

# Training Needs Assessment Of Health Personnel On The Management Of Diabetes Mellitus In The West Region Of Cameroon

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**Abstract :**Background: Cameroon is one of the countries with highest burden diabetes in Africa; the adequate respond of health personnel to this burden depend on their knowledge in preventing and managing diabetic patients. Objective: To assess the knowledge of health personnel on the management of diabetes mellitus in the West Region of Cameroon Study design: It was a cross sectional descriptive study conducted in the West Region of Cameroon from May to July 2016. The Knowledge of consulting health personnel, selected using a multi-stage random sampling, was assessed on diabetes prevention and management using a structured pre-tested questionnaire administered face-to-face. We estimated proportions of health personnel who master the diagnosis of diabetes mellitus, complications, risk factors, management and prevention with 95% CI. Results: Out of 193 health personnel included, 92.8% (CI 88.16-96.0), 119(61.7%), 66.8% (CI 54.4-68.6), and 57.5% (CI 50.2-64.6) of health personnel respectively knew that Polyuria, weights loss, polydypsia and polyphagia were primary signs and symptoms of diabetes. 72.5% (CI 65.7-78.7), 61.1% (CI 53.9-68.1) and 11.9% (7.7-17.3) personnel respectively knew that visual trouble, renal disorder and paralysis respectively were complications of diabetes mellitus. 51.8% (CI 44.5-59.1) of health personnel knew that eye should be frequently examined when exposing to diabetes. 74.6% (CI 67.9-80.6), 67.9% (CI 60.8-74.4) and 62.2% (CI 54.9-69.0) of health personnel knew that they need to advise patients on the importance of physical education, food hygiene and the mastery of primary signs and symptoms of diabetes. 68.9% (CI 61.9-75.4) of health personnel could diagnose diabetes using Fasting plasma glycemc test. Conclusion: The overall knowledge of health personnel regarding diabetes management is average; however, there are deficits in certain aspects of diabetes management. As such, there is an urgent need to improve and enhance the capability of health personnel to deliver adequate healthcare delivery services to diabetic patients through a more educational initiative like workshops, regular training. More so, new training methods should be developed and implement to appropriate health personnel.

**Key words:** Africa, Diabetes, diabetes awareness, knowledge of Health personnel

## 1. Background

Diabetes is a condition where the amount of glucose in the blood is too high because the body cannot use it properly [1], [2]. The principal causes of diabetes are an inactive lifestyle, family history, Race/Ethnicity, nutrition and history of cardiovascular diseases. It is an important cause of blindness, kidney failure, lower limb amputation and other long-term consequences that impact the quality of life. High blood glucose is the third highest risk factor for

premature mortality in the world with 1.5 million case fatality in 2012 [2]. The problem is rapidly increasing in Africa with the prevalence of 2.1-6.7% among adults of aged 20-79 years in 2015 [2]. Cameroon is one of the countries with the highest prevalence in Africa (6.5% in 2015); in 2013, it registered 6,500 deaths among adults leaving with the disease (3). The control of diabetes is done at multiple levels. At the primary health care level, it essentially includes improving the healthcare delivery

services through increasing the screening of the disease, improving the prevention of modifiable risk factors and complications, and particularly reinforcing the capacity of health personnel via training and supervision. Health professionals such as physicians, nurses, and dieticians play a critical role in improving access to and the quality of healthcare for people with diabetes [3]. To do this, they must have a good knowledge of the primary signs and symptoms, complication, clinical assessment, diagnosis, pharmacological and non-pharmacological management of the disease. Previous studies suggest that the knowledge of health personnel in some African countries are still limited [3], [4], [5] but the situation in Cameroon is still largely undocumented. To fill the gap, this study was conducted to assess the knowledge of health personnel on the management of diabetes in the west Region of Cameroon which aimed at contributing to the improvement of diabetes healthcare delivery services

### 3. Methods

#### 3.1. Study design

We carried out a cross sectional descriptive study in the West Region of Cameroon. Using a structured pre-tested questionnaire administered face-to-face to consulting HP to assess their knowledge of the management of diabetes. The respondents were selected using a multi-stage random sampling. Data were collected from the 15<sup>th</sup> of May to 15<sup>th</sup> of June 2016. Analyses were done principally by calculating proportions of major indicators and estimating confidence interval at 95%.

#### 3.2. Study Area

This study was carried out in the West Region of Cameroon. It has a total number of 608 health facilities, among which 6 Para-publics, 80 private confessionals, 137 privates, and 385 public structures spotted in 20 health districts. Among the 608 health facilities, we have 542 integrated health centres, 44 sub-divisional health centres, 21 district hospitals, and 1 regional hospital.

#### 3.3. Study population:

The study targeted consenting consulting health personnel working in the maternity, medical and reception service that were present during the data collection period.

#### 3.4. Sample size:

A total of 193 participants were involved in the study. The sample size calculation was done considering the proportion of health personnel with an average score in diabetes knowledge assessment (54%), at 95% confidence level, a precision of 5% and a design effect of 2.

#### 3.5. Sampling

A total of 12 districts were randomly selected from 20 health districts present in the West region. The 12 health districts were stratified into 03 zones based on population density that is urban districts semi urban and rural. Health facilities were selected from these districts stratified by district zones, sectors of practice (private, confessional and public) and categories of health facilities. The number of health facilities selected per strata was based on probability proportionate to size. In the district hospitals and sub-divisional health centres, 03 services were

included which are maternity, medical and reception service. In the integrated health centres, the services were not differentiated as such, the only available service was targeted. In each service, two nurses and a medical doctor were randomly selected in the district hospitals and sub-divisional health centres and in the integrated health centers 04 consulting personnel were randomly selected. In the sample facility with 04 or fewer consulting health personnel, we interviewed all of them.

#### 3.6. Data collection

Data were collected using a questionnaire administered face-to-face to the consulting health personnel to assess their knowledge on the mastery of primary signs and symptoms, complication, clinical assessment, laboratory diagnosis of diabetes mellitus as well as pharmacological and non-pharmacological management of the disease. At the end of each health facility, the questionnaire was cross-checked for completeness and consistency before going to the next health facility. The questionnaire was built from the IDF-Africa recommendations and a guide line for diabetes program [6](8)(9), reviewed among the research team and pretested in a health facility which was not part of the study population.

#### 3.7. Statistical Analysis

Data were double entered in Epi info 7.2.0 and cross checked and differences corrected using a paper questionnaire. Analyses were done using the same software and excel 2007. For each outcome, the series of questions were posed and proportion of health personnel have corrected answer were calculated.

#### 3.8. Scoring

Each question had a series of responses and each correct answer was score one mark and incorrect answer score zero. Knowledge level was calculated by computing the number of correct answers. Knowledge was considered adequate for participants who score more  $\geq 70\%$ , the average for participants who score between  $< 70\%$  and  $\geq 50\%$  and inadequate knowledge was considered for participants whose score was  $< 50\%$ .

#### 3.9. Ethical approval and consent to participate

The ethical clearance for the study was obtained from Cameroon National Ethics Committee for human research (N°2016/11/830/CE/CNERSH/SP). Each participant was well informed and they consented by putting their signature on the consent form before the interview. The interview was done confidentially between the interviewer and the participants.

### 4. Result

#### 2.1. Characteristics of health facilities and health personnel

**Table 1:** Participation of health personnel in different sectors, categories and grades on the management of diabetes

| Characteristics of health facility | Number of participants (n=193) | (%) |
|------------------------------------|--------------------------------|-----|
| <b>Sectors of practice</b>         |                                |     |
| Public                             | 112                            | 58  |
| Private                            | 69                             | 36  |
| Confessional                       | 11                             | 6   |
| <b>Categories</b>                  |                                |     |
| District hospital                  | 46                             | 24  |
| sub-divisional health centre       | 38                             | 20  |
| Integrated health centre           | 109                            | 56  |
| <b>Grades</b>                      |                                |     |
| Medical doctor                     | 14                             | 7   |
| Nurse                              | 120                            | 62  |
| Assistant Nurse                    | 42                             | 22  |
| Laboratory technician              | 10                             | 5   |
| Mid wife                           | 4                              | 2   |
| others                             | 4                              | 2   |

Our study was conducted in 12 health districts of the West Region of Cameroon in 100 health facilities in which 193 health personnel were involved. A majority of health personnel in the sample were nurses 120(62%), a medical doctor was the least represented in sample 14(7%). The sampling constituted principally consulting health personnel working in the public health facilities 112(58%), private health facilities 69(36%) and 11(6%) confessional health facilities. Equally, in the sample, we have health personnel who practices in the district hospitals 46(24%), sub-divisional health centres 38 (20%) and Integrated health centres 109 (56%).

**2.2 Knowledge of the mastery of primary signs and symptoms of diabetes mellitus**

We note that all the medical doctors know that polydypsia and Polyuria as primary signs and symptoms of diabetes mellitus but the knowledge of health personnel in general on the mastery of dry lips and polyphagia as primary signs and symptoms seem to be average. Generally, the knowledge of health personnel on the mastery primary signs and symptoms of diabetes reduces from medical doctors to nurses and assistant nurses (see table 2)

**Table 3:** knowledge of health personnel on the mastery of diabetes primary signs and symptoms of diabetes

| Signs and symptoms of diabetes | MD %  | Nurse % | AS % | Total % | 95% LCL | 95% UCL |
|--------------------------------|-------|---------|------|---------|---------|---------|
| Polyphagia                     | 85.7  | 64.2    | 38.1 | 57.5    | 50.2    | 64.6    |
| Polydipsia                     | 100.0 | 78.3    | 38.1 | 66.8    | 59.7    | 73.4    |
| Polyuria                       | 100.0 | 95.0    | 92.9 | 92.8    | 88.1    | 96.0    |
| Asthenia                       | 78.7  | 66.7    | 73.8 | 67.9    | 60.8    | 74.4    |
| Weight loss                    | 85.7  | 55.0    | 71.4 | 61.7    | 54.4    | 68.6    |
| Dry lips                       | 64.3  | 55.0    | 59.5 | 55.4    | 48.1    | 62.6    |

**2.3 Knowledge of health personnel on the mastery of diabetes mellitus complications**

From table 3, we observed that the knowledge of health personnel concerning paralysis, painful extremities and cardiovascular trouble as complications of diabetes were very poor. Majority of the health personnel were well informed that coma is one of the complications of diabetes.

**Table 2:** knowledge of health personnel on the mastery of diabetes mellitus complications

| Complications            | MD %  | Nurse % | AS % | Total % | 95% LCL | 95% UCL |
|--------------------------|-------|---------|------|---------|---------|---------|
| Coma                     | 100.0 | 84.2    | 76.2 | 82.9    | 76.8    | 87.9    |
| pains at the extremities | 14.3  | 19.2    | 21.4 | 19.2    | 13.9    | 25.4    |
| Cardiovascular problem   | 57.1  | 45.0    | 33.3 | 42.0    | 34.9    | 49.3    |
| Visual problem           | 92.9  | 75.0    | 71.4 | 72.5    | 65.7    | 78.7    |
| Renal trouble            | 92.9  | 64.2    | 47.6 | 61.1    | 53.9    | 68.1    |
| Diabetic foot            | 100.0 | 73.3    | 50.0 | 66.8    | 59.7    | 73.4    |
| Paralysis                | 50.0  | 9.2     | 7.1  | 11.9    | 7.7     | 17.3    |

**2.4 Knowledge of health personnel on the mastery of diabetes mellitus risk factors**

Globally majority of health personnel are ignorant of the risk factors for diabetes mellitus. Only the genetic factors and the nutritional habit was known by about half of the health personnel (see table 4).

**Table 4:** knowledge of health personnel on mastery of diabetes risk factor

| Risk factors      | MD % | Nurse % | AS % | Total % | LC L | UC L |
|-------------------|------|---------|------|---------|------|------|
| Genetic factors   | 85.7 | 66.7    | 47.6 | 61.7    | 54.4 | 68.6 |
| Stress            | 28.6 | 25.8    | 28.6 | 27.0    | 20.8 | 33.8 |
| Nutritional habit | 71.4 | 61.7    | 90.5 | 63.7    | 56.5 | 70.5 |
| Depression        | 15.0 | 15.0    | 14.3 | 15.0    | 10.3 | 20.9 |
| Renal disorder    | 21.4 | 28.3    | 26.2 | 27.5    | 21.3 | 34.3 |
| Medication        | 28.6 | 25.0    | 14.3 | 21.8    | 16.2 | 28.3 |

**2.5 Knowledge of health personnel on diabetes diagnosis**

From table 5, we note that the majority of health personnel do monitor blood glucose level in the control of diabetes complication. But few of them

**Table 5: knowledge of health personnel on the control of diabetes diagnosis**

| Organ to exams to when expose to | MD % | Nurse % | AS % | Total % | 95% LCL | 95% UCL |
|----------------------------------|------|---------|------|---------|---------|---------|
| Eye                              | 85.7 | 57.5    | 33.3 | 51.8    | 44.5    | 59.1    |
| weight                           | 64.3 | 67.5    | 52.4 | 63.2    | 56.0    | 70.0    |
| Blood Glucose                    | 92.9 | 90.0    | 83.3 | 88.1    | 82.7    | 92.3    |
| Cholesterol level                | 92.9 | 52.5    | 47.6 | 52.6    | 45.6    | 60.1    |
| Foot                             | 50.0 | 30.8    | 38.1 | 32.6    | 26.1    | 39.8    |
| Urine                            | 92.9 | 55.0    | 50.0 | 54.4    | 47.1    | 61.6    |

32.6% (CI 26.1-39.8) knew that foot inspection is part of the Knowledge of health personnel on the mastery of diabetes preventive measures Table 6 shows that the preventive measures of diabetes are master by the majority of the health personnel with physical education being the most common known 74.6% (CI 67.9-80.6). The knowledge of health personnel on the preventive measures decreases from a medical doctor to nurse and then nursing assistant.

**2.6 Knowledge of health personnel on the mastery of preventive measures for diabetes complication;**

From table 7, the majority of health personnel were ignorant of the facts that educating diabetics’ patients on the signs, symptoms and site effects of anti-diabetic drugs are parts of the preventive measures for diabetes complication. A total of 71.0% (CI 64.0-77.3), 92.8% (CI 88.1-96.0), 74.6% (CI 67.9-80.6) of health personnel knew that physical education, regular consultation and diet control respectively are preventive measures for diabetes mellitus complication.

**Table 6: knowledge of health personnel on the mastery of diabetes preventive measures for diabetes mellitus complications**

| Preventive measures of DM complication | MD %  | Nurse % | AS % | Total % | 95% LCL | 95% UCL |
|--|-------|---------|------|---------|---------|---------|
| Physical education                     | 78.6  | 70.8    | 71.4 | 71.0    | 64.0    | 77.3    |
| Foot hygiene                           | 57.1  | 69.2    | 47.6 | 62.7    | 55.5    | 69.5    |
| diet control                           | 85.7  | 71.7    | 78.6 | 74.6    | 67.9    | 80.6    |
| Glucose level Monitoring               | 71.4  | 57.5    | 59.5 | 57.5    | 50.2    | 64.6    |
| Site effect of drugs                   | 78.6  | 67.5    | 50.0 | 35.2    | 28.5    | 42.4    |
| Importance of adhesion                 | 71.4  | 58.3    | 50.0 | 61.1    | 53.9    | 68.1    |
| Regular consultation                   | 100.0 | 91.7    | 92.9 | 92.8    | 88.1    | 96.0    |

**2.7 Knowledge of health personnel in the treatment of diabetes mellitus**

About 73.6% (CI 66.8-79.7%) of health personnel integrate insulin in the treatment of type 1 diabetes mellitus. Among this 142 personnel that integrate insulin

therapy in the treatment of type 1 diabetes, 92.9% (66.1-99.8%) were medical doctors, 78.3% (CI 69.9-85.3%), and 64.3% (CI 64.29-48.0%) were nurses and assistant nurses respectively. Regarding the knowledge of personnel on the treatment of type 2 diabetes, we observed from table 8 that the majority of personnel do not integrate Biguanides class of medication in the first line treatment of type 2 diabetes (see table 8).

**Table 7: knowledge of health personnel on the treatment of diabetes**

| Oral Anti diabetic | Frequency (yes) | % (Yes) | 95% LCL | 95% UCL |
|--------------------|-----------------|---------|---------|---------|
| Biguanides         | 56              | 29.0    | 22.7    | 36.0    |
| DPP-4 Inhibitors   | 7               | 3.6     | 1.5     | 7.3     |
| Glinids            | 15              | 7.8     | 4.4     | 12.5    |
| Glitazones         | 10              | 5.2     | 2.5     | 9.3     |
| Sulfonylurea’s     | 26              | 13.5    | 9.0     | 19.1    |
| Insulin            | 53              | 27.5    | 21.3    | 34.3    |

**2.8 Knowledge of HP on laboratory diagnosis of diabetes**

Concerning laboratory diagnosis, the majority of health personnel 68.9% (CI 61.9-75.4) master the use of fasting glucose test (FPG) for the laboratory testing of diabetes than Oral glucose tolerance test (GTT) and the glycosylated hemoglobin (HbA1C) (see table 9).

**Discussion**

This was a hospital based cross sectional descriptive survey carryout in 12 health districts of the West region of Cameroon to assess the knowledge of health personnel on the diagnosis, pharmacological and non-pharmacological management of diabetes in the health facilities. The onset of diabetes mellitus is influenced by a variety of characteristics. Again, the most common cause of diabetes signs and symptoms are due to high blood glucose levels and may be eliminated if blood glucose is controlled[7]. Polyuria and polydypsia are common clinical features of diabetes mellitus. The knowledge of health personnel on the mastery of polyuria and polydypsia as primary signs and symptoms were adequate. Similar results were gotten from studies carried out in Nigeria[8], [9]. However, there were other common signs and symptoms of diabetes among others weight loss 119(61.7%) identify by this study and other studies in which almost half of the health personnel were ignorant of and this may impact significantly the diagnosis of the disease, consequently increase the undiagnosed cases. To remedy this situation, we recommend up skilling of health personnel through training on the diagnosis of diabetes. Diabetes damages, blood vessels and nerves which can cause problems throughout the body. Some of the most common complications of diabetes are kidney disease, eye problem, foot and leg problem, sexual problem, intestinal disorder, skin, teeth and gum problem. Diabetes accounts for about 40% new cases of kidney disorder in the United States and the leading cause of blindness among adults[7]. This study



shows that the knowledge of health personnel regarding the mastery of diabetes complications was average. This is in line with the study carried out in Nigeria[3], [8] and South Africa[4]. The performance of health personnel on the neurological complications of diabetes was very poor. The identification of diabetes complications by health personnel is very important because it reduces diabetes related mortality. Hence we recommend that health personnel should be trained on the mastery of diabetes complications and its management. Physical inactivity is a risk factor for obesity and insulin resistance which are identified as the major cause of diabetes mellitus. More so, poor or uncontrolled feeding increases triglycerides, LDL cholesterol (bad cholesterol) or lower HDL cholesterol (good cholesterol) level[7]. In this study, 74.6% health personnel were informed of the fact that physical activities could prevent diabetes. This is similar to finding in a study carried in Nigeria[8] and South Africa[4]. Diet control was also noted by 67.9% of health personnel as preventive measures for diabetes mellitus. Which goes in line with a study carried out in South Africa which show that a 50-83.33% of health personnel identify diet control as preventive measures for diabetes mellitus[4]. These findings represent a tremendous need for diabetes instruction in the preventive measure of diabetes. Identification of individual who are at risk of diabetes and those who are undiagnosed is a key element in reducing the overall burden of the disease[10]. Undiagnosed or poorly managed diabetes can results in hyperglycemia or hypoglycemia (living with diabetes). Early initiation of patients to treatment can prevent or delay the progression of the disease and also reduces the risk for diabetes-related complications [10-13]. To reduce the chronic health risk of this disease, health personnel which have the highest contact with patients are expected to be capable of diagnosing and providing adequate healthcare delivery services for these patients. The findings of this study demonstrate that the majority of health personnel knew how to diagnose diabetes mellitus using fasting plasma glyceimic test (68.91%). Similar results were obtained in the studies carried out in Nigeria[3], South Africa[4] and Cameroon[14]. But very few of them were familiar with the use of oral glucose tolerance test (23.44%) and Glycosylated hemoglobin test 41 (21.24%). However, HbA1c testing is more costly than glucose measurement, and therefore less readily available. If HbA1c testing is not available, fasting or post-meal blood glucose is an acceptable substitute[1]. Fasting or post-meal blood glucose is cheap and available and this makes it a good test for the diagnosis of the diseases especially in the poor resource setting like Cameroon. But there exist a great number of health personnel who do not master the tests. Therefore there is a high need for training of health personnel on the seeking and identification of pre-diabetic cases especially using blood glucose test for early intervention. Metformin is a corner stone of oral anti-diabetic treatment for type 2 diabetes for its well established and effective nature[2]. American and European joint guidelines recommend the combination of metformin and lifestyle modification at the time when the patient is diagnosed with type 2 diabetes mellitus. Insulin is indispensable for the treatment of type 1 diabetes. An individual with type 1 diabetes will face life-threatening consequences if the stay without insulin even for a very

short period of time[2]. The results of this study show that majority (73.58%) of health personnel associate insulin in the treatment for patients diagnosed with type 1 diabetes and very few of them associate Biguanides (metformin) in the therapy of type 2 diabetes mellitus. This finding goes in line with the study carried out in South Africa[4] which show that 20-60% if health personnel master diabetes medications. From these results, we conclude that health personnel do not have adequate skill in the treatment of diabetes. Hence we recommend additional training on the treatment of diabetes mellitus. The findings of this study are similar to those carryout in Nigeria[3], [5], south Africa[4] and Cameroon[14] which also show that health personnel did not have the requisite knowledge, attitudes and beliefs to make a positive impact on the prevention and management of diabetes. This study presents some limitations which are; short time of interview due to personnel work load, poor participation of medical doctors (7%). The results of this study cannot be generalized to the entire Cameroonian health personnel, because we recruited only health personnel working in the West Region of the country, and they may have differed greatly in another part of the country. That notwithstanding, to the best of our knowledge, this is a first study that assesses the knowledge of medical doctors and nurses on the management of diabetes. Further studies need to be conducted with larger samples to better assess the challenges faced by health personnel to deliver a better diabetes care and their adherence to guidelines for the treatment and management of diabetes mellitus.

## Conclusion

The overall knowledge of health personnel regarding diabetes management is average; however, there are some deficits in certain aspects of diabetes management that needs to be addressed. As such, there is an urgent need to improve and enhance the capability of health personnel to deliver adequate and efficient healthcare delivery services to diabetic patients through a more educational initiative like workshops, regular training. More so, new training methods should be developed and implement

## Declarations

### Ethical approval and consent to participate

The ethical clearance for the study was obtained from Cameroon National Ethics Committee for human research (N°2016/11/830/CE/CNERSH/SP). Each participant was well informed and they consented by putting their signature on the consent form before the interview. The interview was done confidentially between the interviewer and the participants.

### Consent to publish

Not applicable

### Competing interests

The authors do not declare any conflict of interest with this article. The authors alone are responsible for the content and writing of the paper, and they have benefited neither from any funding nor sponsorship.

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### Authors' contributions

Study conception and design MMA, JA, data collection MMA, DHC, CDM Data analysis and interpretation MMA, JA, BEJ, YMN drafting of manuscript MMA, JA, YMN, BEJ manuscript critical revision MMA, JA, YMN, CDM, BEJ, PW, ACZK, FDAD. All the authors read and approved the final version of the manuscript.

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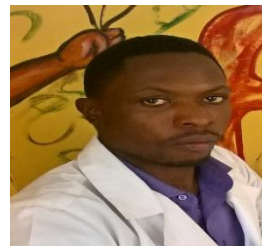
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