8.

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APPENDIX 1: DATA COLLECTION SHEET

NOS	**DEMOGRAPHICS**				**CORMOBID CONDITIONS**		**COMPLI CATION**	**MEDICATIONS**		**LIFE-STYLE**
1	AGE	GENDER	RACE	EMPLOY	HPT	OTHERS	COMPLI CATIONS	ORAL	INJECT.	Alcohol/ smoking
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
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22										
23										
24										
25										

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DATA COLLECTION SHEET 2:

NOS	ROUTINE EXAMINATION							ROUTINE INVESTIGATIONS												
	BP	Fundoscopy	Foot Exam	Weight	Waist Circum.	BMI	Injectsites	HGT	HBAIC 3nthly	HBAIC 6mnthly	Serum Creat.	Lipids	Urine dipstix	Urine ACR	ECG	K	HIV	Dietician	Physicadre	Total points
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				

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TRACKING SHEETS

Nos	Date	File Number	Date of Record Review	Others

`

CODE- Data collection sheet 1

- **Gender:** 1=Male, 2 =Female
- **Race:** 1=Black, 2=White, 3= Coloured, 4= Indian, 5= Others
- **Co-morbid conditions:**
  1= Hypertension, 2= Athritis, 3=Gout, 4=Thyroid, 5=Asthma, 6=HIV
- **Complications**.

- 1= Cardiovascular,
- 2= Renal,
- 3= Retinopathy,
- 4= Diabetic foot ulcer/chronic limb Ischaemia
- 5=Erectile dysfunction

- **Medications:**
  - Oral: 1=Metformin, 2=Glimepiride, 3=Both.
  - Injectables: 1=Long acting, 2 = Short acting, 3=Both.

- **Lifestyle**; 1= alcohol, 2= Smoking, 3=both

CODE: Data collection sheet 2

- **Examinations**: Done -1, Not done- 2
- **Physician-**
  - 1-registrars
  - 2- Medical officers
  - 3- Interns/Community Service Doctors
  - 4- Clinical Associates
  - 5= Doctor + Intern/Community Service Doctors
  - 6=Interns + clinical Associates
  - 7=Doctors+ Interns+ Clinical Associates
  - 8=Doctor + Clinical Associates
- **Referral to dietician**
  1= referral, 2 = No referral

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APPENDIX II: PATIENT INFORMATION AND CONSENT FORMS

PATIENT INFORMATION SHEET

STUDY TITLE

Compliance of medical Practitioners with Diabetic Treatment guidelines at Dr Yusuf Dadoo Hospital, West Rand Health District.

Good day,

I am Dr Nneka Jamie Ohanson, a second year family medicine registrar at the University of Witwatersrand and in the West Rand Heath District. I am conducting a Study to see if Medical practitioners comply with Diabetic treatment guidelines in the management of Diabetic Patients.

Invitation to participate: I am inviting you to participate in the above titled research.

Why are we doing this study? The study will enable the researcher to assess the current level of practice among the health care practitioners in the hospital regarding your diabetic care and identify areas that are not up to standard. Areas of poor practice will be identified and addressed; and changes will be implemented to improve your overall diabetic care.

What is involved in the study: The study will be a retrospective cross-sectional study. It will involve the researcher going through your files and checking to see if your routine monitoring blood investigations for diabetes are done as recommended by the Society for Endocrinology, Metabolism and Diabetes of South Africa (SEMDSA) guideline by your healthcare practitioner.

Risks of being involved in the study: Participation is voluntary and there are no risks involved in participating in this study. It is a review of your file in the hospital.

`

Benefits of participating in this study: Participating in this study will aid in the improvement your diabetes care by your healthcare practitioner.

Confidentiality? Participating in this study by review of your hospital files/record will not expose you to any prejudice, risk or harm. Personal information will be treated with the strictest confidence and will be only available to the Principal Investigator and her supervisor.

The findings and recommendations of this study will be made known to the staff and authority of the clinic, the district and also to you upon request. The findings of this study will also be published in a Journal for academic purposes.

Participation is voluntary: There will be no penalty or loss of benefits if you refuse to participate. You may also discontinue participation at any time without penalty or loss of benefits.

Refusal to participate in this study will not jeopardize or expose you to any prejudice, risk or harm**.**

If you have any concerns or queries regarding the way the study is conducted, please contact: The Researcher - Dr NJ Ohanson @ jamieohanson@gmail.com / **0604373153**

OR The Research Supervisor –Deidre Pretorius @ Deidre.Pretorius@wits.ac.za

You can also contact **The Chairperson of the Human Research and Ethics Committee, University of Witwatersrand Professor Clement Penny by telephone 0n 011 717 2301 or by email on Clement.Penny@wits.ac.za.** The telephone numbers of the committee secretariat are **011 717 2700/1234** and the email addresses are **Zanele.Ndlou@wits.ac.za and Rhulani.Mukansi@wits.ac.za**

Thank you for reading this study information sheet.

9th July 2019

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CONSENT FORM

I hereby confirm that I have been informed about the above project.

I am aware that the result of this project, including personal details will be dealt with anonymously.

If I choose not to give consent this will not prejudice my treatment in any way.

I …… hereby give consent for my medical records to be used for the purpose of the above mentioned research.

Signature:…… Date……

Witness 1…….

Witness 2……..

Journal of Endocrinology, Metabolism and Diabetes of South Africa 2017 ; 22(1)
http://dx.doi.org/10.1080/16089677.2015.1056468

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SEMDSA GUIDELINES

Chapter 4: Organisation of Diabetes Care

SEMDSA Type 2 Diabetes Guidelines Expert Committee

SEMDSA 2017 Recommendations	
Patients with diabetes should be seen by dedicated staff at a clinic/facility with adequate space and resources (equipment and medication)	C
The diabetes consultation should be a structured one. The use of standardised diabetes consultation templates is encouraged to ensure that essential assessments / processes of care are not omitted.	C
At each visit the patient should have a history taken, undergo a clinical examination and have blood taken for biochemical evaluation.	
The complexity of each will be dependent on whether it is an initial consultation, follow-up consultation or an annual review	C

Requirements for a Diabetic Clinic

- Dedicated, appropriately trained staff
- Adequate space:
  - For individual consultation
  - For group education
- Protocols covering:
  - Screening
  - Regular care, including referrals
- Equipment:
  - Tape measure (waist circumference)
  - Scale
  - Height measure
  - Accurate sphygmomanometers, with two cuff sizes
  - Monofilament and 128 Hz tuning fork
  - Glucometers in good working order
  - HbA_{1c} testing equipment, to enable testing on site
  - Educational material
- Regular supply of medication
- Register with recall system for non-attenders
- Annual audits of:
  - Numbers of patients receiving designated processes of care
  - Numbers of patients reaching targets for glycaemia, blood pressure (BP) and lipids
  - History, clinical examination, investigations: What to do when

History	Initial	3-6 monthly visit	Annually
Symptoms of hyperglycaemia, and duration of symptoms	X	X	X
Relevant family history	X		X
Other risk factors (e.g. gestational diabetes, high birthweight)	X		X
Relevant medical history			
Co-morbid conditions	X		X
Symptoms of complications	X	X	X
Cardiovascular, neurological, bladder function, sexual function (i.e. erectile dysfunction), feet, visual, infection			
Drugs			
Current	X		X
Side-effects and adherence	X	X	X
Allergies	X		X
Hypoglycaemic symptoms	X	X	X
Vaccinations			
Pneumococcal (date)	X		X
Influenza (date)	X		X
Lifestyle			
Weight history	X	X	X
Physical activity	X	X	X
Eating pattern	X	X	X
Smoking	X	X	X
Alcohol	X	X	X

Psychosocial			
Occupation	X		X
Family and community support	X		X
Depression	X	X	X
Home monitoring chart (if relevant)	X	X	X

EXAMINATION	Initial visit	3-6 monthly visit	Annually
Weight	X	X	X
Height	X		X
BMI (kg/m^2)	X	X	X
Waist circumference (cm)	X	X	X
Blood pressure	X	X	X
Feet - detailed examination§	X		X
Monofilament assessment	X		X
Vibration sensation assessment	X		X
Ankle jerks	X		X
Evaluation for peripheral arterial disease	X		X
Oral cavity			
- dental caries	X		X
- gum disease	X		X
Eye examination			
-Visual acuity	X		X
- Retinal examination*	X		X
Cardiovascular examination	X		X
Injection sites if appropriate	X	X	X

§ See Chapter 21
*The preferred method for screening for retinopathy is retinal imaging using non-mydriatic fundus photography (the images can be interpreted remotely by those with the expertise); dilated fundoscopy can be used in the absence of a retinal camera by those clinicians who have the necessary expertise to diagnose diabetic retinopathy, and in patients where dilatation of the pupil will not hamper driving or returning to work.

Investigations	Initial visit	3-6 monthly visit	Annually
Blood			
Glucose	X		
HbA1c	X	X	X
Lipids (TC, HDLc, TG, LDLc)	X		X
Creatinine and calculation of eGFR	X		X
Potassium	X		X
HIV	X		
Urine			
Dipstix			
Glucose	X	X	X
Ketones	X	X	X
Protein	X	X	X
Albumin/creatinine ratio	X		X
ECG	X		X
Continuous glucose monitoring*	X	X	X

*Refer to Chapter 8

Other important tasks	Initial visit	Every visit	Annually
Diabetes educator*	X	X	X
Education: Self-management and lifestyle adjustment, including smoking cessation	X	X	X
Setting goals	X	X	X
Preconception counselling and family planning	X	X	X
Medication revision/adjustment	X	X	X
Immunisations	X		X
Testing for autonomic neuropathy	X		X

*Any healthcare worker who has completed, with competence, a South African Nursing Council or SEMDSA-approved diabetes educators course.

Authors: Naomi S. Levitt and Joel A. Dave

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Dr NJ Ohanson

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M200117

NAME: (Principal Investigator)	Dr NJ Ohanson
DEPARTMENT:	School of Clinical Medicine Department of Medicine Division of Family Medicine Medical School University
PROJECT TITLE:	Compliance of medical practitioners with diabetic treament guidelines, at Dr Yusuf Dadoo Hospital, West Rand Health District, Gauteng
DATE CONSIDERED:	2020/01/31
DECISION:	Approved conditionally
CONDITIONS:	All data gathered prior to the date of issue of this Clearance Certificate must be discarded
SUPERVISOR:	Ms D Pretorius and Dr M Magethi
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2020/07/02

This clearance certificate is valid for 5 years from the 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 3rd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.
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 submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **January** and will therefore reports and re-certification will be due early 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 _____

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APPENDIX V: PERMISSION TO CONDUCT RESEARCH FROM DR YUSUF DADOO HOSPITAL

Department of Health

OFFICE OF THE CHIEF EXECUTIVE OFFICER
DR. YUSUF DADOO HOSPITAL

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

ENQUIRIES	:	P.M. Sofohlo
TELEPHONE	:	(011) 951-6161
FAX	:	(011) 953 5952
Cell	:	083 302 7153
E mail	:	**SofohloP@gpg.gov.za**
REF NO	:	1/7/2/1
Date	:	27.11.2019

Attention Dr. N. J. Ohanson

RE: PERMISSION TO CONDUCT RESEARCH AT DR. YUSUF DADOO HOSPITAL

Research Title: Compliance of medical practitioners with diabetic treatment guidelines at Dr. Yusuf Dadoo Hospital, West Rand Health District, Gauteng.

Permission is hereby given to you Dr. N. J. Ohanson to access Dr. Yusuf Dadoo Hospital and conduct research on the above-mentioned topic.

Please consider the following:

- You will report to the office of the Chief Executive Officer **(CEO)** before initiating the study.
- Participants' rights and confidentiality will be maintained at all the time.
- You will submit a copy (electronic and hard copy) of your final research report to the office of the Chief Executive Officer **(CEO)** of Dr. Yusuf Dadoo Hospital.

You are therefore expected to adhere and comply with the Ethics of research as stipulated in the research policy.
I reserve the right to withdraw my permission grated to you, if you breach any of the conditions mentioned above.

Thank you very much for choosing Dr. Yusuf Dadoo Hospital to conduct such an important study. I wish you good luck in your research.

Regards

Patrick Mbeko Sofohlo
Chief Executive Officer (Dr. Yusuf Dadoo Hospital)
Date: 2019/11/27

Dr. YUSUF DADOO HOSPITAL PRIVAATSAK/PRIVATE BAG X2006 KRUGERSDORP 1740 2019 -11- 27 CHIEF EXECUTIVE OFFICER

Dr. Yusuf Dadoo Hospital, Cnr. Hospital & Memorial Avenues, Krugersdorp, 1740

APPENDIX VI: PROVINCIAL APPROVAL

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

WEST RAND DISTRICT
FAMILY MEDICINE
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Email: jamieohanson@gmail.com

NHRD REF NO: GP_202007_010

Title: Compliance of medical practitioners with diabetic treatment guidelines at Dr Yusuf Dadoo Hospital, West Rand Health District, Gauteng.

Protocol: I have studied the protocol and it is well articulated. Sample size will not impact on service delivery.

The location where the study will be conducted: West Rand District

Facilities Requirements:

1. There will not be an additional load on nursing staff, e.g. asking them to recruit patients for study
2. Support services e.g. administration staff including clerks, and reception staff will not be part of facilitating this study (IT Specialist)
3. Consumables e.g. swabs and gloves will not be used in these facilities
4. Laboratory tests will not be done in the above-mentioned facilities
5. Equipment's e.g. BP cuffs belonging to these facilities will not be used
6. Space (office space/counselling cubicles) of these facilities will not be used but the location of the interview will be negotiated according to the interviewee's preferences maybe hospital offices at a time convenient for the interviewee
7. Communication e.g. announcements, and handing out leaflets will not be undertaken in these facilities (Survey Questionnaire)
8. Dates, days of the week, and times you wish to access the facilities should not be determined by the researcher without knowledge of the facilities
9. There will be no additional OPD visits for this study
10. Admission of patients will not be part of this study

Ethics: Provisional approval granted by HREC as provided by the researcher

Funding Source: Researcher

Take note that you will need to share your findings and recommendations with the facilities to assist with future clinical policies.

We wish you well during this project. For any additional information, feel free to contact our department.

Regards,

Dr Wenegieme (DRC WRD)

Dr NJ Ohanson Research Article for Turnitin.docx

ORIGINALITY REPORT

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APPENDIX VII PROOF EDITING CERTIFICA

The Research Faculty

66 Greenfield Rd
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South Africa
Tel: +27 (0) 782-1401
info@theresearchfaculty.com

Attention: Jamie Ohanson
University of the Witwatersrand

1 Aug 2022

To whom it may concern

Confirmation of document editing

This letter is to confirm that we have edited the document titled:

> COMPLIANCE OF MEDICAL PRACTITIONERS WITH DIABETIC TREATMENT GUIDELINES AT DR YUSUF DADOO HOSPITAL, WEST RAND HEALTH DISTRICT, GAUTENG

The document was the work of Dr Jamie Ohanson.

We may have involved the contributions of one or more subcontractor.

We have edited the document for errors of grammar, punctuation, and style. I have also provided the author with a list of aspects needing further attention or correction.

Excluded from the editing work were, if applicable, the annexures, mathematical or statistical formulae, the spelling of authors' names and other proper nouns, fact-checking, foreign-language text, the content of Microsoft Word field codes, the accuracy of cross references or hyperlinks, the order of works within citations, acronym use, joining or splitting paragraphs, citation verbs' tense and number, and the use of first-person pronouns.

The service excluded checking that the reference list (if applicable) conforms to a specified style guide.

Yours faithfully



Bruce Conradie
Research Support Specialist
The Research Faculty

Job reference number = JR00206

Scanned with CamScanner

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APPENDIX - VII RESEARCH PROPOSAL

COMPLIANCE OF MEDICAL PRACTITIONERS WITH DIABETIC TREATMENT GUIDELINES AT DR YUSUF DADOO HOSPITAL, WEST RAND HEALTH DISTRICT, GAUTENG

STUDENT: DR OHANSON N.J

STUDENT NUMBER: 2061778

SUPERVISOR: DEIDRE PRETORIUS

CO- SUPERVISOR: DR MOSHE MAGETHI

DEPARTMENT OF FAMILY MEDICINE

UNIVERSITY OF THE WITWATERSR

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CONTENTS

1.	INTRODUCTION	4
2.	LITERATURE REVIEW	5
3.	AIMS AND OBJECTIVES	7
3.1	Aims	7
3.2	Objectives	7
4.	METHODOLOGY	8
4.1.	Study design	8
4.2.	Site of Study	8
4.3.	Study Population	8
4.4.	Sampling and Sample Size	8
4.5.	Inclusion and Exclusion Criteria	9
4.6.	Selection or Recruitment of Participants	10
4.7.	Measuring tool and Data Collection	10
4.8.	Study Period	11
4.9.	Pilot Study	11
4.10.	Data Analysis	11
5. ETHICAL CONSIDERATIONS		13
6. LIMITATIONS		13
7. FUNDING		13
8. TIME FRAME		14
9. REFERENCES		15
APPENDIX 1: DATA COLLECTION SHEET		19
APPENDIX 2: TRACKING SHEETS		21
APPENDIX 3: LETTER OF PERMISSION TO THE CLINICAL MANAGER TO CONDUCT RESARCH		22
APPENDIX 4: LETTER OF PERMISSION TO THE DISTRICT MANAGER TO CONDUCT RESEARCH		23
APPENDIX 4: PATIENT INFORMATION SHEET		24
TABLE 1: DESCRIPTION OF HOW DATA WILL BE ANALYZED		12
TABLE 2: BUDGET		14
TABLE 3: TIME FRAME		15

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ABBREVIATIONS

DM- Diabetes Mellitus

DYD- Dr Yusuf Dadoo Hospital

EDU- Education

Employ- Employment

HTN- Hypertension

CVS - Cardiovascular

Inject- Injectable

Phys active- Physical activity

Fund. -Fundoscopy

BMI-Body Mass Index

K^+ - Potassium

Serum Crea - Serum creatinine

Urine ACR- Urine Albumin Creatinine Ratio

SEMDSA- Society for Endocrine, Metabolism and Diabetes South Africa

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1. Introduction and Background

Diabetes (DM) is the most common endocrine disease. According to the 2015 WHO report,415 million people are living with diabetes globally. Previously, diabetes was believed to be a disease of affluence occurring in the developed world, characterizing its high incidence in the western world. However, according to the International Diabetes Federation (IDF), Africa is in the last 30years experiencing a dramatic increase in the prevalence of diabetes.[1,2]

The rise in prevalence in Africa and Sub-Saharan Africa (SSA) could probably be due to the increasing urbanization and economic development. The increase in rural-urban migration and development has led to dietary changes; from fresh foods to over processed, canned and unhealthy foods a risk factor for DM. Also, there has been a corresponding increase in sedentary lifestyle, which predisposes to obesity another significant risk factor for diabetes. The current HIV epidemic in SSA with associated increasing use of Anti-Retroviral therapy (ARVs) has also increased the risk of insulin resistance which is a risk factor for diabetes.[3,4] All of these factors contribute to the increasing prevalence of DM seen in Africa and could partly explain the dramatic rise.

Optimal diabetes management and control requires reliable and efficient access to diagnosis, treatment and monitoring. This assists in improving the care, preventing and identifying early complications.[5] Scientific advances have improved the management of diabetes over the years, and these have been constructed into diabetic treatment guidelines and chronic care modules and adapted for use by various countries globally. However, several studies have shown that the quality of diabetes care generally lags behind evidence-based care recommendations.[6,7,8]

Compliance with guidelines has been found to improve quality of diabetes care. A meta-analysis found the standards of care significantly improved after initiating a quality improvement project to greater than 80% in the select quality indicators.[9] Comparably, several studies found that patients whose caregivers adhered to testing guidelines had better glycaemic control than those who did not and thus, better outcomes.[9,10]

There is increasing concern globally, especially in Africa regarding poor adherence to clinical guidelines by healthcare practitioners.[6,7,8] To standardize, improve and optimize the quality of care for diabetic patients, guidelines have been formulated in

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various countries globally usually by the diabetic association with the aim of standardizing and improving care. In South Africa, the Society for Endocrinology, Metabolism, Diabetes South Africa(SEMDSA) and the National Department of Health South Africa have formulated and distributed widely diabetic treatment guidelines in South Africa.[5.11] The instructions contained have recommendations for frequency of visits, assessment of complications, risk factor modification, pharmacological treatment, monitoring and appropriate intervention to abnormal result. However, despite these advances, management and treatment outcomes continue to remain suboptimal in South Africa, sub-Saharan Africa (SSA) and the higher resourced countries.[6,7,8,12,13]

Several reasons have been proposed for the clinical inertia by physicians to adhere to clinical guidelines. They include lack of clear national policies regarding management, limited resources with poor access to medications and other aspects of care such as necessary investigations, limited national health budgets, inadequate training of attending health include poor understanding of guidelines, ignorance of the existence of guidelines, lack of resources to assist implementation, disagreement with the guidelines, simply forgetting to use it.[14,15]

Dr Yusuf Dadoo hospital district hospital lies in West Rand Health District, Gauteng. About 80-100 patients are seen daily in the Outpatient department (OPD) of the hospital, usually by doctors, clinical associates and medical interns. The researcher has observed inconsistencies and erratic behaviours in following diabetic treatment guidelines by medical practitioners. This behaviour in the researcher's opinion would lead to an increase in complications. Besides, there is a paucity of data to determine how well clinical guidelines are complied with to in managing chronic disease such as diabetes in West-Rand health district of South Africa.

The focus of this study is to assess how well medical practitioners in Dr Yusuf Dadoo hospital adhere to diabetic treatment guidelines. The guideline of focus is the SEMDSA guideline of 2017. This is the most recent version of diabetic treatment guideline in South Africa, in the management of diabetic patients in the out-patient department of Dr Yusuf Dadoo Hospital. The result of the study will assist stakeholders in determining if interventions are required to improve the quality of care amongst diabetic patients in the hospital.

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1.2 Literature Review

1.2.1 Key Focus and Trends

Adherence to clinical guidelines and recommendations regarding the management of diabetes and optimizing care have shown not only to reduce complications but improve outcomes and quality of care.[5,6,] Regular monitoring and appropriate intervention to abnormal result have been shown to reduce complications such as renal failure, diabetic foot ulcers, retinopathy.[9,10] However, several studies have shown that physicians do not adhere to guidelines and thus treatment outcomes remain suboptimal globally especially in Sub Saharan Africa including South Africa.[6,7,8,12,13]

In the developed and advanced countries where it is expected that adherence levels to guidelines would be higher; investigations find that adherence levels are not at target standard. In a study done in Norway, the researchers discovered significant discrepancies between the laid down clinical guidelines and the practices of healthcare practitioners.[15] Similarly, in Switzerland, an investigation into the adherence level among medical practitioners regarding diabetic treatment guidelines found good adherence in the significant aspects of management but found certain aspects where control could be improved.[16] It appears that even the western countries do not have it all figured out. Poor compliance with diabetic treatment guidelines among medical practitioners is a global issue.

Sub-Saharan Africa is also experiencing a similar dilemma. In Uganda, glycaemic, blood pressure control and screening for diabetic complications was found to be poorly done by healthcare workers. Testing for dyslipidaemia, foot exam, retinopathy performed in this study was 14%, 21%, 15% and diabetic neuropathy was the most prevalent complication in 31% of the patients.[8] In Mozambique and Zambia, another study found poor access to healthcare workers with appropriate training and understanding of diabetes.[17] This resulted in poor d application of healthcare guidelines in the management of patients by the unskilled healthcare workers. Most patients were found to have complications and poor outcomes, significantly increasing the cost of diabetic care. An average cost in Mali for DM care was found to be about 70% of mean monthly income.[18]

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In South Africa, studies done compare poorly with their westernised counterparts. In a multicentre cross-sectional study done across South Africa, Amod et al. found that 70% of patients were not optimally controlled. Glycaemic control was poor: management by their physicians was suboptimal and needed improvement.[6] Similarly, a study done in a district hospital in KwaZulu-Natal South Africa has shown that poor compliance with current diabetic guidelines among physicians was the main reason for poor outcomes. Only 25% of patients had their HbA1C levels done the preceding year and patients were found to have an increase in diabetic complications.[13]

In a study done in rural Hlabisa, KwaZulu-Natal South Africa, monitoring of glycaemia was infrequent, half of them had no blood glucose recorded, and more than 80% had no urine testing done. In addition, there was a high rate of diabetic complications. This study found a shallow adherence rate to recommended treatment guidelines by healthcare practitioners.[12] Similarly, in Pretoria, a study was done to assess diabetic care and complications in primary health care in Tshwane district found the standard of care to be suboptimal and patients fraught with complications.[19]It is thus imperative that compliance with diabetic treatment be the norm among medical practitioners rather than the opposite.

Another study done in South Africa among specialist physicians and GP's who received education about treatment guidelines and care strategies showed improved diabetic care and outcome. There was a 90% reduction in hospitalization among diabetic patients. This study showed that compliance with diabetic guidelines was possible and had tremendous benefits to patients and the healthcare system.[14,20] Interventions based on the chronic care modules done in Soweto South Africa also improved the critical thinking of primary healthcare nurses and made them more critical of their management of DM patients leading to improvement in patient care.[21]

2. RESEARCH QUESTION AND OBJECTIVES

This study aims to assess the medical practitioner adherence to diabetic treatment guidelines in the management of diabetic patients attending the out-patient department of Dr Yusuf Dadoo Hospital.

The objectives are:

1. To review and describe the demographic profiles of diabetic patients attending the out-patient department.

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2. To assess adherence to SEMDSA guidelines of 2017 in terms of organization of diabetes care related to:

- Symptoms of hyperglycaemia and duration of symptoms.
- Screening for significant risk factors: hypertension, dyslipidaemia, abdominal obesity, family history
- Screening for co-morbid conditions: hypertension, HIV, epilepsy, osteoarthritis, asthma.
- Screening for complications: retinopathy, nephropathy, diabetic foot, cardiovascular, erectile dysfunction.
- Routine examination of feet exam, blood pressure, waist circumference, weight, BMI.
- Performance of routine investigations: Glucose testing at each visit, 3-6 monthly hba1c, annual lipogram, annual serum creatinine & eGFR, urine dipsticks, urine albumin creatinine ratio and ECG.
- Documentation of lifestyle modification methods such as quitting smoking, alcohol.

3. Correlate the professional level of medical practitioners with compliance.

3. METHODOLOGY

3.1 Study design

A retrospective cross-sectional review of diabetic patient records will be carried out.[22] The study will assess compliance of medical practitioners according to the SEMDSA 2017 guideline,[5] the most recent published South African diabetic treatment guideline launched in May 2017. The suitability of this study design is due to its ability to allow the researcher to make inferences about a population characteristic from a subset of the population at a specific or given point in time.[22]

3.2 Site of Study

This study will be carried out in the outpatient department (OPD) of Dr Yusuf Dadoo Hospital, a District Hospital in the West Rand Health District of Gauteng. It is situated in Mogale municipality in the West Rand Health District of Gauteng with a population of about 364,422 (270.03/km) according to the 2011 census. An average of 80-120 patients are seen daily at the OPD, and 15-20 patients of these have diabetes.

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3.3 Study Population

The target population is confirmed diabetic patients, older than 18 years attending regular follow up at the OPD of Dr Yusuf Dadoo Hospital. According to the District Health information system, there was 2112 diabetic patient seen from 1st April 2018 – 31st March 2019.

3.4 Sampling/Sample Size

The files of patients living with diabetes older than 18years attending Dr Yusuf Dadoo Hospital between April 2018 and March 2019 is estimated by the District Health Information system (DHIS) information to be about 2,112. Using the sample size calculator developed by the company Rao Soft,[23] the confidence interval was taken at 95% and a sample error of 5%, the minimum number of files for the audit will be 323. Therefore, the research will carry out a record review of at least 323 patient files.

3.5 Inclusion and Exclusion Criteria-

Inclusion Criteria

- All the male and female diabetic patients 18 years and older.
- Patients presenting for ambulatory care
- Diagnosed for at least one year with diabetes.

Exclusion Criteria

- Pregnant diabetics
- Diabetic emergencies
- Patients are seen during weekends and in the emergency department.
- Files of patients documented and before the publishing of the 2017 SEMDSA guideline.

3.6 Selection or recruitment of participants

The number of diabetic patients seen at the OPD is entered daily into a DM record data book by the OPD sisters and kept at the Nurses station at the clinic. The name and file number of patients are recorded daily from Monday to Friday, excluding weekends and public holidays.

The sister in charge will be notified after getting permission from the clinical manager about the research, and the data entry book will be retrieved from the station. The

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researcher will then identify patient files for record review by selecting patient file numbers of patients seen from 1st August – 31st December 2018.

Sampling will be done using the purposive sampling method of all the patient files seen from the 1st August 2018 -31st December 2018 September until the required sample size is gotten. The first file to be reviewed will be identified using a random number generator. After identifying the first file for review, then every next file would be reviewed until the sample size is gotten. If a file selected does not meet the inclusion criteria, then the next file would be selected.

The clinical manager would inform the record clerks before commencing data collection. The record clerks will be given file numbers of records retrieved from the DM data entry book for retrieval of files. Data from record review would be captured using a data collection sheet. (See Appendix 1)

Data will be captured daily until during the researcher's lunch break until the minimum number of files is gotten. Patient record review will be done for one hour during the researcher's lunch breaks every day from Monday to Friday until the minimum number of files is gotten. This study will commence immediately after HREC approval. Data collection will be done solely by the researcher.

Tracking sheets will be used to document and keep track of patients' details such as file number and date of patient record review. The use of tracking sheets will ensure that files are not captured twice.

3.7 Measuring tool/Data collection

Please refer (Appendix 1). The data collection tool will assess records according to the 2017 SEMDSA guidelines.[5] The guideline was launched in May 2017 during the 52nd congress of the society. It includes the baseline characteristics of the patient age, sex, race and education level, and routine monitoring parameters as stated in the SEMDSA guidelines[5]: hba1c, lipid profile, blood pressure, serum creatinine, urine albumin creatinine ratio, weight and BMI, waist circumference, foot exam, eye exam and referral to a dietician. It also includes the professional level of healthcare professionals who adhere and follow the guideline. (Medical officers, Community service doctors, Interns and clinical associates).[24]

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The SEMDSA standard requires a 100% level of compliance to guidelines by medical practitioners to achieve the optimal required level of care for diabetic patients. Therefore, levels of compliance will be categorized as adherent, partially adherent, poorly adherent, non-adherent following assessment of adherence to the SEMDSA guideline from the record review.

The SEMDSA guideline is the most popular and comprehensive guideline compiled by the South African diabetic society for South Africa, and it is the equivalent of the American Diabetic Association (ADA) in South Africa. The Essential Drug List (EDL) [11]compiled by the South African department of health pulls its resource and information form the SEMDSA guideline, and it is a summarized and brief version. Medical practitioners are expected to be familiar with various chronic guidelines regardless of the availability of EDL and get more comprehensive and up-to-date information.

3.8 Study Period

The study will commence following ethics approval. (see Gant Chart-Table 3). Patient record from 1st August 2018 – 31st December 2018 will be reviewed. This period has the highest number of patients seen in the OPD of Dr Yusuf Dadoo Hospital after May 2017 when the SEMDSA 2017 guideline was published.

3.9 Pilot Study

A pilot study will be conducted with a sample of 10 records in the OPD. This study will be done one month after submission to the assessor group meeting. The data will be coded and will not be used for the final analysis; the patient records used will be excluded from the research sample. This pilot study aims to see if the data collection sheet is working, practical, required information from files are available and how long it takes to capture information from one file.[25] Also, to assess and compare SEMDSA guideline to the Essential drug list (EDL) and assess which guidelines medical practitioners use more in their practice. Also, to find out which aspects of the guidelines medical practitioner healthcare practitioners adhere to, ascertain the critical parts of the guideline and enable the researcher to know what aspects to focus on in the guideline.

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3.10 Data Analysis

Data will be entered in an Excel data spreadsheet and imported into STATA version 13 for analysis.

Table 1: Description of how data will be analysed

Objectives	Analysis	Outcome
Describe demographic characteristics: • Categorical variables like gender, race. • Continuous variables like age	Descriptive stats such as frequencies and percentages. Range, Mean, and Standard deviation-	eg: If there are 100 patients, 10 (10%) whites, 80 black (80%), 5 coloured (5%) and 5 Indians (5%) Specific age and age range. the age range of 20-30 yrs,30 +/- 8.5 SD
Assess the records against the SEMDSA guidelines in terms of –hba1c, lipid profile, serum creatinine, urine dipstick, urine ACR, ECG, blood pressure, weight, BMI. Assessing the recommended frequency of tests and variables of diabetic patients.	Descriptive stats such as frequencies. Standardized scoring according to SEMDSA recommendation. Adherence to each variable will be classified as complete(C), Partial (P), Poor compliance (PC) or Non-adherent(N)	Standardized scoring according to SEMDSA criteria: Complete/Ideal compliance will be 100%, >80% partial compliance, 50-80% poor compliance, < 40% non-adherent.
To assess and correlate the professional level of medical practitioners involved in patient care with compliance and control of diabetes.	Bi-variate analysis using chi-square and multivariate analysis using logistic regression. In this study, the P-value of <0.05 and 95% CI will be	Standardized scoring according to SEMDSA criteria: Complete/Ideal compliance will be 100%, >80% partial compliance, 50-80% poor compliance, < 40% non-adherent.

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	considered as statistical significance. Adherence to each variable will be classified as complete(C), Partial (P), Poor compliance (PC) or Non-adherent(N)	

Assessment of lifestyle modification/practises, examinations and Investigations will be considered as critical aspects of adherence. Each point adds up to a total of 20 for the three critical areas above. 100% of these points will be considered as complete adherence, >80% partially adherent, 40-80% poor compliance and 40% non-adherent.

4. Ethical considerations

- Ethics clearance will be sought and received from the Human Research Ethics Committee before commencing the study.
- Confidentiality of patient details and baseline characteristics will be kept by ensuring there is a data code link file/tracking sheet which would be kept away and accessed only by the researcher. Patient information and file number will be coded and kept separate in a code link file by using tracking sheets. (Refer Appendix 2)
- Permission will be sought from the clinical manager of Dr Yusuf Dadoo hospital before commencing the study. (Appendix 3).
- Permission would also be sought, and approval obtained from West Rand Health District Director before commencing the study. (Refer appendix 4).
- Result of data analysis will be made known to the district manager and facility manager of the hospital. The findings from the study will also be published and distributed in an Academic Journal.
- Raw data will be stored for five years in a safe box with lock and key only known by the researcher if not published and two years if published. It will be discarded by shredding them after they are no longer needed.

5. Limitations and Bias of the study.

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The study will be done in a single centre in the district and thus may limit the generalization of the findings.

6. Funding for the Research

Costs will be carried by the researcher

Table 2: Budget

Item	Cost per item and number needed	Estimate
Data collection sheets	10 pages @ R4 each	R40
Pens	2 x R15	R30
Travelling to hospital	None. The Researcher works there	
Gifts/ cool drinks, for clerks, to collect and return files.	3 x 200	R600
Statistician	Available @ WITS	-
Proofreading	17 pages @ R50 per page	R850
Printing of protocols /Research Report		R3,000
Total		R4,520

Table 3: Time Frame

July 24 2019	Aug 15, 2019	Sept 26 2019	Oct 29 2019	Nov 2019	Feb 2020	Mar 2020-	April 2020	Jun 2020	July 2020	Aug 2020
Submit protocol to PG coordinator and PG office										
	Assessor group meeting									
		Assessor group meeting								

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			Assessor group meeting							
				Submit to Ethic group						
					Data collection	Data collection				
							Data aanalysis			
								Report writing	Report writing	
										Submission to supervisor

REFERENCES

1. World Health Organization: Global Report on Diabetes 2017. Available: https://apps.who.int/iris/bitstream/handle/10665/204871/9789241565257_eng.pdf;jsessionid=C91E01CD5D0D193A28DAF62249D83510?sequence=1 [Accessed 1st August 2018]

2. Cho NH, Shaw JE, Karuranga S, Huang Y, Fernandes da Rocha JD, Ohlrogge AW et al. IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. Diabetes Research and Clinical practise 2018; 138: 271-281. DOI: 10.1016/j.diabres. 2018.02.0230168.8227

3. Peer N, Kengne A, Motala AA, Claude J. Diabetes in the Africa region. Diabetes Research and Clinical Practise 2018; 103(2):197–205. DOI: 10.1016/j.diabres.2013.11.006

4. Hall V, Thomsen R, Henriksen O, Lohse N. Diabetes in Sub Saharan Africa 1999-2011. Epidemiology and public health implications. A systematic review. BMC Public Health, 2011; e11:564. DOI:10.1186/1471-2458-11-564

`

5. The Society for Endocrinology Metabolism and Diabetes of South Africa Type 2 Diabetes guidelines. 2017 SEMDSA Guideline for the management of Type 2 diabetes mellitus. Jemdsa. 2017; 22(1): S1-S196.
6. Amod A, Riback W, Scoeman HS. Diabetes Guidelines and Clinical Practise: is there a gap? The South African cohort of the International Diabetes Management practises study. JEMDSA 2014; 17(2): 85-90. DOI: 10.1080/22201009.2012.10872282
7. Pastakia SD, Nuche- Berenguer B, Pekny CR, Njuguna Benson, O'Hara EG, Cheng SY et al. Retrospective assessment of the quality of diabetes care in a rural diabetes clinic in western Kenya. BMC endocrine disorders 2018;18: 97 doi.org/10.1186/s 12902-018-0324-5
8. Kibirige D, Atuhe D, Sebunya R, Mwebaze R. Suboptimal glycaemic and blood pressure control and screening for diabetic complications in adult ambulatory diabetic patients in Uganda: A retrospective study from a developing country. Journal of Diabetes and Metabolic Disorders 2014; 13: 4 DOI:10.1186/2251-6581-13-40
9. Pillay S, Aldous C, Mahomed F. Improvement noted after a multifaceted approach to diabetes mellitus management. JEMDSA Journal of Endocrinology, Metabolism and diabetes of South Africa2016;21(1):8-12 doi.org/10.1080/16089677.2015.1129704
10. Wolters R, Braspenning J, Wenjing M. Impact of primary care on hospital admission rates for diabetic patients. A systematic review. Diabetes Res Clin Pract 2017; 129:182-196. DOI: 10.1016/j.diabres.2017.05.001
11. The National Department of Health. Standard Treatment Guidelines and Essential Medicines List for South Africa. Hospital Level Adulls. The National Department of Health; 2012.
12. Rotchford AP, Rotchford KM. Diabetes in rural South Africa- An assessment of care and complications. SAMJ 2002;92: 536-541 2 https://www.ajol.info/index.php/samj/article/viewFile/132063/121660 (Accessed 24th August 2019)

`

13. Igbojiaku OJ, Harbor OC, Ross A. Compliance with diabetes guidelines at a regional hospital in KwaZulu-Natal, South Africa. African J. Prim Health Care Fam Med 2013; 5(1): 1–5. DOI:10.4102/ phcfm. v5i1.447

14. Sobngwi E, Ndour-Mbaye M, Boateng KA et al. Type 2 diabetes control and complications in specialised diabetes care centres of six sub-Saharan African countries -the Diabcare Africa study. Diabetes Research and Clinical Practise 2012; 95(1): 30–36. DOI: 10.10.16/j.diabres.2011.10.018

15. Hetlevik I, Holmen J, Midthjell. Treatment of diabetes mellitus- Physicians adherence to clinical guidelines in Norway. Scandinavian Journal of Primary Health Care 1997;15(4): 193-197. DOI:10.3109/02813439709035027

16. Schimke KE, Renström F, Meier S, Stettler C, Brändle M, Group S, et al. Compliance with guidelines for disease management in diabetes: results from the SwissDiab Registry. 2018;1–7 Doi. org/ 10. 1136/ bmjdrc- 2017- 000454

17. Sobngwi E, Ndour-Mbaye M, Boateng KA et al. Type 2 diabetes control and complications in specialised diabetes care centres of six sub-Saharan African countries -the Diabcare Africa study. Diabetes Research and Clinical Practise 2012; 95(1): 30–36. DOI: 10.10.16/j.diabres.2011.10.018

18. Beran D, McCabe A, Yudkina JS. Access to medicines versus access to treatment: The case for type 2 diabetes. Bull World Health Organ. 2008;86(8):648–9. Available: https://www.scielosp.org/scielo.php?pid=S004296862008000800021&script=sci_arttext&tlng=en [accessed 25 07 2019]

19. Webb EM, Rheeder P, Van Zyl DG. Diabetes care and complications in primary care in the Tshwane district of South Africa doi.org/10.1016/j.pcd.2014.05.002

20. Van ZD, Rheeder P. Physicians Education programme improves the quality of diabetes care. South African Med J. 2004; 94(6): 455- 459. Available at: https://www.ajol.info/index.php/samj/article/view/134479 [accessed 02 June 2019]

21. Katz 1, Schneider H, Shezi Z. Managing type 2 diabetes in Soweto- the South African chronic disease outreach program experience. Prim Care Diab 2009;3: 157-164. DOI: 10.1016/j.pcd.2009.06.007

`

22. Ehrlich R, Joubert G. Epidemiology- A research manual for South Africa 2107;3: 1-380

23. RaoSoft sample size calculator

24. El Sharif N, Samara I, Awartani T, Awartani A. Compliance with and knowledge about diabetes guidelines among physicians and nurses in Palestine. EMJH 2015;21(11): 563-574 DOI: 10.26719/2015.21.11.791

25. Van Teijlingen ER, Hundley V. Importance of Pilot Studies.Social Research update 2001;35:1-5 http://hdl.handle.net/2164/157 Accessed 17 September 2019.