OPTIMISATION OF PHARMACOLOGICAL MANAGEMENT OF DIABETES MELLITUS IN A PRIMARY HEALTH CARE SETTING

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OPTIMISATION OF PHARMACOLOGICAL MANAGEMENT
OF DIABETES MELLITUS IN A
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<td>American Diabetes Association</td>
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<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
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<td>ARB</td>
<td>Angiotensin II Receptor Antagonist</td>
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<td>BB</td>
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<td>BMI</td>
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<td>HDL</td>
<td>High Density Lipids</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<tr>
<td>IDF</td>
<td>International Diabetes Federation</td>
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<tr>
<td>JNC</td>
<td>Joint National Committee</td>
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<tr>
<td>LDL</td>
<td>Low Density Lipids</td>
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<tr>
<td>NMMMM</td>
<td>Nelson Mandela Metropolitan Municipality</td>
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<tr>
<td>PA</td>
<td>Pharmacist Assistant</td>
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<tr>
<td>PHC</td>
<td>Primary Health Care</td>
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<td>PN</td>
<td>Professional Nurse</td>
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<tr>
<td>SA</td>
<td>South Africa</td>
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<tr>
<td>SEMDSA</td>
<td>Society for Endocrinology, Metabolism and Diabetes of South Africa</td>
</tr>
<tr>
<td>UKPDS</td>
<td>United Kingdom Prospective Diabetes Study</td>
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<td>USA</td>
<td>United States of America</td>
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Levels of diabetic care in primary health care settings in South Africa have been found to be sub-optimal. Knowledge deficits and inadequate practices have been implicated in the poor quality of local diabetes care. Type 2 diabetes and hypertension are commonly associated chronic conditions hence to optimise diabetic care, tight control of blood pressure is essential. Although guidelines for the overall management of diabetes in a primary health care setting have been published (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a), adherence to these guidelines has not yet been optimised in the primary health care setting.

The objectives of the study were: to design and implement an educational intervention aimed at nursing staff, based on the South African guidelines for type 2 diabetes and hypertension, at a public sector primary health care clinic; to determine the impact of the educational intervention on the level of knowledge and attitudes of the nursing staff, and on the level of diabetic and blood pressure control achieved in the patient population, and to determine the impact of the educational intervention on pharmacological management of patients.

A questionnaire was used to quantitatively assess the nursing staffs’ knowledge of the management of type 2 diabetes and hypertension at a primary health care level. A qualitative evaluation of the nursing staff attitudes was obtained using focus group interviews. The educational intervention, in the form of lectures and based on national diabetes and hypertension guidelines (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne et al., 2003), was then implemented and directed at the nursing staff at a primary health care clinic. A post-intervention evaluation was performed after four months by repeating the questionnaire and focus group interviews. Comparisons between the pre- and post-intervention questionnaire and focus group interviews evaluated the impact
of the educational intervention on the knowledge and attitudes of nursing staff towards the management of type 2 diabetes. Pre- and post-intervention patient data was collected from patient medical files and compared to determine if the management of diabetes and hypertension improved in the patient population after the implementation of the educational intervention.

The patient population consisted of 103 patients. The educational intervention resulted in an extremely significant improvement in the level of knowledge of the nursing staff [93 correct responses (28.3%; n = 329 (pre-intervention)) vs 223 correct responses (67.8%; n = 329 (post-intervention)); p < 0.0001, Fisher’s Exact test]. The educational intervention resulted in improved attitudes of nursing staff towards the management of diabetes. Ideal random blood glucose concentrations improved significantly [16%; n = 100 (pre-intervention) vs 22%; n = 100 (post-intervention); p = 0.0003; Student t test]. The number of patients with a compromised HbA1c level (> 8%) decreased by 2 [51; 49.5%, n = 103 (pre-intervention) vs 49, 47.5%, n = 103 (post-intervention)] which was not a significant improvement. Ideal blood pressure control improved by one from 38 patients [36.9%; n = 103 (pre-intervention)] to 39 patients [37.9%; n = 103 (post-intervention)] which was not significant. Optimal change of pharmacological management following the referral of an uncontrolled diabetic patient was only noted for 18 patients (20.2%, n = 89) referred in the post-intervention phase. Clinical inertia was identified as a major limitation to the optimisation of diabetes care.

Implementation of an educational intervention based on the South African diabetes and hypertension guidelines at a public sector primary health care clinic was successful in improving the knowledge levels and attitudes of nursing staff.

**Key words:** Diabetes mellitus, primary health care, clinical practice guidelines, educational intervention, nursing staff
CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Chapter 1 serves as an introduction to the research study. The Chapter contains an overview of diabetes mellitus as a chronic disease state, and the rationale for undertaking the research study. The hypothesis, purpose, objectives and chapter layout of the research study have been outlined in Chapter 1.

1.2 OVERVIEW OF DIABETES MELLITUS

Diabetes mellitus is a group of metabolic diseases resulting from defects in insulin secretion, insulin action or both, and characterised by elevated blood glucose levels (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). Diabetes can be classified into four clinical classes, namely (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003):

- Type 1 diabetes;
- Type 2 diabetes;
- Other specific types of diabetes, and
- Gestational diabetes mellitus.

Type 1 diabetes is characterised by an absolute deficiency of insulin, resulting from immune-mediated destruction of pancreatic \( \beta \)-cells. Type 1 diabetes usually develops in childhood or early adulthood and it accounts for up to 10% of all cases of diabetes (Oki and Isley, 2002; The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).
Type 2 diabetes is a heterogeneous disorder of glucose metabolism resulting from defects in insulin secretion and insulin sensitivity. Type 2 diabetes accounts for approximately 90% of all cases of diabetes and usually presents in middle-aged adults and the elderly, but is becoming more common in children and adolescents. Type 2 diabetes may range from predominant insulin resistance with relative insulin deficiency to a predominant secretory defect with insulin resistance. (Oki and Isley, 2002; The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

Other causes of diabetes mellitus include genetic defects of $\beta$-cell function or insulin action, diseases of the pancreas, drugs or chemical inducers, infections and immune causes (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

Gestational diabetes mellitus refers to glucose intolerance with first onset or recognition during pregnancy. Glucose levels usually return to normal after delivery, however, there is an increased risk of up to 50% that diabetes or glucose intolerance will develop later in life. (Oki and Isley, 2002; The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003)

Diabetes is, therefore, considered a relatively common disorder of glucose metabolism. It has been estimated that more than 220 million people worldwide will have diabetes by the year 2010 (McCarthy et al., 1997; Oki and Isley, 2002). Until recently it was considered to be rare in sub-Saharan Africa, but as a result of demographic and lifestyle changes, as well as increasing recognition, it is being identified as a major health problem (Gill et al., 1997). It is estimated that the prevalence among black South Africans is 8%, white South Africans 3-4% and mixed race 8% (Leuner, 2000).
The primary goals of diabetes management are to reduce chronic complications, to ameliorate symptoms, to reduce mortality and ultimately improve quality of life (Oki and Isley, 2002). Poorly managed and uncontrolled diabetes mellitus can result in both acute and/or chronic complications. Acute complications include infections such as boils and urinary tract infections as well as metabolic complications, for example hypo or hyperglycaemia. Chronic or long-term complications include macrovascular and microvascular disease. Included in the macrovascular complications are coronary heart disease, peripheral vascular disease and cerebral vascular disease. Retinopathy, nephropathy and neuropathy are all examples of microvascular diabetic complications. (Oki and Isley, 2002)

Type 2 diabetes and hypertension are commonly associated chronic conditions, which both lead to an increased risk of cardiovascular and renal disease (United Kingdom Prospective Diabetes Study Group, 1998b). The United Kingdom Prospective Diabetes Study Group found that tight control of blood pressure in patients with hypertension and type 2 diabetes lead to a marked reduction in the risk of deaths related to diabetes, complications related to diabetes, progression of diabetic retinopathy, and deterioration in visual acuity (United Kingdom Prospective Diabetes Study Group, 1998b). Therefore to optimise diabetic care, tight control of blood pressure is essential.

1.3 RATIONALE FOR THE STUDY

Diabetes imposes a health and economic burden on South Africa due to its prevalence, morbidity, chronic and costly complications (e.g. hypertension), and predisposition to premature mortality (Daniels et al., 2000b). To minimise the incidence and severity of acute and chronic complications, ongoing quality care is necessary (Rotchford and Rotchford, 2002).
Evidence-based guidelines have been formulated to aid in reaching primary goals of diabetes management, therefore reducing chronic complications and optimising the quality of care. The first South African guidelines on the management of type 2 diabetes mellitus were published in 1997. These guidelines included the minimum requirements necessary to improve diabetic control in a primary health care setting. (Working Group of the National Diabetes Advisory Board, 1997) An update to these guidelines was published in 2002 (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a).

Levels of diabetic care in primary health care settings in South Africa have been found to be sub-optimal (Goodman et al., 1997; Daniels et al., 2000b; Rotchford and Rotchford, 2002). Even though evidence-based guidelines have been formulated and adapted for the situation in South Africa, these guidelines are not being utilised in the practice setting (Rotchford and Rotchford, 2002). The quality of management of diabetes mellitus has also been found to be dependent on the knowledge, attitudes and practices of health care providers. Knowledge deficits and inadequate practices have been implicated in the poor quality of local diabetes mellitus care. (Daniels et al., 2000b; Oosthuizen et al., 2002)

In a study undertaken at a primary health care public sector clinic (Reddy, 2003), it was found that the implementation of a record card for diabetic patients resulted in improved documentation of physical and laboratory examination findings and therefore improved record keeping. A significant improvement in blood pressure control and slight improvement in blood glucose control were also obtained. However, it was noted that a change in pharmacotherapy did not always follow documentation of abnormal glucose and/or blood pressure readings. Therefore, to further improve the management of diabetes mellitus, it is proposed that an intervention targeting the pharmacological management of type 2 diabetes mellitus is needed.
1.4 HYPOTHESIS OF THE STUDY

The hypothesis of the research project was that the education of health care providers at a public sector primary health care clinic, regarding the pharmacological management of elevated blood glucose levels and hypertension in diabetic patients, would improve glycaemic and blood pressure control.

1.5 PURPOSE OF THE STUDY

The purpose of the research project was to determine whether optimisation of pharmacotherapy, for glycaemic and blood pressure control in patients with diabetes, could be achieved by educating health care providers, at a primary health care clinic, on relevant sections of the published guidelines pertaining to pharmacotherapy of diabetes and hypertension.

1.6 OBJECTIVES OF THE STUDY

The study objectives were as follows:

1. To collect pre-intervention diabetic patient data pertaining to the level of glycaemic and hypertensive control and management (including values for the following physiological markers: glycosylated haemoglobin, blood glucose, blood pressure and urine dipstick).
2. To assess the pre-intervention level of knowledge and attitudes of health care providers at the clinic.
3. To formulate and design a structured educational intervention based on the South African guidelines for the monitoring and pharmacological management of type 2 diabetes and hypertension (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne et al., 2003).
4. To implement the educational intervention at the primary health care clinic.
5. To collect post-intervention diabetic patient data (after a four-month intervention period) pertaining to the level of glycaemic and hypertensive control and management (including values for the following physiological markers: glycosylated haemoglobin, blood glucose, blood pressure and urine dipstick) in order to assess the effectiveness of the educational intervention.

6. To assess the post-intervention level of knowledge and attitudes of health care providers at the clinic, after a four-month intervention period.

1.7 CHAPTER LAYOUT

The literature review of the study is outlined in Chapters 2 and 3. Chapter 2 entails a detailed discussion on primary health care, clinical practice guidelines and the management of diabetes. A summary of the comparison of the diabetes and hypertension guidelines published in South Africa and abroad has been included in Chapter 2. The main focus of Chapter 3 is on previous research conducted into the management of diabetes in South Africa and abroad. The research plan is outlined in Chapter 4, followed by a detailed outline of the study methodology in Chapter 5. The research results and impact of the educational intervention are presented and discussed in Chapter 6 and Chapter 7, while the conclusions and recommendations of the study are outlined in Chapter 8.
CHAPTER 2

PRIMARY HEALTH CARE,
CLINICAL PRACTICE GUIDELINES AND
MANAGEMENT OF DIABETES MELLITUS

2.1 INTRODUCTION

Public sector primary health care (PHC) services are the backbone of health care in South Africa. Ensuring equity, effectiveness and efficiency in the provision of these services is essential to the optimal functioning of the entire South African health system. (Day et al., 2004) The background to the health care system and the private and public sectors of health care in South Africa will be discussed in this chapter, as well as the management of chronic diseases in PHC in South Africa.

Clinical practice guidelines (CPG) are one of the main tools through which clinicians, policy makers and patients aim to make health care less variable, more reliable and more efficient (Moreira, 2005). The purpose and functions, development, dissemination, implementation, revision and evaluation of CPG will be investigated in this chapter.

The management of diabetes mellitus will be discussed in this chapter with reference to a comparison of sourced CPG for the management of type 2 diabetes mellitus as well as the management of hypertension in patients with diabetes. The South African guidelines will be compared to guidelines from around the world to ascertain whether or not South Africa is on par with international standards, with respect to relevance and currency of published guidelines. The sourced CPG will be compared with regard to guideline
appraisal, clinical targets (blood glucose, blood pressure, glycosylated haemoglobin), lifestyle modification, pharmacological management and the impact of variations (or lack thereof) with respect to guideline recommendations.

A detailed review of the pharmacological agents used, and the monitoring tests recommended, in the management of type 2 diabetes mellitus and associated hypertension has not been included in this literature review. Detailed information regarding the pharmacological agents and recommended monitoring tests has, however, been included in the appendices of the research project (Appendix F and Appendix J).

2.2 PRIMARY HEALTH CARE

2.2.1 Introduction
Primary health care can be defined as comprehensive, community-based services that are accessible to all. This approach to health care defines health as “a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity”. (Johnson, 2001) The key challenge in designing equitable PHC systems is to ensure that service organisation matches health needs and resources available (Mills et al., 2004). The African National Congress, prior to 1994, developed a national health plan for South Africa (SA), which emphasised health and not only medical care, as well as incorporating the vision that every person has the right to achieve optimal health (Ntuli and Day, 2004).

2.2.2 Background to the Health Care System in South Africa
Prior to 1994, the South African health care system was built on apartheid ideology and characterised by racial and geographical disparities, duplication and hospice-centricism, with minimal attention focussed on the PHC approach (Department of Health, 2000; Forman et al., 2004). The highly fragmented public health system was designed to service the different population groups
separately. Fragmentation, curative focus, and lack of community participation resulted in the majority of the population being deprived of even basic PHC. (USAID, 2003; Forman et al., 2004) At the end of apartheid, the health service was biased towards secondary and tertiary care. It was doctor-orientated, as resources and access to services were heavily weighted towards the white minority. (Johnson, 2001; Forman et al., 2004) Therefore, the major health care challenge for the new ‘post-apartheid’ SA was to provide equity in basic health care to all South Africans and, in the process, to rectify the underlying inequalities in health service provision brought about by apartheid (Johnson, 2001; USAID, 2003; Forman et al., 2004).

It is important to note that health care systems do not operate in a vacuum. Trends in health outcomes reflect the socio-economic patterns of a society and are linked inextricably with other factors, such as opportunities for education and employment, access to water and sanitation, and safe forms of energy. (Ntuli and Day, 2004) The health care challenge has, therefore, been exacerbated by factors such as deepening poverty and inequality (the distribution of income and wealth in SA is among the most unequal in the world), as well as the metastatic growth of the national HIV/AIDS epidemic (Forman et al., 2004).

The vision of the Department of Health is one of a caring and humane society in which all South Africans have access to affordable, good quality health care (Department of Health, 2004). However, SA has essentially two separate and distinct health care systems; namely the private and public sectors, which will be discussed below. The private sector is funded by contributions from individuals to medical aid schemes, while the government, through general taxation, funds the public sector. (Clarke, 2000; McIntyre et al., 2000)

2.2.3 The Private Sector
The private sector has grown in the last ten years due to society’s perceived reduction in the quality of public services, which encourages those who can
afford it to use the private sector (Johnson, 2001). The private sector serves 20 to 25% of the South African population, yet it consumes up to 60% of health care resources (Clarke, 2000; McIntyre et al., 2000; Padarath et al., 2004). Most doctors (60%) and pharmacists (70%) work in the private sector. This is a clear indication of an inequitable distribution of both financial and human resources. (Clarke, 2000) A significant number of people, including the poor, seek PHC services from the private sector. There is no doubt about the important role played by the private sector, and its need for regulation and the education of the public. (Ntuli and Day, 2004; Padarath et al., 2004)

In 2002, 15.4% (6 962 914 people) of the South African population was covered by a medical scheme. The total number of beneficiaries of medical schemes in SA has remained relatively stable at approximately 7 million individuals since 1996 due to slow employment growth combined with the continued escalation of medical scheme contributions. The per capita health expenditure in the private sector in 2002 was R5 098 (Harrison, 2004). The ratio of expenditure per capita by medical schemes to public sector provincial health spending has risen from 4.5 to 1 in 1997/1998, to 7.1 to 1 in 2002/2003, which highlights the sharp increase in costs in the private sector. (Ntuli and Day, 2004)

Escalating health care costs continue to be the main factor behind medical scheme contribution increases, while continued increases in the cost of private hospitals, medicines and medical specialists are the major cause of cost inflation. With the cost of medical scheme cover increasing dramatically, a concern is raised that an increasing proportion of South Africa’s population will therefore be reliant on limited public health care resources. (Harrison, 2004)

2.2.4 The Public Sector
Over the past few years the public health sector has undergone rapid change to make it more equitable and accessible to the needy (Ntuli and Day, 2004). The rationale for supporting the development of an integrated PHC system is based
on the government’s identification of PHC as the cornerstone of the new South Africa’s health care services. (Day et al., 2004; USAID, 2003) Therefore, ensuring equity, effectiveness and efficiency in the provision of PHC is critical to the functioning of the entire health care system (Day et al., 2004).

Public PHC was formally introduced to SA from April 1994 as the driving principle for health care provision in SA, with the implementation of two policies: “free health for pregnant mothers and children under the age of six years” and “universal access to PHC for all South Africans”. (Khumisi, 2004; Ntuli and Day, 2004) Public sector PHC in SA is provided and financed by the state and is currently free at the point of use to all uninsured patients (Mills et al., 2004). Primary health care has placed special emphasis on the development of clinics and basic health care programmes such as safe motherhood, child health and nutrition, expanded immunisation, management of communicable disease and the treatment of chronic ailments. These services need to be monitored for equity, accessibility, appropriateness and quality. (Khumisi, 2004) The creation of the National Drug Policy and Essential Drugs List (EDL) has been an important initiative, implemented by all public sector and pharmaceutical services, that is making an important contribution to the improved supply of and access to drugs. (Ntuli and Day, 2004)

Health care can be achieved with the involvement of communities and with the collaboration of other government and civic sectors, non-governmental and private organisations and individuals. (Ntuli and Day, 2004) A unified health care system capable of providing quality health care to all can also be achieved by (Forman et al., 2004):

- Decentralising the management of health care services, with emphasis on the creation of a district health system;
- Increasing access to services by making PHC available to all;
- Ensuring the availability of safe, high quality essential drugs in health care facilities, and
• Rationalising health financing through budget reprioritisation.

2.2.4.1 The District Health System

A district health system can be defined as a means to achieve an equitable, efficient, and effective health care system based on the principles of the PHC approach (McCoy and Engelbrecht, 1999). A district-based health system is aimed to optimally provide local-level control of public health services, and the standardisation and co-ordination of basic health services around SA, to ensure that health care is affordable and accessible to everyone (South African Health Info, 2004). The PHC approach and the district health system model apply to all levels of the health care system, not only to the primary or district level of health care. The essence of the district health system is the organisation of health care according to geographic sub-divisions of a country, which are managed through a decentralised management structure, at the administrative level closest to the patient (i.e. local government). (McCoy and Engelbrecht, 1999) There are 42 health regions and 162 health districts in SA (South African Health Info, 2004).

Adequate human and financial resources, as well as sustainable technologies at the district level, are vital if SA is to strengthen the district health system, which is crucial in effective PHC delivery. The responsibility for the delivery of comprehensive PHC in the public health sector can never completely be assigned to one level of the health system – it requires a vertically integrated, tiered health care system where different levels of management and administration work together in a complementary manner. (McCoy et al., 2000)

One of the major challenges in implementing the PHC approach has been strengthening the multi-sectoral vision. In many instances rural health care has been compromised by a lack of infrastructure, including basic services (such as roads, water, telephone access and electricity), and a lack of basic equipment and drugs. (Ntuli and Day, 2004)
2.2.4.2 Health Care Expenditure

Public health care consumes around 11% of the government’s total budget, which is allocated and spent by the nine provinces. The allocation of resources and the standard of health care delivered may vary from province to province. (South African Health Info, 2004) Provincial governments determine the portion of the provincial budget, allocated from national government, to be spent on health care (Johnson, 2001). With fewer resources and more unemployed and underprivileged people, cash-strapped provinces like the Eastern Cape face greater health challenges than wealthier provinces like Gauteng and the Western Cape. High levels of poverty (71% in rural areas and 50% overall) and unemployment (at least 38%) make it difficult for most people to pay for health care services, which places a substantial strain on resources in the public health sector. (Johnson, 2001; South African Health Info, 2004) Although there has been an overall increase in spending in the health care sector, wage increases (which account for two-thirds of health care expenditure) and inflation have undermined this, as has the HIV/AIDS epidemic (McIntyre et al., 2000; Ntuli and Day, 2004).

The uninsured population has grown by almost 7 million in the last decade (Blecher and Thomas, 2004). In 2002, the public health sector dependent population equalled 38 208 994 (Harrison, 2004). There has been a substantial increase in funding of health care services over the past decade, but given the population increase of 7 million, per capita funding is similar to 1995 levels. The HIV/AIDS epidemic is estimated to cost approximately R6 billion per year, therefore putting the public health sector under substantial financial strain as it is not optimally funded to cope with the effect of HIV/AIDS. (Bletcher and Thomas, 2004)

Per capita spending in the public health sector ranges from R389 to R42 between the highest and lowest spending districts, with a national average expenditure of R158 per capita. The basic PHC package is estimated to cost
around R220 per capita (excluding HIV-related services), signifying that most districts are unable to afford this per capita amount. (Cullinan, 2004; Ntuli and Day, 2004)

2.2.4.3 Health Personnel
The most significant component of any health care system is its health personnel. Without a foundation of skilled human resources, health care systems cannot function adequately or effectively, particularly in the public sector at a PHC level. South Africa faces a variety of health personnel problems. These include an overall lack of personnel in key areas of the health care sector, an inequitable distribution of those health personnel who are available, and a significant loss of trained personnel from the health care sector and from migration out of the country. (Johnson, 2001; Ntuli and Day, 2004; Padarath et al., 2004) The ratio of public sector health personnel to the population has not improved, and appears to be worsening. Ultimate reasons that health personnel are dissatisfied with working in the public health sector include: low levels of job satisfaction, poor working conditions, despondency in the face of HIV epidemic, unsatisfactory management, as well as inadequate salaries. (Ntuli and Day, 2004) The private health sector salaries have led to an outflow of qualified personnel, resulting in an increased work burden for those remaining in the public health sector (Johnson, 2001).

To address some of the resource and personnel shortages facing the public health sector, partnerships between the public and private health sectors are slowly being forged. Some private hospitals are now offering beds and providing medical care to public sector patients. They are also beginning to offer postgraduate teaching facilities to university medical faculties in an effort to stop the migration of doctors out of the country. (Department of Health, 2004) The Department of Health has also initiated interventions intended to strengthen the distribution and retention of personnel, especially in rural and under-served areas. Initiatives include recruiting doctors from other countries, community
service for a selection of key categories of health personnel, and ‘rural’ and/or ‘scarce skills’ allowances to improve on the salaries offered. (Ntuli and Day, 2004)

South Africa spends a considerable amount of money on health care services compared to other middle-income countries, yet the average health status of South Africans is relatively poor (McIntyre et al., 2000). The South African health care system has not yet found a mechanism to address its largest inherent disparities, namely those between private and public sector health care (Forman et al., 2004; Harrison, 2004; Ntuli and Day, 2004). Greater attention needs to be paid to establishing relationships between the public and private sector, particularly through the formation of contract service provision (Harrison, 2004; Mills et al., 2004). The ideal in health care, as well as society in general, is to allow those who have more, to subsidise those who have less, so that some level of equity is reached (Clarke, 2000). South Africa needs to have a perspective of health that recognises good health care as both a pre-requisite for social and economic development as well as an outcome of these factors. Health must be considered as an investment rather than simply as expenditure. (Department of Health, 2004)

2.2.5 Primary Health Care in the Eastern Cape

The population of the Eastern Cape (EC) comprises of 15.0% of the total South African population. Of this population, 61.2% live in rural areas. It should be noted that the EC population has the lowest percentage for people living in formal housing (47.3%), and the highest percentage for poverty prevalence (66.5%) and households with no toilet (30.8%), in South Africa. (Day and Gray, 2005) The EC population has the second lowest percentages in SA, for the following (Day and Gray, 2005):

- Access to electricity for cooking (27.8%);
- Households with tap water inside dwelling (17.8%), and
- Households with refuse removal (36.6%).
The socio-demographic characteristics of the EC population from studies conducted in 2001 can be summarised as follows (Bradshaw and Nannan, 2004):

- % Population younger than 15 years (36.8%)
- % Population older than 60 years (9.2%)
- % Population that is female (53.8%)
- % Population that is unemployed between the ages of 15 and 64 years (54.6%).

From the results presented, the percentage population older than 60 years and the percentage population that is unemployed is the highest in the country (Bradshaw and Nannan, 2004).

The EC public health system has been divided up into one metro (Nelson Mandela Metro) and six district municipalities, namely Cacadu, Amatole, Chris Hani, Ukhahlamba, Oliver Thambo and Alfred Nzo, which cover 24 local service areas (Day and Gray, 2005). The EC public health system is comprised of 653 PHC clinics, 124 mobile clinics, 64 district hospitals, 12 regional hospitals and 18 specialised hospitals (Cullinan, 2004). Current management of PHC clinics in the EC is divided between the provincial Department of Health and the local government. Split management of local PHC clinics may lead to fragmented services and disparities in the level of care provided by facilities. (Baron, 2000)

In 2002/2003, the number of beds available per thousand patients for the uninsured population was 1.3 beds for district, 0.7 beds for regional, 0.8 beds for specialised hospitals, totalling 2.8 beds (Burn and Shongwe, 2004). The life expectancy of males in the EC is 51.1 years, and for females, 56.0 years. It should be noted that the EC has the highest infant mortality rate in the country, with an average of 72 deaths per 1000 infants (Bradshaw and Nannan, 2004; Day and Gray, 2005).
In the EC, R91 is spent *per capita* on PHC, which is the second lowest in the country after Limpopo and far below the national average of R158 *per capita*. The doctor: patient ratio in the EC is the lowest in the country, with only one doctor for every 8825 people. This ratio accounts for the large percentage of vacant doctor’s posts (35%) in the EC. (Cullinan, 2004) The availability of communication in the EC is also considered the lowest in the country. In addition to this, 70% of the health care facilities are in need of urgent repairs (Day *et al*., 2004).

Results compiled in 2005 indicate that per 100 000 patients in the public health sector dependent population, the EC has the following number of health professionals available (Day and Gray, 2005):

- 15.8 Medical practitioners
- 3.4 Pharmacists
- 74.9 Nursing assistants
- 38.2 Enrolled nurses
- 109.1 Professional nurses

It should be noted that 26.6% of all health care professional posts are vacant in the EC (Day and Gray, 2005).

In summary, when analysing the statistics presented above, the EC province stands out as being particularly challenged due to the socio-economic status in the province as well as the high percentage of vacant health professional posts. Poor living conditions, such as high levels of poverty and lack of formal housing and sanitation, exacerbate the health care challenge. All these aspects mentioned above may act as barriers, hence impeding the goal of optimal delivery of health care in the EC province.
2.2.6 Management of Chronic Diseases

Chronic diseases are the leading cause of death in the world, presenting a huge challenge to health care systems (Holman and Lorig, 2000; Swartz and Dick, 2002). In 2002 the leading chronic diseases, namely cardiovascular disease, cancer, chronic respiratory disease and diabetes, resulted in 29 million deaths globally (47% of the global burden of disease). The prevalence of such chronic diseases is increasing worldwide, with the majority of chronic disease cases presenting in developing countries. The disease burden is expected to increase to 60% by the year 2020. (Epping-Jordan et al., 2004; Yach et al., 2004)

South Africa is currently affected by the combination of HIV/AIDS, other infectious diseases, injuries and the rapidly growing epidemic of chronic or non-communicable diseases. The most prominent chronic diseases in SA include cardiovascular diseases, cancer, chronic obstructive pulmonary disease (COPD) and diabetes. Non-communicable diseases were the number one cause of death in the year 2000 in SA, accounting for 37% of deaths. Diabetes mellitus ranked tenth as the single cause of death in SA in 2000. It should be noted that chronic diseases also contribute significantly to the years of life lost due to premature mortality. (Reddy, 2004)

The substantive burden due to emerging chronic diseases requires strong health promotion efforts as well as improved PHC and access to higher level services (Swartz and Dick, 2002; Reddy, 2004). Global evidence suggests that patients with chronic conditions have improved responses when they receive effective treatment within an integrated health care system of self-management support and regular check ups. Organised systems of health care have also proven to be essential in producing positive outcomes in patients with chronic diseases. (Epping-Jordan et al., 2004; Wagner and Groves, 2002) Health care should facilitate an ongoing relationship between provider and patient, with the focus placed on the patient in his or her own context and not only on the chronic disease. Therefore, the partnership between patient and provider is the basis for
prevention and intervention. (Davis et al., 2000; Holman and Lorig, 2000; Swartz and Dick, 2002) Healthcare teams that are equipped with the relevant data and skills can provide patients with the information, skills and confidence needed to manage their chronic condition optimally. It should be noted that the goal of treatment is not cure, but prevention of further complications (Holman and Lorig, 2000; Wagner, 2001).

Chronic diseases are largely preventable if interventions are targeted at risk factors and determinants. When addressing the prevention of chronic diseases at a PHC level, a clear understanding is needed of the complex interaction between personal, educational, political, social, economic, cultural, occupational and environmental determinants. (Reddy, 2004; Wagner, 2001)

Inadequate financing and lack of manpower are seen as major impediments to chronic disease control, resulting in health care services being placed under strain due to the increased burden of chronic diseases where there may already be a high infectious disease burden. (Epping-Jordan et al., 2004; Yach et al., 2004)

In summary, chronic disease management is an important component of health care, as it has evolved into a unique field of inquiry and an essential component of quality improvement efforts in health care systems. For continued progress in chronic disease management research, performance measurement and quality improvement are necessary. (Davis et al., 2000)
2.2.7 Management of Diabetes Mellitus in Primary Health Care

The global number of individuals with diabetes mellitus in 2000 was estimated to be 171 million, which equates to 2.8% of the world’s population. This figure is predicted to increase to 366 million individuals (6.5%) by the year 2030, with 298 million of these individuals originating from developing countries. (Yach et al., 2004)

In 2000, diabetes mellitus was the cause of 5.6% of deaths in SA in persons over the age of 60 years (Day and Hedberg, 2004). As a chronic disease, diabetes should, therefore, take precedence at a PHC level in SA (Department of Health, 2000).

The proportion of the population over 60 years in SA is expected to grow, with the burden of chronic diseases increasing. With this increase in disease burden, an increased demand on the health care system will follow, resulting in the need for social and economic planning for the ageing population in SA. (Ntuli and Day, 2004)

2.2.7.1 Norms and Standards for the Management of Diabetes

In 2000, the South African Department of Health published a set of norms and standards for the provision of health care at a PHC level. A norm is defined as: “a statistical normative rate of provision or measurable target outcome over a specified period of time”. A standard is defined as: “a statement about a desired and acceptable level of health care”. The norms and standards identify the literature, education materials, equipment, facilities, medicines, supplies, competency of staff, reasons for referral to next level of care, patient education, records and community-based services that are required as necessary components of a comprehensive primary health care package. (Department of Health, 2000)
The norms identified for the management of chronic diseases (including diabetes) are (Department of Health, 2000):

- To increase by 50% the proportion of clinics providing comprehensive services;
- To have a superior assess patient satisfaction, quality of care and community involvement every six months;
- To reduce the number of people with a body mass index (BMI) greater than 30 kg/m², and
- To minimise patient travel by prescribing supplies of drugs for a period of one to three months.

The standards identified for the management of diabetes at a PHC level are illustrated in Table 2.1.

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**Table 2.1: Standards for the management of diabetes mellitus at a primary health care level, as set out by the Department of Health, South Africa.** *Source: Department of Health, 2000*

<table>
<thead>
<tr>
<th>1. References and Educational Materials Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A copy of national guidelines on primary prevention of chronic diseases of lifestyle.</td>
</tr>
<tr>
<td>• Management protocols on type 2 diabetes at primary health care level.</td>
</tr>
<tr>
<td>• Health promotion and educational materials relating to chronic diseases of lifestyle.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Equipment and Special Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A working sphygmomanometer with a range of cuff sizes and a stethoscope.</td>
</tr>
<tr>
<td>• Urine test strips to test for glucose, protein and ketones.</td>
</tr>
<tr>
<td>• Blood glucose testing equipment (Glucometer and test strips).</td>
</tr>
<tr>
<td>• A Snellen chart.</td>
</tr>
<tr>
<td>• Access to clinics for the aged, those in wheelchairs and those patients with arthritis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Medicines and Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Drugs to be prescribed according to the Essential Drugs List.</td>
</tr>
<tr>
<td>• Drugs to be prescribed for a period of one to three months, to minimise patient travelling.</td>
</tr>
</tbody>
</table>
### 4. Competence of Health Staff
- Need a staff member who has the skills to give advice on the prevention of diabetes mellitus and to diagnosis and manage the chronic disease.
- Patients should, if possible, see the same nurse at each visit and a system of recall must be used on cards or calendars to ensure continuity of care.
- Staff should be able to provide counselling and motivation on disease acceptance, continuity of care and compliance.
- Staff should make patients feel welcome, and show respect for the elderly and disabled.
- Staff should have the skills and attitude to protect and promote the rights of patients with regard to a full knowledge of health status, participation in decisions, access to own health records and becoming a partner in own health care.
- Staff should be aware of the prevalence of diabetes in South Africa and be able to identify any cases in the clinic catchment areas early.
- Staff should understand the interrelationship between obesity, hypertension, cardiovascular disease and diabetes. All hypertension patients must be screened for diabetes.
- All pregnant women should be screened for glycosuria.
- Patients who require specialised care should have consultations with doctors or district surgeons as soon as possible.

### 5. Referrals
Medical staff at the PHC level must:
- Refer patients to the next level of care when the patient’s management falls beyond the scope of PHC.
- Have the contact details of the nearest hospital or doctor for advice.
- Provide detailed information on previous consultations.
- Refer patients who are suspected of having diabetes to a hospital for diagnosis.

### 6. Patient Education
- After diagnosis, patients must be educated on self care, self monitoring, compliance, prevention of complications and management of diabetes.
- Educational activities must be sensitive to the cultural and economic situation of the patient.

### 7. Records
- Records must be kept of patient’s chronic conditions and treatment, as well as patient carried cards and home-based care.
**8. Community Based Services**

- Staff must work with any district Non Government Organisation dealing with chronic diseases.
- Education should be provided to the community on modifiable risk factors such as diet, weight control, alcohol intake, exercise, substance abuse, smoking cessation, recognition of symptoms of diabetes and the importance of periodic check-ups.
- Educational activities should be culturally acceptable and a language applicable to the target group should be used.

**9. Collaboration**

- Communication between other departments, other health facilities and sectors who deliver or play a part in decisions relating to the management of chronic diseases.
- Staff must facilitate support groups for diabetic patients.
- Staff must reach out to the community via collaboration with other community committees.

As indicated in the standards above, a copy of the published clinical practice guidelines for the management of type 2 diabetes mellitus in a PHC setting is required (Working Group of the National Diabetes Advisory Board, 1997; Department of Health, 2000; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002). These guidelines aim to standardise the treatment received by patients with type 2 diabetes in the management of their chronic condition and will be discussed in detail later in this chapter.

Although the norms and standards have been published by the Department of Health, many PHC providers have not received training on the recommendations outlined (Department of Health, 2000). This lack of training may ultimately lead to diabetic patients receiving suboptimal levels of care at PHC facilities. However, the Department of Health states that it is the responsibility of the PHC providers to arrange appropriate training on the norms and standards (Department of Health, 2000).
2.3 CLINICAL PRACTICE GUIDELINES

Over the last decade there has been an exponential growth and heightened proliferation of CPG internationally (Haines and Feder, 1992; Grilli et al., 2000; Miller and Kearney, 2004), with estimates of the number of CPG ranging from 26 000 upwards (Howard and Jenson, 2003). Clinical practice guidelines are tools for supporting health care practice and policy (Moreira, 2005).

2.3.1 Definition of Clinical Practice Guidelines
Clinical practice guidelines are defined by the Institute of Medicine as being “systemically developed statements used to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances” (Field and Lohr, 1990). Guidelines are a stepwise evaluation of a clinical diagnosis or management strategy that requires observations to be made, decisions to be considered, and actions to be taken (Hoyt, 1997). Clinical practice guidelines are standardised specifications for the care of a typical patient in a typical situation, but are also intended to be flexible, as deviations are expected, accepted and justified, depending on individual characteristics and circumstances (McCollom and Allison, 2004).

2.3.2 Purpose and Functions of Clinical Practice Guidelines
A need has arisen to base clinical practice on outcomes and evidence, due to the recognition of inappropriate variations in practice between practitioners within the same speciality, between different hospitals or health care systems and between geographic areas (Darling, 2002; Larson, 2003; Miller and Kearney, 2004). Therefore, the primary purpose of guidelines is to improve the equity and quality of health care received by patients by recommending cost effective, consistently available, high quality health care, which is supported by scientific evidence (Haines and Feder, 1992; National Health and Medical Research Council, 1998; Darling, 2002). For CPG to achieve this purpose, three issues must be
addressed, namely: who is to be treated, how is the patient to be treated and the target to be achieved by treatment (Swales, 1993).

Clinical practice guidelines offer a systemic, evidence-based framework for health care delivery, while establishing a mechanism for evaluating health care and outcomes (McCollom and Allison, 2004). Hence the functions of CPG can be defined as (McCollom and Allison, 2004):

- To improve health care outcomes and quality;
- To reduce undesirable outcomes through continuity of health care;
- To reduce inflation of health care costs;
- To identify best practices, and
- To manage quality through measurable standards.

### 2.3.3 Benefits of Clinical Practice Guidelines

Clinical practice guidelines aim to improve the quality of health care by providing potential benefits to patients, health care providers as well as health care systems (Woolf et al., 1999; Darling, 2002; Miller and Kearney, 2004).

#### 2.3.3.1 Benefits for Patients

Improved health outcomes can be deemed as the key benefit provided by guidelines. Guidelines have the potential to reduce morbidity and mortality and thus improve quality of health care. As health care can vary dramatically among health care professionals and geographical regions, guidelines may aid in improving the consistency of health care provided to patients. Guidelines, which have been summarised for patients and the public, empower patients by giving them the knowledge to make more informed health care decisions about the best treatment options available. In countries where finances are limited, CPG may result in improved economic outcomes for health care services. (Woolf et al., 1999; Howard and Jenson, 2003; Miller and Kearney, 2004)
2.3.3.2 Benefits for Health Care Providers

Clinical practice guidelines offer improvement in the quality of clinical decisions made by health care providers. Guidelines achieve this with precise recommendations on how to proceed with patients by modifying outdated practices, improving the consistency of care and providing reassurance to health care providers on the appropriateness of their treatment decisions. (Woolf et al., 1999; Howard and Jenson, 2003; Miller and Kearney, 2004)

2.3.3.3 Benefits for Health Care Systems

Health care systems may benefit from CPG as guidelines aid in effectively improving efficiency and standardisation of health care provided. This in turn serves to optimise the financial costs of health care. Publication of the implementation and adherence to guidelines may result in an improved public image as commitment to excellence and quality health care is emphasised. (Woolf et al., 1999; Miller and Kearney, 2004)

2.3.4 Limitations of Clinical Practice Guidelines

The most critical limitation to CPG is the suggestion of an incorrect recommendation. (Jacobson, 1997; Woolf et al., 1999) The potential limitations for patients, health care providers and health care systems will be discussed below.

2.3.4.1 Limitations for Patients

Flawed CPG, which can occur due to the lack of or misinterpreted scientific evidence, present the most significant risk to patients. Inaccurate recommended protocols can result in sub-optimal, ineffective, or harmful treatment decisions. The development of CPG is dependent on the opinions and clinical expertise of the members of the guideline development group. The recommendations made by the guideline development group may be inferior, ineffective or even harmful to the specific needs of individual patients. The needs of patients may not be the
only priority in the development of guidelines, as costs of treatments may also influence recommendations. (Woolf *et al.*, 1999; Darling, 2002)

2.3.4.2 Limitations for Health Care Providers
The quality of health care provided may be compromised if CPG, which include inaccurate or outdated scientific information and clinical advice, are implemented. Health care providers may feel limited by guidelines, as they may feel restricted from using personal work experience in the treatment of patients. Utilising guidelines may also be deemed inconvenient, time consuming and confusing, leading to frustration in health care providers. (Swales, 1993; Jacobson, 1997; Woolf *et al.*, 1999)

2.3.4.3 Limitations for Health Care Systems
Health care systems may be disadvantaged by CPG if the implementation of the guideline results in compromised operating efficiency, increased utilisation and/or waste of limited resources. Guidelines may recommend implementation of costly interventions, which may not be financially viable, as is the case in developing countries. (Woolf *et al.*, 1999; Howard and Jenson, 2003)

2.3.5 Development of Clinical Practice Guidelines
Guidelines are designed to improve the quality of health care, to reduce the use of unnecessary, ineffective or harmful interventions, and to facilitate the treatment of patients, with maximum chance of benefit and minimum risk of harm, at an acceptable cost. Clinical practice guidelines have been shown to be effective in bringing about change and improving health care outcomes, hence their significance in total patient care. (National Health and Medical Research Council, 1998)

When developing guidelines, there is a need to identify the answerable questions within clinical decision making, to locate the evidence that is both valid and applicable, to estimate the benefits and limitations for patients, and to identify
gaps in the science (Pearson, 1998). Guidelines therefore represent an important attempt for health care providers to rationalise the practice of scientific, evidenced-based medicine (Jacobson, 1997). The development of CPG can be divided into stages, which will be discussed below.

2.3.5.1 Establishing Parameters of Clinical Practice Guidelines
Guideline topics need to be refined, defining the areas to which the CPG are applicable, (for example, age group and coexisting conditions). If the guideline topic is not refined, the CPG may be too broad in scope. (Shekelle et al., 1999; Hewitt-Taylor, 2004)

2.3.5.2 Identifying a Multidisciplinary Development Group
Clinical practice guidelines should be constructed including representation from as many parties as possible to achieve subject expertise and representation from appropriate disciplines, while avoiding individual biases. (National Health and Medical Research Council, 1998; Shekelle et al., 1999; Hewitt-Taylor, 2004)

2.3.5.3 Appraisal and Synthesis of Evidence
For health care providers to optimally treat patients, prognosis-orientated literature and research are needed as a foundation (McCollom and Allison, 2004). Guidelines should be developed from a systematic review of the best available evidence from research, clinical expertise and patient experience. (Shekelle et al., 1999; Hewitt-Taylor, 2004)

Search engines and tailored search strategies can be used to locate appropriate studies (National Health and Medical Research Council, 1998; Shekelle et al., 1999). Once studies have been identified, they need to be assessed for relevance to the clinical questions of interest and, most importantly, for evidence of bias. Reviewing of the evidence correlated is followed with an interpretation of the evidence, resulting in recommendations for evidence-based medicine. (Shekelle et al., 1999) Evidence-based medicine can be defined as the
conscientious, explicit, and judicious use of the best current evidence when making decisions about the care of individual patients (Pearson, 1998). Guidelines need to be flexible and adaptable to varying local conditions and should include evidence relevant to different target populations, and to geographic and clinical settings. Hence, in addition, resource constraints should be kept in mind. It is important to incorporate an economic appraisal, which is helpful in the decision-making process between treatment options. (National Health and Medical Research Council, 1998)

Guidelines may be brief, with simplified flow diagrams and tables, or comprehensive, offering detailed advice and even listing individual drug regimes (Swales, 1993). Clinical practice guidelines need be tested and evaluated to assess the feasibility of the guideline (Shekelle et al., 1999).

2.3.5.4 Assessment and Update of Clinical Practice Guidelines

Guidelines should be measurable to assess the effectiveness of the guideline by whether or not they are implemented, achieve predicted outcomes and are cost-effective. As new evidence emerges the guideline should be updated, so as to include possible developments of new treatment options and alterations in outcomes. Dates for guideline reappraisal should also be set. (National Health and Medical Research Council, 1998; Hewitt-Taylor, 2004)

To summarise, CPG should provide recommendations that are based on a systemic review of the available scientific evidence, are developed and endorsed by multidisciplinary panels of reputable experts, and that are contextualised with regard to interpretation and strength of evidence (Scott et al., 2004). CPG are intended to facilitate, but not replace, clinical decision making, with general recommendations not intended as treatment absolutes (Hewitt-Taylor, 2004).
2.3.6 Dissemination and Implementation of Clinical Practice Guidelines

The development of good CPG does not ensure their use in health care practice. Coherent dissemination and implementation strategies are essential to maximise the likelihood of CPG being utilised. (Feder et al., 1999)

There is no single, effective way to ensure the use of guidelines in practice (Feder et al., 1999; Miller and Kearney, 2004). Therefore, multifaceted interventions are pivotal in the dissemination and implementation of guidelines (Feder et al., 1999). Dissemination and implementation strategies should be carefully planned and should take account of factors such as available resources, perceived barriers and research evidence concerning the effectiveness and efficiency of different strategies (Miller and Kearney, 2004).

2.3.6.1 Dissemination of Clinical Practice Guidelines

The term dissemination refers to the methods utilised for the distribution and communication of guidelines to the target audience, the aim being to increase awareness, understanding and acceptance of the guideline. Dissemination alone is not an adequate way of changing practice. However, it is a prerequisite for guideline implementation. Guidelines can be disseminated through publication (in journals or as brochures and posters) and can be made available on the Internet. (National Health and Medical Research Council, 1998; Miller and Kearney, 2004)

Guidelines can be presented in the original full version or as a summary of all, or part, of the guideline (Feder et al., 1999). It should be noted that the simplification of CPG has become common practice. This simplification encourages use and adherence to recommendations by health care providers. (National Health and Medical Research Council, 1998)
2.3.6.2 Implementation of Clinical Practice Guidelines

Change in practice as a result of the implementation of a CPG is only likely to occur when the guideline is based on solid data, provides concrete steps for change and does not require knowledge or skills outside the realm of the health care provider (Miller and Kearney, 2004). Therefore, organisations need to appraise the validity of sourced relevant guidelines prior to implementing their clinical recommendations (Feder et al., 1999).

The implementation of CPG has proved to be quite complex. There are numerous barriers to compliance with guidelines, which may impede the implementation process, including culture barriers, health care resources, lack of information, clinical freedom and guideline flexibility and complexity. (Darling, 2002; Miller and Kearney, 2004) Ways and means of overcoming barriers to CPG include prompts, educational strategies and personal contact. (National Health and Medical Research Council, 1998; Miller and Kearney, 2004)

The impact of CPG depends on the extent to which the guideline is disseminated, accepted and implemented by health care providers, as well as the impact on processes and outcomes of patient care (Larson, 2003). For maximum effectiveness, guidelines should be integrated with broader activities, (including peer review, continuous medical education and quality assurance, performance monitoring and accreditation) to promote and improve the quality of health care (National Health and Medical Research Council, 1998).

2.3.7 Revision of Clinical Practice Guidelines

Guidelines are not static and must be continually updated to take account of changes in medical knowledge, practice and, particularly, the results of randomised trials and meta-analysis (Haines and Feder, 1992). Guidelines may be updated as soon as relevant new evidence is published or a date may be specified for updating the guideline (Shekelle et al., 1999). It is recommended that guidelines be revised every three to five years or sooner, if new relevant
evidence is published (National Health and Medical Research Council, 1998). Clinical practice guidelines should also receive external review to ensure content validity, clarity and applicability (Shekelle et al., 1999).

2.3.8 Evaluation of Clinical Practice Guidelines
Evaluation of CPG is essential, with the main focus of the evaluation being to determine the impact of the guideline on the health outcomes of the patient. The evaluation process should assess the validity of the guidelines and the effectiveness of the dissemination and implementation strategies. (National Health and Medical Research Council, 1998) The disseminators of the guidelines must be responsible for evaluating the acceptability of the guidelines by the target audience and the impact that the recommendations have had on the health care provided (Scott et al., 2004). Steps must then be taken to revise the guideline based on research findings. Results of guideline evaluations should be published, especially for guidelines that have been successfully implemented (National Health and Medical Research Council, 1998).

2.4 MANAGEMENT OF DIABETES MELLITUS

2.4.1 Introduction
Diabetes mellitus is a relatively common disorder of glucose metabolism. It has been estimated that more than 220 million people worldwide will have diabetes by the year 2010 (McCarthy et al., 1997; Oki and Isley, 2002). Until recently, it was considered to be rare in sub-Saharan Africa but, as a result of demographic and lifestyle changes, as well as increasing recognition, it is being identified as a major health problem (Gill et al., 1997). It is estimated that the prevalence of diabetes among black South Africans is 8%, white South Africans 3-4% and mixed race 8% (Leuner, 2000).

The primary goals of diabetes management are to reduce chronic complications, to ameliorate symptoms, to reduce mortality and, ultimately, improve quality of
life (Oki and Isley, 2002). Poorly managed and uncontrolled diabetes mellitus can result in both acute and/or chronic complications.

Diabetes, therefore, imposes a health and economic burden on SA due to its prevalence, morbidity, chronic and costly complications (e.g. hypertension), and predisposition to premature mortality (Daniels et al., 2000b). To minimise the incidence and severity of acute and chronic complications, ongoing quality care is necessary (Rotchford and Rotchford, 2002). Evidence-based guidelines have been formulated to aid in reaching primary goals of diabetes management, thereby reducing chronic complications and optimising the quality of health care. In this section of Chapter 2, sourced published guidelines, on the management of type 2 diabetes, will be compared.

Type 2 diabetes and hypertension are commonly associated chronic conditions, which both lead to an increased risk of cardiovascular and renal disease (United Kingdom Prospective Diabetes Study Group, 1998b). The United Kingdom Prospective Diabetes Study Group found that tight control of blood pressure in patients with hypertension and type 2 diabetes lead to a marked reduction in the risk of deaths related to diabetes, complications related to diabetes, progression of diabetic retinopathy and deterioration in visual acuity (United Kingdom Prospective Diabetes Study Group, 1998b). Therefore, to optimise diabetes care, tight control of blood pressure is essential. In this section of Chapter 2, sourced guidelines, on the management of hypertension, will also be compared with regard to the recommended management of hypertension in patients with type 2 diabetes.

2.4.2 Published Diabetes and Hypertension Clinical Practice Guidelines

A literature search was conducted to source published diabetes and hypertension guidelines. This was accomplished with a comprehensive Internet search using the search engines EBSCOHost®, Google® and ScienceDirect®. Key words utilised included: ‘type 2 diabetes mellitus’, ‘hypertension’,
Six guidelines for type 2 diabetes mellitus and seven guidelines for hypertension were sourced. These guidelines originated from:

- South Africa (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne et al., 2003);
- America (American Diabetes Association, 2005; National High Blood Pressure Education Program, 2003);
- Canada (Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2003; Canadian Hypertension Education Program Working Groups, 2004);
- England (Royal College of General Practitioners Effective Clinical Practice Programme, 2002a; Royal College of General Practitioners Effective Clinical Practice Programme, 2002b; Royal College of General Practitioners Effective Clinical Practice Programme, 2002c; Williams et al., 2004);
- Scotland (Scottish Intercollegiate Guidelines Network, 2001a; Scottish Intercollegiate Guidelines Network, 2001b);
- Australia (National Blood Pressure Advisory Committee, 2004) and;
- Europe (European Diabetes Policy Group, 1999; European Society of Hypertension, 2003).

On completion of Chapter 2, an Australian type 2 diabetes mellitus guideline, regarding blood glucose management, had not been sourced. The Australian guideline was identified as being in the process of development in accordance with the National Health and Medical Research Council approval and ratification process (National Diabetes Strategy, 2004).
To allow for continuity of reading, all tables relating to the management of diabetes mellitus (Table 2.2 to Table 2.14) will be presented on pages 45 to 57 at the end of the discussion.

Table 2.2 (page 45) illustrates publication information such as date of release, title and authors for the guidelines sourced from the six countries on the management of type 2 diabetes mellitus. The dates of publication were from 1999 (for the European region) to 2005 (for America).

Table 2.3 (page 46) illustrates publication information such as date of release, title and authors for the guidelines sourced from the seven countries on the management of hypertension. The dates of publication were from 2001 (for Scotland) to 2004 (for England, Canada and Australia).

**2.4.3 Clinical Practice Guideline Appraisal**

Over the past two decades, CPG have become a popular tool for the synthesis of clinical information resulting in a change in clinical practice and improvement in the level of health care (Grilli et al., 2000). An essential prerequisite for the improvement of health care is that a chosen guideline is valid, with the ultimate adherence to the guideline resulting in the expected health outcomes (Miller and Kearney, 2004). To ensure the validity of guidelines, there are many potential biases that need to be overcome in the development of guidelines. When health care providers identify a relevant guideline, it is essential that they appraise its validity before deciding whether or not to adopt the guideline’s recommendations. The dangers that may result from adopting an invalid guideline include wasteful use of resources on ineffective interventions or, in the worst case scenario, harm to patients. (Grimshaw and Eccles, 1998)

Numerous checklists for guideline appraisal have been proposed, most of which are long and cumbersome to utilise. A brief and practical approach to guideline appraisal is recommended, using primary and secondary questions to help health
care providers appraise selected guidelines. An adapted version of the guide for appraising guidelines recommended by Grimshaw and Eccles (1998), has been formulated (Table 2.4 – page 47) and used to appraise the guidelines sourced for this literature review.

Primary questions act as a filter to determine whether the guideline recommendations should be considered. It is up to the health care providers to use their clinical judgement to assess whether all reasonable practice options and important outcomes have been considered. The guideline development methods need to be considered, with special attention paid to the methods used to identify, select and combine evidence. When a systematic review is utilised to identify relevant evidence, guidelines are more likely to be considered valid. Search methods and search terms should be stated so as to allow the health care provider to assess whether or not all relevant information has been identified. Secondary questions for appraising guidelines focus on three topics, namely, the value of the outcomes stated, recent developments and peer review and testing. (Grimshaw and Eccles, 1998)

The results of the appraisal, conducted by the researcher, for the sourced guidelines on the management of type 2 diabetes have been displayed in Table 2.5 (page 48), with the results of the appraisal of the hypertension guidelines displayed in Table 2.6 (page 49).

The comparison of the appraisal of the type 2 diabetes guidelines yielded the following disparities:

- Considering the date of publication of the Scottish (2001) and IDF (1999) guidelines, it is not likely they would account for recent developments over the last few years.
- Since the publication of the Scottish and IDF diabetes guidelines, changes have been published with regard to the recommended
hypertension target values for patients with diabetes. These changes were not included in the above-mentioned guidelines.

- The date of publication (2002) of the English guideline suggests that it should account for recent developments, however, the hypertension target values included in the guideline were outdated.

In summary, the Scottish, IDF and England guidelines do not account for updated target values. However, all sourced type 2 diabetes guidelines faired well against the appraisal tool and were, therefore, considered valid.

It should be noted that since the completion of Chapter 2, an update to the American diabetes guideline was published in January 2006 (American Diabetes Association, 2006), and an update to the IDF diabetes guideline was published in August 2005 (Clinical Guidelines Task Force, 2005).

The comparison of the appraisal of the hypertension guidelines yielded the following disparities:

- The Scottish guideline concentrated only on hypertension in the elderly; hence, not all applicable sections of the disease state were included.

In summary, it was found that the Scottish hypertension guideline focused primarily on hypertension in the elderly and not on the management of hypertension as a complete disease state. However, all hypertension guidelines sourced faired well against the appraisal tool and were, therefore, considered valid.

It should be noted that since the completion of Chapter 2, an update to the South African hypertension guideline was published in April 2006 (Department of Health and the South African Hypertension Society, 2006), and an update to the Canadian hypertension guideline was published in 2005 (Canadian Hypertension Education Program, 2005).
2.4.4 Comparison of Sourced Guidelines

Diabetes and hypertension guidelines published in SA and from countries around the world, will be compared and discussed below with regard to recommended monitoring tests, target values, pharmacological management and non-pharmacological management. The relevance and currency of the SA guidelines will be compared to that of the guidelines published abroad. In addition, diabetes and hypertension guidelines developed and published in the same countries, will be compared with regard to the recommendations listed above for the management of hypertension. These comparisons will highlight similarities or disparities between recommendations originating from the same country and internationally.

2.4.4.1 Recommended Monitoring Tests

Diabetes mellitus is a metabolic disorder characterised by the presence of hyperglycaemia due to defective insulin secretion, insulin action or both. Chronic hyperglycaemia is associated with significant long-term complications, which can result in damage, dysfunction and failure of various organs including the kidneys, eyes, nerves, heart and blood vessels (Canadian Diabetes Association, 2003). Monitoring tests, which form part of the physical examination, and selected laboratory tests, need to be performed at various intervals of patient care, so as to alert the health care provider to possible chronic complications arising and co-morbid disease states. The prevention of chronic complications is always preferred to treatment.

On assessment of the diabetes guidelines, it was found that there was definite correlation between the countries with regard to recommended monitoring tests and frequency thereof for the management of diabetes. Recommended monitoring tests included (Table 2.7 – page 50): blood glucose levels, body mass index and waist circumference (at every visit), glycated haemoglobin (every six months), eye exam, foot exam and lipid profile (annually). It should be noted that the time interval for ‘regularly’ was not specified in any of the diabetes guidelines.
The South African diabetes guideline was found to be the most detailed with regard to indicating specific time intervals for the recommended monitoring tests (Table 2.7). America, IDF, Canada and Scotland specified the majority of time intervals for the recommended monitoring tests, with England being the most unspecified (Table 2.7).

On assessment of the comparison between diabetes and hypertension guidelines, it was found that there was definite correlation between diabetes and hypertension guidelines, and guidelines published in the same countries with regard to recommended monitoring tests and frequency thereof for the management of hypertension. Recommended monitoring tests included (Table 2.8 – page 51): blood pressure readings and body weight (at every visit); urine and blood testing (routine assessment); lipid profile, serum creatinine, microalbumin and electrocardiogram (annually). In the Australian hypertension guideline, all monitoring tests were recommended on the initial visit. However, the frequency of follow up testing was not specified. In the American, Canadian, Scottish and British hypertension guidelines, the time intervals for routine investigations were not specified. For SA, all monitoring tests were recommended in conjunction with a specific time interval, therefore highlighting the detailed recommendations for monitoring tests from the South African hypertension guideline.

2.4.4.2 Recommended Target Values
Recommended target values indicate the ideal results of recommended monitoring tests for the optimal management of a disease state. On comparison of the recommended target values, for the optimal control of glucose and lipid levels, from the diabetes guidelines, there was definite correlation found between the diabetes guidelines, with only slight differences noted (Table 2.9 – page 52).

Differences were, however, identified between the various diabetes guidelines with respect to the recommended target blood glucose level above which oral
drug therapy should be initiated. These disparities were due to different monitoring tests, such as blood glucose levels (in mmol/L) and HbA1c levels (in %), being utilised to identify the target values above which oral drug therapy should be initiated in the management of diabetes (Table 2.11 – page 54).

On comparison of the recommendations for blood pressure target values, differences were noted between:

- The various diabetes guidelines (Table 2.9);
- The various hypertension guidelines (Table 2.10), and
- The diabetes and hypertension guidelines published in the same countries (Table 2.9 and Table 2.10).

**Differences between diabetes and hypertension guidelines for target blood pressure values**

All 13 guidelines sourced were included in this comparison (Table 2.9 (page 52) and Table 2.10 (page 53)). A total of four different target BP readings were identified. Eight guidelines had a target BP of <130/80 mmHg. This included five hypertension guidelines (America, Canada, England, Scotland and Europe) and three diabetes guidelines (South Africa, America and Canada).

The hypertension guidelines from South Africa and Australia had a target BP of <130/85 mmHg, and the diabetes guidelines from England and Scotland had a target BP of <140/80 mmHg. The diabetes guideline from Europe was found to be the only guideline with a target BP of <140/85 mmHg.

**Differences between diabetes and hypertension guidelines, published in the same country, for target blood pressure values**

Six countries were included in this comparison (Australia was not included as there was no diabetes guideline for comparison purposes) (Table 2.9 and Table 2.10). It was found that America and Canada were the only two countries with corresponding target values for BP monitoring. The remaining four countries...
South Africa, England, Scotland and Europe, all had conflicting data with regard to recommended target values for BP monitoring.

**Differences between diabetes and hypertension guidelines, for the initiation of antihypertensive drug treatment**

All 13 guidelines sourced were included in this comparison (Table 2.9 and Table 2.10). A total of five different target BP readings for initiation of drug therapy were found. These target BP readings indicate the minimum BP level above which the initiation of antihypertensive drug treatment is recommended. Five guidelines had a target BP of >140/90 mmHg. This included three hypertension guidelines (Canada, England and Scotland) and two diabetes guidelines (South Africa and America). The diabetes guideline from Europe had a target BP of >140/85 mmHg. Two diabetes guidelines, from England and Scotland, had a target BP of >140/80 mmHg. Three hypertension guidelines, from South Africa, Europe and Australia, had a target BP of >130/85 mmHg. It was found that the American hypertension guideline and the Canadian diabetes guideline had a target BP of >130/80 mmHg.

**Differences between diabetes and hypertension guidelines, published in the same country, for the initiation of antihypertensive drug treatment**

Six countries were included in this comparison (Australia was not included as there was no diabetes guideline for comparison purposes) (Table 2.9 and Table 2.10). It was found that all six countries had conflicting data with regard to the target BP reading above which the initiation of antihypertensive drug treatment is recommended in patients with diabetes.

The differences identified between the diabetes and hypertension guidelines published in the same country, may result in a negative impact and confusion amongst health care workers providing care to patients with diabetes.
2.4.4.3 Recommended Pharmacological Management

There was a definite correlation found between the diabetes guidelines for the pharmacological management of type 2 diabetes (Table 2.11 – page 54). All six guidelines sourced recommended the use of metformin in an obese patient newly diagnosed with diabetes. There were only slight differences noted with regard to the drug agent of choice in a newly diagnosed diabetic patient with a normal BMI. These differences were accounted to the number of choices of drug classes specified per country. America, Canada and England offered a greater selection of choice, with South Africa and Europe only recommending sulphonylureas. Scotland did not specify any drug of choice for this group of patients. The differences identified between the countries can be attributed to many factors. America, Canada and England are considered first world countries with greater access to resources, including extensive research into recommended drug treatments, hence the greater selection of drug agents in the treatment of diabetes.

There was a definite correlation found between diabetes and hypertension guidelines with regard to drug agents recommended for the treatment of hypertension in the presence of diabetes (with proteinuria) (Table 2.12 (page 55) and Table 2.13 (page 56)). The recommended agents were angiotensin converting enzyme inhibitors (ACE-Is) or angiotensin II receptor antagonists (ARBs). There were, however, slight differences noted between the six diabetes guideline recommendations for the treatment of hypertension in diabetic patients with no proteinuria. These differences were accounted for in the number of choices of drug classes specified per country. The drug class options were as follows: South Africa had two (ACE-I and thiazide diuretics); America, England and Scotland each had four (ACE-I, ARBs, thiazide diuretics or cardioselective beta-blockers (BBs)), and Canada and Europe had five (ACE I, ARBs, thiazide diuretics, cardioselective BBs and long acting calcium channel blockers (CCBs)). The hypertension guidelines also recommended the drug agents of choice in the
treatment of hypertension, in the presence of another chronic disease, also affecting the cardiovascular system (Table 2.14 – page 57).

2.4.4.4 Recommended Non-Pharmacological Management

There was a definite correlation found between the diabetes guidelines with regard to recommended non-pharmacological management of diabetes. The diabetes guidelines listed: lifestyle modification, including diet modifications (low salt intake, reduced fat, reduced sugar and more fibre intake); exercise and cessation of smoking, and patient education as the major recommendations for the non-pharmacological management of diabetes. However, with regard to the time period of lifestyle modification prior to initiation of drug treatment (if targets are not being achieved), there was no consensus, as Scotland and England did not specify a time period, IDF stated “an adequate time period” and SA, America and Canada stated a time period of between one to six months (Table 2.11).

There was a definite correlation found between the hypertension guidelines with regard to the non-pharmacological management of hypertension. The hypertension guidelines listed: lifestyle modification, including diet modifications (including low salt intake, reduced fat intake and more fibre intake); exercise and cessation of smoking, and patient education as the major recommendations for the non-pharmacological management of hypertension. However, with regard to the recommended time period of lifestyle modification prior to initiation of drug treatment (if targets are not being achieved), there was no consensus reached, as most countries did not specify a time interval (Table 2.12 and Table 2.13). From the type 2 diabetes guidelines, America and England recommended an average of two months before the initiation of drug treatment, unless clinical indications dictated otherwise. From the hypertension guidelines only South Africa and Australia recommended time periods before initiating drug treatment. However, these time periods were dependent on the severity of hypertension and co-morbid disease states.
2.4.4.5 South African Guideline Standards as Compared to International Standards

Thus in summary, it can be seen that South African guideline standards equate to those of first world countries, with the South African guidelines frequently offering more detailed and specific recommendations with regard to target values, drug treatments and monitoring tests. It is, however, concerning to note that there were disparities found between the recommendations in the South African type 2 diabetes guideline and the South African hypertension guideline. Differences were noted in the recommended target values for optimal blood pressure control and the recommended blood pressure readings when antihypertensive drug treatment should be initiated. The identification of differences in recommendations in diabetes and hypertension guidelines published in the same country was not found to be isolated to SA, but found to be an international occurrence. Only America and Canada were found to have correlation between recommended guideline target values for optimal control of hypertension in patients with diabetes. In addition to SA, differences were noted in the diabetes and hypertension guidelines published in Scotland, England and Europe. With regard to recommended blood pressure targets for the initiation of antihypertensive drug treatment, there was no correlation between guidelines published in the same country. These differences may lead to confusion amongst health care workers, which negates the predicted positive effects of clinical practice guidelines.
### Table 2.2: Type 2 Diabetes Mellitus Guidelines Listing Country of Origin, Date and Place of Publication

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>DATE PUBLISHED</th>
<th>TITLE</th>
<th>JOURNAL</th>
<th>AUTHORS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2002</td>
<td>Revised SEMDSA Guidelines for Diagnosis and Management of Type 2 Diabetes Mellitus for Primary Health Care in 2002</td>
<td><a href="http://www.semdsa.org.za/guidelines.htm">http://www.semdsa.org.za/guidelines.htm</a>.</td>
<td>2002: Society for Endocrinology, Metabolism and Diabetes of South Africa (SEMDSA)</td>
</tr>
<tr>
<td>England</td>
<td>2002</td>
<td>Clinical Guidelines and Evidence Review for Type 2 Diabetes: Blood Pressure Management</td>
<td><a href="http://www.shef.ac.uk/guidelines/">http://www.shef.ac.uk/guidelines/</a></td>
<td>Royal College of General Practitioners Effective Clinical Practice Programme</td>
</tr>
<tr>
<td>England</td>
<td>2002</td>
<td>Clinical Guidelines and Evidence Review for Type 2 Diabetes: Lipids Management</td>
<td><a href="http://www.shef.ac.uk/guidelines/">http://www.shef.ac.uk/guidelines/</a></td>
<td>Royal College of General Practitioners Effective Clinical Practice Programme</td>
</tr>
<tr>
<td>Australia</td>
<td>Still under construction</td>
<td>National Evidence Based Guidelines for the Management of Type 2 Diabetes Mellitus: Blood Glucose Control.</td>
<td>Not Yet Published</td>
<td>Diabetes Australia Guidelines Development Consortium</td>
</tr>
</tbody>
</table>

* In January 2006, an update to the American diabetes guideline was published. It is available on the Internet – [www.diabetes.org](http://www.diabetes.org).

* In August 2005, an update to the IDF diabetes guideline was published. It is available on the Internet – [www.idf.org](http://www.idf.org).
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>DATE PUBLISHED</th>
<th>TITLE</th>
<th>JOURNAL</th>
<th>AUTHORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scotland</td>
<td>2001</td>
<td>Hypertension in Older People</td>
<td><a href="http://www.sign.ac.uk/guidelines/published/index.html">http://www.sign.ac.uk/guidelines/published/index.html</a></td>
<td>Scottish Intercollegiate Guidelines Network</td>
</tr>
<tr>
<td>European Society of Hypertension</td>
<td>2003</td>
<td>European Society of Cardiology Guidelines for the Management of Arterial Hypertension</td>
<td>Journal of Hypertension (2003), 21: 1011-1053</td>
<td>European Society of Hypertension – European Society of Cardiology Guidelines Committee</td>
</tr>
</tbody>
</table>


* An update to the Canadian Hypertension guideline was published in 2005. It is available on the Internet – www.hypertension.ca.
<table>
<thead>
<tr>
<th>Question 1.1</th>
<th>Were important options (e.g. prevention and/or management) and outcomes (for the chronic condition and co-morbid conditions) clearly stated?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1.2</td>
<td>Has the guideline been well indexed, using easy-to-find sections?</td>
</tr>
<tr>
<td>Question 1.3</td>
<td>Has the guideline been subdivided into relevant sections (e.g. diagnosis, monitoring tests, pharmacological management, non-pharmacological management and patient education), with clear targets and recommended results for each section?</td>
</tr>
<tr>
<td>Question 2.1</td>
<td>Was an explicit and sensible process used to identify, select and combine evidence? (E.g. systemic reviews of peer-reviewed published data)</td>
</tr>
<tr>
<td>Question 2.2</td>
<td>Have applicable sections been included when reviewing the chronic disease state? (E.g. diabetes in pregnancy, in children, in the elderly, etc.)</td>
</tr>
<tr>
<td>Question 3.1</td>
<td>Have recommended outcomes of co-morbid disease states been covered, including complications associated with the chronic disease state (e.g. hypertension, hyperlipidaemia, etc.)?</td>
</tr>
<tr>
<td>Question 3.2</td>
<td>Have all types of management been included in the guideline? (E.g. non-pharmacological and pharmacological).</td>
</tr>
<tr>
<td>Question 4.1</td>
<td>Is the guideline likely to account for important recent developments (e.g. the 7th JNC report)?</td>
</tr>
<tr>
<td>Question 4.2</td>
<td>Have any major changes been published since the dissemination of the guideline?</td>
</tr>
<tr>
<td>Question 5.1</td>
<td>Has the guideline been subject to peer review and testing?</td>
</tr>
<tr>
<td>Question 5.2</td>
<td>Have two or more committees/working groups been involved in the formulation of the guideline and have they been multidisciplinary?</td>
</tr>
<tr>
<td>Question 5.3</td>
<td>Is the guideline part of a continuous review process?</td>
</tr>
<tr>
<td>COUNTRY</td>
<td>SOUTH AFRICA</td>
</tr>
<tr>
<td>---------</td>
<td>--------------</td>
</tr>
</tbody>
</table>

**CRITERIA FOR GUIDELINE (see Table 2.4)**

| Question 1.1 | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 1.2 | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 1.3 | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 2.1 | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 2.2 | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 3.1 | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 3.2 | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 4.1 | Yes | Yes | Yes | No* | Yes | No* |
| Question 4.2 | No | No | No | Yes* | Yes* | Yes* |
| Question 5.1 | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 5.2 | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 5.3 | Yes | Yes | Yes | Yes | Yes | No |

* - The date of publication for these two guidelines indicates that they are not likely to account for recent developments.

yect - Since the publication of the Scottish and IDF diabetes guidelines, changes have been made to the recommended hypertension target values for patients with diabetes and these changes are, therefore, not included in the guideline. The English guideline should account for recent developments considering its date of publication; however, the hypertension target values are outdated.
Table 2.6: Comparison of Guideline Appraisal for the Management of Hypertension

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>SOUTH AFRICA</th>
<th>AMERICA</th>
<th>CANADA</th>
<th>SCOTLAND</th>
<th>ENGLAND</th>
<th>AUSTRALIA</th>
</tr>
</thead>
</table>

**CRITERIA FOR GUIDELINE (see Table 2.4)**

| Question 1.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 1.2 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 1.3 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 2.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 2.2 | Yes | Yes | Yes | No* | Yes | Yes | Yes |
| Question 3.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 3.2 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 4.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 4.2 | No  | No  | No  | No  | No  | No  | No  |
| Question 5.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 5.2 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Question 5.3 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

* - The guideline only concentrates on hypertension in the elderly; hence, not all applicable sections of the disease state have been included.
<table>
<thead>
<tr>
<th>Country</th>
<th>South Africa</th>
<th>America</th>
<th>Canada</th>
<th>Scotland</th>
<th>England</th>
<th>IDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test/Exam</td>
<td>RECOMMENDED FREQUENCY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Examinations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Glucose</td>
<td>Regularly</td>
<td>Regularly</td>
<td>Every day</td>
<td>Regularly</td>
<td>Regularly</td>
<td>Regularly</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>Every visit</td>
<td>Every visit</td>
<td>Every visit</td>
<td>Regularly</td>
<td>Every visit</td>
<td>Every visit</td>
</tr>
<tr>
<td>BMI and Waist Circumference</td>
<td>Initially with weight recorded at every visit</td>
<td>Weight at every visit</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>Comprehensive Foot Exam</td>
<td>At least annually</td>
<td>At least Annually</td>
<td>Annually</td>
<td>Annually</td>
<td>Not specified</td>
<td>Annually</td>
</tr>
<tr>
<td>Dilated Eye Exam</td>
<td>Annually</td>
<td>Annually</td>
<td>Annually</td>
<td>Annually</td>
<td>Not specified</td>
<td>Annually</td>
</tr>
<tr>
<td>Laboratory Examinations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycated Haemoglobin</td>
<td>Quarterly if treatment changes or not meeting goals</td>
<td>Two to four times per year</td>
<td>Every three months</td>
<td>Annually</td>
<td>Every two to six months</td>
<td>Every two to six months</td>
</tr>
<tr>
<td>Lipid Profile</td>
<td>Annually (less frequent if normal)</td>
<td>Annually (every two years if normal)</td>
<td>Every one to three years</td>
<td>Not specified</td>
<td>Annually</td>
<td>Annually (if abnormal then every two to six months)</td>
</tr>
<tr>
<td>Serum Creatinine</td>
<td>Annually</td>
<td>Not specified</td>
<td>Annually</td>
<td>Annually</td>
<td>Not specified</td>
<td>Annually</td>
</tr>
<tr>
<td>Microalbumin Measurement</td>
<td>Annually if no persistent dipstick proteinuria</td>
<td>Annually</td>
<td>Annually</td>
<td>Annually</td>
<td>Not specified</td>
<td>Annually</td>
</tr>
<tr>
<td>Electrocardiogram</td>
<td>Annually if possible</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Annually</td>
</tr>
</tbody>
</table>

For the South African and Canadian diabetes guidelines, it is recommended that all the monitoring tests be performed on the initial visit.
# Table 2.8: Comparison of Recommended Monitoring Tests/Examinations from Guidelines on the Management of Hypertension

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>SOUTH AFRICA</th>
<th>AMERICA(^\text{\text{v}})</th>
<th>CANADA(^\text{\text{v}})</th>
<th>SCOTLAND(^\text{\text{v}})</th>
<th>ENGLAND(^\text{\text{v}})</th>
<th>AUSTRALIA(^*)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYSICAL EXAMINATIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLOOD PRESSURE</td>
<td>Each visit</td>
<td>Each visit</td>
<td>Each visit</td>
<td>Each visit</td>
<td>Each visit</td>
<td>Each visit</td>
</tr>
<tr>
<td>BODY WEIGHT</td>
<td>Each visit</td>
<td>Each visit</td>
<td>Initial visit with more detailed investigation if abnormal</td>
<td>Initial visit with routine assessment</td>
<td>Initial visit with routine investigation</td>
<td>Initial visit</td>
</tr>
<tr>
<td>URINE DIPSTICK ANALYSIS FOR PROTEIN, BLOOD AND SUGAR:</td>
<td>Initial visit</td>
<td>Initial visit with routine investigation</td>
<td>Initial visit with more detailed investigation if abnormal</td>
<td>Initial visit with routine assessment</td>
<td>Initial visit with routine investigation</td>
<td>Initial visit</td>
</tr>
<tr>
<td>- If normal</td>
<td>Repeat yearly</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>- If abnormal</td>
<td>Repeat at next visit</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>- If proteinuria &gt; or = 2+ or haematuria &gt; 1+</td>
<td>Investigate further</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>- If proteinuria &lt; or = 2+</td>
<td>Repeat yearly</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>URINE ANALYSIS OF ALBUMIN EXCRETION</td>
<td>Not specified</td>
<td>Initial visit with routine investigation</td>
<td>Initial visit with more detailed investigation if abnormal</td>
<td>Initial visit with routine assessment</td>
<td>Initial visit with routine investigation</td>
<td>Initial visit</td>
</tr>
<tr>
<td>LABORATORY EXAMINATIONS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLOOD TESTING FOR UREA, CREATININE, POTASSIUM AND GLUCOSE</td>
<td>If facilities available – do regular check</td>
<td>Initial visit with routine investigation twice a year (include calcium)</td>
<td>Initial visit with more detailed investigation if abnormal</td>
<td>Initial visit with routine assessment (include calcium)</td>
<td>Initial visit with routine investigation</td>
<td>Initial visit (include sodium, uric acid and haemoglobin)</td>
</tr>
<tr>
<td>LIPID PROFILE</td>
<td>Initial visit. Non-fasting total cholesterol – each visit in high risk groups</td>
<td>Initial visit (fasting reading) with routine investigation</td>
<td>Initial visit with more detailed investigation if abnormal</td>
<td>Initial visit with routine assessment (fasting reading)</td>
<td>Initial visit with routine investigation (fasting reading)</td>
<td>Initial visit (fasting reading)</td>
</tr>
<tr>
<td>RESTING ELECTROCARDIOGRAM</td>
<td>When available – do regular checks</td>
<td>Initial visit with routine investigation</td>
<td>Initial visit with more detailed investigation if abnormal</td>
<td>Initial visit with routine assessment</td>
<td>Initial visit with routine investigation</td>
<td>Initial visit</td>
</tr>
</tbody>
</table>

\(^*\) In the Australian hypertension guidelines, all tests are recommended on the initial visit, however the frequency of follow up testing has not been specified.

\(^\text{\text{v}}\) In the American, Canadian, Scottish and British hypertension guidelines, the time intervals for routine investigations have not been specified.
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>SOUTH AFRICA</th>
<th>AMERICA</th>
<th>CANADA</th>
<th>SCOTLAND</th>
<th>ENGLAND</th>
<th>IDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBA1c (in %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- optimal</td>
<td>&lt; 7</td>
<td>&lt; 7</td>
<td>&lt; or = 6</td>
<td>&lt; 7</td>
<td>6.5 – 7.5</td>
<td>&lt; 6.5</td>
</tr>
<tr>
<td>- acceptable</td>
<td>7 - 8</td>
<td>Not specified</td>
<td>6 – 7</td>
<td>7</td>
<td>Not specified</td>
<td>6.5 – 7.5</td>
</tr>
<tr>
<td>- additional action</td>
<td>&gt; 8</td>
<td>Not specified</td>
<td>&gt; 7</td>
<td>Not specified</td>
<td>&gt; 7.5</td>
<td>&gt; 7.5</td>
</tr>
<tr>
<td>BLOOD GLUCOSE (in mmol/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FASTING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- optimal</td>
<td>4 - 6</td>
<td>&lt; 5</td>
<td>4 - 6</td>
<td>Not specified</td>
<td>Not specified</td>
<td>&lt; 5.5</td>
</tr>
<tr>
<td>- acceptable</td>
<td>6 - 8</td>
<td>5 – 7.2</td>
<td>6 - 7</td>
<td>Not specified</td>
<td>Not specified</td>
<td>5.5 – 6.0</td>
</tr>
<tr>
<td>- additional action</td>
<td>&gt; 8</td>
<td>&gt; 7.2</td>
<td>&gt; 7</td>
<td>&gt; or = 7</td>
<td>Not specified</td>
<td>&gt; 6.0</td>
</tr>
<tr>
<td>POST PRANDIAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>- optimal</td>
<td>4 - 8</td>
<td>&lt; 7.2</td>
<td>5 - 8</td>
<td>Not specified</td>
<td>Not specified</td>
<td>&lt; 7.5</td>
</tr>
<tr>
<td>- acceptable</td>
<td>8 - 10</td>
<td>7.2 - 10</td>
<td>8 - 10</td>
<td>Not specified</td>
<td>Not specified</td>
<td>7.5 - 9.0</td>
</tr>
<tr>
<td>- additional action</td>
<td>&gt; 10</td>
<td>&gt;10</td>
<td>&gt; 10</td>
<td>&gt; or = 11.1</td>
<td>Not specified</td>
<td>&gt; 9.0</td>
</tr>
<tr>
<td>BLOOD PRESSURE (in mmHg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>&gt; 9 % (HbA1c)</td>
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<td>HbA1c &gt; 6.5% and fasting blood glucose &gt; 7.0 mmol/L</td>
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<td>Adequate trial period</td>
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<td>Drug of choice in obese patients</td>
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<td>Drug of choice in patients with a normal BMI</td>
<td>Sulphonylureas</td>
<td>All drug classes used in the pharmacological management of diabetes listed</td>
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<td>Sulphonylureas or nateglinide/repaglinide</td>
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<td>Recommended time period before initiating second drug (if targets not being achieved)</td>
<td>3 months</td>
<td>Not specified</td>
<td>Keep to a minimum – depends on drugs pharmacokinetics</td>
<td>Not specified</td>
<td>2 – 6 months</td>
<td>Time to titrate initial drug to maximum dose</td>
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<td>Under what circumstances would insulin be considered on a chronic basis</td>
<td>Inadequate blood glucose control on optimised oral glucose-lowering drugs or pregnancy</td>
<td>Inadequate blood glucose control on optimised oral glucose-lowering drugs or pregnancy</td>
<td>HbA1c &gt; 9% with oral glucose-lowering drugs optimised</td>
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<td>Inadequate blood glucose control on optimised oral glucose-lowering drugs</td>
<td>HbA1c &gt; 7.5% with oral glucose-lowering drugs optimised</td>
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<td>Types of insulin recommended initially</td>
<td>Intermediate acting insulin or long acting insulin</td>
<td>Insulin dosage and choice must be individualised</td>
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<td>No direct evidence to support use/choice of any one insulin regime over another</td>
<td>Pre-mixed insulin twice daily in majority of patients</td>
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<td>If sulphonylureas are contraindicated, what are the alternatives?</td>
<td>Metformin. acarbose or meglitinides</td>
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<td>If metformin is contraindicated, what are the alternatives?</td>
<td>Thiazolidinediones (in obese patients), sulphonylureas or meglitinides</td>
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Table 2.12: Comparison of Recommended Pharmacological Management of Hypertension from Type 2 Diabetes Guidelines

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<td>Drug of choice in uncomplicated hypertension</td>
<td>Angiotensin converting enzyme inhibitor (ACE-I) (if affordable) or hydrochlorothiazide (HCT)</td>
<td>ACE-I or angiotensin II receptor antagonists (ARBs) or diuretics or beta blockers (BBs)</td>
<td>ACE-I or ARBs or cardio-selective BBs or thiazide-like diuretics or long-acting calcium channel blockers (CCBs)</td>
<td>Thiazides or BBs or ACE-I or CCBs</td>
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<td>All drug classes used to treat hypertension listed – no specific agent recommended</td>
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<td>AMERICA</td>
<td>CANADA</td>
<td>SCOTLAND</td>
<td>ENGLAND</td>
<td>AUSTRALIA</td>
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<td>BBs or CCB</td>
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<td>ACE-Is and/or BBs</td>
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CHAPTER 3

CLINICAL MANAGEMENT OF DIABETES

3.1 INTRODUCTION

Diabetes is a major and growing health care problem. The prevalence of type 2 diabetes has increased exponentially over the last two decades. This has been accompanied by an increase in the reported cases of type 1 diabetes. (Amos et al., 1997) It has been estimated that more than 220 million people worldwide will have diabetes by the year 2010 (McCarthy et al., 1997; Oki and Isley, 2002).

Numerous research studies have been conducted into the clinical management of diabetes mellitus throughout the world. Results from these research studies would be of no value unless they are disseminated and used to improve health care and services provided to diabetic patients. Extensive research on diabetes management has been conducted internationally. However, due to the differences between first and third world health care, international research findings cannot always be applied to the South African health care setting. Research methodology from successful international studies can, however, aid in the design and implementation of intervention studies in a South African context. Chapter 3 will focus briefly on research studies conducted on the management of diabetes in SA and internationally.
3.2 SOUTH AFRICAN AND INTERNATIONAL RESEARCH INTO THE MANAGEMENT OF DIABETES MELLITUS

This section includes a discussion on the research findings from South African and international research studies aimed at exploring various aspects of the management of diabetes mellitus.

The research areas to be discussed are as follows:
- Trials associated with diabetes management;
- Prevalence of diabetes mellitus;
- Evaluation of diabetes care;
- Intervention studies on diabetes mellitus;
- Attitudes of health care providers to diabetes mellitus, and
- Economic aspects of diabetes mellitus.

3.2.1 Trials Associated with Diabetes Management

Over the years numerous trials have been conducted and published regarding the management of diabetes. Two of the most significant and groundbreaking trials include the Diabetes Control and Complications Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS). Results from these studies have illustrated that maintaining tight control of blood glucose levels leads to a decreased incidence and/or severity of diabetic complications. (Diabetes Control and Complications Trial Research Group, 1993; United Kingdom Prospective Diabetes Study Group, 1998a; United Kingdom Prospective Diabetes Study Group, 1998b)

The DCCT was the longest and largest multi-centre, randomised clinical trial designed to compare the effects of intensive versus conventional diabetes therapy with regard to the development and progression of early vascular and neurological complications in type 1 diabetes mellitus (Diabetes Control and Complications Trial Research Group, 1993).
The DCCT confirmed the direct relationship between blood glucose levels and the risk of complications, as results indicated that achieving and maintaining a goal mean blood glucose level of 8.6 mmol/L, or an HbA1c level of 7.2% led to a more than 60% reduction in the risk of diabetic complications, including diabetic retinopathy, nephropathy and neuropathy. The trial successfully illustrated that lowering blood glucose concentration delayed or prevented the onset of diabetic complications in patients with type 1 diabetes. (Diabetes Control and Complications Trial Research Group, 1993).

The UKPDS was designed to establish whether intensive blood glucose control in patients with type 2 diabetes reduced the risk of macrovascular and microvascular complications associated with diabetes. The UKPDS demonstrated that a mean HbA1c of 7.0% resulted in a decreased risk of microvascular complications, including retinopathy, nephropathy and possibly neuropathy. Results also indicated that for every percentage point decrease in HbA1c the risk of microvascular complications decreased by 35%. (United Kingdom Prospective Diabetes Study Group, 1998a)

Type 2 diabetes and hypertension are chronic conditions, which commonly occur concurrently and both lead to an increased risk of cardiovascular and renal disease (United Kingdom Prospective Diabetes Study Group, 1998b). The UKPDS trial found that tight control of blood pressure (<130/80 mmHg) in patients with hypertension and type 2 diabetes lead to a marked reduction in the risk of deaths related to diabetes, macrovascular complications related to diabetes, progression of diabetic retinopathy and deterioration in visual acuity (United Kingdom Prospective Diabetes Study Group, 1998b). Therefore, to optimise care in patients with type 2 diabetes, tight control of both blood glucose and blood pressure is essential.
3.2.2 Prevalence of Diabetes Mellitus

Type 2 diabetes is a pandemic fuelled by globalisation, rural to urban shifts, and obesity and physical inactivity (King et al., 1998; Wild et al., 2004). In 1995, an estimated 135 million people worldwide had been diagnosed with diabetes. This number is expected to rise to at least 300 million by the year 2025 and 366 million by the year 2030. (King et al., 1998; Narayan et al., 2000; Wild et al., 2004) It is estimated that, between 1995 and 2025, the number of people with diabetes will increase by 42% (from 51 to 72 million) in industrialised countries and by 170% (from 84 to 228 million) in industrialising countries (Narayan et al., 2000). Quantifying the prevalence of diabetes is imperative to allow for sufficient planning and allocation of resources, especially in industrialising countries (Wild et al., 2004).

<table>
<thead>
<tr>
<th>Population</th>
<th>Region</th>
<th>Reference</th>
<th>No of Participants</th>
<th>Prevalence (%)</th>
<th>Age (Years)</th>
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<td>African</td>
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<td>Levitt et al., 1993</td>
<td>729</td>
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<td></td>
<td>QwaQwa (Rural)</td>
<td>Mollentze et al., 1995</td>
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<td>4.8</td>
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<td>Mangaung (Urban)</td>
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<td>758</td>
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<td></td>
<td>Durban (Urban)</td>
<td>Omar et al., 1993</td>
<td>479</td>
<td>5.3</td>
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<td>Charlton et al., 1997</td>
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<td>Cape Town (Peri-urban)</td>
<td>Levitt et al., 1999</td>
<td>974</td>
<td>10.8</td>
<td>15-86</td>
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<td>White</td>
<td>Durban (Urban)</td>
<td>Seedat et al., 1994</td>
<td>396</td>
<td>3.0</td>
<td>15-69</td>
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<td>Durban (Urban)</td>
<td>Omar et al., 1994</td>
<td>2479</td>
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</table>

Epidemiological studies conducted in SA on type 2 diabetes mellitus, indicated significant differences in the prevalence of diabetes among the population groups of SA. The highest rate of prevalence was found in Asians (13%), followed by blacks (8%) and coloureds (8%). The white population had the lowest
prevalence rate, estimated at 3-4%. (Levitt et al., 1993; Omar et al., 1993; Omar et al., 1994; Seedat et al., 1994; Mollentze et al., 1995; Charlton et al., 1997; Levitt et al., 1999; Leuner, 2000) Summaries of studies that have been conducted on the prevalence of type 2 diabetes in South African population groups are displayed in Table 3.1. Only certain regions of SA were considered in these previous studies, as illustrated by Table 3.1. The most current study was published in 1999, thus indicating a need for further research in this field.

Type 2 diabetes prevalence studies in America have estimated that the number of Americans with diagnosed diabetes will increase by 165%, from 11 million in 2000 (prevalence of 4.0%) to 29 million in 2050 (prevalence of 7.2%). The ethnic groups estimated to have the fastest rate of increasing prevalence were the black males (with an increase of 363% from 2000 to 2050) followed by black females (increase of 217%), white males (increase of 148%) and white females (increase of 107%). (Boyle et al., 2001)

The Australian Diabetes, Obesity and Lifestyle Study Group undertook the first national study on the prevalence and impact of diabetes in Australia. The results indicated that the prevalence of diabetes in Australia was 8.0% in men and 6.8% in woman, with an overall prevalence of 7.4%. It was found that diabetes prevalence had more than doubled since 1981. (Australian Diabetes, Obesity and Lifestyle Study Group, 2002)

A study conducted in South Asia highlighted the following notable differences in the prevalence rates of diabetes in urban and rural environments, as diabetes was more prevalent in urban areas (White and Rafique, 2002):

- Bangladesh (urban 7.9%, rural 3.8%)
- India (urban 12.1%, rural 2.9%)
- Nepal (urban 14.1%, rural 2.9%)
- Pakistan (urban 10.8%, rural 6.5%)
- Sri Lanka (urban 5.0%, rural 2.0%)
The DECODA Study Group also investigated the prevalence rates of diabetes in Asian populations. The study indicated that the prevalence of diabetes increased with age. India and Singapore were found to have the highest prevalence rates of >10% (40 – 49 years) and >30% (50 – 69 years). Chinese and Japanese prevalence rates were <10% (30 - 49 years) and <20% (population over 50 years). (DECODA Study Group, 2003)

The DECODE Study Group investigated the prevalence rates of diabetes in Europe. Countries included in the study were Sweden, Finland, Holland, United Kingdom, Poland, Italy, Spain and Malta. It was found that most European populations have a moderate to low prevalence of diabetes. Results indicated that, in most studies, the prevalence was <10% in the population group less than 60 years of age, and 10-20% in the population aged 60 to 79 years. The highest prevalence rates of diabetes in Europe were found in females within the age group of 80 to 89 years in the following countries: Spain (56.5%), Finland (54.6%) and Malta (54.2%). (DECODE Study Group, 2003)

In summary, results from studies on the prevalence of diabetes indicated that the incidence of type 2 diabetes is on the rise in all population groups. The two ethnic groups most affected by diabetes are Asians and Africans (Amos et. al., 1997). Urban populations have a greater prevalence of type 2 diabetes compared to rural populations, due to urbanisation. This significant difference between rural and urban populations was illustrated in the study conducted in South Asia (White and Rafique, 2002).

3.2.3 Evaluation of the Level of Diabetes Care

The major challenge in diabetes management is to optimise quality of life and to prevent common morbidity and premature mortality. To achieve this, improved quality of diabetes care and adequate resources are needed. Evaluation of diabetes care needs to be conducted in order to assess its standard, quality and adequacy in heath care systems.
In SA, numerous studies have indicated that the majority of people with diabetes receive less than optimal care at a PHC level. Results from these studies identified the following deficiencies in the delivering of optimal primary diabetes health care (Levitt et al., 1996; Levitt et al., 1997; Beattie et al., 1998; Erasmus and Blanco-Blanco, 2000; Oosthuizen et al., 2002; Rotchford and Rotchford, 2002; Haque et al., 2005):

- Suboptimal glycaemic and blood pressure control;
- Infrequent assessment of treatable complications;
- High prevalence of diabetic complications;
- Failure to advance therapy to achieve therapeutic goals;
- Differences between recommended and actual diabetic care;
- Financial and time constraints, and
- Language and cultural differences.

The quality of health care received by patients with diabetes was researched in a study conducted at ambulatory outpatient diabetes clinics in 'black' areas of Cape Town (Levitt et al., 1996). The population of the study consisted of 380 patients. Results from the research, with regard to patient attendance, monitoring tests and change in management, indicated that attendance and examinations for treatable complications was inadequate. (Levitt et al., 1996)

The prevalence of diabetes complications was investigated in a study focussing on the level of blood glucose and blood pressure control among black patients in Cape Town (Levitt et al., 1997). The research site consisted of three of the largest PHC clinics in typically black residential areas in Cape Town. The study population consisted of 243 patients. The research study demonstrated the need for preventative diabetes care at the PHC level. (Levitt et al., 1997)

A study conducted in Johannesburg, SA, aimed to assess the quality of diabetes management by focussing on three indicators as proxy measurements of quality
(Beattie et al., 1998). These three measurements included the regularity of blood glucose level measurement; the percentage of patients whose blood glucose levels were acceptable (<10.0 mmol/L) at least 75% of visits; and the rate at which action was taken in response to high blood glucose levels. Five study sites were identified, including public and private, and doctor and nurse-based facilities. Results from the analysis of 128 records indicated that reasons for poor glycaemic control included lack of health education, limited clinical expertise and high costs for patients. (Beattie et al., 1998)

A study was conducted at the Umtata General Hospital in the Eastern Cape, SA, to assess the quality of the medical care provided to patients with diabetes attending an outpatient diabetic clinic at a peri-urban hospital (Erasmus and Blanco-Blanco, 2000). Case records of patients, who attended the clinic over a three-month period, were examined. The population of the study consisted of 307 patients. Results from the study indicated that standards of medical care for diabetic patients were not optimal. The study also emphasised the poor glycaemic control of patients and the need for regular foot and eye examinations to be conducted. (Erasmus and Blanco-Blanco, 2000)

In a study conducted in rural KwaZulu-Natal, the nature of patient care, glycaemic control and the extent of diabetic complications was investigated (Rotchford and Rotchford, 2002). The study population consisted of 253 diabetic patients. The care and control of patients with diabetes in this rural setting was found to be suboptimal. The results indicated that PHC staff needed to focus on modifying prescriptions in patients with uncontrolled blood glucose levels and uncontrolled hypertension. However, to achieve this intervention, additional training and support for health care providers would be needed, in addition to patient education. (Rotchford and Rotchford, 2002)

A study was conducted in California, USA, investigating the quality of diabetes care provided to patients in a large health maintenance organisation (Peters et
al., 1996). The study was conducted between January 1993 and January 1994. The study population consisted of 353 patients. Results of the study were compared to the standards of care of the American Diabetes Association (ADA) and indicated a lack of adequate preventative care in diabetes management. Decreased care may lead to an increased risk of the development of complications, ultimately creating a future burden for the health care system and negative consequences for patients. (Peters et al., 1996)

The aim of a study conducted in North Carolina, USA, was to examine the level of diabetes care among low-income populations (Bell et al., 2001). Data was collected from 429 diabetic patients at 11 health centres serving low-income populations in the state of North Carolina. Results from the study indicated a low compliance with diabetes care guidelines in addition to an inconsistent level of care provided. The results from the study emphasised the need for quality improvement initiatives to enhance the level of care received by patients with diabetes. (Bell et al., 2001)

In a study conducted in Montana, USA, the compliance of rural health care providers to the ADA guidelines was assessed (Coon and Zulkowski, 2002). A retrospective review was conducted at four rural health care facilities in Montana, with the population of the study consisting of 399 patients with diabetes. Results from the study indicated that the ADA guidelines were not adequately followed, resulting in sub-optimal management of patients with diabetes. (Coon and Zulkowski, 2002)

The assessment of the quality of clinical care in English general practice, for three major chronic diseases (including diabetes) was the aim of a study conducted in England, between 1998 and 2003 (Campbell et al., 2005). The longitudinal cohort study included the assessment of 42 general practices in six geographical areas of England. Medical record data from 2300 patients (with diabetes, asthma or coronary heart disease) was assessed in 1998, followed by
1495 patients in 2003. Results indicated that substantial improvements were attained in the quality of care provided for the three conditions studied between 1998 and 2003. The improvements in health care provided were attributed to the systematic quality improvement initiatives of the National Health System during the course of the research. (Campbell et al., 2005)

Changes in diabetes care between 1998 and 2003 were also assessed in the Otago region, New Zealand (Coppell et al., 2005). Cross-sectional data relating to process and outcome measures was collected annually from participating general practices in the region. Results indicated that appreciable improvements in blood pressure and lipid control were observed, however, not for glycaemic control. Reasons for this result were attributed to insufficient necessary lifestyle changes to improve glycaemic control. (Coppell et al., 2005)

In summary, sub-optimal levels of diabetic care are not isolated to SA, but are an international cause for concern. Interventions aimed at improving diabetes care are, therefore, the way forward in diabetic management, whether they are aimed at health care providers or patients with diabetes.

3.2.4 Intervention Studies on Diabetes Mellitus

Diabetes accounts for a significant burden of morbidity and mortality through micro- and macrovascular complications (Renders et al., 2001). Results from the DCCT and UKPDS trials have indicated that strict control of blood glucose and blood pressure can reduce the risk of diabetes-related complications (Diabetes Control and Complications Trial Research Group, 1993; United Kingdom Prospective Diabetes Study Group, 1998a; United Kingdom Prospective Diabetes Study Group, 1998b). To achieve strict diabetes control in patients, structured care is needed.

Guidelines and diabetes management programs have been developed locally and internationally to aid in the structuring of diabetes care, optimally aiming to
improve standards of diabetes care (Renders et al., 2001). Inadequate levels of primary health care, provided to patients with diabetes, may be attributed to poor compliance levels with guideline recommendations. Inadequate diabetes care is characterised by poor glycaemic control and related diabetes complications. The failure to initiate or intensify therapy appropriately, when a problem has been identified with a patient’s diabetic management (i.e. inadequate glycaemic control), can be defined as ‘clinical inertia’ (Shah et al., 2005). To achieve evidence-based goals for metabolic control in patients with diabetes, intensification of medical therapy is necessary to ameliorate clinical inertia. Research into the intensification of medical therapy and the resultant decrease in clinical inertia represents a specific opportunity to improve metabolic control in patients with type 2 diabetes (Grant et al., 2004).

A wide range of interventions have been implemented in health care systems around the world, aimed at improving the level of diabetes care provided with the ultimate goal of achieving better metabolic control for patients with diabetes. (Renders et al., 2001)

A systemic review was conducted by Renders et al. (2001) to review the effectiveness of interventions targeted at health care professionals and/or the structure of care, in order to improve the management of diabetes. A total of 41 studies were included in the systemic review, all of which included multifaceted interventions. Results indicated that multifaceted professional interventions and organisational interventions, that facilitated structured and regular reviews of patients, were effective in improving the process of care. It was also noted that the addition of patient education to these interventions, and the enhancement of the role of nurses in diabetes care, led to improvements in patient outcomes and the process of care. (Renders et al., 2001)

In a study involving meta-analysis, the published evidence regarding the characteristics and effectiveness of disease management programmes was
systemically evaluated (Weingarten et al., 2002). Data was sourced from 102 articles, which evaluated 118 disease management programmes, resulting in most programmes utilising more than one intervention. Results indicated that patient education was the most commonly used intervention, followed by education of healthcare providers and provider feedback. It was concluded that all studied interventions were associated with improvements in provider adherence to practice guidelines and patient disease control. (Weingarten et al., 2002)

Research conducted in SA indicated that the implementation of the national guidelines, for diabetes and hypertension, could be achieved by the development of a structured record (Daniels et al., 2000a). The structured record was implemented in three community health centres in the Western Cape, SA. Results indicated that the structured record elicited a favourable response from health care providers and simplified the application of the guidelines and the systematic recording of processes of care. (Daniels et al., 2000a) In SA, educational interventions have also been found to improve the quality of care received by patients with diabetes (Oosthuizen et al., 2002; van Zyl and Rheeder, 2004).

In an intervention study undertaken at a primary health care public sector clinic in Port Elizabeth, SA (Reddy, 2003), it was found that the implementation of a record card for diabetic patients resulted in improved documentation of physical and laboratory examination findings and therefore improved record keeping. A significant improvement in blood pressure control and slight improvement in blood glucose control were also obtained. However, it was noted that a change in pharmacotherapy did not always follow documentation of abnormal glucose and/or blood pressure readings. Results from the study identified the need for the implementation of an educational intervention targeting the pharmacological management of type 2 diabetes to further improve the management of diabetes. (Reddy, 2003)
In summary, to achieve optimal metabolic control in patients with diabetes, published guideline recommendations should be adhered to. To achieve guideline adherence, intervention studies should be conducted, with the ultimate goal of improved quality of care for patients with diabetes. Multifaceted interventions targeting health care providers and patients, incorporating education on diabetes management, can be deemed effective in improving diabetes care.

3.2.5 Attitudes of Health Care Providers towards Diabetes Mellitus

The importance of tight glucose control and optimal diabetes care has been widely published. However, data from research indicates that health care providers are inconsistent in their adherence to published guideline recommendations. A reason for this may be the fact that attitudes, rather than knowledge, about diabetes, may impede adherence to guidelines. (Larme and Pugh, 1998)

The main objective of a study conducted in Cape Town, SA was to audit staff knowledge, attitudes and practices in the interest of improved public sector primary care for diabetes. The study population consisted of 12 doctors, 10 PHC nurses, 7 registered nurses and 6 staff nurses. Results from the research questionnaire indicated that staff knowledge of diabetic complications was adequate. However, deficiencies in staff knowledge regarding pathophysiology, the management of hypertension and the management of hyperglycemia were still present. This may have been due to inadequate in-service training. Staff indicated that they enjoyed and believed in the value of their work in PHC. This study highlighted the need for in-service training to improve staff knowledge regarding the management of diabetes. (Goodman et al., 1997)

The ambivalence of PHC professionals towards the South African guidelines for hypertension and diabetes was the topic of a study conducted in the Western Cape, SA. The objective of the study was to audit the responses and examine
the attitudes of health care providers in PHC towards diabetes and hypertension guidelines. This was achieved by conducting qualitative focus groups, in-depth discussions and clinic observations. The study population consisted of 15 doctors and 10 professional nurses from four community health centres. Results from the study indicated that individual doctors did not consult the guidelines frequently and, hence, the guidelines were not systemically implemented at the community health centres. Barriers to the application of the guidelines were identified and included time constraints, health system problems and conflict with local practices. This study highlighted the fact that several attitudinal barriers to guideline implementation may exist. Included in the recommendations of the research project was the importance of addressing barriers if guidelines are to be adopted more readily in PHC settings. (Daniels et al., 2000b)

In a study conducted in the north-east of England, general practitioners’ knowledge and attitudes to impaired glucose tolerance were investigated. The study population consisted of 34 general practitioners in five primary care groups. Results indicated that the entire study population had knowledge of impaired glucose tolerance as a clinical entity, but little awareness of its clinical significance. They were also uncertain with regard to the optimal diabetic management of these patients. The general practitioners expressed reservations about workload, concern over lack of resources and pessimism towards the effectiveness of lifestyle interventions. This study highlighted the need for increased awareness of impaired glucose tolerance. (Wylie et al., 2002)

A study conducted in Texas, USA, included 31 PHC providers. The objective of the study was to explore how attitudes, instead of inadequate knowledge, may impede the adherence to standards of care by PHC providers. Results from the study indicated that barriers to providing optimal diabetes care included negative attitudes towards diabetes itself, the complexity of managing diabetes as a chronic condition, and a perceived lack of support from society and the health
care system. Health care provider attitudes toward diabetes, therefore, need to be addressed in addition to updating knowledge. (Larme and Pugh, 1998)

The impact of a short-term, continued medical education program on health care providers’ attitudes toward treating diabetes was investigated in Chicago, USA. The study population consisted of 129 health care providers. Pre- and post-intervention data from the health care providers was collected with regard to diabetes knowledge and attitudes towards diabetes. Results indicated an increase in knowledge, in addition to more favourable attitudes toward diabetes after the program. This study highlighted the importance of the short-term impact of educational interventions. (Sharp and Lipsky, 1999)

In summary, health care providers’ negative attitudes can impact on the provision of health care to patients with diabetes by functioning as a barrier to the implementation of guidelines and by influencing the standard of diabetic care. Improving and updating health care providers’ knowledge on the management of diabetes is essential to the achievement of optimal diabetic care. The improvement in the knowledge of health care providers should, however, not be focussed on separately, but rather in conjunction with their attitudes towards diabetes so as to achieve maximum potential of educational interventions.

3.2.6 Economic Aspects of Diabetes Mellitus

Economic aspects of diabetes and diabetes care remain a concern due to the fact that diabetes prevalence rates are increasing worldwide, resulting in increased pressures on health care sectors to accomplish more within limited resources. If predictions for prevalence rates are fulfilled by 2025, 7% to 13% of the world’s healthcare budget will be spent on diabetes care. (International Diabetes Federation, 2005)

A study was conducted on the economic burden of diabetes from an employer’s perspective using a Fortune 100 manufacturing firm with facilities throughout
USA (Ramsey et al., 2002). Data was sourced from a claims database from the manufacturing firm. Analysis of data indicated that overall the employer’s mean annual per capita costs were higher for all diabetes beneficiaries as compared to control subjects. Results indicated that diabetes does impose a significant economic burden on employers, particularly when assessing productivity costs. (Ramsey et al., 2002)

The economic costs of diabetes in 2002 in the USA were assessed in a study conducted by the ADA (American Diabetes Association, 2003). Estimated medical expenditures for the USA population were calculated based on national health care survey data. Results indicated that direct medical and indirect expenditures attributable to diabetes in 2002 were estimated at $132 billion. It was added that the cost estimate excluded undiagnosed cases of diabetes. To improve the economic situation, factors such as better access to preventative care, more widespread diagnosis and more intensive disease management need to be addressed. (American Diabetes Association, 2003)

The economic impact of diabetes is considerable, with diabetic costs affecting health care services and national productivity, as well as individuals and families. The largest single contributor to direct healthcare costs is the total inpatient hospital costs for the treatment of complications. (White and Rafique, 2002; International Diabetes Federation, 2005) Health care sectors cannot afford to ignore the increasing pandemic of diabetes. Positive measures must be taken, to prevent complications from arising, and in turn preventing their costs. Studies have shown that intensive control of blood glucose and blood pressure delay or prevent the onset of diabetes complications, thereby decreasing longer term costs (Diabetes Control and Complications Trial Research Group, 1993; United Kingdom Prospective Diabetes Study Group, 1998a; United Kingdom Prospective Diabetes Study Group, 1998b). In summary, a reduction in direct and indirect costs is needed to decrease the economic burden that diabetes
represents for populations, health care systems and for society as a whole (Arredondo and Zuniga, 2004).

3.3 SUMMARY

The incidence of diabetes mellitus is on the increase worldwide (Amos et al., 1997). Health care providers need to deliver optimal diabetic care in order to achieve satisfactory levels of diabetes management. Insulin treatment and diabetes complications have a substantial impact on the direct medical costs of type 2 diabetes. It is, therefore, essential that research be conducted with the aid of interventions and guideline implementation to improve the situation of diabetes care worldwide. (Brandle et al., 2003)
CHAPTER 4

PLAN OF WORK

4.1 INTRODUCTION

Levels of diabetic care in PHC settings in South Africa have been found to be sub-optimal (Goodman et al., 1997; Daniels et al., 2000b; Rotchford and Rotchford, 2002). Knowledge deficits and inadequate practices have been implicated in the poor quality of local diabetes care (Daniels et al., 2000b; Oosthuizen et al., 2002). Although guidelines for the overall management of diabetes in a PHC setting have been published (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002), adherence to these guidelines has not yet been optimised in the PHC setting. Implementation of and education regarding these published clinical practice guidelines would assist in standardising patient care (Woolf et al., 1999).

4.2 HYPOTHESIS

The hypothesis of the research project was that the education of health care providers, at a public sector primary health care clinic, regarding the pharmacological management of elevated blood glucose levels and hypertension in diabetic patients would improve glycaemic and blood pressure control.

4.3 RESEARCH PLAN

The primary objective of the research project, as stated in Chapter 1, was to determine whether optimisation of pharmacotherapy, for glycaemic and blood
pressure control in diabetic patients, could be achieved by educating HCPs, at a PHC clinic, on relevant sections of the published guidelines pertaining to pharmacotherapy. In order to achieve the primary objective, the following secondary objectives were required:

1. Selection of a research site (primary health care clinic).
2. Collection of pre-intervention diabetic patient data pertaining to the level of glycaemic and hypertensive control and management.
3. Collection of pre-intervention data pertaining to prescribing changes related to clinical findings - for example, blood glucose and blood pressure readings.
4. Assessment of the pre-intervention level of knowledge and attitudes of health care providers at the clinic.
5. Formulation and design of a structured educational intervention based on the South African guidelines for the monitoring and pharmacological management of type 2 diabetes and hypertension.
6. Implementation of the educational intervention at the primary health care clinic.
7. Collection of post-intervention diabetic patient data pertaining to the level of glycaemic and hypertensive control and management in order to assess the effectiveness of the educational intervention.
8. Collection of post-intervention data pertaining to prescribing changes related to clinical findings (clinical inertia).
9. Assessment of the post-intervention level of knowledge and attitudes of health care providers at the clinic.

To test the hypothesis and fulfil the objectives of the research project the following plan of work was executed:

4.3.1 Selection of Research Site and Study Populations
A public sector PHC clinic in the Nelson Mandela Metropolitan Municipality, providing a diabetic service, was selected as the research site. A register was
compiled of all diabetic patients attending the primary health care clinic. All diabetic patients voluntarily signed a patient consent form. The pre-intervention patient population consisted of all diabetic patients on this register. A register was compiled of all health care providers working at the primary health care clinic. All participants voluntarily signed a participant consent form. The pre-intervention health care provider population consisted of all health care providers on this register.

4.3.2 Ethical Approval
A research proposal addressing the purpose of the study and the proposed research methodology was submitted, for approval, to the Human Ethics Committee at the University of Port Elizabeth and the Business Unit Manager: Health of the Nelson Mandela Metropolitan Municipality.

4.3.3 Literature Review
An extensive literature search was conducted to source information relating to PHC, chronic diseases (especially diabetes) and published diabetes and hypertension clinical practice guidelines. Information relating to previous studies performed in the field of diabetes was also sourced. The literature review was accomplished by a comprehensive Internet search using the search engines EBSCOHost®, Google® and ScienceDirect®.

4.3.4 Diabetic Record Card
Prior to the current study, a structured diabetic record card had been used at the PHC clinic (Reddy, 2003). Due to a change in the patient medical files used at the PHC, the diabetic record card was reformatted and re-introduced.

4.3.5 Health Care Provider Questionnaire
A health care provider questionnaire was used to gain information from the health care providers on their knowledge and understanding of the management of diabetes and hypertension. The questionnaire was designed and piloted in the
pre-intervention phase, and distributed in the pre- and post-intervention phases. The data from the completed questionnaires was captured, collated and analysed.

4.3.6 Focus Group Interviews
Focus group interviews were utilised to assess the attitudes of the health care providers towards primary health care and the management of diabetic patients. The focus group interviews were structured and piloted in the pre-intervention phase, and presented in the pre- and post-intervention phases. The results of the focus group interviews were then transcribed, categorised and analysed.

4.3.7 Educational Intervention
The educational intervention, regarding the pharmacological management of diabetes and hypertension in PHC, was accomplished by the design, pilot and presentation of educational sessions to the HCPs. The content of the educational sessions was based on published South African clinical practice guidelines (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a) as well as the South African hypertension guidelines (Milne et al., 2003). The presentation of the education sessions marked the start of the intervention phase.

4.3.8 Patient Information
Pre-intervention patient data was collected from the diabetic record cards of all patients in the patient population, using a purpose designed data collection form. Post-intervention patient data was collected from the diabetic record cards after the intervention phase using the same data collection form. The pre- and post-intervention patient data was entered onto a spreadsheet and analysed.
4.4 CONCLUSION

Chapter 4 has served as a brief summary of the plan of work for the research project. The diabetic record card, health care provider questionnaire, focus group interviews, educational intervention, patient information and all relevant appendices will be discussed, and referred to, comprehensively in Chapter 5 - the Research Methodology.
CHAPTER 5

RESEARCH METHODOLOGY

5.1 INTRODUCTION

The methodology employed for this research project is discussed in this chapter. All forms, questionnaires, notes and cards referred to in this chapter have been included as appendices as follows:

- Appendix A – ‘Patient Consent Form’
- Appendix B – ‘Health Care Provider Consent Form’
- Appendix C – ‘Usage of Card Questionnaire’
- Appendix D – ‘Extent of Documentation Data Collection Form’
- Appendix E – ‘Diabetic Record Card’
- Appendix F – ‘Comprehensive Notes on Usage of Diabetic Record Card’
- Appendix G – ‘Patient Data Collection Form’
- Appendix H – ‘Health Care Provider Questionnaire’
- Appendix I – ‘Pre- and Post-Intervention Focus Group Interviews’
- Appendix J – ‘Educational Intervention Session Notes’

Figure 5.1 summarises the three sections of the research methodology, namely:

1. The pre-intervention phase;
2. The intervention phase, and
3. The post-intervention phase.

The first step of the pre-intervention phase (Figure 5.1) consisted of selecting a PHC clinic. The pre-intervention phase was then sub-divided into three subsections, namely: obtaining patient consent and extracting relevant information from patients’ medical files; obtaining health care provider consent and
**Pre-intervention Phase**
Select a PHC clinic; Collect patient consent (Appendix A) and HCP consent (Appendix B); Compile a register of all patients with diabetes mellitus attending the PHC clinic and HCPs working at the PHC clinic; Reformat and update diabetic record card; Assess HCPs’ experience with the diabetic record card at PHC clinic using ‘usage of card questionnaire’ (Appendix C); Assess the last usage of the diabetic record card in patients’ medical files using the ‘extent of documentation data collection form’ (Appendix D); Re-introduce diabetic record card (Appendix E) with the aid of comprehensive notes on the usage of the diabetic record card (Appendix F).

Collect pre-intervention data using ‘patient data collection form’ (Appendix G) relating to diabetes management and diabetic control from the patient medical files and prescribing changes related to clinical findings. Capture pre-intervention patient data onto a purpose designed spreadsheet.

Design, pilot and distribute the ‘HCP questionnaire’ (Appendix H) and conduct focus group interviews (Appendix I) to assess the pharmacological knowledge of the HCPs towards diabetic management.

Design an educational intervention (Appendix J) to illustrate national guidelines on the pharmacological management of diabetes.

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**Intervention Phase**
Implement an educational intervention with the presentation of education sessions (Appendix J) to the HCPs on the SA guidelines for pharmacological management of diabetes and hypertension.

Measure initial HbA1c levels in patient population during first visit subsequent to education sessions. **Duration of Intervention Phase = 4 months.**

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**Post-intervention Phase**
Measure post-intervention HbA1c levels in patient population. Collect post-intervention data from patient medical files using the ‘patient data collection form’ (Appendix G), relating to diabetic management and diabetic control, for a four-month period following the intervention.

Re-distribute the ‘HCP questionnaire’ (Appendix H) to evaluate the HCPs’ knowledge on pharmacological management of diabetes, according to the SA guidelines. Conduct focus group interviews (Appendix I) to evaluate HCPs’ attitudes towards the SA guidelines and diabetes management.

Capture post-intervention data onto purpose designed spreadsheet. Analyse data and compare to pre-intervention data.

Feedback of research results to the HCPs at the clinic and to the Department of Health.

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**Figure 5.1: Diagrammatic representation of research methodology**
evaluating knowledge and attitudes of the HCPs; and updating the diabetic record card. All three sub-sections ran concurrently.

The intervention phase involved the implementation of the educational intervention in the form of structured education sessions with the HCPs at the PHC clinic (Figure 5.1). Pre-intervention HbA1c levels were measured in the pre-intervention patient population during the first visit subsequent to the education sessions.

The post-intervention phase (Figure 5.1) was divided into two sub-sections, focussing on re-evaluating the knowledge and attitudes of the HCPs, and extracting information regarding diabetes control from patients’ medical files. Post-intervention HbA1c levels were measured and results from the comparison of pre- and post-intervention data for diabetic control, questionnaires and focus group interviews were finalised. Feedback was then given to the HCPs at the PHC clinic.

5.2 RESEARCH DESIGN

This study was experimental and longitudinal in design as it involved an intervention with pre- and post-intervention phases. The technique of triangulation, which can be defined as the combination of different types of methods and approaches within a single research project, was employed as the research project consisted of both quantitative and qualitative aspects (Smith, 2002). The qualitative section of the study involved analysis of the attitudes and opinions of the HCPs regarding the use of the South African guidelines in the management of diabetes. The quantitative section of the study involved assessment of the pharmacological knowledge of the HCPs with regard to the South African diabetes guidelines, as well as a comparison between pre- and post-intervention patient data relating to diabetic control and onward referrals to
determine if the experimental educational intervention had had any effect on knowledge and diabetic management.

5.3 ETHICAL APPROVAL

Permission to conduct the research project was requested from the Human Ethics Committee at the University of Port Elizabeth and the Business Unit Manager: Health of the NMMM. Written informed patient consent was obtained from each patient included in the research project (Appendix A), as well as written informed HCP consent from all HCPs involved in the research project (Appendix B). This was to ensure that the research project met required ethical standards.

5.4 THE PRE-INTERVENTION PHASE

The pre-intervention phase was initiated by the selection of a PHC clinic as the research site. Subsequently, the pre-intervention phase was divided into three main sub-sections, focusing on (Figure 5.2):

- Section 1 - Information from patients’ medical files;
- Section 2 - The diabetic record card, and
- Section 3 - The health care providers.

Section 1 (patient information) and Section 2 (diabetic record card) were conducted chronologically, as indicated by the arrows in Figure 5.2, while Section 3 (HCPs) was conducted independently of Section 1 and Section 2. In other words, Section 3 was conducted concurrently (but independently) with Section 1 and Section 2.
A. Selection of a PHC clinic as research site

1. PATIENT INFORMATION
   1a. Collection of patient consent (Appendix A) and compilation of patient register
   1b. Assessment of the last usage of the diabetic record card in patients’ medical files using the ‘extent of documentation data collection form’ (Appendix D) to extract data
   1c. Collection of pre-intervention data (using ‘patient data collection form’) to assess diabetic control (Appendix G)
   1d. Capture, collation and analysis of pre-intervention patient data

2. DIABETES RECORD CARD
   2a. Reformat of diabetic record card
   2b. Update of diabetic record card
   2d. Re-introduction of diabetic record card (Appendix E) with the aid of comprehensive notes on the usage of the diabetic record card (Appendix F)
   2c. Assessment of HCP experience with, and the use of the diabetic record card using ‘usage of card questionnaire’ (Appendix C)

3. HCPs
   3a. Collection of HCP consent (Appendix B) and compilation of HCP register
   3b. Design, pilot and distribution of ‘HCP questionnaire’ (Appendix H)
   3c. Capture, collation and analysis of results from ‘HCP questionnaire’
   3d. Structure, pilot and presentation of ‘pre-intervention focus group interview’ (Appendix I)
   3e. Transcription, categorisation and analysis of results from ‘pre-intervention focus group interview’
   3f. Design and pilot of educational intervention sessions (Appendix J)

Figure 5.2: Flow diagram depicting flow of research during the pre-intervention phase
5.4.1 Selection of a Primary Health Care Clinic as the Research Site
A PHC clinic in the NMMM, providing a diabetic service, was selected as the research site (Figure 5.2(A)).

5.4.2 Collection of Patient Consent and Compilation of Patient Register
Patients with diabetes attending the clinic were given a brief description of the research project by the researcher, and were informed that data, with respect to their diabetes management, would be extracted from their medical files. The patients were assured that patient confidentiality would be maintained at all times during the research project. Conversations with the patients were conducted in English or Afrikaans, as chosen by the patient. The patients were requested to sign a ‘patient consent form’ (Appendix A). A register was compiled of all diabetic patients attending the primary health care clinic who had signed a ‘patient consent form’ (Figure 5.2(1a)). The demographics of the diabetic patients were obtained from clinic records and from the completed patient consent forms.

5.4.3 Collection of Health Care Provider Consent and Compilation of Health Care Provider Register
The HCPs were given a brief explanation of the research project by the researcher and were informed that participant confidentiality would be maintained at all times. HCPs were requested to sign the ‘HCP consent form’ (Appendix B). A register was compiled of all HCPs working at the PHC clinic that had signed a ‘HCP consent form’ (Figure 5.2(3a)). The demographics of the HCPs working at the clinic were obtained from the completed HCP consent forms and from the results of the ‘usage of card questionnaire’ (Appendix C) (Section 5.4.5.2).

5.4.4 Reformat and Update of Diabetic Record Card
Prior to the current study, a structured diabetic record card had been used at the PHC clinic (Reddy, 2003). During 2003 and 2004 the format of patient medical files used at government clinics in the NMMM changed from an A4 folder to an
A5 booklet. Due to this change the diabetic record card initiated at the PHC clinic during 2002 and 2003 needed to be modified for use in the new A5 patient booklet (Figure 5.2(2a)). An update to the South African diabetes guidelines was published in 2002 (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Updated recommended target values, therefore, needed to be included in the new A5 design of the diabetic record card (Figure 5.2(2b)).

5.4.5 Assessment of Current Practice with regard to the Diabetic Record Card, prior to the Pre-Intervention Phase

Use of the diabetic record card was initially introduced at the clinic in 2002 (Reddy, 2003). A concise review was performed at the PHC clinic towards the end of September 2004 to assess the current usage of the diabetic record card (Figure 5.2(2c)). This review was necessary to identify whether or not the diabetic record card was still being utilised optimally or whether, for the purposes of this research project, the diabetic record card needed to be re-introduced at the PHC clinic. The concise review conducted will be discussed with regard to:

- Observation of the management of diabetic patients at the Primary Health Care clinic;
- Health Care Provider experience with the diabetic record card, and
- Last usage of diabetic record card in patient medical files.

5.4.5.1 Observation of the Management of Diabetic Patients at the Primary Health Care Clinic

Observations were made and recorded, during patients’ visits to the clinic, with regard to the performance and documentation, or lack thereof, for the following parameters: weight and height; blood pressure and blood glucose readings; urine tests; questions pertaining to patient lifestyle, and eye and foot examinations.
5.4.5.2 Health Care Provider Experience with the Diabetic Record Card
A short questionnaire (‘usage of card questionnaire’) (Appendix C) comprising of nine questions, was compiled to enable assessment of the HCPs’ experience, understanding and usage of the diabetic record card (Figure 5.2 (2c)).

5.4.5.3 Last Usage of Diabetic Record Card in Patient Medical Files
From the analysis of the ‘usage of card questionnaire’ (see Results, section 6.3.2.2), it was found that the previously instituted diabetic record card was not being utilised optimally and that most of the HCPs had not been trained on the usage of the diabetic record card. This prompted an investigation to determine when the diabetic record card was last utilised optimally at the PHC clinic. A purpose designed data collection form (‘extent of documentation data collection form’) was used in the collection of data pertaining to the last documentation of diabetic management in the diabetic record cards (Figure 5.2(1b)) (Appendix D). Patients’ medical files were assessed to determine whether or not a diabetic record card was present. If a diabetic record card was present, data pertaining to diabetic management was then extracted for the last three months that the diabetic record card was utilised. Data fields included patient details; monitoring tests; social habits; physical examinations and disease history.

5.4.6 Re-Introduction of Diabetic Record Card
From the assessment of the ‘usage of card questionnaire’ (see Results, section 6.3.3.2) and the analysis of the data collected using the ‘extent of documentation data collection form’ (see Results, section 7.3.2.3), it was concluded that the new A5 diabetes record card needed to be re-introduced at the clinic (Figure 5.2(2d)), in conjunction with training sessions for the HCPs on how to use the diabetic record card. Two training sessions were held, each lasting for approximately half an hour. During the training sessions, HCPs were introduced to the revised diabetic record card (Appendix E). Comprehensive notes on the usage of the diabetic record card (Appendix F) were presented with the card. Time was allocated for a “question and answer” session where HCPs could pose questions.
about matters of concern relating to the diabetic record card. The card was officially re-introduced during the middle of November 2004.

5.4.7 Collection of Pre-Intervention Data pertaining to level of Diabetic Control in Patients

Pre-intervention data was collected from the patient medical files for a period of three months prior to the implementation of the educational intervention, from the beginning of January 2005 (after the re-implementation of the diabetic record card) to the end of March 2005. A purpose designed data collection form (a modified version of the diabetic record card) was utilised in the collection of pre-intervention data (‘patient data collection form’) (Appendix G) (Figure 5.2(1c)).

The following pre-intervention data was collected from the diabetic record cards:

- Patient details: including surname; name; identity number; date of birth; date of diagnosis of diabetes mellitus; type of diabetes mellitus patient was diagnosed with, and family history regarding diabetes mellitus;
- Medical history regarding the presence or absence of diabetic complications;
- Information from HCP consultation sessions held with the patients at every visit, including: weight and height measurements; BMI results, urine dipstick results, blood pressure and blood glucose measurements; smoking habits; alcohol intake; use of illegal drugs; exercise; compliance with medication; enquiries into the patients vision and presence of foot complications; presence of neuropathy; any incidence of hospitalisation since patients previous visit to the primary health care clinic; symptoms of hypo- and hyperglycaemia, and the rotation of administration sites for the insulin injection;
- Oral hypoglycaemic agents, insulin and/or chronic medication prescribed for the management of complications associated with diabetes mellitus as well as any acute medication prescribed;
- Topics covered by HCPs during education sessions with patients, and
- General comments and remarks, including any referrals made by HCPs.
5.4.8 Capture, Collation and Analysis of Pre-Intervention Patient Data
The pre-intervention patient data was entered onto a purpose designed spreadsheet using Microsoft Excel®, and then collated and analysed (Figure 5.2(1d)).

5.4.9 Design, Pilot and Distribution of ‘Health Care Provider Questionnaire’
The ‘HCP questionnaire’ (Appendix H) (Figure 5.2(3b)) will be discussed with regard to the following:

- Design of ‘Health Care Provider Questionnaire’;
- Pilot of ‘Health Care Provider Questionnaire’ and
- Distribution of ‘HCP Questionnaire’.

5.4.9.1 Design of ‘Health Care Provider Questionnaire’
The ‘HCP questionnaire’ consisted of open-ended questions and case studies. The open-ended questions were posed to gain information on the demographics of the HCPs and their knowledge of diabetes and hypertension, while the case studies concentrated on the HCP’s level of understanding with respect to the pharmacological management of diabetes and hypertension.

5.4.9.2 Pilot of ‘Health Care Provider Questionnaire’
The questionnaire was piloted with a group of nurses completing a postgraduate degree in Nursing Science from the University of Port Elizabeth. Participants were asked to complete the questionnaire and were instructed to ask questions if they did not fully understand a question. If the participants did not know the answer to a certain question, they were requested to indicate this and whether or not the relevant question was understood. Queries made by participants were noted and modifications were made. The time taken for the participants to complete the pre-intervention questionnaire was noted.
5.4.9.3 Distribution of ‘Health Care Provider Questionnaire’
The ‘HCP questionnaire’ was distributed to all HCPs on the HCP register at the PHC clinic. The questionnaires were personally delivered to the HCPs working at the clinic and completed under the supervision of the researcher. The PHC doctor was invited to participate in the completion of the HCP questionnaire, however, she declined due to extensive work commitments in the PHC clinics of the NMMM.

5.4.10 Capture, Collation and Analysis of Results from ‘Health Care Provider Questionnaire’
The pre-intervention data from the completed HCP questionnaires was captured onto a spreadsheet and analysed using Microsoft Excel® (Figure 5.2(3c)).

5.4.11 Structure, Pilot and Presentation of ‘Pre-Intervention Focus Group Interview’
The ‘pre-intervention focus group interview’ (Appendix I) (Figure 5.2(3d)) will be discussed with regard to the following:

- Structure of ‘Pre-Intervention Focus Group Interview’;
- Pilot of ‘Pre-Intervention Focus Group Interview’ and
- Presentation of ‘Pre-Intervention Focus Group Interview’.

5.4.11.1 Structure of ‘Pre-Intervention Focus Group Interview’
Focus group interviews have been used to provide researchers with an opportunity to probe more deeply into a variety of issues relating to a specific topic, as well as gaining a variety of perspectives, leading to the collection of rich information over a short period of time (Creswell, 1998). Focus groups can be differentiated into three types: a full group involving six to nine persons, a mini-group involving four to six persons, and a telephonic group, where individuals participate in a telephone-conference call. It should be noted that a mini-group and a full group are considered equal in all respects, except for the size. (Greenbaum, 1998)
The researcher identified nine topics to be discussed during the pre-intervention focus group interviews, with each topic subdivided to direct the flow of questioning (Appendix I). All topics related to Primary Health Care and the management of diabetic patients. The duration of the focus group interviews was aimed to be 30 to 45 minutes. All questions were open-ended, so as to allow participants to give their honest opinions without feeling pressured to answer in a particular way. To ensure that the data gained during the focus group interviews was available after the conclusion of the session, interviews were recorded with the use of a voice recorder. Data would then be transcribed from the voice recordings, categorised and analysed.

5.4.11.2 Pilot of ‘Pre-Intervention Focus Group Interview’
The pre-intervention focus group interview was piloted with fourth-year pharmacy students from the University of Port Elizabeth’s Pharmacy Department. The purpose of piloting the pre-intervention focus group interview was to record the duration of the interview, and to gain insight from the participants with regard to the questions asked. The participants were asked to relate the questions in the focus group interview to their working environments and to verbally indicate if they did not understand the meaning of the question. The time taken to complete the pilot focus group interview was noted, as were any comments made by the participants.

5.4.11.3 Presentation of ‘Pre-Intervention Focus Group Interview’
The ‘pre-intervention focus group interview’ was presented by the researcher on two separate occasions to allow all the HCPs at the PHC clinic to attend and participate. The PHC doctor was invited to participate in the pre-intervention focus group interview, but declined due to extensive work commitments in the PHC clinics of the NMMM.
The researcher maintained control over the flow and content of the discussions by setting rules limiting the interruption of speakers, and to keep the focus on the topic that was being discussed, only introducing a new topic when it was relevant or applicable to do so. The researcher did not interrupt any speakers or provide her own views on the topics during the discussions. Both pre-intervention focus group interviews were recorded, using a voice recorder, to aid in their transcription, categorisation and analysis.

5.4.12 Transcription, Categorisation and Analysis of Results from ‘Pre-Intervention Focus Group Interviews’

The tape-recorded pre-intervention focus group interviews (Figure 5.2(3e)) were transcribed. The raw data was categorised (according to topics discussed), analysed and presented as a series of descriptive statements (Kreuger, 1988). Descriptive statements are summaries of the participants’ comments and provide illustrative examples of the raw data. The descriptive statements were then interpreted to highlight comparisons made and contrasts formed. (Kreuger, 1988)

5.4.13 Purpose, Design and Pilot of Educational Intervention

The educational intervention (Figure 5.2(3f)) will be discussed with regard to:

- Purpose of educational intervention;
- Design of education sessions, and
- Pilot of education sessions.

5.4.13.1 Purpose of Educational Intervention

The purpose of the educational intervention was to present and illustrate the national guidelines for the pharmacological management of diabetes to the HCPs at the PHC clinic. The educational intervention was based on the South African diabetes guidelines (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a) and the South African hypertension guidelines (Milne et al., 2003).
Structured, planned education sessions would be utilised for the educational intervention, wherein various teaching aids would be used to present and illustrate the national guidelines, correct procedures for optimisation of therapy and the documentation of pharmacological interventions.

5.4.13.2 Design of Education Sessions

The education sessions were designed to be an educational intervention based on the recommendations for the pharmacological management of diabetes and hypertension, as published in the South African PHC guidelines for the management of diabetes, and hypertension in the presence of diabetes. The outcomes of the ‘pre-intervention HCP questionnaire’ and ‘pre-intervention focus group interviews’ influenced the format, structure and content of the education sessions. Two education sessions were designed: Session A (one hour presentation) and Session B (a half-hour presentation). Session A was structured to concentrate on target values, the initiation of drug treatment, first-line drug treatment and second- and third-line drug treatment for diabetes and hypertension. Major drug interactions with antidiabetic and antihypertensive drugs and indications for patient referrals were also included. Detailed notes and summary cards were compiled for the HCPs, to aid in the presentation of the education session (Appendix J). This session was designed to be interactive, so as to allow the HCPs to give input and gain knowledge in a comfortable setting. Session B consisted of case studies, which illustrated when interventions would be required in the drug therapy of a diabetic patient (Appendix J). Knowledge acquired during the previous education session would assist the HCPs in solving the case studies. Answers to the case studies would be discussed systematically to ensure no ambiguity remained amongst HCPs with regard to the information covered in the sessions. Materials needed for the presentation of the education sessions included detailed session notes and summary cards (Appendix J), a flip chart (large enough to illustrate feedback from HCPs and concepts from education session notes), paper, Koki pens and pens.
5.4.13.3 Pilot of Education Sessions
The structured education sessions were piloted with fourth year pharmacy students from the Nelson Mandela Metropolitan University. Materials used during the presentation of the pilot education sessions included a flip chart, paper, Koki pens, pens, detailed session notes and summary cards (Appendix J). The purpose of piloting the education sessions was to allow the sessions to be recorded and to permit the participants an opportunity to give feedback and constructive criticism with regard to the presentation of the education sessions and the materials utilised. Feedback and suggestions from the participants were noted and addressed.

5.5 THE INTERVENTION PHASE

As previously shown in Figure 5.1, the intervention phase included the following (Figure 5.3):

- Presentation of Education Sessions to Health Care Providers, and
- Measurement of Initial HbA$_{1c}$ levels.

![Flow diagram](image)

Figure 5.3: Flow diagram depicting flow of research during the intervention phase.

5.5.1 Presentation of Education Sessions to Health Care Providers
Two structured education sessions, on the South African guidelines for the pharmacological management of diabetes and hypertension, were presented by
the researcher to HCPs working at the PHC clinic (Figure 5.3(1a)). The PHC doctor was invited to participate in the education sessions, but declined due to extensive work commitments in the PHC clinics of the NMMM.

The education sessions were Session A (an hour presentation) and Session B (a half hour presentation). Staff shortages at the PHC clinic, due to the absence of HCPs on leave and at training courses, resulted in the need for both education sessions to be repeated on different days. Session A was presented in the form of an interactive session, where the HCPs received material on the pharmacological management of diabetes and hypertension according to the South African guidelines (Appendix J). Session B concentrated on using the material covered in the first session to complete case studies illustrating complicated cases to the HCP (Appendix J). Materials used during the presentation of the education sessions included a flip chart, paper, Koki pens, pens, detailed session notes and summary cards (Appendix J).

5.5.2 Measurement of Pre-Intervention HbA1c levels
Patient pre-intervention HbA1c levels were required for the purposes of the research project to determine if diabetic control improved among patients after the implementation of the educational intervention. The research team funded the HbA1c tests in the patient population, as the PHC clinic's budget did not cover HbA1c testing. A blood sample for HbA1c determination was taken at the patients’ first visit to the clinic, subsequent to the conclusion of the education sessions with the HCP at the PHC clinic (Figure 5.3(2a)). These blood samples were taken by the HCPs and subsequently sent to the National Health Laboratory Services in Port Elizabeth to be analysed. The results from the HbA1c blood tests were then sent to the PHC clinic, where they were filed in the patients’ medical files. HbA1c test results represent average blood glucose concentrations over a six to eight week period and are not affected by the time of day, food intake or recent therapeutic manipulations, as are the blood glucose finger prick tests. Testing the HbA1c of a diabetic patient is, therefore, the ideal method for

5.6 THE POST-INTERVENTION PHASE

Figure 5.4: Flow diagram depicting flow of research during the post-intervention phase.

As previously shown in Figure 5.1, the post-intervention phase was divided into two main sub-sections, focusing on (Figure 5.4):

- Section 1 - The health care providers, and
- Section 2 - Information from patients’ medical files.
Section 1 (HCPs) and Section 2 (patient information) were conducted chronologically as indicated by the arrows in Figure 5.4.

5.6.1 Redistribution of ‘Health Care Provider Questionnaire’
The ‘HCP questionnaire’ was redistributed to all the HCPs on the HCP register, still working at the PHC clinic after the four month intervention phase (Figure 5.4(1a)). The questionnaires were personally delivered to the HCPs and completed under the supervision of the researcher.

5.6.2 Capture, Collation, Analysis and Comparison of Post-Intervention to Pre-Intervention Health Care Provider Questionnaire Results
The data from the HCP questionnaires (Appendix H) completed in the post-intervention phase was captured onto a spreadsheet and analysed using Microsoft Excel® (Figure 5.4(1b)). The pre- and post-intervention phase data from the HCP questionnaire was then compared.

5.6.3 Presentation of ‘Post-Intervention Focus Group Interview’
The ‘post-intervention focus group interview’ was presented by the researcher on two occasions to allow all the HCPs on the HCP register at the PHC clinic, to attend and participate (Figure 5.4(1c)). The researcher maintained control over the flow and content of the discussions by setting rules limiting the interruption of speakers and to keep the focus on the topic that was discussed, only introducing a new topic when it was relevant or applicable to do so. The researcher did not interrupt any speakers or provide her own views on the topics during the discussions. Both post-intervention focus group interviews were recorded, using a voice recorder, to aid in the transcription, categorising and analysis of the post-intervention focus group interviews.
5.6.4 Transcription, Categorisation, Analysis and Comparison of Post-Intervention to Pre-Intervention Results from Focus Group Interviews

The tape-recorded post-intervention focus group interviews (Figure 5.4(1d)) were transcribed as discussed in Section 5.4.12. The data from the pre- and post-intervention focus group interviews was then compared.

5.6.5 Measurement of Post-Intervention HbA1c levels

Patient post-intervention HbA1c levels were required for purposes of the research project to determine if diabetic control improved among patients after the implementation of the educational intervention. All patients on the patient register, who had been treated for a period of four months after the educational intervention and who had not been excluded from the research project, had a post-intervention HbA1c blood sample taken during the sixth visit after the educational intervention (Figure 5.4(2a)). To ascertain a patient’s HbA1c blood level at the end of the four month intervention phase, HbA1c tests were performed six to eight weeks after the intervention phase (i.e. the sixth visit after the education intervention). These blood samples were taken by the HCPs and subsequently sent to the National Health Laboratory Services in Port Elizabeth to be analysed. The results from the HbA1c blood tests were then sent to the PHC clinic, where they were filed in the patients’ medical files. The results from these post-intervention HbA1c tests retrospectively reflected the patients’ level of diabetic control after the four month intervention phase as HbA1c test results represent average blood glucose concentrations over a six to eight week period.

5.6.6 Collection of Post-Intervention Patient Data

Post intervention patient data was collected from the diabetic record cards after the four month intervention phase using the purpose designed ‘patient data collection form’ utilised in the pre-intervention phase (Figure 5.4(2b)). Data was collected from the diabetic record card for the four months indicated as the intervention phase.
The data included the following:

- **Patient details:** including surname; name; identity number; date of birth; date of diagnosis of diabetes mellitus; type of diabetes mellitus patient was diagnosed with, and family history regarding diabetes mellitus;
- **Medical history:** regarding the presence or absence of diabetic complications;
- **Information from HCP consultation sessions:** held with the patients at every visit, including: weight and height measurements; BMI results; urine dipstick results; blood pressure and blood glucose measurements; smoking habits; alcohol intake; use of illegal drugs; exercise; compliance with medication; enquiries into the patients vision and presence of foot complications; presence of neuropathy; any incidence of hospitalisation since previous visit to the primary health care clinic; symptoms of hypo- and hyperglycaemia, and rotation administration sites for the insulin injection;
- **Six monthly examinations:** incorporating standing blood pressure; examination of oral cavity; visual acuity test; fundal examination; examination for the presence of cataracts; inspection of the feet for injury or infection; pedal pulses; presence of sensation on the feet; callous and nail abnormalities; ulcers; ankle and knee reflex, and presence of gangrene;
- **Oral hypoglycaemic agents, insulin and chronic medication prescribed for the management of complications associated with diabetes mellitus;**
- **Topics covered during education sessions;**
- **General comments and remarks,** and
- **Referrals made by HCPs for patients to see a doctor, and the outcome of these referrals.**
5.6.7 Capture, Collation, Analysis and Comparison of Post-Intervention Patient Data to Pre-Intervention Patient Data

The post-intervention data was entered onto a purpose designed spreadsheet using Microsoft Excel®, collated and analysed (Figure 5.4(2c)). The pre-intervention data was then compared to the post-intervention data.

5.6.8 Feedback of Research Results to the Health Care Providers at the Clinic and to the Department of Health

Upon completion of the research project, all HCPs that had been involved in completing the ‘HCP questionnaire’ and participating in the focus group interviews and educational sessions at the PHC clinic were invited to a presentation on the research results. The results were presented in the following sections:

- Impact of educational sessions on the level of care provided to the patients and diabetic control amongst the patients;
- Optimisation of diabetic record card for continued practice;
- Impact of educational sessions on level of pharmacological knowledge of HCPs, and
- Attitudes and opinions of HCPs working at the PHC clinic with regard to work environment and educational sessions.

Time was set aside for discussion of the results and for questions pertaining to the research results. Concise reports on the research results presented were provided for all in attendance.

A copy of the report summarising the research results of the project was also forwarded to the Department of Health.
5.7 STATISTICAL ANALYSIS

Descriptive statistics was used in the summarisation of data. Results were presented as mean ± standard deviation. Comparisons were made using the Student t test and incidence data was analysed using Fisher's Exact test.

5.8 EXCLUSION CRITERIA

All diabetic patients attending the PHC clinic constituted the pre-intervention patient population. However, at the end of the intervention period, patients were excluded from the study if:

- Patients refused to sign a consent form to participate in research project;
- Patients defaulted from monthly clinic visits during the intervention phase of the project;
- Patients were selected to be apart of a five year research study in the NMMM funded by a private company, involving the use of insulin in patients with type 2 diabetes;
- Patients' medical files were unobtainable because patients removed files from clinic and never returned to clinic for monthly visits;
- Patients did not have a pre- or post-intervention HbA$_{1c}$ reading;
- Patients had a pre-intervention HbA$_{1c}$ reading but no post-intervention HbA$_{1c}$ reading;
- Patients died during the study period;
- Patients moved away from Port Elizabeth;
- Patients were transferred to the tertiary health care level;
- Patients did not have a diabetic record card in their medical record file, and
- Patients withdrew from the study through personal choice.
All HCPs working at the PHC clinic comprised the pre-intervention HCP population. However, at the end of the intervention period, HCPs were excluded from the study for the following reasons:

- Ceased to work at the PHC clinic due to transfers between PHC clinics in the Nelson Mandela Metropole Municipality, or by own decision;
- Did not complete questionnaires or attend focus group interviews (pre- and/or post-intervention);
- Did not attend educational sessions for intervention of research project.

5.9 LIMITATIONS OF THE STUDY

- The pre-intervention patient population was small in comparison to the millions of people that are affected with diabetes mellitus in South Africa. The size of the final patient population was further compromised because of patients who were excluded from the study (due to the exclusion criteria mentioned in Section 5.8).

- All patient medical record files are held by the patients, in accordance with the Patient Rights Charter. This made viewing of the patient medical files very difficult. In April 2005, permission was requested from the patients to retain medical records at the clinic during the study period. If medical records were not present at the primary health care clinic, patients were then visited at home when data needed to be collected from the medical files.

- When investigating the revised format of the previously introduced diabetic record card (Reddy, 2003) in September 2004, it was found that the diabetic record card was no longer in use. This information posed a time delay on the research project as the diabetic record card had to be updated, reformatted and re-introduced before starting collection of pre-intervention data.
• During December, many patients do not visit the clinic due to the fact that they receive two months supply of chronic medication in November. This is done to decrease the workload and accommodate the decreased number of HCPs working over the festive period and during the numerous public holidays. Patients visiting the clinic in November and December often do not see HCPs for a consultation and, therefore, only receive their chronic medication from the pharmacy. As the diabetic record cards were inserted into the patient’s medical file in the observations room, patients only collecting their chronic medication over November/December did not receive diabetic record cards. The pre-intervention period, which was initiated in November 2004, had to be extended by two months to a period of five months, to allow all patients to receive a diabetic record card and, therefore, have three months of clinic visits recorded to constitute pre-intervention patient data.

• A doctor only services the clinic once a week and, therefore, patients sometimes have to wait up to a month or longer (in some cases three months) to see a doctor, resulting in the prescribing interventions, identified by HCPs and referred to doctors, being very difficult to follow up. If patients are considered stable by the HCPs at the PHC clinic, the patients are often requested to leave their medical files at the clinic so that the doctor can renew their chronic prescription, often resulting in the patients not seeing the doctor personally. This ultimately results in the chronic patients not receiving optimal care.

• The PHC doctor was invited to participate in the research project but declined due to extensive work commitments in the PHC clinics of the NMMM. The exclusion of the PHC doctor may influence the overall impact of the educational intervention, since only the doctor can ultimately adjust medication.
The use of written questionnaires can be a limitation for the evaluation of HCP on pharmacological management of diabetes and hypertension, as respondents may not have grasped the essence of the question.
CHAPTER 6

RESULTS AND DISCUSSION – SECTION A

6.1 INTRODUCTION

The results and discussion of the research study are outlined in Chapter 6 and Chapter 7. In Chapter 6 (Results and Discussion – Section A), the impact of the educational intervention on health care providers' knowledge and attitudes will be presented as a comparison of pre- and post-intervention results, for the health care provider questionnaire (knowledge section) and focus group interviews. In Chapter 7 (Results and Discussion – Section B), the impact of the educational intervention on the management of diabetes in the patient population will be presented as a comparison of pre- and post-intervention results from the patients’ medical files, indicating diabetes management. Where applicable, results in Chapter 6 and Chapter 7 are presented as mean ± standard deviation.

In Chapter 6, the results will be presented in the following main sections, namely:

- Ethical Considerations;
- Health Care Provider Questionnaire;
- Focus Group Interviews;
- Educational Intervention;
- Health Care Provider Demographics;
- Impact of Educational Intervention on Health Care Providers’ Knowledge, and
- Impact of Educational Intervention on Health Care Providers’ Attitudes.
Results to be presented and discussed from the pre-intervention phase include: selection of a primary health care (PHC) clinic; obtaining health care provider (HCP) consent, and preparation for, and the evaluation of knowledge and attitudes of the HCPs (Figure 5.2).

The intervention phase results will be presented and discussed with regard to the implementation of the educational intervention with the HCPs at the PHC clinic (Figure 5.3).

Results to be presented and discussed from the post-intervention phase include the re-evaluation of the knowledge and attitudes of the HCPs (Figure 5.4).

6.2 ETHICAL CONSIDERATIONS

Results pertaining to the ethical considerations for this section of results of the research project are presented and discussed with regard to:

- Selection of a Primary Health Care Clinic as the Research Site;
- Ethical Approval, and
- Collection of Health Care Provider Consent and Compilation of Health Care Provider Register.

6.2.1 Selection of a Primary Health Care Clinic as the Research Site
The West End Community Health Centre in the NMMM was selected as the research site. As the diabetic record card was originally piloted and subsequently implemented at this PHC clinic (Reddy, 2003), it was the obvious choice for the study, of a PHC clinic offering a diabetic service.

6.2.2 Ethical Approval
Permission to conduct the research project was granted by the Human Ethics Committee at the University of Port Elizabeth and the Business Unit Manager: Health of the Nelson Mandela Metropolitan Municipality (Appendix K).
6.2.3 Collection of Health Care Provider Consent and Compilation of Health Care Provider Register

A register was compiled at the PHC clinic of all the HCPs who had signed the ‘HCP consent form’ (Appendix B) to participate in the research project. Consent from the HCPs was collected in March and April 2005, during the pre-intervention phase (Figure 5.2). These HCPs (eight Professional Nurses (PNs), one Enrolled Nurse (EN) and one Pharmacist Assistant (PA)) constituted the pre-intervention HCP population of ten in total. Two HCPs (PNs) did not sign HCP consent forms as they were leaving the clinic at the end of March 2005. One HCP transferred to private health care and the other HCP transferred to another PHC clinic in the NMMM. The PA interacts directly with patients at the PHC clinic, by dispensing medication to patients, and therefore is exposed to prescribed chronic medications in the treatment of diabetes and hypertension. For this reason, it was decided to include the PA in the HCP population.

6.3 HEALTH CARE PROVIDER QUESTIONNAIRE

6.3.1 Introduction

The summarised research methodology for the ‘HCP questionnaire’ has been illustrated in Figure 6.1. Methodology pertaining to the ‘HCP questionnaire’ was completed in the pre- and post-intervention phases. The HCPs completed the questionnaire in the pre-intervention phase, before the presentation of the education sessions. The HCPs completed the questionnaire for a second time, in the post-intervention phase, four months after the presentation of the education sessions.

The results pertaining to the design, pilot, distribution, and the capture and collation of data from the ‘HCP questionnaire’ will be discussed below. The comparison of the pre- and post-intervention results from the completed HCP questionnaires, indicating the impact of the educational intervention on HCP knowledge, will be presented in Chapter 6 (Section 6.7).
6.3.2 Design of ‘Health Care Provider Questionnaire’

The HCP questionnaire was designed in the pre-intervention phase and consisted of nine pages in total (Appendix H) (Figure 6.1(a)). This included a cover page with instructions on how to complete the questionnaire and contact details of the researcher. HCPs working at the PHC clinic were allocated a reference number so as to ensure HCP confidentiality.

The ‘HCP questionnaire’ consisted of 21 questions in total with an additional four case studies. The first six questions were formulated to obtain demographic information regarding the HCPs at the clinic. The questions queried the following:

- The age of the HCP;
- The qualifications held by the HCP;
- The number of years worked in primary health care;
- The position held at the clinic (i.e. the research site);
• The period of time during which the staff member had been using the diabetic record card, and
• Previous training received on the management of diabetes mellitus.

The remaining 15 questions and four case studies pertained to diabetic management and investigated respondent’s knowledge regarding target values, monitoring tests and pharmacological management of diabetes and hypertension.

6.3.3 Pilot of ‘Health Care Provider Questionnaire’

The ‘HCP questionnaire’ was piloted on the 18th September 2004, during the pre-intervention phase (Figure 6.1(b)). The pilot population consisted of twenty-two qualified nurses studying towards a postgraduate degree in Nursing Science at the University of Port Elizabeth. During the pilot of the ‘HCP questionnaire’, it was found that the shortest time taken for the completion of the questionnaire was twenty minutes. The last participant completed the questionnaire in thirty-seven minutes. There was only one query with regard to the understanding of a question. The question was number twenty-one on the questionnaire – ‘List some common complications of diabetes mellitus’. The query was whether or not the question pertained to patients receiving treatment for diabetes or not. The question was clarified and altered in the final questionnaire to – ‘List some common complications associated with the poor management of diabetes mellitus’ (Appendix H).

6.3.4 Distribution of ‘Health Care Provider Questionnaire’

The ‘HCP questionnaire’ was distributed to the 10 HCPs that constituted the pre-intervention HCP population, between the 15th of March and the 18th March 2005 (Figure 6.1(c)). The entire pre-intervention HCP population completed and returned the pre-intervention HCP questionnaire, resulting in a response rate of 100% (n=10).
Of the 10 HCPs who completed the ‘HCP questionnaire’ (Appendix H) in the pre-intervention phase, only seven HCPs were still working at the clinic at the end of the four-month intervention phase. The ‘HCP questionnaire’ was therefore redistributed to the seven HCPs at the PHC clinic, between the 8th of August and the 12th of August 2005 (Figure 6.1(d)), during the post-intervention phase. The response rate, for the redistribution of the ‘HCP questionnaire’ during the post-intervention phase, was 100% (7, n = 7), with the final HCP population therefore equalling seven. Of the three HCPs who were no longer at the clinic at the end of the intervention phase, two had resigned during the intervention phase and one was unavailable due to work commitments for NMMM health management.

6.3.5 Capture and Collation of Responses from the ‘Health Care Provider Questionnaire’

Data from the HCP questionnaires completed during the pre- and post-intervention phases was captured onto a spreadsheet using Microsoft Excel® (Figure 6.1 (e and f)). Data was then collated with respect to HCP demographics, HCP knowledge of target values, monitoring tests and pharmacological management of diabetes and hypertension, and case studies. Results pertaining to the demographics of the final HCP will be presented and discussed in Chapter 6 (Section 6.6). Results from the comparative assessment of the pre- and post-intervention HCP questionnaire data pertaining to the level of knowledge of the HCPs, will be presented and discussed in Chapter 6 (Section 6.7).

6.4 FOCUS GROUP INTERVIEWS

6.4.1 Introduction

The summarised research methodology for the ‘focus group interviews’ has been illustrated in Figure 6.2. Methodology pertaining to the ‘focus group interviews’ was completed in the pre- and post-intervention phases. The HCPs participated in the ‘focus group interviews’ in the pre-intervention phase, before the
educational intervention, and again in the post-intervention phase, four months after the presentation of the education sessions.

The results pertaining to the structure, pilot, presentation, and the transcription, categorisation and analysis of data from the ‘focus group interviews’ will be discussed below. The impact of the educational intervention on the attitudes of the HCPs will be presented in Chapter 6 (Section 6.8) as a comparison of the pre- and post-intervention results from the categorised transcripts of the focus group interviews.

Figure 6.2: Summary of research methodology for focus group interviews.

6.4.2 Structure of ‘Focus Group Interviews’

The focus group interviews were structured in the pre-intervention phase (Figure 6.1(a)). The researcher identified nine topics to be discussed during the focus group interviews, with each topic subdivided to direct the flow of questioning (Appendix I).
The nine topics included:

- Working environment;
- Training received;
- Routine when treating patients with diabetes;
- Feelings towards treating patients with diabetes;
- Standard of care provided to patients with diabetes;
- Management of patients with chronic diseases;
- South African diabetes and hypertension guidelines;
- Pharmacological management of diabetes and hypertension, and
- Referral of patients.

All nine topics related to PHC and the treatment of patients with diabetes. The length of the focus group interviews was aimed at 30 to 45 minutes. All questions were structured as open-ended, so as to allow for participants to give their honest opinions without feeling pressurised to answer in a particular way.

6.4.3 Pilot of ‘Focus Group Interviews’

The focus group interviews were piloted on the 23rd September 2004, in the pre-intervention phase (Figure 6.2(b)). The pilot population consisted of four fourth year pharmacy students from the University of Port Elizabeth’s Pharmacy Department. The duration of the pilot focus group interview was twenty-two minutes. Participants indicated verbally that all questions asked were completely understood and that they felt free to speak openly on the relevant topics. Due to this outcome, the focus group interview questions were not modified.

6.4.4 Presentation of ‘Focus Group Interviews’

The ‘pre-intervention focus group interview’ was presented by the researcher on two occasions to allow all the HCPs in the pre-intervention HCP population to attend and participate (Figure 6.2(c)). The pre-intervention focus group interviews were completed on the 1st of April 2005 and on the 12th April 2005. Six HCPs (four PNs, one EN and one PA) participated in the 1st of April interview,
and four HCPs (four PNs) participated in the 12th of April interview. Both focus group interviews were therefore classed as mini-group interviews (Greenbaum, 1998). The first focus group interview was thirty-five minutes in duration, while the second focus group interview was of thirty minutes duration. These times were within the targeted duration of thirty to forty-five minutes. The second focus group interview was concluded faster than the first, due to fewer HCPs in attendance (n=4).

The ‘post-intervention focus group interview’ was also presented by the researcher on two occasions to allow all the HCPs, still working at the clinic and on the HCP register, to attend and participate (Figure 6.2(d)). Of the 10 HCPs who participated in the ‘pre-intervention focus group interviews’ (Appendix I), only seven HCPs were still working at the clinic at the end of the four-month intervention phase. Two HCPs resigned from the PHC clinic during the intervention phase and one HCP was unavailable due to work commitments for NMMM health management. Thus the HCP population for the post-intervention focus group interviews consisted of seven HCPs.

The post-intervention focus group interview was completed on the 12th of August and repeated on the 16th of August 2005. Four HCPs (three PNs and one EN) participated in the focus group interview conducted on the 12th of August 2005, and three HCPs (two PNs and one PA) participated in the focus group interview conducted on the 16th of August 2005. The focus group interview conducted on the 12th of August 2005 was classed as mini-group interview (Greenbaum, 1998). The focus group conducted on the 16th of August 2005 only contained three HCP participants, but the focus group was still conducted as a mini-group interview. The first focus group interview was thirty-five minutes in duration, while the second focus group interview was thirty minutes. These times were within the targeted duration of thirty to forty-five minutes. The second focus group interview was concluded faster than the first, due to fewer HCPs in attendance (n=3). The duration of the post-intervention focus group interviews (thirty-five and thirty
minutes) compared equally with the duration of the pre-intervention focus group interviews (thirty five and thirty minutes) conducted.

6.4.5 Transcription, Categorisation and Analysis of Results from ‘Focus Group Interviews’
To ensure that data gained during the pre- and post-intervention focus group interviews was available after the conclusion of the sessions, a voice recorder was used to record the focus group interviews. The use of a voice recorder has advantages as it provides an unimpeachable data source, assures completeness and provides the opportunity to review data as often as required (Hutchinson and Wilson, 1992). The recordings were then transcribed from the audiotapes by the researcher (Figure 6.2 (e and f)). The transcripts contained the raw data from the pre- and post-intervention focus group interviews (Appendix L). The four transcripts were individually categorised, and presented as summarised descriptive statements. Analysis of the pre-intervention and post-intervention focus group interviews will be presented and discussed in Chapter 6 (Section 6.8) as a comparative assessment.

6.5 EDUCATIONAL INTERVENTION

6.5.1 Introduction
The educational intervention was implemented using education sessions, and the results will be discussed in terms of the design, the pilot and the presentation of these education sessions. The summarised research methodology, indicating the flow of the educational intervention, has been illustrated in Figure 6.3. Preparation for the educational intervention was completed in the pre-intervention phase (Figure 6.3 (a and b)). The presentation of the educational intervention marked the beginning of the four-month intervention phase (Figure 6.3(c)).
PRE-INTERVENTION PHASE

a) Design and b) pilot of educational intervention sessions (Appendix J)

 INTERVENTION PHASE (4 months)

c) Presentation of education sessions to HCPs

POST-INTERVENTION PHASE

No activity regarding educational intervention.

**Figure 6.3: Summary of research methodology for educational intervention.**

6.5.2 Design of Education Sessions

Two education sessions (Session A and Session B) were designed during the pre-intervention phase (Figure 6.3(a)). The sessions aimed to present and illustrate the national guidelines for the pharmacological management of diabetes and hypertension (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne *et al.*, 2003). Session A was structured to be interactive and concentrated on target values, the initiation of drug treatment, recommended drug treatment and additive drug treatment for diabetes and hypertension. Major drug interactions with antidiabetic and antihypertensive drugs and indications for patient referrals were also included. Detailed notes and summary cards were compiled for the HCPs, to aid in the presentation of the education session (Appendix J). Session B consisted of case studies, in order for the HCPs to identify the interventions that would be required in the drug therapy of a diabetic patient (Appendix J).

6.5.3 Pilot of Education Sessions

The structured education sessions were piloted on the 24th of March 2005, during the pre-intervention phase (Figure 6.3(b)). The pilot population consisted of six 4th year pharmacy students from the Nelson Mandela Metropolitan University. Two pilot education sessions were presented: an hour session and a half hour session. The duration of the pilot education sessions was timed to be one hour and five minutes for the first session, with the second session taking thirty-five
minutes to complete. These times were very close to the proposed length of the sessions. Feedback from the participants was very positive, with the suggestion made to shorten the section on target values, and to lengthen the time spent reviewing the drugs used in the treatment of diabetes and hypertension. This suggestion was noted and minor changes were made with regard to time allocations for the relevant sections in the education sessions.

6.5.4 Presentation of Education Sessions to Health Care Providers
Two structured education sessions (Session A and Session B), on the South African guidelines for the pharmacological management of diabetes and hypertension, were presented by the researcher to the HCPs working at the PHC clinic (HCP population). The presentation of the sessions marked the start of the four-month intervention phase (Figure 6.3(c)). Both education sessions were repeated on different days so as to allow all HCPs to attend and participate. The education sessions (Session A and Session B) were presented on the 8th of April 2005 and repeated on the 12th April 2005. Both education sessions were attended by five HCPs. An attendance of 100% (10, n = 10) was achieved from the HCP population for the education sessions.

Session A took an hour to present on both occasions (8th and 12th of April 2005). Session B was presented in 40 minutes on the 8th of April 2005, and in 35 minutes on the 12th of April 2005. Education session notes (Appendix J) were distributed to all HCPs (100%, n = 10) during the presentation of Session A. Case studies were analysed and solved during Session B (Appendix J).
6.6 HEALTH CARE PROVIDER DEMOGRAPHICS

The demographics of the all female, final HCP population of seven will be discussed with regard to the following:

- Age Distribution;
- Qualifications Obtained;
- Work Experience in a Primary Health Care Environment;
- Position Held at Primary Health Care Clinic;
- Extent of Experience of Health Care Providers with Diabetic Record Card, and
- Previous Training Received on the Management of Diabetes.

Data pertaining to the three HCPs who only completed questionnaires in the pre-intervention phase was excluded from the questionnaire analysis, so as to ensure the analysis of paired data for the final HCP population of seven. Open-ended and closed questions were utilised to gain information regarding the HCP population demographics (Appendix H).

6.6.1 Age Distribution

To determine the age distribution of the HCP population, HCPs indicated their age by selecting their appropriate age group in question one of the HCP questionnaire. The average age of the HCPs could not be established as HCPs indicated only their age group and not their exact age in years. Results indicated that one HCP was within the age group of 21 to 30 years (14.3%, n = 7) (Figure 6.4). There was equal age distribution found between the age groups of 31 to 40 years and 41 to 50 years, with three HCPs in each age group (42.85%, n = 7). If a HCP commenced studying towards their Nursing Science diploma/degree directly after the completion of high school, a HCP would have approximately five years of working experience by age thirty. The results from the age distribution of the HCPs at the PHC clinic indicated that the majority of the HCPs were over the age of 30 years (6; 87.5%; n = 7), hence indicating that the majority of the
HCPs would have more than five years experience in the working environment. Confidence levels and practical working knowledge increase with the number of years working experience, indicating that the HCP population at the clinic should have high confidence levels and solid practical working knowledge in the working environment. However, theoretical knowledge and very specific details pertaining to patient care may diminish with time and when not frequently used. The majority of the HCP population would have gained their qualifications more than five years ago, with the result that their theoretical and specific knowledge pertaining to patient care may have diminished, indicating a need for in-service training to improve and update HCP knowledge levels.

Figure 6.4: Age distribution of the health care provider population (n = 7).

6.6.2 Qualifications Obtained

Five HCPs (71.4%, n = 7) had completed a diploma in general Nursing Science (Figure 6.5), with no HCPs having completed a degree in Nursing Science. Courses included in the general Nursing Science diploma include psychiatry, midwifery and general community health. For the purposes of this research
project, nurses with a diploma in general Nursing Science will be referred to as PNs. Of the five nurses who had completed the general Nursing Science diploma, one also held a certificate in occupational health and one held a degree in Education and Administration. One HCP (14.3%, n = 7) held an Enrolled Nursing certificate and will be referred to as an EN and one HCP (14.3%, n = 7) was a qualified basic level pharmacist assistant (PA).

![Qualifications obtained by health care provider population (n = 7).](image)

**Figure 6.5: Qualifications obtained by health care provider population (n = 7).**

### 6.6.3 Work Experience in a Primary Health Care Environment

Results pertaining to work experience in a PHC environment were analysed from the HCP questionnaires completed in the pre-intervention phase. Three (42.85%, n = 7) of the HCPs (all PNs) had worked in PHC for one to five years. One HCP (14.29%, n = 7) (PN) only had six months of PHC work experience and one HCP (14.29%, n = 7) (PN) had 10 years of experience in PHC (Figure 6.6). The EN and the PA (2, 28.57%, n = 7) had both worked in PHC for 11 to 15 years. The average number of years work experience in PHC was calculated to be 5.92 years ± 4.98 years, with a range of 11.5 years.
This result indicated a wide range in PHC work experience among the HCP population. The wide range in work experience is beneficial in the working environment, as HCPs with greater work experience can help train and advise those with less work experience, ultimately aiming to improve the health care of patients.

### 6.6.4 Post Occupied at Primary Health Care Clinic

![Figure 6.7: Positions held by health care provider population at the primary health care clinic (n = 7).](image)

Figure 6.6: Number of years of work experience in primary health care for the health care provider population, prior to the intervention phase (n = 7).
Positions held by the HCPs included community health nurse (PN) (5, 71.42%, n = 7), enrolled nurse (EN) (1, 14.29%, n = 7) and pharmacist assistant (PA) (1, 14.29%, n = 7) (Figure 6.7).

6.6.5 Extent of Experience of Health Care Providers with Diabetic Record Card

The length of time that the HCPs had been working with the diabetic record card at the PHC clinic, prior to the intervention phase was investigated. The diabetic record card had been implemented at the PHC clinic during a pilot study in 2002 (Reddy, 2003). The differences in the length of time working with the diabetic record card were as follows: three of the HCPs (PNs) had worked with the card for less than six months (42.85%, n = 7); one HCP (EN) had worked with the card for two years (24 months) (14.29%, n = 7), two HCPs (one PN and one PA) had worked with the card for two and a half years (30 months) (28.57%, n = 7) and one HCP (PN) had worked with the card for just under three years (34 months) (14.29%, n = 7) (Figure 6.8). The average length of time that the HCPs had worked with the diabetic record card was 16 months (one year and four months) ± 15 months, with a range of 33.75 months. This wide range is due to the staff turnover at the clinic, as the HCPs new to the PHC clinic were not trained on the usage of the diabetic record card. Results in Chapter 7 (Section 7.3.2) concluded that the diabetic record card was not utilised in 2004, by any of the HCPs at the PHC clinic. For this reason, the meaning of ‘working with the diabetic record card’ should be rephrased to implicate the knowledge of the existence of the diabetic record card instead.
Figure 6.8: Length of time that health care providers had worked with diabetic record card at the primary health care clinic, prior to the intervention phase (n = 7).

6.6.6 Previous Training Received on the Management of Diabetes

The HCPs were asked to indicate if they had attended or received any training or education regarding the management of diabetes. All seven HCPs (100%, n = 7) indicated that they had not received any additional training or education regarding the management of diabetes. As diabetes is one of the most prevalent chronic disease states in South Africa and in 2000, diabetes ranked tenth as the single cause of death in SA (Reddy, 2004), the lack of in-service education and training, provided by the Department of Health or the NMMM, is of a concern.
6.7 IMPACT OF EDUCATIONAL INTERVENTION ON HEALTH CARE PROVIDER KNOWLEDGE

6.7.1 Introduction
The results pertaining to the impact of the educational intervention on the HCPs’ level of knowledge will be presented and discussed with regard to:

- Overview of Results from Knowledge Section of Health Care Provider Questionnaire (Appendix H);
- Target Values;
- Pharmacological Management of Diabetes;
- Pharmacological Management of Hypertension;
- Monitoring Tests, and
- Case Studies.

Demographic results obtained from the completed HCP questionnaires indicated that the HCP population consisted of five professional nurses, one enrolled nurse and one pharmacist assistant (basic level) (Figure 6.5 and Figure 6.7). The scope of practice and course work completed during training, for these three groups of HCPs, differs greatly. To qualify as a professional nurse, a four-year General Nursing diploma or degree must be completed. On completion of the four-year diploma or degree, a professional nurse will have received comprehensive education on the pharmacological management of diabetes and hypertension. The same cannot be concluded for enrolled nurses and pharmacist assistants. Enrolled nurses complete a two-year course to obtain a certificate as an enrolled nurse. Pharmacist assistants complete a structured course to obtain the qualification of a pharmacist assistant basic level. Enrolled nurses and pharmacist assistants do not receive in-depth education regarding the pharmacological management of diabetes and hypertension, however, during training they are exposed to drug names and the uses of drugs in the management of diabetes and hypertension. It would, therefore, be assumed that the enrolled nurse and pharmacist assistant would not be able to answer
questions from the HCP questionnaire pertaining to the pharmacological management of diabetes and hypertension. Due to the small HCP population size and the fact that the enrolled nurse and pharmacist assistant are in direct contact with patients with diabetes at the PHC clinic, they were included in this HCP population. In order to uphold participant confidentiality, the questionnaire responses made by the enrolled nurse and pharmacist assistant have not been isolated during the analysis of the HCP questionnaire, but rather included in the complete analysis of the level of knowledge of the HCPs at the PHC clinic.

A comparative assessment was performed regarding the time taken for HCPs to complete the HCP questionnaire, in the pre- and post-intervention phase (Figure 6.9). Results indicated that during the pre-intervention phase the average time taken for the HCPs to complete the HCP questionnaire was 17.14 minutes ± 6.36 minutes, with a range of 20 minutes (n = 7). The maximum time taken to complete the pre-intervention HCP questionnaire was 30 minutes, with a minimum time of 10 minutes. Results from the post-intervention phase indicated that the average time taken for the HCPs to complete the HCP questionnaire was 32.14 minutes ± 2.67 minutes, with a range of 5 minutes. The maximum time taken to complete the post-intervention HCP questionnaire was 35 minutes, with a minimum time of 30 minutes. The significance of the increased time required to complete the questionnaire can be attributed to the HCPs responding to more questions, due to their increased amount of knowledge regarding the pharmacological management of diabetes and hypertension.

The pre- and post-intervention HCP questionnaires were completed four months apart (Figure 6.9). The comparison of the analysed pre- and post-intervention ‘HCP questionnaire’ data pertaining to the level of knowledge of the HCPs, will be presented with regard to the number of correct answers, blank answers and incorrect answers recorded by the HCPs.
Figure 6.9: A comparative analysis, between the pre- and post-intervention phases, of the time taken for health care providers to complete the health care provider questionnaire (n = 7).

6.7.2 Overview of Results from Knowledge Section of Health Care Provider Questionnaire

The responses from the seven HCPs who completed the HCP questionnaire in both the pre- and post-intervention phases were analysed. Three completed HCP questionnaires from the pre-intervention phase were excluded from the comparison, as there was no paired data from the post-intervention phase to complete the comparison. For the “knowledge section” of the HCP questionnaire, the total number of questions analysed was 47, therefore 329 responses (47 x seven HCPs) were analysed in both the pre- and post-intervention phases. The differences in HCP responses, from the HCP questionnaire, between the pre- and post-intervention phases are illustrated in Table 6.1.
Table 6.1: Comparison of the responses given by health care providers from the health care provider questionnaire, between the pre- and post-intervention phases.

<table>
<thead>
<tr>
<th>RESPONSES FROM HCPs</th>
<th>PRE-INTERVENTION PHASE (n = 329)</th>
<th>POST-INTERVENTION PHASE (n = 329)</th>
<th>% INCREASE OR DECREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORRECT</td>
<td>93 (28.3%)</td>
<td>223 (67.8%)</td>
<td>Increase of 39.5%</td>
</tr>
<tr>
<td>INCORRECT</td>
<td>81 (24.6%)</td>
<td>93 (28.3%)</td>
<td>Increase of 3.7%</td>
</tr>
<tr>
<td>BLANK</td>
<td>155 (47.1%)</td>
<td>13 (3.9%)</td>
<td>Decrease of 43.2%</td>
</tr>
</tbody>
</table>

For the purposes of statistical analysis, blank responses from HCPs were also considered as incorrect responses. The total number of correct responses increased from 93 (28.3%, n = 329) to 223 (67.8%, n = 329), an increase of 39.5%, indicating an extremely significant (p < 0.0001, Fisher’s Exact test) increase in the level of HCP knowledge between the pre- and post-intervention phases. The total number of incorrect responses did, however, increase slightly by 3.7%, from 81 (24.6%, n = 329) to 93 (28.3%, n = 329), and the total number of blank responses decreased from 155 (47.1%, n = 329) to 13 (3.9%, n = 329). The most considerable change was evident for the number of blank responses indicated by HCPs, with a decrease of 43.2% noted between the pre- and post-intervention phases. An incorrect response is considered to be more substantial as compared to a blank response, due to the fact that the HCP had the confidence to give an answer, instead of not attempting to answer a question at all.

The significant increase in correct responses indicated by the HCPs in the post-intervention phase illustrated the effectiveness of the educational intervention as a successful tool in improving the level of knowledge of the HCPs at the PHC clinic, with regard to the pharmacological management of diabetes and hypertension. The positive result also suggested that although base knowledge may not have been present in all HCPs, for example the EN and PA, the educational intervention was still effective as a tool in improving HCPs’ knowledge levels.
6.7.3 Target Values

The primary goals in the management of diabetes are to reduce the risk of microvascular and macrovascular disease complications, to ameliorate symptoms, to reduce mortality, and to improve quality of life. Maintaining near normal levels of glycaemia reduce the risk for the development of microvascular disease complications. Reduction in the risk of macrovascular complications is related to the management of dyslipidaemia and intensive blood pressure control. To optimise diabetes care, goal setting (in the form of target values) is essential for parameters including glycaemia, blood pressure and lipid levels. (Working Group of the National Diabetes Advisory Board, 1997; Oki and Isley, 2002; ADA, 2005)

Health care providers need to be aware of goal target values for recommended monitoring parameters to ascertain a patient’s level of diabetes control and if indicated, the need for further diabetes management intervention in order to prevent or delay the onset of diabetic complications.

The HCPs’ knowledge of the target values for fasting blood glucose, post prandial blood glucose, HbA1c, cholesterol and blood pressure was investigated. The HCPs were asked to fill in the relevant values for glycaemic and lipid control above which a diabetic patient’s condition would be considered compromised, as well as the target blood pressure value for patients with diabetes.

A total of 35 responses (seven HCPs and five questions) were analysed for target values in the pre- and post-intervention phases. Overall, for the questions pertaining to target values, there was a significant increase ($p = 0.0194$, Fisher’s Exact test) in the total number of correct responses, from six (17.1%, $n = 35$) in the pre-intervention phase to 16 (45.7%, $n = 35$) in the post-intervention phase. The total number of blank responses decreased from 21 (60%, $n = 35$) to three (8.6%, $n = 35$), and the total number of incorrect responses increased from eight (22.9%, $n = 35$) to 16 (45.7%, $n = 35$), between the pre- and post-
intervention phases. The large percentage of incorrect responses in the post-intervention phase can be attributed to the HCPs indicating ideal target values instead of the target values above which a patient’s condition is considered compromised. Thus not necessarily indicating a lack of knowledge, but rather misinterpretation of the question.

6.7.3.1 Target Values for Glycaemic Control

The risk of diabetic complications has been found to be directly related to fasting and post prandial blood glucose levels. Hence, optimal blood glucose levels will decrease the risk of diabetic complications. (ADA, 2005) Health care providers were asked to indicate the fasting and post prandial blood glucose levels above which a patient’s condition would be considered compromised, i.e. the level at which diabetic management must be adjusted. The correct answers were as follows: fasting blood glucose (> 8 mmol/L) and post prandial blood glucose (> 10 mmol/L) (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Correct responses between the pre- and post-intervention phases increased as follows: fasting blood glucose from four (57.1%, n = 7) to five (71.4%, n = 7) and post prandial blood glucose from zero (0%, n = 7) to two (28.6%, n = 7) (Figure 6.10 (a) and (b)).

The slight increase in the number of correct responses for fasting blood glucose and post prandial blood glucose target levels illustrated an increase in knowledge, however, this change was not significant (p = 1.0 and p = 0.45 respectively; Fischer’s Exact test). In summary, the educational intervention achieved an increase in the level of HCP knowledge pertaining to fasting and post prandial blood glucose target levels, although the increase was not significant.
Figure 6.10: Pre-intervention versus post-intervention health care provider questionnaire data regarding recommended target values (n = 7). For fasting blood glucose (a), post prandial blood glucose (b), HbA1c (c) and cholesterol (d), HCPs were asked to fill in the target value above which a patient’s condition would be considered compromised (i.e. adjustments to management needed). For blood pressure (e), HCPs were asked to indicate the target blood pressure for patients with diabetes.
Intensive treatment regimes in the management of diabetes, aimed at lowering HbA1c levels, have been associated with a reduction in microvascular diabetic complications (ADA, 2005). The HCPs were asked to indicate the HbA1c level above which a patient’s condition would be considered compromised (i.e. > 8%) (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Correct responses for the HbA1c target level increased between the pre- and post-intervention phases from zero (0%, n = 7) to six (85.7%, n = 7) (Figure 6.10 (c)). This dramatic increase was found to be very significant (p = 0.002, Fischer’s Exact test), proving the effectiveness of the educational intervention in increasing the level of knowledge of HCPs regarding the recommended HbA1c target value.

The results of the present study regarding target values of glycaemic control were compared to an educational intervention study conducted by Oosthuizen et al. (2002) among doctors at the Pretoria Academic Hospital (SA), which aimed at improving the quality of care of diabetic patients. Both studies noted positive changes in the level of knowledge of HCPs with regard to target values of glycaemic control, after the presentation of educational interventions. There were no significant (p > 0.05) changes identified in the Oosthuizen et al. (2002) study for fasting glucose, post prandial glucose or HbA1c target values and the only significant (p > 0.05) result identified was for the HbA1c target value from the present study (p = 0.002). This comparison suggests that the present study was a successful tool in educating HCPs with regard to HbA1c target values.

6.7.3.2 Target Values for Cholesterol Control

Diabetes is associated with high risk for vascular disease, and aggressive lipid management is generally necessary. The management of dyslipidemia in patients with type 2 diabetes requires investigation into a patient’s cholesterol level. (Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2003)
The HCPs were asked to indicate the cholesterol level above which a patient’s condition would be considered compromised (i.e. > 6.5 mmol/L) (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Results indicated only one (14.3%, n = 7) correct response for the total cholesterol target value in the pre- and post-intervention phases (Figure 6.10 (d)), with the result not being significant (p = 1.54, Fischer’s Exact test). The low level of correct responses in the post-intervention phase was due to four HCPs who gave the ideal cholesterol target values instead of levels above which a patient’s condition would be considered compromised.

The present study indicated no significant change in knowledge after the educational intervention, however there was an important change noted, as four HCPs indicated improved knowledge by responding with the ideal cholesterol target value instead of not responding at all. In contrast to the present study, Oosthuizen et al. (2002) found a significant increase in knowledge of target LDL cholesterol levels (p = 0.01; Fischer’s Exact test) after an educational intervention involving doctors working at a tertiary care hospital.

6.7.3.3 Target Values for Blood Pressure Control
Type 2 diabetes and hypertension are commonly associated chronic conditions, which both lead to an increased risk of cardiovascular and renal disease. The tight control of blood pressure can lead to a marked reduction in the risk of diabetic complications. (United Kingdom Prospective Diabetes Study Group, 1998b) The HCPs were asked to indicate the blood pressure level above which a patient’s condition would be considered compromised (i.e.> 130/80 mmHg) (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Results indicated that correct responses for blood pressure target values from the HCPs, between the pre- and post-intervention phases, increased from one (14.3%, n = 7) to two (28.6%, n = 7) (Figure 6.10 (e)). In the post-intervention phase, four incorrect responses were attributed to HCPs who indicated blood pressure target values for diabetic patients with proteinuria, instead of the overall
blood pressure target value for patients with diabetes. This slight increase in the number of correct responses was found to be not significant (p = 1.0, Fischer’s Exact test).

In the study conducted by Oosthuizen et al. (2002), a significant increase in correct responses for blood pressure target values was noted after the educational intervention (p = 0.02; Fischer’s Exact test). This indicated the effectiveness of the educational intervention in altering and improving HCP knowledge levels for blood pressure. In the present study, no significant change was noted for the slight increase in the number of correct responses, however, four HCPs did indicate the blood pressure target value for a diabetic patient with proteinuria, thus not reporting a level that was too high.

6.7.4 Pharmacological Management of Diabetes
Pharmacological management of diabetes is usually indicated in patients who present with fasting blood glucose levels > 15mmol/L or who have not achieved adequate control within three months on a diet and exercise program. Recommended treatment regimes utilise drugs, which are effective, safe and inexpensive in accordance with the EDL for PHC. Pharmacological management of diabetes should be started at very low doses and increased slowly over four weekly periods. (Working Group of the National Diabetes Advisory Board, 1997)

The HCPs were questioned on the pharmacological management of diabetes, as recommended in the South African diabetes guidelines. Aspects investigated were knowledge of pharmacological classes of drugs, starting doses of drugs, maximum doses of drugs, and add-on drug therapy.

The HCP questionnaire assessed three oral pharmacological agents used to manage diabetes. These three oral agents are recommended in the South African EDL and the South African diabetes guideline, namely metformin,
gliclazide and glibenclamide (Working Group of the National Diabetes Advisory Board, 1997).

A total of 84 responses (seven HCPs and 12 questions) were analysed for the pharmacological management of diabetes in the pre- and post-intervention phases. Results indicated an extremely significant increase \( (p < 0.0001, \text{Fisher’s Exact test}) \) in the total number of correct responses, from 15 (17.9\%, \( n = 84 \)) in the pre-intervention phase to 69 (82.1\%, \( n = 84 \)) in the post-intervention phase. The total number of blank responses decreased from 53 (63.1\%, \( n = 84 \)) to two (2.4\%, \( n = 84 \)), and the total number of incorrect responses decreased from 16 (19.0\%, \( n = 84 \)) to 13 (15.5\%, \( n = 84 \)), between the pre- and post-intervention phases.

In summary, results indicated that the overall level of HCP knowledge increased for all sections regarding the pharmacological management of diabetes, with significant increases obtained for the questions pertaining to pharmacological classes and add-on drug therapy. These results suggested that the educational intervention was very successful in increasing the level of knowledge of HCPs pertaining to the pharmacological management of diabetes.

6.7.4.1 Pharmacological Classes

In order to maximise the pharmacological care provided to patients, HCPs need to be able to differentiate between the pharmacological classes of drugs used to lower blood glucose levels. The knowledge of a drug agent’s pharmacological class is important when two oral drug agents are combined in the management of diabetes. Two drug agents from the same pharmacological class cannot be utilised together as this would be illogical and detrimental to a patient’s health. Included in the HCP questionnaire were the pharmacological classes of the three recommended oral drug agents used in the treatment of diabetes, namely metformin (biguanide), and gliclazide and glibenclamide (sulphonylureas) (Working Group of the National Diabetes Advisory Board, 1997).
Overall a total of 21 responses (7 HCPs and 3 questions) were analysed in the pre- and post-intervention phases, for the pharmacological classes of drugs used to lower blood glucose levels. The increase in the total number of correct responses was extremely significant \((p < 0.0001, \text{Fischer's Exact test})\) from zero \((0\%, n = 21)\) to 15 \((71.4\%, n = 21)\). The total number of incorrect responses increased from zero \((0\%, n = 21)\) to six \((28.6\%, n = 21)\), and the total of blank responses decreased from 21 \((100\%, n = 21)\) to zero \((0\%, n = 21)\), between the pre- and post-intervention phases. The incorrect responses noted in the post-intervention phase were due to the HCPs filling in drug trade names instead of pharmacological classes.

Results pertaining to correct responses given by the HCPs, for identifying the pharmacological class of the drug agents used to lower blood glucose levels, in the pre-intervention phase versus the post intervention phase were as follows (significance is taken as \(p < 0.05\); Fischer's Exact test) (Figure 6.11):

- **Metformin**: zero \((0\%, n = 7)\) vs five \((71.4\%, n = 7)\) \((p = 0.021)\);
- **Gliclazide**: zero \((0\%, n = 7)\) vs five \((71.4\%, n = 7)\) \((p = 0.021)\), and
- **Glibenclamide**: zero \((0\%, n = 7)\) vs five \((71.4\%, n = 7)\) \((p = 0.021)\).

Results indicated that the HCPs' level of knowledge regarding the pharmacological classes of drug agents used in the management of diabetes, **increased equally and significantly** for all three drugs from 0% \((0, n = 7)\) in the pre-intervention phase to 71.4% \((5, n = 7)\) in the post-intervention phase. With the knowledge the HCPs' had acquired during the education sessions regarding the pharmacological classes of drug agents used in the management of diabetes, the HCPs now had the ability to identify and refer a patient if or when two drug agents from the same pharmacological class were prescribed. This result was therefore very encouraging.
Figure 6.11: Pre-intervention versus post-intervention health care provider questionnaire data regarding the pharmacological classes of drugs used to lower blood glucose levels (n = 7), where (a) represents responses for metformin, (b) responses for gliclazide and (c) responses for glibenclamide.

6.7.4.2 Starting Doses
The HCPs were asked to fill in the recommended starting doses for metformin, gliclazide and glibenclamide. No possible doses were given to the HCPs to select from. The following starting daily doses were considered correct for the initiation of the oral drug agents used to lower blood glucose levels (Working Group of the National Diabetes Advisory Board, 1997): metformin (500mg or 850mg daily), gliclazide (40mg daily), and glibenclamide (2.5mg daily).
Overall a total of 21 responses (seven HCPs and three questions) were analysed in the pre- and post-intervention phases, for the recommended starting daily doses of drugs used to lower blood glucose levels. The total number of correct responses increased from five (23.8%, n = 21) to 12 (57.1%, n = 21), however this was not quite significant \( p = 0.0578 \), Fischer’s Exact test. The total number of incorrect responses decreased from ten (47.6%, n = 21) to nine (42.9%, n = 21), and the total of blank responses decreased from six (28.6%, n = 21) to zero (0%, n = 21), between the pre- and post-intervention phases.

The incorrect responses noted in the post-intervention phase were due to the HCPs indicating double the recommended starting doses for gliclazide and glibenclamide:

- Gliclazide: 80mg instead of 40mg (indicated by four HCPs), and
- Glibenclamide: 5mg instead of 2.5mg (indicated by five HCPs).

Correct responses given by the HCPs, for the recommended starting doses of pharmacological agents used to lower blood glucose levels, in the pre-intervention versus the post intervention phase were as follows (significance is taken as \( p < 0.05 \); Fischer’s Exact test) (Figure 6.12):

- Metformin: five (71.4%, n = 7) vs seven (100%, n = 7) \( p = 0.4615 \);
- Gliclazide: zero (0%, n = 7) vs three (42.9%, n = 7) \( p = 0.1923 \), and
- Glibenclamide: zero (0%, n = 7) vs two (28.6%, n = 7) \( p = 0.4615 \).

There was a slight increase in correct responses for all three drug agents and metformin obtained the highest level of correct responses (100%, n = 7). The increase in the level of knowledge regarding starting doses of pharmacological agents used in the management of diabetes was relevant yet not statistically significant. Health care providers’ knowledge of recommended starting doses can aid as a double check to patient prescriptions from the PHC doctor, and hence HCPs have the ability to provide optimal care to patients who are initiated on pharmacological management for diabetes.
6.7.4.3 Maximum Daily Doses

The HCPs were also asked to fill in the maximum daily doses for metformin, gliclazide and glibenclamide. No possible doses were given to the HCPs to select from. The following maximum daily doses were considered correct for the following oral drug agents (Working Group of the National Diabetes Advisory Board, 1997): metformin (a total of 3000mg daily or 500 to 850mg three times a
day), gliclazide (a total of 320mg daily or 160mg twice a day), and glibenclamide (a total of 15mg daily or 5 to 7.5mg twice a day).

Overall a total of 21 responses (seven HCPs and three questions) were analysed in the pre- and post-intervention phases for the recommended maximum daily doses of drug agents used to lower blood glucose levels. The total number of correct responses increased from eight (38.1%, n = 21) to 15 (71.4%, n = 21), however, this increase was not quite significant ($p = 0.0616$; Fischer’s Exact test). The total number of incorrect responses increased from four (19.0%, n = 21) to six (28.6%, n = 21), and the total of blank responses decreased from nine (42.9%, n = 21) to zero (0%, n = 21), between the pre- and post-intervention phases. The incorrect responses noted in the post-intervention phase were due to the HCPs indicating only half the maximum dose of gliclazide as the maximum dose (80mg twice a day indicated by three HCPs).

Correct responses given by the HCPs, for the maximum daily doses of the oral drug agents used to lower blood glucose levels, in the pre-intervention phase versus the post intervention phase were as follows (significance is taken as $p < 0.05$; Fischer’s Exact test) (Figure 6.13):

- Metformin: four (57.1%, n = 7) vs six (85.7%, n = 7) ($p = 0.5594$);
- Gliclazide: one (14.3%, n = 7) vs three (42.9%, n = 7) ($p = 0.1923$), and
- Glibenclamide: three (42.9%, n = 7) vs six (85.7%, n = 7) ($p = 0.2657$).

There was a slight increase in correct responses for all three pharmacological agents used to lower blood glucose levels, however these increases were not significant. Metformin and glibenclamide obtained the highest level of correct responses (85.7%, 6, n = 7). The knowledge of maximum doses for pharmacological agents used in the management of diabetes can assist HCPs in determining when a patient, who is uncontrolled on their current pharmacological management, is in need of a prescribed dosage increase. Hence HCPs have the knowledge to refer patients to the PHC doctor and suggest dosage increases.
where possible to achieve optimal care for patients who are uncontrolled on pharmacological management for diabetes.

![Diagram showing responses of HCPs for different drugs](image)

Figure 6.13: Pre-intervention versus post-intervention health care provider questionnaire data regarding recommended maximum doses of drugs used to lower blood glucose levels (n = 7), where (a) represents responses for metformin, (b) responses for gliclazide and (c) responses for glibenclamide.

6.7.4.4 Recommended Add-On Drug Therapy

The HCPs were asked to fill in the recommended add-on drug therapy in the management of type 2 diabetes in patients already taking either metformin, gliclazide or glibenclamide. No possible drugs were given to the HCPs to select from. The following add-on drug therapy options were considered correct (Working Group of the National Diabetes Advisory Board, 1997):

- **Metformin (n = 7)**
  - Correct: 6
  - Incorrect: 0
  - Blank: 1

- **Gliclazide (n = 7)**
  - Correct: 3
  - Incorrect: 1
  - Blank: 4

- **Glibenclamide (n = 7)**
  - Correct: 6
  - Incorrect: 1
  - Blank: 1
metformin (if patient already on gliclazide or glibenclamide) and gliclazide or
glibenclamide (if patient already on metformin).

A total of 21 responses (seven HCPs and three questions) were analysed in the
pre- and post-intervention phases, for the recommended add-on drug therapy in
the management of diabetes. The total number of correct responses increased
significantly from two (9.5%, n = 21) to 19 (90.5%, n = 21) (p < 0.0001, Fischer’s
Exact test). The total number of incorrect responses decreased from two (9.5%,
n = 21) to zero (0%, n = 21), and the total of blank responses decreased from 17
(81.0%, n = 21) to two (9.5%, n = 21), between the pre- and post-intervention
phases.

Results pertaining to correct responses given by the HCPs, for recommended
add-on drug therapy in the management of type 2 diabetes, in the pre-
intervention phase versus the post intervention phase were as follows
(significance is taken as p < 0.05; Fischer’s Exact test) (Figure 6.14):

- Metformin: one (14.3%, n = 7) vs six (85.7%, n = 7) (p = 0.0291);
- Gliclazide: zero (0%, n = 7) vs seven (100%, n = 7) (p = 0.0006), and
- Glibenclamide: one (14.3%, n = 7) vs six (85.7%, n = 7) (p = 0.0291).

There was a statistically significant increase in the number of correct responses
for all three drug agents, however, add-on therapy recommended if the patient
was already taking gliclazide, yielded the most number of correct responses
(100%, n = 7). The knowledge of recommended drug agents used as add-on
pharmacological management of diabetes in uncontrolled patients, may assist
HCPs in identifying when a patient requires additional drug therapy due to the
maximum dose of the current drug agent being utilised. Hence HCPs have the
knowledge to refer patients to the PHC doctor with the suggestion of add-on drug
therapy for patients who are uncontrolled on their current pharmacological
management for diabetes. This statistically significant result was very
encouraging.
Figure 6.14: Pre-intervention versus post-intervention health care provider questionnaire data regarding recommended add-on drug therapy in the management of diabetes (n = 7), where (a) represents responses for metformin, (b) responses for gliclazide and (c) responses for glibenclamide.

6.7.5 Pharmacological Management of Hypertension

Cardiovascular disease is a major cause of death in patients with type 2 diabetes. There is a strong relationship between blood pressure and cardiovascular disease, and the higher the blood pressure, the greater the risk of heart attack, heart failure, stroke, and kidney disease. (National High Blood Pressure Education Program, 2003) If lifestyle changes including salt restriction and weight reduction are inadequate in reducing blood pressure levels, drug agents used in the management of hypertension are indicated (Working Group of the National Diabetes Advisory Board, 1997).
Knowledge of HCPs on the pharmacological management of hypertension in patients with type 2 diabetes, from the South African diabetes guidelines, was tested with regard to: pharmacological classes of drugs; starting doses of drugs; maximum doses of drugs, and add-on drug therapy.

The drug agents recommended in the management of hypertension that were assessed in the HCP questionnaire included four agents recommended in the South African EDL, South African diabetes guideline and the South African hypertension guideline, namely: hydrochlorothiazide (HCT); perindopril; atenolol, and reserpine (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne et al., 2003).

A total of 112 responses (seven HCPs and 16 questions) were analysed for the pharmacological management of hypertension in the pre- and post-intervention phases. There was an extremely significant increase ($p < 0.0001$, Fischer’s Exact test) in the total number of correct responses, from 22 (23.2%, $n = 112$) in the pre-intervention phase to 83 (74.1%, $n = 112$) in the post-intervention phase. The total number of blank responses decreased from 65 (58.0%, $n = 112$) to six (5.4%, $n = 112$), and the total number of incorrect responses stayed the same at 23 (20.5%, $n = 112$), between the pre- and post-intervention phases.

Results indicated that the overall level of HCP knowledge increased significantly for all sections of the HCP questionnaire on the pharmacological management of hypertension. This result suggested that the educational intervention was very successful in improving the level of knowledge of HCPs pertaining to the pharmacological management of hypertension in patients with type 2 diabetes. It can therefore be concluded that the educational intervention was a successful tool in increasing knowledge levels, even if base knowledge was not present, for example with the EN and the PA.
6.7.5.1 Pharmacological Classes

In order to maximise the pharmacological care provided to patients, HCPs need to be able to differentiate between the pharmacological classes of drugs used in the management of hypertension. The knowledge of a drug agent’s pharmacological class is important when two or more oral drug agents are combined in the treatment of hypertension. Two agents from the same pharmacological class cannot be utilised together as this would be illogical and detrimental to a patient’s health. Specific pharmacological classes have also been found to be more effective than others when treating co-morbid disease states, such as diabetes and hypertension, hence this class knowledge is vital.

The pharmacological classes of the four oral drug agents, used to lower blood pressure levels, included in the HCP questionnaire were: HCT (thiazide diuretic); perindopril (angiotensin converting enzyme inhibitor (ACE-I)); atenolol (beta-blocker), and reserpine (centrally acting agent).

Overall a total of 28 responses (seven HCPs and four questions) were analysed in the pre- and post-intervention phases, for the pharmacological classes of drugs used to lower blood pressure levels. There was an extremely significant increase ($p = 0.0008$, Fischer’s Exact test) in the total number of correct responses from four (14.3%, $n = 28$) to 16 (76.2%, $n = 28$). The total number of incorrect responses increased from four (14.3%, $n = 28$) to six (21.4%, $n = 28$), and the total of blank responses decreased from 20 (71.4%, $n = 28$) to six (21.4%, $n = 28$), between the pre- and post-intervention phases. In the post-intervention phase, the HCPs knowledge on the pharmacological class classification of reserpine did not improve as no correct response was recorded. This may be due to the fact that the pharmacological class of reserpine (centrally acting agent) is slightly more complex and is not as well known as the thiazides, ACE-Is and beta blockers, hence it is not as easy to recall.

Correct responses indicated by the HCPs, for identifying the pharmacological class of drugs used to lower blood pressure levels, in the pre-intervention phase...
versus the post intervention phase were (significance is taken as \( p \leq 0.05 \);
Fischer’s Exact test) (Figure 6.15):

- HCT: two (28.6%, \( n = 7 \)) vs five (71.4%, \( n = 7 \)) (\( p = 0.2861 \));
- Perindopril: one (14.3%, \( n = 7 \)) vs six (85.7%, \( n = 7 \)) (\( p = 0.0291 \));
- Atenolol: one (14.3%, \( n = 7 \)) vs five (71.4%, \( n = 7 \)) (\( p = 0.1026 \)), and
- Reserpine: zero (0%, \( n = 7 \)) vs zero (0%, \( n = 7 \)) (no \( p \)-value).

Figure 6.15: Pre-intervention versus post-intervention health care provider questionnaire data regarding pharmacological classes of drugs used to lower blood pressure levels (\( n = 7 \)), where (a) represents responses for HCT, (b) responses for perindopril, (c) responses for atenolol, and (d) responses for reserpine.
There was an improvement after the educational intervention in the level of knowledge for three of the four drug agents, with a significant change only noted for perindopril. In the post-intervention phase, perindopril obtained the highest level of correct responses (85.7%, n = 7) as compared to reserpine, which yielded no correct responses (0%, n = 7). With the knowledge the HCPs' had acquired during the education sessions regarding the pharmacological classes of drug agents used in the management of hypertension, the HCPs now had the ability to identify and refer a patient if or when two drug agents from the same pharmacological class were prescribed, or if the incorrect drug agent was prescribed in the management of hypertension in the presence of a co-morbid disease state.

6.7.5.2 Starting Doses
The HCPs were asked to indicate the recommended starting daily doses for the selected drug agents used to lower blood pressure levels. The following starting daily doses were considered correct for the initiation of drug treatment for hypertension (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne et al., 2003): HCT (12.5mg daily); perindopril (2mg daily); atenolol (25mg to 50mg daily), and reserpine (0.05mg to 0.125mg daily).

Overall a total of 28 responses (seven HCPs and four questions) were analysed in the pre- and post-intervention phases, for the recommended starting daily doses of drugs used to lower blood pressure levels. The total number of correct responses increased significantly (p = 0.0154, Fischer's Exact test) from nine (32.1%, n = 28) to 19 (67.9%, n = 28) after the educational intervention. The total number of incorrect responses decreased from 14 (50.0%, n = 28) to nine (32.1%, n = 28), and the total of blank responses decreased from five (17.9%, n = 28) to zero (0%, n = 28), between the pre- and post-intervention phases. The incorrect responses noted in the post-intervention phase for reserpine were due to the HCPs indicating double the recommended starting dose (HCPs indicated 0.25mg as a starting dose for reserpine).
Correct responses indicated by the HCPs, for the recommended starting doses of drug agents used to lower blood pressure levels, in the pre-intervention phase versus the post intervention phase were (significance is taken as $p < 0.05$; Fischer’s Exact test) (Figure 6.16):

- HCT: two (28.6%, $n = 7$) vs four (57.1%, $n = 7$) ($p = 0.5921$);
- Perindopril: two (28.6%, $n = 7$) vs seven (100%, $n = 7$) ($p = 0.021$);
- Atenolol: four (57.1%, $n = 7$) vs six (85.7%, $n = 7$) ($p = 0.5594$), and
- Reserpine: one (14.3%, $n = 7$) vs two (28.6%, $n = 7$) ($p = 1.0$).

Figure 6.16: Pre-intervention versus post-intervention health care provider questionnaire data regarding recommended starting doses of drugs used to lower blood pressure levels ($n = 7$), where (a) represents responses for HCT, (b) responses for perindopril, (c) responses for atenolol, and (d) responses for reserpine.
After the educational intervention the number of correct responses increased for all four drug agents, indicating an increased level of knowledge for the HCPs regarding starting doses of drug agents used to lower blood pressure levels. In the post-intervention phase, perindopril obtained a significant change with the most correct responses (100%, n = 7) as compared to reserpine, which obtained the least (28.6%, n = 7). Health care providers’ knowledge of recommended starting doses can aid as a double check to patient prescriptions from the PHC doctor, and hence HCPs have the ability to provide optimal care to patients who are initiated on pharmacological management for hypertension.

6.7.5.3 Maximum Daily Doses
The HCPs were asked to indicate the maximum daily doses for the pharmacological agents used to lower blood pressure. The following maximum daily doses were considered correct (Gibbon, 2000; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne et al., 2003): HCT (25mg daily); perindopril (8mg daily); atenolol (100mg daily), and reserpine (0.25mg daily).

Overall a total of 28 responses (seven HCPs and four questions) were analysed in the pre- and post-intervention phases, for the recommended maximum daily doses of drugs used to lower blood pressure levels. There was an extremely significant (p = 0.0004, Fischer’s Exact test) increase in the total number of correct responses, from six (21.4%, n = 28) to 20 (71.4%, n = 28) after the educational intervention. The total number of incorrect responses increased from five (17.9%, n = 28) to eight (28.6%, n = 28), and the total of blank responses decreased from 17 (60.7%, n = 28) to zero (0%, n = 28), between the pre- and post-intervention phases. The incorrect responses noted in the post-intervention phase for perindopril were due to the HCPs indicating only half the maximum dose of perindopril as the maximum dose (4mg instead of 8mg).
Results pertaining to correct responses given by the HCPs, for the maximum daily doses of antihypertensive drugs, in the pre-intervention phase versus the post intervention phase were (significance is taken as \( p < 0.05 \); Fischer’s Exact test) (Figure 6.17):

- HCT: three (42.9%, \( n = 7 \)) vs seven (100%, \( n = 7 \)) \( (p = 0.0699) \);
- Perindopril: zero (0%, \( n = 7 \)) vs one (14.3%, \( n = 7 \)) \( (p = 1.0) \);
- Atenolol: three (42.9%, \( n = 7 \)) vs five (71.4%, \( n = 7 \)) \( (p = 0.5921) \), and
- Reserpine: zero (0%, \( n = 7 \)) vs seven (100%, \( n = 7 \)) \( (p = 0.0006) \).

Figure 6.17: Pre-intervention versus post-intervention health care provider questionnaire data regarding recommended maximum doses of drugs used to lower blood pressure levels \( (n = 7) \), where (a) represents responses for HCT, (b) responses for perindopril, (c) responses for atenolol, and (d) responses for reserpine.

There was an increase in the number of correct responses for all four antihypertensive drugs. HCT and reserpine were found to have the most correct responses regarding maximum doses (100%, \( n = 7 \)) after the educational
intervention, yet a significant change was only noted for reserpine. Perindopril obtained the lowest number of correct responses (14.3%, n = 7) in the post-intervention phase. The knowledge of maximum doses for pharmacological agents used in the management of hypertension can assist HCPs in determining when a patient, who is uncontrolled on their current pharmacological management, is in need of a prescribed dosage increase. Hence HCPs have the knowledge to refer patients to the PHC doctor and suggest dosage increases where possible to achieve optimal care for patients who are uncontrolled on pharmacological management for hypertension.

6.7.5.4 Recommended Add-On Drug Therapy
The HCPs were asked to indicate the recommended add-on antihypertensive drug therapy in patients with type 2 diabetes. The South African diabetes guideline recommends the use of ACE-I’s and HCT in the management of hypertension in patients with type 2 diabetes. The following add-on drug therapy options were considered correct: HCT (if the patient on perindopril); perindopril (if the patient on HCT); atenolol (if the patient on perindopril or HCT), and; reserpine (if the patient on perindopril or HCT) (Gibbon, 2000; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne et al., 2003).

Overall a total of 28 responses (seven HCPs and four questions) were analysed in the pre- and post-intervention phases. There was an extremely significant (p < 0.0001, Fischer’s Exact test) increase in the total number of correct responses from seven (25.0%, n = 28) to 28 (100%, n = 28) after the educational intervention. The total number of incorrect responses remained the same at zero for both pre- and post-intervention phases, and the total of blank responses decreased from 21 (75.0%, n = 28) to zero (0%, n = 28), between the pre- and post-intervention phases.

Results pertaining to correct responses given by the HCPs, for recommended second-line antihypertensive drug treatment, in the pre-intervention phase versus
the post intervention phase were (significance is taken as $p < 0.05$; Fischer’s Exact test) (Figure 6.18):

- HCT: three (42.9%, $n = 7$) vs seven (100%, $n = 7$) ($p = 0.0699$);
- Perindopril: one (14.3%, $n = 7$) vs seven (100%, $n = 7$) ($p = 0.0047$);
- Atenolol: one (14.3%, $n = 7$) vs seven (100%, $n = 7$) ($p = 0.0047$), and
- Reserpine: one (14.3%, $n = 7$) vs seven (100%, $n = 7$) ($p = 0.0047$).

![Figure 6.18: Pre-intervention versus post-intervention health care provider questionnaire data regarding recommended add-on drug therapy for the management of hypertension in patients with type 2 diabetes ($n = 7$), where (a) represents responses for HCT, (b) responses for perindopril, (c) responses for atenolol, and (d) responses for reserpine.](image-url)
Following the educational intervention, there was a statistically significant increase in the number of correct responses for all four antihypertensive drugs. All HCPs indicated correct responses in the post-intervention phase, for the recommended add-on drug therapy for hypertension in patients with type 2 diabetes (100%, n = 7). The knowledge of recommended drug agents used as add-on pharmacological management of hypertension in uncontrolled patients, may assist HCPs in identifying when a patient requires additional drug therapy due to the maximum dose of the current drug agent/s being utilised. Hence HCPs have the knowledge to refer patients to the PHC doctor with the suggestion of add-on drug therapy for patients who are uncontrolled on their current pharmacological management for hypertension. This statistically significant result was very encouraging.

6.7.6 Monitoring Tests
Monitoring tests, which form part of the physical examination, and selected laboratory tests, need to be performed at various intervals of patient care, so as to alert HCPs to the patient’s level of diabetic control, possible chronic complications arising and co-morbid disease states. The HCPs were asked to indicate the recommended frequency at which monitoring tests should be performed in patients with type 2 diabetes. Respondents were given the intervals: every visit; every six months, and every 12 months to select from. The following frequencies in the performance of monitoring tests were considered correct (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a):

- Weight (every visit);
- Blood glucose (every visit);
- Blood pressure (every visit);
- Urine dipstick (every visit);
- Eye exam (every 12 months);
- Comprehensive foot exam (every 12 months (more often in patients with high risk conditions);
- Dental exam (every six months);
- HbA\textsubscript{1c} (every six months);
- Total cholesterol (every 12 months), and
- Serum creatinine (every 12 months).

Overall, results indicated that the level of HCP knowledge increased by only one response for sections included in the investigation regarding the recommended frequency of the performance of monitoring tests in patients with type 2 diabetes. The educational intervention did not result in a significant change in the level of HCP knowledge regarding the frequency of monitoring tests.

Results for the recommended frequency of the various monitoring tests, in the pre-intervention phase versus the post intervention phase were (Figure 6.19):

- Weight: seven (100%, n = 7) vs seven (100%, n = 7);
- Blood glucose: seven (100%, n = 7) vs seven (100%, n = 7);
- Blood pressure: seven (100%, n = 7) vs seven (100%, n = 7);
- Urine dipstick: seven (100%, n = 7) vs seven (100%, n = 7);
- Eye exam: two (28.6%) vs three (42.9%);
- Comprehensive foot exam: four (57.1%) vs three (42.9%);
- Dental exam: three (42.9%) vs four (57.1%);
- HbA\textsubscript{1c}: five (71.4%) vs seven (100%);
- Total cholesterol: one (14.3%) vs zero (0%), and
- Serum creatinine: two (28.6%) vs one (14.3%).

Results indicated that all seven HCPs (100%, n = 7) gave the correct answers, in the pre- and post-intervention phases, for the recommended frequency of weight, blood glucose, blood pressure and urine dipstick monitoring tests. This optimal result in the pre- and post-intervention phases was very encouraging, indicating good HCP knowledge of recommended practices for these monitoring tests.
Figure 6.19: Pre-intervention versus post-intervention health care provider questionnaire data regarding the frequency of performance of recommended monitoring tests (n = 7), where (a) represents responses for eye exam, (b) responses for foot exam, (c) responses for dental exam, (d) responses for HbA1c, (e) responses for total cholesterol and (f) responses for serum creatinine.
The number of correct responses decreased for three tests in the post-intervention phase (comprehensive foot exam (b), total cholesterol (e) and serum creatinine (f)). The number of correct responses indicated by the HCPs increased for the eye exam (a), dental exam (c) and HbA\textsubscript{1c} tests (d). HbA\textsubscript{1c} tests (d) obtained 100% correct response rate in the post-intervention phase (7, n = 7), as did weight, blood glucose, blood pressure and urine dipstick.

Overall a total of 70 responses (seven HCPs and 10 questions) were analysed in the pre-intervention and post-intervention phases, for the recommended frequency of monitoring tests. There was a small increase in the total number of correct responses from 45 (64.3%, n = 70) to 46 (65.7%, n = 70), however the increase was not significant (p = 1.0000, Fischer’s exact test). The total number of incorrect responses increased from 17 (24.3%, n = 70) to 22 (31.4%, n = 70), while the total of blank responses decreased from eight (11.4%, n = 70) to two (2.9%, n = 70), between the pre-and post-intervention phases. The incorrect responses in the post-intervention phase were due to HCPs indicating the need for the performance of monitoring tests more frequently than recommended. On the diabetic record card, space is allocated for questions to be asked regarding the condition of the patient’s feet. Results suggest that certain HCPs confused these questions regarding the care of patient’s feet with the comprehensive foot exam, which should be performed every 12 months. Total cholesterol and serum creatinine laboratory tests are recommended in the management of type 2 diabetes, in a PHC setting. Most PHC settings in SA do not have the budget facilities to perform such laboratory tests. For this reason, HCPs are not exposed to the tests, hence the lack of HCP knowledge regarding the frequency of the performance of these monitoring tests.
6.7.7 Case Studies

Four case studies were included in the HCP questionnaire in order to assess the level of understanding of the HCPs with respect to the pharmacological management of diabetes and hypertension, and the ability of the HCPs to apply this knowledge into practice. The case studies were presented at the end of the HCP questionnaire (Appendix H). The level of difficulty regarding the case studies ranged from easy, straightforward problems, to more in-depth scenarios involving multiple complications. The HCPs completed the case studies before the educational intervention and four months after the educational intervention.

Overall a total of 28 responses (seven HCPs and four case studies) were analysed in the pre-intervention and post-intervention phases, for the case studies. There was an extremely significant ($p < 0.0001$, Fischer’s exact test) increase in the total number of correct responses, from one (3.6%, $n = 28$) to 17 (60.7%, $n = 28$). The total number of incorrect responses decreased from 17 (60.7%, $n = 28$) to 11 (39.3%, $n = 28$), and the total of blank responses decreased from 10 (35.7%, $n = 28$) to zero (0%, $n = 28$), between the pre- and post-intervention phases.

The significant increase in the number of correct responses in the post-intervention phase indicated the positive impact of the educational intervention on the ability of all the HCPs (including the EN and PA) to analyse and solve case studies pertaining to the pharmacological management of diabetes and hypertension, which was most encouraging. Hence, the educational intervention was a very successful tool in improving the level of knowledge and understanding of the HCPs regarding the application of the pharmacological management of diabetes and hypertension.

6.7.7.1 Case Study 1

This case study required HCPs to calculate that the patient was obese (BMI > 30kg/m$^2$) with uncontrolled blood glucose levels, after six months of lifestyle...
The correct answer to the case study was the initiation of metformin at the recommended starting dose. Pre-intervention data indicated that no HCP gave the correct response to the case study (Figure 6.20), while five HCPs (71.4%, n = 7) gave incorrect responses and two HCPs (28.6%, n = 7) did not respond. In the post-intervention phase, six HCPs (85.7%, n = 7) indicated correct responses, with only one HCP (14.3%, n = 7) indicating an incorrect response. This significant change (p = 0.0047, Fischer’s Exact test) indicated the improved ability of the HCPs after the educational intervention, to identify the need for the initiation of pharmacological therapy and to select the recommended drug agent for the management of diabetes in obese patients.

**Figure 6.20: Pre-intervention versus post-intervention health care provider questionnaire data regarding the correct responses to the case studies (n = 7).**

### 6.7.7.2 Case Study 2

The second case study required the HCPs to identify that the patient had proteinuria, and subsequently to select the drug of choice for the treatment of hypertension. The correct answer to the case study was the initiation of perindopril at the recommended starting dose. Pre-intervention data concluded...
that no HCP gave the correct response to the case study (Figure 6.20), while four HCPs (57.1%, n = 7) gave incorrect responses and three HCPs (42.9%, n = 7) did not respond. After the educational intervention, only two HCPs (28.6%, n = 7) indicated correct responses, with the other five HCPs (71.4%, n = 7) indicating incorrect responses. The increase in correct responses was an improvement, yet it was not significant (p = 0.4615, Fischer’s Exact test). Reasons for the large number of incorrect responses to the second case study were due to the fact that HCPs only identified that the patient was black, hence the recommended use of HCT, and did not focus on the proteinuria as the deciding treatment factor.

6.7.7.3 Case Study 3
For the third case study, HCPs were required to identify that the patient had uncontrolled blood glucose and blood pressure levels, for the past three months, although the patient was on pharmacological therapy (glibenclamide and HCT). The correct answer to the case study was the initiation of metformin at the recommended starting dose as well as the initiation of perindopril at the recommended starting dose. No HCP gave the correct response prior to the educational intervention (Figure 6.20), while five HCPs (71.4%, n = 7) gave incorrect responses and two HCPs (28.6%, n = 7) did not respond. This pre-intervention result was comparable with a previous study conducted in England amongst 34 general practitioners to assess their knowledge of impaired glucose tolerance. Results from the British study indicated that general practitioners seemed uncertain about how best to manage patients with impaired glucose tolerance. (Wylie et al., 2002) Hence the lack of knowledge as indicated by the pre-intervention result obtained in the present study involving nurses, is not isolated to nurses, but to other health care professionals as well. The British study also highlighted the need for general practitioner training regarding impaired glucose tolerance (Wylie et al., 2002).

In the post-intervention phase, six HCPs (85.7%, n = 7) indicated correct responses (Figure 6.20), with only one HCP (14.3% n = 7) indicating an incorrect
response. This significant change (p = 0.0047, Fischer’s Exact test) indicated the improved ability of the HCPs after the educational intervention, to identify the need for the initiation of add-on pharmacological therapy for diabetes and hypertension, when there is no room to increase the dose of the current medication.

6.7.7.4 Case Study 4
The fourth case study required the HCPs to identify that the patient had an acceptable blood glucose level, but an uncontrolled blood pressure level. As the patient was already taking HCT and peridopril, a third antihypertensive drug was needed. The correct answer to the case study was the initiation of atenolol at the recommended starting dose. Due to the dosing of HCT at 12.5mg daily, the researcher also accepted the answer to increase the HCT dose to 25mg as correct. Only one HCP (14.3%, n = 7) gave a correct response to the fourth case study in the pre-intervention phase (Figure 6.20), while three HCPs (42.9%, n = 7) gave incorrect responses and three HCPs (42.9%, n = 7) had blank responses. In the post-intervention phase, three HCPs (42.9%, n = 7) indicated correct responses, with the remaining four HCPs (57.1% n = 7) indicating incorrect responses. Incorrect responses in the post-intervention phase were due to inappropriate and unnecessary initiation of add-on pharmacological management for diabetes. This result indicated an improvement in case study analysis regarding uncontrolled hypertension, however, the result was not significant (p = 0.1923, Fischer’s Exact test). More in depth training and education may be required for the HCPs, with regard to optimal management of more complex case studies for patients with diabetes and hypertension.
6.8 IMPACT OF EDUCATIONAL INTERVENTION ON HEALTH CARE PROVIDER ATTITUDES

6.8.1 Introduction

Focus group interviews are a tool used to probe more deeply into a variety of issues relating to a specific topic. They provide an opportunity to capture real-life data over a short period of time, from a variety of individuals who are linked to a common purpose or goal. (Kreuger, 1988)

A comparative assessment of the descriptive statements, from the pre- and post-intervention focus group interview transcripts (Appendix L) was conducted in the post-intervention phase. The results from the comparison will be presented and discussed as follows:

- Overview of Results from Focus Group Interviews;
- Working Environment;
- Training Received;
- Treating Patients with Diabetes;
- Standard of Care;
- Management of Patients with Chronic Diseases;
- South African Guidelines;
- Pharmacological Management of Diabetes and Hypertension, and
- Referral of Patients.

The pre- and post-intervention focus group interviews were structured into nine topics. During the analysis of results from the focus group interviews, the nine topics were categorised into eight topics. Questions pertaining to the routine when treating a diabetic patient and the HCP’s feelings towards treating patients with diabetes were categorised as one.
The HCPs were each allocated a number between one and ten, to uphold HCP confidentiality. Ten HCPs attended the pre-intervention focus group interviews; however, only seven HCPs attended the post-intervention focus group interviews. The HCPs that constituted the final HCP population of seven were allocated the numbers 1 to 7. The three HCPs that were not part of the post-intervention HCP population were allocated the numbers 8 to 10.

Results pertaining to the focus group interviews will be presented as categorised descriptive statements, followed by the number of the HCP that made the statement (e.g. ‘There is not enough time’ HCP 6). The numbers of the HCPs who agreed with the descriptive statement made, or who stated something similar, have been included in brackets next to the descriptive statement (e.g. ‘There is not enough time’ HCP 6 (1,8,9)). The categorised descriptive statements will be presented in tables, comparing similarities and highlighting differences between the attitudes of the HCPs for the pre-and post-intervention focus group interviews.

6.8.2 Overview of Results from Focus Group Interviews

The HCP’s attitudes from the pre- and post-intervention focus group interviews were analysed. The most prominent positive and negative attitudes identified from the eight categorised topics from the focus group interviews will be discussed below.

Results from the focus group interviews indicated that HCPs had negative attitudes towards their working environment, in the pre- and post-intervention phases, as working conditions were deteriorating due to an increased patient load and a decreased number of staff. These negative feelings were not as a result of the educational intervention, but due to external factors. The HCPs highlighted the need for more in-service training, and they had positive feelings towards the training presented by the researcher in the intervention phase. A positive attitude change was noted between the pre- and post-intervention
phases, regarding the treatment of patients with diabetes. The HCPs felt that the standard of care provided at the PHC clinic improved after the intervention, however, the staff shortages and time constraints were negatively impacting on the standard of care provided. The HCPs acknowledged the fact that frustration could influence care provided, however, HCPs had found ways of dealing with these feelings of frustration. The initiation of guideline summary cards resulted in improved HCP attitudes towards the South African guidelines after the educational intervention. Confidence levels of the HCPs increased after the educational intervention on the pharmacological management of diabetes and hypertension. The HCPs had high confidence levels with regard to the referral of patients, however, they felt they could not cross professional boundaries by recommending drug agents in uncontrolled patients. Overall, there was an increase in positive attitudes felt by the HCPs after the educational intervention, indicating the success of the educational intervention in improving the attitudes of HCPs towards diabetes and the treatment of patients with diabetes.

6.8.3 Working Environment
The first topic covered in the focus group interviews consisted of four open-ended questions relating to the working environment of the HCPs. Results pertaining to the attitudes of the HCPs towards their working environment have been presented in Table 6.2.

In the pre-intervention phase focus group interviews, HCPs expressed negative feelings towards their working environment due to stress (“it’s very stressful” HCP 5 (3,4,10)) and an increased workload (“the work load has increased” HCP 9 (2,3,4,5,10)). All the HCPs identified ‘out of stock’ medication as a major problem (“The medication is a big problem, with it being out of stock so much” HCP 4 (1,2,3,5,6,7,8,9,10)). The HCPs felt that the equipment available at the clinic was fine, yet rather old. Concern was raised regarding the lack of time available to provide quality care and education to patients as HCPs expressed that “you can’t give them that quality care” (HCP 4 (3,5,10)) and that “there is no
time to focus on preventative care, just curative all the time” (HCP 8 (1,2,6,7,9)).
The introduction of “more trained staff” (HCP 5 (1,2,4,6,7,8,9)) and morale
boosters where recommended by the HCPs to improve their attitudes towards
their working environment.

In the post-intervention phase focus group interviews, HCP attitudes towards
their working environment were comparatively similar to those stated in the pre-
intervention phase. The HCPs expressed concern about the shortage of staff at
the PHC clinic ("most of the PHC Sisters have resigned" HCP 5 (6)), indicating
that the situation had deteriorated between the pre- and post-intervention phases
("it’s not getting better, it is getting worse" HCP 7 (5,6)). The increased number
of patient referrals from the tertiary hospital was identified as a major contributor
to the increased work load at the PHC clinic ("the work load has increased, there
are more referrals" HCP 3 (1,2,5)). The ‘out-of-stock’ medication was still
considered a major problem, and the need for increased doctor visitations was
highlighted ("We need a doctor more often at the clinic. Once a week is not
enough" HCP 3 (1,2,4,6,7)). Time constraints, with regard to the provision of
care and education of patients, was a major concern to HCPs, with the increased
number of patients and decreased number of staff contributing to this problem.
The HCPs commented that “It has gotten worse because there are now more
patients and we have less staff here” (HCP 4 (1,2,3)). The increased availability
of trained staff, doctors and medication were identified as key targets for the
improvement of the HCPs’ working environment ("The biggest problem is the
manpower and the medication" (HCP5 (6,7)) (Table 6.2).
Table 6.2: Descriptive statements from focus group interviews regarding the working environment of the health care providers.

<table>
<thead>
<tr>
<th>PRE-INTERVENTION PHASE (n = 10)</th>
<th>POST INTERVENTION PHASE (n = 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q: How do you feel about your working environment?</strong></td>
<td><strong>Q: How do you feel about your working environment?</strong></td>
</tr>
<tr>
<td>- ‘Not the best conditions to work under’ HCP 8 (1,6,7,9)</td>
<td>- ‘It is not getting better, it is getting worse’ HCP 7 (5,6)</td>
</tr>
<tr>
<td>- ‘It’s very stressful’ HCP 5 (3,4,10)</td>
<td>- ‘The work load has increased, there are more referrals’ HCP 3 (1,2,5)</td>
</tr>
<tr>
<td>- ‘The work load has increased’ HCP 9 (2,3,4,5,10)</td>
<td>- ‘The staff turnover is bad’ HCP 5 (3,6)</td>
</tr>
<tr>
<td>- ‘Hospital is referring all chronic patients to the clinic’ HCP 2 (1,8)</td>
<td>- ‘Most of the primary health care Sisters have resigned’ HCP 5 (6)</td>
</tr>
<tr>
<td>- ‘The Sister: patient ratio is really not good’ HCP 3</td>
<td></td>
</tr>
<tr>
<td>- ‘You find yourself spending 2 to 3 minutes per patient’ HCP 8 (1,6,7,9)</td>
<td></td>
</tr>
<tr>
<td>- ‘Patients are very dissatisfied’ HCP 8 (1,6,7)</td>
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</tbody>
</table>

**Q: Do you feel that everything that you need is available here at the clinic?**

| - ‘No! The medication is a big problem, with it being out of stock so much’ HCP 4 (1,2,3,5,6,7,8,9,10) | - ‘We have all the equipment that we need’ HCP 2 (1) |
| - ‘Equipment is fine, just stock levels are a problem’ HCP 5 (3,4,10) | - ‘We need a doctor more often at the clinic. Once a week is not enough’ HCP 3 (1,2,4,6,7) |
| - ‘The ones (equipment) that we have are antiques!’ HCP 8 (1) | - ‘We don’t have the chronic medication because the drivers are all toy-toying!’ HCP 7 (5,6) |
| - ‘We need standing orders’ HCP 4 (5,10) | |

**Q: Do you feel that there is enough time to do everything that you would like to do with the patients?**

| - ‘There is not enough time’ HCP 6 (1,8,9) | - ‘Not at all’ HCP 6 (1,2,3,4,5) |
| - ‘Definitely not!’ HCP 3 (4,10) | - ‘Don’t have time to educate the patient’ HCP 5 (6) |
| - ‘You can’t give them that quality care’ HCP 4 (3,5,10) | - ‘It has gotten worse because there are now more patients and we have less staff here’ HCP 4 (1,2,3) |
| - ‘You don’t get to educate the patients properly’ HCP 2 (1) | |
| - ‘There is no time to focus on preventative care, just curative care all the time’ HCP 8 (1,2,6,7,9) | |

**Q: If you could, would you change anything about your current working conditions?**

| - ‘More trained staff’ HCP 5 (1,2,4,6,7,8,9) | - ‘More trained staff’ HCP 6 (1,2,3,4,5) |
| - ‘Have a cut off for the amount of patients per day’ HCP 8 (3,5,10) | - ‘The availability of doctors’ HCP 4 (1,2) |
| - ‘Something to lift the morale of the nursing staff. There are a lot of negative feelings here in the working environment’ HCP 4 (3,5,10) | - ‘We need a doctor here more often’ HCP 3 |
| | - ‘Standing orders ...protocols’ HCP 4 (1,2,3) |
| | - ‘The biggest problem is the manpower and the medication’ HCP 5 (6,7) |
A few major points of concern were identified from this topic in the focus group interviews. The deteriorating working conditions regarding the increased patient load and decreased number of staff members was found to be negatively impacting on the staff at the PHC clinic. In order to provide optimal care, HCPs need adequate time to consult, treat and educate patients. This is not the reality; hence measures need to be taken to improve the staff to patient ratio and ultimately the level of care provided. There is a need for increased doctor visits to the PHC clinic, as a doctor only visits the PHC clinic once a week, for a morning. Considering that the patient load is increasing, one doctor a week is insufficient to provide optimal care to all chronic patients. ‘Out of stock’ medication was also identified as a major problem. Continuity of patient care and prevention of complications due to uncontrolled diabetes and hypertension cannot be achieved if patient compliance with pharmacological management is interrupted due to medication being out of stock.

The above points of concern were not found to be isolated to the current research study. In a study conducted in 1997 by Goodman et al., increased patient loads and lack of consultation time were identified as barriers to providing optimal diabetes care in a PHC setting in SA. Results from a study conducted in Cape Town, SA, identified time constraints, health system problems and conflict with local practices as barriers to the application of guidelines (Daniels et al., 2000b). Other areas of concern identified by Daniels et al. (2000b) included an increased number of referred patients, overcrowded clinics, decreased staff numbers and minimal time for patient education. Increased patient loads and an inadequate number of staff were identified as barriers to optimal patient care by a study conducted in the Eastern Cape (Erasmus and Blanco-Blanco, 2000). Hence it can be concluded that the above concerns have been previously identified as barriers to patient care in the PHC setting in South Africa.

In summary, an increase in negative feelings was noted between the pre- and post-intervention phases, regarding the attitudes of the HCPs towards their
working environment. These negative feelings were not as a result of the educational intervention, but due to external factors such as increasing working environment pressures.

6.8.4 Training Received
The second topic covered in the focus group interviews consisted of different sets of questions, for the pre- and post-intervention phases, relating to the training received by HCPs. In the pre-intervention phase, three questions were asked regarding the training received by HCPs during the four year Nursing Science diploma/degree course and in-service training. The two post-intervention questions related to the training provided by the researcher during the intervention phase of the project. Results pertaining to the attitudes of HCPs towards the training they received have been presented in Table 6.3.

In the pre-intervention phase focus group interviews, there were mixed feelings amongst the HCPs regarding the training received during the four-year Nursing Science diploma course. Some HCPs felt that the training received was adequate (“it is very adequate” (HCP 10 (4,5)), however, certain HCPs felt that the pharmacological training was inadequate (“they don’t focus that much on the pharmacology” (HCP 8 (1,6,7)) (Table 6.3). Certain HCPs felt that a “more intense course in PHC” (HCP 6 (1,2,8)) would be a valuable addition to their training received. The HCPs recognised that with time and experience, knowledge will increase. Negative feelings were expressed by the HCPs at the lack of in-service training, especially regarding the chronic disease conditions (“We need more in-service training on the chronic conditions” (HCP 10 (1,6,7,8,9)) (Table 6.3). The need for in-service training and support of HCPs was also identified by two previous studies conducted in PHC settings in South Africa, hence highlighting the need for HCP education and in-service training to aid in the optimal delivery of care to patients (Beattie et al., 1998; Rotchford and Rotchford, 2002).
Table 6.3: Descriptive statements from focus group interviews regarding the training received by health care providers.

<table>
<thead>
<tr>
<th>PRE-INTERVENTION PHASE (n = 10)</th>
<th>POST INTERVENTION PHASE (n = 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q: How do you feel about the training that nurses receive before they graduate?</strong></td>
<td><strong>Q: How do you feel about the training that I gave you on the pharmacological management of diabetes and hypertension?</strong></td>
</tr>
<tr>
<td>• ‘It is very adequate’ HCP 10 (4,5)</td>
<td>• ‘It was enlightening’ HCP 6 (2,5)</td>
</tr>
<tr>
<td>• ‘They don’t focus that much on the pharmacology’ HCP 8 (1,6,7)</td>
<td>• ‘We learnt a lot, it was interesting’ HCP 4 (1,2,3)</td>
</tr>
<tr>
<td></td>
<td>• ‘It made us more aware of the drugs’ HCP 3 (1,2,4)</td>
</tr>
<tr>
<td><strong>Q: Would you change/add anything to the training nurses receive?</strong></td>
<td><strong>Q: Would you have changed/added anything to the training that I gave you on the guidelines?</strong></td>
</tr>
<tr>
<td>• ‘With time and experience, everything comes together’ HCP 5 (3,4,10)</td>
<td>• ‘It was definitely adequate’ HCP 5</td>
</tr>
<tr>
<td>• ‘More intense course in primary health care, because we only did like two to three weeks’ HCP 6 (1,2,8)</td>
<td>• ‘It was good’ HCP 4 (1,2,3)</td>
</tr>
<tr>
<td></td>
<td>• ‘I need more revision’ HCP 7 (1,3,6)</td>
</tr>
<tr>
<td><strong>Q: How do you feel about the in-service training you receive at your place of work?</strong></td>
<td></td>
</tr>
<tr>
<td>• ‘These trainings don’t really happen much anymore!’ HCP 3 (1,2,4,5,6,7,9)</td>
<td></td>
</tr>
<tr>
<td>• ‘There used to be a variety of courses to chose from, but now they are just concentrating on HIV and TB, STI’s. There are no longer topics on the chronic conditions or primary health care, like there used to be’ HCP 3 (8)</td>
<td></td>
</tr>
<tr>
<td>• ‘We need more in-service training on the chronic conditions’ HCP 10 (1,6,7,8,9)</td>
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</tbody>
</table>

When questioned during the post-intervention focus group interviews about the training received from the researcher, regarding the pharmacological management of diabetes and hypertension, HCPs expressed positive attitudes towards the training, indicating that it was “enlightening” (HCP 6 (2,5)), “interesting” (HCP 4 (1,2,3)) and informative. The need for “more revision” (HCP 7 (1,3,6)) regarding the pharmacological management of diabetes and
hypertension was highlighted by the HCPs, however, certain HCPs indicated that the training was “good” (HCP 4 (1,2,3)) and “adequate” (HCP 5).

In summary, mixed feelings were expressed by the HCPs regarding the training received, but consensus was reached on the need for more in-service training. The HCPs had positive feelings towards the training presented by the researcher, indicating the positive impact of the educational intervention on HCP attitudes towards HCP education. The more knowledge and skills that HCPs can gain regarding diabetes care, the more improved the standard of care that can be provided to patients with diabetes.

6.8.5 Treating Patients with Diabetes
The third topic covered in the focus group interviews consisted of questions relating to the treatment of diabetic patients before and after the intervention. Results pertaining to the attitudes of HCPs towards treating diabetic patients have been presented in Table 6.4.

In the pre-intervention phase focus group interviews, HCPs stated their routine approach when treating diabetic patients. This included the recommended monitoring tests, general exam and important questions. The HCPs had a very positive attitude towards the diabetic record card, emphasising its quick and easy to use format (“(The diabetic record card) It makes it so much easier by just ticking, instead of writing the whole time” HCP 10 (1,2,3,4,5,6,7,8)), which was encouraging to the researcher. The larger diabetic patient load due to the referrals from the tertiary hospital was found to negatively affect the attitudes of the HCPs. They mentioned that “we are now getting the diabetics who have been referred from Livingstone, who are not controlled, and they are defaulting and they are in our systems and we are really battling” (HCP 3 (4,5,10)) (Table 6.4).
Table 6.4: Descriptive statements from focus group interviews regarding the treatment of diabetic patients.

<table>
<thead>
<tr>
<th>PRE-INTERVENTION PHASE (n = 10)</th>
<th>POST INTERVENTION PHASE (n = 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q: Describe a normal routine when treating a diabetic patient.</strong></td>
<td><strong>Q: Has your routine for treating a diabetic patient changed?</strong></td>
</tr>
<tr>
<td>▪ ‘We start with observations first, blood glucose, blood pressure, urine testing, and weight’ HCP 5 (1)</td>
<td>▪ ‘We used to only do the blood sugar when the patient saw the doctor or sister, month one month 3 and month 6. Now it is being done every visit’ HCP 3</td>
</tr>
<tr>
<td>▪ ‘You ask for any complaints, do signs and symptoms. General check up on patients and diet counselling and feet’ HCP3 (1,4,5,6,9,10)</td>
<td>▪ ‘It has had a positive impact on the patients’ HCP 2 (1,3,4)</td>
</tr>
<tr>
<td>▪ ‘You need to look if they have more than one chronic condition’ HCP 2</td>
<td>▪ ‘You now notice lots of small things. You see the patient in totality’ HCP 6 (5)</td>
</tr>
<tr>
<td>▪ ‘(The diabetic record card) It makes it so much easier by just ticking, instead of writing the whole time’ HCP 10 (1,2,3,4,5,6,7,8)</td>
<td>▪ ‘The changes…it’s for the better’ HCP 5 (1,2,3,4,6,7)</td>
</tr>
<tr>
<td><strong>Q: How do you feel about treating diabetic patients?</strong></td>
<td><strong>Q: After the training sessions that I gave you, do you feel any different about treating diabetic patients?</strong></td>
</tr>
<tr>
<td>▪ ‘I wouldn’t say that you change your attitude when a diabetic comes in. It’s one of your patients’ HCP 9 (2,6,8)</td>
<td>▪ ‘You knew what parameters to look at. It was like you were refreshed, you were more alert, you really became more aware’ HCP 3 (1,2,4)</td>
</tr>
<tr>
<td>▪ ‘We are now getting the diabetics who have been referred from Livingstone, who are not controlled, and they are defaulting and they are in our systems and we are really battling’ HCP 3 (4,5,10)</td>
<td>▪ ‘More confident’ HCP 5 (6)</td>
</tr>
<tr>
<td></td>
<td>▪ ‘Ya, I know a bit more about the medication, and that is nice’ HCP 7</td>
</tr>
</tbody>
</table>

In the post-intervention focus group interviews, positive changes were noted in the HCPs’ attitudes towards the treatment of diabetic patients. The HCPs commented on the positive impact that the intervention had on patient care, as there was an increase in the number of tests performed as well as the increased awareness of the patient in totality. Comments such as: “We used to only do the blood sugar when the patient saw the doctor or sister, month 1, month 3 and month 6. Now it is being done every visit” (HCP 3) and “It has had a positive impact on the patients” (HCP 2 (1,3,4)) and “The changes… it’s for the better” (HCP 5 (1,2,3,4,6,7)) were made. The HCPs indicated an improved level of confidence in treating diabetic patients after the intervention (“You knew what
parameters to look at. It was like you were refreshed, you were more alert, you really became more aware” (HCP 3 (1,2,4)).

In summary, there was a positive change noted in the attitudes of the HCPs regarding the management of patients with diabetes, during the post-intervention phase, again indicating the positive impact of the educational intervention on HCP attitudes.

6.8.6 Standard of Care
The fourth topic covered by the focus group interviews consisted of questions relating to the standard of care for diabetic patients before and after the intervention. Results pertaining to the attitudes of the HCPs towards the standards of care provided have been presented in Table 6.5.

In the pre-intervention phase focus group interviews, HCPs expressed positive and negative attitudes towards the standard of care provided to diabetic patients. On a positive note, the HCPs considered the care provided at the PHC clinic to be of a higher standard than that of the care provided at the tertiary hospital clinic “I think that it is much better than what the patients get at the hospital” (HCP 3 (4,5,10)). The HCPs felt that the lack of staff as well as time constraints were impacting negatively on the care provided at the clinic (Table 6.5), as mentioned and discussed in Section 6.8.3. The HCPs commented that “they don’t have time to counsel, and that is what is so frustrating” (HCP 4 (3,5,10)) and “if we had more staff it could be better” (HCP 8 (2,6)). The HCPs indicated that the management and control of patients is ultimately the patient’s responsibility (“(The patients) just don’t co-operate with us…then there is nothing that we can do” HCP 4 (3,10)), hence the negative attitudes of the HCPs towards those patients who default on treatment or clinic visits (“Not all of them come on their dates when they should, so they are defaulting” HCP 2 (6,7,8,9)).
In the post-intervention phase focus group interviews, HCP attitudes towards the standard of diabetic care were similar to those stated in the pre-intervention phase, as both positive and negative attitudes were expressed by the HCPs. The responses from HCPs were very positive about the change that had occurred in the provision of diabetes care, after the intervention (“We are doing blood sugars on every visit, and we have been keeping an eye on them” HCP 4 (1,2,3)). Certain HCPs indicated that change had occurred, but care was not yet optimal (“It has changed, but not like it should be” HCP 4 (3)). There were split feelings between the HCPs regarding whether or not the patients were well

| Table 6.5: Descriptive statements from focus group interviews regarding the standard of care. |
|-----------------------------------------------|-----------------------------------------------|
| **PRE-INTERVENTION PHASE (n = 10)**          | **POST INTERVENTION PHASE (n = 7)**          |
| **Q: How do you feel about the standard of care the diabetic patients are provided with at the clinic?** | **Q: Do you feel that the patients are well managed and controlled?** |
| • ‘It’s maybe not the best, but I think it is adequate’ HCP 9 (1) | • ‘It’s excellent’ HCP 5 |
| • ‘I think that it is much better than what the patients get at the hospital. Most of our patients take their treatment but they eat what they want’ HCP 3 (4,5,10) | • ‘Ya its good’ HCP 6 |
| • ‘You don’t have time to counsel, and that is what is so frustrating’ HCP 4 (3,5,10) | • ‘It has changed, but not like it should be’ HCP 4 (3) |
| • ‘If we had more staff it could be better’ HCP 8 (2,6) | • ‘We are doing the blood sugars on every visit, and we have been keeping an eye on them, monitoring their blood sugars more closely and their blood pressures’ HCP 4 (1,2,3) |

• ‘We try our outmost’ HCP 5 (3,4,10) |
• ‘(The patients) just don’t co-operate with us. So then there is nothing that we can do’ HCP 4 (3,10) |
• ‘Not all of them come on their dates when they should, so they are defaulting’ HCP 2 (6,7,8,9) |
• ‘Yes’ HCP 6 (5,7) |
• ‘I am finding that even though we don’t have enough time to educate the patients properly, they definitely seem to know a bit more about their diabetes’ HCP 5 (6,7) |
• ‘Not really’ HCP 3 (1,2,4) |
• ‘Patient awareness…we need to give intensive patient education’ HCP 3 (1,2,4) |
• ‘We would love to do (patient education) but there is no time for that’ HCP 4 (1,2,3) |
managed and controlled. Suggestions were made by the HCPs for the need for “patient awareness and intensive patient education” (HCP 3 (1,2,4)), to optimise care provided.

Numerous previous studies conducted in SA have identified the importance of patient education in optimising diabetes care provided, hence resulting in decreased numbers of patient defaulters, increased levels of compliance with regard to pharmacological and non-pharmacological management, with the ultimate goal of improved diabetic control in patients (Levitt et al., 1996; Goodman et al., 1997; Beattie et al., 1998; Daniels et al., 2000b; Haque et al., 2005).

In summary, the HCPs attitudes improved in the post-intervention phase regarding the standard of care provided, as the HCPs felt that they were actively providing an improved level of care by performing monitoring tests more frequently. However, staff shortages and time constraints impacted negatively on the HCP attitudes, as HCPs felt that they were not providing optimal levels of care to patients, due to the lack of time to implement patient education.

6.8.7 Management of Patients with Chronic Diseases

The fifth topic covered in the focus group interviews consisted of questions relating to the management of patients with chronic diseases and the effect of HCP frustration on care provided. Results pertaining to the attitudes of the HCPs towards chronic disease management have been presented in Table 6.6.

In the pre-intervention phase focus group interviews, HCPs acknowledged that sometimes they felt frustrated when treating patients with chronic diseases. Reasons for the frustrated HCP attitudes included the feeling of “fighting a losing battle” (HCP 10) with chronic patients and the increased number of chronic patients being referred from the tertiary level hospital (HCP 5 (3)). The HCPs also mentioned the important bond formation between the HCP and the chronic
patients, which aids in decreasing levels of frustration (HCP 8 (6)). All the HCPs indicated that personal frustration could influence the care provided to a patient (“We have ways of dealing with our frustration, but it can sometimes get to you and therefore it can affect the care that you give” HCP 8 (1,2,6,7,9)) (Table 6.6).

<table>
<thead>
<tr>
<th>TABLE 6.6: Descriptive statements from focus group interviews regarding the management of patients with chronic diseases.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRE-INTERVENTION PHASE (n = 10)</strong></td>
</tr>
<tr>
<td><strong>Q: Do you ever feel frustrated when treating patients with chronic disease states?</strong></td>
</tr>
<tr>
<td>- ‘Yes!’ HCP 3 (4,5)</td>
</tr>
<tr>
<td>- ‘You actually feel like you are fighting a losing battle with them’ HCP 10</td>
</tr>
<tr>
<td>- ‘Livingstone has got rid of a lot of their diabetic patients, and now they are our baby here at the clinic’ HCP 5 (3)</td>
</tr>
<tr>
<td>- ‘After a while you start to bond with the chronic patients. So no you don’t regard them as an added load because you know their condition, and you know what to look out for’ HCP 8 (6)</td>
</tr>
<tr>
<td>- ‘Most of them make an effort to come, they don’t stay away’ HCP 1 (2,9)</td>
</tr>
</tbody>
</table>

In the post-intervention phase focus group interviews, HCP attitudes towards treating patients with chronic diseases were comparatively similar to those stated in the pre-intervention phase. The HCPs expressed concern with regard to frustrations originating from the “increased patient load and being short staffed” (HCP 5 (6,7)), the lack of time to complete patient education (HCP 1,2,3,4) and
the non-compliance of diabetic patients to their treatment (Table 6.6), as discussed in Section 6.8.3 and Section 6.8.6.

In summary, the same factors were identified in the pre- and post-intervention phases regarding the triggers to attitudes of frustration in HCPs when treating patients with chronic diseases. The HCPs acknowledged the fact that feelings of frustration can influence the care provided to a patient.

6.8.8 South African Guidelines
The sixth topic covered in the focus group interviews consisted of three questions relating to the use of the South African guidelines for the management of diabetes and hypertension, in the pre- and post-intervention phases. Results pertaining to the attitudes of the HCPs towards the South African guidelines have been presented in Table 6.7.

In the pre-intervention phase focus group interviews, HCPs thought the guidelines were “good” (HCP 5 (3,4,10)), however, they expressed negativity towards the actual use of the guidelines in practice (“We don't really use it (guidelines)” HCP 3 (4,5,8,9)). The HCPs felt that the guidelines were “not directed” at the nursing staff in PHC (HCP 2 (1,6,7,8,9)), and added that the doctors only used the guidelines (“It’s the doctors that use them, not us really” HCP 9 (1,2,6,7,8)). These comments are disconcerting, as the South African guidelines for diabetes and hypertension were developed to be utilised by all health care providers working in a PHC environment. The negative feelings of the HCPs towards the guidelines indicate the need to direct guideline implementation at nursing staff working at a PHC level.

Mixed feelings were expressed by the HCPs with regard to the use of the guidelines in everyday practice, as HCPs felt that the care they provided was part of a protocol, probably originating from the PHC guidelines, however, they did not refer to the guidelines on a daily basis (HCP 3,4,5,10) (Table 6.7).
Table 6.7: Descriptive statements from focus group interviews regarding the South African guidelines.

<table>
<thead>
<tr>
<th>PRE-INTERVENTION PHASE (n = 10)</th>
<th>POST INTERVENTION PHASE (n = 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q: How do you feel about the South African guidelines for the management of diabetes and hypertension?</strong></td>
<td><strong>Q: Do you feel that they can be applied easily in practice?</strong></td>
</tr>
<tr>
<td>‘They are good’ HCP 5 (3,4,10)</td>
<td>‘I think they are actually good’ HCP 2 (1,3,4,5,6,7)</td>
</tr>
<tr>
<td>‘We don’t really use it’ HCP 3 (4,5)</td>
<td>‘We don’t all have copies, but there is a main copy’ HCP 3</td>
</tr>
<tr>
<td>‘We don’t really follow these guidelines as we could’ HCP 9 (8)</td>
<td>‘Ya, we work more from experience, we don’t really look at the guidelines, but we do look at your little card’s.’ HCP 6 (5,7)</td>
</tr>
<tr>
<td>‘They should be more publicised’ HCP 6</td>
<td></td>
</tr>
</tbody>
</table>

| **Q: Do you feel that the guidelines are being used in your everyday practice?** | **Q: Do you feel that the guidelines are being used in your everyday practice?** |
| ‘Not really. It’s the doctors that use them, not us really’ HCP 9 (1,2,6,7,8) | ‘Ya’ HCP 5 (6) |
| ‘Yes and no. We do do things that are part of a protocol, which probably comes from the guidelines, we just don’t refer to the guidelines every day’ HCP 3 (4,5,10) | ‘Not really’ HCP 1 (2,3) |
| ‘We use the little cards. The targets and the drugs’ HCP 6 (5,7) | ‘We use the little cards. The targets and the drugs’ HCP 6 (5,7) |
| ‘The target values are helpful’ HCP 4 (1,2,3) | ‘The target values are helpful’ HCP 4 (1,2,3) |
| ‘We don’t initiate treatment or adjust treatment, but it is good to have that background knowledge, but it doesn’t directly affect us’ HCP 4 | ‘We don’t initiate treatment or adjust treatment, but it is good to have that background knowledge, but it doesn’t directly affect us’ HCP 4 |
| ‘If a patient is uncontrolled it is up to the doctor to change the drugs or dosages’ HCP 3 (1,2,4) | ‘If a patient is uncontrolled it is up to the doctor to change the drugs or dosages’ HCP 3 (1,2,4) |

In the post-intervention phase focus group interviews, HCP attitudes towards the South African guidelines improved slightly, as compared to the pre-intervention phase. The HCPs positively expressed that they felt the guidelines were “good” (HCP 2 (1,3,4,5,6,7)). They also added that they worked “more from experience”, but they had been utilising the summary cards, of the South African guidelines, provided to them by the researcher during the intervention phase (HCP 5,6,7). Positive attitudes were expressed by the HCPs towards the
application of the guidelines in practice. The HCPs felt that the summary cards provided by the researcher were “quite explanatory” and could be applied easily in practice (HCP 5,6,7). There were mixed feelings however regarding the use of the guidelines in everyday practice. The HCPs indicated the positive effect and usefulness of the summary cards (“We use the little cards…the targets and the drugs” HCP 6 (5,7)). There were negative feelings expressed regarding the use of the guidelines, as HCPs felt that the initiation or adjustment of therapy was the sole responsibility of the doctor (“If a patient is uncontrolled it is up to the doctor to change the drugs or dosages” HCP 3 (1,2,4) (Table 6.7).

In summary, HCP attitudes relating to the guidelines improved between the pre- and post-intervention phases. This was mainly due to the positive impact of the educational intervention and the initiation of the guideline summary cards by the researcher during the intervention phase. It was disconcerting for the researcher to note that the HCPs had negative feelings towards the use of guidelines, as the HCPs felt the guidelines were directed at doctors only, and that they had little responsibility in initiating or adjusting treatment.

### 6.8.9 Pharmacological Management of Diabetes and Hypertension

The seventh topic covered in the focus group interviews consisted of two questions relating to the pharmacological management of diabetes and hypertension. Results pertaining to the attitudes of the HCPs towards the pharmacological management of diabetes and hypertension have been presented in Table 6.8.

In the pre-intervention phase focus group interviews, HCPs felt that the pharmacological management of diabetes and hypertension was not their responsibility, but that of the doctors, as they were only responsible for the referral of patients to the doctor (“We just refer them to doctor, and doctor decides” HCP 8 (2)). Some HCPs did state that revision was needed to gain insight in terms of the pharmacological management of diabetes and
hypertension (HCP 3,4,5,10). Mixed feelings were expressed by the HCPs regarding their confidence levels in adjustments to pharmacological therapy. The HCPs felt that from experience in monitoring patients, they could recognise when a patient was not controlled (HCP 1,2,6,7,8,9), however, they felt that more training and insight was needed to improve confidence levels (“I think we need more insight” HCP 5 (3,4,10) (Table 6.8).

<table>
<thead>
<tr>
<th>Table 6.8: Descriptive statements from focus group interviews regarding the pharmacological management of diabetes and hypertension.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRE-INTERVENTION PHASE (n = 10)</strong></td>
</tr>
<tr>
<td><strong>Q: How do you feel about the pharmacological management of diabetes and hypertension?</strong></td>
</tr>
<tr>
<td>‘Looking at the drugs in that detail, it’s not something that we are really that into’ HCP 9</td>
</tr>
<tr>
<td>‘We just refer them to doctor, and doctor decides’ HCP 8 (2)</td>
</tr>
<tr>
<td>‘We probably need revision about the drugs, to get insight, but we don’t prescribe. That’s not our job’ HCP 3 (4,5,10)</td>
</tr>
<tr>
<td>‘It doesn’t really affect us. We don’t adjust and initiate treatment’ HCP 2</td>
</tr>
</tbody>
</table>

| ‘No’ HCP 1 (2,3,6,7) | ‘Not completely confident’ HCP 1 (2,3) |
| ‘From experience here, yes! From monitoring a patients HGT and seeing a response, we know when they are not controlled, but when it comes to the drugs I think we could use a bit more training’ HCP 8 (1,2,6,7,9) | ‘We will get confident! But not yet there’ HCP 4 |
| ‘I think we need more insight’ HCP 5 (3,4,10) | ‘We don’t work with it every day’ HCP 2 (1,3,4) |
| ‘It’s not really our scope of practice’ HCP 3 (1,2,4) | ‘It’s not really our scope of practice’ HCP 3 (1,2,4) |
| ‘We just refer patients to doctor, we don’t initiate treatment’ HCP 6 (5,7) | ‘We just refer patients to doctor, we don’t initiate treatment’ HCP 6 (5,7) |
| ‘I feel more confident with diabetes though’ HCP 5 | ‘I feel more confident with diabetes though’ HCP 5 |
| ‘We need more in-service training’ HCP 6 (5,7) | ‘We need more in-service training’ HCP 6 (5,7) |

In the post-intervention phase focus group interviews, a slight improvement was noted with regard to HCP attitudes towards the pharmacological management of diabetes and hypertension. Positive feelings were expressed regarding the improved insight (“It’s nice to have insight” HCP 3 (1,2,4)) and confidence levels.
of HCPs (“I feel more confident” HCP 5 (6)), following the educational intervention. Some HCPs still felt the need for further revision and in-service training with regard to the drugs used in the management of diabetes and hypertension. The HCPs had negative feelings regarding the initiation and adjustments of drug therapy, as they felt it was not their scope of practice, and that their job was only to refer patients to the doctor (Table 6.8). Comments included: “It’s not our scope of practice” (HCP 3 (1,2,4)) and “We just refer patients to doctor, we don’t initiate treatment” (HCP 6 (5,7)).

In summary, HCP attitudes towards the pharmacological management of diabetes and hypertension improved slightly in the post-intervention phase with regard to confidence levels and insight gained. Negative feelings were expressed by the HCPs regarding their responsibility in the initiation and adjustment of drug therapy, as they felt it was the sole responsibility of the doctor, and commented on the importance of upholding professional boundaries. It is essential that the HCPs have the knowledge and insight of pharmacological management, so as to be able to identify when a patient is uncontrolled on their chronic medication. The availability of doctors at PHC clinics is limited, which increases the responsibility of the HCPs to recognise the need for change in pharmacological therapy, and to initiate the referral process. It was disconcerting for the researcher to note that the HCPs did not acknowledge their important role in the initiation and/or adjustment of a patient’s pharmacological management.

6.8.10 Referral of Patients
The final topic covered in the focus group interviews related to the confidence levels of the HCPs in referring patients to doctors. Results pertaining to the attitudes of the HCPs towards the referral of patients to doctors have been presented in Table 6.9.
Table 6.9: Descriptive statements from focus group interviews regarding the referral of patients.

<table>
<thead>
<tr>
<th>PRE-INTERVENTION PHASE (n = 10)</th>
<th>POST INTERVENTION PHASE (n = 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q: Do you feel confident in monitoring diabetic patients and referring patients to doctors when necessary?</strong></td>
<td></td>
</tr>
<tr>
<td>‘Yes’ HCP 1 (2,6,8,9)</td>
<td>‘Yes’ HCP 1 (2,3,4,5,6)</td>
</tr>
<tr>
<td>‘It comes with experience, being able to recognise when a patient is controlled or not’ HCP 3 (4,5)</td>
<td>‘I feel confident in referring the patient and saying that they are not controlled. We know what the drugs are used for, but I don’t think it is my place to tell doctor what drug to use, that is her job’ HCP 3</td>
</tr>
<tr>
<td></td>
<td>‘We can monitor the patients well, but there are professional limitations which we must stick to!’ HCP 6 (1,2,3,4,5,7)</td>
</tr>
</tbody>
</table>

In the pre-intervention phase focus group interviews, HCPs expressed confidence in monitoring and referring patients. The HCPs stated that the confidence to refer patients to doctors “comes with experience” (HCP 3 (4,5)).

In the post-intervention phase focus group interviews, no change was evident in HCP attitudes regarding the referral of patients to doctors, as compared to the pre-intervention phase. The HCPs positively expressed their confidence in monitoring and referring patients. However, the issue of professional limitations was raised, with the HCPs insistent on the need to uphold professional boundaries with regards to referring patients (“We can monitor patients well, but there are professional limitations which we must stick to!” HCP 6 (1,2,3,4,5,7)), as discussed in Section 6.8.9. The HCPs felt that it was not their place to recommend the use of a specific drug agent in an uncontrolled patient, as this was the responsibility of the doctor. This response from the HCPs was disconcerting, as the HCPs do not fully acknowledge their role in the management of patients with diabetes and hypertension in the PHC setting.

In summary, HCPs had high confidence levels in referring patients, but they felt they could not cross professional boundaries by recommending specific agents in uncontrolled patients.
6.9 SUMMARY

The implementation of the educational intervention resulted in an extremely significant increase in the level of knowledge of the HCPs for the management of diabetes and hypertension. The analysis of the data (correct responses) pertaining to the HCP questionnaire indicated a significant increase in the level of HCP knowledge with respect to: target values (6, 17.1%, n = 35 (pre) vs 16, 45.7%, n = 35 (post) (p = 0.0194)); pharmacological management of diabetes (15, 17.9%, n = 84 (pre) vs 61, 72.6%, n = 84 (post) (p < 0.0001)); pharmacological management of hypertension (26, 23.2%, n = 112 (pre) vs 83, 74.1%, n = 112 (post) (p < 0.0001)), and; application of knowledge with respect to case studies (1, 3.6%, n = 28 (pre) vs 17, 60.7%, n = 28 (post) (p < 0.0001)). There was no significant change in the level of knowledge pertaining to monitoring tests, however, the number of correct responses increased by one.

The educational intervention improved the knowledge of all the HCPs at the PHC clinic, including the EN and the PA. This illustrated the effectiveness of the educational intervention in improving HCP knowledge on diabetes and hypertension even when base knowledge was not present.

The increase in the positive attitudes felt by the HCPs after the educational intervention indicated the success of the educational intervention in improving the attitudes of HCPs towards the management of diabetes and hypertension. The HCPs also expressed positive attitudes towards the training presented by the researcher in the intervention phase. Positive attitude changes were noted for the treatment of patients with diabetes, the standard of care provided, the initiation of guideline summary cards and improved confidence levels.

Limitations identified by the HCPs included poor working conditions due to increased patient loads, decreased staff numbers, time constraints and out of stock medication.
The impact of a short-term, continued medical education program on health care providers' attitudes toward treating diabetes was investigated in Chicago, USA (Sharp and Lipsky, 1999). Results indicated an increase in knowledge, in addition to more favourable attitudes toward diabetes after the program. This study highlighted the importance of the short-term impact of educational interventions. On comparison of the results from the study conducted in Chicago, to the current study, definite similarities were identified. These similarities included the increase in knowledge and more favourable attitudes towards diabetes, after an educational intervention (Sharp and Lipsky, 1999).

A short educational intervention, conducted in a tertiary care hospital in SA, resulted in an improvement in attitude, knowledge and clinical management of diabetic patients (Oosthuizen et al., 2002). On comparison, the results from the present study were in accordance with the previous study.

Results from the focus group interviews were consistent with results obtained in previous studies. Health care providers’ negative attitudes can impact on the provision of health care to patients with diabetes by functioning as a barrier to the implementation of guidelines and by influencing the standard of diabetic care (Daniels et al., 2000b). Improving and updating health care providers’ knowledge on the management of diabetes is essential in the achievement of optimal diabetic care. The improvement in the knowledge of health care providers should, however, not be focussed on separately, but rather in conjunction with their attitudes towards diabetes so as to achieve maximum potential of educational interventions.
CHAPTER 7

RESULTS AND DISCUSSION – SECTION B

7.1 INTRODUCTION

The review of the diabetic record card and the impact of the educational intervention on the management of diabetes in the patient population will be presented in Chapter 7. Where applicable, results will be presented and discussed as a comparison of pre- and post-intervention results. The results in Chapter 7 will be presented in the following main sections, namely:

- Ethical Considerations;
- Review of Diabetic Record Card;
- Patient Data;
- Patient Demographics;
- Impact of Educational Intervention on Management of Diabetes in Patient Population, and
- Feedback of Research Results.

Results to be presented and discussed from the pre-intervention phase include: obtaining patient consent and extracting relevant information from patients’ medical files, and maintenance of the diabetic record card (Figure 5.2).

The intervention phase results will be presented and discussed with regard to the measurement of pre-intervention patient population HbA$_{1c}$ levels (Figure 5.3).

Results to be presented and discussed from the post-intervention phase include: the extraction of information regarding diabetes management from patients’ medical files, and the measurement of post-intervention HbA$_{1c}$ levels.
Feedback, given to the HCPs at the PHC clinic and the NMMM Department of Health, will also be discussed (Figure 5.4).

7.2 ETHICAL CONSIDERATIONS

Results pertaining to the ethical considerations for this section of the results of the research project are presented and discussed with regard to the collection of patient consent and compilation of patient register.

7.2.1 Collection of Patient Consent and Compilation of Patient Register

A register was compiled at the PHC clinic of a total of 232 diabetic patients who had signed a ‘patient consent form’ (Appendix A). Patient consent was collected between November 2004 and March 2005, during the pre-intervention phase (Figure 5.2). These patients with diabetes constituted the pre-intervention patient population. During the collection of patient consent, nine patients with diabetes declined to sign the ‘patient consent form’ as they did not wish to participate in the research project (Table 7.1).

<table>
<thead>
<tr>
<th>Reasons for declining</th>
<th>Number of patients (%; n = 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Going away on holiday</td>
<td>3 (33.3%)</td>
</tr>
<tr>
<td>Work commitments</td>
<td>3 (33.3%)</td>
</tr>
<tr>
<td>Refused to sign consent form</td>
<td>2 (22.2%)</td>
</tr>
<tr>
<td>Moving away</td>
<td>1 (11.1%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>9 (100%)</strong></td>
</tr>
</tbody>
</table>

Three patients (33.3%, n = 9) indicated that they would be away on holiday (i.e. not in Port Elizabeth) during the collection period for pre-intervention HbA1c tests. With no pre-intervention HbA1c result, they would not qualify to be a part of the research project. Work commitments prohibited three patients (33.3%, n = 9) from participating in the research project, as they were not able to attend the
PHC clinic every month, and would therefore not have complete patient data for clinic visits. Miscommunication presented as a problem, as two patients (22.2%, n = 9) refused to sign the patient consent form and were unwilling to listen to the researcher regarding the research project. One patient (11.1%, n = 9) indicated that they were moving to Pretoria during the pre-intervention phase, and would therefore not be able to participate.

7.3 REVIEW OF DIABETIC RECORD CARD

Results from the review of the diabetic record card conducted in the pre-intervention phase (Figure 5.2) will be presented and discussed with regard to:

- Reformat and Update of Diabetic Record Card;
- Assessment of Current Practice with regard to the Diabetic Record Card prior to the Pre-Intervention Phase, and
- Re-introduction of Diabetic Record Card;

7.3.1 Reformat and Update of Diabetic Record Card

Prior to the current study, a structured diabetic record card had been used at the PHC clinic (Reddy, 2003). During 2003 and 2004, the format of patient medical files used at government clinics in NMNM changed from an A4 folder to an A5 booklet. Due to this change, the diabetic record card initiated at the PHC clinic during 2002 and 2003, needed to be modified for use in the new A5 patient booklet. Three options of an A5 diabetic record card design were presented to the HCPs at the PHC clinic. One diabetic record card was chosen as the most suitable due to the logical order that the diabetic record card followed. The chosen diabetic record card was then further modified to allow more space for the documentation of chronic medication in the patient file. A section for acute medication was also incorporated into the adapted diabetic record card as the HCPs commented on the lack of space to document acute medication on the previous diabetic record card. An additional page for referral notes was also included (in a different colour), providing HCPs with space to give a brief
description of the reason for patient referral to a doctor/hospital. Space was also provided for the doctor to comment on the outcome of the referral (Appendix E).

Updates to the diabetic record card and associated appendices (Appendix E and Appendix F) included the new target values for blood pressure and HbA1c tests published in the South African type 2 diabetes guidelines (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). The recommended target blood pressure value in diabetic patients for optimal blood pressure control was altered from “< 140/90 mmHg” to “< 130/80 mmHg”. The South African diabetes guideline from 1997 (Working Group of the National Diabetes Advisory Board, 1997) indicated an acceptable target blood pressure range of “> 140/90 mmHg to < 160/95 mmHg”, however no acceptable blood pressure target range was published in the 2002 South African diabetes guideline. The acceptable HbA1c target range was altered from 7-9% (1997 guideline), to 7-8% (2002 guideline). The compromised HbA1c range was altered from “≥ 9%” (1997 guideline) to “≥ 8%” (2002 guideline) (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). The published updates to the South African type 2 diabetes guideline supported the need for tighter control of blood glucose and blood pressure levels for optimal control of diabetes.

7.3.2 Assessment of Current Practice with regard to the Diabetic Record Card prior to the Pre-Intervention Phase

A concise review was performed at the PHC clinic towards the end of September 2004, to assess the current practice in terms of the diabetic record card. Findings from the concise review will be discussed with regard to:

- Observation of Management of Diabetic Patients at the Primary Health Care Clinic;
- Health Care Provider Experience with the Diabetic Record Card, and
- Last usage of Diabetic Record Card in Patient Medical Files.
7.3.2.1 Observation of Management of Diabetic Patients at the Primary Health Care Clinic

Results from observations made by the researcher indicated that the diabetic record card was not being utilised optimally at the clinic. Certain parameters, such as weight and height, were not measured or recorded in the diabetic record card or patient file. Blood pressure and blood glucose readings, when performed, were recorded in the patient file and not in the diabetic record card. Urine was only tested if an infection was suspected. Questions pertaining to patient lifestyle were being asked during the consultation sessions, however, these were not recorded in the diabetic record card or in the patient file. Eye and foot examinations were also performed, but not documented. At the time of the review, it was found that no HCP was documenting information in the diabetic record card.

7.3.2.2 Health Care Provider Experience with the Diabetic Record Card’

A short questionnaire (‘usage of card questionnaire’ - Appendix C) was compiled to enable assessment of the HCPs’ experience, understanding and usage of the diabetic record card, which was initiated at the PHC clinic in 2002 (Reddy, 2003). The ‘usage of card questionnaire’ comprised of nine open-ended questions. The questions pertained to the HCP’s work experience in PHC; the experience, understanding and usage of the diabetic record card; and the proposed dates that the HCP would be away on leave in the months to come.

The ‘usage of card questionnaire’ was distributed on the 5th of September 2004. At the time of completion of the ‘usage of card questionnaire’, there were nine HCPs (seven PNs, one EN and one PA) working at the PHC clinic, however, two HCPs (one PN and one EN) did not complete the questionnaire as they were away on leave when the ‘usage of card questionnaire’ was distributed and completed. (The HCP population in September 2004 was nine, compared to ten in March 2005. Differences in the number of HCPs at the PHC clinic can be
attributed to staff turnover rates between PHC clinics in the NMMM as well as between public and private health care centers.)

The seven HCPs assessed at the PHC clinic included six PNs and one PA (basic level). Results from the ‘usage of card questionnaire’ are presented in Table 7.2. Results indicated that only two (28.6%, n=7) of the HCPs (two PNs) had previously attended training, from Ms Reddy, on the usage of the diabetic record card. Five HCPs (71.4%, n=7) had experience and were familiar with the diabetic record card (four PNs and one PA). Only one HCP (one PN) (14.3%, n=7) indicated that they were initiating a diabetic record card in the medical files of newly diagnosed diabetic patients.

From the above results, regarding the observations made by the researcher and the questionnaire on the HCPs’ experience, usage and understanding of the diabetic record card, it was concluded that there was a need for the diabetic record card to be re-introduced to the HCPs prior to the commencement of the research project.

7.3.2.3 Last Usage of Diabetic Record Card in Patient Medical Files
The cessation of use of the diabetic record card prompted the investigation into the number of patient medical files that had a diabetic record card present and the last month that the diabetic record card was utilised optimally. A purpose designed data collection form (‘extent of documentation data collection form’ – Appendix D) was used in the investigation into the last usage of the diabetic record card at the PHC clinic, prior to the pre-intervention phase. Data was collected, using the ‘extent of documentation data collection form’, between the hours of seven and half past eight each weekday morning during the month of September 2004.
Table 7.2: Tabulated results from the ‘Usage of Card Questionnaire’ completed by seven health care providers at the primary health care clinic.

Q: Time period working at West End Clinic?

<table>
<thead>
<tr>
<th>HCP 1</th>
<th>HCP 2</th>
<th>HCP 3</th>
<th>HCP 4</th>
<th>HCP 5</th>
<th>HCP 6</th>
<th>HCP 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years</td>
<td>2 years</td>
<td>2.5 years</td>
<td>2 years</td>
<td>6 months</td>
<td>7 months</td>
<td>1 year</td>
</tr>
</tbody>
</table>

Q: Where did you work before West End Clinic?

| Motherwell Clinic | Chatty, Gelvandale Clinic | Chatty Clinic | Chatty Clinic | Masakhane Clinic | Mercantile Hospital | Central Clinic |

Q: Where are you stationed at the clinic (observation or consultation)?

| All over | Consultation | All Over | Consultation | Immunisations and Family Planning | TB room | Pharmacy |

Q: Did Milli train you during the previous research project?

| No | No | Yes | Yes | No | No | No |

Q: Are you familiar with the yellow Diabetic Card?

| Yes | Yes | Yes | No | No | Yes |

Q: Are you going to be at work from the 4th October to 15th October?

| Yes | Yes | Yes | Yes | Yes | Yes |

Q: Will you be taking leave between September 2004 and December 2004? If yes, when?

| Dec 04 | No | Not sure | Oct or Nov | No | No | Dec 04 |

Q: Unless due to unforeseen circumstances, will you still be working at the clinic in March/April 2005?

| Maybe | Hope so | Yes | Maybe | Yes | Yes | Not sure |

Q: Do you initiate the yellow diabetic record card in newly diagnosed diabetics?

| No response | No | Did, but not anymore | Yes | No | No | No response |
This specified time would allow for the extraction of data from patient medical files from the majority of the diabetic population as most patients attending the clinic on a particular day would arrive at the clinic before half past eight in the morning. Data was extracted from a total of 140 diabetic patient medical files during September 2004.

Results revealed that only 55 patient medical files contained diabetic record cards (39.3%, \( n = 140 \)), indicating that more than half of diabetic patient medical files assessed in September 2004 did not contain a diabetic record card. This result highlighted the need for the re-introduction of the diabetic record card to aid in the improvement of the documentation of diabetes management.

The month of last utilisation of the diabetic record card, at the PHC clinic, is illustrated in Figure 7.1. Results indicated that in those patients whose files contained a diabetic record card, the card was last utilised in 2003, and the last month of documentation in the diabetic record cards ranged from March 2003 (9.1%, 5, \( n = 55 \)) to October 2003 (1.8%, 1, \( n = 55 \)). April (25.5%, 14, \( n = 55 \)) and May (21.8%, 12, \( n = 55 \)) 2003 represented the last months of documentation in the diabetic record card, for the majority of this patient population (47.3%, 26, \( n = 55 \)). Possible reasons for the cessation of use of the diabetic record card included the fact that the diabetic record card may have been full, with the patient requiring a new card, as there was no space to document data in the complete card, as well as untrained staff at the clinic who may not have known how the card functioned. Results indicated that the diabetic record card was not being utilised, as many patients required new cards to replace full cards, hence the need for the re-introduction of the diabetic record card prior to the pre-intervention phase.
Figure 7.1: Month of last usage of diabetic record card during 2003 (n = 55).

7.3.3 Re-Introduction of Diabetic Record Card

Results regarding the HCPs' experience, usage and understanding of the diabetic record card (Section 7.3.2) as well as the last usage of the diabetic record card, indicated that there was a definite need for the diabetic record card to be re-introduced at the PHC clinic for the purposes of the research project, to improve the extent of documentation of diabetes management.

Two training sessions were held for the HCPs at the PHC clinic to introduce them to the revised diabetic record card and the protocol surrounding the card. Four HCPs (three PNs and one EN) attended the first training session on the 29th of October 2004, and six HCPs (five PNs and one PA) attended the second training session on the 1st of November 2004. It should be noted that of the original 12 staff members at the PHC clinic, the radiographer, health educator and receptionist did not receive training on the diabetic record card. This was due to the fact that they did not have contact with patients in the observation or consulting rooms, and were therefore not exposed to the diabetic record card.
There was only one query noted with regard to the revised diabetic record card, which revolved around the prescribing of acute medication and where to document this. This was explained and demonstrated. The sessions were both completed in approximately thirty minutes. The card was officially re-introduced in mid November 2004. The diabetic record card was inserted into patient medical files in the observation room. The majority of patients only received the adapted and updated diabetic record card into their medical files in January 2005, due to the fact that most patients receive two months supply of chronic medication over the November and December months, and therefore do not consult HCPs over this period.

7.4 PATIENT DATA

The summarised research methodology for patient data has been illustrated in Figure 7.2. Methodology pertaining to patient data was completed in the pre- and post-intervention phases. The results pertaining to the collection, capture, collation and analysis of patient data will be discussed below. The impact of the educational intervention on the level of diabetic management in the patient population will be presented in Chapter 7 (Section 7.6) as a comparison of the pre- and post-intervention results from the analysed patient data.

The patient data will be discussed in terms of:

- Collection of Pre-Intervention Patient Data;
- Measurement of Pre-Intervention HbA$_{1c}$ levels;
- Final Patient Population;
- Measurement of Post-Intervention HbA$_{1c}$ levels;
- Collection of Post-Intervention Patient Data, and
- Capture, Collation and Analysis of Patient Data.
7.4.1 Collection of Pre-Intervention Patient Data

Pre-intervention patient data pertaining to the level of diabetic control was collected from the medical files of all 232 patients with diabetes, who had signed patient consent forms and thus constituted the pre-intervention patient population. Data was extracted from the patients’ files for a period of three months prior to the educational intervention, from January 2005, after re-implementation of the diabetic record card, to March 2005, using the ‘patient data collection form’ (Appendix G) (Figure 7.2(a)).

7.4.2 Measurement of Pre-Intervention HbA\textsubscript{1c} levels

HbA\textsubscript{1c} levels represent average blood glucose concentrations over a six to eight week period and HbA\textsubscript{1c} tests are not affected by the time of day, food intake or recent therapeutic manipulations, as are the blood glucose finger prick tests. Testing the HbA\textsubscript{1c} of a patient with diabetes is therefore the ideal method for determining long-term blood glucose control (American Diabetes Association,
The HbA1c tests were conducted for the purposes of the research project and were financed by the researchers.

Patient pre-intervention HbA1c levels were required as baseline data to determine if diabetic control improved after the implementation of the educational intervention. A blood sample for pre-intervention HbA1c determination was taken at the patients’ first visit to the clinic subsequent to the conclusion of the education sessions with the HCPs at the PHC clinic. Pre-intervention HbA1c levels were determined in 208 (89.7%, n = 232) patients of the initial diabetic patient population of 232. Patients were tested between 13\textsuperscript{th} of April 2005 and the 1\textsuperscript{st} of June 2005. Collection of HbA1c levels was over a six week period, so as to ensure collection from patients’ who may not have visited the PHC clinic in April 2005 (Figure 7.2(c)). A total of 24 patients with diabetes (10.3%, n = 232), from the pre-intervention patient population, did not attend the PHC clinic during the HbA1c collection period; hence they were excluded from the research project, as no pre-intervention HbA1c results were available for these patients. Pre-intervention patient HbA1c levels were analysed to determine the level of diabetic control prior to the intervention phase.

### 7.4.3 Final Patient Population

Exclusion criteria (Chapter 5: Section 5.8: Exclusion criteria) were applied to the pre-intervention patient population of 232 patients at the end of the intervention period (end of July 2005). If patients met the exclusion criteria they were excluded from the study. The exclusion criteria were:

- Did not attend all monthly clinic visits during the pre-intervention phase (3 months) and intervention phase (4 months);
- Pre- and/or post-intervention HbA1c results not available, and
- Medical record files were unobtainable.

Only 103 patients (44.4%, n = 232) constituted the final patient population, as 129 patients (55.6%, n = 232) were excluded from the study. Although the final
patient population was sufficient for the objectives of the research project, a larger population size would have been beneficial. The 129 patients (55.6%, n = 232) were excluded from the study for the following reasons (Figure 7.3):

- Patients defaulted in the pre-intervention phase (24, 10.3%, n = 232) (Exclusion criterion 1);
- Patients defaulted in the post-intervention phase (44, 19.0%, n = 232) (Exclusion criterion 1);
- Patients were admitted to hospital during the study period (14, 6.0%, n = 232) (Exclusion criterion 1);
- Died during the study period (1, 0.4%, n = 232) (Exclusion criterion 1);
- Moved away from Port Elizabeth (4, 1.7%, n = 232) (Exclusion criterion 1);
- Pre-intervention HbA$_{1c}$ level tested, but no post-intervention HbA$_{1c}$ level tested (16, 6.9%, n = 232) (Patients defaulted during the collection of post-intervention HbA$_{1c}$ levels) (Exclusion criterion 2);
- Patients involved in 5 year study on diabetes (had pre HbA$_{1c}$ result, but no post HbA$_{1c}$ test performed) (14, 6.0%, n = 232) (Exclusion criterion 2)
- Pre-and post-intervention HbA$_{1c}$ test performed, but no result for post test (blood clotted) (3, 1.3%, n = 232) (Exclusion criterion 2), and
- Patients’ medical record files were unobtainable (9, 3.9%, n = 232) (Exclusion criterion 3).

For a patient to be included in the research project, all scheduled clinic visits in the pre-intervention phase (3 months in length) and the post-intervention phase (4 months in length) needed to be attended, totalling seven clinic visits. This strict inclusion criterion was implemented to ensure accuracy of results obtained. In total, eighty-four patients (36.2%, n = 232) were excluded from the research project due to defaulting from clinic visits.
Figure 7.3: Reasons for patients being excluded from the study. The pre-intervention patient population consisted of 232 patients. Of these 129 patients (55.6%, n = 232) were excluded from the study.

Twenty-four patients (10.3%, n = 232) who had signed a patient consent form, defaulted during the three-month pre-intervention phase. These 24 patients were excluded from the research project before the pre-intervention HbA1c levels were taken. In the post-intervention, 44 patients (19.0%, n = 232) defaulted during the four-month post-intervention phase. These 44 patients had results for pre-intervention phase HbA1c levels, but were excluded from the research project before the post-intervention phase HbA1c levels were taken. During the collection of post-intervention HbA1c levels, 16 patients (6.9%, n = 232) who had not defaulted in the pre- and post-intervention phases defaulted from clinic visits. The post-intervention HbA1c collection period was extended from four weeks to six weeks to allow for patient defaulters, however, the 16 patients did not attend during the six-week HbA1c collection period. Of the 84 patients who defaulted, 69 patients (29.7%, n = 232) only defaulted for one month, while 15 patients (6.5%, n = 232) defaulted for two months during the research period.
The reasons for the 84 patients defaulting were not determined. Patient defaulting is a common barrier to achieving optimal diabetic care in the public health sector in SA. In a study conducted by Levitt et al. (1996) at five ambulatory outpatient diabetes clinics in Cape Town, patient attendance was found to be poor as only 35% (n = 380) of patients fulfilled the criteria for optimal clinic attendance. The average number of clinic visits per year per patient was found to be 8.1 ± 4.1 visits (Levitt et al., 1996). In a study conducted by Rotchford and Rotchford (2002) on the diabetic population in a public health sector district in rural KwaZulu-Natal, it was found that the average number of clinic visits per year per patient was 9.5 ± 3.4 visits (n = 236). The optimal number of clinic visits per patient per year is 12, hence in the previous two studies, patient defaulting was also identified as a barrier to optimal patient care, as it was in the present study (Levitt et al., 1996; Rotchford and Rotchford, 2002).

The 14 patients (6.0%, n = 232) who were admitted to hospital during the research period were excluded from the final patient population. The reason for their exclusion was due to the fact that patients' pharmacotherapy may have been altered while in hospital and they may have received additional patient counselling regarding diabetes. Including these patients in the research project would have affected the end results, as the changes to pharmacotherapy and additional patient counselling were not initiated at the clinic. The same reasoning is true for the exclusion of the 14 patients (6.0%, n = 232) who were selected to be apart of a five-year research project, related to diabetes and cardiac functioning, funded by a private hospital in the NMMM.

The medical record files of nine patients (3.9%, n = 232) were unobtainable due to the fact that the patients had removed their medical files from the clinic and had not returned them even after home visits were conducted. A post-intervention HbA1c level was not taken in the patients as it could not be established whether or not the patients fitted the criterion to be part of the final patient population.
7.4.4 Measurement of Post-Intervention HbA\textsubscript{1c} levels

Post-intervention HbA\textsubscript{1c} levels were collected during September 2005, six to eight weeks after the conclusion of the four-month intervention phase (Figure 7.2(d)). Medical files from the pre-intervention patient population of 208 patients were reviewed prior to the collection of post-intervention HbA\textsubscript{1c} levels, to identify patients who fitted the exclusion criteria for the research study, and who would therefore be excluded. A total of 105 patients (50.5%, \(n = 208\)) were excluded, hence post-intervention HbA\textsubscript{1c} levels were determined in 103 patients. A comparative assessment of the research findings between pre- and post-intervention patient HbA\textsubscript{1c} levels will be presented in Chapter 7 (Section 7.6).

7.4.5 Collection of Post-Intervention Patient Data

Post-intervention patient data pertaining to the level of diabetic control was collected from the medical files of all 103 diabetic patients in the final patient population. Data was extracted from the diabetic patients’ files in October 2005, for the four-month intervention period. The intervention period ranged from April/May 2005, after the initial measurement of HbA\textsubscript{1c} levels, to July/August 2005, four months after the initial measurement of HbA\textsubscript{1c} levels. The ‘patient data collection form’ (Appendix G) was utilised to collect post-intervention patient data (Figure 7.2 (e)).

7.4.6 Capture, Collation and Analysis of Patient Data

The pre- and post-intervention patient data was captured onto a purpose designed spreadsheet using Microsoft Excel\textsuperscript{®} (Figure 7.2 (b and f)). Data was then collated and analysed with respect to: patient demographics; monitoring tests; social habits; physical examinations; sixth-month visit; medication; complications; patient counselling, and referrals. The results from the analysis and comparison of the pre- and post-intervention patient data will be presented and discussed in Chapter 7 (Section 7.6) to determine the impact of the educational intervention on diabetic patient management.
7.5 PATIENT DEMOGRAPHICS

Patient data was extracted from the diabetic record cards of the final patient population (n = 103). The analysis of results pertaining to patient demographics will be presented and discussed in terms of the following:

- Gender Distribution and Type of Diabetes Diagnosed;
- Age Distribution;
- Age Diagnosed with Diabetes, and
- Family History of Diabetes.

7.5.1 Gender Distribution and Type of Diabetes Diagnosed

Of the 103 patients in the study, 72.8% were female (75, n = 103) and 27.2% were male (28, n = 103). Results indicated that 100% (103, n = 103) of the patient population had type 2 diabetes mellitus. This is in accordance with literature which states that type 2 diabetes mellitus is the more common form of diabetes occurring in 90% of all diabetes cases (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). Patients with type 1 diabetes usually receive chronic care at tertiary level institutions, hence the lack of type 1 diabetics in the patient sample at the PHC clinic.

7.5.2 Age Distribution

Age was documented in 100% of the patient population (103, n = 103). The average age of the population was 59.66 ± 9.21 years (min = 36 yrs; max = 85 yrs; range = 49 yrs; n= 103). The average age of the female population was 59.76 ± 8.83 years (min = 36 yrs; max = 85 yrs; range = 49 yrs; n = 75). The average age of the male population was 59.39 ± 10.36 years (min = 36 yrs; max = 79; range = 43; n = 28). Forty-five patients (43.8%, n = 103) were in the age group 51 to 60 years (Figure 7.4).
The largest prevalence of type 2 diabetes was found in the patient population over the age of 40 years (98, 95.2%, n = 103). This is in accordance with published data indicating that type 2 diabetes mellitus is common in adulthood around age 40 or later (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

7.5.3 Age Diagnosed with Diabetes

The date of diagnosis of diabetes was documented in 80.6% of patient diabetic record cards (83, n = 103), hence there was no data available for 20 patients (19.4%, n = 103). The average age of diagnosis in the patient population was 52.46 ± 8.78 years (min = 30; max = 72; range = 42; n = 83). Seventy-four patients (71.8%, n = 103) were diagnosed with type 2 diabetes over the age of forty years (Figure 7.5), which is in accordance with published data indicating that type 2 diabetes mellitus is common in adulthood around age 40 or later (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). Results indicated that 40 of those 74 patients (38.8%, n = 103) were
diagnosed with type 2 diabetes between the ages of 51 and 60 years (Figure 7.5).

![Bar chart showing age distribution of diagnosed patients](chart.png)

**Figure 7.5: Distribution of age diagnosed for patient population (n = 103).**

The average number of years that a patient in the study population had had diabetes mellitus was $6.16 \pm 5.27$ years (min = 1; max = 25; range = 24; n = 83). Forty-eight patients (46.6%, n = 103) were diagnosed with type 2 diabetes between one and five years ago (Figure 7.6). Fifteen patients (14.6%, n = 103) had been diagnosed with type 2 diabetes for more than 10 years. There was no data available for 20 patients (19.4%, n = 103).

### 7.5.4 Family History of Diabetes

Family history of diabetes (parents or siblings with diabetes) has been identified as a risk factor for the development of type 2 diabetes mellitus (Working Group of the National Diabetes Advisory Board, 1997; Oki and Isley, 2002; The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). Results indicated that 62 patients (60.2%, n = 103) had a family history of diabetes, and 25 patients (24.3%, n = 103) had no family history of diabetes (Figure 7.7). There was no documentation regarding family history of diabetes in 16 patient's medical files (15.5%, n = 103).
Figure 7.6: Time period in years since initial diagnosis of diabetes mellitus in final patient population (n = 103).

Figure 7.7: Family history of diabetes in final patient population (n = 103).
7.6 IMPACT OF EDUCATIONAL INTERVENTION ON MANAGEMENT OF DIABETES IN PATIENT POPULATION

7.6.1 Introduction
The results pertaining to the impact of the educational intervention on the management of diabetes in the patient population will be presented and discussed with regard to:

- Documentation of Diabetic Management;
- Glycaemic Control;
- Blood Pressure and BMI Control;
- Patient Referrals, and
- Pharmacological Management.

7.6.2 Documentation of Diabetic Management
Patient records constitute one of the major sources of information about the health of the patient and their medical history. It is imperative that a proper diagnosis, thorough patient history and clinical findings of previous visits are adequately documented in the patient file. (Sekokotla et al., 2002) Documentation of management ensures high standards of medical care, continuity of patient care, improved communication and distribution of clinical information between HCPs and the ability to detect complications at an early stage (Rodden and Bell, 2002). A complete, organised documentation and medical record keeping system is essential in providing continuous quality health care to patients with diabetes.

Pre-intervention patient data was compared to post-intervention patient data in terms of the documentation of:

- Monitoring Tests;
- Social History;
Queries for Symptoms indicating Diabetic Complications and Disease History;
Pharmacological Management, and
Diabetic Complications, Sixth Month Visit, and Patient Education Sessions.

7.6.2.1 Overview of Results for Documentation of Diabetic Management
Inadequate recording of basic clinical details is a recognised barrier to optimal care of diabetes and hypertension, and may contribute significantly to the poor quality of care that has been recognised in local settings (Daniels et al., 2000b). Pre-intervention patient data was compared to post-intervention patient data in terms of the documentation of diabetic management, after the implementation of an educational intervention. Tests and questions that should be performed and/or asked during every patient clinic visit, as recommended in the South African diabetes guideline, were included in the comparison of documentation of diabetic management. For optimal documentation to be achieved in the pre-intervention phase, documentation needed to be noted 309 times for each parameter (103 patients multiplied by the 3 months of clinic visits constituting the pre-intervention phase). For optimal documentation to be achieved in the post-intervention phase, documentation needed to be noted 412 times (103 patients multiplied by the 4 months of clinic visits constituting the post-intervention phase).

An overview of results pertaining to the comparison of the documentation of diabetic management between the pre- and the post-intervention phases, was as follows (Table 7.3):

Statistically significant (p < 0.0001; Fischer's Exact test) increases in documentation were noted after the implementation of an educational intervention, for all parameters excluding BMI, pharmacological management and patient education (there was no change noted for these three parameters).
- Pharmacological management was found to have an optimal level of documentation (100%) in the pre- and post-intervention phases.
- There was no documentation (0%) noted for BMI and patient education during the pre- and post-intervention phases.
- The largest increase in the level of documentation in the post-intervention phase was noted for urine dipstick tests (129, 41.7%, n = 309 increased to 340, 82.5%, n = 412).

Table 7.3: Extent of documentation of diabetic management in the pre-intervention phase (3 months) compared to after the educational intervention (post-intervention) (4 months). Significance is taken as p < 0.05; Fischer’s Exact test

<table>
<thead>
<tr>
<th>DOCUMENTATION OF DIABETIC MANAGEMENT</th>
<th>Pre-Intervention Documentation (Ideal no. for documentation: n = 309)</th>
<th>Post-Intervention Documentation (Ideal no. for documentation: n = 412)</th>
<th>% ↑ or ↓ after Intervention and p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring Tests - Physical Examinations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>213 (68.9%)</td>
<td>404 (98.1%)</td>
<td>↑ by 29.2% p &lt; 0.0001</td>
</tr>
<tr>
<td>Height</td>
<td>206 (66.6%)</td>
<td>384 (93.2%)</td>
<td>↑ by 26.6% p &lt; 0.0001</td>
</tr>
<tr>
<td>BMI</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>No change</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>274 (88.7%)</td>
<td>411 (99.7%)</td>
<td>↑ by 11% p &lt; 0.0001</td>
</tr>
<tr>
<td>Monitoring Tests - Biochemical Tests</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Glucose</td>
<td>272 (88.0%)</td>
<td>411 (99.7%)</td>
<td>↑ by 11.7% p &lt; 0.0001</td>
</tr>
<tr>
<td>Urine Dipstick</td>
<td>129 (41.7%)</td>
<td>340 (82.5%)</td>
<td>↑ by 40.8% p &lt; 0.0001</td>
</tr>
<tr>
<td>Social History</td>
<td>148 (47.9%)</td>
<td>350 (85.0%)</td>
<td>↑ by 37.1% p &lt; 0.0001</td>
</tr>
<tr>
<td>Queries for Symptoms indicating diabetic complications</td>
<td>148 (47.9%)</td>
<td>350 (85.0%)</td>
<td>↑ by 37.1% p &lt; 0.0001</td>
</tr>
<tr>
<td>Disease history</td>
<td>148 (47.9%)</td>
<td>350 (85.0%)</td>
<td>↑ by 37.1% p &lt; 0.0001</td>
</tr>
<tr>
<td>Pharmacological Management</td>
<td>309 (100%)</td>
<td>412 (100%)</td>
<td>No change</td>
</tr>
<tr>
<td>Patient Education</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>No change</td>
</tr>
</tbody>
</table>
These results indicated the effectiveness of the educational intervention, incorporating a diabetic record card, to improve the documentation of diabetic management. A main reason for the significant increases in the levels of documentation of diabetic management can be attributed to the changed clinic protocol after the implementation of an education intervention. In the pre-intervention phase, health care providers were not consulting with all diabetic patients at every clinic visit, only those patients who wished to be seen by the HCPs or the unstable diabetic patients. However, after the educational intervention, a consensus was reached at the PHC clinic to change the above mentioned protocol; hence resulting in improved diabetes management in the patient population.

7.6.2.2 Monitoring Tests

Monitoring tests need to be performed and documented at various intervals of patient care, so as to alert HCPs to possible chronic complications arising and co-morbid disease states. In the South African diabetes guideline, it is recommended that weight, BMI, blood pressure, blood glucose and urine dipstick monitoring tests be performed at every clinic visit to achieve optimal management of diabetes (Working Group of the National Diabetes Advisory Board, 1997). To calculate a patient’s BMI, documentation of the height of the patient is needed, hence the inclusion of height as a monitoring test.

A comparative analysis was performed to assess the extent of documentation of diabetes management, extracted from patient medical files at the PHC clinic, as compared to results from previous studies conducted. Four previous studies were identified for the comparison, including two studies conducted in SA (Levitt et al., 1996; Erasmus and Blanco-Blanco, 2000) and two studies conducted in USA (Peters et al., 1996; Bell et al., 2001). These previous studies did not involve interventions, however they investigated the level of care provided to patients with diabetes. Results from the comparative analysis are illustrated in Table 7.4.
Table 7.4: Extent of documentation from post-intervention phase of present study as compared to post-intervention phases of previous studies conducted.

<table>
<thead>
<tr>
<th>Extent of documentation for the following fields:</th>
<th>Port Elizabeth, SA (Current study, 2005) (n = 103 patients)</th>
<th>Cape Town, SA (Levitt et al., 1996) (n = 380 patients)</th>
<th>Umtata, SA (Erasmus and Blanco-Blanco, 2000) (n = 307 patients)</th>
<th>California, USA (Peters et al., 1996) (n = 353 patients)</th>
<th>North Carolina, USA (Bell et al., 2001) (n = 429 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose</td>
<td>99.7%</td>
<td>98.4%</td>
<td>85%</td>
<td>20.6%</td>
<td>No data</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>99.7%</td>
<td>97.4%</td>
<td>85%</td>
<td>86%</td>
<td>77.9%</td>
</tr>
<tr>
<td>Urine dipstick</td>
<td>82.5%</td>
<td>99.2%</td>
<td>100%</td>
<td>48%</td>
<td>No data</td>
</tr>
<tr>
<td>Weight</td>
<td>98.1%</td>
<td>97.4%</td>
<td>100%</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>HbA$_{1c}$</td>
<td>0%*</td>
<td>3.4%</td>
<td>24%</td>
<td>44%</td>
<td>52.7%</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0%</td>
<td>No data</td>
<td>67%</td>
<td>56%</td>
<td>44.5%</td>
</tr>
<tr>
<td>Feet examinations</td>
<td>0%</td>
<td>4.7%</td>
<td>0%</td>
<td>6%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Eye examinations</td>
<td>0%</td>
<td>6.0%</td>
<td>0%</td>
<td>No data</td>
<td>6.3%</td>
</tr>
</tbody>
</table>

* HbA$_{1c}$ tests were conducted with the patient population of the present study, however they were financed by the researchers and not by the PHC clinic.
The quality of health care received by patients with diabetes was researched in a study conducted at ambulatory outpatient diabetes clinics in 'black' areas of Cape Town. The population of the study consisted of 380 patients, who attended the clinic over a twelve-month period. (Levitt et al., 1996)

A study was conducted at the Umtata General Hospital in the Eastern Cape, SA, to assess the quality of the medical care provided to patients with diabetes attending an outpatient diabetic clinic at a peri-urban hospital. Case records of patients, who attended the clinic over a three-month period, were examined. The study population consisted of 307 patients. (Erasmus and Blanco-Blanco, 2000).

A study was conducted in California, USA, investigating the quality of diabetes care provided to patients in a large health maintenance organisation. The study population consisted of 353 patients, and was conducted over a twelve-month period. (Peters et al., 1996)

The aim of a study conducted in North Carolina, USA, was to examine the level of diabetes care among low-income populations. Data was collected from 429 diabetic patients at 11 health centres serving low-income populations in the state of North Carolina, and was conducted over four years. (Bell et. al., 2001)

The extent of documentation was compared with regard to the following fields: blood glucose; blood pressure; urine dipstick; feet examinations; eye examinations; HbA1c, and cholesterol. Results indicated that patient medical files at the PHC clinic for the current study had the greatest extent of documentation for blood glucose (90%, n = 140) and blood pressure tests (91.2%, n = 140), which indicated the positive impact of the educational intervention on documentation (Table 7.4). However, urine dipstick tests were documented the least in patient medical files (21.9%, n = 140) in the current study. The documentation of feet examinations in patient medical files was consistent with results from studies conducted in USA, however, these results indicated
For optimal levels of diabetic care to be achieved, 100% of all monitoring tests should be performed and documented as recommended in practice guidelines. In summary, results from the studies concluded that sub-optimal levels of diabetes care were provided by HCPs and health care systems, resulting in the sub-optimal management of patient with diabetes. Results indicated that sub-optimal levels of diabetic care are not isolated to SA, but can be considered an international problem.

7.6.2.3 Social History
The management of diabetes is not isolated to pharmacological management; hence the significance of a patient’s social habits, as bad social habits can be detrimental to the optimal management of diabetes (smoking and alcohol consumption can have a negative impact on glycaemic control (ADA, 2005)). Health care providers need to be aware of a patient’s specific social habits in order to provide beneficial patient counselling and advice aimed towards the improved management of diabetes. Patients need to be counselled on the dangers of smoking, drinking alcohol and use of illegal drugs. Patients need to be encouraged and counselled on the importance of exercise and compliance. Enquiries regarding social habits should be documented at every clinic visit for the optimal management of diabetes.

Results indicated that the documentation of social habits, including smoking, alcohol, illegal drugs, exercise and compliance, improved significantly (increased by 37.1%, $p < 0.0001$; Fischer’s Exact test) after the educational intervention with the HCPs (148, 47.9%, $n = 309$ (pre-intervention) vs 350,
85.0%, n = 412 (post-intervention) (Table 7.3)). The significant increase in the level of documentation for social history can be attributed to the change in clinic protocol after the implementation of the educational intervention, which resulted in patients consulting more frequently with HCPs during clinic visits, instead of only collecting their chronic medication. The results indicate the effectiveness of the implementation of an educational intervention, together with the use of a diabetic record card, in improving the documentation of social history in patients with diabetes.

7.6.2.4 Queries for Symptoms indicating Diabetic Complications and Disease History

For the optimal management of diabetes, queries regarding diabetic complications and disease history should be performed and documented at every clinic visit (Working Group of the National Diabetes Advisory Board, 1997).

Chronic hyperglycaemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels (The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). The severity and progression of diabetic complications can, therefore, be assessed and prevented by the performance and documentation of queries regarding symptoms, which indicate diabetic complications.

The documentation of disease history is essential in assessing a patient’s health status during the preceding month. Any significant disease history (e.g. hospitalisation since last clinic visit) may impact on the treatment decisions made regarding the optimal diabetic management of the patient. All diabetic patients receiving insulin treatment should be advised and counselled regarding the correct usage of insulin, as the rotation of the injection site for insulin administration is essential in achieving optimal diabetes management in these patients.
Results indicated that the documentation of queries regarding symptoms indicating diabetic complications for the eyes, renal functioning, feet and neuropathy (sensory, motor, autonomic), improved significantly (increased by 37.1%; \( p < 0.0001 \); Fischer’s Exact test) after the educational intervention with the HCPs (148, 47.9%, \( n = 309 \) (pre-intervention) vs 350, 85.0%, \( n = 412 \) (post-intervention) (Table 7.3)). The same significant increase of 37.1% (\( p < 0.0001 \), Fischer’s Exact test (Table 7.3)) was noted after the educational intervention for queries regarding disease history, which included questions pertaining to hospitalisation since last clinic visit, symptoms of hypoglycaemia, symptoms of hyperglycaemia and the rotation of injection site if the patient is on insulin therapy.

The significant increase in the level of documentation for queries regarding diabetic complications and disease history can be attributed to the change in clinic protocol after the implementation of the educational intervention, which resulted in patients consulting more frequently with HCPs during clinic visits, instead of only collecting their chronic medication. The results indicated the positive impact of the implementation of an educational intervention, together with the use of a diabetic record card, in improving the documentation of queries regarding diabetic complications and disease history.

7.6.2.5 Pharmacological Management

The documentation of prescribed pharmacological management for type 2 diabetes and hypertension between the pre- and post-intervention phases was compared. The criterion applied to determine if there was adequate documentation of pharmacological management was that the name of the prescribed medicine, dose (mg or units) and frequency of dosing had to be documented for all three clinic visits in the pre-intervention phase (\( n = 309 \) (3 months documentation for 103 patients)) and for all four clinic visits after the educational intervention (post-intervention) (\( n = 412 \) (4 months documentation for 103 patients)).
All 103 patients (100%, n = 103) had optimal documentation of pharmacological management in the pre- (309, 100%, n = 309) and post-intervention (412, 100%, n = 412) phases (Table 7.3), which was a very positive outcome in terms of the management of patients with diabetes. As there was no change in the documentation of pharmacological management, the p value was not significant (Fischer’s Exact test).

7.6.2.6 Diabetic Complications, Sixth Month Visit and Patient Education Sessions

- Diabetic Complications

The documentation of the presence or absence of chronic diabetic complications is essential to achieve optimal diabetes care, as patients with diabetic complications need to be monitored closely to delay or prevent further complications from arising. The presence of diabetic complications may also impact on the prescribed pharmacological management of diabetes and co-morbid disease states, and more rigid target levels for monitoring tests (ADA, 2005).

To achieve optimal documentation of diabetic complications on the structured diabetic record card, the section of the record card designated to diabetic complications should have been completed once during the study period. Results indicated that no documentation was recorded in patients’ diabetic record cards regarding diabetic complications during the study period of seven months (0, 0%, n = 103), indicating sub-optimal levels of diabetic care. Possible reasons regarding the absence of documentation for diabetic complications will be discussed below.

- Sixth Month Clinic Visit

The South African diabetes guidelines recommend the evaluation of glycosylated haemoglobin, total cholesterol, standing blood pressure, complete mouth, eyes and feet examinations every six months in patients with diabetes, in order to achieve optimal levels of diabetic care (Working Group of the National Diabetes
Results indicated that no data (0%, 0, n = 103) was documented for any of the tests recommended at the sixth month clinic visit. The complete lack of documentation for glycosylated haemoglobin and total cholesterol is due to the fact that the tests are expensive and are not budgeted for at the PHC level. The tests are, however, recommended in a PHC setting by the South African diabetes guidelines (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Although standing blood pressure and complete mouth, eyes and feet examinations can be conducted in a PHC setting, it was found that no data (0%, (0), n = 103) was documented for these tests in the diabetic record cards during the sixth month clinic visit. Reasons regarding the absence of documentation for the tests recommended at the sixth month clinic visit will be discussed below.

- Patient Education Sessions

Patient education is essential in the delivery of effective diabetes care (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). A comparative analysis was performed on the documentation of patient education sessions in the pre- and post-intervention phases. Patient education topics included: what is diabetes; complications of diabetes; medication – side effects and compliance; exercise; diabetic diet; smoking and alcohol; symptoms of hypo and hyperglycaemia, and preventative foot care. Patient education and counseling are viewed as the cornerstones of diabetes management. Optimal patient education may lead to improved self-management of diabetes and, therefore, the improvement of glycaemic control, quality of life, and reduction of long-term implications. (Visser and Snoek, 2004; ADA, 2005)

No data was documented for patient education sessions in the pre- (0%, n = 309) or post-intervention (0%, n = 412) phases (Table 7.4). The lack of patient
education can be considered a major limitation, as all diabetic patients should receive regular counseling on diabetes and associated lifestyle changes so as to optimise patient care provided. In a previous study conducted by Oosthuizen et al. (2002), an educational intervention was implemented to improve the quality of care of diabetic patients at a tertiary level hospital in Pretoria, SA. The intervention was aimed at doctors and results indicated a significant increase in patient education between the pre- and post-intervention phases, from 41.9% to 71.9% (n = 32) (Oosthuizen et al., 2002). A study conducted in a peri-urban hospital in the Transkei region of the Eastern Cape, SA, found that there was no systemic format for or documentation of patient education (Erasmus and Blanco-Blanco, 2000). The lack of patient education identified in the present study is not isolated to this study, as numerous previous studies conducted in SA have also identified lack of patient education as a problem (Goodman et al., 1997; Beattie et al., 1998; Daniels et al., 2000b). Possible reasons for the absence of patient education will be discussed below.

- Possible Reasons Regarding the Absence of Documentation
  The position of the documentation site for patient education sessions on the diabetic record card may have contributed to the absence of patient education session documentation. The documentation site was situated at the bottom of the second page in the diabetic record card (Appendix E). Health care providers may not have turned to the second page during a patient consultation, hence not seeing the site, resulting in no documentation of patient education. The position of the documentation site for patient education sessions would need to be reconsidered if the diabetic record card were to be reformatted. Another possible reason for the lack of documentation for diabetic complications, sixth month clinic visit and patient education may be related to the time constraints experienced by the HCPs during patient consultations. Increased patient load and decreased consultation times with patients due to a decrease in the number of permanent HCPs were highlighted as major concerns, by the HCPs, during the focus group interviews (Chapter 6 – Section 6.8.3). Health care providers do not have the
time to provide in-depth patient education, which is essential in the optimal management of patients with diabetes.

Numerous previous studies have identified decreased consultation time with patients as a barrier to optimal diabetic management, indicating the increased need for the shortage of trained HCPs to be addressed (Goodman et al., 1997; Daniels et al., 2000b; Erasmus and Blanco-Blanco, 2000). For diabetes management to improve in patients, patient education must improve.

7.6.3 Glycaemic Control
The levels attained for parameters pertaining to glycaemic control during the pre-intervention phase were compared to the levels achieved during the post-intervention phase to determine if the educational intervention had an impact on patients’ glycaemic control. The recommended target values from the South African diabetes guideline were used to determine whether or not a patient was considered to have ideal glycaemic control (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a).

The glycaemic parameters investigated were:

- Blood glucose;
- Urine glucose, and
- \( \text{HbA}_{1c} \).

7.6.3.1 Comparison of Blood Glucose Levels
The blood glucose reading obtained for the last clinic visit in the pre-intervention phase (3\textsuperscript{rd} month) and the last clinic visit in the post-intervention phase (7\textsuperscript{th} month) was compared for each patient.

The SA diabetes guideline recommends an ideal random blood glucose level of 4 to 8 mmol/L, and an acceptable level of 8 to 10 mmol/L. Any blood glucose level \( \geq 10 \text{ mmol/L} \) is considered as a compromised level, with additional action
suggested to improve on the level of diabetic control. (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a)

Three patients (2.91%, n = 103) were excluded from the comparison of blood glucose levels as they were the only patients that had had fasting blood glucose levels measured in the pre-intervention phase (3rd month) and in the post-intervention phase (7th month). Hence, for the comparison of blood glucose levels, the patient population equaled 100.

The average blood glucose concentration was 12.26 ± 4.13 mmol/L (min = 4.1 mmol/L; max = 21.6; n = 100) for the pre-intervention phase (3rd month) and 11.02 ± 3.74 mmol/L (min = 3 mmol/L; max = 21.1 mmol/L; n = 100) for the post-intervention phase (7th month) (Figure 7.8).

![Blood Glucose Histogram](image)

Figure 7.8: Comparison of blood glucose readings measured during the last month of the pre-intervention phase (3rd month) and post-intervention phase (7th month) (n = 100). The readings are grouped according to the recommended blood glucose target values from the SA diabetes guideline i.e. 4 - 8 mmol/L (ideal), 8 – 10 mmol/L (acceptable), and ≥ 10 mmol/L (compromised) (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a).
There was an extremely significant change ($p = 0.0003$; Student t test) in the blood glucose concentrations after the implementation of the educational intervention, due to the increased number of patients (16% (pre) vs 22% (post); $n = 100$) presenting with ideal blood glucose concentrations ($4 – 8$ mmol/L) (Figure 7.8). This significant change indicated the positive impact of the educational intervention on blood glucose concentrations in the patient population.

The pre-intervention blood glucose concentrations were compared to findings from previous studies conducted in SA, regarding the levels of diabetes care. Results from a Cape Town study, involving 380 patients, found the average random blood glucose concentration to be $11.7 \pm 5.8$ mmol/L (Levitt et al., 1996). In a study conducted in Kwa-Zulu Natal involving 253 patients with diabetes, the average random blood glucose concentration was $14.5 \pm 7.5$ mmol/L (Rotchford and Rotchford, 2002). The comparison highlighted similar trends in blood glucose concentrations, which were suboptimal, for population groups attending PHC facilities in South Africa. Hence the educational intervention from the current study was identified as an effective tool in improving blood glucose concentrations in patients with diabetes.

Blood glucose levels can be affected by numerous factors including the technique used when taking measurements, meals consumed, exercise output and the use of medication. Therefore, blood glucose measurements are not the best measure to assess glycaemic control, with HbA$_{1c}$ results indicating a more accurate level of glycaemic control.

7.6.3.2 Comparison of Urine Glucose Levels
Urine dipstick testing is a less reliable way of detecting hyperglycaemia as compared to blood glucose finger prick testing. However, at the PHC level, urine dipstick testing can be considered a painless and less expensive method in determining high blood glucose levels, as glycosuria is correlated with hyperglycaemia. The optimal result for a urine glucose test is a negative result.
A positive result is indicative of compromised glucose control. (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a)

Urine glucose was tested using a multi urine dipstick, which tests for urine glucose, ketones and protein at the same time. Urine glucose results were available in only 45 patients (43.7%, n = 103) for the third month clinic visit (pre-intervention) and in 94 patients (91.2%, n = 103) for the seventh month clinic visit (post-intervention). The number of patients with an optimal result of no glucose present in the urine increased after the implementation of the educational intervention (28, 27.2%, n = 103 (third month clinic visit: pre-intervention) vs 51, 49.5%, n = 103 (seventh month clinic visit: post-intervention)) (Figure 7.9).

![Figure 7.9: Comparison of urine dipstick glucose levels measured during the third month clinic visit (pre-intervention) and the seventh month clinic visit (post-intervention). The values are grouped according to the SA diabetes guideline recommended target values for urine glucose levels, i.e. negative = optimal, and positive = compromised (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a)](image-url)
The number of patients with a positive test for glucose in the urine also increased after the implementation of the educational intervention (17, 16.5%, n = 103 (third month clinic visit: pre-intervention) vs 43, 41.7%, n = 103 (seventh month clinic visit: post-intervention) (Figure 7.9). This increase could be related to the significant increase (p < 0.0001, Fischer’s exact test) in the level of documentation of urine glucose dipstick results after the implementation of the educational intervention and the subsequent change in clinic protocol (Section 7.6.2.2 Monitoring Tests). The positive urine glucose results (43, 41.7%, n = 103) in the post-intervention phase indicated sub-optimal glycaemic control in the final patient population.

7.6.3.3 Comparison of HbA1c Levels
Pre- and post-intervention HbA1c levels were obtained in all 103 patients in the final patient population. The test was conducted for the purposes of the research project and was financed by the researchers. Glycosylated haemoglobin represents average blood glucose concentrations over a six to eight week period and the test is not affected by the time of day, food intake or pharmacological therapy taken on the day of testing or one to two days prior to testing. Testing the HbA1c of a patient with diabetes is therefore the ideal method for determining long-term glycaemic control. (ADA, 2005) Recommended target values from the SA diabetes guideline for HbA1c levels indicate an ideal HbA1c level of < 7% and an acceptable HbA1c level of between 7% and 8%. Any HbA1c level > 8% is considered as a compromised level, with additional action suggested to improve on the level of diabetic control. (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a)

The average HbA1c levels obtained were 7.97% ± 2.48% (min = 3.5%, max = 13.4%, n = 103) and 7.78% ± 2.19% (min = 3.5%; max = 13.6%; range = 10.1; n = 103) in the pre- and post-intervention phases respectively. The number of patients with an ideal HbA1c level (< 7%) increased from 37 (35.9%, n = 103) in the pre-intervention phase to 39 (37.9%, n = 103) in the post-intervention phase
(Figure 7.10). The number of patients with acceptable HbA$_{1c}$ levels remained the same at 15 (14.6%, n = 103) between the pre- and post-intervention phase, while the number of patients with compromised HbA$_{1c}$ levels decreased by 2 between the pre- and post-intervention phases (51, 49.5%, n = 103 vs 49, 47.5%, n = 103) (Figure 7.10). Although this result did not represent a statistically significant improvement (p = 0.2661, Student t test), there were improvements noted after the implementation of the education intervention. The number of patients with an HbA$_{1c}$ of > 9% dropped from 40 (38.83%, n = 103) in the pre-intervention phase to 32 (31.07%, n = 103) in the post-intervention phase, hence eight patients (7.76%, n = 103) had improved long-term glucose control.

![Figure 7.10: Comparison of HbA$_{1c}$ levels measured during the pre- and post-intervention phases.](image)

A possible reason for the HbA$_{1c}$ levels not showing a statistically significant improvement is that drug therapy was not being adjusted according to blood
glucose and HbA$_{1c}$ levels attained. This possibility will be discussed in Section 7.6.5 and Section 7.6.6.

Glycaemic control reported in other South African studies was found to be lower than that obtained in the pre-intervention phase of the present study. Rotchford and Rotchford (2002) reported that in a rural diabetic population in KwaZulu-Natal only 22.5% of patients had an HbA$_{1c}$ level of less than 8%, as compared to 50.5% (pre-intervention) of the present study patient population. Acceptable glycaemic control (defined as an HbA$_{1c}$ < 10% in a study conducted by Levitt et al., 1997) was reported to be present in 49.4% of patients partaking in an audit in Cape Town, as compared to the 50.5% of the pre-intervention HbA$_{1c}$ levels (less than 8%) of the present study patient population.

Van Zyl and Rheeder (2004) reported that mean HbA$_{1c}$ levels (of 300 patients participating in a study conducted involving a physician education programme improving quality of diabetes care) at baseline and follow up was 10.27% and 9.15% in the intervention group and 9.77% and 8.5% in the control groups, both non-significant changes. Although a similar result was obtained in the present study, levels of diabetic care related to long-term diabetes control were found to be more optimal, as mean HbA$_{1c}$ levels were lower (7.78% (present study – post-intervention vs 8.5% (Van Zyl and Rheeder (2004) – post-intervention)).

7.6.4 Blood Pressure and Body Mass Index Control

7.6.4.1 Comparison of Blood Pressure Control
Type 2 diabetes and hypertension are commonly associated chronic conditions, which both lead to an increased risk of cardiovascular and renal disease (United Kingdom Prospective Diabetes Study Group, 1998b). The UKPDS Group found that tight control of blood pressure in patients with hypertension and type 2 diabetes lead to a marked reduction in the risk of deaths related to diabetes, complications related to diabetes, progression of diabetic retinopathy, and
deterioration in visual acuity (United Kingdom Prospective Diabetes Study Group, 1998b). Therefore, to optimise diabetic care, tight control of blood pressure is essential, and should not be overlooked.

The levels attained for blood pressure control during the third month clinic visit (pre-intervention) were compared to the levels achieved during the seventh month clinic visit (post-intervention) to determine if the educational intervention had an impact on patients’ blood pressure control. The recommended blood pressure target value from the SA diabetes guideline (BP equal or less than 130/80 mmHg), was used to determine whether or not a patient’s blood pressure was within the ideal range or not (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a).

![Blood Pressure Distribution](image)

*Figure 7.11: Comparison of blood pressure readings measured during the 3rd month clinic visit (pre-intervention) and the 7th month clinic visit (post-intervention) (n = 103). The readings are grouped according to the recommended blood pressure target value (<= 130/80 mmHg) from the SA diabetes guideline (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a).*

Results for blood pressure control in the patient population between the pre- and post-intervention phases indicated that 38 patients (36.9%, n = 103) had optimal
blood pressure readings (<= 130/80 mmHg) and 65 patients (63.1%, n = 103) had compromised blood pressure readings (> 130/80 mmHg) in the pre-intervention phase (Figure 7.11). The number of patients with ideal blood pressure readings (<= 130/80 mmHg) only increased by one from 38 patients (36.9%, n = 103) to 39 patients (37.9%, n = 103) after the implementation of the educational intervention (Figure 7.11). This result was not statistically significant. However, there was a decrease noted in the number of patients with a compromised blood pressure of > 140/90 mmHg after the implementation of the educational intervention. In the pre-intervention phase, 38 patients (36.9%, n = 103) had a blood pressure reading of > 140/90 mmHg. In the post-intervention phase only 21 patients (20.4%, n = 103) had a blood pressure reading of > 140/90 mmHg, indicating that 17 patients (16.5%, n = 103) had improved, but not optimal, blood pressure control after the educational intervention, ultimately leading to a decrease in the risk of complications related to compromised blood pressure levels.

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>Pre-Intervention (3rd month)</th>
<th>Post-Intervention (7th month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic Pressure (mmHg)</td>
<td>Ave: 138.8 ± 20.6</td>
<td>Ave: 136.6 ± 17.6</td>
</tr>
<tr>
<td></td>
<td>Min: 100</td>
<td>Min: 90</td>
</tr>
<tr>
<td></td>
<td>Max: 180</td>
<td>Max: 200</td>
</tr>
<tr>
<td>Diastolic Pressure (mmHg)</td>
<td>Ave: 79.9 ± 10.6</td>
<td>Ave: 78.5 ± 11.3</td>
</tr>
<tr>
<td></td>
<td>Min: 50</td>
<td>Min: 60</td>
</tr>
<tr>
<td></td>
<td>Max: 100</td>
<td>Max: 120</td>
</tr>
</tbody>
</table>

There was only a slight decrease noted for the averages of the systolic and diastolic blood pressures for the third month clinic visit (pre-intervention) as compared to the seventh month clinic visit (post-intervention) (Table 7.5).
Levitt et al. (1996) showed that blood pressure management among patients with diabetes is a common problem encountered in PHC facilities in SA. In the study conducted by Levitt et al. (1996) 204 patients had hypertension (53.7%, n = 380) and 36.9% of these patients had a blood pressure reading of > 160/95 mmHg on three consecutive clinic visits and an additional 40% had blood pressure levels > 140/90 mmHg but < 160/95 mmHg (Levitt et al., 1996). Erasmus and Blanco-Blanco (2000) reported that 26.5%, of 307 diabetic patients studied in the EC, Umtata, presented with blood pressure readings of > 160/95 mmHg. In rural KwaZulu-Natal, Rotchford and Rotchford (2002) reported that 44.2% of the patient population of 253, had blood pressure readings of > 160/95 mmHg. Hence, from the above comparisons, poor management of blood pressure in patients with diabetes was not isolated to the present study, but found to be a common factor among diabetes patients in SA. The optimistic outcome from the present study regarding blood pressure control, however, was the improvement in blood pressure control identified for 17 patients (16.5%, n = 103), indicating the positive impact of the educational intervention on decreasing the number of patients with very compromised blood pressure readings.

7.6.4.2 Comparison of Body Mass Index Control
Overweight and obesity are strongly linked to the development of type 2 diabetes and may complicate its management. It is estimated that 80 to 90% of patients with type 2 diabetes are overweight or obese (Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2003). Obesity is also an independent risk factor for other metabolic comorbidities including hypertension, dyslipidemia and cardiovascular disease. The relationship between increasing body fat accumulation and adverse health outcomes exists throughout the range of overweight and obese men and women in all age groups. Moderate weight loss has been shown to improve glycaemic control (by increasing insulin sensitivity and glucose uptake), blood pressure control and dyslipidemia. (Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2003; ADA, 2005)
The assessment of a patient’s weight and height is recommended at every clinic visit, followed by the calculation of their BMI (kg/m²) (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). A patient’s weight control is considered to be optimal if they have a BMI level of < 25 kg/m². A BMI level of > 25 kg/m² is classified as being overweight, and a person is considered obese when their BMI level is > 30 kg/m². (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; ADA, 2005)

The values attained for weight and height during the third month clinic visit (pre-intervention) were compared to the values documented for weight and height during the seventh month clinic visit (post-intervention) to determine if the educational intervention had an impact on patients’ BMI control. The recommended BMI target value from the SA diabetes guideline, was used to determine whether or not a patient’s BMI was within the ideal range (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a).

Body mass index was calculated for 99 patients (99, 96.1%, n = 103) as four patients had no documentation of height. There was no significant impact noted on BMI control after the educational intervention, as the average BMI level increased slightly, instead of a favourable decrease. The average BMI’s obtained were 31.37 kg/m² ± 5.8 kg/m² (min = 20.45 kg/m², max = 51.78 kg/m², n = 99) and 31.50 kg/m² ± 6.01 kg/m² (min = 21.21 kg/m²; max = 54.24 kg/m²; n = 99) in the pre- and post-intervention phases respectively. In the pre-intervention phase only 10 patients (10.1%, n = 99) had optimal BMI levels (< 25 kg/m²), 11 patients (11.1%, n = 99) had acceptable BMI levels (25 to 27 kg/m²) and 78 patients (78.8%, n = 99) had compromised BMI levels (> 27 kg/m²) (Figure 7.12). After the implementation of the educational intervention, the number of patients with optimal BMI’s decreased by one, to nine patients (9.1%, n = 99), and the number of patients with acceptable BMI levels increased by one (12.1%, n = 99) (Figure 7.12). There was no change noted in the post-intervention phase with
regard to the number of patients with a compromised BMI level (> 27 kg/m²) (78, 78.8%, n = 99). In the pre-intervention phase, of the 78 patients classified as overweight with a compromised BMI level, 48 patients (48.5%, n = 99) had a BMI of greater than 30 kg/m² (obese). This number increased slightly in the post-intervention phase to 50 obese patients (50.5%, n = 99) of the 78 overweight patients.

Figure 7.12: Comparison of BMI levels calculated from patients’ height and weight readings during the 3rd month clinic visit (pre-intervention) and the 7th month clinic visit (post-intervention) (n = 99). The values are grouped according to the SA diabetes guideline recommended target values for BMI levels, i.e. < 25 kg/m² = ideal and > 27 kg/m² = compromised (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a).

Results obtained from the present study indicated that in the post-intervention phase, 90.9% (90, n = 99) of the patient population had BMI’s greater than 25 kg/m². This is similar to published data that suggests that 80 to 90% of patients with type 2 diabetes are overweight or obese (Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2003). The elevated average BMI is unfavourable for the patient population due to the numerous risk factors associated with increased BMI levels (Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2003; ADA, 2005). The small increase in
BMI levels in the post-intervention phase may be attributed to inaccurate readings of the measurement of patient weight levels as well as inconsistency with regard to the HCPs performing the weight measurement. It should also be noted that the four month intervention period fell into the Autumn/Winter season, hence patients’ weight levels may have increased slightly due to increased food consumption in the colder months of the year.

7.6.5 Patient Referrals

In a previous intervention study undertaken at the research site of the present study, it was noted that a change in pharmacotherapy did not always follow documentation of abnormal glucose and/or blood pressure readings (Reddy, 2003). This result highlighted the need for an educational intervention aimed at HCPs regarding the pharmacological management of diabetes and hypertension, and the need for HCPs to be able to identify when a patient’s care is compromised, and to ultimately refer the patient to the doctor. When the diabetic record card was updated in the pre-intervention phase an additional page for referral notes was included (in a different colour). This referral page provided HCPs with space to give a brief description of the reason for the patient referral to a doctor/hospital. Space was also provided for the doctor to comment on the outcome of the referral (Appendix E). Patient referrals will be discussed with regard to the:

- Number of Referrals;
- Site of Documentation of Referrals in Patient Medical File;
- Reason for Referrals;
- Outcome of Referrals, and
- Time Interval between Referral and Appointment with Clinic Doctor.
7.6.5.1 Number of Referrals

A total of 50 patient referrals were documented in 48 patient medical files (46.6%, n = 103) in the pre-intervention phase, with the average number of referrals per patient equaling 1.04 (Figure 7.13). In the post-intervention phase, 89 patient referrals were documented in 78 patient medical files (75.7%, n = 103), with the average number of referrals per patient equaling 1.14 (Figure 7.13).

![Figure 7.13: A comparative analysis, between the pre- and post-intervention phases, of the number of referrals documented per patient by the HCPs (n = 103). (Pre-intervention phase = 3 months and post-intervention phase = 4 months)](image)

According to the diabetes guideline of SA, a patient is considered uncontrolled if they present with a random blood glucose level of > 10 mmol/L for three consecutive months, a HbA1c level of > 8%, and/or a blood pressure reading of > 130/80 mmHg for three consecutive months (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Taking into consideration the above target values, of the 25 (24.27%, n = 103) patients who were not referred to the doctor in the post-intervention phase, 19 (18.45%, n = 103) patients should
have been referred due to three consecutive monthly readings of compromised blood glucose and/or blood pressure, and/or a compromised HbA1c level. However, the number of patient referrals increased significantly (p = 0.0030; Fischer’s Exact test) after the implementation of the educational intervention. The positive impact of the educational intervention resulted in the identification and referral of most uncontrolled diabetic and hypertensive patients by HCPs. Reasons for the increased number of patient referrals in the post-intervention phase may be related to the increased HCPs’ levels of knowledge after the education sessions as discussed in Section 6.7, and HCPs having increased levels of confidence after the educational intervention, as commented on during the post-intervention focus group interviews (Section 6.8.10).

7.6.5.2 Site of Documentation of Referrals in Patient Medical File
The site of documentation of referrals in the patient medical files investigated whether or not the new section included in the diabetic record card for the documentation of referrals was being utilised. Three sites for referral documentation were identified, namely the white pages (the patient’s medical file), the yellow pages (the diabetic record card), and the green pages (the specific and desired location for the documentation of patient referrals in the diabetic record card).

<table>
<thead>
<tr>
<th>Site of Documentation of Referrals</th>
<th>Pre-Intervention (n = 50)</th>
<th>Post-Intervention (n = 89)</th>
<th>% ↑ or ↓ after Intervention and p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient file (white pages)</td>
<td>38 (76%)</td>
<td>13 (14.6%)</td>
<td>↓ 61.4% p &lt; 0.0001</td>
</tr>
<tr>
<td>Diabetic record card (yellow pages)</td>
<td>7 (14%)</td>
<td>16 (18.0%)</td>
<td>↑ 4% p = 0.5634</td>
</tr>
<tr>
<td>Diabetic record card (green pages)</td>
<td>5 (10%)</td>
<td>60 (67.4%)</td>
<td>↑ 57.4% p &lt; 0.0001</td>
</tr>
</tbody>
</table>
In October 2004, HCPs were trained in the usage of the updated diabetic record card, including the optimal use of the green referral pages at the back of the diabetic record card. However, in the pre-intervention phase, the white pages in the patient medical files were found to be the favoured site for documentation of patient referrals (38; 76%, n = 50), and the green pages had the least number of documented patient referrals (5, 10%, n = 50) (Table 7.6). In the post-intervention phase, the green referral pages yielded the most number of documented patient referrals (60, 67.4%, n = 89), however the white pages in the patient files and the yellow pages in the diabetic record card were still being utilised (Table 7.6). An extremely significant increase (p < 0.0001; Fischer’s Exact test) was noted for the documentation of patient referrals in the correct site after the implementation of the educational intervention.

7.6.5.3 Reason for Referrals

The following categories for referrals were identified on analysis of patient referrals in the pre- and post-intervention phases, namely: renewal of script; patient uncontrolled; medication side effect, and an acute reason (Table 7.7).

<table>
<thead>
<tr>
<th>Reasons for Referral</th>
<th>Pre-Intervention (n = 50)</th>
<th>Post-Intervention (n = 89)</th>
<th>% ↑ or ↓ after Intervention and p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewal of script</td>
<td>37 (74%)</td>
<td>26 (29.2%)</td>
<td>↓ 44.8% p &lt; 0.0001</td>
</tr>
<tr>
<td>Patient uncontrolled (increased blood glucose, HbA1c and/or blood pressure levels)</td>
<td>11 (22%)</td>
<td>60 (67.4%)</td>
<td>↑ 45.4% p &lt; 0.0001</td>
</tr>
<tr>
<td>Medication side effect</td>
<td>1 (2%)</td>
<td>2 (2.2%)</td>
<td>↑ 0.2% p = 1.3788</td>
</tr>
<tr>
<td>Acute reason</td>
<td>1 (2%)</td>
<td>1 (1.1%)</td>
<td>↓ 0.9% p = 1.0000</td>
</tr>
</tbody>
</table>
In the pre-intervention phase, the most common reason given for a patient referral was identified as ‘renewal of script’ (37, 74%, n = 50) (Table 7.7). This reason is very vague, as it does not indicate whether or not the HCP identified a specific problem for the doctor to address. Only 22% (11, n = 50) of pre-intervention patient referrals documented that the patient was uncontrolled due to increased blood glucose, HbA\textsubscript{1c} and/or blood pressure levels. Results from the post-intervention phase indicated a 44.8% decrease (74% (pre) vs 29.2% (post)) in the use of ‘renewal of script’ as a reason for patient referrals (Table 7.7). The 45.4% increase (22% (pre) vs 67.4% (post)) noted in the post-intervention phase for the usage of a specific reason for a patient referral, was found to be extremely significant (p < 0.0001, Fischer’s Exact test). The educational intervention proved successful in increasing HCP knowledge levels and confidence levels in documenting a specific reason for a patient referral.

7.6.5.4 Outcome of Referrals
On investigation of the outcomes of patient referrals, five outcome categories were identified. These categories included: patient not attending doctor’s appointment; doctor unavailable; no change to medication (even though patient referred presented as uncontrolled); partial change to medication (patient presented with uncontrolled blood glucose and blood pressure values, yet only one problem was addressed), and change to medication (patient’s uncontrolled blood glucose, HbA\textsubscript{1c} and/or blood pressure problem was addressed).

It should be noted that for the analysis of the results pertaining to the outcome of patient referrals, all referrals documented in the pre-intervention phase were analysed as pre-intervention phase data, even if the patient only saw the doctor in the post-intervention phase.

Results indicated that nine patients (18%, n = 50, (pre)) and 14 patients (15.7%, n = 89, (post)) did not attend the doctor’s appointments that had been allocated to them since their referral (Table 7.8). This result was very disconcerting, as
patients who do not attend doctor's appointments can be identified as a self-inflicted limitation to their treatment goal of achieving optimal diabetes and blood pressure management. The importance of patient education is again highlighted by this point, as the patients themselves are ultimately in charge of how their diabetes and hypertension are managed. The need for more trained doctors, as discussed during the focus group interviews, reiterates the time constraints placed on PHC doctors, and decreased availability of doctors, hence once an appointment is missed, long waiting periods may follow before another appointment can be made.

Table 7.8: Comparison of the outcome of referrals in the pre-intervention phase (3 months) to after the educational intervention (post-intervention) (4 months).
Significance is taken as p < 0.05; Fischer's Exact test

<table>
<thead>
<tr>
<th>Outcome of Referrals</th>
<th>Pre-Intervention (n = 50)</th>
<th>Post-Intervention (n = 89)</th>
<th>% ↑ or ↓ after Intervention and p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient did not attend doctor's appointment</td>
<td>9 (18%)</td>
<td>14 (15.7%)</td>
<td>↓ 2.3% p = 0.8509</td>
</tr>
<tr>
<td>Doctor unavailable</td>
<td>3 (6%)</td>
<td>0 (0%)</td>
<td>↓ 6% p = 0.0289</td>
</tr>
<tr>
<td>No change to medication</td>
<td>17 (34%)</td>
<td>42 (47.2%)</td>
<td>↑ 13.2% p = 0.0836</td>
</tr>
<tr>
<td>Partial change to medication</td>
<td>1 (2%)</td>
<td>15 (16.9%)</td>
<td>↑ 14.9% p = 0.0004</td>
</tr>
<tr>
<td>Change to medication</td>
<td>20 (40%)</td>
<td>18 (20.2%)</td>
<td>↓ 19.8% p = 0.0032</td>
</tr>
</tbody>
</table>

The optimal result for a patient who is referred due to uncontrolled blood glucose, HbA1c and/or blood pressure readings, would be an appropriate change to pharmacological management, be that an increase in dose or the addition of a new drug agent. In the pre-intervention phase, 40% of patient referrals (20, n = 50) had an optimal outcome of a change in medication. There was a significant decrease observed (p = 0.0032, Fischer’s Exact test) in the optimal outcome of patient referrals in the post-intervention phase (18, 20.2%, n = 89). The doctor is
the only health care professional who has authority to prescribe or alter chronic prescriptions in a PHC setting hence the negative result obtained was not due to the educational intervention, as the prescribing doctor did not partake in the education sessions. It was disconcerting to note that of the 89 patient referrals in the post-intervention phase, 64.04% (57, n = 89) did not have a positive referral outcome. The educational intervention was successful in increasing the number of patient referrals documented by the HCPs, however, to complement the increased number of referrals, increased changes to pharmacological therapy needed to be observed to fully assess the impact of the educational intervention on diabetes management. The doctor can therefore be identified as a barrier to patients achieving optimal diabetes management in the present study.

The lack of response in the form of pharmacological changes, from the PHC doctor, to the uncontrolled blood glucose, HbA1c and/or blood pressure readings identified in the patient population, is referred to as clinical inertia. Diabetes care of patients cannot improve if clinical inertia is observed, as necessary changes to pharmacotherapy will not occur. From the above results, clinical inertia has presented as one of the main external limitations to the present study. Clinical inertia is not isolated to this study. Levitt et al. (1996) identified a high percentage (48.9%, n = 380) of patients who received no change to pharmacological management in this Cape Town study. In a study conducted by Rotchford and Rotchford (2002) in KwaZulu-Natal, 118 patients were identified as uncontrolled, however only 28 (23.7%, n = 118) patients received medication alterations. From the results of the two studies above and the present study, clinical inertia needs to be addressed in order for the optimization of pharmacotherapy of diabetes and hypertension.

7.6.5.5 Time Interval between Referral and Appointment with Clinic Doctor
Results from the analysis of the time interval between referral and appointment with the PHC clinic doctor indicated that the average waiting time was 1.65 months (min = 0 months, max = 3 months) in the pre-intervention phase. In the
post-intervention phase, this average waiting time increased to 2 months (min = 0 months, max = 4 months), for example if a patient was referred in May, they would only get a doctors appointment in August (2 months later). This increase in waiting time for an appointment with the clinic doctor correlates with comments made by the HCPs in the focus group interviews, regarding the increased patient loads experienced at the clinic and the need for a doctor to visit the clinic on a more regular basis, not just once a week. It was very evident that the patient load experienced at the PHC clinic was too great for one doctor to manage, let alone to be able to provide optimal levels of care to all those patients.

Figure 7.14: A comparative analysis, between the pre- and post-intervention phases, of the waiting time (in months) from a patient’s referral to a patient’s appointment with the clinic doctor. (Pre-intervention phase = 3 months (n = 50 referrals) and post-intervention phase = 4 months (n = 89 referrals)).

Results from the post-intervention phase were very disconcerting, indicating that 41.6% of patient referrals (37, n = 89) had a three months waiting period, and 11.2% of patient referrals (10, n = 89) had an unacceptable waiting period of four months (Figure 7.14).
When a patient is referred by a HCP, they may have had uncontrolled glycaemic and blood pressure levels for three months. The patient may then wait an additional three months before their appointment with the PHC doctor. By the time the patient consults with the doctor, they have been uncontrolled with compromised levels of diabetic and/or hypertensive care for more than six months. These extended periods of compromised care may lead to further diabetic and/or hypertensive complications arising, as well as the long term damage caused by the uncontrolled glycaemic and blood pressure levels. In addition to the extended periods of compromised care, clinical inertia may also result in no pharmacological changes being made to a patient’s drug therapy. All the above factors play a major role in the delay of optimisation of pharmacological management, and hence ultimate improved levels of diabetes and/or blood pressure care.

7.6.6 Pharmacological Management

The pharmacological management of the final patient population will be discussed in terms of:

- Pharmacological Management of Diabetes;
- Pharmacological Management of Hypertension, and
- ‘Out of Stock’ Medication.

7.6.6.1 Pharmacological Management of Diabetes

The pharmacological management of diabetes in the final patient population was compared in terms of the third month clinic visit (pre-intervention phase) to the seventh month clinic visit (post-intervention phase) or the month, after the seventh month clinic visit, when an outcome from a patient referral was achieved (post-intervention phase). All 103 patients (100%, n = 103) in the final patient population were receiving pharmacological management for type 2 diabetes mellitus.
The recommended oral drug agents used in the management of diabetes that are available in public sector PHC in SA are metformin, glibenclamide and gliclazide (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; National Essential Drugs List Committee, 2003).

The average number of drug agents used in the management of diabetes per patient was found to be 1.44 (total drug agents = 148, n = 103) in the pre-intervention phase and 1.5 (total drug agents = 154, n = 103) in the post-intervention phase (Figure 7.15). Metformin was found to be the oral drug of choice in the management of type 2 diabetes, with 59 patients (57.28%, n = 103) taking metformin in the post-intervention phase.

![Figure 7.15: Comparison of pre- and post-intervention pharmacological management of diabetes (n = 103).](image-url)
The most notable change with regard to drug agents used in the pharmacological management of diabetes in the post-intervention phase was the decreased number of single agents used (45, 43.7%, n = 103 (pre) vs 38, 36.9%, n = 103 (post)) and the subsequent increase in the number of patients on combined oral agents (40, 38.8%, n = 103 (pre) vs 46, 44.7%, n = 103 (post)) (Table 7.9). Eight patients (7.76%, n = 103) taking glibenclamide as a single agent in the pre-intervention, were initiated on metformin in the post-intervention phase (Table 7.9). Prescribing changes in the post-intervention phase also included the following: one patient (0.9%, n = 103) who was on metformin and gliclazide in the pre-intervention phase, was changed onto gliclazide only in the post-intervention phase, and one patient (0.9%, n = 103) who was on metformin and gliclazide, was initiated on insulin in the post-intervention phase. Throughout the study period, there were a total of 17 dose increases in the pharmacological management of diabetes. This result indicated a positive change, yet not optimal change due to clinical inertia identified in Section 7.6.5.4, in the pharmacological management of diabetes after the implementation of an educational intervention, as prescribing changes were noted.

The total number of patients with suboptimal glycaemic control at the end of the post-intervention phase was as follows:

- Of the 38 patients (36.9%, n = 103) on single oral agents, 17 patients (16.5%, n = 103) had not achieved optimal glycaemic control, all of whom were not taking the maximum dose of their single agent drug.
- Of the 46 patients (44.7%, n = 103) on combination oral agents, 23 patients (22.3%, n = 103) had not achieved optimal glycaemic control, of which 41 of 92 agents (46 patients on two agents each) were not prescribed at maximum doses.
- Of the 15 patients (14.5%, n = 103) on insulin therapy only, seven patients (6.8%, n = 103) had not achieved optimal glycaemic control.
Table 7.9: Summary of pharmacological management of type 2 diabetes in patient population between the pre- and post-intervention phases (n = 103).

<table>
<thead>
<tr>
<th>Pharmacological Therapy</th>
<th>No. of patients (%)</th>
<th>Minimum dose (%)</th>
<th>Within dosing range (%)</th>
<th>Maximum dose (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td><strong>SINGLE ORAL AGENTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metformin</td>
<td>10 (9.7%)</td>
<td>10 (9.7%)</td>
<td>1 (1.0%)</td>
<td>-</td>
</tr>
<tr>
<td>Glibenclamide</td>
<td>22 (21.4%)</td>
<td>14 (13.6%)</td>
<td>2 (1.9%)</td>
<td>-</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>13 (12.6%)</td>
<td>14 (13.6%)</td>
<td>1 (1.0%)</td>
<td>1 (1.0%)</td>
</tr>
<tr>
<td><strong>COMBINATION ORAL AGENTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metformin</td>
<td>19 (18.4%)</td>
<td>27 (26.2%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Glibenclamide</td>
<td>19 (18.4%)</td>
<td>27 (26.2%)</td>
<td>1 (1.0%)</td>
<td>-</td>
</tr>
<tr>
<td>Metformin</td>
<td>20 (19.4%)</td>
<td>18 (17.5%)</td>
<td>1 (1.0%)</td>
<td>-</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>20 (19.4%)</td>
<td>18 (17.5%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Glibenclamide</td>
<td>1 (1.0%)</td>
<td>1 (1.0%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>1 (1.0%)</td>
<td>1 (1.0%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>INSULIN ONLY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biphasic mixtures 30/70</td>
<td>14 (13.6%)</td>
<td>15 (14.6%)</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td><strong>INSULIN AND ORAL AGENTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biphasic Mix 30/70</td>
<td>4 (3.9%)</td>
<td>4 (3.9%)</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Metformin</td>
<td>3 (2.9%)</td>
<td>3 (2.9%)</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Intermediate acting Metformin</td>
<td>1 (1.0%)</td>
<td>1 (1.0%)</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>1 (1.0%)</td>
<td>1 (1.0%)</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

* = Dosing range for insulin individualised
- = 0 (0%)
Of the three patients (2.9%, n = 103) on insulin and oral drug agent management, two patients (1.9%, n = 103) had not achieved optimal glycaemic control.

The combination of gliclazide and glibenclamide in one patient (0.9%, n = 103) was very concerning, as the use of two sulphonylurea agents may be very detrimental to the patients health. The results above highlighted yet again the phenomenon of clinical inertia in the patient population with regard to the pharmacological management of diabetes. It was also evident that there was room for dosage adjustments to aid in optimising of pharmacological management, as not all oral drug agents were being dosed at their maximum doses at the end of the research period.

Use of Metformin in Overweight Patients (BMI > 25 kg/m²)
The recommended value for optimal BMI control from the SA diabetes guideline is < 25 kg/m² (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Patients with type 2 diabetes are considered overweight if they have a BMI > 25 kg/m². The recommended single drug agent of choice in treating overweight patients with type 2 diabetes is metformin, unless it is contraindicated (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Results from the study indicated that 34 patients (33.0%, n = 103) of the 38 patients on single oral agent drug therapy in the post-intervention phase, had BMI’s > 25 kg/m². Only two patients (1.9%, n = 103) had optimal BMI’s and there was no BMI data for two patients (1.9%, n = 103). According to guideline recommendations, all 34 patients with BMI’s > 25 kg/m² should have been prescribed metformin, unless contraindicated. However, only 9 patients (8.7%, n = 103) of the 34 patients were prescribed metformin, indicating poor prescribing adherence to the SA diabetes guidelines in the final patient population on single agent drug therapy.
7.6.6.2 Pharmacological Management of Hypertension

The pharmacological management of hypertension in the final patient population was compared in terms of the third month clinic visit (pre-intervention phase) to the seventh month clinic visit (post-intervention phase) or the month, after the seventh month clinic visit, when an outcome from a patient referral was achieved (post-intervention phase). Results indicated that 82 patients (79.6%, n = 103) in the final patient population were receiving pharmacological management for hypertension at the end of the study period. The target blood pressure in patients with type 2 diabetes is 130/80 mmHg (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a). Of the 21 patients (20.4%, n = 103) not receiving pharmacological management for hypertension, 15 patients (14.6%, n = 103) did not have controlled BP levels of below 130/80 mmHg, and should hence have been on pharmacological management for hypertension.

The recommended oral drug agents used in the management of hypertension, in the presence of type 2 diabetes that are available in public sector PHC in SA are perindopril and HCT (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne et al., 2003; National Essential Drugs List Committee, 2003). If a patient's BP is not controlled on perindopril and HCT, other drug agents classed in the management of hypertension may be utilised, as long as no contraindications exist.

The average number of drug agents used in the management of hypertension per patient was found to be 1.81 (total drug agents = 136, n = 75) in the pre-intervention phase and 1.94 (total drug agents = 159, n = 82) in the post-intervention phase (Figure 7.16). Perindopril was found to be the oral drug of choice in the management of hypertension, with 69 patients (84.15%, n = 82) taking perindopril in the post-intervention phase. This result was in accordance with diabetes guideline recommendations, as perindopril is the drug agent of choice in the treatment of hypertension in the presence of type 2 diabetes (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a).
There were notable differences with regard to prescribing changes in the pharmacological management of hypertension in the post-intervention phase (Table 7.10). Seven patients (6.8%, n = 103) were initiated on pharmacological management of hypertension in the post-intervention. All seven of these patients were initiated on perindopril, which is in accordance with the SA diabetes guideline (Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a).
Table 7.10: Summary of pharmacological management of hypertension in patient population between the pre- and post-intervention phases (n = 103).

<table>
<thead>
<tr>
<th>Pharmacological Therapy</th>
<th>No. of patients (%)</th>
<th>Minimum dose (%)</th>
<th>Within dosing range (%)</th>
<th>Maximum dose (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>ZERO AGENTS</td>
<td>28 (27.2%)</td>
<td>21 (20.4%)</td>
<td>3 (2.9%)</td>
<td>3 (2.9%)</td>
</tr>
<tr>
<td>SINGLE AGENT</td>
<td>29 (28.2%)</td>
<td>25 (24.3%)</td>
<td>3 (2.9%)</td>
<td>3 (2.9%)</td>
</tr>
<tr>
<td>TWO AGENTS</td>
<td>34 (33.0%)</td>
<td>40 (38.8%)</td>
<td>1 (0.9%)</td>
<td>7 (6.8%)</td>
</tr>
<tr>
<td>THREE AGENTS</td>
<td>9 (8.7%)</td>
<td>14 (13.6%)</td>
<td>3 (2.9%)</td>
<td>7 (6.8%)</td>
</tr>
<tr>
<td>FOUR AGENTS</td>
<td>3 (2.9%)</td>
<td>3 (2.9%)</td>
<td>2 (1.9%)</td>
<td>1 (0.9%)</td>
</tr>
</tbody>
</table>
There was an increase in the number of patients taking two agents for blood pressure control in the post-intervention phase (34, 33.0%, n = 103 (pre) vs 40, 38.8%, n = 103 (post)), as well as an increase in the number of patients taking three agents for blood pressure control in the post-intervention phase (9, 8.7%, n = 103 (pre) vs 14, 13.6%, n = 103 (post)). Throughout the study period, there were only two dose increases noted in the pharmacological management of hypertension. This result indicated a positive change, yet not optimal change due to clinical inertia identified in Section 7.6.5.4, in the pharmacological management of hypertension after the implementation of an educational intervention, as prescribing changes were noted.

The total number of patients with suboptimal blood pressure control at the end of the post-intervention phase was as follows:

- Of the 21 (20.4%, n = 103) patients not prescribed pharmacological management for hypertension, 15 patients (14.6%, n = 103) did not have optimal BP readings.
- Of the 25 patients (24.3%, n = 103) on single oral agents, 16 patients (15.5%, n = 103) had not achieved optimal BP control, of which 19 of the 25 single agents were not prescribed at maximum doses.
- Of the 40 patients (38.8%, n = 103) on two oral agents, 24 patients (23.3%, n = 103) had not achieved optimal BP control, of which 33 of 80 agents (40 patients on two agents each) were not prescribed at maximum doses.
- Of the 14 patients (13.6%, n = 103) on three oral agents, 8 patients (7.8%, n = 103) had not achieved optimal BP control, of which 15 of 42 agents (14 patients on three agents each) were not prescribed at maximum doses.
- Of the three patients (2.98%, n = 103) on four oral agents, two patients (1.9%, n = 103) had not achieved optimal BP control, of which 7 of 12 agents (three patients on four agents each) were not prescribed at maximum doses.
The results above highlighted yet again the phenomenon of clinical inertia in the patient population with regard to the pharmacological management of hypertension. It was also evident that there was room for dosage adjustments to aid in optimising of pharmacological management of hypertension, as not all drug agents were being dosed at their maximum doses at the end of the research period.

7.6.6.3 ‘Out of Stock’ Medication

‘Out of stock’ medication is considered to be a major limitation to the optimisation of pharmacological management of diabetes and hypertension. In the pre- and post-intervention focus group interviews, HCPs identified the problem of ‘out of stock’ medication and commented on how this external problem was negatively affecting their attitudes to their working environment. Continuity of patient care and prevention of complications due to uncontrolled diabetes and hypertension cannot be achieved if patient compliance with pharmacological management is interrupted due to medication being out of stock.

Patient diabetic record cards were analysed to determine if any medication was ‘out of stock’ during the seven month study period (combined pre- and post-intervention phases). Results indicated that 53 patients (51.46%, n = 103) were not issued all their prescribed medication at some point during the seven month study period. In total, 95 items were indicated as ‘out of stock’ in the seven month period, with an average of 1.79 ‘out of stock’ items (min = 1, max = 4, n = 95) for each of the 53 patients affected.

Hydrochlorothiazide was found to be the most ‘out of stock’ item, with it not being issued on 35 (36.84%, n = 95) occasions (Table 7.11). As a result of HCT being out of stock on so many occasions, six patients (5.82%, n = 103) who had stable, yet not all optimal, BP readings on their prescribed pharmacological management, experienced a decreased level of blood pressure control due to non-compliance with HCT (Table 7.12). Hence ‘out of stock’ medication was
identified as an external factor negatively influencing the level of diabetes and blood pressure care.

<table>
<thead>
<tr>
<th>'Out of Stock' Medication</th>
<th>Number of times medication indicated as 'Out of Stock' (n = 95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCT</td>
<td>35 (36.84%)</td>
</tr>
<tr>
<td>Aspirin</td>
<td>14 (14.74%)</td>
</tr>
<tr>
<td>Verapamil</td>
<td>10 (10.53%)</td>
</tr>
<tr>
<td>Insulin – Biphasic mix 30/70</td>
<td>2 (2.11%)</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>2 (2.11%)</td>
</tr>
<tr>
<td>Metformin</td>
<td>1 (1.05%)</td>
</tr>
<tr>
<td>Perindopril</td>
<td>1 (1.05%)</td>
</tr>
<tr>
<td>Other Items</td>
<td>29 (30.53%)</td>
</tr>
</tbody>
</table>

It was most disconcerting to find that the biphasic insulin mix (30/70) was out of stock on two occasions (2.11%, n = 95) (Table 7.11). Patients, who are controlled on insulin as pharmacological management of diabetes, could go into a hyperglycaemic coma without the insulin. Other ‘out of stock’ medication items illustrated in Table 7.11 referred to one of the following drug agents: chlorpheniramine tablets; conjugated oestrogen tablets; diclofenac tablets;
ibuprofen tablets; methylsalicylate ointment; paracetamol tablets; salbutamol inhalers, and vitamin B Co tablets. The cost implications of diabetes complications due to out of stock medication far outweigh the cost of the medications, hence to optimise pharmacological management of diabetes and hypertension, out of stock medication must be addressed.

7.7 FEEDBACK OF RESEARCH RESULTS

On the 17th of February 2006, the research results were presented to six of the health care providers who had been involved in the research study, and other members of the NMMM and Department of Health. The presentation was held at the Port Elizabeth Resource Centre at the Livingstone Hospital. Overall, the response from the health care providers was positive as the research results highlighted the possibilities and limitations to improving care provided to patients in a primary health care setting. A copy of the presentation summarising the research results of the project was forwarded to the Department of Health and the NMMM.

7.8 SUMMARY

The implementation of the educational intervention resulted in improved documentation of clinical findings. Statistically significant (p < 0.0001; Fischer’s Exact) improvements in documentation were noted for physical examinations (excluding BMI), biochemical monitoring tests, social history, queries for symptoms indicating diabetic complications and disease history.

There was an extremely significant (p = 0.0003; Student t test) improvement noted after the educational intervention for blood glucose concentrations. As blood glucose measurements can be affected by numerous factors, HbA1c levels offer a more accurate level of glycaemic control. A slight improvement was noted for HbA1c levels after the educational intervention however, this improvement was
not significant. There were improvements noted as the number of patients with an HbA$_{1c}$ of > 9% dropped from 40 (38.83%, n = 103) in the pre-intervention phase to 32 (31.07%, n = 103) in the post-intervention phase, hence eight patients (7.76%, n = 103) had improved long-term glucose control.

Blood pressure control improved slightly but not significantly. However, there was a decrease noted in the number of patients with a compromised blood pressure of > 140/90 mmHg after the implementation of the educational intervention. In the pre-intervention phase, 38 patients (36.9%, n = 103) had a blood pressure reading of > 140/90 mmHg. In the post-intervention phase only 21 patients (20.4%, n = 103) had a blood pressure reading of > 140/90 mmHg, indicating that 17 patients (16.5%, n = 103) had improved, but not optimal, blood pressure control after the educational intervention, ultimately leading to a decrease in the risk of complications related to compromised blood pressure levels.

The number of patient referrals increased significantly ($p = 0.0030$; Fischer’s Exact test) after the implementation of the educational intervention. The positive impact of the educational intervention resulted in the identification and referral of most uncontrolled diabetic and hypertensive patients by HCPs.

There was a significant decrease observed in the optimal outcome of patient referrals in the post-intervention phase. The doctor is the only health care professional who has authority to prescribe or alter chronic prescriptions in a PHC setting hence the negative result obtained was not due to the educational intervention, as the prescribing doctor did not partake in the education sessions, but due to clinical inertia. It was disconcerting to note that of the 89 patient referrals in the post-intervention phase, 64.04% (57, n = 89) did not have a positive referral outcome, hence influencing the level of diabetic and hypertensive control achieved in the patient population.
Positive prescribing changes in the management of diabetes and hypertension were noted after the implementation of the educational intervention however, these changes were not optimal due to clinical inertia. The extended waiting period for doctor consultations was identified as a major limitation to the optimisation of diabetes care, as the impact of prescribing changes may not have been able to illicit the optimal effect on patients’ glycaemic and blood pressure control.

The positive outcome of the educational intervention on the quality of diabetes care provided, as identified in this study, is in accordance with previous South African studies conducted which also achieved positive outcomes in diabetes care provided. These studies included:

- Oosthuizen et al. (2002): A short educational intervention resulted in the improvement of clinical management of diabetic patients in a tertiary care hospital.
CHAPTER 8

CONCLUSION AND RECOMMENDATIONS

8.1 INTRODUCTION

The conclusions and recommendations arising from the research study are presented in Chapter 8.

8.2 CONCLUSION

The West End Community Health Centre, which is a public sector PHC clinic in the NMMM, was selected as the research site. Patient data, pertaining to the level of glycaemic and hypertensive control and management, was collected in the pre- and post-intervention phases. Data pertaining to prescribing changes related to clinical findings, was collected in the pre- and post-intervention phases. The level of knowledge and attitudes of health care providers at the PHC was assessed in the pre- and post-intervention phases. A structured educational intervention based on the South African diabetes and hypertension guidelines for the monitoring and pharmacological management of type 2 diabetes and hypertension was formulated and designed, with the aid of detailed notes and summarised desk cards, for implementation at the PHC clinic (Working Group of the National Diabetes Advisory Board, 1997; Society for Endocrinology, Metabolism and Diabetes of South Africa, 2002a; Milne et al., 2003). The implementation of the educational intervention at the PHC clinic was successful. The educational intervention resulted in a significant increase in the level of knowledge of the HCPs. Attitudes of the HCPs improved towards the management of diabetes after the implementation of the educational intervention. The updated diabetic record card assured adequate documentation of clinical
findings from consultations with the patients. An increase in the monitoring of clinical findings was evident in the patient population after the educational intervention, due to the increased number of patient referrals, documented in the specific section of the diabetic record card allocated to referrals, for patients with uncontrolled diabetes and hypertension. This increase in patient referrals positively impacted the pharmacological management of the patient population as an increase in prescribing changes was noted. The prescribing changes had a positive clinical outcome, yet not significant outcome, on glycaemic and blood pressure control in the patient population. The educational intervention helped to improve the level of diabetes and hypertension care provided at the PHC clinic. To further optimise pharmacological management of patients with diabetes and hypertension, external factors which negatively impacted the study, including prolonged waiting periods for doctor’s appointments and clinical inertia, need to be addressed.

The initial patient population consisted of 232 patients with diabetes. However, after exclusion criteria were applied, the final patient population consisted of 103 patients with diabetes.

Detailed conclusions will be presented in terms of: level of health care provider knowledge achieved; attitudes of the HCPs from the focus group interviews; documentation of diabetic management; glycaemic and blood pressure control achieved, and patient referrals and pharmacological management.

- **Level of Health Care Provider Knowledge**
  The implementation of the educational intervention resulted in an extremely significant increase in the level of knowledge of the HCPs for the pharmacological management of diabetes and hypertension. Although base knowledge may not have been present in all HCPs, the educational intervention was still effective as a tool in improving HCPs’ knowledge levels.
Health care provider knowledge levels, indicated below as the number of correct responses to questions, improved significantly after the educational intervention with regard to:

- Target values: 6, 17.1%, n = 35 (pre) vs 16, 45.7%, n = 35 (post) (p = 0.00194, Fisher’s Exact test).
- Pharmacological management of diabetes: 15, 17.9%, n = 84 (pre) vs 61, 72.6%, n = 84 (post) (p < 0.0001, Fisher’s Exact test).
- Pharmacological management of hypertension: 26, 23.2%, n = 112 (pre) vs 83, 74.1%, n = 112 (post) (p < 0.0001, Fisher’s Exact test).
- Case studies: 1, 3.6%, n = 28 (pre) vs 17, 60.7%, n = 28 (post) (p < 0.0001, Fisher’s Exact test).

- Attitudes of Health Care Providers

The increase in the positive attitudes felt by the HCPs after the educational intervention indicated the success of the educational intervention in improving the attitudes of HCPs towards the management of diabetes and hypertension. The HCPs expressed positive attitudes towards the training presented by the researcher in the intervention phase.

Positive attitude changes after the implementation of the educational intervention were noted for:

- The treatment of patients with diabetes;
- The improvement of the standard of care provided at the PHC clinic;
- The initiation of guideline summary cards which resulted in improved HCP attitudes towards the South African guidelines, and
- Improved confidence levels regarding the pharmacological management of diabetes and hypertension.

Limitations with respect to the provision of optimal diabetes care were identified by the HCPs. These limitations were not as a result of the educational intervention, but due to external factors. Limitations included: negative working
environments due to increased patient loads and a decreased number of staff; time constraints which negatively impact on the standard of care provided, and 'out of stock' medication.

- **Documentation of Diabetic Management**

  The updated diabetic record card improved documentation of clinical findings. This is important, as medical records are the primary source of information regarding the health of the patient. Furthermore, in the public health sector the patient is not assured of being treated by the same HCP at every visit. A main reason for the significant increases in the levels of documentation of diabetic management can be attributed to the changed clinic protocol after the implementation of an education intervention.

  - Statistically significant ($p < 0.0001$; Fischer's Exact test) increases in documentation were noted after the implementation of an educational intervention, for all parameters excluding BMI, pharmacological management and patient education (there was no change noted for these three parameters).
  
  - Pharmacological management was found to have an optimal level of documentation (100%) in the pre- and post-intervention phases.
  
  - There was no documentation (0%) noted for BMI and patient education during the pre- and post-intervention phases.
  
  - The most significant increase in the level of documentation in the post-intervention phase was noted for urine dipstick tests (129, 41.7%, n = 309 increased to 340, 82.5%, n = 412).

- **Glycaemic and Blood Pressure Control**

  There was an extremely significant improvement noted after the educational intervention for blood glucose concentrations. Blood glucose measurements are not the best measure to assess glycaemic control, with HbA$_{1c}$ results indicating a more accurate level of glycaemic control. Although improvements in HbA$_{1c}$ levels and blood pressure levels were noted after the educational intervention, they
were not significant. A possible reason is that the number of referrals of uncontrolled patients increased, however, extended waiting periods for doctor’s appointments and clinical inertia impacted negatively on glycaemic and blood pressure control.

- Blood glucose concentrations improved significantly ($p = 0.0003$, Student t test), due to an increased number of patients presenting with ideal blood glucose concentrations in the post-intervention phase (16%, $n = 100$ (pre) vs 22%, $n = 100$ (post)).

- Glycosylated haemoglobin results improved but not significantly. However there were clinically significant improvements noted. In the pre-intervention phase 40 patients (38.83%, $n = 103$) had a compromised HbA$_{1c}$ level of > 9%. After the implementation of the educational intervention, the number of patients with a compromised HbA$_{1c}$ level of > 9% decreased to 32 patients (31.07%, $n = 103$).

- Blood pressure control improved slightly but not significantly. However there were clinically significant improvements noted. In the pre-intervention phase 38 patients (36.89%, $n = 103$) had a compromised blood pressure of > 140/90mmHg. After the implementation of the educational intervention, the number of patients with a compromised blood pressure of > 140/90mmHg decreased to 21 patients (20.4%, $n = 103$).

- **Patient Referrals and Pharmacological Management**

  The educational intervention was successful in increasing the number of patient referrals documented by the HCPs. However, the outcome of these referrals was found to not always be optimal. Out of 89 patient referrals documented in the post-intervention phase, 64.04% (57, $n = 89$) did not have an optimal referral outcome. For an optimal referral outcome, changes to pharmacological therapy needed to be observed, when necessary. Prescribing changes were noted after the educational intervention however, clinical inertia was identified as a barrier to patients achieving optimal diabetes management in the present study. Extended
waiting periods for doctor consultations were also identified as a barrier to the effectiveness of the educational intervention.

8.3 RECOMMENDATIONS

The following recommendations arose from the research study:

- Implement an educational intervention aimed at doctors to encourage adjustment of prescribed medication (either dose or pharmacological agent) relative to diabetic and blood pressure control achieved (to address the limitation of clinical inertia as identified in this study).
- Implement an educational intervention aimed at patients with type 2 diabetes to improve their knowledge and understanding of the disease state, favourable diet, compliance to pharmacological management and complications (to address the limitation of the lack of patient education provided). Diabetes care begins with the patient, and prevention is better than cure.
- Increase the number of permanent trained HCPs (doctors, nurses, pharmacists) at PHC clinics, to improve on the continuity of care and the level of care provided, for example, this would result in longer consultation times and faster rates for referral outcomes as the waiting time interval for an appointment with a doctor would be decreased.
- Develop a procedure for effective follow-ups on patient defaulters, as patients’ defaulting from clinic visits was identified as a limitation in the present study.
- Address ‘out of stock’ medication limitation, as patients cannot achieve optimal care if their pharmacological management is out of stock.
- Implement periodic in-service training regarding diabetes and hypertension, to allow HCPs to achieve and maintain high levels of knowledge regarding the management of these chronic conditions.


APPENDIX A

Patient Consent Form
### INFORMATION AND INFORMED PATIENT CONSENT FORM

**TITLE OF THE RESEARCH PROJECT:** Optimisation of pharmacological management of diabetes mellitus in a primary health care setting.

**PRINCIPAL INVESTIGATOR:** Ms Bev Dickason

**ADDRESS:** 26 5th Avenue, Newton Park, Port Elizabeth, 6045

**CONTACT TELEPHONE NO.:** (041) 3652241 (h), 072 8506768, (041) 5042717 (w)

**DECLARATION BY OR ON BEHALF OF PATIENT:**

| I, THE UNDERSIGNED, ........................................ (name) | Initial |
| [I.D. No: .............................................................. ] the patient of .............................................................. | |
| ............................................................................. (address). | |

**A. HEREBY CONFIRM AS FOLLOWS:**

| I, the patient was invited to participate in the abovementioned research project, which is being undertaken by Bev Dickason of the Department of Pharmacy in the Faculty of Health Sciences, University of Port Elizabeth. | Initial |
| The following aspects have been explained to me: | Initial |
| The investigators are studying: Optimisation of diabetic care in a primary health care setting. | Initial |
| The information will be used as part of a research project focused towards improving management of diabetes mellitus patients. | Initial |
| I understand that information from my medical file will be used in this research project. | Initial |
| There will be no risks involved. | Initial |
| There will be no direct benefit to individual patients during the length of the study. | Initial |
| My identity will not be revealed in any discussion, description or scientific publications by the investigators. | Initial |
| Any new information / or benefit that may develop during the course of the study will be shared with me. | Initial |
| My participation is voluntary. My decision whether or not to participate will in no way affect my present or future medical care/ employment / lifestyle. | Initial |
| The information above was explained to me / the participant by Bev Dickason | Initial |
| In Afrikaans / English | Initial |
| And I am in command of this language / it was satisfactorily translated to me by .............................................. (name of translator) | Initial |
| I was given the opportunity to ask questions and all these questions were answered satisfactorily. | Initial |
| No pressure was exerted on me to consent to participation and I understand that I may withdraw at any stage without penalization. | Initial |
Participation in this study will not result in any additional cost to myself.

B. I HEREBY CONSENT VOLUNTARILY TO PARTICIPATE IN THE ABOVEMENTIONED PROJECT.

Signed / confirmed at Port Elizabeth on ........................................ 2005
(date)

.................................................. ..................................................
Signature or right thumb print of patient Signature of witness

Statements and Declarations:

STATEMENT BY OR ON BEHALF OF INVESTIGATOR(S):
I, Bev Dickason .........................................................., declare that
- I have explained the information given in this document to
  ..........................................................
  (name of the patient) and/or his/her representative ..................................
  (name of the representative);
- he/she was encouraged and given ample time to ask me any questions;
- this conversation was conducted in Afrikaans/English/Xhosa/Other ..........
  and no translator was used / this conversation was translated into ..........
  (language) by .......................................................... (name).

Signed at ........................................ on ........................................ 2005
(place) (date)

.................................................. ..................................................
Signature of investigator / representative Signature of witness

IMPORTANT MESSAGE TO PATIENT:

Dear patient,

Thank you for your participation in this study. Should, at any time during the study,
- an emergency arise as a result of the research, or
- you require any further information with regard to the study
kindly ask Nursing staff to contact Bev Dickason at (041) 3652241 (h), 072 8506768 or (041) 5042717 (UPE)
APPENDIX B

Health Care Provider Consent Form
# INFORMATION AND INFORMED HEALTH CARE PROVIDER CONSENT FORM

**TITLE OF THE RESEARCH PROJECT:** Optimisation of pharmacological management of diabetes mellitus in a primary health care setting.

**PRINCIPAL INVESTIGATOR:** Ms Bev Dickason

**ADDRESS:** 26 5th Avenue, Newton Park, Port Elizabeth, 6045

**CONTACT TELEPHONE NO.:** (041) 3652241 (h), 072 8506768, (041) 5042717 (w)

---

## DECLARATION BY HEALTH CARE PROVIDER:

I, THE UNDERSIGNED, ................................................. (name)

[I.D. No: ..............................................................] the health care provider

of .............................................................................. (address).

---

**A. HEREBY CONFIRM AS FOLLOWS:**

I, the HCP was invited to participate in the abovementioned research project, which is being undertaken by Bev Dickason of the Department of Pharmacy in the Faculty of Health Sciences, University of Port Elizabeth.

The following aspects have been explained to me:

- The investigators are studying: Optimisation of diabetic care in a primary health care setting.
- The information will be used as part of a research project focused towards improving management of diabetes mellitus patients.

I understand that information from me will be used in this research project.

There will be no risks involved.

There will be no direct benefit to individual patients during the length of the study.

My identity will not be revealed in any discussion, description or scientific publications by the investigators.

Any new information / or benefit that may develop during the course of the study will be shared with me.

My participation is voluntary. My decision whether or not to participate will in no way affect my present or future employment / lifestyle.

The information above was explained to me, the HCP, by Bev Dickason in English, and I am in command of this language.

I was given the opportunity to ask questions and all these questions were answered satisfactorily.

No pressure was exerted on me to consent to participation and I understand that I may withdraw at any stage without penalization.

Participation in this study will not result in any additional cost to myself.

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</table>

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274
B. I HEREBY CONSENT VOLUNTARILY TO PARTICIPATE IN THE
ABOVEMENTIONED PROJECT.

Signed / confirmed at Port Elizabeth on .......................... 2005

(date)

Signature of HCP  Signature of witness

Statements and Declarations:

STATEMENT BY OR ON BEHALF OF INVESTIGATOR(S):

I. Bev Dickason, declare that
   • I have explained the information given in this document to
     ............................................................................ (name of the HCP)
   • he/she was encouraged and given ample time to ask me any questions;
   • this conversation was conducted in English and no translator was used.

Signed at Port Elizabeth on .......................... 2005

(date)

Signature of investigator / representative  Signature of witness

IMPORTANT MESSAGE TO HCP:

Dear health care provider,

Thank you for your participation in this study. Should, at any time during the study,
   • an emergency arise as a result of the research, or
   • you require any further information with regard to the study
kindly contact Bev Dickason at (041) 3652241 (h), 072 8506768 or (041) 5042717 (UPE)
APPENDIX C

Usage of Card Questionnaire
‘USAGE OF CARD QUESTIONNAIRE’

1. Name

2. Time period working at West End Clinic?

3. Where did you work before West End Clinic?

4. Where are you stationed at the clinic (observation or consultation)?

5. Did Milli train you during the previous research project?

6. Are you familiar with the yellow Diabetic Card?

7. Are you going to be at work from the 4th October to 15th October?

8. Will you be taking leave between September 2004 and December 2004? If yes, when?

9. Unless due to unforeseen circumstances, will you still be working at the clinic in March/April 2005?

10. Do you initiate the yellow diabetic record card in newly diagnosed diabetics?

THANK YOU FOR YOUR TIME!
APPENDIX D

Extent of Documentation
Data Collection Form
EXTENT OF DOCUMENTATION DATA COLLECTION FORM

Date of data collection:

## PATIENT DEMOGRAPHICS

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<tr>
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</tr>
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<td>Family History (Y/N)</td>
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## RECORD CARD INFORMATION

Does patient have a diabetic record card (Y/N)?

Dates of last 3 entries on record card vs. dates of last 3 entries in patient file for:-

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<th>FILE</th>
</tr>
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<tr>
<td>Complications</td>
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<td>Every visit</td>
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<td></td>
</tr>
<tr>
<td>Blood Pressure</td>
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<tr>
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<td>Patient Education Sessions</td>
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</table>

**GENERAL**
APPENDIX E

Diabetic Record Card
**DIABETIC RECORD CARD: U.P.E. PHARMACY DEPARTMENT**

Name:  
Date of Birth:  
I.D. no.:  
Type I:  
Type II:  
Diagnosis Date (DD/MM/YY):  
Family History: Yes  
Medical History:

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<td>Stroke</td>
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</tr>
<tr>
<td>Heart Attack</td>
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<tr>
<td>Cholesterol</td>
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<tr>
<td>Angina</td>
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<tr>
<td>Cataracts</td>
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<td>Retinopathy</td>
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<tr>
<td>Amputation</td>
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**EVERY VISIT**

<table>
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<tr>
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<th>1</th>
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<table>
<thead>
<tr>
<th>Nurse (Initials)</th>
<th>Date (DD/MM): 2004 &amp; 2005</th>
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<tbody>
<tr>
<td>Weight (kg)</td>
<td></td>
</tr>
<tr>
<td>Height (m)</td>
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</tr>
<tr>
<td>BMI (kg/m²)</td>
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</table>

<table>
<thead>
<tr>
<th>Blood Pressure (mmHg)</th>
<th>Ketones (−/+/++)</th>
<th>Protein (−/+/++)</th>
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<tbody>
<tr>
<td>Blood Glucose mmol/L</td>
<td>Random</td>
<td>Fasting</td>
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<table>
<thead>
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<table>
<thead>
<tr>
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<th>No</th>
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<th>1 to 5 per day</th>
<th>&gt; 5 per day</th>
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<table>
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<table>
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<table>
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<tr>
<th>Exercise Y/N</th>
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<table>
<thead>
<tr>
<th>Compliance: Excellent/Good/Bad</th>
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</table>

<table>
<thead>
<tr>
<th>Eyes Y/N</th>
<th>Problem: Vision</th>
</tr>
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<tbody>
<tr>
<td>Renal Y/N</td>
<td>Proteinuria</td>
</tr>
<tr>
<td>Feet</td>
<td>Sores</td>
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<table>
<thead>
<tr>
<th>Sensory</th>
<th>Pain</th>
<th>Numbness</th>
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</thead>
<tbody>
<tr>
<td>Motor</td>
<td>Weakness</td>
<td>Diarrhoea</td>
</tr>
<tr>
<td>Autonomic</td>
<td>Dizziness</td>
<td>Constipation</td>
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</table>

<table>
<thead>
<tr>
<th>Hospitalised since last visit Y/N</th>
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</thead>
<tbody>
<tr>
<td>Symptoms of hypoglycaemia Y/N</td>
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<tr>
<td>Symptoms of hyperglycaemia Y/N</td>
</tr>
<tr>
<td>Rotate Insulin Injection Sites Y/N</td>
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### VISIT 6

<table>
<thead>
<tr>
<th>HbA1c (%)</th>
<th>Skin: (Injury/ Infection) Y/N</th>
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<tbody>
<tr>
<td>Total Cholesterol</td>
<td>Pulse: Normal/ Reduced/ Absent</td>
</tr>
<tr>
<td>Standing Blood Pressure (mmHg)</td>
<td>Sensation: Present/ Weakened/Absent</td>
</tr>
<tr>
<td>Feet</td>
<td></td>
</tr>
<tr>
<td>Mouth</td>
<td>Teeth &amp; Gums Y/N</td>
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<tr>
<td>Eyes</td>
<td>Callous and Nail Abnormalities YN</td>
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<tr>
<td></td>
<td>Ulcers Y/N</td>
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<td>Gangrene Y/N</td>
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<td>Ankle &amp; Knee Reflex: Present/Absent</td>
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<table>
<thead>
<tr>
<th>HbA1c (%)</th>
<th>Serum Lipids</th>
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</thead>
<tbody>
<tr>
<td><strong>Test only if total cholesterol at visit 6 not ideal</strong></td>
<td></td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>Triglycerides</td>
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<tr>
<td></td>
<td>LDL</td>
</tr>
<tr>
<td></td>
<td>HDL</td>
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Serum Creatinine: To be tested only if proteinuria is present

### PATIENT EDUCATION SESSIONS BY DIABETIC EDUCATOR

<table>
<thead>
<tr>
<th>Topics</th>
<th>Nurse Date</th>
<th>Topics</th>
<th>Nurse Date</th>
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<tbody>
<tr>
<td>What is diabetes</td>
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<td>Smoking and alcohol</td>
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<tr>
<td>Complications of diabetes</td>
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<td>Symptoms of hypo and hyperglycaemia</td>
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<tr>
<td>Medication – Side Effects &amp; Compliance</td>
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<td>Preventative foot care</td>
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<td>Exercise</td>
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### ACUTE MEDICATION

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<tr>
<td>VISIT/DATE</td>
<td>CHRONIC MEDICATION</td>
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<td>Visit 11: General Comments</td>
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<td>Visit 12: General Comments</td>
<td>Date:</td>
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APPENDIX F

Comprehensive Notes on
Usage of Diabetic Record Card
INSTRUCTIONS FOR FILLING OUT DIABETIC RECORD CARD

General Details:

Must be filled at first visit.

- **Name:** Patients name and surname
- **ID No:** Identity number
- **Date of Birth:** Day, followed by month, followed by year (eg: 28/03/1980) Determine age of patient and fill in the bracket
- **Diagnosis Date:** To be filled by the nurse or doctor in the consultation room. Look back in the patient file. If not available ask the patient. Fill in day, followed by month, followed by year (eg: 28/03/1980). If the patient does not remember the exact date, the year will be sufficient. If this information is not available fill in not available.
- **Type:** To be filled by the nurse or doctor in the consultation room. Tick if the patient has Type I or Type II diabetes
- **Family History:** To be filled by the nurse or doctor in the consultation room. Ask patient if parents/grandparents/brothers/sisters are/were diabetic. Tick yes if the patient has a family history of diabetes. Tick no if the patient does not have a family history of diabetes.

Medical History:

*To be filled by nurse or doctor in the consultation room.*

If unable to determine if the patient has the complication on the first visit, leave this section blank and fill in as the necessary tests are performed throughout the year.

The date refers to the date that the complication was detected.

Tick the yes column if the patient has the complication. If the exact date is not in the file, ask the patient and fill in the approximate date that the complication was detected.

Tick the no column if the patient does not have the complication. No date will be required.

If the patient develops the complication during the course of the year, tick yes and fill in the date on which the complication was detected. If a tick was present in the no column, do not delete this tick.
At Sorting:

- **Nurse (Initials):** The nurse at sorting must fill in his/her initials
- **Date (DD/MM):** Fill in day of visit & month (e.g. 15/04)
- **Weight:** Weight in kilograms
- **Height:** Height in meters (If the height is in centimetres divide by 100 to convert it to meters e.g. 160 cm divided by 100 = 1.6m

- **Body Mass Index (BMI):** Kilograms divided by the height squared

  **Example:**
  - Weight = 70 kg
  - Height = 1.6 m

  **Body Mass Index** = 70 divided by 1.6 x 1.6 = 27.3 kg/m²

  If the BMI is > 27 kg/m² in men or > than 26 kg/m² in women please give card to patient indicating that BMI is not within the normal range. The patient will have to give the card to the doctor/nurse in the consultation room.

- **Blood pressure:** Systolic and diastolic pressure must be filled in this column. If the blood pressure is ≥ 130/80 mmHg please give card to patient indicating that blood pressure is not within the normal range. The patient will have to give the card to the doctor/nurse in the consultation room.

- **Urine:** From the dipstick.

  - : If the patient does not have any ketones/ protein/ glucose/ blood/ leucocytes
  - +/+++:+: Each + indicates the amount of ketones/ protein/ glucose/ blood/ leucocytes

  If ketones/ protein/ glucose/ blood/ leucocytes are detected in the urine give card indicating that abnormality has been detected in the urine to the patient to give to nurse/doctor in the consultation room.

  **NB:** If there are no abnormalities detected in the urine it is essential that you fill in the -. Do not leave it blank.

- **Blood Glucose:** Determine if the patient has eaten. If the patient has eaten a meal within the last two hours, the blood glucose value must be filled in the random column. If the patient has not eaten a meal within the last two hours the blood glucose value must be filled in the fasting column. If the glucose is > 8 mmol/l before meals or ≥ 10 mmol/l after meals please give card to patient indicating that glucose value is not within the normal range. The patient will have to give the card to the doctor/nurse in the consultation room.
Consultation Room:

- **Name Doctor/Nurse (Initials):** The nurse or doctor in the consultation room must fill in their initials.

- **Look at blood pressure readings, blood glucose readings and urine dipstick results:** REACT TO THE CARDS THAT WERE SENT FROM SORTING! Counsel the patient on loosing weight, exercising and eating correctly.

- **Blood pressure:** If blood pressure is not within normal limits advise on lifestyle modification (exercise, limit salt intake). Determine if the patient has been compliant. If the patient has not been compliant counsel the patient on the importance of taking their medication as the doctor has prescribed it. Monitor blood pressure after 4 to 8 weeks and if still not within the optimal or acceptable level refer to the doctor at the clinic. *(See flow chart: Guidelines for managing blood pressure)* Before referring to the doctor for additional drug therapy, ensure that the patient has been taking his or her medication as prescribed.

- **Blood glucose:** If not within the optimal or acceptable limit (see table for targets) advise the patient on lifestyle modification (eating, exercising, taking medication as prescribed). If lifestyle modification was not successful in improving glucose control (after 4 to 8 weeks), consider referring to the doctor for the revision of medication (refer to medication flow chart). **Before referring to the doctor for additional drug therapy, ensure that the patient has been taking his or her medication as prescribed.**

- **Smoking:** Ask the patient. Tick the NO row if the patient does not smoke. If the patient does smoke determine the number smoked per day and tick the appropriate row. If the patient smokes, counsel the patient. The importance of not smoking will also be reinforced in the education session.

- **Alcohol:** Ask the patient. Tick the NO row if the patient does not drink alcohol. If the patient does drink alcohol determine how often and tick the appropriate row. If the patient drinks alcohol, counsel the patient. The importance of not drinking alcohol will also be reinforced in the education session.

- **Illegal Drugs:** Ask the patient if they take any illegal agents e.g. Dagga. If the patient uses illegal drugs tick, if the patient does not use illegal drugs cross the row. If the patient uses illegal drugs, counsel the patient. The importance of not using illegal drugs will also be reinforced in the education session.
• **Exercise:** Ask the patient. The patient must exercise for about 30 min at least four times a week. If the patient exercises tick, if the patient does not exercise cross the column. If the patient does not exercise, encourage him/her to start a regular moderate exercise programme for about 30 minutes at a time, at least four times in the week.

• **Compliance:** Is the patient taking their diabetic medication as prescribed? Ask the patient. If the patient takes the medication as prescribed fill in **E** for excellent, if the patient missed one or two days fill in **G** for good, if the patient missed taking his or her medication for more than two days then fill in **B** for bad.

• **Eyes:**
  - **Vision:** Ask the patient. If there is decreased vision tick the column, if the patient does not have problems with their vision cross the column. If the patient has experienced a sudden deterioration in their vision, their vision must be tested using the snellen chart. If the deterioration in vision is drastic then the patient must be referred to an ophthalmologist.

• **Renal:**
  - **Proteinuria:** Check the results of the urine dipstick. If there was protein in the urine tick, if there was no protein in the urine cross the column. If protein is detected for more than three consecutive visits refer patient to doctor at the clinic.

• **Feet:**
  - **Sores:** Check the feet for sores *(DO NOT ASK THE PATIENT-LOOK).* If present tick, if sores not present cross the column. If present **TREAT!!!**
  - **Gangrene:** Check the feet for the presence of gangrene. If present tick, if gangrene is not present cross the column. Patients with gangrene must be urgently referred to Livingstone.

**Counsel the patient on foot care:** Avoid injuries and if they do occur take them seriously, ensure foot hygiene, wear well fitting shoes, do not walk barefoot, inspect feet regularly for cuts, callous, nail abnormalities, infections and ulcers

• **Neuropathy:**
  - **Sensory:** Ask the patient if they experience pain or numbness on the feet or hands. If present tick, if pain or numbness not present cross the column
  - **Motor:** Ask the patient if they experience muscular weakness. If present tick, if muscle weakness not present cross the column
• **Autonomic:** Ask the patient if they experience diarrhoea/dizziness/constipation. If present tick, if not present cross the column.

**If any of the above problems were detected counsel the patient on the importance of a diabetic diet (eating foods low in fat and sugar content), exercise routine (regular moderate exercise programme for about 30 minutes at a time, at least four times in the week) and taking their medication (both diabetic and hypertension medication) as prescribed by the doctor**

• **Hospitalised since last visit:**
Ask patient if they had been hospitalised since their last visit due to their diabetes. If yes tick the column if no cross the column. If yes counsel the patient on the importance of compliance to medication (both hypertension and diabetic medication), following an exercise routine (regular moderate exercise programme for about 30 minutes at a time, at least four times in the week) and following a diabetic diet.

• **Symptoms of hypoglycaemia:**
Ask the patient if they have experienced symptoms of hypoglycaemia since their last visit e.g. sweating, tremor, hunger, anxiety, increased heart rate, dizziness, headache and vision becoming cloudy. Three or more of these symptoms must be present at once for it to be recognised as a hypoglycaemic attack. If yes tick the column, if no cross the column. If the patient is not aware of the symptoms of a hypoglycaemic attack, give them the examples of the symptoms (sweating, tremor, hunger, anxiety, increased heart rate, dizziness, headache and vision becoming cloudy). Tell the patient that hypoglycaemia can occur if they skip meals and if they undertake strenuous physical activity without eating. If the patient has experienced these symptoms advise them not to skip meals, to carry a sweet and if the symptoms occur to eat the sweet.

• **Symptoms of hyperglycaemia:**
Ask the patient if they experienced increased thirst, very high glucose levels (from home glucose monitoring if possible) and increased urination since their last visit. If yes tick the column if no cross the column. If the patient is unaware of the symptoms of hyperglycaemia give them examples of the signs and symptoms (increased thirst, very high glucose levels and increased urination). If yes counsel on the importance of taking their medication as prescribed, and to follow a diabetic diet.
• **Rotation of insulin injection sites:**
  Ask patients on insulin therapy if they rotate the site of injection when injecting in different parts of the body. If yes tick the column if no cross the column. If the patient does not rotate the site of the injection advise the patient to rotate sites of injection on the abdomen (not to close to the navel) and the thighs. Insulin injections can also be given on the buttocks and upper arm.
  In addition check the injection technique:
  - Inject insulin at room temperature
  - Make sure no air bubbles remain in the syringe before injecting- flick the upright syringe once or twice with a finger to allow for air bubbles to escape
  - Keep muscles in the injection area relaxed
  - Most patients can grasp a fold of the skin and inject at a 90° angle. Thin patients can pinch the skin and inject at a 45° angle.
  - Penetrate the skin quickly
  - Do not change direction of the needle during insertion or withdrawal.
  - If blood or a clear fluid is seen after withdrawing the needle, the patient must apply pressure for 5-8 seconds without rubbing.

**Visit 6:**

- **HbA₁c:** To be tested in all patients. If not within the optimal or acceptable limit (see table for targets) advise the patient on lifestyle modification (eating, exercising, taking medication as prescribed).

- **Total Cholesterol:** To be tested in all patients. If not within the optimal or acceptable limit (see table for targets) advise the patient on lifestyle modification (eating, exercising).

- **Standing blood pressure:** To be tested in all patients

- **Mouth:** Check the mouth for dental cavities and ulcers on the gum. Tick if abnormalities were detected, cross if no abnormalities were detected. *(Refer to dentist if cavities are found)*

- **Eyes:**
  - **Visual Acuity:** Use the snellen chart to determine the patients visual acuity. Fill in the score of the test. If sudden deterioration noted in vision refer to doctor at the clinic then ophthalmologist
  - **Fundal Examination:** Examine the retina in a dark room If abnormalities detected refer to doctor at the clinic then ophthalmologist
  - **Cataracts:** Examine if cataracts are present. If Present fill in P, if absent fill in A, and if the patient was treated for cataracts fill in T. If cataracts observed for the first time refer to the doctor at the clinic then ophthalmologist
• **Feet:**
  - **Skin:** Check feet for injury and infection. If present tick, if injury and infection not present cross the column. If injury or infection present **TREAT!!**
  - **Pulses:** Feel the foot for pulses. Fill in **N** (Normal) if the pulse is normal, fill **R** (Reduced) if the pulses are present but not normal. Fill in **A** (Absent) if no pulses are present
  - **Sensation:** Run a piece of cotton wool on the patient’s feet. Check protective sensation by pricking the patient with a pin. If the patient feels, the cotton wool and the pinprick fill in **P** (Present), if the feeling is not so strong fill in **W** (Weakened). If the sensation is not present fill in **A** (Absent)
  - **Callous and Nail abnormalities:** Check the feet and toe nails. If present tick, if callous and nail abnormalities not present cross the column. If present treat appropriately. If very severe refer to the doctor at the clinic.
  - **Ulcers:** Check the feet. If present tick, if ulcers not present cross the column. If ulcers present **TREAT!!**
  - **Gangrene:** Check the feet. If present tick, if gangrene not present cross the column. If gangrene present **REFER TO LIVINGSTONE!!**
  - **Ankle and knee reflex:** Test the ankle and knee reflex with a patella hammer. If present fill in **P**, if absent fill in **A**

**Counsel the patient on foot care:** Avoid injuries and if they do occur take them seriously, ensure foot hygiene, wear well fitting shoes, do not walk barefoot, inspect feet regularly for cuts, callous, nail abnormalities, infections and ulcers

**Visit 12:**

- **HbA1c:** To be tested in all the patients. If not within the optimal or acceptable limit (see table for targets) advise the patient on lifestyle modification (eating, exercising, taking medication as prescribed). If lifestyle modification since visit six was not successful in improving glucose control, consider referral to doctor for the revision of medication (refer to medication flow chart). **Before referring to the doctor for additional drug therapy, ensure that the patient has been taking his or her medication as prescribed.**

- **Serum Lipids:** Total cholesterol, triglycerides. LDL and HDL levels must be tested only in patients who did not have an ideal or acceptable total cholesterol level at visit 6. (Refer to table for values)

- **Serum Creatinine:** To be tested only if proteinuria was present in the urine for more than five successive visits (from the urine dipstick)
**Acute and Chronic Medication:**

The nurse or doctors initials must be filled in the column titled nurse/doctor. The date of the visit must be filled in, in the column titled visit/date. The nurse or doctor in the consultation room must fill in this section. The name of the drug and dosage prescribed must be filled in the relevant block.

**Education Sessions:**

The nurse who leads the education sessions must fill in her initials. The date of the education session must be filled in when a particular topic was discussed.

**General Comments:**

Fill in the date
Fill in initials (doctor/nurse)

Any general comments/ notes can be filled in this section.

**Referral Comments:**

Fill in date
Fill in doctor or hospital referred to
Fill in the nurse’s name that is referring patient
Give a brief reason for the referral

The doctor is required to complete section below, stating the outcome of the referral.
ABNORMALITY DETECTED IN URINE

BLOOD PRESSURE ≥130/80 mmHg

BODY MASS INDEX > 27 kg/m² (Male)

BODY MASS INDEX > 26 kg/m² (Female)

BLOOD GLUCOSE ≥ 10 mmol/l (AFTER MEAL)

BLOOD GLUCOSE > 8 mmol/l (BEFORE MEAL)
REASONS FOR REFERRAL

The tiny numbers on the record card serve as prompts for reasons for referral.

1. Significant hyperglycaemia > 20mmol/l

2. Hypoglycaemic coma (Not responding to IV glucose)

3. Refer to ophthalmologist:
   • Sudden deterioration in vision (Determined from Snellens chart or complaints by patient)
   • If changes detected on fundal examination
   • If cataracts detected

4. Gangrene or Ischaemic feet – URGENT REFERRAL

5. Pregnancy

6. Visit 6:
   • HbA1c
   • Total cholesterol

7. Visit 12:
   • HbA1c
   • Total cholesterol, Triglycerides, LDL and HDL only if the Total cholesterol at visit 6 was not within the optimal or acceptable range
   • Serum Creatinine if the patient had proteinuria for more than five successive visits
## TARGETS

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<th>*OPTIMAL</th>
<th>**ACCEPTABLE</th>
<th>***COMPROMISED</th>
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<td>Negative (−)</td>
<td>Positive (+)</td>
<td>Positive (++)</td>
</tr>
<tr>
<td>Blood Glucose (mmol/l)</td>
<td>Fasting</td>
<td>4-6</td>
<td>6-8</td>
</tr>
<tr>
<td></td>
<td>After Meals</td>
<td>4-8</td>
<td>8-10</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>Men</td>
<td>20-25</td>
<td>25-27</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>19-24</td>
<td>24-26</td>
</tr>
<tr>
<td>Blood Pressure (mmHg)</td>
<td>&lt; 130/80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA₁c (%)</td>
<td>&lt; 7</td>
<td>7-8</td>
<td>&gt;8</td>
</tr>
<tr>
<td>Total cholesterol (mmol/l)</td>
<td>&lt; 5.0</td>
<td>5.0-6.5</td>
<td>&gt; 6.5</td>
</tr>
<tr>
<td>HDL Cholesterol (mmol/l)</td>
<td>&gt; 1.2</td>
<td>0.9-1.2</td>
<td>&lt; 0.9</td>
</tr>
<tr>
<td>Triglycerides (mmol/l)</td>
<td>&lt; 1.5</td>
<td>1.5-2.2</td>
<td>≥ 2.2</td>
</tr>
</tbody>
</table>

*This is the ideal in a diabetic patient and indicates excellent diabetic control
** This is acceptable in diabetic patients and indicates good diabetic control
*** These values indicate very poor diabetic control

**Source:**
1. Guidelines for the management of patients with type II (non-insulin-dependent) diabetes mellitus at primary health care level in South Africa (1997).

University of Port Elizabeth
Pharmacy Department
Tel: 041 5042717
APPENDIX G

Patient Data Collection Form
DATA COLLECTION FORM

REF No: ____________________________
Date of Birth: (Age: ....) ____________________________
Diagnosis Date (DD/MM/YY): ____________________________
Type I: ________ Type II: ________
While filling in the form: Yes = ✓ and No = ×
Family History: Yes ________ No ________

Medical History:

<table>
<thead>
<tr>
<th>COMPLICATION</th>
<th>DATE</th>
<th>YES</th>
<th>NO</th>
<th>COMPLICATION</th>
<th>DATE</th>
<th>YES</th>
<th>NO</th>
<th>COMPLICATION</th>
<th>DATE</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
<td></td>
<td>Stroke</td>
<td></td>
<td></td>
<td></td>
<td>Heart Attack</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cholesterol</td>
<td></td>
<td></td>
<td></td>
<td>Angina</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Retinopathy</td>
<td></td>
<td></td>
<td></td>
<td>Cataracts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Glaucoma</td>
<td></td>
<td></td>
<td></td>
<td>Amputation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EVERY VISIT

Every Visit

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
</table>

Nurse (Initials)

Date (DD/MM): 2004 & 2005

Weight (kg)

Height (m)

BMI (kg/m²)

Blood Pressure (mmHg)

Ketones (-/+/++)

Protein (-/+/++)

Glucose (-/+/++)

Blood (-/+/++)

Leucocytes (-/+/++)

Blood Glucose mmol/L

Random

Fasting

Name: Doctor/Nurse (Initials)

Smoking

No

1 a day

1 to 5 per day

> 5 per day

Alcohol

No

Once a week

2-3 times per week

Daily

Illegal Drugs Y/N

Exercise Y/N

Compliance: Excellent/Good/Bad

Eyes Y/N

Problem: Vision

Renal Y/N

Proteinuria

Feet

Sores

Gangrene

Sensory

Pain

Numbness

Motor

Weakness

Diarrhoea

Autonomic

Dizziness

Constipation

Hospitalised since last visit Y/N

Symptoms of hypoglycaemia Y/N

Symptoms of hyperglycaemia Y/N

Rotate insulin injection sites Y/N

304
### VISIT 6

<table>
<thead>
<tr>
<th><strong>HbA1c (%)</strong></th>
<th><strong>Total Cholesterol</strong></th>
<th><strong>Skin:</strong> (Injury/Infection) Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standing Blood Pressure (mmHg)</strong></td>
<td><strong>Feet</strong></td>
<td><strong>Pulse:</strong> Normal/Reduced/Absent</td>
</tr>
<tr>
<td><strong>Mouth:</strong> Teeth &amp; Gums Y/N</td>
<td></td>
<td><strong>Sensation:</strong> Present/Weakened/Absent</td>
</tr>
<tr>
<td><strong>Eyes:</strong> Visual Acuity (Score)</td>
<td></td>
<td><strong>Callous and Nail Abnormalities Y/N</strong></td>
</tr>
<tr>
<td><strong>Fundal Examination (Retina)</strong></td>
<td></td>
<td><strong>Ulcers Y/N</strong></td>
</tr>
<tr>
<td><strong>Cataracts:</strong> Present/Absent/Treated</td>
<td></td>
<td><strong>Gangrene Y/N</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Ankle &amp; Knee Reflex:</strong> Present/Absent</td>
</tr>
</tbody>
</table>

### VISIT 12

<table>
<thead>
<tr>
<th><strong>HbA1c (%)</strong></th>
<th><strong>Serum Lipids</strong> <strong>“Test only if total cholesterol at visit 6 not ideal”</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Total Cholesterol</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Triglycerides</strong></td>
</tr>
<tr>
<td></td>
<td><strong>LDL</strong></td>
</tr>
<tr>
<td></td>
<td><strong>HDL</strong></td>
</tr>
<tr>
<td><strong>Serum Creatinine:</strong> To be tested only if proteinuria is present</td>
<td></td>
</tr>
</tbody>
</table>

### MEDICATION

<table>
<thead>
<tr>
<th>Visit/Date</th>
<th>Nurse/Doctor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
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<tr>
<td>5</td>
<td></td>
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<td>6</td>
<td></td>
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<tr>
<td>7</td>
<td></td>
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<tr>
<td>8</td>
<td></td>
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<tr>
<td>9</td>
<td></td>
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<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

### PATIENT EDUCATION SESSIONS BY DIABETIC EDUCATOR

<table>
<thead>
<tr>
<th>Topics</th>
<th>Nurse</th>
<th>Date</th>
<th>Topics</th>
<th>Nurse</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is diabetes</td>
<td></td>
<td></td>
<td>Diabetic diet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complications of diabetes</td>
<td></td>
<td></td>
<td>Smoking and alcohol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication – Side Effects &amp; Compliance</td>
<td></td>
<td></td>
<td>Symptoms of hypo and hyperglycaemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
<td>Preventative foot care</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX H

Health Care Provider Questionnaire
HEALTH CARE PROVIDER QUESTIONNAIRE

Please complete the following questionnaire on the recommended management of type 2 diabetes mellitus.

Where indicated, please circle the relevant answer to indicate your response, for example:

YES  NO

OR

Place a cross in the relevant box.

If a question does not apply to you, please indicate this by writing NOT APPLICABLE (N/A) next to the question (please do not leave the question blank).

THANK YOU FOR YOUR TIME AND CO-OPERATION!

Bev Dickason  Contact details:
MPharm student  Cell: 072 8506768
Department of Pharmacy  Home: 041 3652241
University of Port Elizabeth

This questionnaire will be allocated a reference number, therefore your name will not appear on this questionnaire and your questionnaire will remain confidential.

REF NUMBER
1. Please indicate which age group you fall into:

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Year Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20 years</td>
<td>21 – 30 years</td>
</tr>
<tr>
<td>31 – 40 years</td>
<td>41 – 50 years</td>
</tr>
<tr>
<td>51 – 60 years</td>
<td>Over 61 years</td>
</tr>
</tbody>
</table>

2. Please indicate all the degrees/diplomas that you have obtained in the nursing/medical field and the year in which the degree/diploma was awarded?

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. How many years have you been working in primary care?  

4. What position do you hold at West End Clinic?

5. How long have you been working with the diabetic structured record card at the clinic?
6. Have you received any other training or education on the management of diabetes mellitus? YES NO
If yes, elaborate please:

<table>
<thead>
<tr>
<th>DATE</th>
<th>TRAINER</th>
<th>SHORT DESCRIPTION OF TRAINING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. A patient’s condition is said to be compromised if their:

Fasting blood glucose concentration is above: mmol/L
Post prandial blood glucose concentration is above: mmol/L
HbA1c reading is greater than: %
Cholesterol reading is greater than: mmol/L

8. What is the target blood pressure for patients with diabetes? mmHg

9. Give the pharmacological class for the following drugs used to lower blood glucose levels:

<table>
<thead>
<tr>
<th>DRUG</th>
<th>PHARMACOLOGICAL CLASS (e.g. ibuprofen = NSAID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td></td>
</tr>
<tr>
<td>Gliclazide</td>
<td></td>
</tr>
<tr>
<td>Glibenclamide</td>
<td></td>
</tr>
</tbody>
</table>
10. At what dose would you start a patient on each of the following drugs:

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE (mg)</th>
<th>TIMES PER DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gliclazide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glibenclamide</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. How high can you increase the dose of the following drugs before you would consider adding a second drug (i.e. what is the maximum dose of the following drugs):

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE (mg)</th>
<th>TIMES PER DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gliclazide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glibenclamide</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. Which clinical findings would require adding a second drug to a patient’s drug profile for the treatment of diabetes?

........................................................................................................................................................................
........................................................................................................................................................................
........................................................................................................................................................................

13. What drug would be a logical choice to add to a patient’s therapy if they are already taking the following drugs:

<table>
<thead>
<tr>
<th>Drug regimen already prescribed</th>
<th>Drug to be added</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td></td>
</tr>
<tr>
<td>Gliclazide</td>
<td></td>
</tr>
<tr>
<td>Glibenclamide</td>
<td></td>
</tr>
</tbody>
</table>
14. Give the pharmacological class for the following drugs used to lower blood pressure levels:

<table>
<thead>
<tr>
<th>DRUG</th>
<th>PHARMACOLOGICAL CLASS (e.g. ibuprofen = NSAID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochlorothiazide</td>
<td></td>
</tr>
<tr>
<td>Perindopril</td>
<td></td>
</tr>
<tr>
<td>Atenolol</td>
<td></td>
</tr>
<tr>
<td>Reserpine</td>
<td></td>
</tr>
</tbody>
</table>

15. At what dose would you start a patient on each of the following drugs:

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE (mg)</th>
<th>TIMES PER DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochlorothiazide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perindopril</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atenolol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserpine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16. Of the following drugs, tick the drug(s) which could be problematic and must be used with caution in diabetics. Briefly explain what problem could be encountered?

<table>
<thead>
<tr>
<th>DRUG</th>
<th>PROBLEMATIC</th>
<th>WHY?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochlorothiazide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perindopril</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atenolol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserpine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
17. How high can you increase the dose of the following drugs before you would consider adding a second drug (i.e. what is the maximum dose of the following drugs).

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE (mg)</th>
<th>TIMES PER DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochlorothiazide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perindopril</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atenolol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserpine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. Which clinical findings would require adding a second drug to a patient’s drug profile for the treatment of hypertension?

………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………

19. What drug would be a logical choice to add to a patient’s therapy if they are already taking the following agents for blood pressure control:

<table>
<thead>
<tr>
<th>Drug regimen already prescribed</th>
<th>Drug to be added</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochlorothiazide</td>
<td></td>
</tr>
<tr>
<td>Perindopril</td>
<td></td>
</tr>
<tr>
<td>Atenolol</td>
<td></td>
</tr>
<tr>
<td>Reserpine</td>
<td></td>
</tr>
</tbody>
</table>
20. How often should the following tests be performed (please tick the appropriate box):

<table>
<thead>
<tr>
<th>TEST</th>
<th>EVERY VISIT</th>
<th>6 MONTHS</th>
<th>12 MONTHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood glucose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine dipstick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye exam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foot exam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dental exam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA\textsubscript{1c}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cholesterol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum creatinine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

PLEASE TURN OVER AND COMPLETE THE CASE STUDIES
CASE STUDIES

1. A 54 year old male has recently been diagnosed as a type 2 diabetic. He is not on pharmacological management but has been on lifestyle management for 6 months. He has a fasting blood glucose reading of 13.5 mmol/L on arrival at the clinic. For the past six months the patient’s fasting blood glucose readings have varied around the 13 mmol/L level. He has a mass of 105 kg and is 1.70 meters tall. What is the blood glucose lowering agent of choice in this patient and what is the starting dose?

2. A 50 year old, Xhosa speaking black female patient presents at the clinic with a blood pressure reading of 170/90 mmHg. This patient is currently not on drug therapy for high blood pressure, but has been on lifestyle modification for six months. However, her blood pressure has not decreased. On examination of her urine dipstick results, it is found that she has profound proteinuria, but no infection. What is the agent of choice in this patient for management of high blood pressure? (This patient is a type 2 diabetic and is currently taking gliclazide 80mg twice daily.)
3. Mrs Y is 64 years old and has been a diagnosed type 2 diabetic for two years. She also suffers from hypertension. Her current medication includes glibenclamide at a dose of 5mg twice daily and hydrochlorothiazide at a dose of 25mg daily. She has been taking this drug regimen for the past six months and is complaint to therapy. Her blood glucose and blood pressure readings for the past three months are as follows:

<table>
<thead>
<tr>
<th>DATE</th>
<th>BLOOD GLUCOSE (Random)</th>
<th>BLOOD PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15/03</td>
<td>16.4 mmol/L</td>
<td>170/95 mmHg</td>
</tr>
<tr>
<td>15/04</td>
<td>13.8 mmol/L</td>
<td>160/90 mmHg</td>
</tr>
<tr>
<td>15/05</td>
<td>14.9 mmol/L</td>
<td>165/90 mmHg</td>
</tr>
</tbody>
</table>

What would you do in this situation to try and improve Mrs Y’s blood glucose and blood pressure readings?

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………

4. Mr X is a type 2 diabetic and hypertensive patient. He is 65 years old, weighs 90kg and has been taking the following medication for the past year: Metformin at a dose of 500mg three times a day, hydrochlorothiazide at a dose of 12.5mg daily and perindopril at a dose of 4mg daily. His blood glucose and blood pressure readings for the past three months are as follows:

<table>
<thead>
<tr>
<th>DATE</th>
<th>BLOOD GLUCOSE (Random)</th>
<th>BLOOD PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15/03</td>
<td>8.5 mmol/L</td>
<td>185/100 mmHg</td>
</tr>
<tr>
<td>15/04</td>
<td>7.3 mmol/L</td>
<td>170/90 mmHg</td>
</tr>
<tr>
<td>15/05</td>
<td>7.5 mmol/L</td>
<td>180/90 mmHg</td>
</tr>
</tbody>
</table>

What would you do in this situation to try and improve Mr X’s condition?

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………

THANK YOU FOR YOUR TIME AND CO-OPERATION!
APPENDIX I

Pre- and Post-Intervention Focus Group Interviews
FOCUS GROUP QUESTIONS - PRE-INTERVENTION PHASE

TOPIC 1
- How do you feel about your working environment?
- Is everything that you need available?
- Is there enough time to do everything you would like to with the patient?
- If you could, would you change anything about your working conditions?

TOPIC 2
- How do you feel about the training that nurses receive before they graduate?
- Would you change/add anything to the training nurses receive?
- How do you feel about the in-service training you receive at your place of work?

TOPIC 3
- I would like you to describe for me your normal routine when a diabetic patient comes in for a checkup – what do you do?

TOPIC 4
- How do you feel about treating diabetic patients?

TOPIC 5
- How do you feel about the standard of care the diabetic patients are provided with at the clinic?
- Do you feel that the patients are well managed and controlled?
TOPIC 6
- Do you ever feel frustrated when treating patients with chronic disease states, for example diabetes and hypertension?
- Do you feel that your frustration can influence the care that you give to these patients?

TOPIC 7
- How do you feel about the South African guidelines for the management of diabetes and hypertension?
- Do you feel that they can be applied easily in practice?
- Do you feel that the guidelines are being used in your everyday practice?

TOPIC 8
- How do you feel about the pharmacological management of diabetes and hypertension?
- Do you feel that you are confident enough in your knowledge about diabetes and hypertension to recognise when pharmacological therapy should be changed?

TOPIC 9
- Do you feel confident in monitoring diabetic patients and referring patients to doctors when necessary?
FOCUS GROUP QUESTIONS - POST-INTERVENTION PHASE

TOPIC 1
- Taking into consideration the past six months - How do you feel about your working environment now?
- Is everything that you need available?
- Is there enough time to do everything you would like to with the patient?
- If you could, would you change anything about your current working conditions?

TOPIC 2
- How do you feel about the training that I gave you on the pharmacological management of diabetes and hypertension?
- Would you have changed/added anything to the training that I gave you on the guidelines?

TOPIC 3
- Do you feel that your routine for treating a diabetic patient has changed?
- If so how has it changed?
- Do you feel that these changes are for the better?

TOPIC 4
- After the training sessions I gave you - How do you now feel about treating diabetic patients?

TOPIC 5
- How do you feel about the standard of care the diabetic patients are provided with now at the clinic?
- Do you feel that the patients are now more managed and controlled?
TOPIC 6

- Do you feel any frustration now, after the trainings I have given you, with respect to the way patients are managed?
- Do you feel that the training sessions you attended have influenced the care that you give to patients at the clinic?

TOPIC 7

- How do you feel now about the South African guidelines for the management of diabetes and hypertension?
- Do you feel that they can be applied easily in practice?
- Do you feel that the guidelines are now being used in your everyday practice?

TOPIC 8

- How do you feel about the pharmacological management of diabetes and hypertension?
- Do you feel that you are confident enough in your knowledge about diabetes and hypertension to recognise when pharmacological therapy should be changed?
- If you do not feel confident enough, why not?
- What would still be needed to help you to feel more confident?

TOPIC 9

- Do you feel confident in monitoring diabetic patients and referring patients to doctors when necessary?
- If you do not feel confident enough, why not?
- What would still be needed to help you to feel more confident?
APPENDIX J

Educational Intervention
Session Notes

J1. Notes for education sessions on the pharmacological management of diabetes and hypertension for HCP.
J2. Diabetes and hypertension treatment algorithms.
J3. Summary of antidiabetic and antihypertensive drugs.
J4. Case studies and answers for education sessions.
J5. Summary of notes in desk card format.
J1. NOTES FOR THE EDUCATION SESSION ON THE PHARMACOLOGICAL MANAGEMENT OF DIABETES AND HYPERTENSION FOR HEALTH CARE PROVIDERS AT THE WEST END CLINIC

1. DIABETES MELLITUS

1.1 BACKGROUND

1.1.1 Definition
Diabetes mellitus is a disorder of metabolism due to defective production or action of insulin and characterised by a number of clinical and biochemical abnormalities (primarily an abnormal increase of glucose in the blood) which, if untreated, may result in acute death or premature morbidity and mortality.

1.1.2 Major Types Of Diabetes
Type 1 diabetes = insulin-dependent diabetes mellitus.
Type 2 diabetes = non-insulin-dependent diabetes mellitus.

1.1.3 Diagnosis Of Diabetes
The diagnosis of diabetes is made by the presence of classic symptoms of diabetes as well as an elevated blood glucose concentration. The classic symptoms of diabetes include excessive urination, excessive thirst and unexplained weight loss. The diagnostic elevated blood glucose concentrations are defined as a random plasma glucose concentration of greater or equal to 11.1 mmol/L or a fasting plasma glucose concentration of greater or equal to 7.0 mmol/L. To confirm the diagnosis, the plasma glucose test should be repeated on a different day.
1.2 MONITORING TESTS

1.2.1 Monitoring Tests Recommended
See Diabetic Record Card for all recommended tests that should be performed and questions that should be asked.

Brief summary of monitoring tests:

<table>
<thead>
<tr>
<th>MONITORING TEST</th>
<th>FREQUENCY (if normal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight, Height and Body Mass Index</td>
<td>Every visit</td>
</tr>
<tr>
<td>Blood Glucose (random or fasting)</td>
<td>Every visit</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>Every visit</td>
</tr>
<tr>
<td>Urine Dipstick</td>
<td>Every visit</td>
</tr>
<tr>
<td>Dental Exam</td>
<td>Every 6 months</td>
</tr>
<tr>
<td>Eye Exam</td>
<td>Every 12 months</td>
</tr>
<tr>
<td>Foot Exam</td>
<td>Every 12 months</td>
</tr>
<tr>
<td>HbA1c</td>
<td>Every 6 months</td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>Every 12 months</td>
</tr>
<tr>
<td>Serum Creatinine</td>
<td>Every 12 months</td>
</tr>
</tbody>
</table>

1.2.2 Targets For Monitoring Tests

<table>
<thead>
<tr>
<th>Urine Glucose</th>
<th>*OPTIMAL *</th>
<th><strong>ACCEPTABLE</strong></th>
<th><em><strong>COMPROMISED</strong></em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Glucose (mmol/L)</td>
<td>Fasting</td>
<td>4-6</td>
<td>6-8</td>
</tr>
<tr>
<td></td>
<td>After Meals</td>
<td>4-8</td>
<td>8-10</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>Men</td>
<td>20-25</td>
<td>25-27</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>19-24</td>
<td>24-26</td>
</tr>
<tr>
<td>Blood Pressure (mmHg)</td>
<td>&lt; 130/80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>&lt; 7</td>
<td>7-8</td>
<td>&gt;8</td>
</tr>
<tr>
<td>Total cholesterol (mmol/L)</td>
<td>&lt; 5.0</td>
<td>5.0-6.5</td>
<td>&gt;6.5</td>
</tr>
<tr>
<td>HDL Cholesterol (mmol/L)</td>
<td>&gt; 1.2</td>
<td>0.9-1.2</td>
<td>&lt; 0.9</td>
</tr>
<tr>
<td>Triglycerides (mmol/L)</td>
<td>&lt; 1.5</td>
<td>1.5-2.2</td>
<td>≥ 2.2</td>
</tr>
</tbody>
</table>

*This is the ideal in a diabetic patient and indicates excellent diabetic control
** This is acceptable in diabetic patients and indicates good diabetic control
*** These values indicate very poor diabetic control
1.3 COMPLICATIONS OF DIABETES

Uncontrolled diabetes may lead to acute or chronic complications.

1.3.1 Acute Complications
Acute complications include infections and metabolic complications such as hypoglycaemia and hyperglycaemic coma.

1.3.2 Chronic Complications
- Macrovascular disease (coronary artery disease, peripheral vascular disease and cerebral vascular disease). Risk factors for this include hypertension, obesity, smoking, alcohol, dyslipidaemia, positive family history and physical inactivity.
- Microvascular disease (retinopathy (eyes), nephropathy (kidneys), neuropathy and diabetic foot disease). Risk factors for this include hyperglycaemia (for long durations and/or poor control), hypertension, smoking and genetic predisposition.

1.4 DRUG MANAGEMENT OF TYPE 2 DIABETES

1.4.1 Initiation Of Drug Treatment
Refer to algorithm for the management of type 2 diabetes.

- Drug treatment is initiated immediately in newly diabetic patients who present with a random blood glucose level of greater than 15 mmol/L or who are severely symptomatic from the start.
- If a patient presents with a random blood glucose level of less than 15 mmol/L, lifestyle modification should be initiated, with monthly assessments for the following 3 months.
- If blood glucose targets have not been achieved within three months of initiating lifestyle modification, start drug treatment.

There are 3 main types of medication available that can be utilised individually or in combination. These include sulphonylureas, biguanides and insulin. (SEE ATTACHED TABLE)
1.4.2 SULPHONYLUREAS

Special Precautions for sulphonylureas
- Patients should be warned about the signs of hypoglycaemia.
- Gliclazide is the preferred sulphonylurea in the elderly and those prone to hypoglycaemia, as smaller doses can be given.

Dosing of sulphonylureas

<table>
<thead>
<tr>
<th>Sulphonylurea</th>
<th>Tablet strength (mg)</th>
<th>Starting daily dose (mg)</th>
<th>Number of doses per day</th>
<th>Total max daily dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glibenclamide</td>
<td>5</td>
<td>2.5</td>
<td>1 – 2</td>
<td>15</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>80</td>
<td>40</td>
<td>1 – 2</td>
<td>320</td>
</tr>
</tbody>
</table>

- There is no benefit in combining two sulphonylurea agents.
- Sulphonylureas are the drug agents of choice in non-obese patients.
- Dosing of sulphonylureas should be titrated to the maximum dosage over a period of one to three months.
- Counsel on the importance of eating before taking a sulphonylurea.

1.4.3 Biguanides

Dosing of Metformin

<table>
<thead>
<tr>
<th>Metformin</th>
<th>Tablet strength (mg)</th>
<th>Starting daily dose (mg)</th>
<th>Number of doses per day</th>
<th>Total max daily dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>500/850</td>
<td>500/850</td>
<td>1 – 3</td>
<td>3 000</td>
</tr>
</tbody>
</table>

- Metformin is insulin sparing, it does not increase weight or provoke hypoglycemia.
- Metformin is the drug of choice in obese/overweight patients with no major complications and normal renal function.
- Dosing of metformin should be titrated to the maximum dosage over a period of one to three months.
- Prescribe with care in the elderly.
1.4.4 Combination Therapy

- If a patient has **not reached target blood glucose** levels in **one to three months**, a **second drug agent should be added**, starting at the lowest dose and titrating the dose when necessary.
- If the patient is taking **glibenclamide or gliclazide**, the second agent of choice is **metformin**.
- If the patient is taking **metformin**, the second agent of choice is **glibenclamide or gliclazide**.
- If **target blood glucose levels** are still **not attained** despite good compliance and absence of major stressors such as infection, **insulin therapy** should be considered.

1.4.5 Insulin Therapy

**Insulin therapy is indicated in:**
- Severe infections
- Major surgery
- Pregnant diabetic woman
- Patients not controlled on diet and oral drug agents

**Insulin preparations**

<table>
<thead>
<tr>
<th>Insulin preparation</th>
<th>Onset of action</th>
<th>Peak action</th>
<th>Duration of action</th>
<th>Injections per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate – acting</td>
<td>1 – 3 hrs</td>
<td>6 – 12 hrs</td>
<td>16 – 24 hrs</td>
<td>Once or twice</td>
</tr>
<tr>
<td>Biphasic mixtures 30/70</td>
<td>30 min</td>
<td>2 – 12 hrs</td>
<td>16 – 24 hrs</td>
<td>Once or twice</td>
</tr>
</tbody>
</table>

**Initiation of insulin therapy**
- If maximum doses of oral agents are being used and patients remain with sub optimal hyperglycaemia, insulin therapy should be considered under the supervision of a doctor.

**Intermediate-acting insulin**
- Bedtime dosing: start with a dosage of **0.2 to 0.3 U/kg/d**. This dose can be increased by **4 units weekly** until adequate control is achieved. Maximum dose of **0.6 U/kg/d**.
- This insulin can be given alone or in combination with oral agents as follows:
  - Maintain same dose as before OR
  - Reduce doses by half by omitting the evening dose OR
  - Stop all oral antidiabetic medication.
- If more than **30 U** per day are required, use twice daily biphasic insulin.
Biphasic insulin (1/3 short acting, 2/3 intermediate-acting)
- This should be given in a twice-daily regimen, giving 2/3 of the dose in the morning before breakfast and 1/3 in the evening before supper.
- Starting dose is 0.2 U/kg/d increasing up to a maximum dose of 0.6 U/kg/d.
- All antidiabetic medication must be stopped.

If a patient’s blood glucose levels are still not controlled on insulin, then the patient must be referred.

Special precautions with insulin use
- Counsel patient on use of insulin, injection techniques, rotation of injection site and storage of insulin.
- Counsel patient on hypoglycaemia management, especially patients receiving sulphonylureas and insulin.

1.5 REASONS FOR REFERRAL

1. Significant hyperglycaemia > 20mmol/l
2. Hypoglycaemic coma (Not responding to IV glucose)
3. Refer to ophthalmologist:
   - Sudden deterioration in vision (Determined from Snellens chart or complaints by patient)
   - If changes detected on fundal examination
   - If cataracts detected
4. Gangrene or Ischaemic feet – URGENT REFERRAL
5. Pregnancy
6. Visit 6:
   - HbA1c
   - Total cholesterol
7. Visit 12:
   - HbA1c
   - Total cholesterol, Triglycerides, LDL and HDL only if the Total cholesterol at visit 6 was not within the optimal or acceptable range
   - Serum Creatinine if the patient had proteinuria for more than five successive visits.
8. If patient not controlled on current drug therapy for more than 2 months.
2. HYPERTENSION

2.1 BACKGROUND

2.1.1 Definition
Hypertension can be defined as elevated blood pressure. It is the most common cardiovascular disease. Blood pressure is proportional to the rate of blood flow (cardiac output) and vascular resistance.

2.1.2 Diagnosis
Hypertension diagnosis is based on repeated reproducible measurements of elevated blood pressure. For diabetics, a repeated blood pressure reading of > 130/80 mmHg would classify the patient as having hypertension. For diabetic patients with proteinuria, a repeated blood pressure reading of > 120/70 mmHg would classify the patient as having hypertension.

2.2 MONITORING TESTS

2.2.1 Monitoring Tests Recommended
The monitoring tests that are recommended in the management of hypertension are very similar to those recommended in the management of diabetes.

Brief summary of monitoring tests:

<table>
<thead>
<tr>
<th>MONITORING TEST</th>
<th>FREQUENCY (if normal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Pressure</td>
<td>Every visit</td>
</tr>
<tr>
<td>Weight</td>
<td>Every visit</td>
</tr>
<tr>
<td>Urine Dipstick</td>
<td>Every visit if abnormal, if normal then every 12 months.</td>
</tr>
<tr>
<td>Blood Glucose, Creatinine, Urea and potassium</td>
<td>If facilities are available</td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>Every 12 months</td>
</tr>
<tr>
<td>Resting ECG</td>
<td>When available – every 12 months</td>
</tr>
</tbody>
</table>

2.2.2 Targets For Monitoring Tests
For diabetic patients with hypertension, the recommended target value for blood pressure is < 130/80 mmHg. However for diabetic patients who have persistent dipstick proteinuria, the recommended target value for blood pressure is < 120/70 mmHg.

2.3 COMPLICATIONS OF HYPERTENSION

Complications of hypertension include angina, heart failure, nephropathy, stroke, retinopathy and peripheral arterial disease.
2.4 DRUG MANAGEMENT OF HYPERTENSION IN PATIENTS WITH DIABETES

2.4.1 Initiation Of Drug Treatment
Refer to algorithm for the management of hypertension in diabetic patients.

- If a diabetic patient’s blood pressure is \( > 130/80 \) mmHg (with no proteinuria present), drug therapy should be initiated immediately.
- If a diabetic patient’s blood pressure is \( > 120/70 \) mmHg (with proteinuria present), drug therapy should be initiated immediately.

There are 5 main drug classes used in the treatment of hypertension at primary health care level. These include diuretics, ACE inhibitors, beta-blockers, reserpine and long-acting calcium channel blockers (SEE ATTACHED TABLE). It should be noted that some of these drug classes must be used with caution or avoided in diabetic patients.

NOTE:
- High-dose thiazide diuretics and non-selective beta-blockers may adversely affect carbohydrate metabolism.
- Calcium-channel blockers are metabolically “neutral”, and can be particularly useful in black patients.

2.4.2 Drug Dosages

<table>
<thead>
<tr>
<th>DRUG</th>
<th>Tablet strength (mg)</th>
<th>Starting daily dose (mg)</th>
<th>Number of doses per day</th>
<th>Total max daily dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCT</td>
<td>25</td>
<td>12.5</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Perindopril</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Atenolol</td>
<td>50, 100</td>
<td>25 to 50</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Reserpine</td>
<td>0.25</td>
<td>0.05 to 0.125</td>
<td>1</td>
<td>0.25</td>
</tr>
<tr>
<td>Verapamil</td>
<td>40, 80, 120</td>
<td>40 to 80</td>
<td>1 to 3 (usually 2 with chronic therapy)</td>
<td>480</td>
</tr>
<tr>
<td>Nifedipine (controlled release)</td>
<td>30</td>
<td>30</td>
<td>1</td>
<td>90</td>
</tr>
</tbody>
</table>

2.4.3 First Line Drug Treatment
- For starting doses refer to table above or hypertension treatment algorithm.
- For diabetic patients with or without microalbuminuria, proteinuria or kidney disease = ACE inhibitors.
- For Black diabetic patients = low dose diuretics (hydrochlorothiazide).
- For diabetic patients over the age of 55 years with hypertension, or without hypertension but other cardiovascular risk factors, an ACE inhibitor should be considered to reduce risk of cardiovascular events.
2.4.4 Second Line Drug Treatment
- If a patient has not reached target BP levels after two months of taking one drug, titrate dose to maximum per day. If a patient has not reached target BP after a further two months, a second drug agent should be added, starting at the lowest dose and titrating the dose.
- If a patient is receiving an ACE inhibitor (perindopril or enalapril), the second line agent of choice is a thiazide diuretic (hydrochlorothiazide).
- If a patient is receiving hydrochlorothiazide, the second line agent of choice is an ACE inhibitor (perindopril or enalapril), and the dose of hydrochlorothiazide should be reduced to 12.5mg/day.

2.4.5 Third Line Drug Treatment
- If a patient has not reached target BP levels after two months of taking two drug agents, a third drug agent should be added, starting at the lowest dose and titrating the dose.
- If a patient is receiving an ACE inhibitor and hydrochlorothiazide, the third line drug agent of choice is reserpine or atenolol or verapamil. A patient's drug profile should be assessed before prescribing one of the above agents.
- If a patient does not reach target blood pressure levels after 2 months of treatment on three drug agents (with good compliance), the patient must be referred appropriately.

2.4.6 Treatment of Hypertension with Associated Disease States other than Diabetes

<table>
<thead>
<tr>
<th>Associated Disease State to Hypertension</th>
<th>Drug Treatment Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angina</td>
<td>Beta-blocker or Calcium Channel Blocker.</td>
</tr>
<tr>
<td>Coronary Artery Disease</td>
<td>Beta-blocker and ACE inhibitor. Use Verapamil if Beta-blocker is contraindicated.</td>
</tr>
<tr>
<td>Post Myocardial Infarction</td>
<td>Beta-blocker and ACE inhibitor.</td>
</tr>
<tr>
<td>Heart failure</td>
<td>ACE inhibitor or Beta-blockers.</td>
</tr>
<tr>
<td>Left Ventricular Heart Failure</td>
<td>ACE inhibitor.</td>
</tr>
<tr>
<td>Stroke</td>
<td>Hydrochlorothiazide and ACE inhibitor.</td>
</tr>
<tr>
<td>Ischaemic Heart Disease</td>
<td>Hydrochlorothiazide and long acting Calcium Channel Blocker.</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>Methyldopa, Prazosin, Calcium Channel Blocker.</td>
</tr>
</tbody>
</table>
J2. GUIDELINES FOR THE MANAGEMENT OF TYPE 2 DIABETES MELLITUS

DIAGNOSIS

Random -> or = 11.1 mmol/L
Fasting -> or = 7.0 mmol/L

EDUCATION
LIFESTYLE CHANGES
(Diet, weight control, physical activity)

Treatment targets reached in 1 to 3 months
Continue and Monitor

Targets not reached in 1 to 3 months

ORAL HYPOGLYCAEMIC THERAPY

Non-obese patients

SULPHONYLUREA

Targets reached in 1 to 3 months
Review

Targets not reached in 1 to 3 months
Add other class of oral agent

BIGUANIDE

Severe symptoms, pregnancy, infections

Obese patients

Blood Glucose Target Values (mmol/L)

<table>
<thead>
<tr>
<th></th>
<th>Optimal</th>
<th>Acceptable</th>
<th>Compromised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>4 – 6</td>
<td>6 – 8</td>
<td>&gt; 8</td>
</tr>
<tr>
<td>After food</td>
<td>4 – 8</td>
<td>8 – 10</td>
<td>&gt; 10</td>
</tr>
</tbody>
</table>

Targets not reached in 3 months. Other factors

Consider INSULIN therapy (permanent/temporary)

Source:
1. Guidelines for the management of patients with type II (non-insulin-dependent) diabetes mellitus at primary health care level in South Africa (1997).
J2. GUIDELINES FOR THE MANAGEMENT OF HYPERTENSION IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

DIAGNOSIS
No proteinuria -> 130/80 mmHg
With proteinuria -> 120/70 mmHg

LIFESTYLE MODIFICATION
(Salt restriction + weight reduction)

AND

ANTIHYPERTENSIVE DRUG TREATMENT

ACE INHIBITOR
Check BP after 4 – 8 weeks
Check compliance

Targets reached in 2 months
Review

HYDROCHLOROTHIAZIDE
Check BP after 4 – 8 weeks
Check compliance

Targets not reached in 2 months AFTER titrating dose

Add 2nd line drug agent, not in same class

Targets not reached in 2 months AFTER titrating dose

Add 3rd line drug agent, not in same class

Targets not reached in 2 months AFTER titrating dose

REFER APPROPRIATELY

- Patients with or without proteinuria or kidney disease
- Patients over 55 years

Black patients

Source:
1. Guidelines for the management of patients with type II (non-insulin-dependent) diabetes mellitus at primary health care level in South Africa (1997).
## J3. Summary of Antidiabetic Drugs

<table>
<thead>
<tr>
<th>Antidiabetic Drugs</th>
<th>Mechanism of Action</th>
<th>Contraindications</th>
<th>Drug Interactions</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sulphonylureas</strong></td>
<td>- Glipizide (Diamicron&lt;sup&gt;®&lt;/sup&gt;, Glucomet&lt;sup&gt;®&lt;/sup&gt;, Sandoz-Glipizide&lt;sup&gt;®&lt;/sup&gt;)&lt;br&gt;- Glibenclamide (Glycomin&lt;sup&gt;®&lt;/sup&gt;, Sandoz-Glibenclamide&lt;sup&gt;®&lt;/sup&gt;)</td>
<td>- ↑ the release of insulin from beta cells in the pancreas.&lt;br&gt;- ↓ serum glucagon levels.&lt;br&gt;- Potentiates the action of insulin on its target tissues</td>
<td>- Severe renal impairment (but Glipizide can be used at low doses in patients with renal impairment)&lt;br&gt;- Liver disease (only glipizide)&lt;br&gt;- Pregnancy&lt;br&gt;- In paediatrics</td>
<td>- Aspirin (and possibly other NSAIDs), sulphonamides, chloramphenicol, cimetidine, fluconazole = increased hypoglycaemic effect.&lt;br&gt;- Warfarin = increased blood concentrations of both drugs, therefore need to adjust doses.&lt;br&gt;- Alcohol = increased risk of hypoglycaemia. May also lead to alcohol intolerance (flushing, headache, nausea and vomiting).&lt;br&gt;- Beta-blocking agents = may mask warning symptoms of hypoglycaemia.&lt;br&gt;- Hepatic enzyme inducers (phenytoin, rifampicin) = decreased hypoglycaemic effect.&lt;br&gt;- Thiazide diuretics, glucocorticoids, furosemide, oral contraceptives = decreased hypoglycaemic effect.</td>
</tr>
<tr>
<td><strong>Biguanides</strong></td>
<td>- Metformin (Glucophage&lt;sup&gt;®&lt;/sup&gt;, Sandoz-Metformin&lt;sup&gt;®&lt;/sup&gt;)</td>
<td>- Stimulate glycolysis in tissues which leads to ↑ glucose removal from blood.&lt;br&gt;- ↓ hepatic gluconeogenesis.&lt;br&gt;- Slow glucose absorption from the gastrointestinal tract.&lt;br&gt;- ↓ plasma glucagon levels.</td>
<td>- Renal disease&lt;br&gt;- Hepatic disease&lt;br&gt;- Cardiovascular disease&lt;br&gt;- Alcoholism&lt;br&gt;- Patients predisposed to lactic acidosis&lt;br&gt;- Pregnancy&lt;br&gt;- In paediatrics</td>
<td>- Alcohol = increased risk of lactic acidosis.&lt;br&gt;- Agents that may impair glucose tolerance – thiazides, furosemide, glucocorticoids, oral contraceptives = decreased hypoglycaemic effect.</td>
</tr>
<tr>
<td><strong>Insulin Therapy</strong></td>
<td>- Intermediate-acting (Protaphane&lt;sup&gt;®&lt;/sup&gt;, Humulin&lt;sup&gt;®&lt;/sup&gt;)&lt;br&gt;- Biphasic (Actraphane&lt;sup&gt;®&lt;/sup&gt;, Humulin&lt;sup&gt;®&lt;/sup&gt; 30/70)</td>
<td>- Hypoglycaemia</td>
<td>- Oral contraceptives, diuretics and corticosteroids = glucose tolerance may be decreased therefore insulin requirements increased.&lt;br&gt;- Alcohol and aspirin = hypoglycaemic effect increased.&lt;br&gt;- Beta blockers = potential to mask the signs and symptoms of hypoglycaemia</td>
<td>- Lipohypertrophy from using the same injection site. To avoid, rotate injection site.</td>
</tr>
</tbody>
</table>
### J3. Summary of Antihypertensive Drugs

<table>
<thead>
<tr>
<th>ANTIHYPERTENSIVE DRUGS</th>
<th>MECHANISM OF ACTION</th>
<th>CONTRAINDICATIONS</th>
<th>DRUG INTERACTIONS</th>
<th>SIDE EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DIURETICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Hydrochlorothiazide (HCT) (Ridaq) | Inhibits reabsorption of sodium and chloride ions in kidney, leading to ↓ water loss, ↓ blood volume and therefore ↓ blood pressure. | - Severe renal impairment. | - Corticosteroids = ↑ risk of low potassium levels (both are potassium-depleting agents) | - Electrolyte imbalances  
- Glucose tolerance may be impaired, diabetes precipitated or diabetic control may be lost. |
| **ACE INHIBITORS**     |                     |                   |                   |              |
| - Perindopril (Coversyl, Prexum) | Act by inhibiting the conversion of angiotensin I to angiotensin II (which is a powerful vasoconstrictor). Note — in black patients they are less effective in the absence of diuretics. | - Renal failure  
- Pregnancy  
- ↑ potassium levels | - Potassium supplements = may cause increased potassium levels  
- NSAIDS = decrease antihypertensive effect  
- Antacids = decrease bioavailability | - Dry hacking cough  
- Taste disturbances |
| **BETA BLOCKERS**      |                     |                   |                   |              |
| Atenolol (Arco-atenolol, Ten-bloxa) | Inhibit the beta receptors in the heart leading to a ↓ cardiac output. Note: Black patients may have less of a response to monotherapy of atenolol. | - Asthma and chronic obstructive pulmonary disease  
- Caution in patients with renal failure and treated heart disease | - NSAIDS = decreased efficacy of beta blockers  
- Insulin or oral antidiabetic agents = increased risk of hypo- or hyperglycaemia | - Glucose utilisation may be impaired.  
- Bronchospasm |
| **CENTRALLY ACTING AGENTS** |                     |                   |                   |              |
| Reserpine (Reserpine)  | - Blocks uptake of Noradrenaline into storage granules  
- ↓ cardiac output and vascular resistance  
- Therefore ↓ blood pressure | - Mental depression  
- Peptic ulcers  
- Parkinson's disease  
- Epilepsy  
- Pregnancy | - MOA inhibitors = severe hypertension  
- Alcohol = CNS depression  
- Levodopa = ↓ efficacy | - Dizziness  
- Drowsiness, lethargy  
- ↓ Libido  
- Dry mouth, headache  
- Depression  
- Nausea and vomiting |
| **CALCIUM CHANNEL BLOCKERS (LONG ACTING)** |                     |                   |                   |              |
| Cardiac effects:  
Verapamil (Rotal-Verapamil, Vasornil)  
Vascular effects:  
Nifedipine (Adalat XL, Cardifen) | - Blocks cardiac or vascular Ca²⁺ channels  
- Therefore cardiac and vascular muscle tone are ↓ and electrical conductivity are ↓  
- Leads to vasodilation  
- Therefore ↓ blood pressure | - Certain cardiac defects  
- Heart block  
- Congestive heart failure  
- Unstable angina (Nifedipine) | - Digoxin and/or beta blockers = ↑ cardiac depressant effects  
- Highly protein bound drugs (NSAIDS, warfarin, sulphonylureas) = both drugs may be displaced, ↑ effects of drugs.  
- Nifedipine — may cause glucose intolerance | - Constipation  
- Heart block  
- Nausea  
- Dizziness, fatigue  
- Flushing, headache |
J4. CASE STUDIES FOR EDUCATION TRAINING SESSIONS

Indicate whether or not the following prescriptions are correct for the specific patient scenarios. If they are incorrect, change them to make them acceptable:

1. Mr Mbali, a Xhosa gentleman who is 45 years old, is a diabetic patient. He is receiving Metformin 500mg three times a day, and his glucose levels are well controlled. He has just been diagnosed with hypertension. There is no proteinuria present. The doctor has prescribed Perindopril 4mg daily.

2. Mrs Ecksteen is 56 years old, weighs 85kg and is 1.60m tall. At her last visit she presented with a random glucose level of 15.7mmol/L. The doctor recommended that she start with lifestyle modifications for the next 3 months. If no improvement, she should begin taking glibenclamide 5mg twice a day.

3. Mrs Smith is 67 years old, weighs 78kg and is 1.55m tall. She is a diagnosed diabetic with hypertension. She is on metformin 500mg three times a day and perindopril 4mg daily. Her blood glucose and blood pressure readings for the past three months are as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>Random Blood Glucose</th>
<th>Blood Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/12/04</td>
<td>12.4 mmol/L</td>
<td>140/90 mmHg</td>
</tr>
<tr>
<td>11/01/05</td>
<td>11.2 mmol/L</td>
<td>145/90 mmHg</td>
</tr>
<tr>
<td>11/02/05</td>
<td>13.5 mmol/L</td>
<td>140/90 mmHg</td>
</tr>
</tbody>
</table>

The doctor prescribes Gliclazide 80mg twice daily in addition to her present medication. The doctor is happy with the blood pressure control.

4. Mr Simons is 63 years old, and has been a diabetic with hypertension for the past 15 years. He weighs 80kg and is 1.7m tall. He takes metformin 500mg three times a day, glibenclamide 5mg twice daily, perindopril 4mg daily and HCT 25mg daily. Mr Simons is compliant and follows a strict diet. His blood glucose and blood pressure readings for the past three months are as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>Random Blood Glucose</th>
<th>Blood Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/12/04</td>
<td>11.1 mmol/L</td>
<td>135/85 mmHg</td>
</tr>
<tr>
<td>11/01/05</td>
<td>12.7 mmol/L</td>
<td>140/85 mmHg</td>
</tr>
<tr>
<td>11/02/05</td>
<td>15.4 mmol/L</td>
<td>150/90 mmHg</td>
</tr>
</tbody>
</table>

The doctor recommends that the Mr Simons start with insulin therapy, Protaphane® 16 units at night. He should continue taking metformin 500mg in the morning and at lunch but stop taking glibenclamide. He should continue taking perindopril 4mg daily and HCT 25mg daily. The doctor prescribes that he begins taking atenolol 25mg daily.
What would you recommend in the following situations to improve the management of the patient:

5. Mr Siwisa, a Xhosa speaking gentleman, is a diabetic patient with hypertension. He is currently taking Gliclazide 80mg twice daily and HCT 25mg daily, which he has been taking at those doses for the past six months. He has started to present with proteinuria in the past two months. His blood glucose and blood pressure readings for the past three months are as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>Fasting Blood Glucose</th>
<th>Blood Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/12/04</td>
<td>8.2 mmol/L</td>
<td>145/95 mmHg</td>
</tr>
<tr>
<td>11/01/05</td>
<td>10.8 mmol/L</td>
<td>140/92 mmHg</td>
</tr>
<tr>
<td>11/02/05</td>
<td>9.1 mmol/L</td>
<td>142/95 mmHg</td>
</tr>
</tbody>
</table>

6. Mrs Kleinhans is 62 years old and overweight. She was diagnosed with diabetes 6 months ago. She was on lifestyle modification for 3 months and then started drug treatment with metformin 500mg twice daily. She has had hypertension for 20 years. She has been taking 2mg perindopril daily since diagnosed with hypertension. Her blood glucose and blood pressure readings for the past three months are as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>Fasting Blood Glucose</th>
<th>Blood Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/12/04</td>
<td>11.3 mmol/L</td>
<td>138/85 mmHg</td>
</tr>
<tr>
<td>11/01/05</td>
<td>10.6 mmol/L</td>
<td>140/85 mmHg</td>
</tr>
<tr>
<td>11/02/05</td>
<td>10.8 mmol/L</td>
<td>140/85 mmHg</td>
</tr>
</tbody>
</table>
J4. ANSWERS TO CASE STUDIES FOR EDUCATION TRAINING SESSION

1. Incorrect – Mr Mbali should have been prescribed HCT at a starting dose of 12.5mg daily. If perindopril was correct, it should have been started at 2mg daily.

2. Incorrect – Mrs Ecksteen should have been started on drug treatment immediately, not in three months time. The drug of choice for her is Metformin at a starting dose of 500mg twice daily because she is obese. Glibenclamide would not be ideal drug of choice and if it was, the starting dose is 2.5mg twice daily.

3. Incorrect – Mrs Smith should have been prescribed Gliclazide 40mg twice daily instead of 80mg twice daily. Her blood pressure is not controlled and the doctor should have added HCT 12.5mg daily to her drug profile.

4. Correct

5. For blood glucose management – start metformin at 500mg twice daily. For blood pressure management – start perindopril at 2mg daily and decrease HCT to 12.5mg daily. Monitor for the next one to three months.

6. For blood glucose management – Titrate metformin dose to 500mg three times a day. For blood pressure management – titrate perindopril dose to 4mg daily. Monitor for the next three months.
J5. Summary of Notes in Desk Card Format.

DIAGNOSIS OF DIABETES
- Symptoms of diabetes = excessive urination, excessive thirst and unexplained weight loss.
- Diagnostic blood glucose concentrations:
  o Random: > or = 11.1mmol/L
  o Fasting: > or = 7.0 mmol/L

DRUG TREATMENT
- If random blood glucose level < 15 mmol/L → start lifestyle modification and assess monthly for 3 months.
- If targets not achieved within 3 months start drug treatment.
- If random blood glucose level > 15 mmol/L → start drug treatment and titrate dosage to max over 1 to 3 months.
- If targets not achieved within 3 months, add a second agent (lowest dose, titrate when necessary).
- If targets still not attained (with good compliance and no infection) consider insulin therapy.

DIAGNOSIS OF HYPERTENSION IN DIABETIC PATIENTS
- Diabetics with no proteinuria: repeated BP readings of > 130/80 mmHg
- Diabetics with proteinuria: repeated BP readings of > 120/70 mmHg

DRUG TREATMENT
- If a diabetic patient's blood pressure is > 130/80 mmHg (with no proteinuria present), drug therapy should be initiated immediately.
- If a diabetic patient's blood pressure is > 120/70 mmHg (with proteinuria present), drug therapy should be initiated immediately.
- If targets not achieved within 2 months, add a second agent (lowest dose, titrate when necessary).
- If targets not achieved with two drug agents within 2 months, add a third agent (lowest dose, titrate when necessary).
- If targets not achieved with three drug agents within 2 months, refer appropriately.
REASONS FOR REFERRAL

1. Significant hyperglycaemia > 20mmol/l
2. Hypoglycaemic coma (Not responding to IV glucose)
3. Refer to ophthalmologist:
   a. Sudden deterioration in vision (Determined from Snellen chart or complaints by patient)
   b. If changes detected on fundal examination
   c. If cataracts detected
4. Gangrene or Ischaemic feet – URGENT REFERRAL
5. Pregnancy
6. Visit 6:
   a. \( \text{HbA}_1c \)
   b. Total cholesterol
7. Visit 12:
   a. \( \text{HbA}_1c \)
   b. Total cholesterol, Triglycerides, LDL and HDL only if the Total cholesterol at visit 6 was not within the optimal or acceptable range
   c. Serum Creatinine if the patient had proteinuria for more than five successive visits.
8. If patient not controlled on current drug therapy for 2 months.

<table>
<thead>
<tr>
<th>Targets For Monitoring Tests</th>
<th><strong>OPTIMAL</strong></th>
<th><strong>ACCEPTABLE</strong></th>
<th>*<strong>COMPROMISED</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urine Glucose</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Glucose (mmol/L)</td>
<td>Fasting</td>
<td>4-6</td>
<td>6-8</td>
</tr>
<tr>
<td></td>
<td>After Meals</td>
<td>4-8</td>
<td>8-10</td>
</tr>
<tr>
<td><strong>Body Mass Index (kg/m²)</strong></td>
<td>Men</td>
<td>20-25</td>
<td>25-27</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>19-24</td>
<td>24-26</td>
</tr>
<tr>
<td>Blood Pressure (mmHg)</td>
<td>&lt; 130/80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>&lt; 7</td>
<td>7-8</td>
<td>&gt; 8</td>
</tr>
<tr>
<td>Total cholesterol (mmol/L)</td>
<td>&lt; 5.0</td>
<td>5.0-6.5</td>
<td>&gt; 6.5</td>
</tr>
<tr>
<td>HDL Cholesterol (mmol/L)</td>
<td>&gt; 1.2</td>
<td>0.9-1.2</td>
<td>&lt; 0.9</td>
</tr>
<tr>
<td>Triglycerides (mmol/L)</td>
<td>&lt; 1.5</td>
<td>1.5-2.2</td>
<td>≥ 2.2</td>
</tr>
</tbody>
</table>

*This is the ideal in a diabetic patient and indicates excellent diabetic control
** This is acceptable in diabetic patients and indicates good diabetic control
*** These values indicate very poor diabetic control
### SUMMARY OF DRUGS

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Tablet strength (mg)</th>
<th>Starting daily dose (mg)</th>
<th>Number of doses per day</th>
<th>Total max daily dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphonylurea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glibenclamide (Glycomin®)</td>
<td>5</td>
<td>2.5</td>
<td>1 – 2</td>
<td>15</td>
</tr>
<tr>
<td>Gliclazide (Diamicron®)</td>
<td>80</td>
<td>40</td>
<td>1 – 2</td>
<td>320</td>
</tr>
<tr>
<td>Biguanide</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metformin (Glucophage®)</td>
<td>500/850</td>
<td>500/850</td>
<td>1 – 3</td>
<td>3000</td>
</tr>
<tr>
<td>Insulin preparation</td>
<td>Onset of action</td>
<td>Starting daily dose (U/kg/d)</td>
<td>Injections per day</td>
<td>Total max daily dose (U)</td>
</tr>
<tr>
<td>Intermediate – acting (Protophane®)</td>
<td>1 – 3 hrs</td>
<td>0.2 – 0.3</td>
<td>1</td>
<td>30 or 0.6 U/kg/d</td>
</tr>
<tr>
<td>Biphasic mixtures 30/70 (Actraphane®)</td>
<td>30 min</td>
<td>0.2 – 0.3</td>
<td>2</td>
<td>0.6 U/kg/d</td>
</tr>
</tbody>
</table>

### COMBINATION DRUG TREATMENT FOR TYPE 2 DIABETES

<table>
<thead>
<tr>
<th>FIRST LINE DRUG</th>
<th>SECOND LINE DRUG</th>
<th>THIRD LINE DRUG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>Glibenclamide or gliclazide</td>
<td>Intermediate-acting insulin with metformin and/or sulphonylurea OR biphasic insulin</td>
</tr>
<tr>
<td>Glibenclamide</td>
<td>Metformin</td>
<td>Intermediate-acting insulin with metformin and/or sulphonylurea OR biphasic insulin</td>
</tr>
<tr>
<td>Gliclazide</td>
<td>Metformin</td>
<td>Intermediate-acting insulin with metformin and/or sulphonylurea OR biphasic insulin</td>
</tr>
</tbody>
</table>
### Hypertension Drug Dosages

<table>
<thead>
<tr>
<th>Summary of Hypertension Drugs</th>
<th>Tablet strength (mg)</th>
<th>Starting daily dose (mg)</th>
<th>Number of doses per day</th>
<th>Total max daily dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCT</td>
<td>25</td>
<td>12.5</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Perindopril</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Atenolol</td>
<td>50, 100</td>
<td>25 to 50</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Reserpine</td>
<td>0.25</td>
<td>0.05 to 0.125</td>
<td>1</td>
<td>0.25</td>
</tr>
<tr>
<td>Verapamil</td>
<td>40, 80, 120</td>
<td>40 to 80</td>
<td>1 to 3 (usually 2 with chronic therapy)</td>
<td>480</td>
</tr>
<tr>
<td>Nifedipine (controlled release)</td>
<td>30</td>
<td>30</td>
<td>1</td>
<td>90</td>
</tr>
</tbody>
</table>

### COMBINATION DRUG TREATMENT FOR HYPERTENSION IN DIABETIC PATIENTS

<table>
<thead>
<tr>
<th>With or without proteinuria</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; LINE DRUG</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; LINE DRUG</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; LINE DRUG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black diabetic patients</td>
<td>Hydrochlorothiazide</td>
<td>ACE inhibitor</td>
<td>Atenolol OR reserpine OR verapamil</td>
</tr>
<tr>
<td>Patients over the age of 55 years</td>
<td>ACE inhibitor</td>
<td>Hydrochlorothiazide</td>
<td>Atenolol OR reserpine OR verapamil</td>
</tr>
</tbody>
</table>
APPENDIX K

Letters of Approval from NMMM and UPE Ethics Committee
Ms S A Boschmans
Pharmacy Department
Faculty Health Sciences
P O Box X6001
PORT ELIZABETH
6001

Dear Madam

RESEARCH PROPOSAL : OPTIMISATION OF PHARMACOLOGICAL MANAGEMENT OF DIABETICS MELLITUS IN A PRIMARY CARE SETTING : BEV DICKASON

Permission is granted for the implementation of Phase II of the study into the Management of Diabetic patients at West End Clinic subject to the provision of a copy of the UPE Human Ethics Committee’s endorsement of approval of this phase of Research.

Your attention is drawn to the current situation regarding availability of Nursing Personnel in the Clinics in comparison to 2002/2003. The increase in the numbers of clients now presenting for voluntary HIV Counselling and testing and the Anti-retroviral programme implementation may impact on the progress of your research.

Yours faithfully

BUSINESS UNIT MANAGER : HEALTH
UNIVERSITY OF PORT ELIZABETH
HUMAN ETHICS COMMITTEE

28 July 2004

Mrs S-A Bouschmanns
Department: Pharmacy
UPE, Building 12

Dear Mrs Bouschmanns,

PROPOSAL FOR APPROVAL: DICKASON, B.

The proposal entitled "Optimisation of pharmacological management of diabetes mellitus in a primary health care setting" was submitted to the Committee in July 2004.

The committee accepted the proposal with the following amendments:

- There was uncertainty whether permission was received/requested from nurses as well – this is required.
- Permission needed from the hospitals/clinics.
- Standard consent forms must be used.
- Include contact numbers/details on the consent form, preferably departmental numbers.
- The aim and objective of the study must be mentioned on the consent form.

All the above amendments must be to the satisfaction of the supervisor.

Kindly inform the candidate of the outcome and we wish you well with the project.

Sincerely,

PROP B POTGIETER
ACTING CHAIRPERSON: HUMAN ETHICS COMMITTEE

Cc: Members of the Human Ethics Committee
    The Director of Research, UPE
    Faculty Officer of Health Sciences, UPE
APPENDIX L

Pre- and Post-Intervention Focus Group Interviews: Transcripts
TRANSCRIPT – PRE-INTERVENTION FOCUS GROUP INTERVIEW 1

F = Facilitator (Researcher)
HCP = Health Care Provider

F - Just to say thank you very much for your time, I do appreciate it this afternoon. What I am basically going to be doing this afternoon is running a discussion to find out your opinions and your feelings about working in a clinic environment, working in primary health care and that type of thing. I want to find out your feelings, your attitudes towards your working conditions here. There is no right or wrong answer here. If you have negative feelings that great, say your negative feelings, if you have positive feelings then say your positive feelings. I want to know a bit of everything. Obviously your name is not going to be mentioned anywhere, I am going to put it into a format of some Sisters suggested ‘this’ about ‘that’, so you don’t have to worry about that. So that’s all for now and we can get started then. Great! Please feel free to talk openly and if possible to try and speak in English, as it will make it easier for me to transcribe, OK? Then we can start with the first question which is: How do you feel about your working environment? Is it positive or negative?

HCP8 - … Well personally I feel that um it is not the best conditions to work under, um mostly because um with the hospital, with the clinic being the first point of contact now for primary health care and with the hospital having referred all their chronic patients to the clinic, we finding the increase in the load of patients that we see, and then there hasn’t really been an increase in staff. So uh you find that the patient ratio to the staff is not really well balanced, so that would put a full lot of strain on the nursing staff at the moment, uh you don’t really give the quality care to the patient that you would like to give. You can’t focus on things that you would normally do. So you feel frustrated at the end of the day. So it puts you down to instead of spending the 20 minutes per patient or even 15 minutes per patient you find yourself spending 2 to 3 minutes per patient, and I mean what can you really do in 2 to 3 minutes per patient. So its very frustrating and um unsatisfactory.

F – OK! Anyone else like to comment on that?

HCP1 – No, I agree with that! It’s very true!

HCP6,7,9 – Ya, mmmm (nodding heads).

HCP2 – Just to add to what HCP8 said, it is true especially at West End Clinic, what we have picked up is that if a patient comes from Dora or even Livingstone
or wherever, the first clinic that the hospitals write down is West End Clinic, whether the patient stays this side of the area or not, and I am talking now about primary health as well as TB. When the patient comes here they say that they said that they must come to West End Clinic, as if there are no other clinics. Now you must explain to the patient that you are not supposed to come here, you must go to the clinic where you stay. Because it is far for the patients to come from say Chatty and even Gelvandale to West End if a patient is staying in that area. So that is what is making the workload even more and adding to that!

HCP9 – Ya, the workload is increasing for the nurses and the patients are being inconvenienced because they have to come further than they should!

HCP8 – The patients are very dissatisfied. You find that they are coming into the clinic by 7 ‘o clock, in fact they start queuing by half past four, five, and then those very patients are the ones that leave here two o’clock, three o’clock in the afternoon, so you can imagine that by the time they come into the consulting room what their attitudes are like, and you have to sit with that. And it’s directed at you as the nurse, who is consulting with them, so its very frustrating! And yet we enjoy working with people, that is why we are in the community! You want to work with people. You want to spend your most time with them. It’s just the conditions.

HCP1 – Ya, the conditions are not good at all!

HCP6,7 – Ya (nodding heads)!

F – Ok, then going onto the next one! Do you feel that everything that you need is available here at clinic, with regard to helping and treating patients?

HCP7 – Well in the dispensary, no there is not everything that we need! Sometimes, well most of the times the medicines are out of stock! Then when we are explaining the problem to the patients, they are becoming rude, as if we are not wanting to give them the medication! If it is out of stock from the Depot, what must we do? There is nothing we can do!

F – Ok, so out of stock medication, that is a problem!

HCP1,2,6,7,8,9 – Mmmmmmm (nodding heads)!

F – The Sisters in the consulting rooms, is everything there that you need?

HCP1 – If you look at the boganometers, we have asked for them to be fixed, because they are mostly out of order!
HCP8 - And then also the ones that we have are antiques, we would like to have some new ones (Everyone – laughing!)

F – So the equipment is old! Ok, you have touched on this subject, but do you feel that there is enough time to do everything that you would like with the patients?

HCP6 – There is not enough time! Actually when you see the loads of people and you just think that these people want to get out before 4 ‘o clock, actually before 12 ‘o clock they want to be out of the clinic. And in front in the morning, they shout and scream, and you just think, I have to finish this now, I have to finish working. So you actually just concentrating on that getting finished! You feel rushed!

HCP1,8,9 – Ya, mmmmm!

HCP2 – And you know the patients are losing out! Especially with family planning, sometimes you need to sit with that patient and counsel in a way, but now you are just rushing through everything, not the way you have been taught. But you are doing now short ways because you are looking outside, and you want to finish this patient because you need to get through everybody!

HCP9 – You are trying to create short cuts to manage the patient load!

HCP2 – You don’t get to educate the patients as properly as you want to!

HCP1 – Ya, as you would like to educate!

HCP8 – Because the emphasis with community health was more on preventative care, but you find now that with the increase in primary health care, that there is really no time to focus on preventative care. Your health education has gone down, because the consultation time has gone down! And with the result you find that you are just focusing on primary health care all the time, curative all the time, and the loads increase because there is no preventative care really being done!

HCP6 – Ya, it’s a vicious circle!

HCP1,2,7,9 – Ya, mmmmm (nodding heads)!

F – And then if you could, what would you change here then at the clinic to help improve this situation?
HCP9 – We need more staff!
HCP2,6,8 – Ya, definitely!
HCP1,7 – Ya, mmmmm!

F – Ok, more staff! What else?

HCP8 – A cut off time for patients. You limit your patients.
F – Ok, to limit patients. What else?

HCP6 – Patients must go to their own clinic in their own areas, where they are supposed to go!
HCP1,7,9 – Ya, mmmmm!
HCP2,8 – Yes!

F – Ok then, onto the next one. How do you feel about the training that nurses receive before you graduate, with regard to specifically looking at the training for managing diabetic and hypertensive patients? So do you feel about the training you received while you are studying?

HCP2 – Like us, we did GNS in our first and second year, then you wrote it off, and you only come into contact again with it when you go to the hospital as such. So you are studying at that point in time about diabetes and hypertension, whatever. Now you are writing exams, and it’s over and done with, and you move onto the next field, whether it is psychiatry or midwifery, you know. So then when you are in the clinic or in the clinical situation, its something different, because that time when you were studying you didn’t even take note, but now it makes sense to you in that practical area, it makes sense. But now you must scratch far back for that knowledge, because that is second year knowledge. You see, that is also one of the things with that four year course.

HCP8 – And they don’t focus that much on the pharmacology, you know, specifically with diabetic patients, so and as HCP2 said, you don’t concentrate so much on that when you are a student, but now when you are qualified and you are in the field, where you are really doing the thing, some in-service training on that would really be nice!

HCP1,6,7 – Ya, mmmmm (nodding heads)!
HCP9 – Yes, we really do need more in-service training!

F – Ok, then I want to ask, would you have added anything to the training that you receive, whether it be while you do your four year course or here in the clinic? You have already mentioned the in-service training, but any other ideas to improve it?

HCP6 – Maybe like a more intense course in primary health care, because we only did like two to three weeks. We where in Livingstone hospital and our teacher just said ‘This is head and neck, this is chest, this is that’, but you didn’t actually know what you looking for, and what you are listening at, things like that. I think we just need a more intense course in primary health care.

F – Do you all agree with that?

HCP1,2,8 – Ya, mmmm.

HCP9 – I think a lot of that comes with practical experience, which you can only get with working in the clinical situation.

F – Alright, and how do you feel about the in-service training that you receive at your place of work? Is there any in-service training?

HCP1,2,6,7,8,9 – (Laughing)

HCP8 – It is frequently cancelled! They schedule it, but then just cancel.

HCP9 – Ya, there really is not much in-service training.

HCP1,2,6,7 – Ya!

F – And do you feel that that should change?

HCP1,2,6,7,9 – Ya (nodding heads).

HCP8 – Especially on the primary health care conditions, we would like to have some doctors or specialists, people who are working in that field, to come and give us some guidelines, some lectures on the conditions that we are treating.

F – And when is the best time for this in-service training?

HCP9 – Friday afternoons.
HCP8 – Ya, it’s the only day in the week that we have a bit of time to do anything, because there are not as many patients on a Friday.

F – Ok. For those Sisters that do actually see diabetic patients, what is your normal routine when a diabetic patient comes in for a check-up?

HCP1 – You check their sugar levels, their blood pressure, their vital signs and their urine.

F – Ok. And then moving on into the consultation room, what happens there?

HCP6 – You look at general appearance. You watch, when you speak to the patient you watch for things that might be wrong.

HCP9 – When the patient comes in you do a screening, you know you do JACCAL, you look for the main things that you report on. Just a basic screening. And then you stick more to the things for diabetics, like you check their feet, you ask them about their eyesight, any complications, and you check what the vitals look like.

HCP1 – And you ask about their diet.

HCP8 – And you check if they are taking insulin, for rotation of injection sights.

HCP2 – And you need to look if they have hypertension as well as diabetes. Ya, if they have more than one chronic condition.

F – Ok. And just to ask, do you use the diabetic record card as a guide?

HCP1,2,6,7,8 – Yes we do!

F – And then, how do you feel about treating diabetic patients?

HCP9 – Not exited! (HCP1,2,6,7,8 – Laughing) But I wouldn’t say that you change you attitude when a diabetic comes in. It’s one of your patients.

HCP2,6,8 – Mmmmm (nodding heads).

HCP1 – I just feel that diabetic patients and hypertensive patients must look after themselves. So I am glad when they come to the clinic so that we can keep a check on them, and they must take their medication daily, as they should. Ya so they should come on their dates and get a thorough check up.
F – And how do you feel about the standard of care that the diabetic patients are provided with here at the clinic? How do you feel?

HCP9 – It’s maybe not the best, but I think it is adequate.

HCP1 – Ya! They get what they can get here. We have enough for them to be treated.

HCP8 – Ya, but again, if we had more staff it could be better!

HCP2,6 – Ya!

HCP7 – And if we had the medication all the time, that would be better!

F – Do you feel that the patients themselves are well controlled and well managed here?

HCP1 – Ya they are!

HCP2 – But not all of them come on their dates when they should, so they are defaulting.

HCP7 – Ya, they don’t always come on the right dates for their medication!

HCP8 – For some, that is a problem.

HCP6,9 – Ya!

F – And then, what feelings do you have about treating patients with chronic conditions like diabetes and hypertension?

HCP8 – I feel that after a while you start to bond with the chronic patients, more so than with the acute patients. So no you don’t regard them as an added load because you know their condition, and you know what to look out for.

HCP6 – Ya and you get to know them.

HCP1 – And most of them make an effort to come, they don’t stay away.

HCP2 – Ya, and that is encouraging!

HCP9 – Ya!
F – Do you ever feel any frustration and do you think that this can influence the care that you provide? Be honest.

HCP8 – It does. Even though I feel that we are mature here, the nursing staff is very mature and we debrief themselves, and we support one another. So we have ways of dealing with our frustration, but it can sometimes get to you and therefore it can affect the care that you give. We all lose our cool now and then!

HCP1,2,6,7,9 – Ya, mmmm.

F – Yes, which does happen! How do you feel, with looking at diabetes and hypertension, about the South African guidelines? Are they helpful, not helpful? What do you feel?

HCP6 – I think they should be more publicised.

HCP9 – We rely a lot on the doctor. We don’t really follow those guidelines as we could. We know that the doctor wants to prescribe a to z, which is in the guideline, but we don’t really use them.

HCP8 – Ya!

F – Do you think that the guidelines are more directed at doctors compared to nurses.

HCP2 – Yes, they are not really directed at us. We don’t really look at them much, just maybe the blood sugar and blood pressure values.

HCP1,6,7,8,9 – Ya, mmmmm.

F – And then do you feel the guidelines are being used here at the clinic everyday?

HCP9 – As I said, not really. It’s the doctors that use them, not us really.

F – Do you all agree with that?

HCP1,2,6,7,8 – Yes (nodding heads).

F – Alright! How do you feel about the drug management of diabetes and hypertension? Say for example when you are looking at a patient’s drug profile, do you feel that you can spot drug interactions, or if something is wrong or right? A dose that is right or wrong?
HCP9 – Looking at the drugs in that detail, it’s not something that we are really that into. That again is what the doctor should be able to do.

HCP8 – I sometimes think that doctors are too quick to start patients on drug therapy before they give diet control a chance.

HCP2 – There is also sometimes the problem of poly-pharmacy, where these patients are on a whole lot of drugs.

HCP8 – Ya, but then again I suppose with most of these patients you can’t really trust them to go on diet management alone, because they might not be to diligent with that. Because even when they are on their medication, you still find them cheating with their diets. And the other thing is that if we find that a patient has consistently high glucose levels on current medication, we just refer them to doctor, and doctor will decide whether or not to alter their medication.

F – And HCP7, do you feel that with the training you received to become a pharmacy assistant, do you feel that it is enough to be able to spot big drug interactions, or to spot whether a patient is on the maximum dose of a drug.

HCP7 – No, it is definitely not enough. We need more training, or to have a pharmacist here at the clinic.

F – Ok. And then, do you feel with having the knowledge from varsity or college and experience at the clinic and any in-service training, do you feel that you have enough knowledge in the pharmacology of the drugs to recognise when a patients medication should be altered or doses increased?

HCP1,2,6,7 – No (shaking heads)

HCP8 – From experience here, yes! From monitoring a patients HGT and seeing a response, we know when they are not controlled, but when it comes to the drugs I think we could use a bit more training. (HCP1,2,6,7,8,9 – Laughing)

HCP9 – Ya!

F – So say for example if you had to look at a patient’ prescription, and see that their blood sugar was not controlled, and their blood pressure is not controlled, you would refer to doctor. So would you be able to suggest adding on medication to a patient’s drug profile or suggesting a dosage be increased?

HCP8 – You can see when a patient is not controlled, but I would not feel comfortable suggesting drugs and doses.
HCP1,2,6,7,9 – No (shaking heads).

F – Ok, then do you feel confident in monitoring the patients and being able to refer.

HCP1,2,6,8,9 – Yes.

F – So you are confident in referring to doctor when necessary, but how do you feel about the doctor only being available once a week on a Wednesday morning?

HCP9 – The number of doctors available, and number of visits to the clinics is totally inadequate.

HCP8 – It’s so frustrating. Because you have so many of our patients are not controlled, the border line cases, which are not severe enough to send to casualty or hospital as an emergency, but you are not comfortable with keeping the patient till the next session of doctor. So it is just those border line cases, that is of a concern to you. And it would be nice just to have a doctor at that time, just to alter doses and trying to phone the POC at casualty, sometimes causes a problem, you know, just to consult with them, or to ask them to change the treatment or you might not be successful in tracing the POC or even the clinic doctor. So for those border line cases it is frustrating.

F – And you as nurses don’t do any prescribing for chronic, only acute.

HCP8 – Yes, doctor does the chronic. And also if we had some standing orders, you know, would be nice. If the blood sugar is at this level and the patient is on this and that, do this. Something signed by doctor, it would be nice to have something like that to guide you when there is no doctor available.

HCP2,6,9 – Ya, mmmmm.

F – For those Sisters who have been working in primary health care for a while, has it always been like this, where the doctor is only available at the clinic four times a month?

HCP9 – Its always been like that.

HCP1,7,8 – Ya!

HCP8 – And she is actually more frequent now than before. But obviously, it would be even better if we could have a doctor here at the clinic every day!
HCP1,2,6,7,9 – Ya, mmmmmm!!

F – Is there anything else that you would like to add about working here in primary health care?

HCP6 – Even though the doctor is coming here more often, the amount of patients are more. So that is why we are struggling so much, and that is why we need doctor more often.

HCP1,2,8,9 – Ya!

HCP7 – And like I said before, I can’t handle everything alone. That is why we need a pharmacist here more often too. Especially when it is doctors clinics, even with the repeats. Sometimes, its because they don’t come on their dates regularly, maybe tomorrow its busy, but they must come to the clinic and see how the situation is here, especially when it is doctors clinic.

F – Are any suggestions ever made to management authority higher up about the situations here? Do you ever get any feedback?

HCP9 – They will only respond if there is a major crisis, like a major blow up. And then you find them running to the clinic. But when we complain, and write letters stating our frustrations and our working conditions, there is no response.

HCP8 – Or the response is not what you would like it to be!

HCP1,2,6,7 – Ya!!

F – Ok, then what keeps you motivated to stay in primary health care?

HCP8 – Like me, I love primary health care. I love working with people. And you bond with the patients over the years. And in spite of what the conditions are outside, and the large number of patients waiting outside the door, when that person comes in, you focus totally on that person. This is the person I need to spend my time with now. So it’s rewarding even though its frustrating.

F – Anybody else got anything to add to that?

HCP6 – Ya, it is definitely rewarding. Because you do get patients that come back to you and say ‘Thank you Sister! What you gave me really did help me’, and stuff like that.

HCP1 – And there is always a bit of everything!
HCP2 – Ya, and some patients even bring milktarts and cooldrinks.

HCP1,2,6,7,8,9 – Laughing!!

HCP9 – I think the positions we have here at the clinic are probably better than most.

F – And any other final comments? Then I would just like to say thank you very much for your time, and for answering the questions and for speaking so freely! It really is greatly appreciated.
F = Facilitator (Researcher)
HCP = Health Care Provider

F - Just to say thank you very much for your time, I do appreciate it this afternoon. What I am basically going to be doing this afternoon is running a discussion to find out your opinions and your feelings about working in a clinic environment, working in primary health care and that type of thing. I am wanting to find out your feelings, your attitudes towards your working conditions here. There is no right or wrong answer here. If you have negative feelings that great, say your negative feelings, if you have positive feelings then say your positive feelings. I want to know a bit of everything. Obviously your name is not going to be mentioned anywhere, I am going to put it into a format of some Sisters suggested ‘this’ about ‘that’, so you don’t have to worry about that. So that’s all for now and we can get started then. Great! Please feel free to talk openly and if possible to try and speak in English, as it will make it easier for me to transcribe, OK? Then we can start with the first question which is: How do you feel about your working environment?

HCP5 – It’s very stressful!

HCP10 – Ya stressful!

HCP4 – I agree with her, very stressful!

HCP5 – The workload has increased, and we are only getting in contractual workers to fill in positions.

HCP3 – The Sister patient ratio is really not good. Its not always the same Sisters doing primary health, you have new Sisters coming in, sometimes we are short staffed and we get a new Sister coming in. And that adds a lot of pressure and stress because that person now needs to be buddy trained within 5 minutes.

HCP5 – And another thing that adds to the stress side of it is that most of these Sisters come from a Midwifery background for example, with no previous experience in primary health care.

F – So am I correct in saying that the general feeling is that it is stressful and that the workload has increased. Do you all feel the same about that?

HCP3,4,5,10 – Yes (nodding heads)!
F – Right, then the next question, is everything that you need available to you here at the clinic?

HCP5 – No!

HCP4 – No not always, especially the medication. The medication is a big problem, with it being out of stock so much.

HCP10 – Ya, and the dressings.

HCP3 – The referral system! If a patient needs to see a doctor, doctor is not always available, and sometimes when you refer a patient to the hospital, the blood pressure or blood sugar is too high, but the dosages are not altered, so you sit with the same problem.

HCP5 – Yes, that is a problem.

F – And equipment wise?

HCP5 – No equipment is fine, but it is just the stock levels that are the problem!

HCP3,4,10 – Ya!

HCP4 – I feel it would help if we had standing orders for emergencies, like for high blood pressures and high blood sugars. It would help a lot because sometimes the patient only needs that little bit extra to prevent the patient from going to hospital.

HCP10 – Ya, because then you sit with the problem of trying to get the patient to the hospital, because most of them that come here don’t have transport or money. So you don’t even know if the referrals even get to the hospital, or whether they don’t just go home.

HCP5 – Ya and then the problem gets worse!

F – Ok, then do you feel that there is enough time to do everything that you would like to do with the patient?

HCP3 – Definitely not!

HCP4,10 – No!
HCP5 – First of all looking at the diabetic or hypertensive patients, we need to educate. And the masses are, the load outside is so big that you can’t really pay the attention you need to the patients. Like you can’t spend 30 minutes with them like you would want to.

HCP4 – You can’t give them that quality care, because the people start getting irritable outside, then you start hearing the comments.

F – Ok, so you all feel the same about that!

HCP3,4,5,10 – Yes (nodding heads)!

F – Ok, then if you could, what would you change about these working conditions?

HCP4 – More staff!

HCP5 – More trained staff!

HCP3 – And have a certain amount of patients per day that the Sisters will see, because then you can give the quality care that you want to give.

HCP10 – Ya, like a cut off every day.

HCP5 – Not like a strict cut off, because you will always have like emergencies, but I mean with the chronic patients, they do take up time, and they like to come in late. But that’s only the minority.

HCP4 – And something to lift the morale of the nursing staff. There is nothing to look forward to. You get up in the morning, you come to work, there is nothing extra to look forward to. It’s the same day in and day out. But there is nothing besides the patients that make your day. Do you agree?

HCP3 – The situation here at work is not going to change, and that is just demotivating.

HCP5 – Ya, there is nothing for you to look forward to. There is no support from management, they don’t address anything and there are no courses on offer. And in the HR department and management, to them we are just another body, another nurse! And a pair of hands. But what comes with that pair of hands? There is nothing in our environment to keep us interested and stimulated. There is nothing to look forward to.
HCP10 – Ya, I agree!

HCP5 – There are no job incentives to work towards, and the job satisfaction comes from the patients that are grateful for your help. Seeing a patient improving, that is the only job satisfaction. Just for me, I am at my lowest. There is nothing really motivating me. If I get another work tomorrow, I will go. Because it’s as if all you are doing and what you have done is not appreciated, its like nobody sees it. There is no appreciation from management side.

F – Do you all feel the same and has it always been like this, or has it deteriorated?

HCP3,4 – It has definitely worsened!

HCP10 – Ya!

HCP5 – Let me tell you when I started here in the early 90’s, and we had job satisfaction. You know we did our very best for our patients, I really enjoyed working for the Municipality then. But now you just go with the flow, because you feel like you can’t change anything.

HCP4 – It’s very demoralizing!

HCP3 – And de-motivating!

HCP10 – Ya, there are lots of negative feelings here in the working environment, and that is wrong!

F – Ok, but moving on. How do you feel about the training that nurses receive before you graduate? Do you feel that it is enough?

HCP10 – I think that it is very adequate. You see they have mostly theory, their practical experience is very little.

HCP5 – There is also a big difference between the nurses from UPE and from Shirley Cribb. The Shirley Cribbs nurse is more hands on, and she is willing to work, she is motivated. But the UPE students, I am sorry to say it, but they are not as hands on.

HCP3 – They are always in the back!

HCP5 – Ya, they are not motivated, they are not eager to learn. I don’t really see the difference between the diploma and the degree.
HCP4 – I think there is a difference between the UPE and Shirley Cribb students. I don’t know where it comes from. Maybe it is because the UPE students are less exposure to the clinical field, but there is a definite difference.

HCP3 – Some may say that is the superior feeling, because they are graduates.

F – Ok, but the actual qualifications, the practical study, what you have to learn, do you feel that is up to standard?

HCP4,5,10 – Yes.

HCP3 – The rest comes with exposure and experience.

F – And would you add or change anything to the training that the nurses receive?

HCP5 – With time and experience, everything comes together. You can’t be expected to know everything at age say 21 when you have just finished your degree or diploma!

HCP3,4,10 – Ya!

F – And how do you feel about the in-service training at you place of work? Is there any in-service training?

HCP3 – Before, there used to be a variety of courses to chose from, all of high standards, but now they are just concentrating on HIV and TB, STI’s. There are no longer topics on the chronic conditions or primary health care, like there used to be. But these trainings don’t really happen much anymore!

HCP5 – Ya, they don’t really do them anymore.

HCP10 – I feel that we need some more in-service training on the chronic conditions.

HCP4 – And now because of the referrals from the hospitals we are no longer just getting the diabetics and hypertensives, we are getting a wide variety, and we need training on these other conditions, because of the new medication from the specialist hospitals. And some of the new medication needs blood work which we don’t have the protocol to do! So maybe we need training on these other conditions.

F – Ok, so when do these trainings usually take place?
HCP3,4,5,10 – Fridays!

HCP3 – If it happens!

F – Ok, then to change the topic. When you get a diabetic patient in, what is your normal routine when treating a diabetic patient?

HCP5 – If we start with observations first, blood glucose, blood pressure, urine testing. And weight.

HCP3 – You ask for and complaints from them, do signs and symptoms. General check up on patients and diet counseling, and the feet.

HCP4 – And any other presenting symptoms. Its hard to say them all now, but when you are in the room, you know what to do.

HCP3,5,10 – Ya!

F – Are you finding that the diabetic record helps you when examining a patient?

HCP3,4,5 – Yes.

HCP10 – It makes it so much easier by just ticking, instead of writing the whole time.

HCP5 – I do just have one concern with the diabetic record card. There are separate areas to write in acute and chronic medication. I am always scared that, if HCP7 is not there that the acute medication will not be issued. I like to write everything in chronic.

F – That’s fine, if you feel more comfortable that way!

HCP3 – The other thing that I have a problem with is that if a patient comes in for an acute visit, I find it time consuming to fill out the whole card. I just do it once a month, with their chronic visits. I have said before that it is not always possible to examine every diabetic patient every time they come to the clinic because the work load is just too much. We try so that the blood sugar, and blood pressure and urine etc. is done is every month, but they can’t always see the Sister.

HCP4 – Ya, there is no manpower to be able to do that!

HCP3 - Ya, you know with Milly, it was much easier. There were very few diabetics.
HCP5 – Ya, it was because there were very few diabetics, and the size was controlled, and the patients were more controlled.

HCP3 – We are now getting the diabetics who have been referred from Livingstone, who are not controlled, we cannot get them back to the hospital, and they are defaulting and they are in our systems and we are really battling. And that is what is so frustrating.

HCP4 – Ya, some are not coming every month, their blood sugar is not being sorted out, and their medication stays the same.

HCP5 – And then with those problem diabetics, you can’t see them every month, because they are not controlled, because we don’t have the staff to do so.

HCP3 – When those diabetics were at the hospital, they just receive repeats with no tests, or counseling.

F – Ok, so we also need to concentrate on the hospitals as well.

HCP3,4,5,10 – Yes (nodding heads).

F – Alright, then how do you feel about the standard of care that the diabetic patients are provided with here at the clinic?

HCP3 – I think that it is much better than what the patients get at the hospital. And you can also see the difference with the patients that are in the support group you can see the difference in their attitudes and their understanding of the disease. Because most of our patients they do take their treatment but they eat whatever they want!

HCP4,5,10 – Yes, mmmmm!

HCP3 – And then you ask them ‘Have you been naughty’, then they will laugh and eventually you get the truth out of them about what they ate. The one lady was telling me ‘I know my blood sugar is high because I like my sweet things. And there again you don’t have time to counsel, and it is those patients you need to sit and educate…

HCP4 – Ya reinforce!

HCP5,10 – Ya, mmmmm!
HCP3 - …and reinforce, but you just don’t have time and that is what is so frustrating.

F – So do you feel that the patients are not well controlled here from what you have said?

HCP5 – We try our outmost!

HCP3,4,10 – Ya, mmmmm!

HCP4 – They just don’t co-operate with us. So then there is nothing that we can do.

HCP10 – And I think they are not motivated enough.

HCP5 – But Mrs Ackerdien she really goes out of her way, but the patients don’t want to stay here till 11 o’clock for the meetings. And that health education is so important, because we really don’t have that much time in the room, to preach to each and every diabetic patient, you know, but if they don’t want to listen, we can’t force them.

HCP3,4,10 – Ya, mmmm (nodding heads).

F – So you feel you are trying your best, but under the time constraints you not providing perhaps what you could be.

HCP3,4,5,10 – Ya!

HCP4 – But it is not only with the diabetics, it the minor ailments to, just generally.

F – Do you ever feel frustrated when treating patients with chronic disease states, like diabetes and hypertension?

HCP3,4,5 – Yes!

HCP10 – You actually feel like you are fighting a losing battle with them.

HCP5 – You see, Livingstone has got rid of a lot of their diabetic patients, and now they are our baby here now at the clinic. You can’t send that patient back to Livingstone, because that is also just a nightmare. And it is traumatic for the old people to go back to Livingstone.
HCP3 – Ya!

F – Do you feel that your frustrations can influence the care that you give to these patients?

HCP3 – Obviously!

HCP4,5,10 – Yes!!

HCP5 – But shame, 90% of the diabetics, and even the chronic patients here are very sweet. The young ones, yes you get frustrated, but with the old ones I am never influenced. We usually go the extra mile for the chronic patients.

HCP3 – Ya the old patients are very sweet! You can’t get frustrated with them!

HCP4,10 – Ya!

F – Ok, moving on again. How do you feel about the South African guidelines for the management of diabetes and hypertension?

HCP5 – Its good.

HCP3,4,10 - Ya.

HCP3 – But we don’t really use it! They are locked up in a cupboard!

HCP5 – Ya, that is true! I used to read them every now and again, but not anymore.

HCP4 – I have never even seen them here at the clinic.

HCP3 – Ya, but we use the EDL, we don’t use the guidelines!

F – So you are not really applying the guidelines?

HCP3 – I think that will be yes and no. Because we do do things that are part of a protocol, which probably comes from the guideline, we just don’t refer to the guidelines every day!

HCP4,5,10 – Ya!

F – So then, how do you feel about the pharmacological management of diabetes and hypertension?
HCP3 – We probably need revision about the drugs, to get insight, but we don’t prescribe. That’s not our job!

HCP5 – Ya, we really do need some in-service training to brush up on the drug management, because you can forget so easily because you are not working with it everyday. But you can normally see when a patient should be put onto drugs. But we don’t prescribe!

HCP3,4,10 – Ya!

F – Then the next thing: do you feel that you are confident enough in your knowledge of diabetes and hypertension to recognize when pharmacological therapy should be changed?

HCP3 – Not really, because you know a bit, but you don’t really know why, or what can be changed, you know, that sort of thing.

HCP5 – Uh uh (Shacking head). I think we need more insight!

HCP4,10 – Ya, we don’t now enough!

F – Ok, then do you feel confident in monitoring diabetic patients and referring patients to doctor when necessary?

HCP4 – Ya, you know, you can see when a patient is really bad, and then you must just refer.

HCP5 – Ya, we can see the problem patients! But maybe we need to know what the fine line is for when a patient is controlled or not.

HCP3 – It comes with experience, being able to recognize when a patient is uncontrolled.

HCP10 – Ideally we should have a doctor everyday, then there would be better control with the patients and their scripts and the changing of medication, because we could just ask them.

HCP3 – In a perfect world!

HCP4,5 – Ya!

F – Are there any other comments that you would like to add about anything that we have discussed here today, or with regard to primary health care?
HCP5 – I think we have had our say!

HCP3 – Ya, I have spilt my beans!

HCP4,10 – (Giggles)

F - Then I would just like to say thank you very much for your time, and for answering the questions and for speaking so freely! It really is greatly appreciated.
F = Facilitator (Researcher)  
HCP = Health Care Provider  

F – Thank you for your time this afternoon. I want you to feel relaxed during this discussion today. Please be honest when answering, as there is no write or wrong answer. Your names will not be mentioned anywhere, so you don’t have to worry about that. Remember to let everyone have a say, and to think of this as a normal chat in the staff room. Ok, the first thing. If you take into consideration the past four months, from after the education sessions until now, how do you feel about your working environment? Has anything changed? Is anything different?

HCP1 – Yes, there are more patients now that are being sent from the hospitals.

HCP2 – Ya, definitely more patients.

HCP3 – So now the workload has increased because of there are more referrals.

HCP4 -Um, staff change over is also a problem. We have had a lot of people leaving, with not many replacements.

F – And how do you think that impacts the working environment?

HCP3 – Ag, its just adjustment that’s needed. And orientating the new people.

HCP1,2,4 – Ya (nodding heads)

F - Do you feel that everything you need is available here at the clinic?

HCP4 – More or less.

HCP2 – Ya, we have all the equipment that we need.

HCP1 – Mmmmm(nodding head)

HCP3 – But we need a doctor more often at the clinic. Once a week is not enough!

HCP1,2,4 – Ya, definitely! (Nodding heads)
F – Is there enough time for you to do everything that you would like to do with the patient?

HCP1,2,3,4 – No (shaking heads)

F – Thinking back to four months ago, has anything changed with regard to time?

HCP4 – It has gotten worse because there are now more patients and we have less staff here.

HCP1,3 – Ya, I agree.

HCP2 – (nodding head)

F – If you could, what would you change about your current working environment?

HCP3 – More staff.

HCP1,2,4 – Mmmm (nodding heads)

HCP4 – And I would also say the availability of doctors.

HCP1,2 – Mmmm, ya.

HCP3 – Ya we need a Doctor here more often.

HCP4 – Ya or maybe even standing orders, so that we don’t end up referring the wrong patients to casualty.

F – So what is a standing order?

HCP4 – If the blood sugars are this, and if the patients are that, and if the blood pressure is this, we must do that.

HCP2 – Ya, its like a protocol.

HCP1,3 – Mmmm, ya.

F – Ok. Moving on. Please be honest with this one. How do you feel about the training I gave you on the pharmacological management of diabetes and hypertension?
HCP4 – We learnt a lot, it was interesting.

HCP3 – Especially on what should be given with what. (HCP1,2,4 – Mmmm (heads nodding) It made us more aware of the drugs.

F – Anything else?

HCP3 – I think that maybe we should have had another session, to go over it again, to reinforce it again.

F – So, another session, ok.

HCP1 – It was very interesting for me because I never knew that you could…

HCP2 – Ya, very informative also.

HCP1 – Ya, actually I learnt a lot from that session, but another one wont be a waste.

F – Ok, then if you could have changed or added anything to the session, what would you have done?

HCP3 – No it was fine.

HCP4 – It was good.

F – So you wouldn’t change anything then?

HCP1,2,3,4 – No (Shaking heads).

F – ok, moving on then. Do you feel that your routine for treating a diabetic patient has changed over the past four months?

HCP3 – Ya it has changed.

F – In what sense?

HCP3 – We used to only do the blood sugar when the patient saw the doctor or sister, month one, month 3 and month 6. Now it is being done with every visit.

F - How has that impacted the work load?
HCP4 – Its positive for the patient, but when it comes to workload it is sometimes very frustrating, because it adds to the workload.

HCP2 – Ya sometimes you just want to get the work done, but it has really had a positive impact on the patients. When you see how the patient was doing previously.

HCP1,3 – Mmmm (nodding heads)

F - So you feel that these changes have been for the better?

HCP1,2,3,4 – Mmmm (nodding heads)

F – Just a question that I would like to know, once I am gone, what will be your protocol, or are you going to try stick with what it is as the moment?

HCP2 – We will try to keep it as it is, with the blood sugar test every month.

HCP3 – And if they are controlled, they can go for meds, but if not, then they must see the sister.

HCP1,4 – Ya.

F – Ok. Then after the training sessions that I gave you, do you feel any different about treating diabetic patients?

HCP4 – Yes, you looked at them differently.

HCP3 – You looked at what the patient was getting, and um, you knew what parameters to look at. You knew that this is too high, this is the fasting. You know, you just, it was like you were refreshed, you were more alert, you really became more aware. You sometimes feel that you get stuck in a rut, where you get used to saying, ag 11 is ok, 10 is ok. So your awareness has changed.

HCP1 – Mmmm, ya.

F – And how do you feel with regards to doing all the monitoring tests?

HCP2 – No its fine. It depends on the patients, because some are used to being sent through for meds, but now some patients are actually wanting to come and have things checked first, which is fine with me. Then we know what the status is.
HCP4 – Like our old people, I find that most of those patients, even if they are just coming for meds, they like to see the sister.

HCP1,2 – Ya they do.

HCP3 – Ya, sometimes they just need that reassurance that ya, I am ok.

HCP1,2,4 – Yes, Mmmm.

F – You are based in TB, so you do you see any diabetic patients?

HCP1 – Only in dispensary.

F – And in the dispensary, do you react differently to the scripts now?

HCP2,3,4 – Ya.

HCP1 - Now we are alert there. Previously we just gave, but now we ask each other, what do you think, is this alright, and we discuss it together.

HCP3 – And look at this, this doesn’t look right.

HCP1 – Especially with the hgt, (HCP2,3,4 –Yes) we have become more aware.

HCP3 – Then we right something in the back for the doctor to see.

F – So, how do you feel now about the standard of care that the diabetic patients are provided with here at the clinic? Do you feel it has changed over the four months?

HCP4 – It has, but not like it should be.

HCP3 – Mmmmm.

F – What have been the changes?

HCP4 – I would say the fact that we are doing the blood sugars on every visit, we can handle, and we have been keeping an eye on them, monitoring their blood sugars more closely.

HCP3 – Blood pressures as well.

HCP1,2 – Ya.
F – And do you feel that these patients are now more managed and more controlled or not?

HCP3 – Not really.

HCP1,2,4 – No.

F – Why? Why do you feel that?

HCP3 – Patient awareness. We need to look at besides drug adjustments, because many a time we will refer our patients to doctor because blood sugar is not what it should be, but then doctor will say, look – this person is not adhering or this person is not following a diet or you now, so I think the next time you also need to, besides speaking to us, and besides the group that we have monthly, we need to give intensive patient education.

HCP1 – Ya to the diabetics, about their illness, not just you know, but really so that they know what is going on.

HCP3 – Ya, because it really is great when you have a patient who asks ‘what is my blood sugar’, ‘but why’ and so on. Because if they are interested and take a keen interest in their condition, because we have a lot of uncontrolled diabetics and hypertensives.

HCP1,2,4 – Mmmm (Nodding heads)

F – So you feel we need to look at patients themselves, to direct things towards patients, that patient education is very important.

HCP4 – Ya, which we would love to do but there is no time for that.

HCP1,2,3 – Mmmmm (Nodding heads)

F – Ok. Now do you feel any frustration after the training, with respect to the way the patients are managed?

HCP2 – Well we have said that the patients themselves are not compliant, and we do what we can to help them.

HCP3 – You do not have the time that you used to have to sit and explain like if you had time then you could explain to them like these are the side effects, these things affect blood pressure and blood sugar, um, what do you eat, what did you eat today, look at it, change it, like what did you eat last night. Um, maybe the
patient has been coughing, what did they drink for the cough. You know, little things, so that is frustrating that you don’t really always have the time to get to all those nitty gritty important issues.

HCP2 – Ya, those little things that make the big difference.

F – Do you all feel the same about that?

HCP4 – Ya.

HCP1 – Um, and the patients doesn’t bring their side as well. Ya, because they come, like the one came this morning who had an HGT of about 18, and he had a date for earlier on which he didn’t adhere to, he came today because his medication was finished today, so they don’t bring their side also.

HCP4 – Ya we try our best in a bad situation.

HCP1,2,3 – Ya, mmmmm.

F – Ok – So you feel that the patients should also be more interest in their health.

HCP1,2,3 – Ya!

HCP4 – Ya, even just to give them some pamphlets that we can keep in our rooms, speak to them more, we need to educate the patients more.

HCP1,2,3 – Ya, mmmm (nodding heads).

F – Ok! So how do you feel now about the South African Guidelines for the management of diabetes and hypertension?

HCP2 – I think they are actually good.

F – Ok, you think they are good. Do you think they are explicit enough? Do they give enough detail?

HCP1,2,3 – (Nodding heads) Ya, mmmmm.

HCP4 – Ya, they are fine.

HCP3 – We don’t all have copies of the guidelines, but there is a main copy here. But we have those card things that you gave us.
F – And do you feel that they can be used?

HCP1 – Yes.

HCP2,3,4 – Ya.

F – Alright. And do you feel that the guidelines are being used in everyday practice? Do you look at the tables in the cards?

HCP1 – Not really

HCP2,3 – (Shaking heads) No.

HCP4 - Um, we don’t initiate treatment or adjust treatment, but it is good to have that background knowledge, but it doesn’t directly affect us. But also when to refer, you have been over that with us, but if anyone needs to look something up it is there. They can look in the guidelines. As Doctor initiates treatment, it doesn’t really affect us.

F – Ok!

HCP3 – And if a patient is uncontrolled it is up to the doctor to change the drugs or dosages. And, um, maybe we old fashioned or whatever, but when it comes to the doctor, i.e. I won’t suggest things, say if the script has two g g’s (gliclazide and glibenclamide), I’ll just leave a little note to pass on to the doctor, but I’m not going to challenge the doctor.

HCP1,2,4 – Mmmmm

F – Ok.

HCP3 – Maybe I’m just not assertive enough, but I can’t challenge the doctor.

F – And with regard to the target values?

HCP4 – Ya, they have been helpful.

HCP1,2,3 – Yes (Nodding heads)

HCP4 – And now you know, really, when say this one should be adjusted.
HCP1 – Ja, and for me I notice know when its not controlled. I normally look back to what it was last time, then I compare it and you can see, because you know what you are looking for.

F – You have mentioned a bit about this, but about the pharmacological management, the actual drug treatment of diabetes and hypertension, how are you feeling about that? Are you feeling confident, not feeling confident?

HCP2 – It doesn’t really affect us. She was just mentioning it, that we don’t adjust and initiate treatment.

HCP3 – But it is nice to have that insight.

HCP1,4 – Yes.

HCP3 – Because sometimes you can be thinking what is wrong with this patient! This patient is not taking his medication but then you can also realize that he is probably not on the proper medication.

HCP4 – But I think with our patients it still has a lot to do with the diet (HCP1,2,3 – Ya, mmmm), and how they eat, and they are not complying with it. Because they will tell you when their sugar is high that they have been eating a lot of sugary things.

HCP1 – Ya, they tell you before hand.

HCP2 – Yes

HCP3 – They warn you before hand.

HCP2 – But some of them must just eat what is available. Um, sometimes they don’t have a choice, maybe there is only white bread available, so they can’t turn that down and say “I don’t want any”, so they won’t eat the brown or the wholewheat. So they must make do with what they have. And this all affects their blood sugars. (HCP1,3 – Ya; HCP4 – absolutely) And they might be taking their tablets everyday, but it is the diet, the diet is the major thing.

F – So you feel that even though you know more about the drugs and the drug management, that’s not the biggest impact on the patient’s diabetic management.

HCP3 – When you really look into the problem with the patient’s, it always seem to boil down to the diet.
F – And now, looking back at the training, do you feel that you are confident enough in your knowledge about the drugs to be able to recognize when a patient’s therapy should be changed or doses should be changed or altered?

HCP3 – You know I am not going to say that I am totally confident.

HCP2 – Not quite there.

HCP1 – Ya, not completely confident.

HCP4 – We will get confident! But not yet there!

F – So why don’t you feel confident? Let’s find out why not?

HCP2 – I suppose it is because you are not doing it on a regular basis.

HCP3 – You aren’t doing it and that is why!

HCP1,4 – Mmmmm (nodding heads).

HCP2 – Although you know what is going on, you are not practicing.

HCP4 - You know if you work in primary health and say you have to treat a UTI I will give this and this and this. And you know the dosages because you are using it continuously. But with the diabetic drugs, you don’t really initiate treatment, so you are not into the habit of prescribing and changing and looking at the doses.

HCP3 – And with confidence I guess for example, say you have a diabetic, and you would adjust something and you would see improvement that would boost your confidence. But because we don’t do that… If you refer a patient, doctor might change it, but because doctor would change it…You get what I am saying (F – yes) If it would boost our confidence it would probably be because you would be adjusting and changing and you would see the difference. And with me the more you do something the more you learn and became more confident in doing it. But because we don’t do it …

F – So with looking at the diabetic patients that you have been seeing now, with looking at whether or not they should be referred, have you been looking more at the target values than at the drugs?

HCP2 – No we do look at the drugs.
HCP3 – Ya we do look at the drugs!

HCP4 – No, I mean you can’t just look at the blood sugar, you have to look at the patient in terms of ‘how is the patient doing, how are they taking their medication, what are they eating!

HCP3 – Ya you can’t just look at one thing, you need to look at everything with the patient. Before you even refer, because you don’t want to refer unnecessarily.

F – Ok! But with the doses of the drugs, do you feel confident enough yet with the dosing of the drugs and the maximum doses?

HCP4 – No, because we don’t do that.

HCP1,3 – Ya.

HCP2 – We don’t work with it every day.

F – Alright! So what would we need to do to make you feel more confident about the drug, what would you need? Besides what you have mentioned now about working more with the dosages of the drugs and prescribing yourself, or seeing the positive changes, what else would you need?

HCP4 – We personally need to look at the doses more regularly. I don’t look at them enough.

HCP2 – Ya we don’t!

HCP3 – Its like treating a patient for a minor ailment, you will know because you are used to giving that thing, and you are giving it often. So we still need to look at the doses more often.

F – Ok! From personal experience, has anyone looked at the tables (for drug treatment and dosages, and when another drug can be added) when referring a patient to doctor?

HCP2 – Not necessarily!

HCP3 – I didn’t really look at the drugs, I did look at the targets though, when I was a bit unsure.

HCP1,4 – Ya, the targets.
HCP3 – Ya, but we still need to work more with those targets!

F – How would you suggest the situation be improved with getting to know the dosages of the drugs better, with working more with the dosages of the drugs?

HCP4 – I don’t think we can really! Unless there is no doctor and you are forced to do it yourself.

HCP3 – It’s not really in our scope of practice to do it.

HCP1,2 – Mmmmm.

HCP3 – But it is still good to recognize when a patient is not controlled.

HCP4 – But you can recognize. Its just that a lot of the doctors would not like it if you had to come to them and say listen, I think you should add this or increase the dose of this, they don’t like that.

HCP3 – Ya, they don’t appreciate that.

HCP2 – Especially the doctor that we have here!

HCP3 – And it’s not that we are bad mouthing the doctor, but you learn to know the doctor.

HCP2 – So you tend to just avoid it!

HCP4 – With some doctors you can, but with most you can’t. So I don’t think the situation will improve.

F – So from what I understand at the moment (please tell me if I am wrong or right), you had the training, you have more insight into the drugs, you have the tables to use, but you feel that because of the way that the doctor is perhaps, and that you don’t feel confident saying that ‘this is not good’, or ‘this dosage could be changed’ (HCP1,2,3,4 – Mmmmm), you have backed off a bit and not looked quite so much at the dosing of the drugs?

HCP3 – Ya, that sums it up well!

HCP1,4 – Ya, mmmmm (nodding heads).

HCP2 – I agree!
F – Ok! Do you feel confident in monitoring diabetic patients and referring to a doctor when necessary?

HCP1,2,3,4 – Yes!

F – Resounding yes from all sides – good! Um, ok, but what do you feel you still need to help improve your confidence in that? You say you feel confident, but what could improve on that confidence? Or can you give me examples of referrals that you have made?

HCP3 – If it is for the clinic, I usually just make a note: please assess - uncontrolled blood sugar, I won’t even mention any drugs, but if it is to outside or whatever, I will go into detail, like give the drugs and the last three blood sugars all that, you know and doses and all, but here, no, I just make a little note. Also because doctor can see here in the card, so you don’t want to state the obvious. Sometimes when I take a patient to her personally, then I ask her “don’t you think”, but it also depends on the mood that she is in before I do that because …

F – (Look of shock!)

HCP3 – No, I’m serious, because there where times that um you got the impression ‘you are the Sister, stay in your place’.

HCP1,2 – Ya!

HCP4 – Mmmmm! No really!

F – But now how does that make you feel?

HCP3 – Ag no, doesn’t worry me!

F – But are you happy with that?

HCP2 – Kind of! You must just let it go!

HCP4 – She does her work, and we do ours!

HCP3 – And if I am not happy with how the patient is after doctor, then I will make an appointment for them at MOPD, and I send the patient to MOPD.

F – Ok!
HCP3 – I don’t have a major problem with her, she still treats the patients here and so on!

F – No, that’s fine. But what I am kind of imagining is this: she is the doctor from numerous clinics in this area, so if there is a slight issue here, it is probably at the other clinics as well. Perhaps the nurses are not getting enough respect for the knowledge and experience with working with these patients and identifying problems.

HCP2 – But most of the doctors do recognize the knowledge and experience (HCP1,3,4 –Mmmmm) because most of them will ask you what is your opinion.

F – Have you noticed at all from any referrals that you might have put there ‘patient uncontrolled’ and then things haven’t happened, like the script has not changed.

HCP2,3,4 – Yes.

F – And how do you feel about that?

HCP3 – No, but then I go back sometimes, and then she will explain why. And most times she will say that it is the diet that we need to concentrate more on, the diet. And then I have had quite a few that I have gone back with and said ‘look they are still not controlled’, and then she has made adjustments.

F – Any other feelings with regards to that?

HCP4 – Like its been mentioned earlier on, mostly its just the diet that needs to be fixed. And if you just adjust that diet a little bit, you don’t really need to adjust the management or the treatment on the patients with blood sugars that shoot up, because they are either defaulting from their medication or its their diet and that causes the major problem.

HCP1 - Our patients are not very particular with their treatment, most of them, the majority of them. They are either defaulting their treatment or they are not taking their treatment, like they will take it today and then tomorrow they will say that they feel fine, and then they won’t take it! So again its patient education!

HCP4 – Ya, everything boils down to patient education!

HCP3 – You get those patients that are really your ideal patients, and you don’t usually find a problem with them.
HCP1 – Ya, mmmmm.

HCP2 – When they come to the clinic and you do the things you are supposed to, then you ask them “did you take you treatment?” then they say no!!

HCP1,4 – Ya, mmmmmm (nodding heads).

HCP3 – Ya, and then I mean, how can you see if they are being well managed on their treatment if they default all the time, and don’t follow a diet?

F – So that is why you feel that if you do refer to doctor, and you say things like ‘patient uncontrolled’, she will often say that you must first look at compliance and diet management.

HCP1,2,3,4 – Ya, mmmmmm (nodding heads).

F – Ok, then have you found those referral notes handy or useful or not?

HCP3 – Sometimes I don’t actually look at them, because I have to make a note in the white section so that the doctor can see that it is not just a repeat script. You see sometimes the doctor is not always the same, so they don’t always know to look in the green section.

HCP4 – Ya, sometimes if I am helping in dispensary, then I will see that the treatment has not changed then I will go and show the doctor the green page, because they don’t always look there.

HCP3 – Ya, and then I write in both the green and white sections, just so that your thingy is covered!

HCP1,2,4 – Ya, mmmmm! (Giggle)

HCP3 – Ya, and the other thing about the patients as well is, some of them come and tell me ‘Sister, I come and stand in the queue early in the morning! I can’t eat so early so I don’t take my medication’ (HCP1,2,4 – Ya, mmmmm (nodding heads)). So now I tell them that they must bring some water in a bottle, bring a snack to eat so that they can take their medication while they are waiting in the queue. But a lot of them don’t want to take their diuretic, because then they have to run to the toilet all the time, and the toilets are in a state and they don’t want to use them! What can I tell them? I wouldn’t want to use those toilets!

HCP1 – Ya, you see it’s all these other factors that influence the blood sugar and blood pressure readings in the morning!
HCP2 – You see they start queuing at four, but we only start taking their blood sugars after seven, and by that time its high! And that’s the same for the blood pressures!

HCP4 – Ya, some of the patients are here from just past four! And then when you must examine them and they must get undressed, they must take off these layers and layers of clothes because it’s cold that early in the morning! Some bring little chairs to sit on.

HCP1,2,3 – Mmmmm (nodding heads).

F – Ok, then just to sum up here! From the session that we did, you felt that it was helpful, Correct?

HCP1,2,,4 – Yes!

HCP3 – Yes, definitely!

F - Ok, but you don’t feel that it had the impact that it could have….

HCP3 – Not really.

F - …with regard to the referrals to the doctor.

HCP1 – Mmmmm.

F - You feel that it boils down to the patients who have not been educated.

HCP1,2,3,4 – Yes (nodding heads)!

F – And therefore you can’t actually see the difference, and you can't actually control them like you would like to with the medication because you don’t know what is happening at home.

HCP1,2,4 – Ya!

HCP3 – That’s sums it up nicely!

F – Ok! Well then I just want to say thank you again for your time and willingness to talk honestly about things here at the clinic.
F = Facilitator (Researcher)
HCP = Health Care Provider

F – Thank you for your time this afternoon. I want you to feel relaxed during this discussion today. Please be honest when answering, as there is no write or wrong answer. Your names will not be mentioned anywhere, so you don’t have to worry about that. Remember to let everyone have a say, and to think of this as a normal chat in the staff room. Ok, the first thing. If you take into consideration the past four months, from after the education sessions until now, how do you feel about your working environment? Has anything changed? Is anything different?

HCP5 – It hasn’t got better because most of the primary health care sisters resigned, so now we are making use of contractual sisters. The staff turnover is bad, but we are trying to cope, we do our best!

HCP6 – Ya, mmmm (nodding head).

HCP7 – Oohh – and in the dispensary, it is worse, my dear! It is even worse now because we are every day, we are also having the referrals from hospital on top of what the other sister is saying, the staff, the most of the people are just resigning. We are using the contractual staff. The other contractuals, they don’t know about the chronic medication and what ever from the hospitals. So its not getting better, it is getting worse.

HCP6 – Ya definitely worse!

HCP5 – You see we get all these referrals from Livingstone, not Dora as such, only Livingstone.

HCP7 – Ya, it is only Livingstone that is chasing people away.

HCP6 – Yes!

F – Well then the next question, is everything that you need available?

HCP5 – Well obviously not!

HCP6 – No, we don’t have all that we need! We need the doctor to come more often!
HCP7 – Ya, definitely! And like now I don’t have the chronic medication because the drivers are all toy-toying, and the other antibiotics, its been a long time, especially the Bactrim®, its been out of stock for a long time!

HCP5 – Ya and that Bactrim® is the most important because of the monthly HIV patients.

HCP6,7 – Ya, mmmm (nodding heads).

HCP5 – And its been out of stock for months and that is the most important antibiotic that we really make use of on a daily basis.

F – So, you are saying that the stock and being short staffed here at the clinic are big concerns?

HCP5,6,7 – Yes, mmmmm (nodding heads)!

F – Again, is there enough time to do everything that you would like to do with the patients?

HCP6 – No!

HCP5 – No, not at all! That is why we rely heavily on Mrs Ackerdien to do the education part for us because, say for instance, when a patient comes from Livingstone, a diabetic, I’m sure they don’t have time at Livingstone to educate the patient, but now the patients are nearer to home, and the patient will feel free to talk and ask. That is why we rely very heavily on Mrs Ackerdien to do the patient education side for us, for example the foot care and the diet, everything. But sometimes I must go to Mavis with the insulin, because I think we must get a list, you know with the generic name and the trade name, because sometimes the patient comes from Livingstone with different names to what we have here. Now I am very scared of insulin, so I will phone and ask, to double check, but we need something to be able to check with! You know because when you are busy, you start to doubt yourself. I don’t know about you (HCP6 – No, its right), but I don’t want to take chances with insulin. We sometimes have to phone Terry to check, and especially with the contractuals working, they don’t always know and Mavis is not always there!

HCP6 – Ya!

HCP7 – Its not only needed for the insulin, we need it for all the chronic medication!
HCP6 – Especially for those that come from Livingstone, because we don’t always know all the trade names, and we can get confused!

HCP5 – Even though I have been in nursing for a long time, I still doubt myself with the trade names of the medication.

F – Ok, so you have said that there is not enough time to do everything, (HCP5,6,7 – Yes,mmmmm), but if you could now, what would you change about your working conditions here? In a perfect world, what would you have?

HCP6 – More staff!!

HCP5 – Definitely more staff!

HCP6 – But we need more trained staff! Us newly appointed staff, we are not primary health care trained, so it is difficult for us because we must now buddy train each other.

HCP5 – And look here, the Department is sending nobody on courses! This child has been here for how many years, and she is the perfect candidate to go for primary health care training, but they don’t send anybody on courses. There is no time, there is no staff, because they have to look at the clinics staff component before they will send someone away for a few weeks on training! So now where will they get primary health care nurses?

HCP6 – Nowhere!

HCP5 – Ya, nowhere!

HCP7 – Ya, and we want the proper stock to work from, otherwise the patients get mad at us!

HCP5,6 – Ya!

F – And equipment wise?

HCP6 – We are fine with equipment.

HCP5 – Ya, there is no problem with that! But the biggest problem is the manpower and the medication!
F – Ok! How do you feel now about the training that I gave you on the pharmacological management of diabetes and hypertension? What do you think about it?

HCP6 – It's fine! It was enlightening!

HCP5 – Yes! It opened you know … as I said we sometimes doubt, we were not sure, but you taught us that this go with that, the different … now we know. We are enlightened, so we can go to doctor, or I write in the green section, and doctor really listens when you tell her your concerns! She is cooperating! I like to write big notes, so when I write there, doctor will change like when I say no two G’s together.

HCP6 – Ya!

HCP5 – No two G’s together, and she will change that. And with the blood pressure, when the blood pressure is higher than the 130/80mmHg, then the patient should be on something, HCT or Coversyl, here she puts the patient on. Ya, she is helping when you ask, when you speak to her!

F – Ok, would you have changed or added anything to the training that you received on the guidelines?

HCP5 – Ya, it was definitely adequate!

HCP7 – For me, it was not enough! I needed more revision!

HCP6 – Now for me, who is not always working primary health care, so you kind of lose touch with all that you taught us, so a revision session would have been good!

F – Ok! Thank you for that suggestion. Now do you feel that your routine for treating a diabetic patient has changed since the training?

HCP6 – Ya, you now notice lots of small things. You see the patient in totality. Now you know you must look for this and this and this.

HCP5 – You must look at the blood pressure, for example if the patient is higher that 130/80 mmHg, then alarm bells should start ringing. There are so many questions that you can ask. It’s the diet, and even with the patients on the antihypertensives, you see that some of them are on four to five antihypertensives, (HCP6 – Ya.) and you wonder if the diet and weight were controlled, that maybe they would not have to be on so many, because it can’t be
good for you to take so many antihypertensives. But these patients are so forward now. They all want their HGT checked because of all the notices around the clinic! So they sit and read them, then they come into the room and say ‘Sister, I’ve got a dry mouth.’

HCP6 – ‘I think I’ve got sugar’

HCP5 – Ya, they say ‘I think I’ve got sugar. I go to the toilet more frequently.

HCP6 – Ya, they see the posters, then they find the things to complain about!

HCP5 – But if you do it for them once, and they are fine like between 3 and 4 so it’s normal, then they won’t bother you again. It’s just a once off thing.

F – So it is all the little things that you are noticing and picking up on.

HCP5 – Ya. More recently I have been in the observation room because we are so busy and so short staffed, so I am sorting out the diabetics up there. So they are having their blood pressures and HGT done. But what I have found is that they are very reluctant to bring their urine. Mostly the men, the females still bring their urine. And there is another thing, it opened my eyes, to ask them to come to clinic for a fasting blood sugar. Those with the very uncontrolled sugars of 20 and so on, I wrote there for them to come have a fasting blood sugar. I told them not to eat anything, but just to bring their things to the clinic. You now, it can make such a difference just to see the fasting blood sugar. You can then really see how controlled or uncontrolled the patients are. Because some of the patients eat here in the clinic just before we do the blood sugars, and they don’t have their tablets and then they look very uncontrolled.

HCP6 – Ya, they don’t have their tablets, then their blood sugars go sky high!

F – Ok, so do you feel these changes that you have made and noticed now are for the better

HCP6,7 – Yes!

HCP5 – Yes, definitely. It’s for the better. Because of Mrs Ackerdien and the group, the diabetics in the group are really working with Mrs Ackerdien and they are motivated. But then looking at all the diabetics, not one diabetic complained about the program. They were asking to be on the program. They were not complaining.
HCP6 – Ya! They are enjoying the program and always show a lot of interest for it.

HCP5 – and in the diabetic group, they are enjoying coming together once a month to get new information and they are benefiting from the eye tests, and speakers you know.

F – Alright, so now after the training sessions I gave you, how do you feel about treating these diabetic patients and giving them their medication?

HCP5 – Much more confident!

HCP6 – Ya! And you feel more confident about the targets for blood pressure and blood sugar.

HCP7 – Ya, I know I bit more about the medication, and that is nice.

HCP5 – And you do see the patient in totality, as she said earlier.

F – Ok, good. How do you feel about the standard of care that the diabetic patients are provided with here at the clinic?

HCP5 – Its excellent!

HCP6 – Ya its good!

HCP5 - But besides being out of stock, we have all the important equipment, just a shortage of needles for the insulin, that’s one of the big problems.

F – And now do you feel that the patients are now more managed and controlled?

HCP5,6,7 – Yes!

HCP5 – I am finding that even though we don’t have enough time to educate the patients properly they definitely do seem to know a bit more about their diabetes!

HCP6 – Sometimes when the sugars are high, they come into your room and they say ‘Sister, I know why my blood sugar is high! This weekend I did this and this and this. I know its wrong but I did it.’

HCP5 – Ya, the education that they get here is of a high standard.
HCP6 – But not all the diabetics go to the support group meetings, so they don’t all know as much.

HCP7 – But most of them know something about what they shouldn’t eat!

HCP5 – Ya. Those that are not controlled and are not part of the support group and they show no interest in their condition, I make a little note and I give them extra attention and spend some extra time with the patient.

F – Ok, moving on. Do you feel though, any frustrations now after the trainings I have done with you with respect to the way patients are managed?

HCP5,6,7 – No, nothing (shaking heads).

HCP5 – Besides us being short staffed and that the patient load is getting more, there are no frustrations with treating the diabetic patients.

HCP6,7 – Ya.

HCP5 – I just hope and pray that one day someone will do the research with the epileptic patients, because there is always research with the diabetics, but there is a neglected group with the epileptics and some of the other chronic conditions.

F – I think the reason why there is more research being performed with the diabetics is that you can with a good diet and lifestyle, greatly prevent the onset of type 2 diabetes. Epilepsy, however, is not preventable, unless the cause is drug use etc. But you are right in saying that all chronic diseases need to be researched more. Ok, do you feel that the training sessions have influenced the care that you give to the patients at the clinic?

HCP6,7 – Ya, mmmm (nodding heads).

HCP5 – Definitely, and in a positive way!

HCP6,7 – Ya.

F – Do you feel, honestly now, in you referrals, that doctor responds well to them?

HCP5 – I feel confident to go to our doctor and ask here about things, to change or add things to patient’s medication. I have a good relationship with her! I can speak to doctor, I can discuss the patient with doctor and I can ask her what does she think. I have an open relationship with doctor I feel free to go to her.
HCP7 – But I haven’t really seen many changes!

HCP6 – Ya!

HCP5 – But you have to ask her and discuss things with her.

F – So am I correct in saying that if you write a referral in the green pages, that she probably won’t change things unless you come and discuss it with her?

HCP5 – You know what I normally wrote in the green pages – I am referring the patient to you because of this and this and this. Query? Don’t you think ….. I don’t make demands, I ask her in a nice way, I don’t tell her. I put a question mark there! It’s the way you approach, we are all different.

F – Have you had much experience in referring or are you mostly in family planning now?

HCP6 – While I was working in primary health care, you need to take the patient to doctor and tell her why you think there is a problem, but then she will do what she feels is best.

HCP5 – It’s the way you approach doctor.

F – Ok, that’s fine. How do you feel though about the South African guidelines for the management of diabetes and hypertension?

HCP6 – Ya, they are good.

HCP7 – Ya, mmmm.

HCP5 – Ya, they are very good.

F – Do you have much working with them, besides the management cards I have given you, do you ever look at them?

HCP5 – The whole file was in my room, room 14. Who ever wanted to could come and read it if they needed to. But now it is locked up in a cupboard now. Why the guidelines are locked up in the cupboard, I don’t know!

HCP6 – Ya, we work more from experience, we don’t really look at the guidelines, but we do look at your little cards.

HCP7 – Ya!
F – Do you feel though that they can be applied easily in practice, the guidelines?

HCP5 – Well those little cards of yours are quite explanatory, its clear.

HCP6 – Ya, those cards are nice!

HCP7 – Mmmmm they are fine!

F – And do you feel that these guidelines are being used in everyday practice?

HCP5,6 – Ya!

HCP5 – Because we have it in our rooms. I took mine home. I want to keep it with me when I go! Because I know I’m going to need it in the future. (HCP5,6,7 - Giggling)

F – Ok! Be honest now, out of the little cards, which do you use the most?

HCP6 – We use most of them! The targets and the drugs!

HCP7 – Ya, I look more at the drugs in the dispensary!

HCP5 – Because you know doctor only comes once a week, and it is easy for her to miss something. Therefore it is up to us to make her aware, like if a patient has a constant fasting HGT of 14, then you write a query, and then doctor can see to add something on.

F – Does that make you feel more confident? Actually seeing a change?

HCP5 – Yes, because then we ask the patient to come back in a week and you can see that the blood sugar is coming down slowly.

HCP6 – Ya, then the patient has more confidence in you!

F – How do you feel now about the pharmacological management of diabetes and hypertension? Are you feeling more confident?

HCP5,6 – Yes!

HCP7 – I need more revision with the drugs!

F – Do you feel that you know the drugs as well as you should?
HCP5 – Well you can never know everything there is to know about the drugs, but I feel better now than I did before the trainings!

HCP6 – Ya, I feel the same! But I could also use more revision!

HCP5 – Ya, and we need to know about the drugs so that we can counsel our patients on how to use them properly, like if they are meant to take it in the morning or at night or after food, you know.

F – So do you feel that you are confident enough in your knowledge on diabetes and hypertension to recognize when pharmacological therapy should be changed?

HCP5 – Yes.

HCP6 – I’m getting there. Just need to spend more time in primary health care.

HCP5 – I feel more confident with diabetes though, because I don’t know all the drugs for hypertension.

F – Why don’t you feel confident enough then?

HCP5 – We have never really had extensive in-service training.

HCP6 – Ya, and the thing is that we have so much high blood pressure, so we are always just referring the patients to the doctor, because we can’t initiate treatment.

HCP5 – But in our guidelines, we do have standing orders if a patients blood pressure is to high, and the doctor is not here, we can do something! And in the outlying areas, they can prescribe more, but because we have a doctor here, all the patients must go through her. But she is only her once a week, which is a problem!

HCP6,7 – Ya, that is a big problem.

F – What do you still need to improve on your confidence levels?

HCP6 – We need more in-service training!

HCP5,7 – Yes, definitely!
HCP5 – Short courses, because there is no time to send people out for long periods because we are so short staffed. Or buddy training! If one person can go out and bring the information back to the others, then it will be better.

F – Do you feel confident in monitoring diabetic patients and referring them to doctor when necessary?

HCP5,6 – Yes!

HCP7 – I don’t really do that!

F – No, that is fine! Do you feel confident with all the drugs and the dosages?

HCP5 – I feel that I know enough to notice when a patient is not controlled. I may not know the best drug for example in hypertension to recommend but that is doctors job. In the diabetes I just get very confused with the insulin’s as I said earlier. But we have the tables to look at the dosages if we are not sure!

HCP6 – You know we work more with the target values, so the drugs and the dosages I must look up most of the time!

HCP5 – You know, I won’t feel confident in saying to doctor that she must start a patient on metformin at a certain dose. That is just too much. We have our own way of monitoring our patients, and that is more with the target values, like the blood sugar and the urine tests, you know! But I feel confident in referring the patient and saying that they are not controlled. We know what the drugs are used for, but I don’t think it is my place to tell doctor what drug to use, that is her job.

HCP6 – Ya, we can monitor the patients well! There are professional limitations which we must stick to!

HCP5,7 – Ya, definitely.

F - Ok! So you feel confident in monitoring the patients but feel that it is doctors responsibility to change the management if she feels it necessary. You can’t recommend drugs to be added or taken away?

HCP5,6,7 – Ya!

F – Ok! Well then I just want to say thank you again for your time and willingness to talk honestly about things here at the clinic.