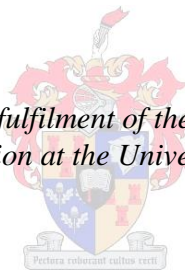


An Assessment of the Level of Knowledge of Health Professionals on Nutrition and Diabetes Self-management in Treating Patients with Type 1 and Type 2 Diabetes Mellitus in South Africa

by
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*Thesis presented in partial fulfilment of the requirements for the degree
of Master of Nutrition at the University of Stellenbosch*



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Declaration

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ABSTRACT

Objective: The objective of the study was to assess and compare the level of knowledge of South African health professionals) treating patients with Type 1 and Type 2 Diabetes Mellitus (T1 and T2 DM) with regard to nutrition and Diabetes Self-management (DSM). To achieve this objective, two questionnaires (one for T1 DM and one for T2 DM) was developed and validated. In addition the study identifies the areas in need for further education as well as to assess if socio-demographic factors influence the level of knowledge.

Methods: The questionnaires were developed by: i) planning and developing constructs on nutrition and DSM by experts (n = 2) in the field of nutrition and diabetes care, ii) compilation and evaluation of a pool of 60 questions for face and content validity by an expert panel comprising six Registered Nurses / Diabetes Educators (RN / DE) and registered dieticians (RD) and iii) testing the questionnaires for criterion validity and reliability by a pilot group (n = 34 RN / DE and RD). Chronbach's alpha values were calculated to determine validity and questions were disregarded or changed depending on this outcome. These questionnaires were then sent via electronic and hard mail to a randomised sample of RD (n = 1200) and RN / DE (n = 498). Data of 70 questionnaires on T1 DM and 105 on T2 DM was coded and analysed. The cut off value of 70% was considered as adequate knowledge.

Results: With regard to questionnaire development, constructs were eliminated by the expert panel and this resulted in the acceptance of 60 constructs for the final questionnaires. Five constructs were replaced to improve content validity and an additional three constructs were adjusted to improve face validity. Recommended amendments were made to improve the criterion validity of the questionnaires. Internal consistency was shown with an overall Cronbach's alpha value of 0.73 for the T1 DM questionnaire and 0.71 for the T2 DM questionnaire. In terms of the assessment of knowledge for T1 DM, the RD (75.4%) but not the RN/DE (67.2%) had adequate knowledge of nutrition. This was not statistically significant different from the RN / DE (p = 0.07). Both groups scored equally with regard to their knowledge of DSM with scores indicating inadequate knowledge (64.7% and 64.9% respectively) (p = 0.27).

For T2 DM, the RD (74.6%) but not the RN / DE (61.6%) showed their knowledge of nutrition to be adequate, and statistically significantly better than the RN / DE (p = 0.0005). Both groups

showed inadequate knowledge of DSM (56.0% and 61.9% respectively) ($p = 0.31$). The main areas of knowledge for diabetes mellitus (DM) identified in need for further education were the glycaemic index (GI) values of food, carbohydrate counting, the use of sugars / sweeteners, timing of meals and snacks with regard to activity, medication used, treatment of hypo- and hyperglycaemia and the use of alcohol. Age affected knowledge (for both nutrition and DSM) with regard to T1 DM, as the age group 30 - 49 years scored significantly better than the rest (nutrition $p = 0.005$, DSM $p = 0.006$ respectively). Health professionals in the private sector achieved higher scores compared to those working in the public sector (nutrition $p = 0.011$, DSM $p = 0.016$ respectively).

Conclusion: Two valid and reliable quantitative questionnaires comprising 4 sections and 30 questions were developed to assess the level of knowledge of health professionals (RN / DE and RD) on nutrition and DSM treating patients with T1 and T2 DM in South Africa. RN / DE required further education towards key nutrition concepts and RN / DE and RD required further education on key concepts regarding DSM for both T1 and T2 DM.

Key words: questionnaire, development, health professionals, diabetes, knowledge, nutrition diabetes self -management

OPSOMMING:

Doel: Die doel van die studie was om die hoeveelheid van kennis van verpleeg en dieetkunde personeel wat persone met Tipe 1 en Tipe 2 Diabetes Mellitus (T1DM en T2DM) in Suid – Afrika behandel, te bepaal en te vergelyk. Die studie het gefokus op kennis t.o.v. voeding en diabetiese self-sorg. Om die doel te bereik was twee vrae lyste, een vir T1 DM en een vir T 2 DM ontwikkel. Die verskillende aspekte van kennis wat verdere opleiding benodig is geïdentifiseer asook of enige demografiese faktore wat kennis kon beïnvloed.

Metode: Die volgende stappe was geneem om voldoende geldigheid en betroubaarheid te bereik:

1. Twee kenners het verskeie belangrike aspekte van voeding en diabetiese self-sorg geïdentifiseer en ontwikkel.
2. 'n Paneel van 34 geregistreerde dieetkundiges en verpleeg personeel wat in Diabetes Mellitus spesialiseer, het die inhoud van 'n totaal van 60 vrae ge-evalueer vir geldigheid en toepaslikheid.
3. Die paneel het die vraelyste verder ge-evalueer vir 'n aanvaarbare standaard van betroubaarheid. Chronbach-alfa waardes was gebruik vir die aanvaarbaarheid van alle vrae.
4. Die finale weergawe van 30 aanvaarbare vrae in elke vraelys was gestuur via elektroniese en normale pos na 1200 RD en 489 verpleegpersoneel wat spesialiseer in T1 en T2 DM.
5. Inligting van onderskeidelik 70 T1DM en 105 T2 DM vraelyste was gekodeer en ge-analiseer.

Resultate: Tydens die ontwikkeling van die vraelyste, was sekere aspekte van kennis deur die twee kenners ge-elimineer. Die evaluering van die groep van dieetkundiges en verpleeg personeel het verder bygedra tot die vervanging en aanpassing van sekere aspekte van kennis. Dit het bygedra tot die vlak van voldoende geldigheid en toepaslikheid. Vir voldoende betroubaarheid was die Chronbach- alfa waardes van 0.73 vir T1DM and 0.71 vir T2 DM onderskeidelik aanvaar.

Die studie het getoon dat die dieetkundiges voldoende kennis besit t.o.v. voeding vir T1 DM (75.4%). Dit was egter nie statisties betekenisvol meer in vergelyking met die kennis soos behaal

deur die verpleegpersoneel (62.2%) ($p = 0.07$). Beide groepe se kennis t.o.v diabetiese self sorg was bepaal as onvoldoende met onderskeidelik 64.7% en 64.9%.

In terme van T2 DM, het die dieetkundiges statisties betekenisvol beter kennis getoon vir voeding (74.6%) in vergelyking met die vlak van kennis soos behaal deur die verpleeg personeel (61.6%) ($p = 0.0005$). Soos in die geval van T1 DM het beide groepe onvoldoende kennis getoon vir diabetiese self sorg met onderskeidelike waardes van 56.0% en 61.9%. ($p = 0.31$). Die areas van kennis wat geïdentifiseer was vir verdere opleiding, was die glisemiese indeks van voedsel, bepaling van die hoeveelheid koolhidrate in voedsel, die gebruik van suiker en versoeters, die neem van maaltye en versnapperinge, oefening, medikasie, voorkoming van lae en hoe blood glukose vlakke asook die gebruik van alkoholiese drankies. Die ouderdoms groep tussen 30-49 jaar het statisties 'n hoër vlak van kennis getoon vir beide voeding ($p = 0.005$) en diabetiese self sorg ($p = 0.006$) vir T1 DM in vergelyking met die ander ouderdoms groepe. Personeel wat in die private sektor werk het 'n beter vlak van kennis getoon in vergelyking met personeel wat in die openbare sektor werk ($p = 0.011$ en $p = 0.016$ vir voeding en diabetiese self sorg onderskeidelik).

Samevatting: Twee geldige en betroubare vrae lyste met 30 vrae in totaal was ontwikkel om die vlak van kennis van dieetkundiges en verpleeg personeel te bepaal in terme van voeding en diabetiese self sorg vir beide T1 en T2 DM. Die verpleegpersoneel benodig verder opleiding t.o.v sekere aspekte van voeding en diabetiese self -sorg en die dieetkundiges t.o.v. diabetiese self -sorg vir beide T1 en T2 DM.

Sleutelwoorde: vraelyste, ontwikkeling, verpleeg personeel, dieetkundiges, kennis, voeding, diabetiese self sorg.

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Contributions by principal and fellow researchers

The principal researcher (R Catsicas) developed the idea and the protocol. The principal researcher planned the study, sourced funding, undertook data collection, captured the data for analyses, analysed the data with the assistance of a statistician (Prof DG Nel), interpreted the data and drafted the dissertation. Dr Martani Lombard and Dr Sunita Potgieter (supervisors) provided input at all stages and revised the protocol and dissertation. The thesis was language edited by Melany Bailey.

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Addendum 2: Letter of invitation to members of the pilot group.

Addendum 3: Questionnaire T1 DM - pilot study.

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Addendum 5: Questionnaire T 1 DM – final study.

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Addendum 7: Letter from the University requiring the list of dieticians from HPCSA.

Addendum 8: Letter to DENOSA requiring advertisement space in the news letter to the members.

Addendum 9: Letter from the University regarding informed consent to the members of the main study.

List of abbreviations

DM	Diabetes Mellitus
ADA	American Diabetes Association
HbA1c	Glycosylated haemoglobin
SEMDSA	Society of Endocrinology Metabolism and Diabetes in South Africa
DCCT	Diabetes Control and Complications Trial
UKPDS	United Kingdom Prospective Study
DSM	Diabetes Self-management
AADE	American Association of Diabetes Educators
USA	United States of America
DESSA	Diabetes Educators Society of South Africa
RD	Registered Dietician
RN	Registered Nurse
DE	Diabetes Educator
HPCSA	Health Professional Council of South Africa
BDA	British Diabetes Association
DENOSA	Democratic Nursing association of South Africa
SANC	South African Nursing Council
EASD	European Association for the Study of Diabetes
ISPAD	International Society for Paediatric and Adolescent Diabetes
ICR	Internal Consistency Reliability
ANOVA	Analysis of variance
CDE	Centre of Diabetes and Endocrinology
SBGM	Serum blood glucose monitoring

Chapter 1 LITERATURE OVERVIEW

1. Introduction

Diabetes mellitus (DM) defines a group of metabolic diseases characterized by hyperglycaemia resulting from defects in insulin secretion and insulin action or both.¹ This chronic hyperglycaemia is associated with long term damage, dysfunction and failure of various organs.¹ Diabetes mellitus can be classified into two types, i.e. Type 1 (T1) and Type 2 (T2) DM. Type 1 DM previously known as insulin dependent DM, occurs in 5 to 10% of patients, and is characterized by the pancreas producing very little or no insulin which is necessary to maintain normal glycaemia.¹ Globally T2 DM occurs in 90 to 95% of patients diagnosed with DM. This results from inadequate insulin function due to body cell resistance and consequent progressive β -cell failure.¹ Uncontrolled DM characterized by chronic hyperglycaemia increases the risk for both T1 and T2 DM patients to develop long term complications such as retinopathy (eye disease), neuropathy (nerve disease), nephropathy (kidney disease)^{2,3} atherosclerotic cardiovascular (heart disease), peripheral vascular and cerebrovascular diseases (stroke).⁴

The American Diabetes Association (ADA) defines optimal glycaemic control as a fasting blood glucose level of 5.6 - 7 mmol/l, random blood glucose level < 8.8 mmol/l and glycated haemoglobin (HbA1c) of < 7%.⁵ HbA1c refers to the amount of glucose that binds to the red blood cells and this blood glucose measurement gives an indication of the average blood glucose control of an individual over a longer period of approximately three months.⁵

Political and economic changes in South Africa have resulted in rapid urbanization, causing a process of nutrition transition. Urbanization has resulted in South Africa following the global trend of an escalating prevalence of obesity with a consequential increase in the development of T2 DM.⁶ In South Africa's first demographic health study, conducted in 1998, 13 827 adults were surveyed and a prevalence of T2 DM among 2.4% of males and 3.7% amongst females were found.⁷ The Society of Endocrinology, Metabolism and Diabetes in South Africa

(SEMDSA) suggested an average prevalence of 6.3% based on a variety of smaller studies conducted among different population groups in both rural and urban areas.⁸

More recently the South African National Health and Nutrition Examination Survey (SANHANES-1) reported data on non-communicable diseases. The prevalence of impaired glucose homeostasis and diabetes (HbA1c > 6.5%) appeared to be 16.7% in the age group 45 - 54 years and in the age group 55 - 64 years as high as 24.4%.⁹

What is of concern is that T2 DM can be asymptomatic for a period of time and it is suspected that a large number of individuals have undiagnosed T2 DM.⁷

2. *Importance of education*

It is a well-established principle that education methods focusing on structured self-management care is essential to successful management of this chronic condition. Two landmark studies, the Diabetes Control and Complications Trial (DCCT) 1993 and the United Kingdom Prospective Diabetes Study (UKPDS) 1998 conclusively showed that patients with T1 and T2 DM who attained glycaemic control as close to normal as possible were successful in preventing long term complications.^{2,3} The DCCT trial compared 1 400 T1 DM patients who followed a regime of more than three injections per day with insulin adjustments to a control group who injected themselves less often and who did not adjust their insulin. By lowering HbA1c levels to 6%, T1 DM participants of the DCCT trial reduced their risk of developing heart disease by 41%, retinopathy by 75%, nephropathy by 35% and neuropathy by 70%.² A total of 591 T2 DM patients in the UKPDS achieved glycaemic control of 7% HbA1c or less in the intensive treated group (used sulfonylurea and metformin) compared to 7.9% HbA1c in the control group (used sulfonylurea only). This 0.9% reduction in HbA1c reduced their risk to develop heart disease by 16%, retinopathy by 25%, nephropathy by 25% and neuropathy by 25%.³ The ability to achieve normal glycaemic control requires an intensive approach to diabetes self-management education (DSME) strategies, which includes healthy nutrition practice, physical activity, self-monitoring of blood glucose levels (SMBG) and weight control.⁷ Adequate diabetes self-management (DSM) and lifestyle intervention have

been shown to improve clinical outcomes such as glycaemic control (defined by lower HbA1c levels) as well as quality of life.¹⁰⁻¹⁴

A review of the effectiveness of nutrition therapy alone in T1 and T2 DM was done by means of a meta-analysis of 12 randomised controlled trials and observational studies done in the United States (US) involving more than 7 000 patients. Evidence suggested the nutrition therapy provided by an experienced dietician can reduce HbA1c levels by 1 to 2% in patients with T1 and T2 DM depending on the type and duration of diabetes. These positive results led to the formulation of the American Diabetes Association (ADA) position statement on nutrition recommendations and interventions as well as standards of practice and professional performance for registered dietitians in diabetes by Franz et al. (2008) based on the best available scientific evidence.^{15,16}

In the case of registered nurses (RN) / diabetes educators (DE), the American Association of Diabetes Educators (AADE) formulated a document that describes the scope of practice, standards of practice and standards of professional performance for diabetes educators.^{17,18}

South Africa (SA) differs significantly from the US from a demographic and socio-economical point of view and therefore their policies cannot be blindly adopted in the South African environment.^{6,7} The education demands on health professionals in counselling people with T1 and T2 DM is of critical importance to achieve optimal diabetes care and the consequent prevention or delay of complications.⁷ Despite the fact that the education demands on health professionals in counselling people with T1 and T2 DM is critical, no study has been conducted to date in South Africa to estimate the level of knowledge regarding nutrition and DSM in health professionals, which includes RN and / or DE. Although RN / DEs are currently encouraged to do a one-year post graduate diploma offered by the Wales-based University of Prifysgol, called the Glamorgan Course, these individuals form a small part of the population of health professionals consulted by patients on nutrition and DSM in SA. Albeit RDs received formal training in nutrition as part of their undergraduate studies, their knowledge of DSM is unknown. Even though the education process should ideally be shared by a team of professionals which should include a RD, the practical reality in South Africa

necessitates that RN / DEs and medical doctors in most cases are solely responsible for the education of the patient with regard to all aspects of diabetes care.

3. *The global picture*

A small study done in the US (2007) assessed and compared the diabetes knowledge of RN, residents in surgery (SR), internal medicine (IMR), and family practice (FPR). A 21- question survey based on current diabetes standards of care was developed and administered to 163 of the above-mentioned professionals. The total mean correct scores of IMR, FPR, and RNs were 68%, 64% and 66% respectively and significantly better than the SR score of only 44%. A subgroup of RNs with additional diabetes training earned a higher score of 82%. The researchers came to the conclusion that the IMR, FPR and RNs have similar but insufficient knowledge about DM care and require additional education in order to provide optimal care to patients with DM.¹⁹

The above study corresponds with a study done at Southampton University (2000) evaluating 135 qualified community nurses' knowledge of dietary recommendations for people with DM.²⁰ The researchers concluded that the participants displayed inadequate knowledge levels to sufficiently educate patients in diet-related issues. This supported the main findings of Drass *et al*, (1998) that associated poor patient compliance and understanding of DM with poor knowledge levels of associated health professionals.²¹

In SA (2003) researchers developed and validated a knowledge questionnaire for health professionals to test their knowledge regarding lifestyle modification that included nutrition, physical activity and smoking cessation aspects. The results revealed that the group of 186 RNs, general practitioners, and medical students had reported that their main source of information was from the mass media.²² It was also found that lack of time and knowledge as well as lack of patient compliance were barriers to counselling patients on lifestyle modification.

Another study, conducted in two hospitals in Hong Kong, evaluated 245 nurses' perceived and actual DM knowledge by means of a questionnaire. Although the study found a close

relationship between the nurse's perceived knowledge and actual knowledge, the important finding was a close relationship between the level of education measured as number of years' training and perceived confidence.²³

A study done in the US (2004) reported little differences between nutrition messages communicated by different health professionals.²⁴ This particular study involved 366 questionnaires to RDs and RNs. The authors found a difference in the message on nutrition treatment of a hypoglycaemic attack (blood glucose below the critical level of 3.5 mmol/l) given by RDs and RNs.

The findings reported in the above mentioned study are in contrast with inter-professional discrepancies found in the practices in Canadian dieticians. In a cross sectional study (2006) of 1 057 respondents to a questionnaire evaluating the usability of the glycaemic index (GI) as a concept in nutrition education, 39% responded by saying that they used the concept while 61% said that they did not use the concept when educating / counselling patients with DM.²⁵

Researchers in the United Kingdom (UK) (2003) conducted a survey on 613 RNs and 360 RDs who were all members of the British Diabetes Association (BDA). The study was done to determine their beliefs, attitudes and knowledge regarding the links between obesity, nutrition and health. All showed a clear understanding of nutrition and health. However, their understanding of obesity as a disease and the effectiveness of weight management using low energy diets was limited and most of the participants were uncertain about their own effectiveness when delivering weight management advice.²⁶

Another study was done to view Canadian dieticians' views and practices regarding obesity and weight management. A cross sectional postal survey resulted in a response from 514 dieticians. Two thirds of the responding dieticians believed that obese individuals should be encouraged to lose weight. However only 50% believed dietary advice should emphasize reduced energy intake. In terms of physical activity, 75% disagree that regular physical activity, independent of change in energy intake from food, has an effect on promoting weight loss.²⁷

To evaluate the nurses' perceptions and issues that arise while caring for patients with DM, a qualitative study was done (1999) involving 103 responses from RN / DEs. The RN / DEs felt that the lack of acceptance of the disease by the patient knowledge, deficits and non-compliance was primary patient problems in the management of DM. What was important was that 84% of those RN / DEs who used the practice guidelines found it useful. They felt they needed more education to improve their care of DM patients and believed that it is in their scope of practice to change treatment regimens.²⁸

4. Conclusion

From an evaluation of the results mentioned above, it can be concluded that in some areas of nutrition and DSM, the quality of knowledge may be inadequate to assist patients to achieve optimal glycaemic and weight control. This level of knowledge positively correlated to perceived competence. In some areas of practice such as nutrition, DSM and weight management discrepancies within health professionals exist. The proposed study is therefore important for the following reasons:

- The above-mentioned studies support the fact that the information provided may not be of adequate quality for patients to acquire the necessary knowledge to achieve optimal nutrition and DSM care.
- To date no study has been conducted in SA to assess the level of knowledge on nutrition and DSM that needs to be communicated to patients with T1 and T2 DM taking the unique social, cultural and economic diversity of South Africa into consideration.
- Knowledge with regard to nutrition and DSM can now be scientifically and adequately assessed through valid and reliable questionnaires. This information can be evaluated using improved statistical methods (logistic regression) that measure the size of effect.²⁹ Knowledge is an important component required for changing attitude and ultimately eating and self-care behaviour, and the lack thereof has been identified as one of the key barriers to patient compliance.^{30,31} Identifying the gaps in nutrition and DSM practices as well as individuals who need additional training, will significantly improve practice guidelines for RDs and RN / DEs and will ultimately benefit patients with T1 and T2 DM.

The aim and objective of the study was thus to assess and compare the level of knowledge on nutrition and DSM of RDs and RN / DEs treating patients with T1 and T2 DM in South Africa. The further aim is to identify the areas of knowledge with regard to which further education should be given. In addition, it was assessed whether external factors such as age, number of years practising the profession, level of qualification, location of practice, work status and source of information with regard to further education have an impact on the level of knowledge.

In order to assess the level of knowledge it was necessary to develop and validate questionnaires on both domains of knowledge for both T1 and T2 DM. Chapter two describes the development and validation of these questionnaires. Chapter three describes the results of using these questionnaires to assess the level of knowledge on nutrition and DSM of RDs and RN / DEs treating patients with T1 and T2 DM. In Chapter four the results obtained from the questionnaires are discussed and interpreted.

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**CHAPTER 2 DEVELOPMENT OF VALIDATED QUESTIONNAIRES TO
ASSESS KNOWLEDGE OF SOUTH AFRICAN HEALTH
PROFESSIONALS WITH REGARD TO NUTRITION AND DIABETES
SELF-MANAGEMENT WHEN TREATING PATIENTS WITH TYPE 1
AND TYPE 2 DIABETES MELLITUS**

1. Introduction

It is imperative for health professionals (HPs) to communicate evidence-based knowledge to their patients in order for them to achieve the required health objectives such as optimal glycaemic control.¹ To date few studies have been conducted to assess the level of knowledge of nutrition and DSM necessary to treat patients with T1 and T2 DM taking the social, cultural and economic diversity of South Africa into consideration.

Accurate assessment of the knowledge of HPs such as registered dietitians (RDs) and registered nurses / diabetes educators (RN / DEs) communicating knowledge to patients requires the development of a valid and reliable assessment tool to measure the level of knowledge.² Developing an effective assessment instrument, includes the need to incorporate all levels of validity and reliability testing.

Byrd-Bredbenner (1981) as well as Towler and Shepard (1990) were some of the first to develop nutrition questionnaires to assess nutritional knowledge.^{2,3} Many studies have failed to show a positive correlation between nutritional knowledge and dietary behaviour, as many factors such as the readiness, sense of self efficacy and confidence of the patient can influence the practical implementation of knowledge in healthy lifestyle behaviour. Thus, although knowledge alone does not necessarily produce a positive outcome, communicating correct knowledge by HPs is considered the first step towards change in behaviour in individuals. This led to researchers developing a reliable and valid tool to test nutrition knowledge on various relevant aspects, and further to measure change in dietary practices.^{4,5}

In SA, two such questionnaires were developed and tested. The first was to test the knowledge and practices of dieticians regarding dietary supplements (2003) and the second was the development of a reliable and valid questionnaire testing the knowledge of urban SA adolescents on various aspects of nutrition (2005).^{6,7}

To date no appropriate questionnaire for assessing the knowledge of T1 and T2 DM of RDs and RN / DEs in South Africa (SA) has been developed.

2. *Aim and objective*

As no questionnaire has addressed both nutrition and DSM, it was the aim and objective of this part of the study to develop and validate a reliable tool to assess the level of knowledge of HPs treating patients with T1 and T2 DM in SA.

T1 and T2 DM vary with regard to the prevalence, manifestation and treatment. The type of knowledge HPs need to communicate to their patients to treat these two conditions will therefore also differ. It was decided to develop two separate questionnaires, one focussed on the concepts important with regard to T1 DM and a second focussed on concepts important with regard to T2 DM.

3. *Methods*

This part of the study is based on an observational descriptive study design. Approval was obtained from the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Stellenbosch University Reference number 10/09/314 (Addendum 1). Each participant provided informed consent before participation (Addendum 2). All information was processed anonymously.

Figure 3.1 presents a summary of the process followed to develop, validate and test reliability of the newly developed, self-administered knowledge questionnaires. These documents were called Questionnaire T1 DM (Addendum 3) and Questionnaire T2 DM (Addendum 4).

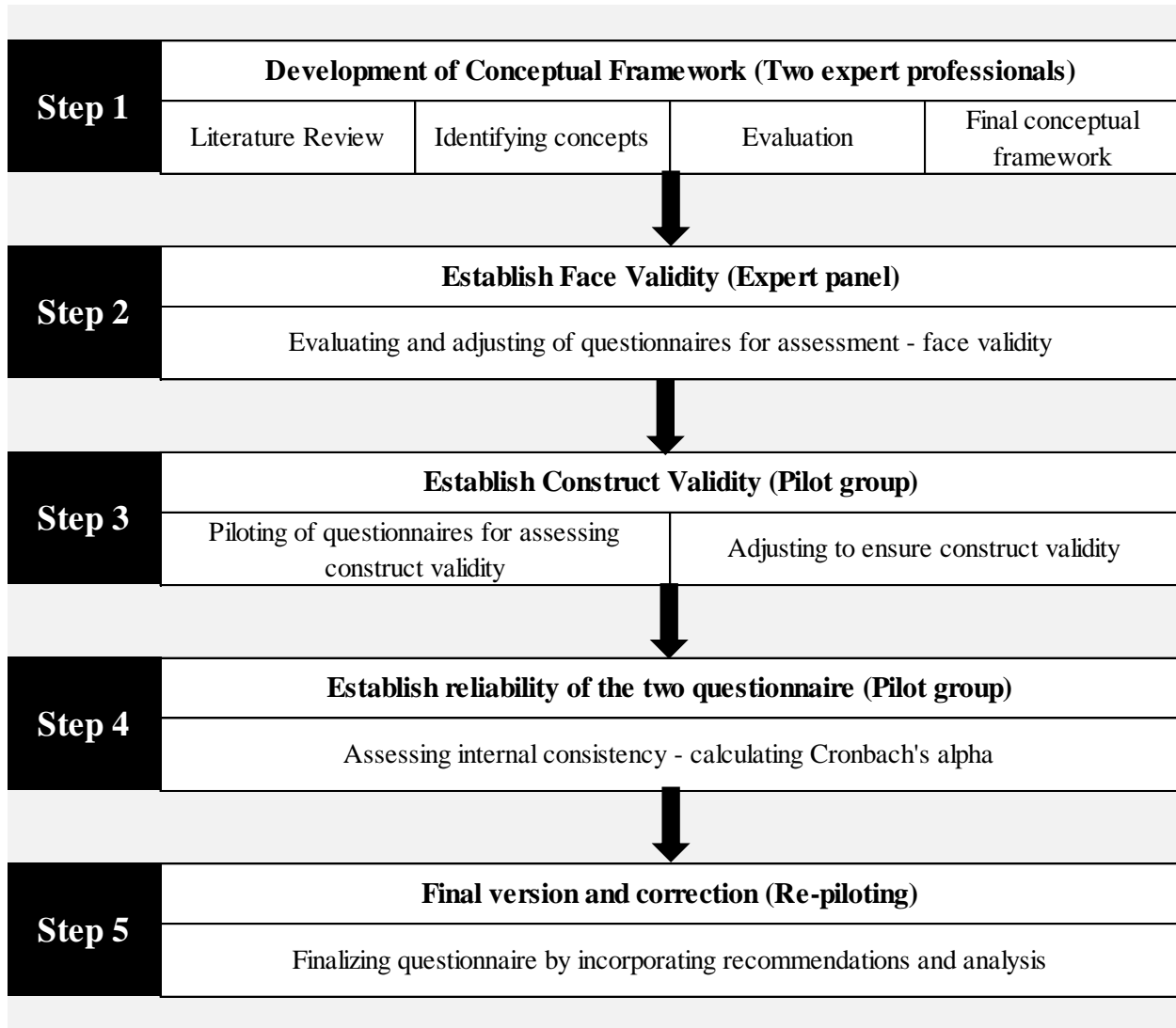


Figure 3-1 Steps taken during the development and validation of the questionnaires

3.1. Step 1: Development of a conceptual framework and identification of key concepts

Position papers, clinical guidelines and scope and standards of performance and practice of a variety of organisations involved in diabetes education such as the American Diabetes Association (ADA), American Academy of Nutrition and Dietetics, American Association of Diabetes Educators (AADE), the European Association for the Study of Diabetes (EASD) and the Joslyn Diabetes centre in Massachusetts were obtained.⁸⁻¹⁴ The data search (including Pub Med, Medline and the Cochrane Collaboration) was extensively reviewed and a conceptual

framework including the relevant concepts were developed. The researcher reviewed and discussed the various concepts as presented in Tables 3.1 and 3.2 during a consultation with a RN and specialist DE. The final conceptual framework was formulated based on these results.

3.2. Step 2: Development of face validity

The concept of face validity of the questionnaire refers to the questions to be appropriate, reasonable and formulated with maximum clarity and limited ambiguity. The first draft of the questionnaire consisting of a pool of items (n = 32) was evaluated by an expert panel, consisting of RDs (n = 3) and RN / DEs (n = 3). In addition in-depth interviews were conducted with RN / DEs (n = 2).

The panel evaluated how representative and appropriate the questions were in covering the important concepts with regard to the nutrition and DSM of patients with T1 and T2 DM.

Members of the panel were also invited to introduce new concepts. All questions were evaluated for face validity, especially in terms of accuracy, reasonability and appropriateness.

Adequate and clear instructions on how to complete the questionnaire were incorporated. The questions were phrased simply and unambiguously. Attention was paid to the visual presentation, lay out and logic flow of the questionnaires (Addenda 3 and 4).

3.3. Step 3: Testing the questionnaires for construct validity

Criterion or construct validity refers to how scores differ between two groups who theoretically should possess different levels of knowledge on the two different topics due to training and experience.⁵ Healthcare professionals attending the Society of Endocrinology and Metabolism and Diabetes in South Africa (SEMDSA) congress were invited to participate in the pilot study and a letter of informed consent was sent to them (Addendum 2). During a meeting organised by the Diabetes Education Society of South Africa (DESSA) the two draft questionnaires were handed to the DESSA members who attended the meeting (Addenda 3 and 4). Participation was conducted on a voluntary basis and all information was captured anonymously.

The questionnaire was evaluated for item difficulty. The difficulty index that was developed by Dwyer and Stoulorow (1981) of 0.1 to 0.9 was used.¹⁵ Therefore items that were answered correctly by more than 90% were considered too easy, and questions answered correctly by less than 10% were considered too difficult and were excluded.

A total of 34 questionnaires for T1 DM and 41 for T2 DM were completed. The data was captured using MS Excel. STATISTICA version 9 Stat Soft Inc. (2009) STATISTICA (data analysis software system) was used to analyse the data.

3.4. Step 4: Testing the questionnaire for reliability

Reliability is the extent to which a test yields the same results during repeated trials. Due to practical and cost considerations this study did one re-piloting trial.

Finally, internal consistency reliability (ICR) was determined. The pilot group's answers for both questionnaires on sections 2 (nutrition) and 3 (DSM) were evaluated. The minimum requirement for internal consistency has been recommended as 0.7, which is called Cronbach's alpha.¹⁶ Internal consistency reliability (ICR) refers to the degree to which individual items within a scale relate to the total score. The results were statistically analysed and recommendations were made to improve the scores.

3.5. Step 5: Final adjustment and correction

The questions identified as not complying with construct validity, item difficulty and internal consistency were replaced and a new questionnaire was compiled.

The revised questionnaire was sent to the same expert consultants for comment before it was sent electronically for re-piloting to 20 RDs and RN / DEs.

4. Results

4.1. Step 1: Results of the conceptual framework and identification of concepts

Table 3.1 illustrates the fundamental concepts regarding nutrition and DSM as identified from the literature for the T1 DM questionnaire.

Table 3-1 Concepts on nutrition and diabetes self-management T 1 DM

Question	Nutrition concept	Question	DSM concept
2,3,7,9	Carbohydrate counting	1	HbA1 C levels
1,8,11,14	Basic food concepts	3,9,11,14	Hypo and hyperglycaemia
5,12	Energy intake, weight control	6	Patient “burn out”
4	Interview procedures	4, 10	Insulin administration
6,10,15	Hypo, hyper glycaemia	5	Knowledge communication
13	Alcohol consumption	7,8,15	Physical activity
		2,12	Self-monitoring
		13	Honeymoon phase

DSM: Diabetes Self-management

Table 3.2 illustrates the fundamental concepts regarding nutrition and DSM compiled from the literature for the T2 DM questionnaire.

Table 3-2 Concepts on nutrition and diabetes self-management T 2 DM

Question	Nutrition concept	Question	DSM concept
1,2	Energy intake weight control	1,2,3,7	Target levels of metabolic control
3,5,8,9	Type and quantity of carbohydrate intake	4,8,9	Self -monitoring, use of insulin
10,12,13,14,15	Basic food concepts	10,11, 12	Hypo- and hyperglycaemia
4	Timing of meals and snacks	5, 13	Prevention of complications
6,7,11	Sugars and sweeteners	6,14 15	Physical activity Motivational interviewing

DSM: Diabetes Self-Management

Multiple answers were provided for all questions. The participants had to choose the most correct answer and only one answer per question was allowed. Addenda 3 and 4 are the questionnaires which illustrate the format of all questions.

Based on the above concepts, the first draft of the questionnaires was divided into the following four sections: *Section 1* (7 items) included questions on demographics, education and the profession of the participants, *Section 2* (15 items) comprised questions to assess the RDs and RN / DEs knowledge and practices on nutrition for T1 DM and T2 DM, *Section 3* (15 items) comprised of questions to assess the RDs and RN / DEs knowledge and practices with regard to DSM for T1 DM and T2 DM, *Section 4* (3 items) asked participants to evaluate their own knowledge. In this section participants were also provided with an opportunity to make suggestions and comments.

Adequate and clear instructions on how to complete the questionnaire were incorporated. Some questions were designed to test basic nutrition knowledge while others were phrased and designed to test the application of knowledge e.g.

Question 7: Carbohydrate counting is a method to estimate the amount of insulin needed to cover a certain amount of carbohydrate in a meal. Which of the following principles should be mastered to achieve good glycaemic control?

a) Calculating the calories on the labels of the foods eaten.	
b) Checking for the low GI logo on the food label.	
c) Doing a blood glucose test four times a day to develop an individual <i>carbohydrate insulin ratio</i> .	
d) Focusing on eating whole grain carbohydrates at the expense of refined starchy foods.	

4.2. Step 2: Results with regard to face validity

The RD and specialist DE agreed that the questionnaires should have a 4-section format. The expert panel identified two questions on the T1 DM questionnaire and three on the T2 DM questionnaire that didn't meet the content validity requirement. These questions were replaced with more appropriate questions addressing the same topic. Three additional questions on T1 DM and three questions on T2 DM were identified as too easy. Two questions on T2 DM were identified as being ambiguous. These questions answer options were changed to appear less easy. In the case of the ambiguous questions answer options were changed to be clearer. With the T1 DM questionnaire too many questions focussed on children and some were changed to aspects relevant to adults. No new concepts were introduced and the second drafts of questionnaires were developed based on the information obtained from the expert panel.

4.3. Step 3: Results with regard to construct validity

4.3.1 Socio demographic information of the pilot group

Table 3.3 presents the basic socio-demographic information of participants who completed questionnaires for T1 DM (n = 24) and questionnaires for T2 DM (n = 30).

With respect to both questionnaires, the number of participants from the two groups was adequate to meet the requirement of the pilot group (10% of the sample size). The majority of the participants were between 30 - 49 years of age, and were more and less equally representative with regard to working in the private (n = 24) or public sector (n = 29). Most worked full time (n = 36) and held a diploma in nursing (3 years) (n = 35) or a degree in dietetics (4 years) (n = 13). Workshops were identified as their main source of information.

Table 3-3 Socio demographic information of the pilot group

Socio demographic information		T1 DM	T2 DM
		n (%)	n (%)
Qualification	RD	6 (25 %)	7 (23%)
	RN/DE	15 (62%)	20 (69%)
Work sector	Public	14 (58%)	15 (50%)
	Private	10 (41%)	14 (46%)
Work status	Full time	16 (66%)	20 (66%)
	Part time	8 (33%)	9 (37%)

T1 DM: Type 1 Diabetes Mellitus.

T2 DM: Type 2 Diabetes Mellitus.

RD: Registered Nurses

RN / DE: Registered Nurses / Diabetes Educators

4.3.2. Knowledge scores with regard to Type 1 Diabetes Mellitus

With regard to nutrition the score obtained by the two professions didn't differ significantly as displayed in Table 3.4. The RDs obtained a better score for their knowledge on DSM compared to the score obtained from the RN / DE. The two box plot representations (Figures 3.2 and 3.3) showed that for both nutrition and DSM the RDs showed more variability compared to the RN / DEs.

Table 3-4 Basic knowledge scores stratified according to profession for Type 1 Diabetes Mellitus

	n = 34	Nutrition		DSM	
		Mean %	SD	Mean %	SD
RD	6	66	0.186	62	0.332
RN / DE	28	62	0.245	45	0.248
Tot	34				

DSM: Diabetes Self-Management

SD: Standard Deviation

RN: Registered Nurses

RN / DE: Registered Nurses / Diabetes Educators

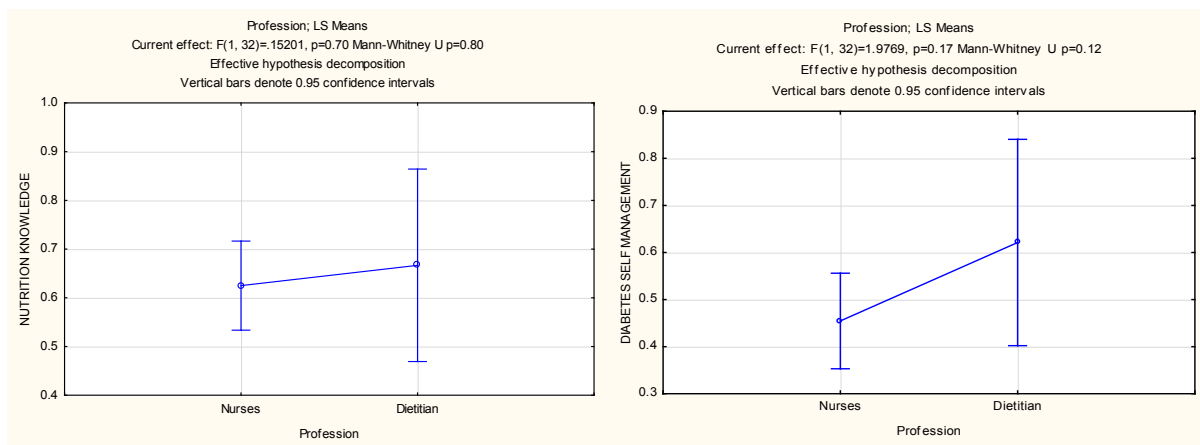


Figure 3-2 Box plot representation of the variability of knowledge scores of the pilot group with regard to nutrition and diabetes self-management for Type 1 Diabetes Mellitus

4.3.3. Knowledge scores with regard to Type 2 Diabetes Mellitus

With regard to both domains of knowledge the RN / DEs obtained a score very similar to the RDs. The knowledge of the two groups did not differ significantly with p values of 0.83 and 0.99 for knowledge on nutrition and DSM respectively.

The two box plot representations (Figures 3.3) showed that for both nutrition and DSM the RDs showed more variability than the RN / DEs.

Table 3-5 Basic knowledge scores stratified according to profession for Type 2 Diabetes Mellitus

	n = 41	Nutrition		DSM	
		Mean %	SD	Mean %	SD
RD	13	54	0.211	55	0.204
RN/DE	28	52	0.188	56	0.215

DSM: Diabetes Self-Management
SD: Standard Deviation
RN: Registered Nurses
RN / DE: Registered Nurses / Diabetes Educators

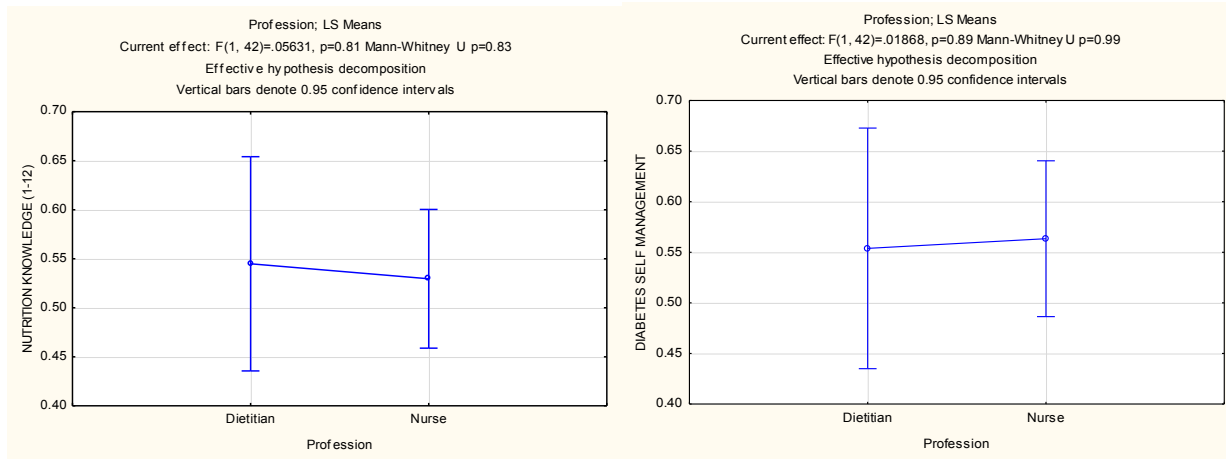


Figure 3-3 Box plot representation of the variability of knowledge scores of the pilot group on nutrition and diabetes self-management for Type 2 Diabetes Mellitus

4.4. Step 4: Results with regard to item reliability

4.4.1. Item difficulty

With regard to item difficulty Table 3.6 show the scores of the different questions for both knowledge domains.

T1 DM: Using the criteria for item difficulty, questions 1 (97%), 5 (97%) and 6 (91%) in section 2 (nutrition) and question 2 (97%) in section 3 (DSM) were identified as too easy (> 90%). T2 DM: In terms of item difficulty Questions 3 (0%) was too difficult (< 10%) (Table 3.6)

Table 3-6 Item difficulty scores for Diabetes Mellitus questionnaires on both nutrition and diabetes self-management

Question	T1 DM		T2 DM	
	Nutrition	DSM	Nutrition	DSM
	(%)	(%)	(%)	(%)
1 Healthy eating, HbA1c, health goals, waist measure	97	29	25	56
2 Insulin, SBGM, weight loss, blood pressure	82	97	68	48
3 Carbohydrate counting, insulin, snacks, HbA1c	21	74	0	34
4 Prioritize info, types insulin, weight loss, SBGM	65	35	45	45
5 Energy restriction, diagnosis, GI, testing	97	26	75	43
6 Meals, fabricating values, sweeteners, medication	91	24	86	55
7 Carbohydrate counting, activity, drinks, LDL-C	59	68	45	61
8 Fruit, activity, starch intake, severe diabetes	50	50	59	64
9 Activity, ketoacidosis, fibre in bread, weight gain	59	56	30	73
10 Hyperglycaemia, insulin pump, low fat meals, treating hyperglycaemia	65	53	75	52
11 GI, hyperglycaemia, sweet snacks, testing hyperglycaemia	50	35	55	39
12 Weight loss, goal setting, snacks, treating hypoglycaemia	68	56	39	64
13 Alcohol, honeymoon phase, fish oils, foot care	41	59	39	70
14 Social value, hypo unawareness, fibre, exercise	79	59	71	61
15 Activity, hypoglycaemia, fat, education	76	35	78	82

T1 DM: Type 1 Diabetes Mellitus.
T2 DM: Type 2 Diabetes Mellitus.
DSM: Diabetes Self-Management

4.4.2. Internal consistency

In terms of internal consistency Table 3.7 presents the Cronbach's alpha scores on the questions about nutrition and DSM for both T1 DM and T2 DM.

T1 DM: The criteria for internal consistency were used and the removal of the nutrition questions 5, 7, 11 and 13 improved the alpha score to 0.71. With regard to DSM the removal and replacement of questions 2, 6 and 11 improved the reliability to an alpha score of 0.77.

T2 DM: Question 3 in Section 2 (nutrition) obtained a score of 0% correct and was thus excluded from the reliability analysis. After the exclusion of question 3 the nutrition section set of questions obtained a Cronbach's alpha score of 0.69. Question 3 was replaced with another question. With regard to section 3 on DSM question one was identified as not being reliable. It was decided not to change question 1 of the T2 DM questionnaire section 3 (DSM) as this information was considered fundamental to the knowledge of all HPs.

Table 3-7 Cronbach's alpha scores for questionnaires Type 1 and Type 2 Diabetes Mellitus on nutrition and diabetes self-management

Question	T1 DM		T2 DM	
	Nutrition	DSM	Nutrition	DSM
1 Healthy eating, HbA1c, health goals, waist measure	0.08	0.25	0.43	-0.13
2 Insulin, SBGM, weight loss, blood pressure	0.28	-0.08	0.46	0.30
3 Carbo counting, insulin, snacks, HbA1c	0.17	0.57	0.00	0.20
4 Prioritising info, types insulin, weight loss, SBGM	0.06	0.27	0.50	0.26
5 Energy restriction, diagnosis, GI, testing	-0.07	0.37	0.43	0.28
6 Meals, fabricating values, sweeteners, medication	0.43	-0.16	0.34	0.48

7 Fruit, activity, starch intake, severe diabetes	0.24	-0.16	0.50	0.41
8 Fruit, activity, starch intake, severe diabetes	0.32	0.22	0.49	0.52
9 Activity, ketoacidosis, fibre in bread, weight gain	0.39	0.44	0.45	0.22
10 Hyperglycaemia, insulin pump, low fat meals, treating hyperglycaemia	0.29	0.40	0.43	0.22
11 GI, hyperglycaemia, sweet snacks, testing hyperglycaemia	-0.09	-0.25	0.50	0.28
12 Weight loss, goal setting, snacks, treating hypoglycaemia	0.54	0.50	0.48	0.36
13 Alcohol, honeymoon phase, fish oils, foot care	-0.36	0.49	0.48	0.45
14 Social value, hypo unawareness, fibre, exercise	0.50	0.44		0.38
15 Activity, hypoglycaemia, fat, education	0.38	0.35		0.23

T1 DM: Type 1 Diabetes Mellitus

T2 DM: Type 2 Diabetes Mellitus

DSM: Diabetes Self-Management

4.5. Step 5: Final revision and correction (re-piloting)

The following questions were revised and improved internal consistency as well as construct validity was used in the development of the new questionnaires.

T1 DM: Nutrition questions 1, 5, 6, 11 and 13. DSM questions 2, 6 and 11.

T2 DM: Nutrition question 3.

These revised questionnaires (both T1 DM and T2 DM) were sent to two expert consultants for comment and a second set of both questionnaires were compiled for re-piloting. The second set of questionnaires (both T1 DM and T2 DM) was sent electronically to 20 RDs and RN / DEs for re-piloting. Fourteen completed questionnaires were returned and the reliability was determined.

Type 1 Diabetes Mellitus re-piloting results

Although questions 3, 5 and 14 on nutrition received > 90% it was decided not to replace them as the pilot group consisted of a small group of individual with good knowledge on DM. With regard to DSM questions 1, 2 and 3 were corrected but question 14 (received 91%) was not corrected. The discrimination assessment revealed that questions 1, 2 and 3 with regard to nutrition and questions 3, 6 and 12 should be changed to improve the alpha score.

Type 2 Diabetes Mellitus re-piloting results

According to the item difficulty index identified, section 2 (nutrition) questions 7, 8, 10, 13 and 14 received > 90% and question 2 in section 3 (DSM) received < 10%.

With regard to the item discrimination assessment in section 2 (nutrition), question 2 was identified as having a Cronbach's alpha below 0.7, and in section 3 (DSM) question 1 was identified as needing to be changed or replaced to improve reliability.

The results of the re-piloting study were evaluated in the light of knowledge that the sample number of individuals was small and the individuals were RN / DEs and RDs very competent in their field of expertise as all of the participants were involved in private practice and active members of the professional associations attending workshops on a regular basis. Questions were reformulated to ensure accuracy and not stated in the negative. The final questionnaires were compiled for use in the main study (Addenda 5 and 6)

5. Discussion

It has been identified that patients with diabetes consider HPs as a trusted and reliable source of information.^{17,18} It is therefore critical that HPs communicate evidence-based knowledge on nutrition and DSM to patients in order for them to achieve optimal diabetes care.

This study followed the development procedures described by Whati LH et al. (2003) namely to compose a conceptual framework and to establish face, content and construct validity. The questions were reviewed by an expert panel before and after the pilot study to establish reliability.⁷

The reason for the non-significant differences between the two professional groups may be due to the fact that a small number RDs attended the DESSA meeting at the SEMDSA congress and this can be considered a limitation of the study. The dieticians were working mainly in the pharmaceutical industry with a consequent above average knowledge with regard to DSM. It could also be that in SA both professions are involved in communicating knowledge of both domains to patients and the RN / DEs that attended the SEMDSA congress could possess an above average knowledge on nutrition.

Adequate criterion validity could have been achieved if another HP group not involved with DM and /or nutrition (such as physiotherapists or medical students) were used. This was the case when Whadi-ah T et al (2003) achieved scores of 74% versus 53% when comparing the nutritional knowledge of dieticians with the knowledge of general practitioners and medical students.⁶ Results were remarkably different from the scores achieved in the present study for T1 DM and T2 DM. For future development it is therefore recommended that another HPs group (not daily involved in communicating DM and nutrition knowledge to patients), be used.

The results of the re-piloting reliability test were not an improvement on the results of the first pilot study due to the small sample size. Cost and practical considerations made it difficult to obtain a larger re-piloting sample group. It is recommended that should reliability testing being done, the re-pilot group be similar in size and characteristics as the pilot group.

It was difficult to compare these results to studies that have been done elsewhere, as no studies could be found describing the development and validation of questionnaires measuring similar knowledge domains in HPs (adding to the uniqueness of this study). However the Paediatric Carbohydrate Quiz (PCQ) was a questionnaire that was developed and validated to assess the carbohydrate and insulin dosing knowledge in youth with T1 DM.¹⁹ This study achieved the desirable value for reliability and compared fairly to other studies The Pad Carb Quiz (PCQ) assessed carbohydrate and insulin dosing in young people with T1 DM. A Cronbach's alpha value of 0.88 was achieved, and the validity scores were correlated with HbA1c, expert assessments, parent educational level and complexity of insulin regime.

With regard to T2 DM, no similar studies have to the author's knowledge, been done elsewhere. Whadi-ah T et al. (2003) developed and validated a knowledge test for HPs regarding lifestyle modification in SA.⁶ The construct validity and internal consistency were evaluated by testing the knowledge of dieticians, dietetic interns, general practitioners (GP's), medical students and nurses. Internal consistency resulted in a higher Cronbach's alpha of 0.99 compared to the 0.69 in this study. In this study, HPs reported medical journals, workshops and text books as their main sources of information, contrary to in the study done by Whadi-ah T et al. (2003) where medical interns and nurses reported the mass media as their main source of information.⁶ The reason might be that HPs who has achieved a level of higher education, has the ability to discriminate with regard to the validity of information sources. Nurses in the lifestyle study reported being confident of their nutrition knowledge and their perceived knowledge corresponds with their actual knowledge score. All HPs reported obtaining their knowledge regarding smoking cessation and physical activity from the mass media. Some of the researchers reported being concerned about this.⁶

Previous researchers reported the reliability and validity measures of nutrition knowledge to be inadequate as a discrepancy was shown between the nutrition knowledge test and the health awareness test.²⁰ It was for this reason that approximately 60% of the questions in this study were formulated in the context of application of knowledge and addressed the practical aspects of nutrition and DSM care.

6. Conclusion

The final questionnaires were used in the second phase of this study to assess the level of knowledge with regard to nutrition and DSM of health professionals treating patients with T1 DM and T2 DM (Addendums 5 and 6). After testing the validity and reliability of these questionnaires, it can be concluded that these questionnaires are valid and reliable tools that can be used by all institutions and pharmaceutical companies in SA, to evaluate the outcome of training of all HPs involved in DM education

These questionnaires can also be used for the evaluation of training by professional bodies in an attempt to provide accreditation to HPs.

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Chapter 3 AN ASSESSMENT OF THE LEVEL OF KNOWLEDGE OF HEALTH PROFESSIONALS WITH REGARD TO NUTRITION AND DIABETES SELF MANAGEMENT WHEN TREATING PATIENTS WITH TYPE 1 AND TYPE 2 DIABETES MELLITUS IN SOUTH AFRICA

1. Introduction

Two separate self-administered questionnaires were developed (Chapter 2) to test the knowledge on nutrition and DSM for both Type 1 (T1 DM) and Type 2 (T2 DM). The development of the conceptual framework and establishment of face validity was successfully completed by an expert panel of registered dietitians (RDs) and registered nurses/diabetes educators (RN / DEs) actively working in the field of treating patient with T1 and T2 DM.

The establishment of construct validity and reliability was successfully completed using a pilot group (n = 41) of RDs and RN / DEs who attended the SEMDSA Congress in 2011. The results of the second phase of the study using the questionnaires to establish the level of knowledge on both domains of diabetes care are described.

2. Aim and Objectives

2.1. Aim

To date no study has been conducted in SA to assess the level of knowledge on nutrition and DSM that needs to be communicated to patients with T1 and T2 DM taking the unique social, cultural and economic diversity of South Africa into consideration. Obtaining correct and adequate knowledge is considered the first step for patients to take care of their condition. It was therefore decided that the aim of this part of the study should be to assess the level of knowledge of health professionals (HPs) on nutrition and DSM when treating patients with T1 DM and T2 DM in SA.

2.2. Objectives

- To assess and compare the level of knowledge on nutrition and DSM of RDs and RN / DEs when treating patients with T1 DM and T2 DM.
- To achieve the objective, two questionnaires (one for T1 DM and one for T2 DM) were developed and validated.
- To identify the areas of knowledge in need of improvement.
- To assess if external factors such as age, number of years practising in the profession, level of qualification, location of practice, source of information and work status have an impact on the level of knowledge.

3. Methodology

3.1. Study type

This part of the study was largely an observational descriptive study. As it involved assessment of individual knowledge and assessment of information at a point in time, it was of a cross sectional design. The study had an analytical component as the level of knowledge on nutrition and DSM has been quantitatively assessed and comparisons between the two groups have been made. The study also included a qualitative component as comments were invited on how the participants treating patients with T1 and T2 DM perceive their own level of knowledge.

3.2. Study population

The study population was all RDs and RN / DEs living and practising in SA and who are involved in the treatment of patients diagnosed with T1 DM and T2 DM.

3.3. Sampling methodology

3.3.1. Population Size

To define the study frame of RD, the Health Professional Council of South Africa (HPCSA) was approached (Addendum 7). Since hard mail was offered as the only option of contact and after taking costs and time into consideration, it was decided to contact the professional association of dietitians called the Association of Dietetics in South Africa (ADSA). All dietitians registered

with ADSA were approached for voluntary participation. 1 200 members received the questionnaire through electronic mail. Due to a poor return of the questionnaires (1.6%) the questionnaires were sent via hard mail during December 2011 and the response rate increased to 116 responses (9.6%).

Nurses and DEs registered with the Democratic Nurses' Organisation in South Africa (DENOSA) were approached for voluntary participation during August 2011 via their monthly newsletter (Addendum 8). Permission was obtained from six more national databases in the private sector and their RDs and RN / DEs invited to participate telephonically. The number of participants included; i) the Centre of Diabetes and Endocrinology (CDE) (237), ii) Novo Nordisk (219), iii) The Diabetes Educators' Society in South Africa (DESSA) (111), iv) Life Scan (21), v) Sanovi Aventis (8) and vi) Bayer (39). To obtain the details of RN / DEs working in the public sector the relevant people at the Departments of Health of Gauteng, Limpopo, Mpumalanga, Kwa-Zulu Natal, North West, Free State, Western Cape, Eastern Cape and Northern Cape were contacted and a list of telephone numbers of all the hospitals in the provinces were obtained. These hospitals were contacted and RDs and / or RN / DEs treating patients diagnosed with T1 DM and T2 DM were invited to participate. The following numbers of hospitals in the different provinces were contacted: Gauteng 90, Limpopo 12, Mpumalanga, 13, Kwa-Zulu Natal 30, North West 12, Free State 36, Western Cape 26, Eastern Cape 19 and Northern Cape 9.

Of these 247 hospitals a total of 156 hospitals agreed to participate via electronic or hard mail. In total the contact details of a total number of 498 RN / DEs were received. These included HPs working in public hospitals, those from the DESSA mailing list, those registered with DENOSA, those working at the different CDE centres as well as those working for the pharmaceutical companies mentioned.

3.3.2. Inclusion and exclusion criteria

Inclusion criteria for the RDs were all RDs registered with ADSA. The exclusion criteria for the RDs were as follows:

- RDs who were not currently practising;
- RDs who did not enjoy membership of the HPCSA and were completing the compulsory community service year;

- RDs younger than 24 and older than 60 years.

The inclusion criteria for the RN / DEs were all nurses who are members of the South African Nursing Council (SANC) and DENOSA. The exclusion criteria for the RN / DEs were:

- RN / DEs who are not currently practising;
- RN / DEs who do not enjoy full membership of the SANC;
- RD / DEs younger than 24 and older than 60 years.

The relevant questionnaires as well as a letter explaining the aim and objectives of the study and informed consent form were sent to the corresponding RD and RN / DEs (Addendum 9). The letter stated clearly that participation was voluntary and all the information would be processed with the utmost confidentiality.

3.4. *Methods of data coding*

For T1 DM the total number of completed questionnaires received was 86 (RD n = 46, RN / DE n = 40). Five completed questionnaires for both professions were excluded due to a lack of demographic data. For T2 DM a total of 116 questionnaires (70 RD, 35 RN / DE) were received and 11 questionnaires were excluded due to a lack of demographic data, a total of 105 questionnaires (RD n = 70, RD / DE n = 35) were coded for analysis.

Data was captured manually on an excel spreadsheet. The following variables were captured: participant number, age, gender, highest qualification, language, profession, work status (full time or part time), sector (private or public sector), province, and number of years working in the field and information sources.

A data capture form was developed for both T1 DM and T2 DM questionnaires with Section 1 capturing the correct answers to the questions on nutrition and Section 2 capturing the correct answers to the questions on DSM.

3.5. Analyses of Data

Microsoft Excel was used to capture data and IBM SPSS Version 20 was used by a statistician to analyse the data. General profiles of the participants were compiled. Descriptive statistics in the form of tables, histograms, graphs and summary statistics were used. Where two groups' means were compared, the independent sample t- test was applied if underlying assumptions were met (normality and equal variances) and tested by using the Shapiro Wilk test, Levine's test respectively. If underlying assumptions were not met, the Mann-Whitney u test was used.

Where more than two groups' means were compared, an analysis of variance was done to assess the significance of differences between groups. Post hoc tests were Hochberg if group sizes differed and Donnett's T3 test if equal variances could not be assumed.

If underlying assumptions were seriously violated and if group sizes were < 30, results of the non-parametric tests for differences among groups such as the Kruskal-Wallis test was considered. Post hoc analysis was done with the Mann-Whitney test. When testing for relationships between two categorical variables the Chi-square test for independence was used. In the case of a 2 x 2 contingency table to be analysed the Yates continuity correction was incorporated.

Due to the fact that the respondents (sample group of nurses) were largely RN / DEs working in the field of DM and consulted with patients with DM on a daily basis, the cut-off point of knowledge was taken as 70%. The fact that the curriculum of RD training covers diabetes in detail contributed to this decision.

The p-value of $p < 0.05$ represented statistical significance in hypothesis testing and 95% confidence intervals were used to describe the estimation of unknown parameters.

4. Results

The full demographic data distribution of all the participants who completed the questionnaires is displayed in Table 4.1. The majority of HPs who completed the questionnaires were in the first age group (30- 49 years) (n = 89, 50%). Most of the participants were employed full time (n = 144, 79%) and more were working in the private sector (n = 122, 67%) compared to those who work in the public sector (n = 59, 32.5%). Participants were living in all nine provinces of South Africa.

Table 4-1 Demographic data distribution of the health professionals participating in the study

Variable		T1 DM	T2 DM
Age	20 – 29 years	17	27
	30 – 39 years	23	32
	40 – 49 years	24	21
	50 + years	12	22
Work status			
	Part time	20	17
	Full time	56	88
Employment status			
	Private	49	73
	Public	27	32
Years' experience			
	< 5 years	25	35
	5-10 years	15	25
	> 10 years	27	32
Work location			
	Western Cape	11	15
	Eastern Cape	6	11
	Northern Cape	2	3
	Free State	6	12
	Gauteng	26	28
	Kwa -Zulu Natal	15	19
	Mpumalanga	5	5
	Limpopo	2	2
	North West Province	2	5

4.1. Actual level of knowledge of the two professions with regard to nutrition and Diabetes self-management for Diabetes Mellitus

4.1.1. Type 1 Diabetes Mellitus

Table 4.2 displays the actual level of knowledge of the two professions with regard to nutrition and DSM for T1 DM. The actual knowledge of RDs but not of RNs / DEs was shown to be adequate (> 70%) with regard to T1 DM. With a 5% level of significance their knowledge was not significantly better compared to the knowledge of the RNs / DEs ($p = 0.07$). Both groups scored equally with regard to their knowledge of DSM with scores indicating inadequate knowledge (< 70%). The means and medians of both groups were similar. The standard deviations as well as variability of the data within both groups compared with very little difference ($p = 0.27$).

Table 4-2 Level of knowledge of the two professions with regard to nutrition and diabetes self-management for Type1 Diabetes Mellitus

Profession	Nutrition			
	Mean	SD %	Median	p-value
RD (n = 41)	75.4%	13	73.0	0.07
RN/DE (n = 35)	67.2%	17	66.6	
DSM				
RD (n = 41)	64.7%	14	66.6	0.27
RN/DE (n = 35)	64.9%	16	66.6	

RD = Registered dietician
RN/DE = Registered nurse/Diabetes Educator
SD = Standard deviation
DSM = Diabetes self-management.

The comparative Box and Whisker plot (Figure 4.1) shows the distribution of the scores, for both domains of knowledge. For nutrition the results showed that 29% (n = 12) of the RDs scored below 70%, (± 13) and 71% (n = 29) scored more than 70% (± 13). The RN / DEs showed more variability in their knowledge. Although 48% (n = 17) (± 17) scored more than 70%, scores below 50% (n = 5, 14%) were also observed. The average score for DSM for the two professions was similar (64.7% and 64.9% respectively) even though the RDs' scores were lower than those of the RN/DEs, as 63% (n = 26) of the RDs scored below 70% compared to 54% (n = 19) of the RNs/DEs.

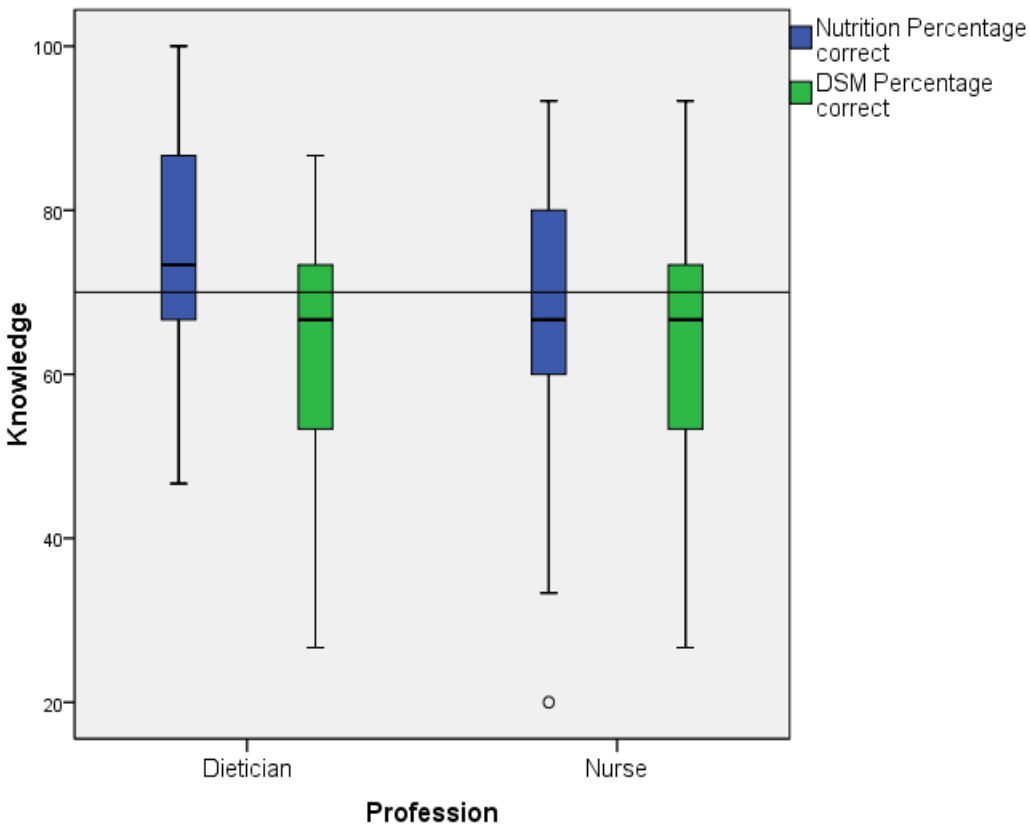


Figure 4-1 Comparative Box and Whisker plot for the level of knowledge with regard to nutrition and diabetes self-management for Type 1 Diabetes Mellitus

Table 4.3 Distribution of knowledge scores with regard to nutrition and diabetes self-management for Type 1 Diabetes Mellitus

Profession (N)	Nutrition								
	< 30%		31-50%		51-70%		> 70%		
	n	%	n	%	n	%	n	%	
RD (n = 41)	0	0.0	1	2.4	11	26.8	29	70.0	
RN/DE (n = 35)	1	2.8	4	11.4	13	37.0	17	48.0	
Profession (N)	DSM								
	RD (n = 41)	1	0.0	5	12.0	20	48.7	15	36.5
	RN/DE (n = 35)	1	2.8	6	17.0	12	34.0	16	45.7

RD = Registered Dietician
RN/ DE = Registered nurse/ Diabetes Educator
SD = Standard deviation
DSM = Diabetes Self-Management

4.1.2. Type 2 Diabetes Mellitus

Table 4.4 depicts the actual knowledge of the two professions with regard to nutrition and DSM for T2 DM. The RDs showed their knowledge on nutrition to be adequate on average (74.6%) with regard to T2 DM. The RNs / DEs score of 61.6% implicating inadequate nutrition knowledge. With a 5% level of confidence the knowledge level of RDs were significantly better compared to the RNs / DEs ($p = 0.0005$).

In terms of knowledge on DSM both professions achieved scores indicating their knowledge to be inadequate (< 70%). The RNs / DEs performed better than the RDs however with a p value of 0.31 the difference between the two groups with a confidence interval of 5% was considered non-significant.

Table 4.4 Level of knowledge of the two professions with regard to nutrition and diabetes self-management for Type 2 Diabetes Mellitus

Profession	Nutrition			
	Mean	SD %	Median	P value
RD (n = 70)	74.6%	1	73.3	0.0005
RN/DE (n = 35)	61.6%	11	63.8	
	DSM			
RD (n = 70)	56.0%	14	53.3	0.31
RN/DE (n =35)	61.9%	16	66.6	

RD = Registered Dietician
RN/DE = Registered Nurse/Diabetes Educator
SD = Standard deviations
DSM = Diabetes Self-Management

The comparative Box-Whisker plot (Figure 4.2) and Table 4.5 show the distribution of scores for both domains of knowledge. A larger number of RDs 65% (n = 46) scored more than 70% for nutrition compared to a smaller number of the RNs / DEs 37% (n = 13). The RNs / DEs displayed inadequate knowledge with approximately 63% (n = 22) scoring below 70%.

When evaluating the knowledge levels with regard to DSM, the mean score of the RDs was found to be 56%. A significant number (n = 57, 81%) of the respondents scored below 70% and only 18% (n = 13) above. The RNs / DEs average score was 61.9%, however, 66% (n = 23) of the respondents scored below 70%. The variability within the two professional groups in this case was similar. The results display poor knowledge with regard to DSM in both professional groups treating patients with T2 DM.

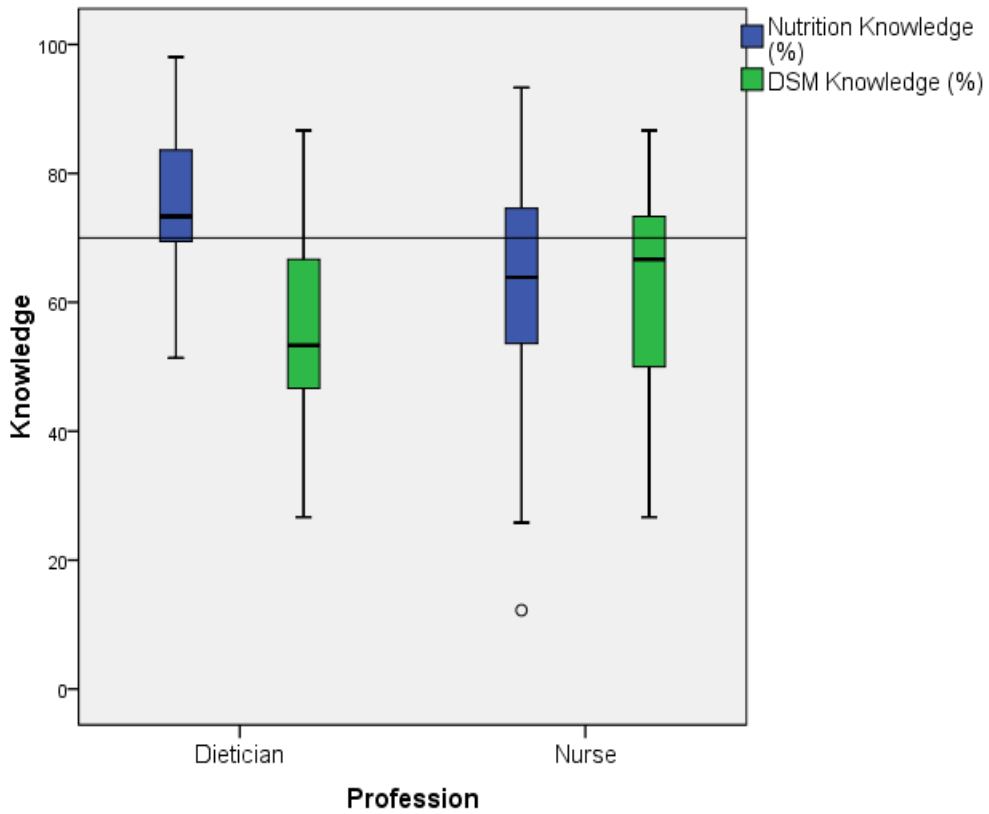


Figure 4-2 Comparative Box and Whisker plot for the level of knowledge with regard to nutrition and diabetes self-management for Type 2 Diabetes Mellitus

Table 4-5 Distribution of knowledge scores with regard to nutrition and diabetes self-management for Type 2 Diabetes Mellitus

Profession	Nutrition							
	< 30%		31-50%		51-70%		> 70%	
	n	%	n	%	n	%	n	%
RD (n = 41)	1	1.4	4	5.7	19	27.0	46	66.0
RN/DE (n = 35)	3	8.6	7	20.0	12	34.0	13	37.0
	DSM							
RD (n = 41)	3	4.2	19	27.0	35	50.0	13	18.0
RN/DE (n = 35)	1	2.8	8	23.0	14	40.0	12	34.0

RD = Registered dietician
RN/DE= Registered Nurse/ Diabetes Educator
SD= Standard Deviations
DSM= Diabetes Self- management

4.2. Identified knowledge gaps

Table 4.6 depicts the scores the different questions received as correctly answered on both domains of knowledge for T1 DM and T2 DM for all participants (RD and RN / DE combined). This serves as an indication of the areas of nutrition and DSM in need of further improvement.

Table 4-6 Scores of questions with regard to nutrition and diabetes self-management for Diabetes Mellitus which were correctly answered

Question	T1 DM		T2 DM	
	Nutrition %	DSM %	Nutrition %	DSM %
1 Requirements children, HbA1c, goals, waist measure	54	43	76	56
2 DAFNE, SBGM, weight loss, blood pressure	68	23	76	44
3 Carbohydrate counting, rebound hypoglycaemia, GI, HbA1c	19	70	47	79
4 Prioritize info, insulin, snacks, testing	66	57	54	48
5 Energy restriction, diagnosis, GL, eye care	58	51	32	7
6 GI, treating “burn out” sweeteners, medication	86	73	32	67
7 Carb counting, activity, snacks, LDL –C	73	68	79	75
8 Fruit, hyperglycaemia, weight loss, SBGM	85	31	88	68
9 Activity, ketoacidosis, fibre in bread, insulin	87	72	36	35
10 Carbohydrate intake, insulin pump, low fat foods, testing hyperglycaemia	78	70	72	29
11 Fruit, hyperglycaemia, sweet snacks, treating hyperglycaemia	77	74	56	76
12 Weight loss, goal setting, snacks, hypoglycaemia	75	98	78	83
13 Alcohol, honeymoon phase, fish oils, foot care	48	93	78	88
14 Social value of food, hypo unawareness, fibre value, exercise	95	87	80	55

15 Exercise, alcohol induced hypo, fat values, approach to education 93 **56** 86 72

T1 DM: Type 1 Diabetes Mellitus

T2 DM: Type 2 Diabetes Mellitus

DSM: Diabetes Self-Management

4.2.1. Knowledge gaps identified for Type 1 Diabetes Mellitus

The following areas on nutrition seem to be problematic as the scores for questions 1, 2, 3, 4, and 13 were lower than 70%. In these questions concepts such as the nutritional needs of children, carbohydrate counting, and energy control were addressed and the focus was on weight loss and recommendations with regard to alcohol consumption (Table 6).

With regard to DSM the scores for questions 1, 2, 4, 5, 7, 8 and 15 were lower than 70%. These questions addressed basic knowledge on insulin, target levels of HbA1c, how to prioritise communicating information to a newly diagnosed patient, how to treat alcohol related hypoglycaemia and hyperglycaemia before exercise and what to advise a patient who tested high for sugar before participating in physical activity.

4.2.2. Knowledge gaps identified for Type 2 Diabetes Mellitus

The participants' score for questions 3, 4, 5, 6, 9 and 11 was below 70%. In these questions, the type and quantity of carbohydrate foods that needs to be consumed, the GI values of foods, the timing of meals and snacks with regard to activity, as well as the use of sugars and sweeteners were addressed.

In terms of DSM the participants scored below 70% for questions 1, 2, 4, 5, 6, 8, 9 and 10. These questions tested the knowledge of participants with regard to concepts such as target levels for optimal treatment of glycaemia, blood pressure and weight loss. The questions also tested the importance of serum blood glucose monitoring (SBGM), how to treat hyperglycaemia, whether insulin causes weight gain and the importance of regular physical activity.

4.3. Comparison of actual knowledge with perceived knowledge

In section four participants were asked if they perceive their knowledge on nutrition and DSM as adequate or not for the treatment of patients with T1 and T2 DM. Participants were invited to add additional comments. In Table 4.7 the results for both professional groups on their actual and perceived knowledge with regard to both domains and for both T1 and T2 DM are summarised. A total of 83% of HPs who indicated inadequate knowledge scored below 70% compared to only 64% who perceived their knowledge as adequate and who actually achieved a score of 70% for

actual knowledge. This finding rules out the possibility of any under- or over perception of the adequacy of their knowledge. However, the difference between actual and perceived knowledge was non-significant.

Table 4-7 Comparisons of actual knowledge and perceived knowledge for both groups of health professional with regard to Diabetes Mellitus

	Actual knowledge score			
	< 70%		≥ 70%	
Perceived knowledge	n	%	n	%
Adequate	15	83.3	3	16.7
Inadequate	56	64.0	31	36.0
Total	71	67.6	34	32.4

p (2 sided) = 0.118

4.4. Comments of participants

Comments on T1 DM were received from 32 participants and on T2 DM from 25. Most expressed their need for further education on a variety of aspects regarding diabetes care for patients. Participants expressed this information to be practical and further training on the means to modify the information to be individualized to the patient lifestyle requirements, level of literacy and circumstances. Table 4.8 describes the areas of knowledge warranted for further education for T1 and T2 DM.

Table 4-8 Areas of knowledge identified by participants as warranting further education

T1 DM	T2 DM
Application of different insulin regimes	The necessity of treating T2 DM patients with insulin
The use of insulin therapy and weight gain	Carbohydrate counting
Information on the low GI concept	The importance of prevention of complications
Carbohydrate counting and how to adjust insulin administration accordingly	Information on the use of new drugs (insulin mixes, DPP4 and GLP -1 agents)
Psychological needs of the patient	The necessity of planning for snacks in the diet
How to adjust carbohydrate intake throughout the day	The need for the holistic treatment of the patient as doctors focus on drugs only
	Measures on how to motivate the patient
	Skills with regard to motivational interviewing and empowerment
	Listening skills and the prioritizing of information
	How to modify the information to meet the patient's lifestyle requirements

4.5. Effect of demographic factors on the level of knowledge of health professions regarding Diabetes Mellitus

The effect of various demographic factors (including age, work status, employment status, experience level and location) on the level of knowledge regarding T1 and T2 DM were investigated.

4.5.1. Age

In the study it was evaluated whether the age of the HPs had an effect on the actual knowledge. The categorical variable “knowledge” of participants was compared with age. Participants’ age

was divided in 4 groups: Group 1 (20 - 29 years), Group 2 (30 - 39 years), Group 3 (40 - 49 years) and Group 4 (50 years and older).

Table 4.9 and Figure 4.3 display the results of the effect of age group on actual knowledge. With regard to knowledge of T1 DM a significant difference was only found between Group 2 (30 - 39 years) and Group 3 (40 - 49 years). This significant difference was found for both nutrition and DSM knowledge.

Age had no effect on the level of knowledge of HPs with regard to both domains, as the average p value for the 4 different age groups with regard to nutrition ($p = 0.64$) and DSM were ($p = 1.53$) not significant for T2 DM. Although the differences in the levels of knowledge between the different age groups were statistically insignificant, both professions scored higher with regard to nutrition than DSM (Table 4.9).

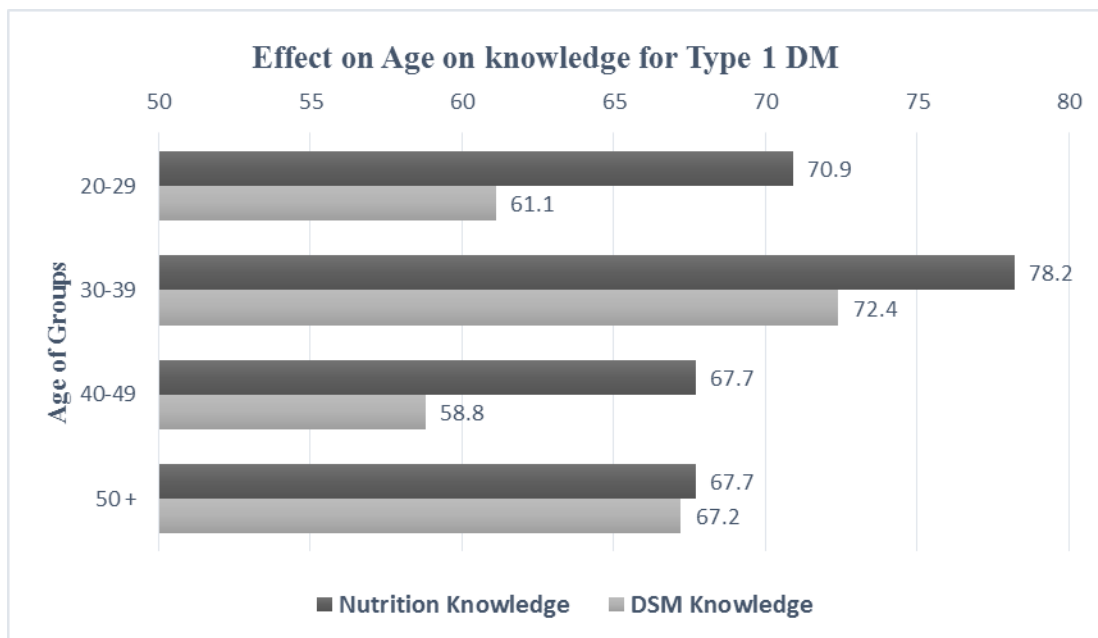


Figure 4-3 Effect of age on the level of knowledge of nutrition and diabetes self-management of health professionals treating Type 1 Diabetes Mellitus

Table 4-9 Effect of age on the knowledge of nutrition and diabetes self-management of health professionals treating patients with Diabetes Mellitus

		T1 DM				T2 DM				
Age	N	Mean	SD	Median	p-value	N	Mean	SD	Median	p-value
Nutrition Knowledge (%)						Nutrition Knowledge (%)				
20-29	17	70.9	14.5	73.3	0.005	27	72.6	13.0	71.3	0.64
30-39	23	78.2	15.5	86.6		32	73.8	12.8	76.9	
40-49	24	67.7	15.4	73.3		21	65.3	17.2	70.5	
50 +	12	67.7	14.1	66.6		22	65.9	17.3	67.6	
DSM knowledge (%)						DSM knowledge (%)				
20-29	17	61.1	12.7	60.0	0.006	27	57.3	14.0	53.3	1.53
30-39	23	72.4	12.9	60.0		32	59.5	16.3	60.0	
40-49	24	58.8	16.8	73.3		21	56.5	14.0	53.3	
50+	12	67.2	14.3	60.0		22	59.3	14.3	60.0	

SD: Standard deviation
 DSM: Diabetes self-management

4.5.2. Work status

The effect of work status in terms of working part time compared to full time was determined for both T1 and T2 DM. Data is presented for all participants regardless of profession.

Whether the current work status (full time or part time) had an effect on the participants' level of knowledge was evaluated and results are displayed in Table 4.10. Health professionals treating patients with T1 DM who work part time scored higher with regard to both their knowledge on nutrition and DSM. With regard to nutrition knowledge a large percentage of the HPs who work part time scored above 70%. The scores of HPs who work full time varied considerably. Although it seems that the knowledge of the participants who work part time was better, especially with regard to nutrition, it was not possible to generalize this finding to the larger population (p value not significant). Although the value lies close to 5% the knowledge of part-time and full-time HPs treating patients with T1 DM with regard to nutrition and DSM did not differ. A t-test with more sensitivity would have shown the difference, however the groups were too small to use the test.

Table 4.10 displays the scores of the HPs who work part time and full time. As in the case with T1 DM the difference in the scores was insignificant. The scores of HPs who work part time showed less variability than the scores of participants who work full time. The latter varied greatly and there were significant outliers.

Table 4-10 Effect of work status on the knowledge of nutrition and diabetes self-management of health professionals treating patients with Diabetes Mellitus

Work status	T1 DM					T2 DM				
	N	Mean	SD	Median	p-value	N	Mean	SD	Median	p-value
	Nutrition Knowledge (%)					Nutrition Knowledge (%)				
Part time	20	77	8.7	73.3	0.078	17	71.1	8.8	71.3	0.751
Full time	56	69.3	16.8	73.3		88	70.1	16	72.2	
	DSM knowledge (%)					DSM knowledge (%)				
Part time	20	68	11.5	66.6	0.421	17	59.2	12.2	60.0	0.823
Full time	56	63.6	16.5	18.3		88	57.8	15.2	60.0	

SD: Standard deviation
DSM: Diabetes self-management

4.5.3. Employment status

The effect of employment status in terms of working in the private or public sector was determined for both T1 and T2 DM. Data is presented for all participants regardless of profession.

Whether employment status has an impact on their level of knowledge was also evaluated. Table 4.11 and Figure 4.4 illustrate that HPs treating patients with T1 DM working in the private sector scored significantly higher ($p = 0.02$) with regard to their knowledge of both nutrition and DSM. The variability of scores within the groups was smaller for HPs in the private compared to those in the public sector. These differences in knowledge were significant as the p values for both domains show.

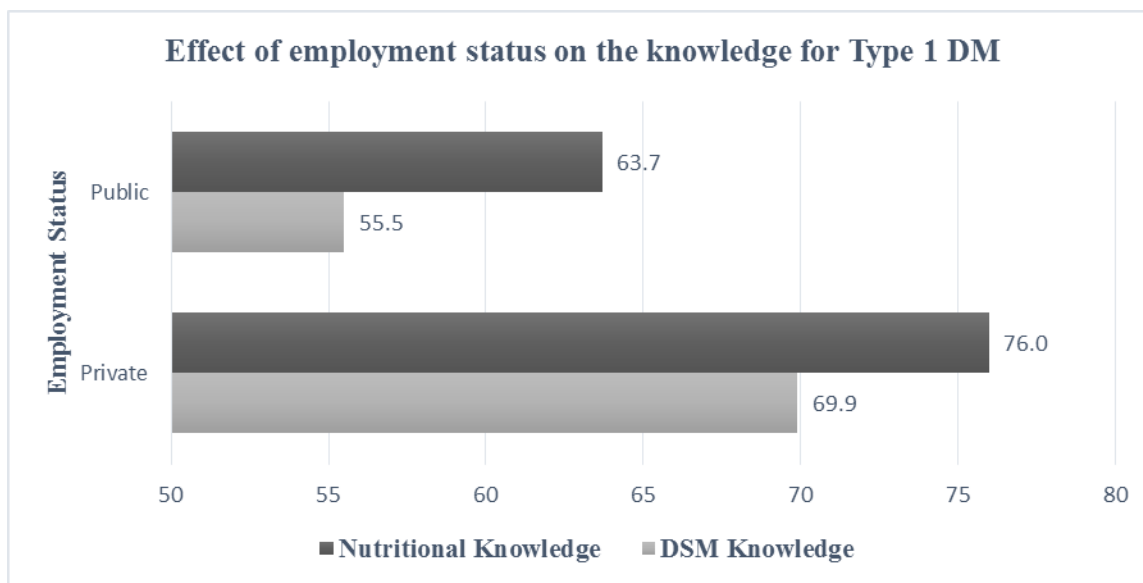


Figure 4-4 Effect of employment status on the levels of knowledge of nutrition and diabetes self –management of health professionals treating patients with Type 1 Diabetes Mellitus

Table 4.11 and Figure 4.5 illustrate the effect of employment status on the level of knowledge of T2 DM. Just as in the case of T1 DM, the p-values confirmed that HPs working in the private sector had more knowledge with regards to both domains of knowledge than HPs who work in the public sector.

Table 4-11 Effect of employment status on the levels of knowledge of nutrition and diabetes self-management of health professionals treating patients with Diabetes Mellitus

Employment status	T1 DM					T2 DM					
	N	Mean	SD	Median	p-value	N	Mean	SD	Median	p-value	
Nutrition Knowledge (%)						Nutrition Knowledge (%)					
Private	49	76	12	80.0	0.002	73	72.4	13.5	72.5	0.002	
Public	27	63.7	17.8	66.6		32	65.5	17.3	69.4.		
DSM knowledge (%)						DSM knowledge (%)					
Private	49	69.9	13	73.3	0.0005	73	60	14	60.0	0.033	
Public	27	55.5	15	53.3		32	53.5	15.8	53.3		

SD: Standard deviation
DSM: Diabetes self-management

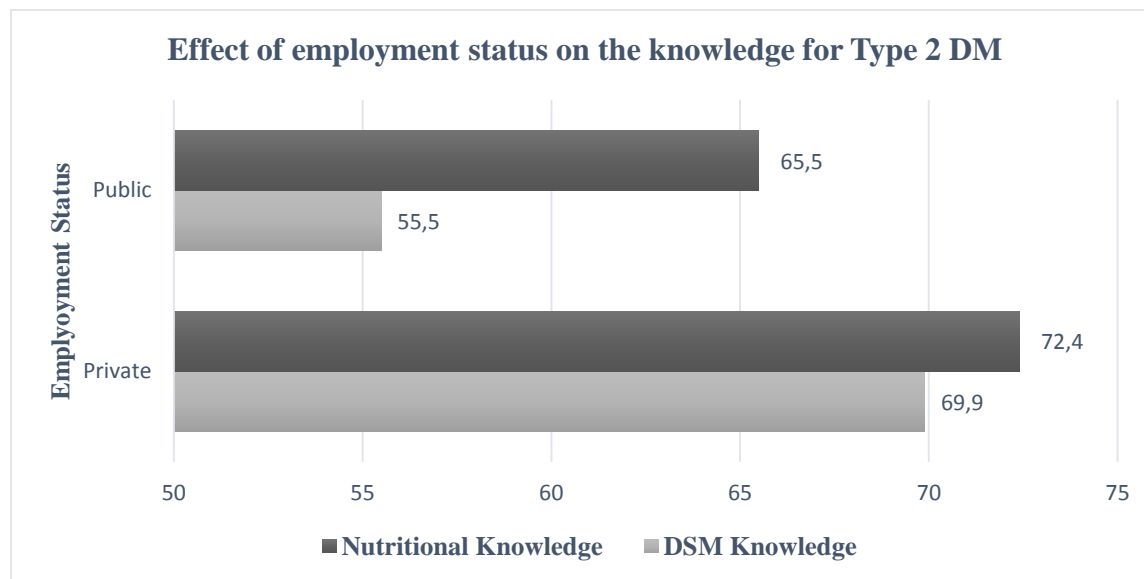


Figure 4-5 Effect of the employment status on the level of knowledge of nutrition and diabetes self-management of health professionals treating patients with Type 2 Diabetes Mellitus

4.5.4. Experience level

The effect of experience (number of years) was determined for both T1 and T2 DM. Data is presented for all participants regardless of profession.

To assess whether years of experience had an effect on how much the participants know they were allocated into three groups: Group 1 (< 5 years), Group 2 (5 - 10 years), Group 3 (> 10 years). The results were analysed using one-way ANOVA, and are displayed in Table 4.12. No statistically significant differences were found among the three groups regarding their scores for nutrition and DSM with regard to T1 DM.

Table 4.12 displays the scores of the different groups of HPs treating patients with T2 DM, categorised by years of experience with regard to their knowledge on nutrition and DSM. As in the case of T1 DM no statistically significant differences were found with regard to both domains of knowledge between the groups with different years of experience.

Table 4-12 Effect of the number of years of experience on the levels of knowledge of nutrition and diabetes self-management of health professionals treating patients with Diabetes Mellitus

T1 DM						T2 DM				
Experience	N	Mean	SD	Median	p-value	N	Mean	SD	Median	p-value
Nutrition Knowledge (%)						Nutrition Knowledge (%)				
< 5 years	25	68.2	16.3	66.6	0.201	35	70.22	16.8	71.3	0.76
5 - 10 years	15	75.1	16.4	80.0		25	70.7	14.9	71.6	
> 10 years	27	69.8	13.3	73.3		32	70.3	12.3	70.9	
DSM knowledge (%)						DSM knowledge (%)				
< 5 years	25	60.8	15.5	60.0	0.192	35	59.2	14.7	60.0	0.8
5 - 10 years	15	68.0	15.1	73.3		25	56.2	14.4	60.0	
> 10 years	27	66.1	15.1	66.6		32	58.7	15.4	56.6	

SD: Standard deviation
DSM: Diabetes self-management

4.5.3. Work location

The effect of different work locations (in terms of province) was determined for both T1 and T2 DM. Data is presented for all participants regardless of profession.

Table 4.13 displays the levels of knowledge as assessed per province of HPs treating patients with T1 DM. The p values of both domains of knowledge show the differences between the provinces as being of no statistical significance. This finding can be explained as being due to the small number of participants especially from provinces such as Limpopo and the Northern Cape. The participants from these provinces achieved obviously lower scores however this finding can't be generalized to all the HPs in the province.

Table 4.13 displays the levels of knowledge regarding the treatment of patients with T2 DM, as assessed per province. As in the case of T1 DM, the p-values of both domains of knowledge show the differences between the provinces to be of no statistical significance. Due to the small groups and p values this information cannot be generalised to the general population.

Table 4-13 Effect of work location on the level of knowledge of nutrition and diabetes self –management of health professionals treating patients with Diabetes Mellitus

Province	T1 DM					T2 DM					
	N	Mean	SD	Median	p-value	N	Mean	SD	Median	p-value	
Nutrition Knowledge (%)						Nutrition Knowledge (%)					
Western Cape	11	76.3	11.6	73.3	0.058	15	76.0	8.20	79.6	0.35	
Eastern Cape	6	64.4	10.8	66.6		11	65.4	8.00	67.5		
Northern Cape	2	73.3	0	53.3		3	60.0	14.30	65.0		
Free State	6	72.2	21.2	76.7		12	77.0	16.50	79.5		
Gauteng	26	74.6	12.5	80.0		28	67.0	15.80	70.5		
Kwa-Zulu Natal	15	70.6	16.4	66.6		19	70.0	15.60	73.3		
Mpumalanga	5	78.6	15.9	66.6		5	79.0	10.10	76.9		
Limpopo	2	36.6	15.9	40.0		2	48.0	51.20	46.4		
North West	2	50	3.33	50.0		5	65.0	10.20	63.6		
DSM knowledge (%)						DSM knowledge (%)					
Western Cape	11	71.5	13.6	73.3	0.08	15	68.0	13.60	73.3	0.20	
Eastern Cape	6	70.0	15.6	70.0		11	55.0	17.10	60.0		
Northern Cape	2	53.3	9.4	53.3		3	55.5	7.70	60.0		
Free State	6	72.2	20.4	80.0		12	56.6	9.60	53.3		
Gauteng	26	65.6	12.4	66.6		28	59.0	14.90	60.0		
Kwa-Zulu Natal	15	62.6	15.7	66.6		19	57.5	14.70	60.0		

Mpumalanga	5	57.3	19.7	66.6	5	53.3	20.50	60.0
Limpopo	2	40.0	18.8	40.0	2	40.0	18.80	40.0
North West	2	50.0	4.7	50.0	5	52.0	12.80	46.6

SD: Standard deviation

DSM: Diabetes self-management

4.5.6. Sources of information

It was further evaluated whether different sources of information would have an effect on level of knowledge. Table 4.14 display the sources of information for both nutrition and DSM knowledge for both professions. None of the participants reported friends as a source of information. Workshops and congresses were considered the most popular sources of information followed by scientific journals, text books, colleague's internet and media.

Table 4-14 Effect of sources of information on the level of knowledge of nutrition and diabetes- self management of health professionals treating patients with Diabetes Mellitus

	Source of information (%)				
	Sample size	Mean	SD	Mean	SD
	Nutrition knowledge			DSM	
Colleagues	26	68.2	16.1	62.0	16.6
Media	4	42.4	23.8	41.6	13.7
Internet	23	72.4	10.2	58.8	14.8
Text book	48	69.2	14.4	56.1	14.5
Journals	62	73.0	12.3	59.5	15.8
Workshops / Conferences	69	72.5	12.4	60.0	14.3
Other	1	70.2	0.0	60.0	0.0

SD: Standard Deviation

Chapter 4 DISCUSSION

1. Study results

RDs and RNs / DEs are critical role players in the multi-disciplinary team that provide adequate, relevant and evidence based information to patients living with T1 DM and T2 DM. With regard to knowledge on nutrition, the RDs scored better for both T1 DM and T2 DM compared to the RNs / DEs. Although the differences for T1 DM were not statistically significant, the RDs scored statistically significantly better with regard to the nutrition knowledge for T2 DM. (74.6% vs. 61.6%). The RDs met the expectations of achieving > 70% taking into consideration that all RDs are professionally trained with regard to DM. It is of concern that the RNs / DEs whom are patients with diabetes consult on a daily basis and who are often responsible for nutrition education showed inadequate knowledge with regard to both domains of knowledge for both types of DM. An additional concern is that this level of knowledge may represent the upper level of knowledge base of HPs whom patients consult, as this study used volunteers that often value knowledge and are more confident in their knowledge of a particular subject.

With regard to knowledge on DSM, the RNs / DEs achieved better results for both T1 DM and T2 DM (64.9% vs. 61.9%) compared to the RDs (64.7% vs. 56%). Although the results met the expectation that this group should achieve better results, the differences in level of knowledge were not statistically significant. The low scores achieved by both groups of HPs are of concern, taking into consideration that in both professions, these participants were a selected group whom patients with T1 DM and T2 DM consult on a on a daily basis. The fields of nutrition and DSM are becoming more challenging with new research on nutrition, physical activity and medications being done all the time. In summary the areas of nutrition and DSM knowledge identified to be inadequate were: i) carbohydrate counting, ii) cut off standards of treatment of blood pressure and weight loss, iii) GI values of carbohydrate foods, iv) timing of meals and snacks, v) insulin treatment, vi) treating hyper- and hypoglycaemia especially with regard to physical activity and alcohol consumption and vii) prioritizing information to a newly diagnosed patient.

These results echoed the findings of Nthangeni G et al (2002) who evaluated patient's dietary intake and barriers to compliance in black patients in South Africa with T2 DM attending primary health services. The authors found that patients reported that the dietary advice given was inadequate, inconsistent, incorrect, confusing and not culturally sensitive.¹

2. Global comparison

The findings of this study compare favourably to the results found during similar studies done globally. The first study was conducted by Drass JA et al (1989)² who concluded that the actual knowledge regarding DM of 64% of the nurses in acute hospital settings was associated with poor patient compliance and understanding of DM. Gossain W et al. (1993) tested the actual and self-perceived knowledge of diabetes among staff nurses using the same validated measuring instruments as Drass JA et al (1989). These were the Basic Diabetes Knowledge Test (DBKT) and the Diabetes Self Report Tool (DSRT) for perceived knowledge, and suggested a level of 69% as fairly competent.³

More recently Heller TM et al (2007) completed a study in Israel evaluating physicians and nurses' (n = 99) knowledge and attitude towards nutritional therapy in DM. He concluded that the results showed a lack of knowledge in both groups despite the fact the physicians achieved a higher score compared to the nurses (50.9% vs. 44.5% p < 0.05).⁴

In this study a higher score was achieved (64.4%) than in the study done by Heller TM et al (2007) of (44.5%). This might be due to the fact that the RN / DEs in this study worked specifically with patients with DM where nutrition forms the cornerstone of therapy.

Nugent C et al (2003) conducted a small study (n = 48) in Australia in 2003 comparing the levels of diabetes knowledge of nurses working in the medical wards to that of nurses working in the surgical wards. The mean knowledge score of all nurses was 66.8% with the knowledge of the medical nurses statistically higher than that of the nurses working in the surgical wards (71% vs. 63%).⁵

The present study showed no over-perception of knowledge as 83% of the HPs who considered their knowledge inadequate, indeed scored < 70% in their actual knowledge test. These perceptions corresponded with a study that was done by El-Deirawi KM et al (2001), who

found a significant positive correlation, between actual and perceived knowledge of nurses (home and hospital group), achieving a mean score of 72% for their actual knowledge on diabetes management.⁶

With reference to personal and demographic variables, this study found that the employment status for both T1 and T2 DM and age for T1 DM significantly influenced the level of knowledge.

With regard to T1 DM, the health professionals in the private sector scored 76% for nutrition vs. 64% for the public sector, and on for DSM knowledge 70% vs. 56% respectively. With regard to T2 DM the scores were 72% vs. 66% for nutrition and 60% vs. 54% for DSM knowledge respectively.

This can possibly be explained by the fact that resources and financial support are more available to professionals who work in the private sector. The private sector is also more competitive than the public sector and professionals consequently are continuously trying to improve their knowledge, skills and expertise.

With regard to age and knowledge of T1 DM a significant difference was found only between the age groups Group 2 and 3, with those in Group 3 achieving a score of 76%. A study done by Schaller C et al (2005) also found that although the mean score on nutrition of Australian nurses was 60% (n = 103), older nurses (> 35 years) achieved significant higher scores than younger nurses (< 35 years).

Schaller also reported that nurses with more than 10 years of experience achieved a significantly higher score compared with nurses with 10 years' or less experience, contrary to this study where years of experience had no effect on the level of knowledge. A possible reason for failing to find any effect was that the knowledge of only a small group of 35 RN / DEs was evaluated.⁷

It was concluded that HPs who worked part time achieved higher scores in their knowledge of both domains of knowledge for both T1 and T 2 DM; however the differences in the scores were statistically non -significant.

When evaluating the variety of information sources used, it was found that HPs regard workshops and conferences as their favourite source information. However, as an inadequate level of knowledge, was found, it seems that workshops have not contributed to improved knowledge. Although it seems logical that further education should be conducted via these means, the format of communicating knowledge via workshops requires change, as workshops to date have not contributed to improvement in knowledge. It has been suggested that the format be changed from theoretical lectures to case study presentation and that participants contribute actively by taking part in discussion, answering questions and solving problems. This can assist HPs to develop skills and knowledge to transform theoretical concepts to practical advice meeting the patients' lifestyle, social, economic and literacy requirements. It was found during the study that the location where the health professionals were practicing did not have any effect on the level of knowledge. Although the mean knowledge scores of the health professionals working in the provinces of Limpopo and North West were lower compared to the means of the other provinces due to the small groups, the differences were not statistically significant and therefore it can't be assumed that the knowledge of HPs working in these provinces is inadequate.

3. Education- global perspective

Globally it is well established that increased knowledge makes a difference towards behaviour changes with regard to dietary practices. Secondly that adequate lifestyle intervention makes a difference to the overall care of the patients with T1 DM and T2 DM.^{8,9}

Internationally the DAWN (Diabetes, Attitudes Wishes and Needs) study (2007) involved 5 000 people with T2 DM and 3 800 health care providers in 13 countries. It was reported in the study that less than one third of people with diabetes reported that they were able to manage the disease on their own and more than half reported significant distress in dealing with the disease. What was more important was the fact that fewer than half reported that they experienced poor patient provider relationships and poor access to coordinated care. These findings were positively associated with poor self-management and control.¹⁰ This study emphasizes the importance of patient education for patients and their care providers to acquire an adequate level of self-management care and support.

The American Academy of Nutrition and Dietetics and the American Association for Diabetes Educators (AADE) therefore published guidelines for RDs and RN / DEs on the scope and standards of practice as well as the professional performance of RN / DEs^{11,12}

These practice guidelines assist HPs to provide a standard of care universally applied to all patients living with T1 and T2 DM and attending hospitals and clinics in the US.

The effectiveness of nutrition therapy as implemented by RDs using the guidelines as described by the ADA Scope of Dietetics Practice Framework, Standards of Practice and Professional Performance was reviewed. It was found that nutrition therapy for both T1 and T2 DM was effective and several studies documented an HbA1c drop of 1 to 2% depending on the type and duration of DM. It was found that nutrition therapy has the greatest impact at initial diagnosis although it also proved to be effective during any time of the intervention.⁸

Many types of nutrition intervention proved to be effective however multiple encounters providing education and counselling as part of a multi-disciplinary team seems to be most effective. Counselling sensitive to the patient's personal needs, cultural preferences as well as their ability and readiness to make changes were considered of vital importance in order to achieve a positive outcome.

Kulkarni K et al (1998) evaluated if practice guidelines as formulated for RDs to treat T1 DM had any positive outcome over a three month period. The RDs in the intervention group (n = 24) responded positively by spending 63% more time with the patients, and were more likely to discuss results with their patients than the control group (n = 30) who practised the usual care. From the patients perspective the HbA1c improved in 88% of patients in the intervention group compared to 53% in the control group.¹³

The results obtained from the Fremantle Diabetes Study (2003) echoed the impact of diabetes care as provided by RDs on patients' outcomes. This study was done in Australia and involved 1 264 patients with T2 DM. Diabetes programmes, SMBG and visits to RDs were positively associated with improved knowledge regarding the conditions and management of patients. The Fremantle study found that the combination of education on the condition itself, SBGM and nutrition education were associated with the highest knowledge scores. What was

interesting was that knowledge scores were not associated with improved HbA1c. This re-emphasizes the fact that the application of knowledge as part of a healthy lifestyle and monitoring as part of a structured treatment plan are of vital importance for a positive outcome. Regular monitoring facilitate adherence to treatment, regularity of exercise and willingness to seek professional help in solving problems with managing all aspects of the condition.¹⁴

The same outcome was found during a systemic review of studies and it was shown that self-management training in patients with T2 DM was positively associated with knowledge, the frequency and accuracy of SMBG and self-reported dietary habits over a period of six months.¹⁵ Norris SL et al (2001) however expressed concern that at the time no data was available with regard to the effect of structured lifestyle intervention programmes on the long term quality of life, cardiovascular risk factors, mortality and cost. These aspects were addressed in the AHEAD (Action for Health in Diabetes).^{15,16}

The 9.5-year AHEAD trail was designed to examine the long term effects of weight loss, on the incidence of major CVD events, using intensive lifestyle intervention (ILI). This study consisted of a multi centred, randomized, controlled trial involving 5 145 individuals with T2 DM aged between 45 and 74, with a BMI ≥ 25 kg/m² (≥ 27 kg/m² if insulin was administered). The ILI patients were involved in 3 to 4 groups and/or individual meetings per month to achieve and maintain weight loss through decreased calorie intake and increased physical (175 min per week) activity. The outcome was compared with that of a control group which received standard diabetes support and education (DSE) consisting of 3 group educational sessions per year for the duration of four year's.⁹

After a year, the participants assigned to the ILI group had lost an average of 8.6% of their initial weight compared to a 0.7% reduction in the DSE group. Mean fitness increased in ILI participants by 20.9 % compared with 5.8 % increase in the DSE sample. A greater percentage of ILI participants showed lower glycaemic and hypertension figures, and required fewer lipid lowering medicines. Mean HbA1c dropped from 7.3% to 6.6% in ILI participants, while only decreasing from 7.3 to 7.2 % in the DSE group. Systolic and diastolic pressure, triglycerides, HDL cholesterol and urine albumin-to-creatinine ration improved more significantly in ILI compared to the DSE participants.

The participants in the ILI groups reported a significant improvement regarding health related quality of life (improved fitness and physical symptoms) compared to the participants in the DSE group. The ILI group achieved these results with less medication a consequent saving in costs.⁹

Although this study was recently discontinued and no significant benefits with regard to reducing the risk of CVD were reported, decreasing sleep apnoea and improved quality of life were reported. Both groups experienced a lower number of cardiovascular events compared to what was found during previous studies previous studies done with patients with Type 2 DM.⁹

4. Education – South African perspective

The current situation in South Africa is a reason for concern as the increasing prevalence of obesity and consequent T2 DM can no longer be ignored.

The results of the South African National Health and Nutrition Examination Survey (SAHANES-1) assessing individuals (n = 7074) has recently been published. Obesity appeared to be 20% in men in the age groups 45 - 64 years and as high as 55% in the age group of 55 - 64years. Abdominal obesity appears to be a dominant with 22% of men between 45 - 54 years of age and 70% of women between 55 - 64 years having waist circumferences that exceed the guidelines as proposed by the WHO (2011) of 102 cm for men and 88 cm for women. It is important to note that the prevalence of impaired glucose homeostasis and diabetes measured (n = 4750) as high as 24.4% for the age group 55-64 years.¹⁷ It is important to realise that (n = 4750) 24.4% of the age group 55 - 64 years of age suffered from impaired glucose tolerance and diabetes.

ADSA to date has not published any practice guidelines for RDs treating patients with T1 DM and T2 DM. Guidelines as formulated by the HP bodies such as the ADA, EASD and the American Academy of Nutrition and Dietetics are currently used. These guidelines are inappropriate for the multi-cultural and socio demographic diversity of patients living with diabetes and their families in South Africa.

The Centre for Diabetes and Endocrinology (CDE) have compiled a five-day course in diabetes management based on evidence based medicine in combination with an on line accreditation. Although computerized education can be used effectively Eaton-Spiva L et al (2011) found that a computer-based learning module contributed to only a slight and statistically non-significant

improvement in knowledge and confidence in 541 nurses who completed the course.¹⁸ On line learning can be effective with regard to some aspects of knowledge, however this should be complemented with, interactive practical workshops where the solutions to problems real patients living with T1 and T2 DM and their families experience on a daily basis are discussed in the form of case studies. DESSA in collaboration with CDE has compiled a four-day course presented by leading RN / DEs for their profession and to date has trained 130 RNs. A RD was involved in formulating the nutritional material. The RNs received a certificate after four days of attendance but only accreditation after completion of practical case studies over a period of six months. It is of concern that the lectures on nutrition are presented by a RN / DE and not a RD.

5. Summary of findings

During the study the main aims and objectives as proposed at the beginning of the study, were achieved. Two validated questionnaires were developed to test the level of knowledge of HPs treating patients with T1 and T2 DM of nutrition and DSM. All the necessary steps were followed to develop reliable questionnaires such as establishing the conceptual frame work, face and construct validity as well as reliability confirmed by Cronbach's alpha.

During the main study it was established that the level of knowledge on nutrition of the RDs was adequate for both T1 and T 2 DM, however the level of RN / DEs knowledge of nutrition was inadequate and the knowledge of both professions of T1 and T2 DM was also inadequate.

Different areas of knowledge with regard to nutrition and DSM were identified to be inadequate such as carbohydrate counting, energy control to control weight, recommendations with regard to alcohol consumption, treating alcohol induced hypoglycaemia, treating hyperglycaemia, carbohydrate intake before and after activity, as well as prioritizing communication information to a newly diagnosed patient.

The reason why HPs demonstrated inadequate knowledge could be that the questions were asked emphasising the application of knowledge e.g. "What would you advise your patient whose sugar tested high to do before embarking on a session of physical activity?" rather than straight forward questions such as: "Do you consider sweeteners to be safe for use by patients with diabetes?" The lack of knowledge can also be due to the lack of practice guidelines in both professions and a

lack of the implementation thereof. Although workshops are presented at congresses and meetings a large number of HPs do not attend the workshops or meetings. As mentioned previously the knowledge presented at workshops is often theoretical with too little information given to HPs on practical knowledge that can improve all aspects of diabetes care given the patients living with DM and their families or care givers.

It was successfully established that employment status played a role in the level of knowledge of HPs. Both groups of HPs working in the private sector possess a higher level of knowledge with regard to both domains of both T1 and T2 DM, than HPs working in the public sector. It was established that that age only with regard to knowledge on T1 DM and only between the age groups 2 and 3 influence knowledge.

The other demographic and personal factors evaluated such as age in the case of T2 DM, work status (part time or full time) number of years of experience, and work location had no statistical effect on the level of HP's knowledge of both domains with regard to both T1 and T2 DM.

6. *Limitations of the study*

Limitations during the development of the questionnaires were that RDs and RN / DEs who work in the public sector and particularly in the rural area and consulted by lower socio-economic groups, were not included. Including such a HP could contribute to including concepts necessary to test the application of knowledge to this particular group of patients. Due to logistical and practical factors, the pilot group consisted of more RN / DEs than RDs and the re-piloting group consisted mainly of RD and RN / DEs working in the private sector. A more heterogeneous group of HPs could contribute to developing questionnaires with a higher level of validity and reliability. A higher level of construct validity could have been reached if an alternative group not involved in diabetes care was used to establish construct validity.

The limitations of the main study were the small number of respondents that made it statistically difficult to assess the effect of demographic and personal factors such as years of experience, work status and location on the levels of knowledge.

Due to the failure of RN / DEs to respond to the DENOSA advertisement this sample was not randomised. The study attracted far more respondents from the private sector than the public sector

and although an effort was made, only a small number of HPs in the public sector could be reached and an even smaller number ultimately participated by completing the questionnaires. Logistical problems such as no response to telephonic contact, no response to messages left, lack of staff, lack of time and lack of consent by authorities, were experienced. These obstacles are the result of a health care system that is functioning with the burden of insufficiency.

The researcher therefore considers the knowledge score not representative of the knowledge of HPs in the public sector. This study included volunteers. It is possible that our data for HPs working in both the private and public sector represents the upper limit of the knowledge scale. Individuals who volunteered are usually more confident of their own knowledge and are more aware of the importance of knowledge compared to HPs who do not volunteer to participate in research studies.

7. Recommendations

7.1. Developing of questionnaires

It is recommended that both HPs working the private and public sector be part of the expert panel to assist with including concepts in the questionnaire that will reflect the socio-economic and cultural diversity of SA. In order to establish a higher level of construct validity during the pilot study, it is recommended that a group not involved with the health care of patients with diabetes, be used. It is recommended to ideally have the HPs representative in pilot and re- piloting groups of the same ratio

7.2. The main study

7.2.1. Practice guidelines

ADSA should formulate evidence- based nutrition guidelines for diabetes – scope and standards of practice, for all RDs in South Africa.

DESSA should formulate evidence –based diabetes self-management guidelines – scope and standards of practice, for all RN / Ds in South Africa.

These guidelines should take the demographic, cultural and socio-economic diversity of the South Africa diabetes population into consideration.

7.2.2. Courses

Further education can be obtained by attending the 5-day course in diabetes management offered by the CDE in Houghton Johannesburg. The course covers all aspects of diabetes care and can contribute to an improvement in the level of knowledge of HPs treating patients with T1 DM and T2 DM.

All RDs and RN / DEs who consult with patients are encouraged to do a one-year post graduate diploma offered by the University of Prifysgol, called the Glamorgan Course.

7.2.3. Workshops

The need for further education in the format of practical workshops was also expressed by the HPs in the section of comments in the questionnaires. They indicated that they would appreciate further education on how to motivate patients, listening skills, information on new medication and insulin, and how to apply information in practice.

The workshops can be structured to include the following information:

- Basic education

All patients with diabetes require basic but comprehensive nutrition education on food composition, classification and how types, quantity and times of food and drink consumption impact on blood glucose levels and weight control and the consequent risk for short term (hypo- and hyperglycaemia) and long term complications (CVD, retinopathy, neuropathy and neuropathy).

The basic education on DSM involves the physiology regarding the purpose of glucose and insulin in the body, factors affecting blood glucose levels on a daily basis, the importance of achieving optimal blood glucose control, the progressive nature of the condition, medication administration, monitoring of blood glucose levels, preventing and treating hyper- and hypoglycaemia. The benefits of regular physical activity and healthy food choices preventing and treating short and long term complications are also constructs that need to be addressed.16

It was found that there was a lack of DSM knowledge regarding the following concepts: target levels to optimally treat weight loss and blood pressure, glycaemia, the necessity of SMBG levels, how to treat hypo- and hyperglycaemia effectively during alcohol consumption and physical activity.

- **Individualised meal plans**

All HPs need training on how to individualize all information to patients. The information communicated needs to be practical, culturally sensitive and to meet the patients and their care providers' literacy level and readiness to change. The nutrition concepts as described in most of the literature are based on a Western style of eating. There is a need to adjust these concepts to suit the diversity of patients' needs present in South Africa in terms of culture (Indian, traditional African and Western) socio- economical and literacy status.

A comprehensive assessment (anthropometric, nutrition, socio-economical and lifestyle) is the first step towards communicating the necessary information to the patient and to understanding his / her individual needs.

- **Monitoring the process**

The AHEAD study demonstrated the importance of structured monitoring and prolonged contact to produce and facilitate behaviour change in order to create a positive outcome. Monitoring sessions help patients to keep motivated through constructive feedback and reinforcement as well as to find solutions to the barriers to compliance. The strategies that need to be taught to HP's workshops to facilitate the monitoring process are the following:

- Assessment of the patient's readiness to change and how to move the patient towards increased willingness.
- Goal setting – SMART (small, achievable, realistic, and within a time frame)
- Self -monitoring
- Cognitive restructuring
- Flexible restraint
- Relapse management
- Social support

- Stress and contingency management
- The method of motivational interviewing^{19,20,21}
- Incentives
- Modelling²²

8. Conclusion

Much needs to be done in SA towards further education of HP's. In this study it was demonstrated that although the RD's nutrition knowledge is adequate, the RN / DEs possess inadequate knowledge on both domains of knowledge and the RDs on DSM. Attending the current courses available is a step in the right direction. Developing and implementing standards of practice guidelines and practical treatment plans on nutrition and DSM that can be universally used by all RD and RN / DEs treating patients with T1 DM and T2 DM is of critical importance. This will contribute to an improvement of the quality of practice and standards of care provided by all HPs to patients with T1 and T2 DM in all hospitals and clinics throughout SA. Standards of practice guidelines will also contribute to a reduction in the communication of conflicting information to patients. There is also a need to transform theoretical lectures at congresses and workshops. It would be better to organise practical, interactive workshops presented by RDs and RN / DEs who are leaders in the field and who work with patients with T1 and T2 DM on a daily basis.

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ADDENDUM 1

S

04 October 2010

MAILED

Mrs M Gatsicas
Department of Human Nutrition
3rd Floor
Clinical Building

Dear Mrs Gatsicas

"An assessment of the knowledge of health professionals on nutrition and diabetes self management in treating type 1 and type 2 diabetes mellitus in South Africa."

ETHICS REFERENCE NO: N10/09/314

RE : APPROVAL

It is a pleasure to inform you that a review panel of the Health Research Ethics Committee has approved the above-mentioned project on 4 October 2010, including the ethical aspects involved, for a period of one year from this date.

This project is therefore now registered and you can proceed with the work. Please quote the above-mentioned project number in ALL future correspondence. You may start with the project. Notwithstanding this approval, the Committee can request that work on this project be halted temporarily in anticipation of more information that they might deem necessary.

Please note a template of the progress report is obtainable on www.sun.ac.za/rds and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly and subjected to an external audit.

Translations of the consent document in the languages applicable to the study participants should be submitted.

Federal Wide Assurance Number: 00001372
Institutional Review Board (IRB) Number: IRB0005239

The Health Research Ethics Committee complies with the SA National Health Act No.61 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

Please note that for research at primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Contact persons are Ms Claudette Abrahams at Western Cape Department of Health (healthres@pgwc.gov.za Tel: +27 21 483 9907) and Dr Hélène Visser at City Health (Helene.Visser@capetown.gov.za Tel: +27 21 400 3981). Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities

04 October 2010 11:25

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Approval Date: 4 October 2010

Expiry Date: 4 October 2011

Yours faithfully

MS CARL SAGER

RESEARCH DEVELOPMENT AND SUPPORT

Tel: +27 21 938 9140 / E-mail: carlis@sun.ac.za

Fax: +27 21 931 3352

04 October 2010 11:25

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ADDENDUM 2

PARTICIPANT INFORMATION LEAFLET and CONSENT FORM

PARTICIPANTS of the PILOT GROUP

TITLE of the RESEARCH PROJECT:

An assessment of the knowledge of health professionals with regards to nutrition and diabetes self - management in treating patients with Type 1 and Type 2 diabetes mellitus in South Africa.

REFERENCE NUMBER: 158 64537

PRINCIPAL INVESTIGATOR: Ria Catsicas

ADDRESS:

Suite 06
Athol Square Shopping Centre
Corner Katherine Street and Wierda East Road
SANDTON

CONTACT DETAILS: 011 023 8051/2
082 454 7382

We would like to thank you for responding to the invitation to be part of the pilot group testing the two questionnaires for validity and reliability. Please take some time to read the information presented here, which will explain the details of the project. It is important that that you clearly understand what the research entails as well as your involvement in the project. Please do not hesitate to contact the principal investigator should you have any questions. Your participation is **entirely voluntary** and you are free to decline to participate. If you decide not to complete the questionnaire this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Health Research Ethics Committee (HREC) at the Stellenbosch University and will be conducted according to the ethical guidelines and principles of the International Declaration of Helsinki, South African Guidelines for good clinical practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is the research study all about?

The objective of the study is to develop two questionnaires, one for treating people with Type 1 and one for Type 2 diabetes and to test whether these questionnaires are valid and reliable.

The two questionnaires will be used to test the level of knowledge of registered dietitians (RDs) and registered nurses or diabetes educators (RN/DEs) of nutrition and diabetes self -care education (DSME). The knowledge of nutrition and DSME of the two professions will be compared as well as the knowledge of professional groups working in the private sector and those working in the public sector.

What will your responsibilities be?

You will have to read the questions in the questionnaires carefully and answer them to the best of your ability. Your answers will help the investigator to evaluate the questions for accuracy, appropriateness, difficulty and consistency. This will ultimately contribute to improvement of both questionnaires as more valid and reliable measuring tools

Will you benefit from taking part in this study?

You will not receive any personal benefits from taking part in this study. Your contribution by completing the questionnaire however will provide us with most valuable information that can be used for education purposes and this will ultimately benefit the patients living with both Type 1 and Type 2 diabetes. You will not be taking any risks by taking part in the study and it will not cost you anything.

Is there anything else you should know or do?

You can contact the Health Research Ethics Committee at 021 938 9207 if you have any concerns or complaints that have not been adequately addressed by the chief investigator.

Declaration by participant

By signing below, I..... agree to be part of the pilot group testing two questionnaires – one for the treatment of Type 1 diabetes and one for the treatment of Type 2 diabetes. These questionnaires will be used as measurement tools in a research study entitled: An assessment of the knowledge of health professionals on nutrition and diabetes self- management education (DSME) in treating patients with type 1 and Type 2 diabetes mellitus in South Africa.

I declare that:

- I have read this information and consent form and state that it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I might choose to leave the study at any time and will not be penalised or prejudiced in any way.

Signed at (*place*)..... on (*date*)..... 2011

Signature of participant

Signature of witness

Declaration by investigator

I Ria Catsicas declare that:

- I have explained the information in this document to
- I encouraged her/ him to ask questions and took adequate time to answer them
- I am satisfied that she / he adequately understands all aspects of the research as discussed above.
- I did not use an interpreter

Signed at (place) on (*date*) 2011

Signature of investigator

Signature of witness

ADDENDUM 3

An assessment of the knowledge of health professionals with regard to nutrition and Diabetes Self- Management education in treating patients with Type 1 and Type 2 diabetes mellitus in South Africa QUESTIONNAIRE 1: TYPE 1 DIABETES SECTION 1:

1. Personal Details

Age Group

20 to 29	<input type="checkbox"/>
30 to 39	<input type="checkbox"/>
40 to 49	<input type="checkbox"/>
50 plus	<input type="checkbox"/>

Your Gender

Male	<input type="checkbox"/>
Female	<input type="checkbox"/>

Your Qualifications *

Year Qualified

Name of Institution

Your Qualifications *	Year Qualified	Name of Institution
Matric	<input type="checkbox"/>	<input type="checkbox"/>
Diploma in Nursing	<input type="checkbox"/>	<input type="checkbox"/>
Degree in Nursing or Dietetics	<input type="checkbox"/>	<input type="checkbox"/>
Post graduate degree in Nursing or Dietetics	<input type="checkbox"/>	<input type="checkbox"/>
Other - Specify in Boxes Below	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

If you have more than one qualification tick all appropriate boxes

Your First language

English	<input type="checkbox"/>	Tswana	<input type="checkbox"/>
Afrikaans	<input type="checkbox"/>	Siphedi	<input type="checkbox"/>
Xhosa	<input type="checkbox"/>	Swati	<input type="checkbox"/>
Venda	<input type="checkbox"/>	Ndebele	<input type="checkbox"/>
Zulu	<input type="checkbox"/>	Tsonga	<input type="checkbox"/>
Sotho	<input type="checkbox"/>		
Other	<input type="text"/>		

Please specify language if Other

SECTION 2: Nutrition Questions

Please read the questions carefully and choose the **MOST CORRECT** option that best answers the question. Complete the questions by making a mark in the appropriate box.

Only **ONE** choice per question is allowed. Your anonymity is guaranteed. Thank you for your cooperation

Question 1: All children, adolescents and adults should eat healthily, regardless of having Type 1 diabetes

a) True	
b) False	

Question 2: The insulin regimen chosen for a child depends on the age and a variety of family social economical dynamics, which in turn determines the meal plan prescription and format

a) True	
b) False	

Question 3: Patients on a “*basal bolus regimen*” or insulin pump should calculate their carbohydrate intake of meals to match their insulin regimen

a) True	
b) False	

Question 4: You are consulting a patient who has just been diagnosed with Type 1 diabetes. The focus of your education should be the following:

a) Explaining the Glycaemic index of carbohydrates	
b) How all types of foods impact on blood glucose and consequent insulin levels	
c) How to choose foods low in saturated fats	
d) How to adjust insulin dose to what and how much the child eats	

Question 5: When drafting an eating plan for patients on a *basal bolus regimen* ensuring adequate calories for growth, development and activity, while at the same time restricting calories in order to manage the patient's weight, should be taken into consideration.

a) True	
b) False	

Question 6: Consistency of food intake is not important for patients who are on fixed insulin regimens and pre-meal insulin dosages should not be adjusted

a) True	
b) False	

Question 7: Carbohydrate counting is a method to estimate the amount of insulin needed to cover the amount of carbohydrate in a meal. Which of the following principles should be mastered to achieve good glycaemic control?

e) Calculating the calories on the labels of the foods eaten	
f) Checking for the low GI logo on the food label	
g) Testing blood glucose four times a day in order to develop an individual <i>carbohydrate insulin ratio</i>	
h) Focusing on eating whole grain carbohydrates at the expense of refined starchy foods	

Question 8: Most fresh fruits in normal portions ranging from 100 to 150g in weight contain the following amount of carbohydrates?

a) 10g	
b) 15 to 20g	
c) 20 to 30g	
d) 30 to 40g	

Question 9: The most important factors that play a role in estimating the amount of rapid acting insulin to inject before a meal if the patient is on a basal bolus regime, are the following:

a) The blood glucose reading taken before the meal	
b) The amount of carbohydrate in the meal anticipated to be eaten	
c) The amount of activity planned after eating the meal	
d) All of the above	

Question 10: Your patient who is on an insulin pump asks your advice regarding what to do when his/her blood glucose level is too high just before eating a meal. What advice will you give your patient?

a) Postpone the meal by more than an hour and re test the blood glucose levels	
b) Use the correction formulae and add additional insulin to the bolus meal dose	
c) Drink plenty of water	
d) All of the above	

Question 11: Advising your patient on counting carbohydrates to match insulin is more important than educating on the type of carbohydrate foods eaten?

a) True	
b) False	

Question 12: Your teenage girl patient has lost a significant amount of weight over the past 6 months with deteriorating HbA1c levels. She refuses to be weighed and insists that she is eating adequate amounts of healthy food. What advice will you give her?

a) Insist that you need to weigh her to estimate the weight loss	
b) Encourage her to eat more food to gain a bit of weight	
c) Encourage her to eat the correct type of foods in order to improve glycaemic control	
d) Contact the family and a psychologist for a consultation to identify the problem	

Question 13: Your patient with Type 1 diabetes wants to know which drink is the best to enjoy while attending social events. Your advice to him is to enjoy spirits such as whisky mixed with water, as this contains fewer calories and less alcohol than wine and beer

a) True	
b) False	

Question 14: Your young female patient's mother insists that her child needs to eat special types of foods and that she is prepared to cook her food separately. Your advice to her is one of the following

a) Provide her with a list of low GI foods to include in the patients meals and snacks	
b) Advise her on low fat cooking methods	
c) As parents and older siblings act as role models to the patient, all family members should start to embrace healthy eating habits to create a healthy eating environment at home	
d) Give her guidance on how to exclude all unhealthy foods from the patient's diet	

Question 15: Your male patient wants to partake in sport, however he is hesitating. The reason is that he fears the activity may cause hypoglycaemic attacks. Your advice to him will be one of the following?

a) To encourage him to select a non- strenuous sport	
b) To let him take partake in the sport on the condition that he drinks a sugar based cold drink after practice and games	
c) To take an additional snack such as a sandwich before any practice or game	
d) To teach him to check his blood glucose before and after practice and either adjust insulin or take an additional snack if necessary	

SECTION 3: Diabetes Self-management

Question 1: SEMDSA established one of the following as the treatment target for treating adolescents with Type 1 diabetes.

a) HbA1c <6.5% , pre-prandial blood glucose levels <6 m mol/l and post prandial < than 10 m mol/l	
b) HbA1c < 7.5% , pre-prandial blood glucose levels < 7 m mol/l and post prandial <than 11.1 m mol/l	
c) HbA1c < 8.5% , pre- prandial blood glucose < 8m mol/l, and post prandial <than 12.1 m mol/l	

Question 2: According to SEMDSA patients who are on a regimen using multiple (greater or equal to 2) injections per day should be encouraged to practise SMBG 3 times or more per day.

a) True	
b) False	

Question 3: What is the most important factor to take into consideration when planning an insulin treatment plan?

a) The age of the patient.	
b) The family logistics, support and financial situation	
c) The education level of the family	
d) All of the above	

Question 4: Act rapid and Humulin R are two types of ultra -rapid acting insulin

a) True	
b) False	

Question 5: Diabetes education is an on-going process of exchanging information within a non-judgemental and trustful relationship. Which of the following would you do at the first consultation with a newly diagnosed patient with Type 1 diabetes?

a) Demonstrate the basic information with regard to insulin administration, blood glucose monitoring and treating hypo glycaemic attacks	
b) Educate on how to interpret blood glucose levels	
c) Explain how to adjust insulin levels and carbohydrate intake to meet physical activity levels	
d) All of the above	

Question 6: Your adult patient with Type 1 diabetes on a basal bolus regimen refuses to test his/her blood glucose levels 3 to 4 times per day and fabricates imaginary levels. Your advice to her will be one of the following:

a) Advise her/him to stop testing and to take a break	
b) Individualise the treatment plan and advise her to test 2 x day at different times of the day	
c) Introduce a pre-mix insulin - 2 x day injection regime	
d) Negotiate the rationale behind testing in order to achieve increased flexibility and optimal glycaemic control	

Question 7: Your female patient regularly tests her blood glucose levels after her early afternoon weekly tennis match. Her blood glucose readings vary between 4 to 6 mmol/l. What advice will you give her to control her glucose level?

a) To eat more carbohydrate for supper	
b) To drink a sugar-based cold drink after the match	
c) Not to worry as the reading is not too low	
d) To eat a carbohydrate rich snack after the match to prevent the "lag" effect	

Question 8: Your patient who is 25 year old man regularly partakes in cycling races on weekends. He normally tests his blood glucose levels before a race. On one occasion the reading was a high 14 mmol/l and he didn't know what to do. The best advice for you to give him is the following

a) He should cancel the race, take insulin and wait till the levels return to normal	
b) He should go ahead as exercise will lower the blood glucose levels	
c) He must take a few units more insulin before the race	
d) He should avoid doing anything until two hours into the race	

Question 9: Your male patient, who is 50 years old and on a two injections per day regimen, has contracted food poisoning. Telephonically he informs you that he cannot eat anything and has consequently stopped his insulin injections. What advice will you give him?

a) He must drink water continuously to prevent dehydration	
b) He must start taking insulin, lie down and phone you back after four hours so you can re-evaluate his condition	
c) He must test his blood glucose level immediately and start taking insulin as well as sugar based drinks on an hourly basis	
d) He must try to drink or eat 50g carbohydrates such as fruit juice or soft foods such as normal jelly every three hours.	

Question 10: The insulin pump provides a patient with a more physiological means of insulin delivery with the benefit of achieving near normal glycaemia. It should therefore be recommended to all your patients who are able to afford it?

a) True	
b) False	

Question 11: Hyperglycaemia is a good index of the severity of Diabetes Keto acidosis (DKA)

a) True	
b) False	

Question 12: Motivating your patients to practise optimal DSM requires an understanding of the patient’s problems and limitations, and good effective communication. Goal-setting should be instrumental in mapping out an effective strategy. What is the best approach in order to achieve optimal DSM?

a) Assist patients to set their own goals	
b) Set the goals yourself as this makes it easier for the patients to apply them	
c) Stay clear from setting goals and treat patients individually	
d) All of the above	

Question 13: Your female patient of 10 years old is experiencing a “honeymoon phase” where her blood glucose levels have returned to normal. She has started to skip her insulin injections. What is your advice to her?

a) To stop insulin temporarily and to come back to the clinic in three months’ time for a re-evaluation	
b) To take a little insulin, but stop using discernment regarding the foods eaten	
c) To continue with healthy eating principles and use less insulin	
d) To stop insulin altogether and increase her level of physical activity	

Question 14: You are consulting with one of your more dedicated female patients who have had Type 1 diabetes for over 10 years. She is complaining of experiencing hypoglaemic attacks without feeling any of the typical warning signs. What advice will you give her?

a) To carry sweets with her all the time and consume one or two during the day to prevent the onset of the attack	
b) Consult with the doctor to adjust her insulin in order to control her blood glucose levels at a higher level for a period of time	
c) To stop her exercise regime for one month and then to re- evaluate the number of attacks again	
d) To increase her carbohydrate intake during all meals and to eat snacks	

Question 15: One of your male patients admits to experiencing hypoglycaemic attacks early in the morning after a night of partying and consuming too much alcohol. What advice will you give him?

a) Not to drink on an empty stomach.	
b) Not to eat too much food as alcohol increases blood glucose levels and this rebound may be the cause of the hypoglycaemia	
c) To attempt to consume non- alcohol drinks and avoid alcoholic drinks all together	
d) To eat a substantial snack on arriving home early in the morning or to wake up for a substantial snack early in the morning and to go back to sleep if necessary	

SECTION 4: SELF ASSESSMENT

Do you consider your knowledge on nutrition to be sufficiently adequate to advise patients with Type 1 diabetes?

Yes	
No	

Any comments that you wish to add on the level of knowledge that you feel is appropriate when educating patients with Type 1 diabetes

Thank you for your participation

ADDENDUM 4

An assessment of the knowledge of health professionals with respect to nutrition and DSM education in treating patients with Type 1 and Type 2 diabetes mellitus in South Africa. QUESTIONNAIRE 2: TYPE 2 DIABETES - SECTION 1: Information required

1. Personal Details

Age Group

20 to 29	<input type="checkbox"/>
30 to 39	<input type="checkbox"/>
40 to 49	<input type="checkbox"/>
50 plus	<input type="checkbox"/>

Your Gender

Male	<input type="checkbox"/>
Female	<input type="checkbox"/>

Your Qualifications *

Year Qualified

Name of Institution

Your Qualifications *	Year Qualified	Name of Institution
Matric	<input type="checkbox"/>	
Diploma in Nursing	<input type="checkbox"/>	
Degree in Nursing or Dietetics	<input type="checkbox"/>	
Post graduate degree in Nursing or Dietetics	<input type="checkbox"/>	
Other - Specify in Boxes Below	<input type="checkbox"/>	

If you have more than one qualification tick all appropriate boxes

Your First language

English	<input type="checkbox"/>	Tswana	<input type="checkbox"/>
Afrikaans	<input type="checkbox"/>	Siphedi	<input type="checkbox"/>
Xhosa	<input type="checkbox"/>	Swati	<input type="checkbox"/>
Venda	<input type="checkbox"/>	Ndebele	<input type="checkbox"/>
Zulu	<input type="checkbox"/>	Tsonga	<input type="checkbox"/>
Sotho	<input type="checkbox"/>		
Other	<input type="text"/>		

Please specify language if Other

2. Work Details

What is your work status

Full time employed	
Part time employed	

What is your work status

Public Sector	
Private Sector	

Province of present practice and work

Western Cape		KwaZulu Natal	
Eastern Cape		Mpumalanga	
Northern Cape		Limpopo	
Free State		Northern Province	
Gauteng			
Country other than South Africa			

Please specify country

Number of years working in the field of Diabetes Patient Management

Less than 5 years	
Between 5 to 10 years	
Longer than 10 years	

Which of the following sources do you consider your MAIN source of information regarding nutrition and Diabetes self management

Friends		Text Books	
Colleagues		Journal Articles	
Media Sources including radio, television, magazines etc.		Conferences and workshops	
Internet		Other	

Please Specify

SECTION 2: Nutrition Questions

Please read the questions carefully and choose the **MOST CORRECT** option that best answers the question. Complete the questions by making a mark in the appropriate box.

Only **ONE** choice per question is allowed. Your anonymity is guaranteed. Thank you for your cooperation

Question 1: Which of the following will you tell overweight patients diagnosed with Type 2 diabetes?

a) Achieving ideal body weight is a necessary condition to improve blood glucose control	
b) Modest weight loss has been shown to improve insulin resistance and consequent glycaemic control	
c) People have to exercise to lose any weight	
d) All of the above	

Question 2: The best advice to give to a patient with Type 2 diabetes to lose weight is:

a) To cut down their intake of carbohydrate foods	
b) To cut down their intake of fatty foods	
c) To limit their overall calorie intake from all types of foods	
d) None of the above	

Question 3: The best advice for a Type 2 overweight patient to lose weight is to:

a) Follow a low GI diet	
b) Exercise as hard and often as possible	
c) Control portions of all starchy foods	
d) None of the above	

Question 4: Patients with Type 2 diabetes should:

a) Eat three small meals and three snacks per day	
b) Can skip some meals and snacks occasionally	
c) Eat three small meals and consider snacks as optional	
d) The timing of meals and snacks should be individualised according to the medication taken	

Question 5: Patients with Type 2 diabetes are required to control the portion size and the amount of fruits and vegetables consumed. However some fruit and vegetables such as carrots and watermelon have a high glycaemic index and therefore need to be avoided?

a) True	
b) False	

Question 6: Using artificial sweeteners can cause undesirable side effects and it is better for patients with Type 2 diabetes to use brown sugar or honey

a) True	
b) False	

Question 7: The healthiest drink for a patient with Type 2 diabetes to enjoy after an exercise session is the following;

a) Sugar free cold drink	
b) Fruit juice	
c) Flavoured water or vitamin water	
d) None of the above	

Question 8: Carbohydrate rich foods affect the blood glucose level substantially. Based on this fact, what is the best advice to give a patient on what diet to follow?

a) Include low GI starches in the diet	
b) Exclude the intake of all high GI starches and sugars	
c) Control both the type and quantity of carbohydrate foods consumed	
d) Count the amount of carbohydrate you consume in each meal throughout the day	

Question 9: Carbohydrate rich foods high in fibre delay the digestion and absorption of glucose into in blood stream. Based on this fact, is brown bread is a better choice than white bread?

a) Yes	
b) No	

Question 10: Which combination of foods listed below will be the best choice for a low fat high fibre meal?

a) Grilled chicken breast (skin removed)	
b) Cheese on health bread toast	
c) Pap served with tomato onion gravy	
d) Bean curry served with brown/wild rice	

Question 11: If a patient felt like something sweet, which of the following would be the best choice to enjoy?

a) Honey on brown toast	
b) A cereal snack bar	
c) A plain digestive biscuit	
d) Banana	

Question 12: Which of the following foods is the best choice for a low fat high fibre snack?

a) Standard low fat flavoured yoghurt	
b) Dried apricots	
c) Muesli bar	
d) Pro vita crackers with cheddar cheese	

Question 13: Which of the following would you consider as the best source of Omega 3 Fatty Acids?

a) Canned tuna fish	
b) Canola oil	
c) Haddock	
d) Sardines canned in tomato sauce (Pilchards)	

Part 2: The following questions require you to categorise (classify) the food items listed into the correct box.

Question 14: Please categorise the food items listed below as either **high** or **low** in fibre.

Please tick what best describes the fibre content

Food Item	High in Fibre	Low in Fibre
Corn Flakes		
Apple		
Cabbage		
Chicken		
Samp and beans		
Peanuts		
Eggs		
Baked Beans		

Question 15: Research has shown that patients with Type 2 diabetes should limit their intake of saturated fats (SF). Which of the following foods are high or low in saturated fats?

Please tick what best describes the quantity of saturated fats

Food Item	High in SF	Low in SF
Boerewors		
Pilchards in tomato sauce		
Mutton chops		
Canola oil		
Amazi		
Sunflower margarine		

SECTION 3: Diabetes Self-Management

Question 1: Weight loss improves glycaemic control in overweight patients with Type 2 diabetes. SEMDSA recommend the target for the waist circumference for women to be no more than:

a) 80 cm	
b) 88 cm	
c) 94 cm	
d) 102 cm	

Question 2: Controlling blood pressure to an optimal level will prevent and/or limit the progression of further complications in patients diagnosed with Type 2 diabetes. SEMDSA recommends that patients set the following target for optimal blood pressure control:

a) 120/ 80 (systolic/ diastolic)	
b) 130/80	
c) 140/80	

Question 3: Patients' HBA1 C reading is a good indication of both their fasting and pre-prandial blood glucose levels.

a) True	
b) False	

Question 4: According to SEMDSA it is recommended that patients who use oral agents without insulin practice SMBG on a daily basis

a) True	
b) False	

Question 5: For a patient with Type 2 Diabetes with an HbA1c which is stable and within target, it is recommended that repeat testing should be undertaken in the following frequency?

a) 1 per year	
b) 2 per year	
c) 3 times per year	

Question 6: Type 2 Diabetes is a progressive disease, however a compliant patient who adheres to healthy eating and exercises on a regular basis will most likely require no medication to achieve good glycaemic control?

a) True	
b) False	

Question 7: A patient with Type 2 diabetes is at an increased risk to develop cardiovascular disease. SEMDA recommends patients should aim to keep their LDL cholesterol level equal or below?

a) 2.5 m mol/l	
b) 3.5 m mol l/l	
c) 4.5 m mol/l	

Question 8: A patient who requires insulin therapy to control their diabetes has an advanced form of diabetes compared to those who only need oral hypo glycaemic agents.

a) True	
b) False	

Question 9: Unlike other therapies which lower HbA1c by 1 to 2%, insulin can decrease any level of elevated A1C close to the required therapeutic goal. It should however not be introduced to overweight patients as it can cause them to gain more weight.

a) True	
b) False	

Question 10: A patient wants to know how he/she will know when his/her blood glucose level is too high. The best advice for you to provide is one of the following?

a) Watch out for symptoms such as thirst, tiredness, frequent urination and blurred vision	
b) Check your temperature as you might be ill	
c) Check your blood glucose levels	
d) Check the content of your previous meal or snack	

Question 11: When a patient's blood glucose levels test high, the best advice is to do one of the following?

a) Increase your oral hypoglycaemic medication	
b) Skip meals and / or snacks	
c) Drink plenty of water (6 - 8 glasses) and follow your normal eating and treatment plan	
d) Re check and contact HCP if it stays elevated	

Question 12: A patient complained about experiencing feelings of light headedness and nausea. You suspect it might be a hypoglycaemic attack. The best advice to give is one of the following?

a) Wait as some of these signs might be a sign of high blood glucose levels	
b) Drink or eat something sweet such as ½ tin of coke, sugar water or a few sweets	
c) Test blood glucose levels immediately and if low, eat a snack containing 15 gram of carbohydrate, wait 10 to 15 minutes and re test	
d) Be prepared especially when active and driving and carry something sweet with you all the time	

Question 13: During a consultation a patient is complaining about a scratch on his foot that is painful and not healing. Your advice to the patient is the following?

a) To wash the foot with water (not hot) and to use an antiseptic medication	
b) To always wear socks and shoes and never to walk barefoot	
c) To refer to the doctor for immediate treatment	
d) To come back to the clinic when redness and swelling occurs	

Question 14: What advice do you give an overweight patient with Type 2 diabetes on the frequency of engaging in physical activity?

a) Three to five times a week	
b) As much as possible	
c) Depending on the time available to the patient	
d) The recommendation should be individualized depending on the risk profile and complications	

Question 15: Which of the following sentences best describes the most successful approach to DSM?

a) To individualize advice to meet the patient's needs and lifestyle	
b) To identify barriers of applying knowledge, personal attitudes and beliefs	
c) To improve self-care and coping skills with reinforcement and feed back	
d) All of the above	

SECTION 4: SELF ASSESSMENT

Do you consider that your knowledge on nutrition is sufficiently adequate to advise patients with Type 2 diabetes?

Yes	
No	

Any comments that you wish to add on the level of knowledge that you feel is appropriate when educating patients with Type 2 diabetes

Thank you for your participation

ADDENDUM 5

An assessment of the knowledge of health professionals with regard to nutrition and diabetes self- management in treating patients with Type 1 and Type 2 diabetes mellitus in South Africa

QUESTIONNAIRE 1: TYPE 1 DIABETES

SECTION 1 : Information Required

Please Tick Appropriate Box

1. Personal Details

Age Group

20 to 29	<input type="checkbox"/>
30 to 39	<input type="checkbox"/>
40 to 49	<input type="checkbox"/>
50 plus	<input type="checkbox"/>

Your Gender

Male	<input type="checkbox"/>
Female	<input type="checkbox"/>

Your Qualifications *

Year Qualified

Name of Institution

Your Qualifications *	Year Qualified	Name of Institution
Matric	<input type="checkbox"/>	
Diploma in Nursing	<input type="checkbox"/>	
Degree in Nursing	<input type="checkbox"/>	
Degree in Dietetics	<input type="checkbox"/>	
Other - Specify in Boxes Below	<input type="checkbox"/>	
	<input type="checkbox"/>	
	<input type="checkbox"/>	

* If you have more than one qualification tick all appropriate boxes

Your First language

English	<input type="checkbox"/>	Tswana	<input type="checkbox"/>
Afrikaans	<input type="checkbox"/>	Siphedi	<input type="checkbox"/>
Xhosa	<input type="checkbox"/>	Swati	<input type="checkbox"/>
Venda	<input type="checkbox"/>	Ndebele	<input type="checkbox"/>
Zulu	<input type="checkbox"/>	Tsonga	<input type="checkbox"/>
Sotho	<input type="checkbox"/>		
Other	<input type="text"/>		

Please specify language if Other

2. Work Details

What is your work status

Full time employed	<input type="checkbox"/>
Part time employed	<input type="checkbox"/>

What is your work status

Public Sector	<input type="checkbox"/>
Private Sector	<input type="checkbox"/>

Province of present practice and work

Western Cape	<input type="checkbox"/>	Kwa -Zulu Natal	<input type="checkbox"/>
Eastern Cape	<input type="checkbox"/>	Mpumalanga	<input type="checkbox"/>
Northern Cape	<input type="checkbox"/>	Limpopo	<input type="checkbox"/>
Free State	<input type="checkbox"/>	Northern Province	<input type="checkbox"/>
Gauteng	<input type="checkbox"/>		
Country other than South Africa	<input type="text"/>		

Please specify country

Number of years working in the field of Diabetes Patient Management

Less than 5 years	<input type="checkbox"/>
Between 5 to 10 years	<input type="checkbox"/>
Longer than 10 years	<input type="checkbox"/>

Which of the following sources do you consider your MAIN source of information regarding nutrition and Diabetes self- management

Friends	<input type="checkbox"/>	Textbooks	<input type="checkbox"/>
Colleagues	<input type="checkbox"/>	Journal Articles	<input type="checkbox"/>
Media Sources including radio, television, magazines etc.	<input type="checkbox"/>	Conferences and workshops	<input type="checkbox"/>
Internet	<input type="checkbox"/>	Other	<input type="text"/>

Please Specify

SECTION 2: Nutrition Questions

Please read the questions carefully and choose the **MOST CORRECT** option that best answers the question. Complete the questions by making a mark in the appropriate box.

Only ONE choice per question is allowed. Your anonymity is guaranteed. Thank you for your co-operation.

Question 1: The nutritional requirements (protein, carbohydrates, fat, vitamins and minerals) of children and adolescents with Type 1 diabetes are exactly the same as for children without diabetes.

a) True	
b) False	

Question 2: DAFNE stands for **D**ose **A**djustment for **N**ormal **E**ating. This programme mainly encourages patients to do more frequent glucose monitoring to allow for more freedom of eating. The programme teaches people the following:

a) To adjust their insulin to match the carbohydrate eaten	
b) To test their blood glucose levels before and after each meal	
c) To adjust the amount of carbohydrate to the insulin injecting	
d) I am not familiar with the programme	

Question 3: Patients on a “*basal bolus regimen*” or insulin pump use “carbohydrate counting” as a tool for more flexibility of eating. In doing do they match the amount of carbohydrates eaten in a meal with the amount of insulin they need to inject.

c) True	
d) False	

Question 4: You are counselling a 10 year old child who has just been diagnosed with Type 1 diabetes, and his mother. The focus of your education should be the following:

a) How to choose low GI foods.	
b) How to adhere to a healthy diet and how all types of foods impact on blood glucose levels	
c) How to choose foods low in saturated fats.	
d) How to adjust insulin dose to what and how much the child eats.	

Question 5: Your 30 year old female patient with Type I diabetes needs to lose some weight. The best advice you can offer her is:

a) To start a physical activity program that suits her lifestyle.	
b) To change her diet of high GI starches to low GI starches.	
c) To control her daily energy intake including all meals and snacks.	
d) To drink more water.	

Question 6: Your male adolescent patient with Type 1 diabetes experiences high glucose levels after supper. Which of the following type of starches would you advise him to try in an attempt to lower the glucose levels.

a) Baked potato	
b) Maize meal stiff porridge “pap”.	
c) Instant noodles.	
d) Brown rice	

Question 7: Carbohydrate counting is a method to estimate the amount of insulin needed to cover a certain amount of carbohydrate in a meal. Which of the following principles should be mastered to achieve good glycaemic control?

a) Calculating the calories on the labels of the foods eaten.	
b) Checking for the low GI logo on the food label.	
c) Testing blood glucose four times a day to develop an individual <i>carbohydrate insulin ratio</i> .	
d) Focussing on eating whole grain carbohydrates rather than refined starchy foods.	

Question 8: Most fresh fruits in normal portions ranging from 100 to 150g in weight contain the following amount of carbohydrates?

a) 10g	
b) 15 to 20g	
c) 20 to 30g	
d) 30 to 40g	

Question 9: The most important factor that plays a role in estimating the amount of rapid acting insulin to inject into a patient on a basal bolus regime before a meal is the following

a) The blood glucose reading taken before the meal.	
b) The amount of carbohydrate in the meal to be eaten.	
c) The amount of activity planned after eating the meal.	
d) All of the above.	

Question 10: Your patient who is on an insulin pump asks your advice regarding what to do when their blood glucose level is too high just before eating a meal. What advice will you give your patient?

a) Postpone the meal by more than an hour and re test the blood glucose levels	
b) Use the correction formulae and add additional insulin to the bolus meal dose.	
c) Drink k plenty of water.	
d) All of the above.	

Question 11: Patients who use carbohydrate counting as a method to adjust their insulin to the amount of carbohydrate in a meal should avoid bananas and grapes as these fruit contain more carbohydrates per portion than other fruits

a) True	
b) False	

Question 12: Your teenage girl patient has lost a significant amount of weight over the past 6 months with deteriorating HbA1c levels. She refuses to be weighed and insists that she is eating adequate amounts of healthy food. What advice will you give her?

e) Insist that you need to weigh her to estimate the weight loss.	
f) Encourage her to eat more food to gain a bit of weight.	
g) Encourage her to eat the correct type of foods in order to improve glycaemic control.	
h) Contact the family and a psychologist for a consultation to identify the problem.	

Question 13: Your patient with Type 1 diabetes wants to know which drink is the best whilst attending social events. Your advice to him is to enjoy the drink of choice, as it is more important to control the amount of alcohol consumed to prevent hyper- and consequent hypoglycaemia.

c) True	
d) False	

Question 14: Your young female patient's mother insists that her child needs to eat special types of foods and says that she is prepared to cook her food separately. Which of the following would you do?

a) Provide her with a list of low GI foods to include in the patient's meals and snacks.	
b) Advise her on low fat cooking methods.	
c) As parents and older siblings act as role models to the patient, all family members should start to embrace healthy eating habits to create a healthy eating environment at home.	
d) Give her guidance on how to exclude all unhealthy foods from the patient's diet.	

Question 15: Your male patient wants to partake in sport, however he is hesitating. The reason is that he fears the activity may cause hypoglycaemic attacks. You're advice to him will be one of the following?

a) Encourage him to select a non -strenuous sport.	
b) Tell him to take part in the sport on the condition that he drinks a sugar based cold drink after practice and games.	
c) Tell him to take an additional snack such as a sandwich before any practice or game.	
d) Teach him to check his blood glucose before and after practice and either adjust insulin or take an additional snack if necessary.	

SECTION 3: Diabetes Self-management

Question 1: SEMDSA established the treatment target for treating adolescents with Type 1 diabetes as one of the following?

a) HbA1c <6.5% , pre-prandial blood glucose levels <6 m mol/l and post prandial < than 10 m mol/l .	
b) HbA1c < 7.5% , pre-prandial blood glucose levels < 7 m mol/l and post prandial <than 11.1 m mol/l .	
c) HbA1c < 8.5% , pre- prandial blood glucose < 8m mol/l , and post prandial <than 12.1 m mol/l .	

Question 2: According to SEMDSA patients who are on a regimen using multiple (greater or equal to 2) injections per day should be encouraged to practise SMBG at least once or twice a day.

a) True	
b) False	

Question 3: What advice will you give your patient with Type 1 diabetes who is on a twice a day insulin regime and is now experiencing high fasting glucose levels?

a) To increase the starch portion for dinner	
b) To increase the amount of starch for the bed time snack	
c) To check blood glucose levels at night to eliminate the rebound effect	
d) To increase breakfast bolus insulin	

Question 4: Act rapid and Humulin R are two types of ultra -rapid acting insulin

a) True	
b) False	

Question 5: Diabetes education is an on-going process of exchanging information within a non-judgemental and trustful relationship. What advice would you give a newly diagnosed patient with Type 1 diabetes after your assessment at the first consultation?

a) Give basic information regarding insulin administration, blood glucose monitoring and treating hypo glycaemic attacks.	
b) Educate on how to interpret blood glucose levels.	
c) Explain how to adjust insulin levels and carbohydrate intake to meet physical activity levels.	
d) All of the above.	

Question 6: Your adult female patient with Type 1 diabetes on a basal bolus regimen refuses to test her blood glucose levels 3 to 4 times per day and fabricates imaginary levels as she suffers from “burn out” which of the following will you do?

a) Tell her to stop testing altogether and to take a break.	
b) Individualise the treatment plan and advise her to test 1 to 2 x days at different times of the day for a while.	
c) Introduce a pre-mix insulin - 2 x day injection regime.	
d) Suggest the use of the insulin pump.	

Question 7: Your female patient regularly tests her blood glucose levels after her early afternoon weekly tennis match. Her blood glucose readings vary between 4 and 6 mmol/l. What advice will give her to control her glucose level?

a) To eat more carbohydrate for supper.	
b) To drink a sugar based cold drink after the match.	
c) Not to worry as the reading is not too low.	
d) To eat a carbohydrate rich snack after the match to prevent the “lag” effect.	

Question 8: Your patient who is 25 year-old man regularly partakes in cycling races on weekends. He normally tests his blood glucose levels before a race. On one occasion a high reading of 14 m mol/l and didn't know what to do. The best advice for you to give him is the following:

a) He should cancel the race, take insulin and wait till the levels return to normal.	
b) He should go ahead as exercise will lower the blood glucose levels.	
c) He must take a few units more insulin before the race.	
d) He should avoid doing anything until two hours into the race anything for two hours into the race.	

Question 9: Your male patient who is 50 years old is on a two injections per day regimen, has contracted food poisoning. Telephonically he informs you that he cannot eat anything and has consequently stopped his insulin injections. What advice will you give him?

a) He must drink water continuously to prevent dehydration.	
b) He must start taking insulin, lie down and phone you back after four hours so you can re-evaluate his condition.	
c) He must test his blood glucose level immediately and start taking insulin as well as sugar based drinks on an hourly basis.	
d) He must drink or eat 50g carbohydrates such as fruit juice or soft foods such as normal jelly every three hours.	

Question 10: An insulin pump provides a patient with a more physiological means of insulin delivery with the benefit of achieving near normal glycaemia. It should therefore be recommended to all your patients who are able to afford it?

a) True	
b) False	

Question 11: Hyperglycaemia is a good index of the severity of Diabetes Keto acidosis (DKA).

a) True	
b) False	

Question 12: Motivating your patients to practise (diabetes self- monitoring) DSM requires an understanding of the patient’s problems and limitations, and good effective communication. Goal setting should be instrumental in mapping out an effective strategy. What is the best approach optimal DSM?

a) Explain the purpose of DSM and assist patients to set their own goals regarding DSM.	
b) Set the goals yourself as it is then easier for the patients to apply them.	
c) Avoid setting any goals towards monitoring.	
d) Set an ultimatum with regard to DSM.	

Question 13: Your female patient of 10 years old is experiencing a “honeymoon phase” where her blood glucose levels have returned to normal. She has started to skip her insulin injections. What is your advice to her?

a) To stop insulin temporarily and to come back to the clinic in three months’ time for a re-evaluation.	
b) To take insulin, but stop using discernment regarding the foods eaten.	
c) To continue with healthy eating principles and use less insulin.	
d) To stop insulin altogether and increase her level of physical activity.	

Question 14: You are consulting with one of your more dedicated female patients who are living with Type 1 diabetes for over 10 years. She is complaining of experiencing hypo glycaemic attacks without feeling any of the typical warning signs. What advice will you give her?

a) To carry sweets with her all the time and consume one or two during the day to prevent the onset of the attack.	
b) To consult with the doctor to adjust her insulin in order to control her blood glucose levels at a higher level for a period of time.	
c) To stop her exercise regime for one month and to re- evaluate the number of attacks	
d) To increase her carbohydrate intake of all meals and snacks.	

Question 15: One of your male patients admits to experiencing hypoglycaemic attacks early in the morning after a night of partying consuming too much alcohol. What advice will you give him?

a) Not to drink on an empty stomach.	
b) Not to eat too much food as alcohol increases blood glucose levels and this rebound may be the cause of the hypoglycaemia.	
c) To attempt to consume non- alcohol drinks and avoid alcoholic drinks altogether.	
d) To eat a substantial snack on arriving home early in the morning early morning or to wake up for a substantial snack early morning and to go back to sleep if necessary.	

SECTION 4: SELF ASSESSMENT

Do you consider that your knowledge is sufficiently adequate to educate patients with Type 1 diabetes?

Yes	
No	

Any comments that you wish to add on the level of knowledge that you feel is appropriate when educating patients with Type 1 diabetes.

Thank you for your participation

ADDENDUM 6

An assessment of the knowledge of health professionals with regards to nutrition and diabetes self -management in treating patients with Type 1 and Type 2 diabetes mellitus in South Africa

QUESTIONNAIRE 2: TYPE 2 DIABETES

SECTION 1 : Information Required

Please Tick Appropriate Box

1. Personal Details

Age Group

20 to 29	<input type="checkbox"/>
30 to 39	<input type="checkbox"/>
40 to 49	<input type="checkbox"/>
50 plus	<input type="checkbox"/>

Your Gender

Male	<input type="checkbox"/>
Female	<input type="checkbox"/>

Your Qualifications *

Year Qualified

Name of Institution

Your Qualifications *	Year Qualified	Name of Institution
Matric	<input type="checkbox"/>	
Diploma in Nursing	<input type="checkbox"/>	
Degree in Nursing	<input type="checkbox"/>	
Degree in Dietetics	<input type="checkbox"/>	
Other - Specify in Boxes Below	<input type="checkbox"/>	
	<input type="checkbox"/>	
	<input type="checkbox"/>	

* If you have more than one qualification tick all appropriate boxes

Your First language

English	<input type="checkbox"/>	Tswana	<input type="checkbox"/>
Afrikaans	<input type="checkbox"/>	Siphedi	<input type="checkbox"/>
Xhosa	<input type="checkbox"/>	Swati	<input type="checkbox"/>
Venda	<input type="checkbox"/>	Ndebele	<input type="checkbox"/>
Zulu	<input type="checkbox"/>	Tsonga	<input type="checkbox"/>
Sotho	<input type="checkbox"/>		
Other	<input type="text"/>		

Please specify language if Other

2. Work Details

What is your work status

Full time employed	<input type="checkbox"/>
Part time employed	<input type="checkbox"/>

What is your work status

Public Sector	<input type="checkbox"/>
Private Sector	<input type="checkbox"/>

Province of present practice and work

Western Cape	<input type="checkbox"/>	KwaZulu Natal	<input type="checkbox"/>
Eastern Cape	<input type="checkbox"/>	Mpumalanga	<input type="checkbox"/>
Northern Cape	<input type="checkbox"/>	Limpopo	<input type="checkbox"/>
Free State	<input type="checkbox"/>	Northern Province	<input type="checkbox"/>
Gauteng	<input type="checkbox"/>		
Country other than South Africa	<input type="text"/>		

Please specify country

Number of years working in the field of Diabetes Patients Management

Less than 5 years	<input type="checkbox"/>
Between 5 and 10 years	<input type="checkbox"/>
Longer than 10 years	<input type="checkbox"/>

Which of the following sources do you consider your MAIN source of information regarding Nutrition and Diabetes self -management

Friends	<input type="checkbox"/>
Colleagues	<input type="checkbox"/>
Media Sources including radio, television, magazines etc.	<input type="checkbox"/>
Internet	<input type="checkbox"/>

Textbooks	<input type="checkbox"/>
Journal Articles	<input type="checkbox"/>
Conferences and workshops	<input type="checkbox"/>
Other	<input type="text"/>

Please Specify

SECTION 2: Nutrition Questions

Please read the questions carefully and choose the **MOST CORRECT** option that best answers the question. Complete the questions by making a mark in the appropriate box.

Only ONE choice per question is allowed. Your anonymity is guaranteed. Thank you for your cooperation

Question 1: The best advice to your 50 year old overweight male patient recently diagnosed with Type 2 diabetes is the following?

a) Achieving an ideal body weight is very important if there is to be any improvement in blood glucose control.	
b) Modest weight loss has been shown to improve insulin resistance and consequent glycaemic control.	
c) He has to start exercising in order to lose any weight.	
d) Being fit is more important than weight loss	

Question 2: The best advice to give to patients with Type 2 diabetes and who should lose weight is:

a) To cut down their intake of carbohydrate foods.	
b) To cut down their intake of fatty foods.	
c) To limit their overall energy (kilo joule) intake from all types of foods.	
d) To cut down on their intake of unhealthy snacks.	

Question 3: In treating a patient with Type 2 diabetes the most important principle is to control the quantity of carbohydrate foods eaten. This is more important than the type of carbohydrate food eaten

a) True	
b) False	

Question 4: Patients with Type 2 diabetes should:

a) Eat three small meals and three snacks per day.	
b) Can skip some meals and snacks occasionally.	
c) Eat three small meals and consider snacks as optional.	
d) The timing of meals and snacks should be individualised according to the medication taken.	

Question 5: Patients with Type 2 diabetes are required to control the portion size and the amount of fruits and vegetables consumed. However some fruit and vegetables such as carrots and watermelon have a high glycaemic index and therefore need to be avoided?

a) True	
b) False	

Question 6: Using artificial sweeteners can cause undesirable side effects. The best sweetener a patient with Type 2 diabetes can use is the following;

a) Brown sugar.	
b) Natural artificial sweetener.	
c) Honey	
d) Any commercial artificial sweetener.	

Question 7: The healthiest drink for a patient with Type 2 diabetes to enjoy after an exercise session is the following;

a) Sugar free cold drink.	
b) Fruit juice.	
c) Flavoured water or vitamin water.	
d) Water.	

Question 8: Carbohydrate rich foods affect the blood glucose level most profoundly. Based on this fact, what is the best advice to give a patient on what diet to follow?

a) Include low GI starches in the diet.	
b) Exclude the intake of all high GI starches and sugars.	
c) Control both the type and quantity of carbohydrate foods consumed.	
d) Count the amount of carbohydrate you consume in each meal throughout the day.	

Question 9: Carbohydrate rich foods high in fibre delay the digestion and absorption of glucose into the blood stream. Based on this fact, is brown bread a better choice than white bread?

a) Yes	
b) No	

Question 10: Which combination of foods listed below will be the best choice for a low fat high fibre meal?

a) Grilled chicken breast served with samp and beans	
b) Cheese on health bread toast.	
c) Pap served with tomato onion gravy.	
d) Bean curry served with brown/wild rice.	

Question 11: If a patient felt like something sweet, which of the following will be the best choice to enjoy?

a) Honey on brown toast.	
b) Diabetic chocolates	
c) A digestive biscuit.	
d) Banana.	

Question 12: Which of the following foods is the best choice for a low fat high fibre snack?

a) Standard low fat flavoured yoghurt.	
b) Dried apricots.	
c) Muesli bar.	
d) Pro vita crackers with cheddar cheese.	

Question 13: Which of the following would you consider as the best source of Omega 3 Fatty Acids?

a) Canned tuna fish.	
b) Canola oil.	
c) Haddock.	
d) Sardines canned in tomato sauce (Pilchards).	

Part 2: The following questions require you to categorise (classify) the food items listed into the correct box.

Question 14: Please categorise the food items listed below as either **high** or **low** in fibre.

Please tick in the box which best describes the fibre content

Food Item	High in Fibre	Low in Fibre
Corn Flakes		
Apple		
Brown bread		
Chicken		
Samp and beans		
Peanuts		
Eggs		
Baked Beans		

Question 15: Research has shown that patients with Type 2 diabetes should limit their intake of saturated fats (SF). Which of the following foods are high or low in saturated fats (SF)?

Please tick in the box that best describes the quantity of saturated fats

Food Item	High in SF	Low in SF
Boerewors		
Pilchards in tomato sauce		
Beef stew made from brisket meat		
Tussers cheese		
Amazi		
Sunflower “lite” margarine		

SECTION 3: Diabetes Self-Management

Question 1: Weight loss improves glycaemic control in overweight patients with Type 2 diabetes. SEMDSA recommends that the waist circumference of women be no more than:

a) 80 cm	
b) 88 cm	
c) 94 cm	
d) 102 cm	

Question 2: Controlling blood pressure to an optimal level will prevent and or limit the progression of further complications in patients diagnosed with Type 2 diabetes. SEMDSA recommends patients to set the following target for optimal blood pressure control:

a) 120/ 80 (systolic/ diastolic)	
b) 130/80	
c) 140/80	

Question 3: Patients’ HBA1 C reading is a good indication of their fasting and pre- prandial blood glucose levels but not their post prandial levels.

a) True	
b) False	

Question 4: According to SEMDSA it is recommended that patients with Type 2 diabetes who use oral agents without insulin to practice SMBG on a daily basis.

a) True	
b) False	

Question 5: In order to prevent retinopathy (diabetes eye related disease) it is important for the patient to see an ophthalmologist. This should ideally happen at a frequency of:

a) once per year	
b) twice per year	
c) three times per year	

Question 6: Type 2 Diabetes is a progressive disease; however a compliant patient who adheres to healthy eating and exercises on a regular basis will most likely require no medication to achieve good glycaemic control in the long term?

a) True	
b) False	

Question 7: A patient with Type 2 diabetes is at an increased risk to develop cardiovascular disease. SEMDA recommends patients should aim to keep their LDL cholesterol level equal or below?

a) 2.5 m mol/l	
b) 3.5 m mol l/l	
c) 4.5 m mol/l	

Question 8: Your male patient with Type 2 diabetes on insulin can only afford to test his blood glucose levels four times a week. He wants to know when is the best time of the day to measure his blood glucose level.

a) First thing in the morning (fasting)	
b) Before lunch time	
c) Before bed time	
d) At different times during the day	

Question 9: Unlike other therapies which lower HbA1c by 1 to 2%, insulin can decrease any level of elevated A1C to close to the required therapeutic goal. It should however be introduced with to overweight patients with caution as it can cause them to gain more weight.

a) True	
b) False	

Question 10: A patient wants to know how he/ she will feel when their blood glucose level is too high. The best advice for you to provide is the following.

a) Watch out for symptoms such as thirst, tiredness, frequent urination and blurred vision.	
b) Check your temperature as you might be ill.	
c) Check your blood glucose levels.	
d) Check the content of your previous meal or snack.	

Question 11: Which of the following is the best advice when a patient's blood glucose levels test high?

a) Increase your oral hypoglycaemic medication.	
b) Skip meals and / or snacks.	
c) Drink plenty of water (6 - 8 glasses) and follow your normal eating and treatment plan.	
d) Recheck and contact your doctor or nurse if it stays elevated.	

Question 12: A patient complained about experiencing feelings of light headedness and nausea. You suspect it might be a hypoglycaemic attack. Which of the following is the best advice to give?

a) To wait as some of these signs might be a sign of high blood glucose levels.	
b) To drink or eat something sweet such as ½ tin of coke, sugar water or a few sweets.	
c) To test blood glucose levels immediately and if low, eat a snack containing 15 gram of carbohydrate, wait 10 to 15 minutes and retest.	
d) To be prepared especially when active and driving and carry something sweet with you all the time.	

Question 13: During a consultation a patient is complaining about a scratch on his foot that is painful and not healing. Which of the following would you advise the patient?

a) To wash the foot with water (not hot) and to use an antiseptic medication.	
b) To always wear socks and shoes and never to walk barefoot.	
c) To refer to the doctor for immediate treatment.	
d) To come back to the clinic when redness and swelling occurs.	

Question 14: What advice do you give an overweight patient with Type 2 diabetes with regard to the frequency of engaging in physical activity?

a) Three to five times a week.	
b) Daily (if possible).	
c) Depending on the time available to the patient.	
d) The recommendation should be individualized depending on the risk profile of complications.	

Question 15: Which of the following sentences best describes the most successful approach to diabetes self -management DSM?

a) To individualize advice to meet the patient’s needs and practical lifestyle constraints.	
b) To try and change the negative attitudes and beliefs with regard to diabetes self -care.	
c) To set goals for the patient towards improvement of all aspects of self -management care.	
d) None of the above	

SECTION 4: SELF ASSESSMENT

Do you consider that your knowledge is adequate to educate patients with Type 2 diabetes?

Yes	
No	

Any comments that you wish to add on the level of knowledge that you feel is adequate when educating patients with Type 2 diabetes.

Thank you for your participation

ADDENDUM 7

Letter to the HPCSA

To: Yvette Daffue

RE: E mail address list of dieticians registered with the Health Professional Council of South Africa (HPCSA).

Dear Yvette,

I am a post graduate student at the University of Stellenbosch studying for my MSC in Nutrition

My research study is on a critical dimension of how well health professionals are advising patients with diabetes. The ultimate objective is to design more effective education programmes to use when counselling patients with Type 1 and Type 2 diabetes.

I need to define the study frame of dieticians between the ages of 24 and 60 years of age currently practising in South Africa. I intend to send an e mail letter of invitation to identify the dieticians involved in treating patients with Type 1 and Type 2 diabetes and to ask whether they would be willing to participate in the study. From the response received a sample of 200 participants will be chosen at random to check whether the questionnaire is valid and reliable.

In this respect I kindly request permission to obtain the e mail address list and would like you to familiarise me with the procedure s to follow and the costs involved.

Should you require any more information please do not hesitate to contact me

With kind regards

Yours faithfully,

RIA CATSICAS RD (SA)

011 023 8051/2

ria@nutritionalsolutions.co.za

ADDENDUM 8:

Letter to the editor of DENOSA newsletter UPDATE

To: Asanda Fongqo

RE: Advertising space in your Publication.

Dear Asanda,

I am a post graduate student at the University of Stellenbosch studying for my MSC in Nutrition

My research study is on a critical dimension of how well health professionals are advising patients with diabetes. The ultimate objective is to design more effective education programmes to be used when treating patients with Type 1 and Type 2 diabetes.

I need to advertise in your publication to reach the vast audience you command. I wish to find approximately 200 nurses willing to participate in the study.

In this respect I would be most grateful if you could include the following insert in your publication and inform me regarding the costs involved.

<p style="text-align: center;">RESEARCH STUDY ON DIABETES</p> <p>Are you involved in the treatment of patients with Type 1 and Type 2 diabetes?</p> <p>Would you like to be part of an existing study on the knowledge of nutrition and diabetes self-care</p> <p>If the answer is YES, please contact us ASAP as your input will be much appreciated</p> <p>Sandy Nkosi</p> <p>011 023 8051/2</p> <p>info@nutritionalsolutions.co.za</p>

Should you require any more information please do not hesitate to contact me

With kind regards

Yours faithfully,

RIA CATSICAS RD (SA)

011 023 8051/2

ria@nutritionalsolutions.co.za

ADDENDUM 9

PARTICIPANT INFORMATION LEAFLET and CONSENT FORM

PARTICIPANTS in the MAIN STUDY

TITLE of the RESEARCH PROJECT:

An assessment of the knowledge of health professionals of nutrition and diabetes self -management in treating patients with Type 1 and Type 2 diabetes mellitus in South Africa.

REFERENCE NUMBER: 158 64537

PRINCIPAL INVESTIGATOR: Ria Catsicas

ADDRESS:

Suite 06
Athol Square Shopping Centre
Corner Katherine Street and Wierda East Road
SANDTON

CONTACT DETAILS: 011 023 8051/2
082 454 7382

We would like to thank you for responding to the invitation to take part in this research project. Please take some time to read the information presented here, which will explain the details of the project. It is important that that you clearly understand what the research entails as well as your involvement in the project. Please do not hesitate to contact the principal investigator should you have any questions. Your participation is **entirely voluntary** and you are free to decline to participate. If you decide not to complete the questionnaire this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Health Research Ethics Committee (HREC) at the Stellenbosch University and will be conducted according to the ethical guidelines and principles of the International Declaration of Helsinki, South African Guidelines for good clinical; practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is the research study all about?

The objective of the study is to develop two questionnaires, one for treating people with Type 1 and one for Type 2 diabetes and to test whether these questionnaires are valid and reliable. These two questionnaires will be used to test the level of knowledge of registered dietitians (RD) and registered nurses or diabetes educators (RN/DE) of nutrition and diabetes self- care education (DSME). The knowledge of the two professions with regard to nutrition and DSME will be compared as well as the knowledge of the professional groups working in the private sector to those working in the public sector. As you are well aware we have placed an advertisement in the DENOSA newsletter *UPDATE* and we have e mailed all the dietitians registered with the Health Professional Council of South Africa. We have listed all the respondents and your name has been randomly selected a computer based randomised program to participated in the study. We aim to get back 200 questionnaires from each professional group for analysis.

What will your responsibilities be?

If you have received this questionnaire by post, please complete the answers to the questions and post it back as soon as possible (before the dead line indicated) by using the self-addressed envelope.

If you have received the questionnaire by e mail your responsibility is to complete the answers to the questions and mail the answers back as soon as possible.

Will you benefit from taking part in this study?

You will not receive any personal benefits from taking part in this study. Your contribution by completing the questionnaire however will provide us with valuable information that can be used for education purposes and this will ultimately benefit the patients living with both Type 1 and Type 2 diabetes. You're taking part in this study does not will not lead to you incurring any costs or taking any risks.

Is there anything else you should know or do?

You can inform your supervisor should you feel it necessary to do so.

You can contact the Health Research Ethics Committee at 021 938 9207 if you have any concerns or complaints that have not been adequately addressed by the chief investigator.

Declaration by participant

By signing below, I..... agree to take part in a research study entitled: An assessment of the knowledge of health professionals with regards to nutrition and diabetes self -management (DSM) when treating patients with Type 1 and Type 2 diabetes mellitus in South Africa.

I declare that:

- I have read this information and consent form and that it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I might choose to leave the study at any time and will not be penalised or prejudiced in any way.

Signed at (*place*)..... on (*date*)..... 2011

Signature of participant

Signature of witness

Declaration by investigator

I Ria Catsicas declare that:

- I have explained the information in this document to
- I encouraged her/ him to ask questions and took adequate time to answer them
- I am satisfied that she / he adequately understands all aspects of the research as discussed above.
- I did not use an interpreter

Signed at (place) on (*date*) 2011

Signature of investigator

Signature of witness

