

**A quality improvement project on
the quality of care of diabetes
at three clinics in the Swellendam
Sub District**

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Declaration

I, the undersigned, hereby declare that the work contained in this assignment is my original work and that I have not previously submitted it, in its entirety or in part, at any university for a degree.

Signature

Date.....

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Abbreviations

- AC Abdominal circumference
- BMI Body mass index
- BP Bloodpressure
- CNP Clinical nurse practitioners
- COPD Chronic obstructive pulmonary disease
- CVD Cerebrovascular Disease
- DM Diabetes Mellitus
- Hgt Haemoglucotest
- HbA1c Glycosilated Haemoglobin A1c
- RBS Random Blood Sugar
- QA Quality Assurance

Abstract

Background: Diabetes Mellitus and its complications have become a major public health problem around the world, with the number of patients diagnosed rising each year. Swellendam is no exception. Many of the patients, who receive their chronic medication from our clinics, have poorly controlled diabetes. Clinical audit can eliminate the gap between current and optimal clinical performance in Swellendam. The aim of this study was to improve the quality of care of diabetic patients at the chronic care clinics of the Swellendam sub district through a quality improvement process.

Methods: An audit was done on the treatment and follow up of diabetic patients at Railton, Suurbraak and Buffeljagsrivier clinics in Swellendam. Standards and targets were set and data was collected retrospectively from a sample size of 95 patients. The results of the first audit were compared with the criteria and target standards. The audit team identified the standards we failed to meet and changes were made, as a result of the initial audit. To improve the quality of care of the patients and thus limiting the complications, it was set out to implement practical diabetes guidelines at our clinics to achieve this. After the changes were implemented and twelve months had past, another sample of the same 95 patients were taken and the audit was repeated.

Results: The standards set were poorly achieved in the first audit. Significant improvements were noted when the secondary audit was done 12 months later. Patients who attended the clinic at least 6 times a year, improved from 40% during the first audit to 62% during the second audit. This increased the rate well above the target level of 50%. Recording of the patient's weight at each visit remained fairly constant at 40% during the first audit and 41% during the second audit. This is still lower than the expected target level of 50%.

The BMI was measured poorly. Although it improved from 6% in the first audit to 20% in the second audit, it was still far below the target level of 50%.

Measuring of the Hgt levels improved well above the target level of 80%, from 78% in the first audit to 94% in the second audit. The same applies to the measuring of the blood pressure, where the first audit measured 78% and the second audit 95%.

Testing of the patient's urine was poorly adhered to, with 28% in the first and 35% in the second audit - much lower than the target level of 70%.

A diet sheet was given to 93% of patients in the second audit, 21% more than in the first audit and 13% higher than the target of 80%. There was a huge improvement in the documenting of the patients' foot exam, with 17% against 67%. In the first audit 61% of patients yearly visited the dietician, against 88% in the second audit. Again it is higher than the target of 80%.

The vision test and fundoscopy were not well done, but nevertheless improved from the first audit. Vision test was done in 14% of patients in the first audit against 47% in the second audit, and the fundoscopy was done in 1% of patients against 38% in the second audit. The testing of the creatinine, lipid and HbA1c levels improved significantly in the second audit, respectively measuring 10%, 2% and 7% in the first audit, against 96%, 87% and 95% in the second, all well above the target levels of 70%.

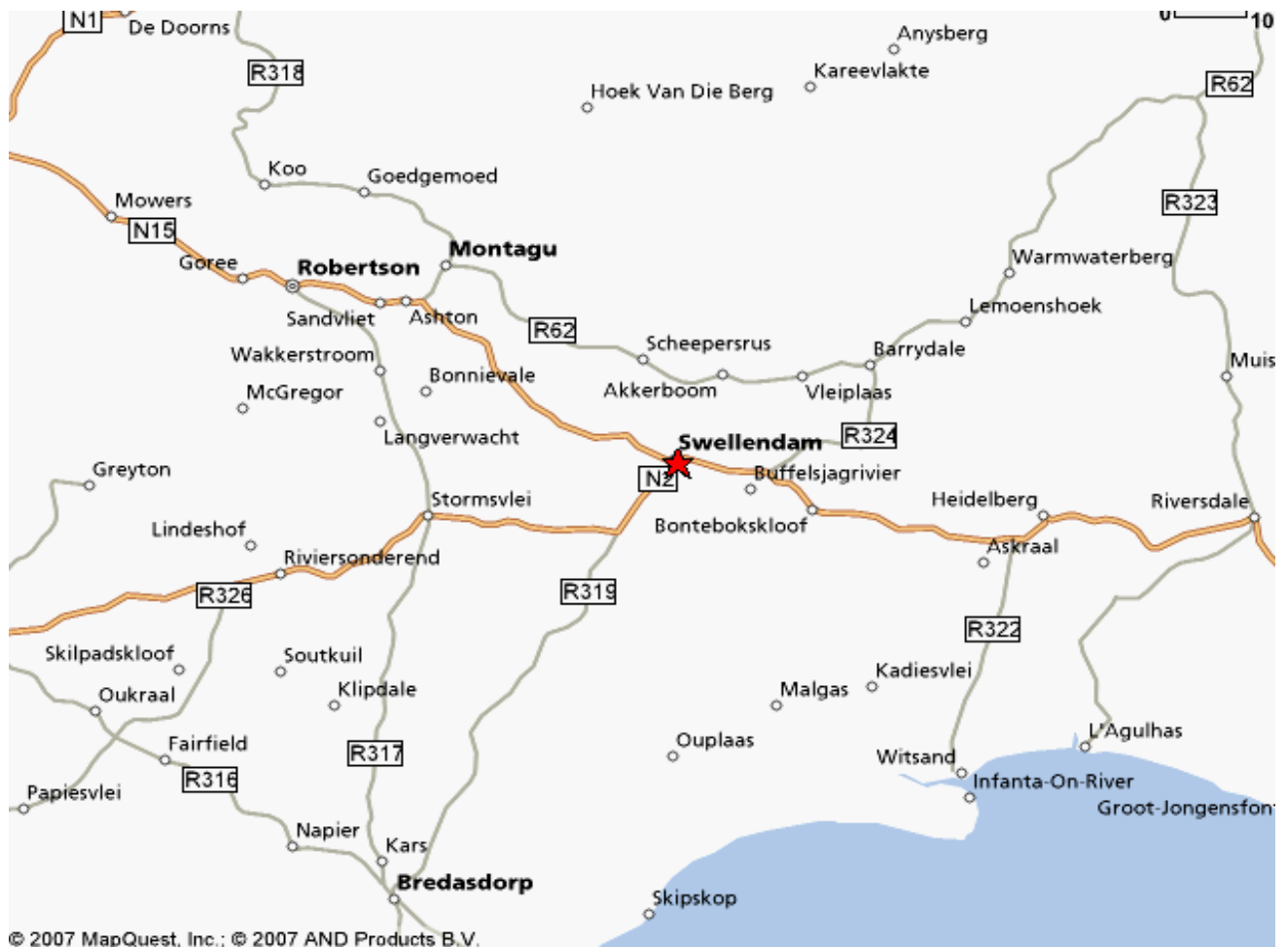
Only 24% of the patients' random blood glucose levels were below 10 in the first audit against 44% in the second audit. This is lower than the target of 50%. The HbA1c levels were lower than 8 in only 13% of patients in the first audit, against 46% of patients in the second audit. Also it is lower than the target of 50%, but increased significantly.

Conclusion: The results of the study showed how criteria-based audit can produce significant improvements in the quality of care of diabetic patients in a rural town in South Africa.

Introduction

Swellendam lies in the Overberg district and is situated about 250km southeast of Cape Town on the Garden Route in South Africa. Swellendam subdistrict comprises about 2635,09 square kilometers and has a population size estimated at 30 180 people in 2006.

In the Boland Overberg region, non-communicable diseases such as ischaemic heart disease, stroke, COPD and diabetes mellitus accounted for 50% of premature mortality in 2006. Chronic care visits accounted for 25% of the total caseload in 2006, of which diabetes care visits accounted for 3% and it was the highest in Swellendam.¹



Swellendam and Railton together with villages such as Barrydale, Suurbraak, Malagas, Stormsvlei and Infanta, falls under the Swellendam Subdistrict. The Swellendam area has five clinics. A large portion of the Swellendam Subdistrict lies on land that are described as the Ruens, which is thinly populated. These remote areas are serviced by our mobile clinics and are visited once a month. Patients are referred to Worcester Provincial Hospital for secondary care.

This project was motivated by a perceived need to improve the quality of care of diabetic patients and to limit complications by implementing a set of practical diabetes guidelines at the following clinics:

1. Railton clinic in Swellendam
2. Buffeljagsrivier Clinic in Buffeljagsrivier (15km outside Swellendam on the N2 to George)
3. Suurbraak Clinic in Suurbraak (an old missionary post between Barrydale and Swellendam)
4. Barrydale Clinic in Barrydale (about 50km from Swellendam on the R62)
5. The mobile clinics visiting the remote areas

Working at Swellendam Hospital, one comes into contact with diabetic patients every day and witnesses how a preventable incident such as a gangrenous limb ends up in an amputation. Being involved in the clinics for the past four years has focused the researcher's attention on the way the patients with chronic illnesses such as diabetes and hypertension are followed up and it was found that some of these patients' urine for instance, are tested only once a year. Therefore it was decided to embark on this study to see if proper guidelines on how to manage diabetic patients would make a difference in the control of their disease. The researcher decided to perform an audit (quality assurance) on the treatment and follow up of diabetic patients in Swellendam. Clinical audit can eliminate the gap between current and optimal clinical performance in Swellendam.

The study was done at Railton, Suurbraak and Buffeljagsrivier clinics. Railton clinic is about 5 kilometers out of Swellendam, Suurbraak about 25km and Buffeljagsrivier about 15km from Swellendam. There are two CNP's and seven staff members working in Railton, and one CNP and five

staff members at Suurbraak and Buffeljagsrivier respectively. The pharmacist and her two assistants visit Railton clinic twice a week and Suurbraak and Buffeljagsrivier once a week to dispense chronic medication. Each clinic is also visited by a doctor twice a week. There are about 180 patients on chronic anti-diabetic medication at these clinics.

The audit would be valuable to identify and promote good clinical practice and it will provide training and education opportunities. It will help to ensure better use of resources and can improve working relationships and communication between staff and patients.

Literature survey

From the literature it is evident that proper guidelines on the quality of care of diabetic patients are necessary, but that the morbidity and mortality from the disease and the cost of care remain challenging.² Better glycaemic control is necessary to prevent long term complications and it is best done by a multidisciplinary diabetes care team that provides diabetes education, medical nutrition therapy, appropriately prescribed physical activity and appropriately prescribed treatment i.e. antihyperglycaemic drugs.³

Because of the high incidence of diabetic complications and the high number of hospitalizations due to poor diabetes control that are seen daily, it was suspected that the rates of adherence to process measures of quality i.e. BP, Hgt, weight measurements, vision tests, foot inspection, fundoscopy and yearly blood tests for creatinin, cholesterol and HbA1c etc. were very low at our clinics.

Guidelines for diabetes control i.e. structured diabetes care, are suggested by a variety of organizations of which the most comprehensive ones are by the American Diabetes Association and include glycaemic, BP and lipid control. An annual foot examination, tests for diabetic kidney disease, retinopathy and neuropathy are also recommended.³

In 2000 a study by Chin et al. was done in Chicago, USA, in which the charts of 2865 diabetic patients in 55 community health centers were reviewed. Only 70% of diabetics had HbA1C measurements, 26% had dilated eye examinations, 66% had diet intervention and only 51% received foot care.

These rates of adherence to process measures of quality were very low compared with the targets established by the American Diabetes Association.⁴

According to a study done in Hong Kong in 2003, the effects of protocol driven care compared to usual OPD (out patients department) clinic care on survival rates of type 2 diabetics, were tested over a 7 year period and it was found that the protocol driven care model improved survival and clinical outcomes in type 2 diabetics.⁵ Similar results were found in a study by Hidaka H et al. (Third Department of Medicine, Shiga University of Medical Science, Seta, Otsu) in 2000, where they also did a before and after assessment on the implementation of standardized protocols at a diabetic follow up clinic. The results showed increasing quality of outpatient care which will obviously lead to prevention of chronic diabetic complications.⁶

Several other studies were done worldwide to evaluate the implementation of structured diabetes care at clinics.^{7,8} One such study by Reed et al. was done in 2005 in Abu Dhabi, United Arab Emirates, and looked at a controlled before-after trial of structured diabetes care in primary health centers. Structured diabetes care can be explained as follows:

- development of GP diabetic clinics
- patient education program
- health care professional education program
- improved recording of clinical information including the HbA1C, s-LDL, BP, foot examinations etc.

It was run over a period of 33 months and it was found that there was a statistically significant improvement in some of the processes of care, namely, HbA1C, cholesterol and documented foot examinations.⁷

A similar study was done in 2004 in the Netherlands and USA simultaneously, where quality improvement programs were implemented. It included a medical record system, clinical practice guidelines, physician educational meetings, audit and feedback. The main process outcomes were: annual number of diabetes visits and number of HbA1C and blood lipid measurements. Main patient outcomes were HbA1C and blood lipid levels.

A definite positive trend was noted in the process and patient outcomes following implementation of guidelines and organizational improvement efforts. The following improvements were noted:

- mean number of diabetes visits
- HbA1C measurements
- blood glucose measurements per patient per year.
- the percentage of patients with at least one cholesterol and at least one serum creatinine measurement per year

On the patient outcome side the percentage of patients with acceptable glycemic control improved after implementation of the quality improvement program. There were definite improvements in HbA1C and total cholesterol levels, as well as the HDL levels.⁸

More appropriate to our rural setting was a study done in Canada in 2003 by Majumdar et al. where an outreach service to rural communities was tested against improved quality of diabetes care. Data was collected before and 6 months after intervention. The result was a 10% improvement in all of the following process measures: BP, total cholesterol or HbA1C.⁹

A similar study in a rural setting in Pennsylvania, USA, in 2005, determined the impact of implementing elements of the chronic care model (decision support, self management, delivery system redesign) on diabetes care practices and patient outcomes. This study included a certified diabetes educator who educated and supported providers and patients on diabetes management. Again the variables evaluated were: HbA1C, BP, cholesterol, knowledge and empowerment levels. The results proved better provider adherence to American Diabetes Association (ADA) Standards of care, and improvements in patient knowledge and empowerment, HbA1C, and HDL cholesterol levels.¹⁰

In South Africa we face the problem of adherence by GP's/nursing staff to diabetes guidelines/protocols. In the researcher's experience this is mainly due to ignorance and the lack of a multifaceted approach.

A study done in Indiana, USA, sought to determine the state of diabetes care by independent GPs, and whether a multifaceted intervention targeting GP's, patients and the health care system would improve adherence to diabetes guidelines. Baseline audits to assess adherence to diabetes guidelines were done and then repeated after development of local consensus guidelines and feedback of baseline performance, and after implementation of the following interventions:

- practice aids
- physician detailing

- patient education sessions
- implementation of individual meal planning

The rates of adherence to guidelines were low before any interventions, but after 1 year of implementing the local consensus guidelines, improvements were seen in BP measurements, foot inspections, HbA1C measurements, and eye examinations. There was also a trend toward improvement in referral to eye specialists.¹¹ A longitudinal assessment of diabetes care management systems was also done in Salt Lake City, Utah in 1998 and then again in 2002 after implementing a proper disease management process. These included:

- provider education programs
- performance feedback to physicians
- clinical quality performance incentives for physicians
- patient education programs
- patient incentive, reminder systems to encourage patient's compliance
- tracking of physician behaviour change and patient compliance with diabetes therapy

The outcome measures included rates of testing of HbA1C and LDL levels, rates of annual eye exams, and improvements in HbA1C and LDL levels. There were improvements in all of the above clinical measures related to diabetes care that have been shown to reduce the risk of diabetic patients developing diabetes related complications.¹²

Also in 1998, Rubin RJ et al. looked at the clinical and economic impact of implementing a comprehensive diabetes management program. Approximately 7000 diabetic patients were studied and the end analysis indicated that there were gross economic savings of \$50 per diabetic patient per month. Hospital admissions per 1000 diabetic members decreased by 18%, and bed days fell by 21%. Again it was demonstrated that the diabetic patients were more likely to get HbA1C tests, foot exams, eye exams and cholesterol screenings.¹³

All of the above studies were done abroad as there are very little information available on quality of care in clinics and hospitals in South Africa. According to an audit done in four community health centres in the Western Cape, the guidelines for the management for diabetes and hypertension were not systematically implemented although it was available at these clinics.¹⁴

In conclusion, the data presented suggest that implementation of a comprehensive healthcare management program for diabetic patients, lead to substantial improvements in costs and clinical outcomes in the short term, and a reduction in the number of diabetic complications in the long run.

Aim of the study

The aim of this study is to improve the quality of care of diabetic patients at the chronic care clinics of the Swellendam sub district through a quality improvement process.

Objectives

1. To implement a system of recording diabetic patients' data / observations and interventions on a patient card so that it can be used for clinical audit purposes.
2. To implement these quality care guidelines in the clinics through a team effort and involving the diabetic patients.
3. To determine and compare patient care and control before and after implementing the guidelines.
4. To make recommendations to the Overberg District Municipality on implementing these guidelines / protocols if they prove successful, to assure quality of care of diabetic patients.

Methods

A criterion based quality improvement process was chosen.

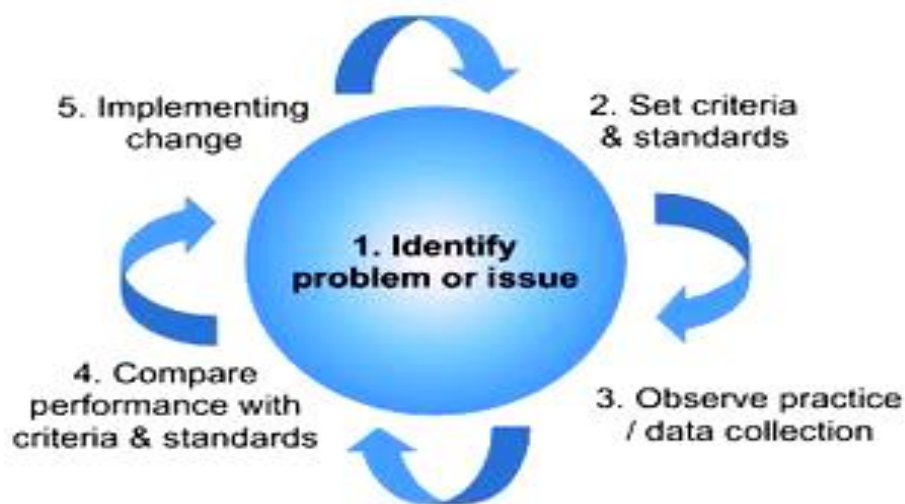
The definition of a quality improvement process is: " A clinically led initiative that seeks to improve the quality and outcome of patient care through systematic review of care against explicit criteria and the implementation of care.

Aspects of the structure, processes, and outcomes of care are selected and systematically evaluated against explicit criteria. Where indicated, changes

are implemented at an individual, team, or service level and further monitoring is used to confirm improvement in healthcare delivery."¹⁵

The audit team comprised of the researcher and a colleague, 2 pharmacists, the clinical nurse practitioners (CNP's) and nurses working in the clinics, as well as the receptionists involved in the recall process.

The Audit (Figure 1)¹⁵



Stage 1

Identifying the problem / issue

The diabetic patients of the Swellendam sub district are not sufficiently followed up at the chronic care clinics and subsequently have poorly controlled diabetes.

This statement was proposed to the audit team in March 2008.

Stage 2

Define criteria and set target standards

After discussion and input from all the members of the audit team, consensus was reached and the following criteria and standards were decided on as set out in Table I below. It was based on the clinical experience of the audit team and from guidelines in the literature reviewed.²⁻¹⁴ The criteria are divided into structural, process and outcome measures.

Table I

Criteria and targets	
<u>Criterion</u>	<u>Target</u>
Structural measures	
* Scale	100%
* Height measure	100%
* Functional glucometer	100%
* Urine dipstix	100%
Process measures	
* 2monthly visits	50%
Every visit	
* Weight	50%
* Either AC / BMI measured	50%
* Blood pressure	80%
* Random blood glucose	80%
* Urine dipstix	70%
Annually	
* Diet sheet	80%
* Dietician consult	80%
* Foot inspection	50%
* Vision test	50%
* Fundoscopy	50%
* Creatinine	70%
* Lipid profile	70%
* HbA1c	70%
Outcome measures	
* Random s-glucose < 10 in 50% of visits	50%
* HbA1c < 8%	50%

Stage 3

Data collection

Clinical scenario:

Swellendam Hospital has 3 full time MO's working in a hospital with 60 beds. There are 4 surrounding chronic care clinics which are visited twice weekly. They all have CNP's. The patients are allocated to a specific clinic according to the area they live in to receive their monthly supply of chronic medicine. Unfortunately no registers are available for these patients, so we are not sure what the exact numbers of diabetic patients are, but it is approximately 100 diabetic patients in Railton, and 40 in each of the other clinics. Chronic patient registers will be implemented in the near future. The study population was chosen out of each of the following 3 clinics:

- Buffeljagsrivier
- Suurbraak
- Railton

Minimum sample size of 95 patients in total at Railton, Buffeljagsrivier and Suurbraak Clinic was calculated using Epi-Info 3.3.2 version. In calculating the sample size we considered the following: population size 100 (Railton) and 40 respectively (Suurbraak and Buffeljagsrivier), expected frequency of 10%, worst acceptable frequency for any measurable indicator 3%, and confidence level 95%.¹⁶

During May and June 2008, data was collected retrospectively by evaluating all the files. Of the approximate 180 files, 98 files fulfilled the inclusion criteria for the timeframe of June 2007 to May 2008, which was more than the calculated minimum sample size of 95. No file numbers or names from the files audited were recorded, instead the files of these patients were tagged to be identified for the re-audit. All data collected were kept confidential by the participants involved. The patients had to meet the following criteria:

INCLUSION CRITERIA:

- Patients between the age of 16 and 80 with diagnosis of diabetes mellitus type I/II
- Records must show that the patients visit the clinic at least 3 times a year

- Patients diagnosed with diabetes mellitus before January 2007. Patients diagnosed after this would not have sufficient information to complete the audit.

EXCLUSION CRITERIA:

- Patients under 16 years of age with DM
- Patients with severe dementia, blindness or residing in a nursing home or that are bedridden at home
- Patients diagnosed with diabetes mellitus after February 2007 (see the reason above)

If a patient did not meet the criteria, the file was excluded from the sample and replaced by another. A data collection sheet was used for each patient.

Stage 4

Analysis and comparison of collected data with the criteria & standards

The data collected was computerized and analyzed using Microsoft Excel. The analysis of the data collected in the initial audit was compared against the set criteria and standards and the results were transformed onto charts. These results were presented to the members of the audit team during June 2008. The audit team identified the standards that were not met and all possible causes for the failures were examined.

Together an action plan was formulated in the form of a data record sheet that had to be introduced in each patient's folder from July 2008. All the clinical information should be recorded on this when the patient visits the clinic. Guidelines as to how often certain investigations should be done, were also given to the CNP's e.g. the creatinine, HbA1c, lipid profile, etc.

Annexure A presents an example of the data record sheet.

Stage 5

Planning and implementing change

The audit team decided that the data record sheets would be implemented in all the diabetic patients' folders (not only the ones being audited) as from July 2008 and that the data collection phase of the audit would be repeated in June 2009. The focus was on an overall improvement of care of all diabetic patients and not only of specific patients.

Recollection of data after implementing change

Ethical approval for the study was obtained from the ethics committee of the University of Stellenbosch.

One year after the implementation of the data record sheets (June '09), the audit was repeated on the same 98 patients. In the second audit it was much easier to extract data from the files due to the data record sheets which contained all the information.

The same process of data capturing and data analysis were followed, but this time there was a comparison with the target standards as well as the first audit's results.

Results

Data from both audits were obtained and compared to one another, as well as to the target standards set. The structural measures of a working scale, a height measure, a functional glucometer and the stocking of urine dipstix, all met their target standards of 100% in the first as well as in the second audit. The process and the outcome measures are demonstrated in Figures 1 to 16. It demonstrates the improvements and the shortcomings from the first to the second audit, compared to the target standards set.

Figure 1:

The number of patients who attended the clinic at least 6 times a year, improved from 40% during the first audit to 62% during the second audit. This exceeded the target level of 50%.

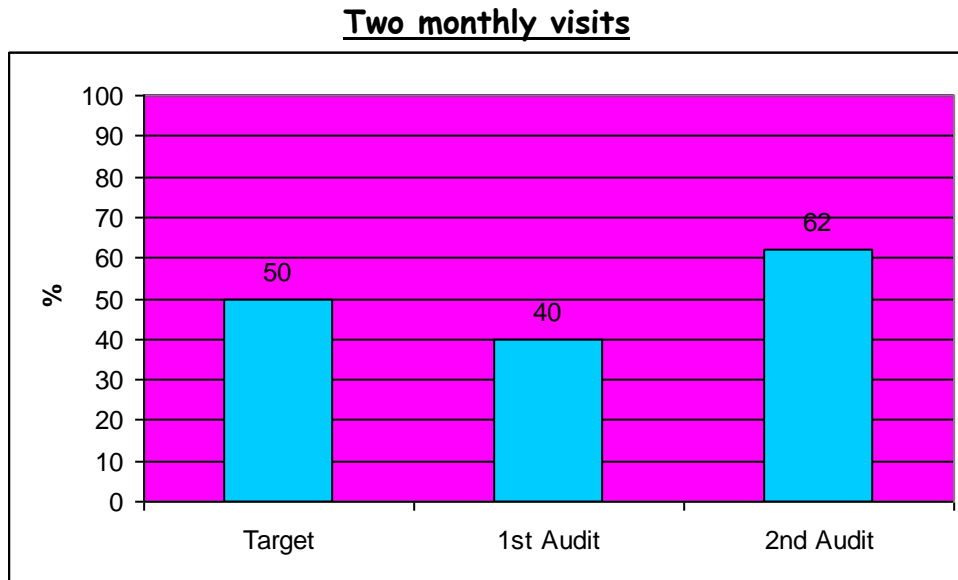


Figure 2:

Recording of the patient's weight at each visit remained fairly constant at 40% during the first audit and 41% during the second audit. This is still lower than the expected target level of 50%.

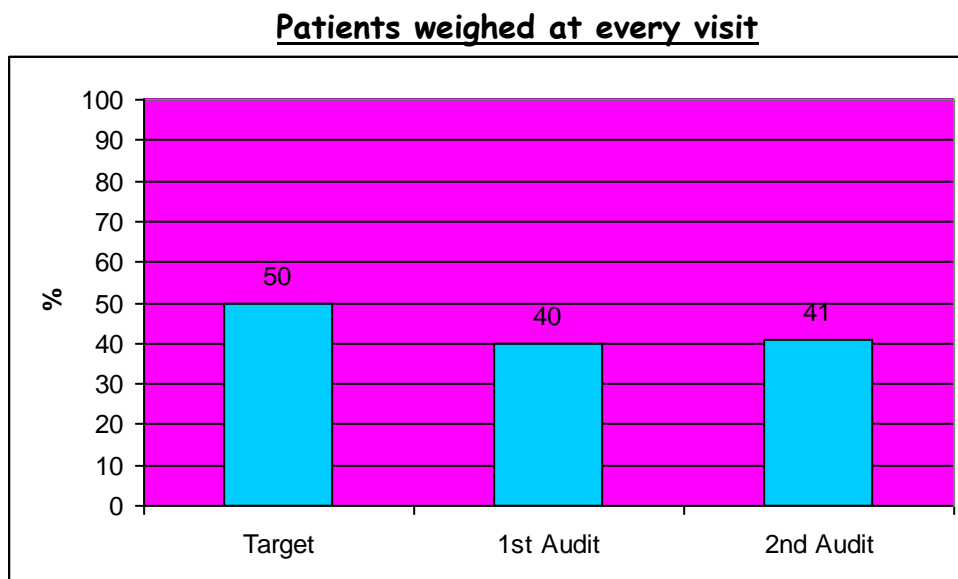


Figure 3:

The BMI/AC was measured poorly overall. Although it improved from 6% in the first audit to 20% in the second audit, it was still far below the target level of 50%.

Either BMI / AC measured at every visit

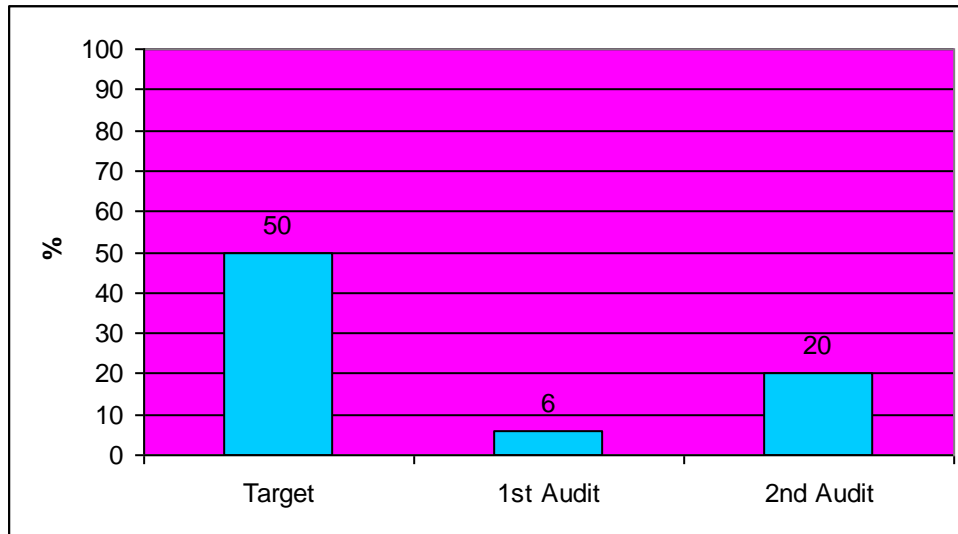


Figure 4:

Measurement of the Hgt levels improved well above the target level of 80%, from 78% in the first audit to 94% in the second audit.

Hgt measured at every visit

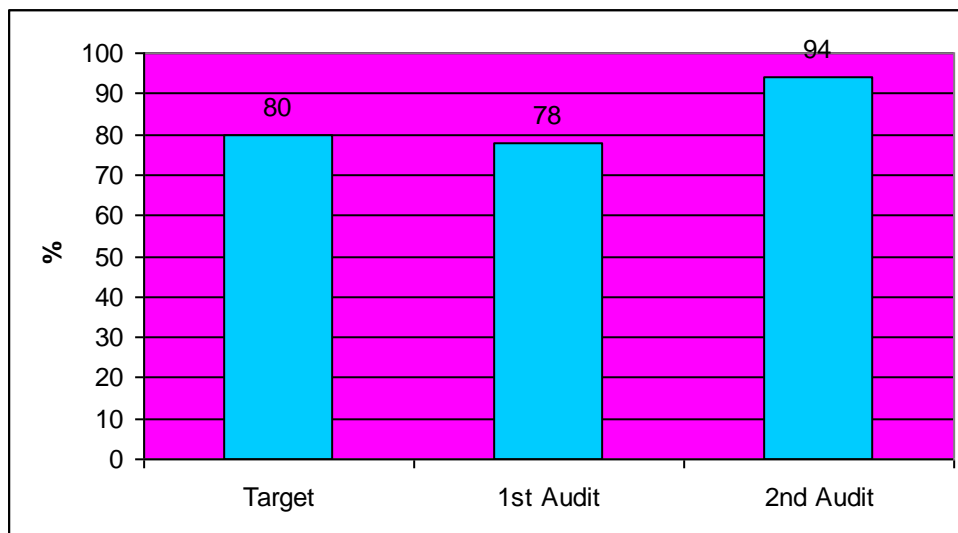


Figure 5:

Measurement of the blood pressure improved from the first audit measuring 78% to the second audit measuring 95%, again an improvement above the target level of 80%.

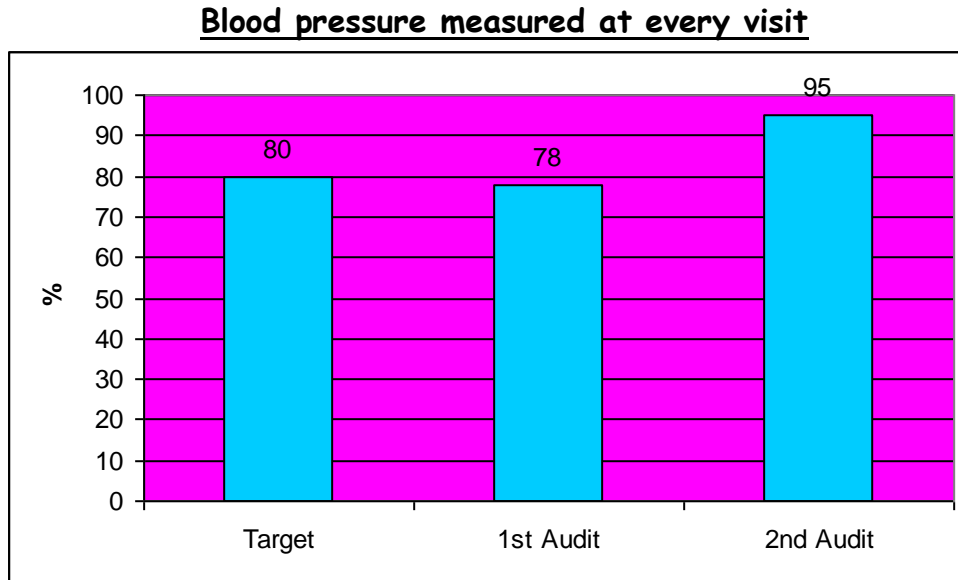


Figure 6: Testing of the patient's urine at every visit was poorly adhered to, with 28% in the first and 35% in the second audit - much lower than the target level of 70%.

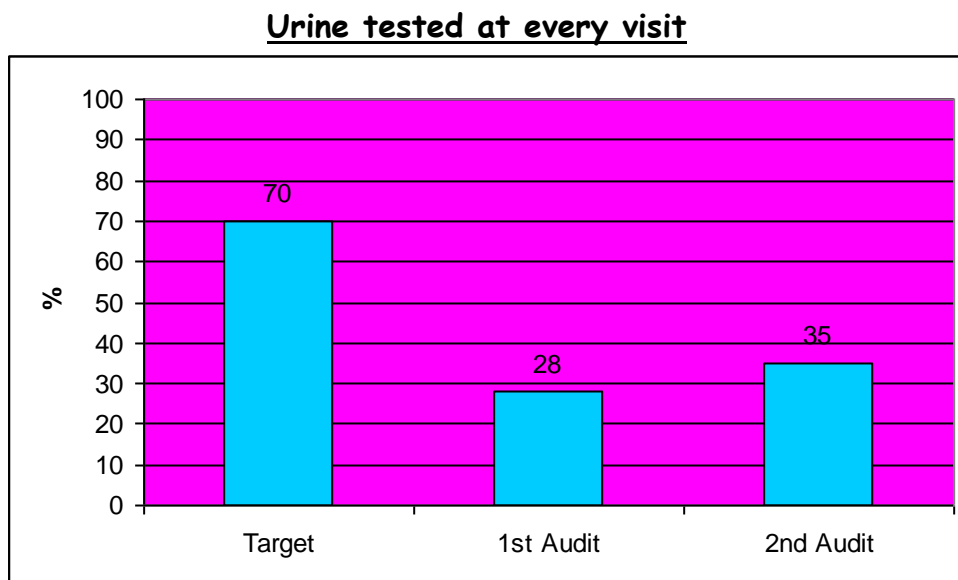


Figure 7:

A diet sheet was given to 93% of patients in the second audit, 21% more than in the first audit and 13% higher than the target of 80%.

Diet sheet handed to each patient once a year

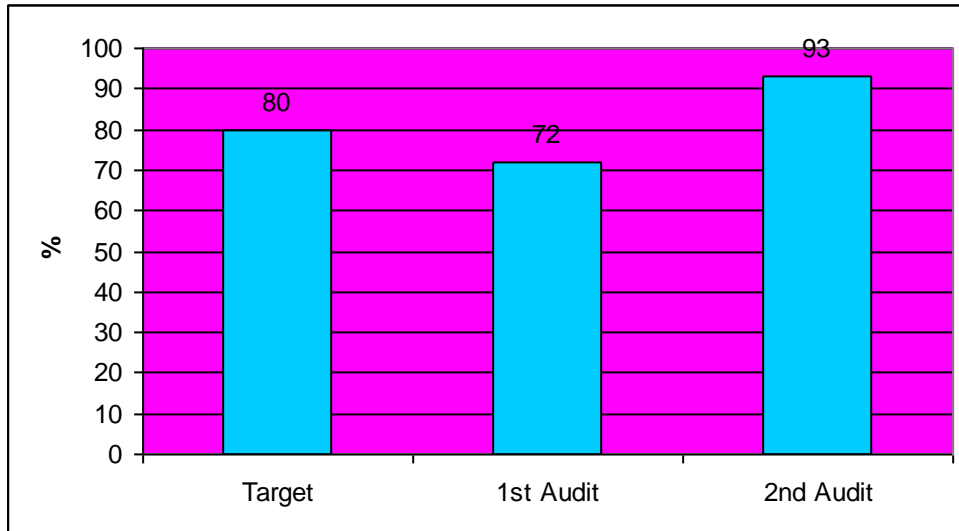


Figure 8:

There was a huge improvement in the documenting of the patients' foot examination, with 17% in the first audit against 67% in the second audit. It improved by 50% and is higher than the target level of 50%.

Annual foot inspection

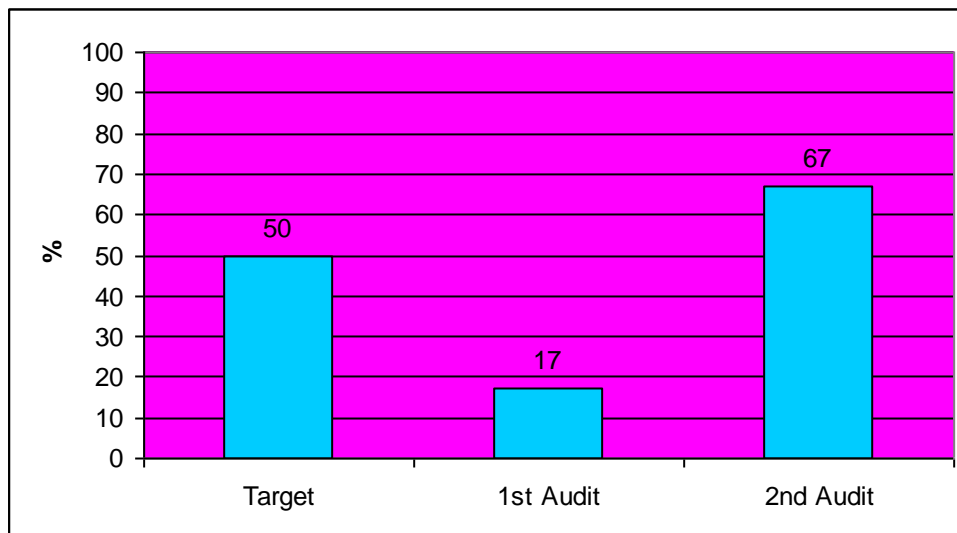


Figure 9:

In the first audit 61% of patients visited the dietician, against 88% in the second audit. Again it is higher than the target of 80% and an improvement of 17%.

Annual visit to the dietician

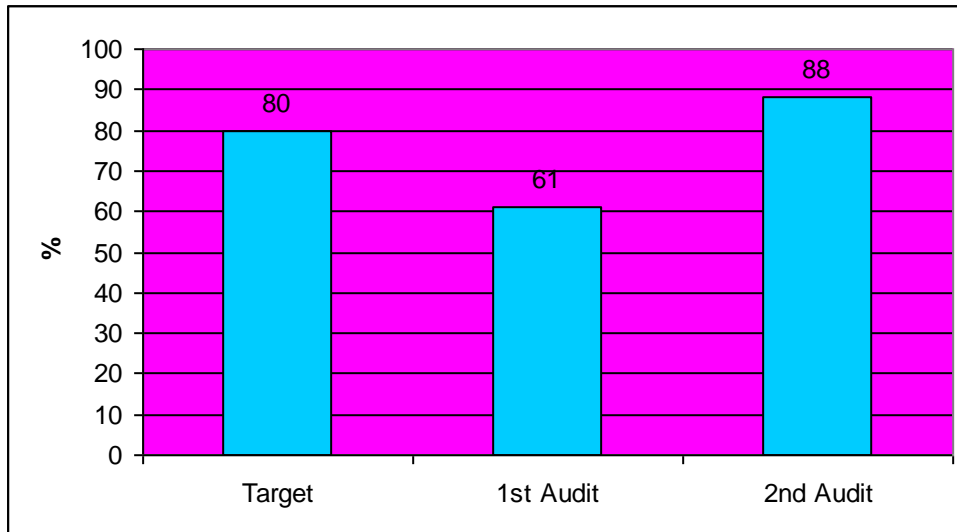


Figure 10: Vision test was done in 14% of patients in the first audit against 47% in the second audit. This leaves room for improvement as the target level is 50%.

Annual vision test

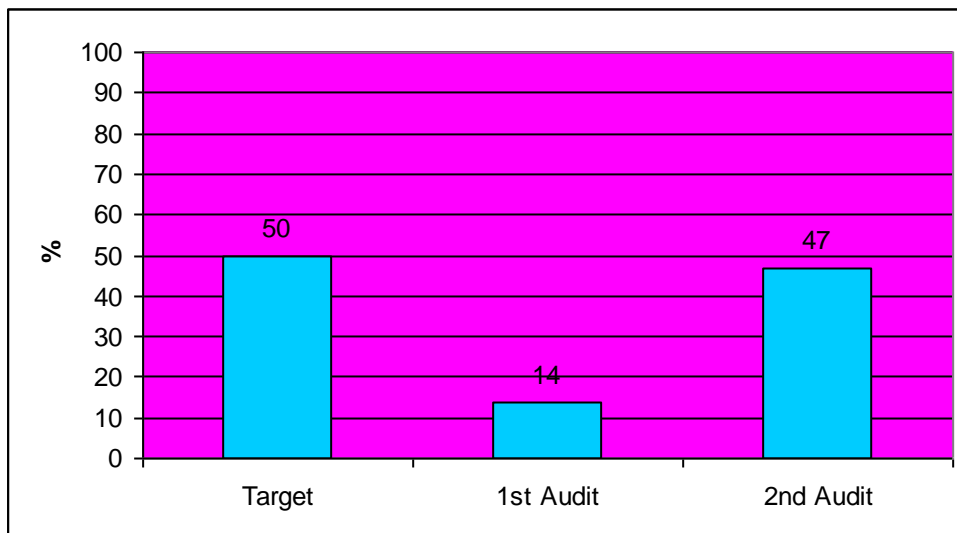
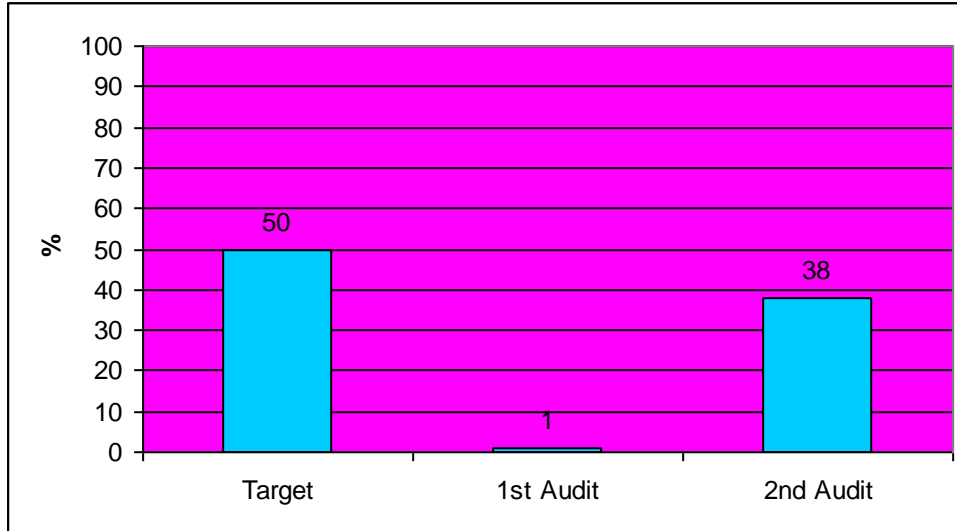


Figure 11:

Fundoscopy is one of the poorest parameters adhered to and was done in 1% of patients in the first audit against 38% in the second audit. This is still 12% below the target level of 50%.

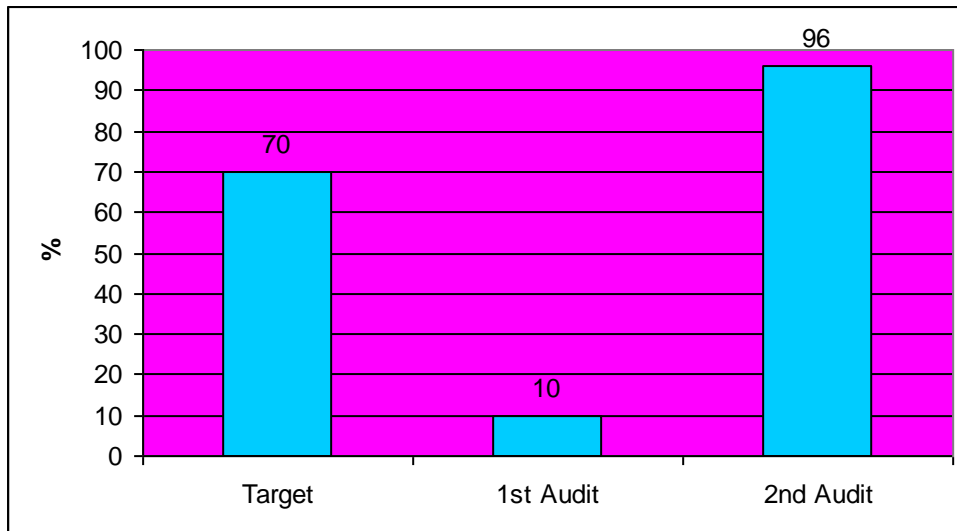
Annual fundoscopy



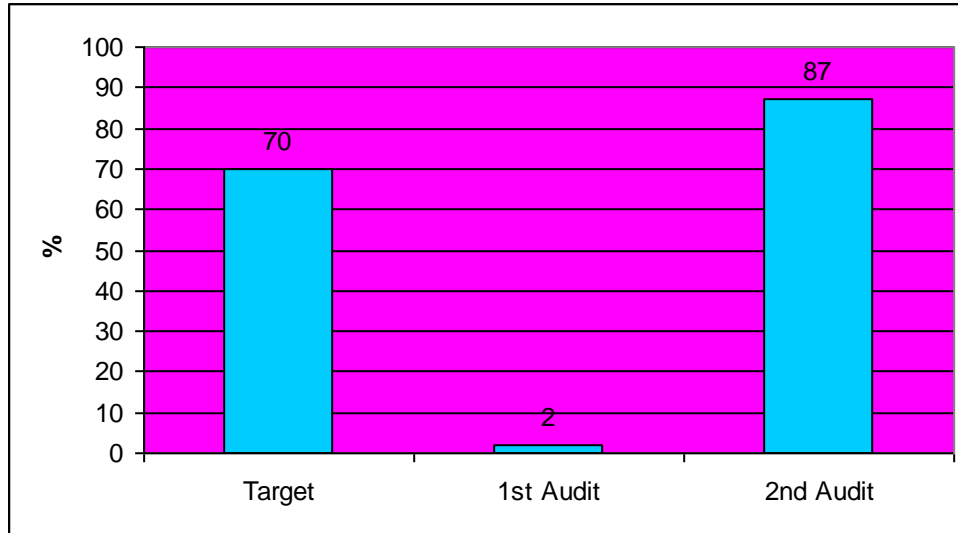
Figures 12,13,14:

The testing of the creatinine, lipid and HbA1c levels improved significantly in the second audit, respectively measuring 10%, 2% and 7% in the first audit, against 96%, 87% and 95% in the second. All well above the target levels of 70%.

Annual creatinine levels tested



Annual lipid levels tested



Annual HbA1c levels tested

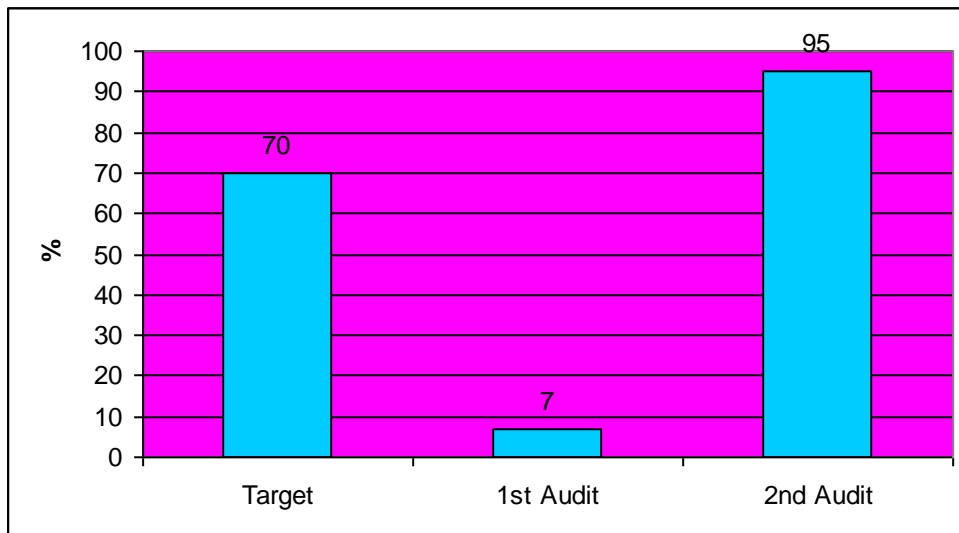


Figure 15:

Only 24% of the patients' random blood glucose levels were below 10 in the first audit against 44% in the second audit. This is lower than the target of 50%.

Random serum glucose < 10 in 50% of visits

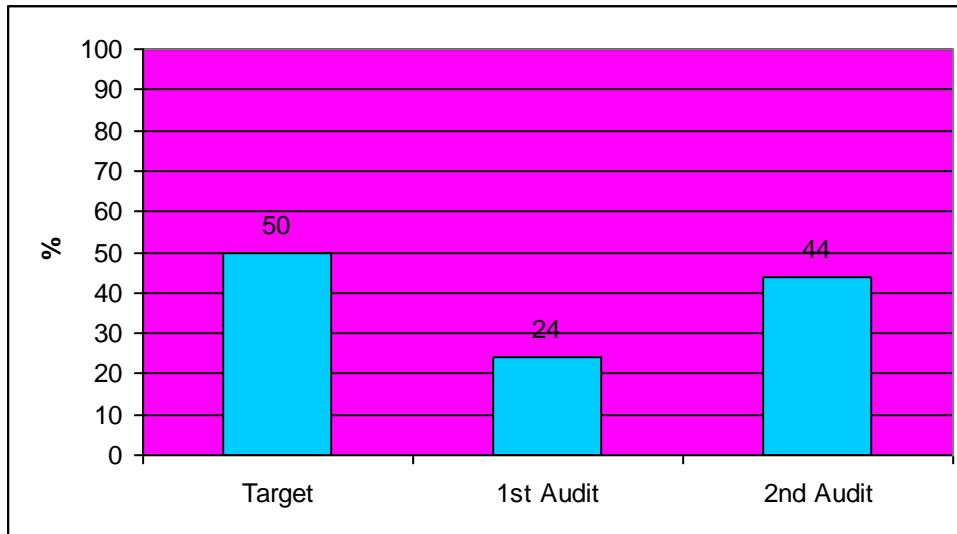
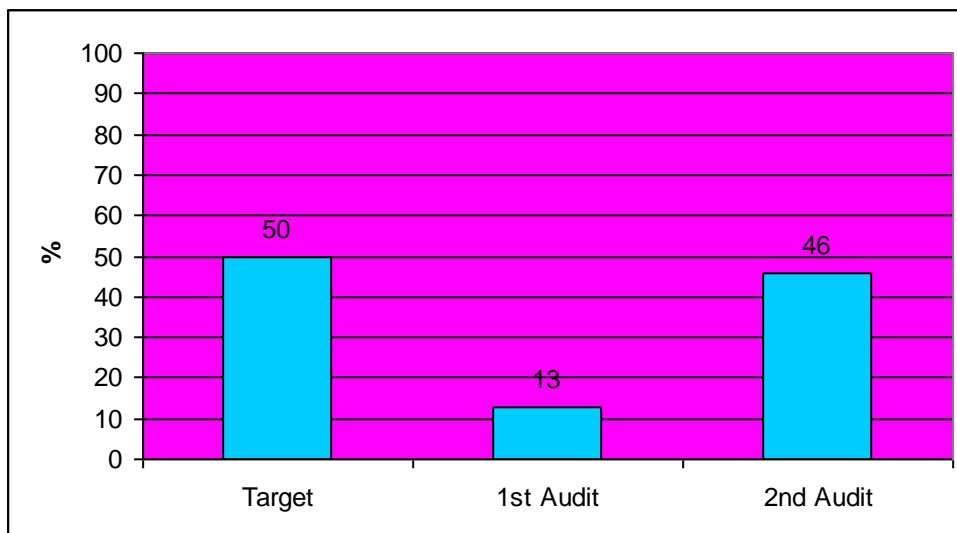


Figure 16:

The HbA1c levels were lower than 8 in only 13% of patients in the first audit, against 46% of patients in the second audit. Also it is lower than the target of 50%, but increased significantly.

HbA1c < 8



Discussion

The following objectives that were set were reached:

- Quality care guidelines were implemented for diabetic patients which, according to the results achieved in the second audit, were demonstrated to be practical and achievable in the chronic care clinics in Swellendam.
- A system of recording diabetic patients' clinical data on a patient card in order to be used for clinical audit purposes was implemented successfully.
- Patient care and control was determined and compared successfully before and after implementing quality care guidelines.
- Recommendations were made to the Swellendam sub district on implementing these guidelines. They were accepted and hopefully it will ensure future quality care of the diabetic patients in the Swellendam sub district.

Because of the lack of clear standardized protocols, the first audit revealed that there are significant gaps between standards of care and medical practice at the clinics. After implementation of clear clinical guidelines for diabetes care, the second audit performed much better against the criteria and standards set, although not all were achieved yet. The improvements were seen over a period of one year and nine out of the sixteen criteria measured, met/improved on the standards that were set.

The criteria used in this audit were similar to those used in the literature. It was set up keeping in mind that it would be measurable and a true reflection of the control of the disease in Swellendam sub district, therefore the target standards for some of the measures eg. blood pressure, random blood glucose and urine dipsticks were set as below 100% by the project team, because it was felt that it would be unrealistic to set standards of 100% for a first time audit.

For the same reason outcome measures for frequency of diabetic complications such as diabetic nephropathy, retinopathy, neuropathy and hospitalizations were also not included to assure a simple and manageable first QA cycle.

The enquiry component of the data record sheet e.g. symptoms of CVD, smoking, alcohol intake, exercise etc. was not included in the QA cycle because the data was not available in the first audit and it therefore could not be measured.

The patients' clinic attendance improved with 22% to 62% and exceeded the target of 50%. In the researcher's opinion, the main reason for this could be that the patients feel more responsible for their illness because of the improved quality of care that they receive at the clinics. They feel that they are being cared for better and owe it to the caregiver/clinics to attend the clinics regularly.

The surging obesity rates throughout the world which have rapidly changed the face of diabetes mellitus, spawning a type 2 diabetes epidemic, supports the emphasis on the regular measurement of the AC and weight of the patients. Whereas in the past the most prevalent form of the disease was type 1, today more than 90% of cases are type 2. Researchers have calculated that each kilogram increase in body mass increases the risk for developing diabetes by 4.5%.¹⁷ For this reason patients should be strongly motivated to lose weight, and one definitive researched tool for weight loss motivation is to be weighed and measured monthly.¹⁸ This was one of the process measures that did not improve on the target set and was fairly poorly done in both audits. In the researchers opinion this could be because of the shortage of staff and therefore time constraints which prevents the patient to be weighed or measured every time.

Regular visits to the dietician and stressing the importance of the diabetic diet, is of equal importance. These parameters were adhered to quite well in the second audit by improving with 27% from the first audit. The reason for this might be that the dietician visited Swellendam Hospital more regularly since 2008 and it was therefore easier to get an appointment with her. The appointment of a dietician also raised more awareness of weight control under the clinic staff because she started giving them small informative tutorials which made them more aware of the importance of weighing/measuring a patient.

Measuring the random serum glucose levels gives a good indication of how well the diabetes is controlled. The more often it is done, the better.

Measurement of Hgt levels improved from 78% to 94% and exceeded the target level of 80%. One of the reasons for the poor performance in the first audit might again be a shortage of staff and therefore a shortage of time spent with the patient. If the patient has no complaints, he/she is dismissed without doing the essential observations. A shortage of stock e.g. glucosticks or batteries for the glucometer could also be a reason for the poor performance in the first audit.

Although glucose levels cannot replace HbA1c determinations, measurement of fasting or random plasma glucose may be used during a clinic visit to identify poorly controlled type 2 patients with reasonable certainty and deserves timely patient education and therapeutic intervention.¹⁹

The same applies to the recording of the blood pressure. Most diabetics are also hypertensive and normotension lowers the risk of developing end organ damage e.g. diabetic nephropathy. Measuring and controlling the BP in a diabetic patient is part of the structured diabetes care that is suggested by the ADA.² The blood pressure measurements also improved drastically in the second audit from 78% to 96% and the reason for the poor first audit results is probably also due to time constraints and staff shortages and a lack of health care professional education about the importance of these measurements.

Regular testing of the patients' urine is non-invasive and non-expensive. According to the National Kidney Foundation, it is recommended that everyone with diabetes who is between 12 and 70 years of age should have a urine test for microalbuminuria at least once a year. At the Swellendam clinics only proteinuria can be tested which is much less sensitive than testing for microalbuminuria, but according to a study by Pereira, when the patient eventually develops proteinuria, it might still not be too late to prevent serious nephropathy.²⁰ For this reason the urine should be tested frequently. It was unfortunately not the case in both audits, with the results far below the target set of 70%. Possible reasons for this might be that the patients were unable to give a urine sample at that time, or that the urine dipsticks were out of stock on that day, or that the sister/nurse didn't understand the reason behind the exercise and omitted to do it. The question arises whether urine testing could rather be done at 6-monthly intervals to improve adherence and again special attention should be given to health professional education.⁷

Annual dilated fundus examination is desirable beginning 5 years after the diagnosis of type 1 diabetes mellitus and at the time of diagnosis of type 2 diabetes mellitus. The importance of this schedule is widely accepted. This objective continues to elude about half the patients with diabetes mellitus.²¹ In both audits the fundoscopy was done poorly with only 1% of patients examined in the first audit and 38% in the second audit. Time constraints because of overbooked clinics and lack of physician confidence could be contributing factors. Prior pupil dilatation could enhance the quality of fundoscopy and save time. A simple vision test done by the clinic annually can identify serious regression in eye function, and can prevent permanent damage to the retina by timeous referral to the ophthalmologist. This was also poorly done in both audits also most probably due to time constraints and lack of nurse education as explained above.

Annual testing of the creatinine, lipid and HbA1c levels, gives an indication of the severity of the disease and abnormalities noted here should be treated aggressively to prevent further end organ damage.⁴⁻¹³ In the second audit there was a very encouraging increase in the measurement of these variables. This might be an indication that the sisters / nursing staff at the clinics value a blood test more than a simple urine dipstick test or a vision test and therefore these tests are done more often. These variables are done yearly and this could also be the reason for the good adherence. Although the outcome measures did not meet the targets, there was a significant improvement. Reasons for this can include the fact that the patients visit the clinics more often and their RBS and HbA1c are done more often. This might act as a motivation to the patients to be more compliant towards their treatment. Early dietician referral might also play a role here.

Limitations of this research

In retrospect the following should have been included in the structural measures:

- Baumanometer
- Ophthalmoscope
- Tuning fork / microfilament
- Snellen chart

These were omitted as the researcher felt that too many criteria would make the audit too complicated for a first time.

In future audits, the target standards will be gradually raised to still be achievable and measurable. Additional criteria will be added. Examples of the additional criteria are:

- Structural measures as described above
- Outcome measures e.g. frequency of complications such as nephropathy, retinopathy, neuropathy and hospital admissions
- How many patients were evaluated for Simvastatin treatment?
- How many patients on Metformin had their creatinine evaluated?
- How many patients were aggressively treated and started on insulin?

How many patients receive daily aspirin?

Recommendations

Special emphasis will be put on the targets that were not met and each will be discussed separately with the health care personnel to explore the problem areas and possible reasons for the poor performance in the second audit.

The results of this project will be used for future reference when doing additional audits to continue to improve our service to the patients of Swellendam.

Chronic disease registers will be implemented at clinic level. In addition chronic record cards are being issued to the patients with chronic diseases e.g. diabetes, hypertension, asthma and epilepsy. This will reduce unnecessary repeating of special investigations e.g. creatinine or HbA1c and improve medical record keeping of hospitalizations or complications. Education sessions with the health care personnel to explain the importance of the criteria measured, is a necessity for a successful QI cycle and all health care professionals involved should be invited before the next QI cycle is attempted. Feedback sessions should also be held every 2-3 months during the QI cycle to explore problems that might arise.

The fact that the folders were tagged could have created a potential bias, as the health personnel were aware of which patients were part of the project, but it was done for easier identification for the re-audit. In the

next QI cycle this can be omitted as all the diabetic patients will be evaluated.

Conclusion

Starting to adhere to guidelines to improve the quality of care and control of diabetic patients in Swellendam, was only the first step in a major project for future generations.

By presenting the results of the audit to all the personnel involved, it is hoped that better care of diabetic patients will be inspired, especially since most of the targets were achieved and the patient outcomes were improved. The patient will benefit from the optimization of therapy, reduced episodes of therapeutic failure and of side effects. The healthcare professionals taking part should experience greater co-operation and wider dissemination of information between the members of the team. Improved inter-professional co-operation could lead to cost savings through optimal therapy, reduced wastage and fewer emergency episodes requiring hospital admission.

The outcomes of the audit done in Swellendam could therefore be compared to the literature and support the notion that standardized care with clear guidelines is a necessity in addressing and maintaining quality care in chronic patients.

To address this, guidelines for diabetes control i.e. control of glycemia, as well as blood pressure and lipid levels, are being applied worldwide. These guideline goals are to improve quality of care and thus decrease morbidity, mortality and costs by reducing complications, and to subsequently improve the quality of life for people with DM and reduce the disease burden on society.

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Annexure A: Data record sheet

PATIENT NAME / STUDY CODE

Target weight:

Length:

Date	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Hgt												
BP												
Weight												
BMI												
A/C												
URINE:												
*Prot												
*Glucose												
*Ketones												
LAB:												
Creatinine**												
Tot Chol**												
Lipogram:**												
HDL												
LDL												
T/G												
HbA1c*												
EXAM:												
Eyes:												
Vision**												
Fundosc**												
Referral Opth												
Foot exam**												
Injection sites												
ENQUIRY:												
Sx of CVD												
Smoking												
Diet												
Salt intake												
Alcohol												

Exercise												
Asprin												
Dietician**												
Diet sheet**												

*** 6 Monthly**

**** Yearly**