Assessment of Knowledge, Attitude and Practice of General Practitioners in Suriname towards the National Diabetes Guideline

Paper submitted in fulfilment of the requirements for the degree of Master in Public Health

Supervisor: Hedwig Goede MD.MPH

M.B.Mohab-Ali
February 2013
- “Acquire knowledge. It enables its possessor to distinguish right from wrong, it lighten the way to Heave, it is our friend in the desert, it is our society in solitude, it is our companion when friendless, it guide us to happiness, it sustained us in misery, it is an ornament among friends and an armour against enemies.”
  Prophet Muhammad saw

- “Seek knowledge from the cradle to the grave.”
  Prophet Muhammad saw

- “Poorly managed diabetes leads to unnecessary and costly diabetic complications”
  From; Diabetes the hidden epidemic and its impact on America
CONTENTS

ACKNOWLEDGEMENT ................................................................. V

LIST OF TABLES AND FIGURES .............................................. VI

ABBREVIATIONS .................................................................... VII

ABSTRACT ........................................................................... VIII

1.0 INTRODUCTION ...................................................................... 10

1.1 GLOBAL DISEASE BURDEN OF DIABETES MELLITUS ........................................................................ 10

1.1.1 IMPACT OF DIABETES MELLITUS ........................................... 10

1.1.2 PREVALENCE OF DIABETES MELLITUS ............................ 10

1.2 THE DISEASE DIABETES MELLITUS ..................................... 11

1.2.1 DEFINITION AND DESCRIPTION OF DIABETES MELLITUS ............................................................ 11

1.2.2 CLASSIFICATION OF DIABETES MELLITUS ................. 11

1.2.3 SYMPTOMS ..................................................................... 12

1.2.4 COMPLICATIONS .................................................................. 12

1.2.5 PREVALENCE OF DIABETES COMPLICATIONS ........... 13

1.2.6 PREVENTION OF DIABETES COMPLICATIONS ............ 13

1.3 CLINICAL PRACTICAL GUIDELINES ...................................... 14

1.3.1 DEFINITION AND PURPOSE OF GUIDELINES ............... 14

1.3.2 DEVELOPMENT AND DISSEMINATION OF GUIDELINES ............. 14

1.3.3 NON ADHERENCE TO CLINICAL PRACTICAL GUIDELINES .......... 15

1.3.4 STRATEGIES TO IMPROVE GUIDELINE ADHERENCE .......... 15

1.4 INNOVATIVE CARE FOR CHRONIC CONDITIONS (ICCC) ...................................................................... 16

1.5 DIABETES MELLITUS AND SURINAME ........................................ 17

1.5.1 PREVALENCE AND IMPACT OF DIABETES IN SURINAME .......... 17

1.5.2 DIABETES GUIDELINE OF SURINAME .................................. 18

2.0 RESEARCH DESIGN AND METHODS........................................ 19

2.1 PROBLEM STATEMENT ........................................................... 19

2.2 RESEARCH QUESTIONS .......................................................... 19

2.3 AIMS OF STUDY ................................................................... 20

2.4 STUDY DESIGN ................................................................... 20

2.5 POPULATION AND STUDY SAMPLE ...................................... 20

2.6 SAMPLE SIZE AND SELECTION OF SAMPLE ....................... 21

2.7 DATA COLLECTION ................................................................ 21

2.8 DATA MANAGEMENT AND ANALYSIS ..................................... 22

2.9 ETHICS AND HUMAN SUBJECTS ISSUES ............................... 22

2.10 STRENGTHS AND WEAKNESSES OF THE STUDY ................ 22

2.11 PUBLIC HEALTH SIGNIFICANCE .......................................... 22
ACKNOWLEDGEMENT

My first gratitude is to Allah swt for giving me life, health and making everything possible.

I thank the Ministry of Health of Suriname, especially the director of the Ministry of Health for making a master of public health study possible in Suriname. And I thank the Institute for Graduate Studies and Research (IGSR) for giving me the opportunity to do a master in Public Health study in Suriname. I thank the director and personnel of the IGSR.

I thank my supervisor Mrs. Hedwig Goede MD, MPH for being helpful and patient in guiding me through this part of the study.

I thank all the medical doctors in Suriname who responded to my survey. I also thank the chairman of the association of physicians in Suriname, the chairman of the general practitioners section of the association of physicians in Suriname, director of Regional Health Services, the nursing director of the Regional Health Services, the human resource manager of the Regional Health Services and doctor Raghoel of the medical section of State Health Insurance Foundation for their permission and assistance.

I thank my colleague, doctor Ramkisor, and other personnel of the Regional Health Services clinic Koewarasen.

I thank my fellow students for a nice and pleasant time during the courses. And I thank Maltie Mohan –Algoe for reading my concept thesis.

I thank the coordinators of the public health stream; Mrs. drs.Ingrid Krisnadath MPH and Mrs. drs. R.Codfried- Kranenburg.

I thank my wife, Loes and the children; Safoera and Taufiq for giving me “space” and support during this study.

Last but not least I thank my parents, especially my mother, who give priority to the education of their children.

Paramaribo, 13 February 2013
M.B.Mohab-Ali
LIST OF TABLES AND FIGURES

TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 3.1</td>
<td>The location of practice, type of practice and sex of the general practitioners.</td>
<td>23</td>
</tr>
<tr>
<td>Table 3.2</td>
<td>The availability, familiarity, adherence and usability of the national diabetes guideline.</td>
<td>24</td>
</tr>
</tbody>
</table>

FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.1</td>
<td>The Innovative Care for Chronic Conditions Framework.</td>
<td>16</td>
</tr>
<tr>
<td>Figure 3.1</td>
<td>The relation between practice type, practice category, location of clinic and guideline adherence or availability.</td>
<td>25</td>
</tr>
<tr>
<td>Figure 3.2</td>
<td>The relation between having a nurse with diabetes education, the possibility of phone consultation with an internist, years of experience of the GP and the availability or adherence to the diabetes guideline.</td>
<td>26</td>
</tr>
<tr>
<td>Figure 3.3</td>
<td>Distribution of doctors (%) and the fasting blood glucose level (mmol/l) at which they decide to start treatment with medication.</td>
<td>28</td>
</tr>
<tr>
<td>Figure 3.4</td>
<td>Distribution of doctors (%) and the fasting blood glucose value (mmol/l) at which they are content with treatment outcome.</td>
<td>29</td>
</tr>
<tr>
<td>Figure 3.5</td>
<td>The importance of treatment goals for the respondents.</td>
<td>29</td>
</tr>
<tr>
<td>Figure 3.6</td>
<td>Patient related factors for non-adherence to the guidelines.</td>
<td>30</td>
</tr>
<tr>
<td>Figure 3.7</td>
<td>Practice management factors for non-adherence to guidelines.</td>
<td>31</td>
</tr>
<tr>
<td>Figure 3.8</td>
<td>Frequency of laboratory test and examination.</td>
<td>32</td>
</tr>
<tr>
<td>Figure 3.9</td>
<td>Frequency of laboratory test and examination.</td>
<td>33</td>
</tr>
</tbody>
</table>
## ABBREVIATIONS

<table>
<thead>
<tr>
<th>ABBREVIATIONS</th>
<th>IN PLAIN TEXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADA</td>
<td>American Diabetes Association</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>BOG</td>
<td>Bureau of Public Health in Suriname</td>
</tr>
<tr>
<td>CPG</td>
<td>Clinical Practical Guidelines</td>
</tr>
<tr>
<td>GFR</td>
<td>Glomerular Filtration Rate</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>FBG</td>
<td>Fasting Blood Glucose</td>
</tr>
<tr>
<td>Hba1c</td>
<td>Glucosylated Haemoglobin</td>
</tr>
<tr>
<td>IDF</td>
<td>International Diabetes Federation</td>
</tr>
<tr>
<td>PAHO</td>
<td>Pan American Health Organization</td>
</tr>
<tr>
<td>RGD</td>
<td>Regional Health Services</td>
</tr>
<tr>
<td>SD</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>SZF</td>
<td>State Health Insurance Foundation</td>
</tr>
<tr>
<td>T2DM</td>
<td>Type 2 Diabetes Mellitus</td>
</tr>
<tr>
<td>VMS</td>
<td>the Board of Medical Physicians in Suriname</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
ABSTRACT

Background: The long-feared diabetes epidemic is no longer predicted – it is here. In 2012 there were more than 371 million persons living with diabetes and if no urgent action is taken this number is expected to rise to 552 million by 2030. In Suriname the prevalence of diabetes is 11.67% of the population in the age group of 20 – 79 years. In absolute number there are 38,010 persons with diabetes. If diabetes is not well managed and controlled, it can lead to debilitating complications. Delay and prevention of these complications is possible by stringent control of diabetes. Therefore it is necessary for the general practitioner to implement adequate management of the patient by using the available guideline.

Objective: to assess the knowledge, attitude and use of the national diabetes guideline by the general practitioners in Suriname.

Methods: A questionnaire-based cross-sectional survey was conducted in eight of the ten districts of Suriname in May and June of 2012. The questionnaire was sent by email to the selected general practitioners in Suriname, after two weeks followed by a reminder mail and a telephone call. The questionnaire consist of four sections and 22 questions requesting information about; the general practitioners (GP’s) background characteristics, the GP’s knowledge about the diabetes guideline, the treatment goals, patient & practice management factors for not following the guideline, the familiarity with it, the availability and the use of the guideline in the daily practice.

Results: The response rate was 46% (81 out of 175). The average time (± SD) from the graduation of medical faculty was 15.56 ± 9.1 years. The mean age of the doctors was 45.5 ± 8.3 years. The mean size of the patient list was 1984 ± 1181. The average number of diabetes patients was 160 ranging from a minimum of 30 to a maximum of 500. The estimated prevalence of diabetes was 9%.
The survey showed that 68% of the respondents have the national diabetes guideline of March 2008 at their clinic and that 80% of them are familiar with it. Most of the general practitioners (65%) states that they adhere to the guidelines in their practice mostly and always. The majority of the doctors said the guideline is applicable 75%. Availability and use of the guideline were not related to the sex of the doctor, the type of practice, category of practice, working area (district or city), having a nurse with diabetes
education, the possibility of phone consultation with an internist and years of working experience of the general practitioners. The doctors tend to start treatment with medication at a higher fasting blood glucose (FBG) level (7.9 ± 1.2 mmol/l) if compared with the guideline (7.0 mmol/l). More than half of all the doctors make a decision of treatment on FBG above 7.5 mmol/l. The general practitioners are content with treatment at the fasting blood sugar values of 7.3 ± 0.7 mmol/l in average. The standard mentioned a target goal for fasting blood sugar value of less than 7 mmol/l. The drug of choice for 95 % of the respondents for starting treatment with medication was metformin. The treatment goal “keeping blood glucose in normal range” was the most important indicator for 57 % of the general practitioners. The most important patient related factors pointed out by doctors for non-adherence to clinical practical guidelines were; “lack of patients’ motivation to change their lifestyle”(88%), “patients’ low awareness about diabetes and its complications”(80 %), and “irregular use of medicaments”(72 %). The practice management related factor for non-adherence to the clinical practice guideline were; “lack of special education materials for patients”( 67%), “inadequate finances for making all necessary analyses and studies in diabetes patients”(47 %) and “lack of financial incentives for physicians”(43 %).

There is an underuse in the performance of the following test and examinations; Glycosylated haemoglobin, thorax – x-ray, assessing smoking, proteinuria, calculation of Body Mass Index (BMI), examination of the feet, examination of the eye-ground and calculation of glomerular filtration rate (GFR).

**Conclusions:** Although the great majority of general practitioners had the national diabetes guidelines at their clinics and the majority of general practitioners said they are using the guideline in the treatment of diabetes, there is a significant percentage of general practitioners that do not follow the guideline. The availability and the use of the national diabetes guideline were not related to any professional or practice characteristics. Doctors tend to start medical treatment and are content with treatment at a higher fasting blood glucose level than mentioned in the guideline. For the general practitioners “keeping blood glucose in normal range” was the most important treatment goal. The main patient related barriers and the practice related factors pointed out by general practitioners for not following the guidelines are a clear indication for possibilities to improve guideline adherence and improve diabetes care. There is an underuse in the performances of test and examination that are most needed for the early detection, prevention and treatment of diabetes complications.
1.0 INTRODUCTION

1.1 GLOBAL DISEASE BURDEN OF DIABETES MELLITUS

1.1.1 IMPACT OF DIABETES MELLITUS

The long-feared diabetes epidemic is no longer predicted – it is here.
Diabetes strikes at people of all ages, in all walks of life, and in all countries. For people in
countries where there is little or no social security, a diagnosis of diabetes can sentence a
whole family to generations of financial and educational hardship and even poverty.

Once thought of as a disease of the elderly, type 2 diabetes has now become a huge problem
and threat of the productive years of the life cycle. Diabetes is increasingly affecting people
earlier and earlier in their life, in some cases even in their teens and younger. Once thought of
as a disease of affluence, new evidence suggests higher prevalence rates among slum
dwellers in some countries.
High, middle and low income countries alike have to bear the burden and are suffering under
the impact of diabetes on health care costs, disability and productivity, early retirement,
increased pensions and early death (Mbanya, 2010).
At present about two-thirds of persons with diabetes live in developing countries and the
majority of new cases will originate from these areas (PAHO, 2006).

1.1.2 PREVALENCE OF DIABETES MELLITUS

The World Health Organization (WHO) estimated the worldwide prevalence of diabetes in
adults to be around 173 million in 2002 and predicted that there will be at least 350 million
people with Type 2 diabetes by 2030 (PAHO, 2006).

On 14 November 2012, World Diabetes Day, the International Diabetes Federation (IDF)
released the 5th edition of the Diabetes Atlas. New figures indicate that the number of people
living with diabetes in 2012 is more than 371 million and if no urgent action is taken it is
expected to rise to 552 million by 2030. This equates to approximately three new cases every
ten seconds or almost ten million per year. IDF also estimates that as many as 187 million people are unaware that they have diabetes (International Diabetes Federation, 2012).

The global increase in the incidence of diabetes is related to high levels of obesity associated with a change from traditional diets, diminishing levels of physical activity, population ageing and increasing urbanization.

Diabetes mellitus is one of the leading health problems in the world, contributing significantly to morbidity and mortality and adversely affecting both the quality and length of life (PAHO, 2006). Diabetes reduces life expectancy by five to 10 years (Marshall, 2006). Due to diabetes 4.8 million people died and 471 billion USD were spent in 2012(IDF, 2012).

1.2 THE DISEASE DIABETES MELLITUS

1.2.1 DEFINITION AND DESCRIPTION OF DIABETES MELLITUS

Diabetes is a group of metabolic diseases characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycaemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels (ADA, 2010).

1.2.2 CLASSIFICATION OF DIABETES MELLITUS

The vast majority of cases of diabetes fall into two broad etiopathogenetic categories;

**TYPE 1 DIABETES**

This form of diabetes was previously known by different names; insulin dependent diabetes, juvenile-onset diabetes or immune-mediated diabetes. It accounts for only 5–10% of those with diabetes and results from a cellular- mediated autoimmune destruction of the cells of the pancreas. The cause of type 1 diabetes is an absolute deficiency of insulin secretion.
**TYPE 2 DIABETES**

This form of diabetes accounts for 90–95% of those with diabetes and was previously referred to as non–insulin dependent diabetes or adult-onset diabetes. These individuals have insulin resistance and usually have relative (rather than absolute) insulin deficiency. At least initially, and often throughout their lifetime, these individuals do not need insulin treatment to survive. There are probably many different causes of this form of diabetes. Specific aetiologies are not known, most patients with this form of diabetes are obese, and obesity itself causes some degree of insulin resistance (ADA, 2010).

In this thesis whenever diabetes mellitus is mentioned it is referred to type 2 diabetes mellitus (T2DM).

**1.2.3 SYMPTOMS**

Symptoms of marked hyperglycaemia include frequent urination (polyuria), excessive thirst and plenty of drinking (polydipsia), weight loss, sometimes with extreme hunger and plenty of eating (polyphagia), and blurred vision. Impairment of growth and susceptibility to certain infections may also accompany chronic hyperglycaemia. Acute, life-threatening consequences of uncontrolled diabetes are hyperglycaemia with ketoacidosis or the nonketotic hyperosmolar syndrome.

**1.2.4 COMPLICATIONS**

Diabetes is a chronic, life-long condition that requires careful monitoring and control. Without proper management it can lead to very high blood sugar levels which can result in long term damage to various organs and tissues (complications). Long-term complications of diabetes are divided into microvascular and macrovascular. Microvascular complications are;

A. Eye disease (diabetic retinopathy), damage to the eyes with potential loss of vision,
B. Kidney disease (diabetic nephropathy), damage to the kidney leading to renal failure,
C. Nerve disease (diabetic neuropathy), damage to the nerves leading to loss of feeling with risk of foot ulcers, amputations, Charcot joints and impotence. Loss of feeling is a particular risk because it can allow foot injuries to escape notice and treatment, leading to major infections and amputation.

Macrovascular complications include (D.) cerebrovascular disease (affects heart and blood vessels) such as heart attacks, strokes and insufficiency in blood flow to the legs.
1.2.5 PREVALENCE OF DIABETES COMPLICATIONS

Studies of people with newly diagnosed type 2 diabetes have found that 2 – 39 % have retinopathy, 8 – 18 % have nephropathy, 5 -13 % have neuropathy and 8 % have cardiovascular disease (Engelgau, 2000).

Retinopathy; The World Health Organization estimates that diabetic retinopathy is the cause of blindness in 5% of the blind people worldwide and the most common cause of blindness in the age group of under the 65 years.

Nephropathy; about half of the patients with diabetes develop microalbuminuria at some point. Approximately one third will progress to proteinuria, one third will remain microalbuminuric and one third will revert to normal albumin excretion. Once proteinuria is present, progression to end stage renal disease is inevitable. Of all the patients who starts renal replacement therapy 20 % - 50 % have diabetes.

Neuropathy; patients with diabetes have a 30-50 % lifetime risk of developing chronic peripheral neuropathy and 10- 20 % patients develop severe symptoms. Peripheral neuropathy contributes to foot ulceration and amputation of the lower limbs. Diabetes is the most common cause of non-traumatic amputation of the lower limbs.

Macrovascular; In type 2 diabetes the risk of myocardial infarction and stroke is two to five times higher than the general population(Marshall, 2006).

1.2.6 PREVENTION OF DIABETES COMPLICATIONS

At the end of the twentieth century, clinical trials provided evidence that tight control of blood glucose, blood pressure and cholesterol decreases the risk of developing diabetes related macro (e.g., myocardial infarction, stroke).- and micro vascular (e.g., nephropathy, retinopathy, diabetic foot) complications, and cardiovascular death. (van Bruggen, 2009).

The Diabetes Control and Complications Trail (DCCT) in type 1 and the United Kingdom Prospective Diabetes Study (UKPDS) in type 2 diabetes showed that the lower the glycosylated haemoglobin achieved the lower the risks of microvascular complications (Marshall, 2006).
Prevention of these complications rests on timely institution of drug therapy by the prescribing physician, usually a general practitioner (GP), and the patient's compliance with the treatment regimen and willingness to make lifestyle changes. A proactive follow-up of diabetic patients is essential and should include foot examinations, blood and urine tests, and eye examination. In addition, patients should be counselled about the dangers of diabetes and the importance of a healthy lifestyle, and impressed with the need for compliance with doctor's orders (Goderis et al, 2009).

Knowledge on the importance of stringent diabetes control is reflected in current diabetes guidelines recommending ambitious treatment goals for blood glucose, glycosylated haemoglobin (HbA1c), blood pressure and cholesterol levels (van Bruggen, 2009).

1.3 Clinical Practical Guidelines

1.3.1 DEFINITION AND PURPOSE OF GUIDELINES

Definition
Clinical guidelines are defined as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances” (Koutsavlis, A.T, 2001).

Purpose
The need for guidelines and their effective dissemination arises from a generally perceived need to reduce the variability of medical care and to improve the efficiency, effectiveness, quality and appropriateness of care (Koutsavlis, A.T, 2001). The purpose of diabetes clinical practice guidelines for primary care physicians is to promote comprehensive care and management of patients with type 2 diabetes mellitus (Harris et al 2003).

1.3.2 DEVELOPMENT AND DISSEMINATION OF GUIDELINES

The production of clinical practice guidelines has several components. First, a local group or a national body decides to develop guidelines in a clinical area in which there is a need for such guidelines. Second, data are synthesised from research information and relevant practice patterns by searching the literature (including existing guidelines) and then weighing the
strength of the evidence from the resulting trials or studies. Third, these data are further reviewed, appraised, distilled and collated as guidelines; that is, as recommendations about strategies for investigation and management. Fourth, the sponsoring organisation and other interested organisations then endorse the guidelines. Fifth, clinical practice guidelines are disseminated, usually by traditional means such as mailing them to members or publishing them in recognized professional clinical journals. Sixth, various groups or individual practitioners may attempt to implement the guidelines more actively, through various, often multiple, strategies to assist, convince or otherwise influence physicians, patients and their caregivers. Finally, the guidelines are subjected to re-appraisal, evaluation and reiteration of the process. Each step in the development of clinical practice guidelines is crucial, and can involve potential pitfalls. The steps can be divided into two general groups. One conglomerate defines the scientific validity and reliability of the guidelines (content), while the other determines their use in decision making in clinical practice (dissemination & implementation) (Koutsavlis, A.T, 2001).

1.3.3 NON ADHERENCE TO CLINICAL PRACTICAL GUIDELINES

Although clinical practice guidelines are recommended and freely available there are reasons why general practitioners do not use them. Non-compliance with guidelines has been attributed to many different factors; lack of awareness that guidelines exist, insufficient knowledge about the content of the guidelines, lack of agreement with the guidelines, time constraints, lack of reminder systems, insufficient staff or support, poor reimbursement, increased practice costs, attitudes of providers towards diabetes itself, the complexity of its management, the perceived lack of support from society and the health system (van Bruggen, 2009) / (The Royal Australian College of General Practitioners, 2010).

1.3.4 STRATEGIES TO IMPROVE GUIDELINE ADHERENCE

Multiple strategies have been developed to improve physicians’ guideline adherence. Such strategies are targeted at different levels of care (professional, team, patient and organisation), adequately resourced, and include systems for training and evaluation. It has been argued that the involvement of end-users in the development process and adaptation of national guidelines to local circumstances, will give rise to an increased uptake (van Bruggen, 2009).
Theories have been developed to explain the behaviour of general practitioners towards guidelines. Examples of some of these theories are diffusion of innovation theory and trans theoretical model of behaviour change (Koutsavlis, A.T, 2001).

1.4 INNOVATIVE CARE FOR CHRONIC CONDITIONS (ICCC)

In response to the global increase in the prevalence of a range of chronic diseases the World Health Organization (WHO) recently published a report: Innovative care for chronic conditions: building blocks for action (ICCC). The purpose of the ICCC report was to describe a comprehensive global framework for the prevention and management of chronic disease, which could be applied to both developed and developing countries. The ICCC report stated that healthcare systems around the world have developed to deal with acute episodic care, which is not appropriate for the management of chronic conditions in the long term.

The Innovative Care for Chronic Conditions Model focuses on improving care at three different levels: micro level (individual and family), meso level (healthcare organisation and community), and macro level (policy).

Figure 1.1   The Innovative Care for Chronic Conditions Framework

(WHO, 2002; Innovative care for chronic conditions: building blocks for action)
At the centre of the Innovative Care for Chronic Conditions Framework is the micro level, consisting of people with long-term conditions, families, community partners, and the healthcare team. The model suggests that positive outcomes for people with long-term conditions occur only when people and their families, community partners, and health professionals are informed, motivated, and working together. The micro level is supported by healthcare organisations and the broader community (meso level). At the meso level there should be systems to manage care over time as opposed to acute episodic care. This will involve education of health care professionals, evidence-based guidelines, prevention strategies, information systems and linking with community resources. The meso level in turn influence and is effected on by the broader policy environment (macro level). In this model, essential elements for the policy environment include leadership and advocacy; integrated policies that span different disease types and prevention strategies; consistent financing; developing human resources; legislative frameworks; and partnership working (WHO, 2002).

1.5 DIABETES MELLITUS AND SURINAME

1.5.1 PREVALENCE AND IMPACT OF DIABETES IN SURINAME

The International Diabetes Federation (IDF) estimated that in 2010 the prevalence of diabetes in Suriname was 10.3 % of the population in the age group of 20 – 79 years. In absolute number there were 29,700 persons living with diabetes. The total number of persons in the age group 20-79 years was 289,000. The age when persons develop diabetes is decreasing. In the age group 20 – 39 years there were 5400 persons with diabetes (IDF, 2009).

On world diabetes day, 14 November 2012, the IDF released the fifth edition of the IDF diabetes atlas with new estimates for diabetes in all countries of the world. The prevalence of diabetes in Suriname for 2012 is 11.67 % in the age group of 20-79 years. That makes the total number of 38,010 persons living with diabetes. There are 12,380 undiagnosed cases of diabetes (IDF, 2012).

In 1999 diabetes mellitus was responsible for 3.9 % of the deaths in Suriname and it was on the seventh place on the list of causes of death published by the Bureau of Public Health.
In 2000 diabetes was on the fifth place with 4.6% of all deaths. On the list of the leading causes of death for 2004 diabetes was on the sixth place, accountable for 4.8% of all deaths (Punwasi, 2005). In 2008 and 2009 diabetes came on the fifth place on this list (5.5% and 5.7% of all deaths), one step higher than HIV/AIDS (Punwasi, 2011). Since diabetes mellitus is frequently underreported on death certificates this might be an underestimation.

1.5.2 DIABETES GUIDELINE OF SURINAME

In July 2003 the first national diabetes protocol for general practitioners was introduced in Suriname containing recommendations for screening, early detection and treatment of diabetes and its complications.


The protocol recommends the following test and examination for a diabetic patient;

A. Every 3 months; anamneses, weight, waist/hip ratio, blood pressure, foot examination if there are problems, fasting blood glucose, for insulin users a four point day curve, glycosylated haemoglobin (3 – 6 months), protein in the urine and microalbuminuria.

B. Annually; anamneses, weight, blood pressure, foot examination, for insulin users inspection of injection sites, examination of the eye (once in 1-2 years), fasting blood glucose, protein in the urine and microalbuminuria, kreatinine, kalium for diuretica users, total cholesterol, HDL, LDL and triglycerides, glomerular filtration rate (GFR) (Kloof, Berggraaf, Irving, van Weissenbruch, Kooman & Wolff, 2008).

The updated national diabetes protocol was presented to the general practitioners in a seminar on the 9th of March 2008. Despite the existence of a protocol and the presentation of it in a seminar there are strong indications that general practitioners still do not comply with the diabetes protocol.
2.0 RESEARCH DESIGN AND METHODS

2.1 PROBLEM STATEMENT

Despite the availability of the national diabetes guideline it seems like many general practitioners do not adhere to the guideline so the diabetes patients do not receive an optimal level of care. A guideline is a tool for giving a standard care with prescribed target goals for blood glucose, blood pressure and lipids. This study assesses the awareness, knowledge and use of the national diabetes guideline by general practitioners in Suriname. It is the first time such a study will be done in Suriname.

2.2 RESEARCH QUESTIONS

Questions that are addressed in this study are:

- 1. Are general practitioners familiar with the national diabetes guideline?
- 2. Is the guideline available at the general practitioners practice (office)?
- 3a. Do general practitioners use or refer to this guideline on a regular basis?
- 3b. What percentage of the general practitioners regularly refers to this guideline?
- 4. Do general practitioners find this guideline helpful?
- 5. Is there a relation between practice and general practitioners characteristics and the use of this guideline?
- 6. Are there differences between private and public general practitioners in the use of this guideline?
- 7. Is there a difference in the general practitioners knowledge about the treatment goal against the criteria in the guideline?
- 8. What are some patient, practice and practice management factors contributing to non-adherence of this guideline?
2.3 AIM OF STUDY

The aims of this study are to assess the current use of the national diabetes guideline, the knowledge, attitude, beliefs and practice of the general practitioners towards this guideline as well as to identify the barriers for the implementation of the guideline.

2.4 STUDY DESIGN

A questionnaire-based cross-sectional survey was conducted in eight of the ten districts of Suriname in May and June of 2012. The questionnaire was sent by email to all the subjects on the first of May. After two weeks a reminder mail was send and a telephone call was made. A hard copy of the questionnaire was sent to those who had problems with their email, internet or PC. After 5 weeks on Saturday the 9th June there were enough responses and the data collection phase was finished.

2.5 POPULATION AND STUDY SAMPLE

Population: all the general practitioners working in Suriname are subjects for this study.

Study sample. Inclusion criteria
In this study will be included (1) all the private general practitioners that have an agreement with the State Health Insurance Foundation (SZF) and (2) the general practitioners that are working for the Regional Health Services (RGD). The Regional Health Services is a governmental foundation through which Suriname provide primary health care for the poor. The Regional Health Services operates a total of 45 clinics in all eight coastal districts and is staffed by 61 physicians. In this study “public doctors” or “governmental doctors” shall be used as synonym of RGD doctors.
Exclusion criteria
From this study are excluded (1) those general practitioners who don’t work in a clinic, (those without a practice) and (2) general practitioners working for companies. The number of general practitioners working for companies is low, so it’s difficult to compare them with the two other groups named in the inclusion criteria.

2.6 SAMPLE SIZE AND SELECTION OF SAMPLE

Sample size
Using “Epi info” it is calculated that out of the 61 general practitioners working at the Regional Health Services (RGD) 30 general practitioners (GP) are needed for the study. Different studies with mail questionnaire have shown an average response rate of 50 %. So taking into account this response rate all the 61 GP should be included in the study to have at least 30 respondents. There are 114 private GP’s. It is calculated with “Epi info” that from this group 46 is needed for the study. Taking a response rate of 50 % in account all the 114 private general practitioners should be selected for the study.

Selection of sample
All the 61 general practitioners working at the RGD clinics will be included in the study and of the private general practitioners with a SZF agreement all the 114 will be asked to participate in the study.

2.7 DATA COLLECTION

An existing questionnaire that was used in an earlier study was modified, adapted and pilot tested for the situation in Suriname (Oja, 2005). This questionnaire was send by email to all the general practitioners in Suriname that were selected for this study. The questionnaire consist of four sections and in total 22 questions; in the first section information about GP’s background characteristics is obtained, the second section assesses knowledge about the diabetes guideline, the third is dealing with treatment goals and the last section determine patient and practice management factors for not following the guideline. The last section also assesses the familiarity with, the availability and the use of the guideline in the daily practice.
2.8 DATA MANAGEMENT AND ANALYSIS

The collected data was entered in an excel file. For the analysis SPSS for windows version 17.0 was used. Most of the analysis was done by using the descriptive methods for statistical analysis, for some categorical variables the chi-square test was used and means were compared by using the student’s t test. A confidence interval of 95% was used and a probability value of < 0.05 was considered significant.

2.9 ETHICS AND HUMAN SUBJECTS ISSUES

Permission for conducting this study was asked and received from the following institutes and authorities;
A. The director of the Ministry of Health,
B. The medical ethical committee of the Ministry of Health,
C. The director of the Regional Health Services (RGD),
D. The chairman of the Association of physicians in Suriname (VMS) and
E. The chairman of the general practitioners section of the VMS.
It was agreed on that the names of the general practitioners and the names of their clinics would be confidential and should not be mentioned in this study.

2.10 STRENGTHS AND WEAKNESSES OF THE STUDY

Since it is a self reported interview there is chance for information bias and non responder’s bias. Information bias shall be minimised by using clear and closed questions in the questionnaire and by pilot testing the questionnaire. In addition critical issues will be addressed through more than one question. Responders and non responders shall be monitored closely to see if the non response is at random or systematically. By reminders call and personal interview non responder’s bias will be minimised.

2.11 PUBLIC HEALTH SIGNIFICANCE

The ultimate goal of this study is to improve the care for diabetes patients in Suriname.
3.0 RESULTS

3.1 GENERAL PRACTITIONERS PERSONAL AND PRACTICE CHARACTERISTICS

54 % (33 out of 61) of the Regional Health Services doctors responded to the mail survey, comparing to 42 % (48 out of 114) of the private doctors. The overall response rate was 46 % (81 out of 175). The average time (± SD) from the graduation of medical faculty was 15.56 ± 9.1 years. The mean age of the doctors was 45.5 ± 8.3 years. The youngest doctor was 31 years of age and the oldest was 73 years. The mean size of the patient list was 1984 ± 1181. The smallest clinic has 200 patients on their list and the biggest clinic has 5100 patients. The average number of diabetes patients was 160, ranging from a minimum of 30 to a maximum of 500. The estimated prevalence of diabetes mellitus was 9 %.

Table3.1 The location of practice, type of practice and sex of the general practitioners.

<table>
<thead>
<tr>
<th>Location of practice (total 81)</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paramaribo</td>
<td>54</td>
<td>67</td>
</tr>
<tr>
<td>Wanica</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>Saramacca</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Commewijne</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Marowijne</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Coronie</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Nickerie</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Para</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Type of practice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solo</td>
<td>49</td>
<td>60</td>
</tr>
<tr>
<td>Group practices</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>42</td>
<td>52</td>
</tr>
<tr>
<td>Female</td>
<td>39</td>
<td>48</td>
</tr>
</tbody>
</table>
3.2 AVAILABILITY AND USE OF THE NATIONAL DIABETES GUIDELINE IN THE CLINICS

The survey shows that the majority of the respondents, 68% have the national diabetes guideline of March 2008 at their clinic and that 80% of the doctors are familiar with it. 65% the general practitioners states that they adhere to the guidelines in their practice mostly and always. The responses were as follow; 5% adhere always, 60% mostly, 15% seldom and 20% never adheres to the guideline. The majority of the doctors (75%) said the guideline is applicable.

Table 3.2 The availability, familiarity, adherence and usability of the national diabetes guideline.

<table>
<thead>
<tr>
<th>Guideline is available in the clinic</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (n = 81)</td>
<td>55</td>
<td>68</td>
</tr>
<tr>
<td>RGD doctors (n = 33)</td>
<td>19</td>
<td>58</td>
</tr>
<tr>
<td>Private doctors (n= 48)</td>
<td>36</td>
<td>75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Familiar with guideline</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>RGD doctors</td>
<td>25</td>
<td>76</td>
</tr>
<tr>
<td>Private doctors</td>
<td>40</td>
<td>83</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adhere to guideline always and mostly</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>53</td>
<td>65</td>
</tr>
<tr>
<td>RGD doctors</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>Private doctors</td>
<td>33</td>
<td>69</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Finds guidelines usable</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>61</td>
<td>75</td>
</tr>
<tr>
<td>RGD doctors</td>
<td>23</td>
<td>70</td>
</tr>
<tr>
<td>Private doctors</td>
<td>38</td>
<td>80</td>
</tr>
</tbody>
</table>
The private doctors scored higher on the four issues about the guideline mentioned above;

a. Availability, private GP’s 75 % vs. public GP’s 58 % ( p value = 0.09)
b. Familiarity, private GP’s 83% vs. public GP’s 76 % ( p value = 0.40)
c. Adherence, private GP’s 69 % vs. public GP’s  60 % ( p value = 0.44)
d. Usability, private GP’s  80 % vs. public GP’s 70 % ( p value = 0.33)

The difference seen between the private doctors and the public doctors were statistically not significant.

3.3 IMPACT OF THE PRACTICE CHARACTERISTICS ON THE
AVAILABILITY AND THE REPORTED USE OF THE GUIDELINE

The different characteristics were analyzed to see if there is any relationship with it and the availability or the use of the guideline. The availability of the guideline for the different characteristics was as follow;

a. sex of general practitioner; male 71 % vs. female 64 % (p value= 0.48 )
b. type of practice; solo practice 67 % vs. partnership 69 % (p value= 0.89 ),
c. category of practice, governmental 58% vs. private 75 % (p value=0.09 )and
d. working area; district 74 % vs. city 65 % (p value=0.40).

Figure3.1 The relation between practice type, practice category, location of clinic and guideline adherence or availability.
The use of the guideline for the different characteristics was as follows:

a. sex of general practitioner; male 62 % vs. female 69 % (p value= 0.68 )
b. type of practice; solo practice 61 % vs. partnership 72 % (p value= 0.56),
c. category of practice; governmental 60 % vs. private 69 % (p value=0.80) and
   d. working area; district 67 % vs. city 65 % (p value=0.90).

No relation was seen between the availability and use of the guideline and the sex of the general practitioner, the type of practice (solo practice or partnership), category of practice (governmental or private) and working area (district or city).

The variables having a nurse with diabetes education, the possibility of phone consultation with an internist and years of working experience of the general practitioners were analyzed to search for any relation with the availability and use of the diabetes guideline.

![Figure 3.2](image_url)

Figure 3.2 The relation between; having a nurse with diabetes education, the possibility of phone consultation with an internist, years of experience of the GP and the availability or adherence to the diabetes guideline.
The availability of the guideline for the different variables was as follow;
   a. Having nurse with diabetes education; yes 65 % vs. no 71 % (p value= 0.58 ),
   b. Possibility of consulting an internist by phone; yes 72 % vs. no 50 % (p value=0.23)
   c. Years of working experience; 1. < 10 yrs 68 %
      2. 10 -19 yrs 63 %
      3. 20 -29 yrs 67 %
      4. > 30 yrs 88% (p value=0.63).

The use of the guideline for the different variables was as follow;
   a. Having nurse with diabetes education; yes 63 % vs. no 69 % (p value= 0.22 ),
   b. Possibility of consulting an internist by phone; yes 66 % vs. no 71 % (p value=0.45)
   c. Years of working experience; 1. < 10 yrs 68 %
      2. 10 -19 yrs 67 %
      3. 20 -29 yrs 60 %
      4. > 30 yrs 63% (p value=0.13).

No relation was found between having a nurse with diabetes education, the possibility of phone consultation with an internist and years of working experience of the general practitioners and the availability and adherence to the diabetes guideline.
3.4 COMPARISON OF THE DOCTOR’S KNOWLEDGE ABOUT THE TREATMENT GOALS AGAINST THE CRITERIA IN THE GUIDELINE

The doctors tend to start treatment with medication at a higher fasting blood glucose (FBG) level (7.9 ± 1.2 mmol/l) if compared with the guideline (7.0 mmol/l). More than half of all the doctors make a decision of treatment on FBG above 7.5 mmol/l. Nine percent of respondents start with medical treatment while FBG value is below 7 mmol/l, 29 percent in the range 7.0- 7.4 mmol/l and 62 % when the FBG is 7.5 mmol/ l and higher.

Figure 3.3 Distribution of doctors (%) and the fasting blood glucose level (mmol/l) at which they decide to start treatment with medication.

There was no difference between RGD doctors and private doctors in the decision when to start treatment with medication. The RGD doctors start with medical treatment at a fasting blood glucose level of 8.0 ± 1.17 mmol/l while the private doctors starts at a fasting blood glucose level of 7.8 ± 1.14 mmol/l.

The drug of choice for 95 % of the respondents for starting treatment with medication was metformin. Five percent started with glibenclamide or tolbutamide.
The general practitioners are content with treatment at the fasting blood sugar values of 7.3 ± 0.7 mmol/l in average (RGD doctors 7.3 ± 0.76 mmol/l, private doctors 7.3 ± 0.65 mmol/l). Nine percent of respondents are content with a fasting blood glucose level between 6 and 6.5 mmol/l, 54 % with a FBG level of less than 7 mmol/l, 33 % with a FBG value in the range of 7-8 mmol/l and 4 % with a value of above 8 mmol/l. The standard mentioned a target goal for fasting blood sugar value of less than 7 mmol/l.

Figure 3.4 Distribution of doctors (%) and the fasting blood glucose value (mmol/l) at which they are content with treatment outcome.

On the request to value the importance of the treatment goals 57 % of the respondents mentioned that “keeping blood glucose in normal range” was the most important indicator for evaluation of the diabetes patient. By importance the next indicators for the doctors were; “absence of ketoses in urine” (43 %), “achieving and maintenance of body weight” (42%), “absence of glucosuria” (33%), and at last “elimination of symptoms” (31 %).

Figure 3.5 The importance of treatment goals for the respondents.

<table>
<thead>
<tr>
<th>Importance of treatment goals by doctors (%)</th>
<th>very important</th>
<th>important</th>
<th>rather not important</th>
<th>not important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>31</td>
<td>44</td>
<td>42</td>
<td>57</td>
</tr>
<tr>
<td>2</td>
<td>33</td>
<td>42</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>42</td>
<td>38</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>43</td>
<td>25</td>
<td>12</td>
<td>1</td>
</tr>
</tbody>
</table>

1-Elimination of symptoms; 2 – absence of glucosuria; 3 – keeping blood glucose in normal range; 4 achieving and maintenance of body weight; 5 – absence of ketoses in urine.
3.5 THE GENERAL PRACTITIONERS ASSESSMENT ON THE PATIENT AND PRACTICE MANAGEMENT RELATED FACTORS CONTRIBUTING TO NON-ADHERENCE OF THE GUIDELINE

The most important patient related factor pointed out by doctors for non-adherence to the guideline was “lack of patients’ motivation to change their life style” (overall 88%, public 91%, private 85%, p = 0.23). The other factors were; “patients’ low awareness about diabetes and its complications” (overall 80%, public 88%, private 75%, p = 0.01), “irregular use of medicaments” (overall 72%, public 82%, private 65%, p = 0.12), “patients’ non-following of their treatment schemes prescribed by the doctor” (overall 64%, public 73%, private 58%, p = 0.09), “patient’s lack of interest in their disease” (overall 55%, public 67%, private 48%, p = 0.14), “patients’ limited financial means” (overall 40%, public 52%, private 31%, p = 0.07).

For the factor “patients’ low awareness about diabetes and its complications” a statistical significant difference was found between public and private doctors. More public doctors saw this factor as a problem than private doctors for not following the guideline.

![Patient related factors for non-adherence by doctors (%)](image)

**Figure 3.6 Patient related factors for non-adherence to the guidelines.**
The practice management related factor “lack of special education materials for patients” (overall 67%; public 73%, private 63%, p= 0.20) was the most important factor for non-adherence to the clinical practice guideline. This was followed by; “inadequate finances for making all necessary analyses and studies in diabetes patients” (overall 47%; public 58%, private 40%, p=0.34), “lack of financial incentives for physicians” (overall 43%; public 39%, private 46%, p=0.57), “lack of support/ feedback from specialists” (overall 40%; public 46%, private 35%, p= 0.26), “lack of special diabetes education of the nurses” (overall 37%; public 36%, private 38%, p= 0.17), “physician’s lack of time” (overall 21%; public 33%, private 13%, p=0.05), “lack of clear care guidelines” (overall 17%; public 18%, private 17%, p= 0.43).

For the factor “physician’s lack of time” a statistical significant difference was found between public and private doctors. More public doctors saw this factor as a problem than private doctors for not following the guideline.

Figure 3.7 Practice management factors for non-adherence to guidelines.
3.6 PERFORMANCE OF THE TESTS AND EXAMINATIONS COMPARED TO THE TIME LIMITS IN THE GUIDELINE

The performance of the tests and examinations mentioned in the guideline that should be done in a year varied from underuse to overuse.

As illustrated in figure 3.8; “complications and symptoms” (1), “managing diabetes” (2), blood glucose value (3) and total cholesterol (6) are done in time.

There is overuse for measuring blood pressure (4).

For the test glycosylated haemoglobin (5) and for a thorax – x-ray (7) there is an underuse.

![Frequency of laboratory test and examination](image)

1 - complications/ symptoms; 2 - managing the diabetes; 3 - blood glucose value; 4 - blood pressure; 5 - glycosylated haemoglobin; 6 - total cholesterol/ lipid profile; 7 - thorax X-ray

Figure 3.8. Frequency of laboratory test and examination.
As shown is figure 3.9; body weight (3) and serum creatinine (7) are done in time. For “assessing smoking” (1), proteinuria (2), calculation of body mass index (BMI) (4), examination of the feet (5), examination of the eye-ground or referral to the eye specialist(6), calculation of glomerular filtration rate (GFR) (8) there is an underuse.

1 - smoking; 2- proteinuria ; 3 - body weight ; 4 - calculate BMI; 5 - examination of the feet ; 6 - examination of the eye/ referral to an eye specialist;7- serum creatinine; 8- calculate GFR.

Figure 3.9 Frequency of laboratory test and examination.

This means that the patients with diabetes of twenty percent of the general practitioners will not have an examination of their feet at least once a year. The patients of eighteenth percent of the respondents will not have an examination of their eyes yearly and of the patients of thirty two percent of the doctors the GFR will not be calculated.
4. DISCUSSION

The current study is the first one in Suriname to assess the knowledge, attitude and practice of general practitioners towards the national diabetes guideline. It was a cross-sectional survey of physicians working at the primary care level; both private and governmental. All the private doctors who have an agreement with the State Health Insurance Foundation (SZF) and all the doctors working for the state foundation, the Regional Health Services (RGD) were included in the study.

4.1 GENERAL PRACTITIONERS PERSONAL AND PRACTICE CHARACTERISTICS

Response rate; 54% (33 out of 61) of the regional health services doctors responded, comparing to 42% (48 out of 114) of the private doctors. The overall response rate was 46% (81 out of 175). Response rate of the regional health services doctors is higher than that of private doctors may be because the researcher himself works for the regional health services. The response rate for mail surveys’ usually varies between 43% (Faruqi et all, 2003), 46% (Rätsep et all, 2006), 54% (Newton et all, 1996) to 70% (Grol, 1990) and 71% (wolfe, 2004). So the response rate (46%) of this study is low when compared with the other mail surveys done elsewhere in the world. For Suriname it is still a response rate to be content with since it is the first time such a study is done here.

The age, gender, geographical, practice category and practice type distribution of the respondents corresponds with the normal distribution of general practitioners in Suriname. So the results of this study can be generalized.

4.2 AVAILIBILITY AND USE OF THE NATIONAL DIABETES GUIDELINE IN THE CLINICS

The survey showed that the majority of the doctors (68%) have the national diabetes guideline of March 2008 at their clinic. In a study done by Rätsep et all in 2003 in Estonia 76% of the respondents stated that they had a copy of the guideline (Rätsep et all, 2006).
The majority of respondents (80%) are familiar with the guideline. Most of the general practitioners stated that they adhere to the guidelines in their daily work practice mostly and always 65%. The responses were as follow; 5% adhere always, 60% mostly, 15% seldom and 20% never adheres to the guidelines. This means that 35% of the diabetes patients do not receive the care that they need.

In the study of Rätsep et al. 79% of the doctors reported using it daily. The majority of the doctors (75%) said the guideline is applicable compared to 83% in the study of Rätsep et all.

For all the four mentioned issue’s; “having the guidelines at the clinic”, “being familiar with it”, “adhering to it” and “finding it applicable” the private doctors scored a higher percentage than the governmental doctors. The difference between the doctors of the regional health services and the private doctors was statistical not significant.

4.3 IMPACT OF THE PRACTICE CHARACTERISTICS ON THE AVAILABILITY AND THE REPORTED USE OF THE GUIDELINE

Availability and use of the guideline were not related to the sex of the general practitioner, the working area, type of practice, category of clinic and location of practice. The availability of a diabetes nurse, the possibility of phone consultation with an internist and years of working experience also was not related to the availability and use of the guideline.

In the study of Oja also no relation was found between the availability and the use of the guideline and the working area, practice type and size, previous status before specialization as a general practitioner, working experience and waiting time nor distance to an endocrinologist (Oja, 2005).

Wolfe et al. noticed in 2004 a difference in guideline use. Use of the clinical practice guideline (CPG) was lowest among physicians in solo practice and among those working in rural areas. However Wolfe et al. did not found a significant difference in CPG use or familiarity based on number of years in practice (wolfe, 2004).
In Suriname people used to believe that governmental general practitioners, districts general practitioners and older general practitioners do not give the appropriate diabetes care. But in this study no difference is found between governmental and private general practitioners, districts and city general practitioners and young and older general practitioners.

4.4 COMPARISON OF THE DOCTOR’S KNOWLEDGE ABOUT THE TREATMENT GOALS AGAINST THE CRITERIA IN THE GUIDELINE

As an average, doctors tend to start treatment with medication at a higher fasting blood glucose (FBG) level (7.9 ± 1.2 mmol/l) if compared with the guideline (7.0 mmol/l). More than half of all the doctors make a decision of treatment on FBG above 7.5 mmol/l. Nine percent of respondents start with medical treatment while FBG value is below 7 mmol/l, 29 percent in the range 7.0-7.4 mmol/l and 62% when the FBG is 7.5 mmol/l and higher. Approximately two third of the respondents did not start with medical treatment of the diabetes patient as recommended by the guideline. If the diabetes patients live with a fasting blood glucose that is higher than the recommended level, they have a bigger chance of developing complications. It is important to start treatment when fasting blood glucose level is 7 mmol/l.

The mean glucose level when to start treatment with medication was not different between public and private doctors.

Rätsep et all in 2003 in Estonia noticed that the doctors tended to start treatment with medications at higher fasting blood glucose (FBG) levels than the recommended 6.1 mmol/l in the guideline. More than half of the doctors made a decision to start treatment with medications on FBG above 7 mmol/l, while a few made this decision at FBG values below 6.1 mmol/l (Rätsep et all, 2006).

The general practitioners are content with treatment at the fasting blood sugar values of 7.3 ± 0.7 mmol/l in average. Nine percent of respondents are content with a fasting blood glucose level between 6 and 6.5 mmol/l, 54% with a FBG level of 7 mmol/l. And 37% of the general practitioners are content with a blood glucose level of > 7 mmol/l. The standard mentioned a target goal for fasting blood sugar value of < 7 mmol/l.
Our guideline is not absolutely clear about this issue. The guideline recommends to start with medical treatment when the blood glucose level is 7 mmol/l and to be content with treatment if the blood glucose level is less than 7 mmol/l. Most guidelines in the world have a margin of 0.5 to 1 mmol/l between the blood glucose level when to start treatment and the blood glucose level to be content with it.

On the request to value the importance of the following treatment goals 57% of the respondents mentioned that “keeping blood glucose in normal range” was the most important indicator for evaluation of the diabetes patient.

In the study of Oja more than 80% of the general practitioners said that keeping blood glucose in normal range was the most important indicator (Oja, 2005).

4.5 THE GENERAL PRACTITIONERS ASSESSMENT ON THE PATIENT AND PRACTICE MANAGEMENT RELATED FACTORS CONTRIBUTING TO NON-ADHERENCE OF THE GUIDELINE

The three most important patient related factors pointed out by doctors for non-adherence to clinical practical guidelines were; “lack of patients’ motivation to change their life style” (88%), “patients’ low awareness about diabetes and its complications” (80%) and “irregular use of medicaments” (72%). These results point out very clearly that with education, counselling and motivation of the diabetic patient there is still much to gain in the improvement of diabetes care.

For the factor “patients’ low awareness about diabetes and its complications” a statistical significant difference was found between public (88%) and private doctors (75%) (p=0.01). More public doctors saw this factor as a problem than private doctors for not following the guideline. A possible explanation for this could be that the patients that visit the public clinics are mostly lesser educated than those visiting the private clinics.

In a study of diabetes patients done in Suriname in 1995 it was found that fifty percent of the patients hospitalized in public hospitals had no or only one or two years of formal education. The knowledge and awareness of diabetes and its complications was low, especially for eye complications (Goede & Fränkel, 1995).
In the study of Oja the three most important patient related factors were; “lack of patients’ motivation to change their life style” (70%), “patients’ low awareness about diabetes and its complications” (70 %) and “patients’ non-following of their treatment schemes prescribed by the doctor” (50 %)(Oja, 2005).

From the practice management view the three most important factors for non –adherence to the clinical practice guideline were; “lack of special education materials for patients” ( 67%), “inadequate finances for making all necessary analyses and studies in diabetes patients” (47%), “lack of financial incentives for physicians” (43 %).

For an increase in adherence to the guidelines it is necessary to have more education materials for patients and financial incentives for the physicians who treat patients with diabetes.

For the factor “physician’s lack of time” a statistical significant difference was found between public (33%) and private doctors (13 %) (p value = 0.05). More public doctors saw this factor as a problem than private doctors for not following the guideline. A possible explanation for this is that the public clinics have more patients registered than the private clinics have. The public clinics have also more patients with diabetes than the private clinics.

The most important practice management factor for non –adherence to the clinical practice guideline pointed out by doctors in the Oja study were; “lack of special education materials for patients” (56 %), “inadequate diabetes education of the nurses” (41% ) and “underfunding of doctors” (33%) (Oja, 2005).

**4.6 PERFORMANCE OF THE TESTS AND EXAMINATIONS COMPARED TO THE TIME LIMITS IN THE GUIDELINE**

The performance of the tests and examinations mentioned in the guideline that should be done during a year varied from underuse to overuse. Complications and symptoms, managing diabetes, blood glucose value, total cholesterol, body weight and serum creatinine are done in time. Overuse is for measuring blood pressure.
For glycosylated haemoglobin, thorax – x-ray, assessing smoking, proteinuria, calculation of BMI, examination of the feet, examination of the eye-ground, calculation of glomerular filtration rate (GFR) there is an underuse. The patients with diabetes of 20% of the general practitioners will not have an examination of their feet at least once a year. The patients of 18% of the respondents will not have an examination of their eyes yearly and the GFR will not be calculated for the patients of 32% of the doctors.

The timely performance of test and examination is a tool for screening, early detection and prevention of diabetes complications. It is not good for the patients with diabetes and for the diabetic care that so many patients are denied the necessary test and examination. A chance for early detection and treatment of the complications of diabetes is taken away from these patients with diabetes. It is recommendable to search for the reasons why the test and examination are not done on time and that the problems are solved.

The study done by Goede and Fränkel showed failure at the primary health care level to provide standard diabetes care to prevent complications and hospitalization. The information that could be found in the patient chart was very scanty and the examination of the eye or referral to the eye specialist was not a part of the treatment plan of the patient with diabetes. Even weight and blood pressure was not always noted on the patient charts suggesting that these crucial measurements were not always performed (Goede & Fränkel, 1995). It should be noted that diabetes mellitus diagnosis and care was included in the curriculum at the Medical Faculty in Suriname, but at the time of this study in 1995 national guidelines were not yet developed.

A study in South Africa found that; glycosylated haemoglobin, microalbumin measurement, lipid profile, foot examination, blood pressure and BMI were the assessments most commonly performed by the surveyed population. And Only 36% of the participants conducted eye examinations (Leslie & Nkombua, 2012).

In contrast a study conducted in Estonia found that eye examinations, blood pressure checks and serum creatinine were most frequently performed, while glycosylated haemoglobin was not routinely done (Rätsep et all, 2006).
CONCLUSION

1. The majority of the doctors (80%) are familiar with the national diabetes guideline.
2. Although the great majority of general practitioners (68%) had the national diabetes guidelines at their clinic and the majority of general practitioners (65%) said they are using the guideline in the treatment of diabetes, there is still a significant percentage (35%) of general practitioners that do not follow the guideline.
3. Seventy five percent of the respondents find the guideline usable and helpful.
4. The availability and use of the national diabetes guideline was not related to professional and practice characteristics such as; type of practice, location of practice, sex of the professional, category of clinic, availability of a diabetes nurse, the possibility of phone consultation with an internist and years of working experience.
5. No differences were found between public and private doctors in the use of the guideline.
6. 62% of doctors tend to start medical treatment of patients with diabetes at a higher fasting blood glucose level than mentioned in the guideline and 37% of the doctors are content with treatment with a higher fasting blood glucose level than recommended in the guideline. For the general practitioners “keeping blood glucose in normal range” was the most important treatment goal.
7. The main patient related factor mentioned by general practitioners for not implementing the guidelines was “patient’s lack of motivation to change their lifestyle” and the most important clinic related barrier was “lack of special education materials for patients”.
8. There is an underuse of the following test and examinations that should be done during a year; assessment of smoking, check for proteinuria, calculation of body mass index (BMI), examination of the feet, examination of the eye-ground and calculation of the glomerular filtration rate (GFR).
9. The consequence of the above mentioned conclusions is that although the general practitioners mentioned they have the guideline and use it, the patients with diabetes is not carefully monitored and controlled. The blood glucose level is not controlled securely. This can lead to debilitating diabetes complications. The test and examinations to recognize complications in an early stage are not performed timely, so an opportunity to detect and treat complications is missed.
RECOMMENDATIONS

A. For the improvement of general practitioners adherence to the guideline;
1. The medical students must acquire knowledge and skills of guidelines use in their last study year.
2. All general practitioners must update their knowledge and skills of the use of the diabetes guidelines regularly. It is best to do this in an interactive workshop through problem-based learning.
3. Different stakeholders must be involved in the process of guideline development, dissemination, implementation and evaluation. Stakeholders such as; representatives of the Ministry of Health, general practitioners, medical specialists as; ophthalmologist, nephrologists and surgeons and health insurance companies must be involved.
4. The national diabetes guideline must be updated and evaluated regularly. So the most recent recommendations for diabetes management can be taken in account.
5. The possibility of incentives for physicians that adhere to guidelines must be taken in consideration.

B. For improvement of diabetes care;
1. Due to the significant number of people living with diabetes in Suriname there is a need for more and better co-ordination and monitoring of diabetes care across levels of care. This can be done by establishing a National Diabetes Program (NDP). Such a program will guard against fragmentation of services and monitor quality of care. It can also develop and implement policy measures for an effective and comprehensive approach to the prevention and control of diabetes and its complications.
2. The education of patients for self management of diabetes should be intensified.
3. Information and education tools must be developed for patients with diabetes as well as for their family, health care workers and the public at large.
4. The current study is conducted through a self reported interview. It is advisable to do a patient record survey / chart audit to see if the guideline is truly implemented as mentioned by the respondents. Then it is possible to have an idea how it is in the “real world”, estimate physicians competencies and better measure physicians’ performance.
REFERENCES


23. The Caribbean Health Research Council (CHRC), Managing Diabetes in Primary Care in the Caribbean, the Pan American Health Organization (PAHO), 2006, Trinidad and Tobago April 2006
24. The Royal Australian College of General Practitioners, A systems approach to the management of diabetes: A guide for general practice networks, Victoria/ Australia, July 2010,
APPENDICES

1. QUESTIONNAIRE

Please complete this questionnaire by placing an X in the appropriate box for the “closed” questions and for the open questions fill in the answers. Don’t search for the “correct” answer in the guideline, but be spontaneous and just fill in what comes into your mind. You may return the completed questionnaire via email to me at my email address: barkatmohab@yahoo.com

Name; ……………………… clinic; ………………………

Background characteristics

1. What is your age? ……….years
2. You are; 
   a. Male ………
   b. Female ………
3. The location of your practice:

   | a. Paramaribo | …… | e. Marowijne | …… |
   | b. Wanica    | …… | f. Coronie   | …… |
   | c. Saramacca | …… | g. Nickerie | …… |
   | d. Commewijne| …… | h. Para     | …… |

4. Please indicate the year of graduation from the university? 19……… / 20 ……………
5. Where do you work?
   a. RGD … … b. Private … … c. Other ……
6. What type of practice do you have?
   1. Solo practice .... 2. Group practice, no of partner GPs ………
7. What is the size of your patients list (patienten bestand)? ………………………
8. What is the number of diabetes patients in the list?..............

9. How many nurses work in your health centre?

| Nurse /"MBOV" or “verpleegkundige A” | .......... |
| Nurse assistant /“Ziekenverzorgende” | ........ |
| Health assistant or physician assistant | ........ |

10. Had any nurses in your family health centre had special education on diabetes care?
   1. Yes .......        2. No .......

11. Is it possible for you to use phone consultation with an internist? 1. Yes ....   2. No ..... 

Guideline knowledge and practice

12. Based on your experience you decide to start treatment with medication when change of lifestyle, dietary counselling and increase of physical activity has not provided satisfying results and when fasting blood glucose value is above................................................ mmol/l.

13. What is your drug of choice, when you start treatment with medication for a type 2 diabetes patient (see question 12)?

| a. Metformine / Glucophage | .......... |
| b. Glibenclamide / Daonil | .......... |
| c. Tolbutamide/ Rastinon | .......... |
| d. Insulatard/ Protafaan insulin (1 x at the night) | .......... |
| e. Mixtard insulin (twice daily) | .......... |
| f. Actrapid insulin (four times daily) | .......... |

14. In your daily work you are generally content with treatment when the fasting blood glucose value of the diabetes patient is below.............. mmol/l.

15. Please indicate assumed amount of diabetes patients in your list, whose blood glucose is compensated with treatment, i.e. at fasting blood glucose value mostly under 7.0 mmol/l?...........%
**Treatment goals**

16. How would you appraise the importance of the following selected treatment goals in assessing the efficiency of the diabetes patient?

<table>
<thead>
<tr>
<th>Treatment Goals</th>
<th>Very important (1)</th>
<th>Important (2)</th>
<th>Rather not important (3)</th>
<th>Not important (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elimination of symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence of glucosuria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keeping blood glucose in normal range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achieving and maintenance of body weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence of ketoses in urine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. How often do you assess the following indicators in type 2 diabetes patient in your daily practice?

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Once a month (1)</th>
<th>At least once a quarter (2)</th>
<th>At least once a year (3)</th>
<th>Less often (4)</th>
<th>Not necessary (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a). Complications/ symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b). Managing the diabetes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c). Blood glucose value</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d). Blood pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e). Glycosylated haemoglobin (HbAlc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f). Total cholesterol/ Lipids profile (LDL, HDL, TG)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g). Thorax X-ray</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h). Smoking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i). Proteinuria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j). Body weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>k). Calculate BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>l). Examination of feet (skin, sensitivity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>m). Examination of eye-ground/ vision/referral to an eye specialist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n). Serum creatine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o). Calculate GFR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Perceived barriers for following guidelines

18. Which of the following factors do you regard as problematic in adherence to the guidelines for type 2 diabetes?

<table>
<thead>
<tr>
<th>problems</th>
<th>No (1)</th>
<th>Seldom (2)</th>
<th>Often (3)</th>
<th>Very often (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a). lack of clear care guidelines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b). patients’ low awareness about diabetes and its complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c). lack of patients’ motivation to change their life style</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d). irregular consumption of medicaments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e). patients’ limited financial means</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d). physician’s lack of interest in their disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e). patients’ non-following of their treatment schemes prescribed by the doctor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f). physician’s lack of time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g). lack of special diabetes education of the nurses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h). lack of support/ feedback from specialists</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i). lack of special education materials for patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j). inadequate finances for making all necessary analyses and studies in diabetes patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>k). lack of financial incentives for physicians</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

19. Are you familiar with (do you know) the national diabetes guideline of March 2008 (Diabetes Mellitus type 2, protocol voor aanpak in de eerste lijn, maart 2008)?

<table>
<thead>
<tr>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>......</td>
<td>......</td>
</tr>
</tbody>
</table>

20. Do you have the national diabetes guideline of March 2008 at your disposal in the clinic?

<table>
<thead>
<tr>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>......</td>
<td>......</td>
</tr>
</tbody>
</table>

21. Do you adhere to these clinical practice guidelines in your daily work?

<table>
<thead>
<tr>
<th>The national diabetes guideline of March 2008</th>
<th>Yes, always</th>
<th>mostly</th>
<th>seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>........</td>
<td>.......</td>
<td>.......</td>
<td>......</td>
</tr>
</tbody>
</table>

22. How do you assess the applicability of this guideline in daily work?

<table>
<thead>
<tr>
<th>The national diabetes guideline of March 2008</th>
<th>Very well applicable</th>
<th>not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>......</td>
<td>........</td>
</tr>
</tbody>
</table>