Chapter 1

Introduction and Literature Review

Introduction

Diabetes mellitus is a significant problem with an estimated 140 million sufferers worldwide, and an expected increase to 300 million by the year 2025. [1] South Africa is not spared from this chronic disease with an estimated 2.4 to 3.2 million patients of whom more than 1 million is still undiagnosed. [2] During the period 1990 to 2000 an increase of 30% in the prevalence of diabetes was reported in Africa, mostly due to a change to a more westernised lifestyle and an increase in obesity. [2]

According to the WHO [1]: Diabetes is the fourth largest underlying cause of death and is strongly associated with cardiovascular disease. Hypertension is a common co-morbidity to Diabetes in South Africa and contributes significantly to morbidity in diabetes. [3, 4, 5]

It is therefore very important to optimise the care of diabetic patients at primary, secondary and tertiary care level and to persist in the maintenance of care of the highest standard.

Multiple guidelines have been drawn up and circulated to health care workers but despite this, the level of diabetes care is still not optimal due to sub-optimal implementation strategies. Guideline implementation problems are a significant problem in South Africa as evidenced by the study of Levitt et al [6] who studied and attempted to improve the quality of diabetes care in primary care clinics in Cape town. This is however not only a local problem as evidenced by numerous international audits indicating sub-optimal and varied implementation of guidelines. [7]

This study attempts to describe and test a model to improve the quality of diabetes care in a tertiary care diabetes clinic, which includes a physician-training program as well as a structured consultation schedule based on the South African guidelines for diabetes care. [8]

Background (Literature Review)

Introduction

Diabetes mellitus is a common disease in black South Africans although limited data is available on the prevalence thereof. Three studies report the prevalence of diabetes in South Africa namely: Omar, Seedat and Motala [9] which estimates the prevalence of Diabetes amongst the black population of Kwa Zulu-Natal at: 4,2% (women 5,2% and men 2,3%). Overall age and sex adjusted prevalence was 5,3%. Impaired glucose tolerance was seen in 6,9% of the sample population (11,5% males and 5,5% females). Levitt, Katzenellenbogen, Bradshaw, Hofmann and Bonnici [10] reports the prevalence of Type 2 Diabetes in urban Africans in Cape Town to be 8.0% (CI 5.8% to 10.3%) and that of Impaired Glucose tolerance at 7.0% (CI 4.9% to 9.1%). Lastly the study by Mollentze, Moore, Steyn et.al. [11] reports the prevalence in two populations to be 4.8% (Rural population of QuaQua) and 6.0% (urban population of Mangaung).

The prevalence of diabetes in the rest of Africa is uncertain but studies done between 1958 and 1989 at various places in Africa reported figures between 0.1 and 3.8% of the population.[12] The most recent study (2000) on the prevalence of diabetes in Africa is that of Aspray et.al. [13] who reports the prevalence in rural and urban communities in Tanzania. The crude prevalence for the rural community was 1.5% (SD 0.6) and for the urban population 5.3% (SD 1.2) for men. Females had a slightly lower crude prevalence with 1.1% (SD 0.5) and 4.0% (SD 0.9) for the rural and urban populations respectively. The prevalence of diabetes is expected to rise in the order of 170% in developing countries of most of Africa forms part, mostly due to population ageing, unhealthy diets and obesity. [14]

Morbidity and Mortality of Diabetes in South Africa

Diabetes is not just common in SA but also contributes to extreme morbidity and carries a heavy mortality burden. Kalk, Pick and Sayed [15] estimated that diabetes in women accounted for 18,2% of deaths in Asians, 7,1% in coloured patients, 4,3% in blacks and 3,0% in whites.

Most of this mortality occurred in middle age. Amongst men mortality in black, coloured and white populations are 2,0 –2,5% but amongst Asians 4,9%.

In Africa, although information is limited, the prognosis for patients with diabetes seems grave. This was demonstrated in a large study done in Dar es Salaam [16] reported in 1990 where the five year survival rate of diabetic patients was only 71%. The author of this study concluded that diabetes in sub-Sahara Africa is, in many patients, a serious disease with a poor prognosis and that more effort is needed to increase public awareness, improve patient detection, management and follow-up.

Diabetes doesn't only contribute to mortality but also to morbidity, as demonstrated by a study done amongst black Africans attending public sector clinics in Cape Town. In this study retinopathy (any grade) was present in 55,4% of patients with 15,6% proliferative or pre-proliferative. Further more 7,9% of patients had cataracts, 27,6% had peripheral neuropathy, 8,2% had absent foot pulses, 1,4% had amputations, 5,3% had persistent proteinuria and 36,7% had an elevated albumin-creatinine ratio. [3]

The economic impact of Diabetes

The management of diabetes is primarily preventive. The aim of treatment is to prevent complications. Complications contribute to a significant proportion of hospitalisations and loss of man-hours. This also places a heavy burden on health and welfare services.

In a Tanzanian study by Chale et. Al. [17] they conclude, "Diabetes places a severe strain on the limited resources of developing countries. If African patients with diabetes have to pay for their treatment most will be unable to do so and will die."

If diabetes is treated, there are clear indications that proper management with an appropriate and effective program improve the quality of life and reduce the cost of healthcare needed by diabetic patients. [18]

In the South African government sponsored hospital sector the average cost of outpatient management of diabetes (excluding salaries of healthcare workers and clinic facilities), according to an unpublished audit done at Kalafong hospital during 2002, amounted to R 1050.00 per patient per year. [19]

Can the chronic complications of diabetes be prevented – Is it worth the effort?

Numerous studies indicate that good glycaemic and hypertension control in both types of diabetes leads to a decrease in microvascular and macrovascular complications. Thus good control can reduce the morbidity and mortality in diabetic patients. [20, 21, 22]

The current Quality of care

There is very little information available on quality of care in clinics and hospitals in South Africa, although the impression is that the care in general is poorer than advised in the current guidelines. According to an audit done in four community health centres in the Western Cape the guidelines for the management of diabetes and hypertension were not systematically implemented although it was available in these clinics. [20]

In a South African audit of primary diabetes care in the public sector of Cape Town a poor quality of care; together with a high prevalence of sub optimal glycaemic and blood pressure control was recorded. Diabetic complications remained largely unrecorded. [3]

Poor quality of care seems to be a worldwide problem, of which the following are examples:

Audit of care in a large urban hospital in the USA indicated that service rendered at different levels (within the same hospital) of care varies: HbA1c tests was done in 76% to 94% of patients annually with 31% to 43% of patients with HbA1c levels higher than 9.5% (highest risk category) and only 24% to 30% of patients with HbA1c of less than 7%. Process measures looked for, also have a large variation according to who delivers

the service: Endocrinologist supervised diabetes care in a well structured diabetes clinic seeing only diabetic patients consistently performed better than internal medicine clinics taking care not exclusively of diabetic patients. Ninety seven percent, 64% and 79% of patients seen in the dedicated diabetes clinic, supervised by endocrinologists, had a annual foot, dilated eye and nephropathy assessment compared to 55%, 50% and 67% respectively for the internal medicine clinic.[25]

Three studies illustrate the quality of diabetes care delivery to health care insured patients in the USA clearly, and is summarised in table 1.1. What is clearly to be noted is the number of annual visits to the health care provider, but in some instances still poor delivery of certain essential interventions or investigations.

Table 1.1:   Comparison of three audits of insured healthcare delivery to diabetic patients in the USA. * Advised annually, reported of percentage of patients who received the intervention

Parameter of care	Srinivasan et. al. [25]	Arday et. al. [26]	Edelman et. al. [27]
Number of clinic visits	8 ± 5 (mean, SD)	15.7 (mean)	14 (median)
HbA1c (≥ 1x per year)*	70%	67.8%	98%
Urine test for microalbuminuria*	57%	-	34%
Lipid profile*	41%	56.8%	87%
Eye examination*	-	68.3%	74%
Foot examination*	37%	-	90%

Chin MH et. al. [28] assessed the quality of diabetes care in Midwestern community health centres (USA) and came to the conclusion that rates of adherence to process measures of quality were relatively low compared to targets established by the American Diabetes Association.

Among minority groups and lower socio-economic groups in the USA the quality of care are demonstrated in table1.2.

Table 1.2: *Quality of care parameters in minority groups and low socio-economic groups in the USA. * Advised annually, reported as percentage of patients who received the intervention. ** Total cholesterol only.*

Parameter of care	American Indians [29]	Uninsured Rural patients [30]	Alaskan Natives [31]
HbA1c (≥ 1x per year)*	79.6%	88%	-
Urine test for microalbuminuria*	23%	62%	-
Lipid profile*	85%**	68.3%	
Eye examination*	55%	20.4%	56.5%
Foot examination*	61%	80.3%	62.8%

Models of Diabetes Care

Ovhed [32] described and compared two different team models of delivering diabetes care in the primary health care setting of suburban and rural Sweden. Care of each model was assessed by analysing patient records as well as conducting a structured telephone interview of all diabetic patients. The two models were compared with regards to the quality of care, frequency of diabetic patient consultations, patient knowledge of their disease and patient self-management. Care in the first model is scheduled to three nurse visits and one general practitioner visit per year. An agreed checklist was to be followed at each visit, which considered the different quality criteria. In this way the local guidelines were implemented.

The second model the care of diabetic patients were not formalised and checklists were not used. Diabetic patients were scheduled to see the general practitioner twice every year. Nurses acted as assistants to the doctors and only saw the patient if referred to them by the doctor for a patient specific need. A clear difference in the two models was observed when audited, glycaemic control was significantly better in the first model (HbA1c: 6.9 ± 1.6 and 7.7 ± 2.0 for model 1 and 2 respectively). Process measures for the two models clearly differ, with the more structured, guideline based consultation schedule, being clearly better (table 1.3).

Table 1.3: *Percentage of patients who received process measures annually*

Process Measure	Model 1	Model 2
HbA1c test	97%	36%
Total cholesterol	51%	11%
Serum triglyserides	49%	3%
Fundus photograph	73%	47%

A structured consultation schedule based on diabetes care guidelines can significantly improve the quality of care as well as improve glycaemic control in general practices and clinics rendering service to diabetic patients.

Measures of Ideal care

Diabetes associations worldwide publish guidelines and position statements in assisting physicians and other health care providers in rendering a minimum standard of diabetes care. Examples of such guidelines are:

- SEMDSA guidelines for management of type 2 diabetes. [33]
- American Diabetes Association Clinical practice recommendations (published annually). [34]

The ideal care would follow one of these guidelines; local guidelines are preferable since they are adjusted for local circumstances and health care policies.

Characteristics of good quality of diabetes care

Campbell et. al.[35] studied 60 general practices in England in an attempt to identify predictors of high quality of care of chronic diseases. High quality of care was strongly related to the duration of routine consultations, the size of the practice (larger practices tend to deliver better diabetes care), location of the practice (preventative care was worse in practices in low socio-economic areas) and lastly practices with a good team climate delivered a higher level of care.

Continuity and service provided to the patient by his or her usual provider at least once a year was associated with a better quality of care, as reported by patients with diabetes type 2, in a survey done in Texas. [36]

How to assess quality of care?

In assessing quality of care the first essential step is to set criteria against which the quality will be measured. [22, 23] In our hospital this measure is the SEMDSA clinical practice guidelines for type 2 diabetes. [33]

Two aspects could be measured: [37]

(a) Professional quality outcome: whether the service correctly meets the professionally assessed needs of its patients (outcome measures).

(b) Professional quality process: whether the service correctly selects and carries out the techniques and procedures which professionals believe will meet the needs of patients (process measures).

All the activities of assessment depend on the availability of appropriate and accurate information with regards to the outcome and process measures under investigation.

The most important source of information is the clinical records but these have obvious shortcomings, namely: They are frequently incomplete and the information frequently inaccurate with errors in diagnostic testing, clinical observation, clinical assessment, recording and coding. [38] Luck et al. [39] did a prospective study, evaluating the validity of chart abstraction by directly comparing it to reports of patients, and concluded that chart abstraction underestimates the quality of care for common outpatient general medical conditions. Other ways to enhance the value of clinical record is to reassess laboratory results, X-rays etc. as well as by interviews with or questionnaires to practitioners and patients. [38]

Hospital admission and readmission rates might be a useful method to assess the quality of care and gives an indication of patient education, pre-discharge assessment and aftercare. Benbassat and Taragin [40] evaluated the validity of the above assumption and found that readmission rates are not a useful indicator of patient care and that most readmissions are due to patient factors and frailty.

Thus a few ways to assess the professional quality process is:
- (a)　Audit of Medical records. [41, 42, 43, 44, 45]
- (b)　Interviewing of patient. [46, 47, 42]
- (c)　Re-evaluation of laboratory results, X rays, ECG etc. [48]
- (d)　Evaluating patient admission and re-admission rates. [46]

Currently all the methods for assessment of professional quality are flawed in one way or another.

How to improve quality of professional care

Oxman and Thomson et al [49] conducted a systematic review of 102 trials of interventions with the aim of improving professional practice quality. The following types of interventions were assessed:

- (a)　Educational materials: Distribution of published or printed guidelines and recommendations for clinical care, audiovisual material and electronic publications.
- (b)　Conferences: Participation of health care providers in conferences, lectures, workshop etc. outside their practice settings.
- (c)　Outreach visits: Visit of a trained person to meet with health care providers in their practice settings to provide information and advice.
- (d)　Local opinion leaders: Use of provider's explicitly nominated by their colleagues to be educationally influential.
- (e)　Patient mediated interventions: Interventions aimed at patients e.g. Education, counselling and clinical information to make health care providers aware of expected care.
- (f)　Audit and feedback: Any summary of clinical performance of health care workers over a period of time, with or without recommendations for clinical action. This information may have been obtained from clinical records, databases, patients or observation.
- (g)　Reminders: Any intervention that prompts the health care worker to perform a clinical action.

(h) Marketing: Personal interviewing, group discussion or a survey of targeted providers to identify barriers to change.

(i) Multifaceted process: Inclusion of clinic doctors and other health care providers in discussions to ensure that consensus is reached on the appropriate management of a chosen clinical problem.

Of all these interventions none provides a magic cure for improving the quality of professional practice but all of them may, in the appropriate setting, be useful tools to improve professional practice and patient outcomes.

Motivation and Aim of the Study

Diabetes is a significant problem with a need for preventative measures to counteract and delay complications, which lead to enormous morbidity (with loss of quality of life) and mortality.

All strategies for prevention are labour intensive and should be maintained for life for each diabetic patient. Since diabetic complications develop insidiously health care providers tend to fail in their persistent vigilance for the development of complications as well as continuous patient assessment and education. It is therefore important to continually educate and motivate health care personnel in order to render a high level of health care.

The diabetic clinic should also be structured to optimally support health care, with a protocol for patient care and education. [42]

This study aims to measure the effect of a physician education program as well as a structured consultation schedule at a tertiary care diabetes clinic.