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Nurses' competencies and resource availability in the care of diabetes mellitus patient attending primary health care Centres in Anambra State

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Abstract

Diabetes mellitus is a global public health concern with a rise in prevalence rate in Nigeria. There is increase in report on the high mortality rate of the diabetes at different communities as a result of the incompetence of care by the nurses and other health workers. This study was aimed at determining the competencies of nurses and availability of resource for diabetes mellitus care at Primary Health Care Centres in Anambra State.

Design: Cross sectional survey.

Method: Questionnaire was adopted for the collection data from 158 nurses and midwives from the Primary Health Care Centres in the selected local government areas of Anambra state. Data was analysed using statistical package for social sciences (SPSS) version 20 Spearman Rank Order Correlation was used to determine the relationship between socio-demographic characteristics and level of competency in diabetes care among the primary health care nurses at significant level of $P<0.05$. and the result was presented in tables and frequencies.

Result: The study revealed poor theoretical knowledge of diabetes mellitus care (36.97%) by the nurses, although their perceived skill and perceived practice towards diabetes care was good. Also, there was adequate material resources for diabetes mellitus care in majority of the primary health care centres. There was no significant association between the nurses age and knowledge competence but a significant relationship was found between the nurses years of work experiences and their skills (Rho = -0.221, P = 0.005). Therefore, there is need to bridge the gap between theory and practice in diabetes care among nurses and midwives in primary health care.

Keywords: Nurses competency; Diabetes mellitus care; Resources availability; Primary Healthcare

1. Introduction

Diabetes is becoming an increasing global public health concern with its prevalence steadily on the rise, as noted by the American Diabetes Association (American Diabetes Association, 2014). Diabetes mellitus as one of the primary health care concern is considered to be a condition that leads to increased morbidity and mortality worldwide (Babelgaith, 2013). Diabetes mellitus is one of the most common non communicable diseases globally.

Primary care represents the first level of personal health care services in the community, which ensures accessible, continual, whole-person care for health needs throughout an individual's lifespan (Oyewole, 2020). Primary care professionals work with patients and their families to address their immediate and long term health needs and not just for a set of specific disease with an approach that addresses the broader determinants of health and the interrelated

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aspects that influence people's physical, mental, and social well-being (WHO, 2020). Nurses have a key role to play in primary care in expanding, connecting and co-ordinating care.

Primary health care centres are the entry point for most patients with diabetes (Abduehadi, 2013). Nurses have crucial role and clear responsibilities when managing patients with diabetes mellitus by regular care and identifying various symptoms or complications at the early stage thus assist in leading normal or comfort life for diabetics (Oyewole, 2020). Increased registered nurses' knowledge on diabetes mellitus required to reduce hypoglycemic event and improve care for diabetes mellitus (Ortiz, 2016). Diabetes is a chronic disease that is associated with high cost and health care utilization (Ortiz, 2016). Attitude of health care professionals towards diabetes has a significant impact on quality of diabetes care (Bani-issa et al, 2014). Positive attitude of nurses is necessary for successful diabetes care at all levels of health care including primary, secondary and tertiary. In the UK general practice nursing standards, in response to concern about a variable quality of nursing care being provided in general practices, both the common core competencies and the wider range of skills, knowledge and behaviours that a nurse needs in order to be a fully proficient general practice nurse is included (General Practice Foundation Nursing Sub-group, 2012).

Nursing competence according to Nakayaa, (2018) is the ability to take action by combining knowledge, skills, values, beliefs and experience acquired as a nurse. Nursing competency includes core abilities that are required for fulfilling one's role as a nurse (Fukada, 2018).

Nursing competency can be divided into the following three theories: behaviorism, trait theory and holism (Fukada, 2018). Behaviourism refers to competency as an ability to perform individual core skills, and is evaluated by demonstration of those skills. Trait theory considers competency as individual traits necessary for effectively performing duties (knowledge, critical thinking skills). Holism views competency as a cluster of elements, including knowledge, skills, attitudes, thinking ability and values that are required in certain contexts.

Nursing competency is generally viewed as a complex integration of knowledge including professional judgement, skills, values and attitude, indicating that holism is widely accepted. In nursing practice, nurses are required to apply their acquired knowledge, skills and innate individual traits to each situation and be able to adapt that knowledge and those skills to different circumstances.

Diabetes mellitus occurs worldwide but it is common (especially type 2) in developed countries. According to WHO (2016), the greatest increase in prevalence income countries including Asia and Africa. The prevalence of the disease is increasing rapidly as previous 2013 estimates from the International Diabetes Federation (IDF, 2017) put the number at 381 million people, the number is projected to almost double by 2030.

According to Sociedade (2016), it is estimated that the world population with diabetes mellitus is 382 million people and that it should reach 471 million in the year 2035. Due to its high prevalence and the serious complications that contribute to raise rates of disability, morbidity and mortality. Diabetes mellitus is one of the most commonly treated chronic conditions in primary health care and is becoming a major challenge for health system. Because it is a chronic condition, it imposes on the person the need to appropriate knowledge for the process. Nurses need to incorporate new strategies to encourage the empowerment of people with diabetes in order for them to take care of themselves, thereby promoting, maintaining and preserving health and wellbeing.

Nurses, as primary health care providers, have important roles in the patient's adaptation and acceptance of life style modification in chronic diseases. Nurses need to incorporate skills of leadership, communication, counseling, teaching and research into their practice in order to improve patient care. In the primary care units, screening for diabetes and providing illness prevention are performed by the nurses. They have the basic knowledge about diabetes and its complications, but their knowledge of diabetic patient care is insufficient. Bedside nurses have the greatest access to the patient and their approach to the patient on diabetes influences the success of diabetic patient care. Consequently, all bedside nurses need to have adequate diabetic patient care knowledge including education on diet and insulin therapy management. To improve outcomes of the diabetic patient care, it is critical that, all nurses should be participated in continuing diabetic education programs.

It is important to develop health education actions in order to encourage self management of the disease, lifestyle changes, monitor risk factors and prevent complications of diabetes mellitus. Adequate material resources are also important for diabetes mellitus care at all levels of health care including primary, secondary and tertiary. It is thus imperative to examine the competency of nurses and availability of resources which is very crucial in order to make recommendations to the necessary stakeholders to improve diabetes mellitus care, if necessary.

Resources can be defined as materials, money, energy, assets, services, staff, knowledge or other assets that are transformed to produce benefit and in the process may be consumed or made unavailable (Nanzip, 2020). They are distributed all over the earth and have specific importance such as create wealth or wants, aids in proper functioning of a system or enhances the wellbeing of people. Different types of resources include natural resources, human resources, environmental resources, mineral resources, water resources, vegetation resources, material resources. Material resources are physical and concrete ways which help to achieve a goal. According to this study, resources means material resources which include equipments and other tools for diabetes mellitus care (Nanzip, 2020).

Aim of the study

- to determine the level of competency of primary health care nurses at Local Government Areas of Anambra State on diabetes care
- to evaluate the resources available for diabetes care at primary health care centers.

1.1. Hypotheses

- There is no significant association between nurses' knowledge competency and the age of primary health care nurses
- There is no significant association between nurses' skill acquisition competency and the years of practice of the primary health care nurses
- There is no significant association between nurses' practice in diabetes care and the educational qualifications of the primary health care nurses

2. Methodology

2.1. Study design

The research design that was used in this study was cross sectional survey. The study was carried out at the selected primary health care centres in Anambra State.

2.2. Sample

The population for the study consists of all the 326 nurses and midwives working in functional primary health centers in Anambra State. The sample size for this study was 158 nurses, determined using the Taro Yamane Formula for a finite population. Simple random sampling technique was used to select 4 Local Government Areas from each of the 3 senatorial zones making a total of 12 Local Government Areas. Convenient sampling technique was used to select the required nurses and midwives who met the inclusion criteria.

2.3. Data collection

The instrument for data collection was questionnaire. Data collection was done by the researcher and two research assistants on daily basis over a period of three months. Duly completed questionnaires were retrieved on the spot while others were collected on an agreed date

2.4. Ethical consideration

An approval letter was obtained from Ministry of Health Anambra State

2.5. Data analysis

Data was analysed using statistical package for social sciences (SPSS) version 20 and presented in tables and frequencies. Spearman Rank Order Correlation was used to determine the relationship between socio demographic characteristics and level of competency of primary health care nurses on diabetes mellitus care at significant level of $P<0.05$.

2.6. Validity

The face and content validity of the researcher designed questionnaire was established by experts in nursing and a coefficient reliability test result of 0.82 was obtained signifying a considerable reliability. Informed consent was obtained from the respondents and confidentiality was maintained.

3. Results

The results were presented in tables according to research questions of the study.

Table 1 Socio-demographic profiles of the participants

			n= 158
Variables	**Class**	**Frequency**	**Percentage**
Age (years)	20-29	41	25.9
	30-39	56	35.4
	40-49	59	37.3
	50 and above	2	1.3
	Total	158	100
Highest level of education	Diploma	114	72.2
	First degree	44	27.8
	MSc	0	0
	PhD	0	0
	Total	158	100
Highest professional qualification	RN	48	30.4
	RM	76	48.1
	RP HNO	34	21.5
	Total	158	100
Rank	NO II	20	12.7
	NO I	63	39.9
	SNO	32	20.3
	PNO	26	16.5
	ACNO	13	8.2
	CNO	4	2.5
	ADNS	0	0
	DDN	0	0
	HNS	0	0
	Total	158	100
Year of work experience	1-5	46	29.1
	6-10	78	49.4
	11 and above	34	21.5
	Total	158	100

The mean age= 36.96±6.66 year

Table 1 shows the socio-demographic data of the respondents, the results of the study indicate that 41(25.9%) of the nurses and midwives were between the age of 20-29, 30-39 years 56(35.4%), 40-49 years 5(37.3%) and 50years and above 2(1.3%).

With regards to their highest level of education, 114(72.2%) had diploma while 44(27.8%) obtained first degree. For the highest professional qualification, RN 48(30.4%), RM 76(48.1%) and RPHO 34(21.5%). For their rank, NO II 20(12.7%), NO 1 63(39.9%), SNO 32(20.3%), PNO 26(16.5%), ACNO 13(8.2%) and CNO 4(2.5%), then years of work experience, 1-5years 46(29.1%), 6 -10years 78(49.4%) and 11 and above 34(21.5%).

Table 2 Knowledge of the primary health care nurses on diabetes mellitus

		n= 158
Knowledge item	**Knowledge status (f(%))**	
	Wrong	**Correct**
Factors that seem to play a role in the development of Type 2 Diabetes include		
Weight	85(53.8)	73(46.2)
Liver disease	158(100.0)	0(0.0)
Heredity	100(63.3)	58(36.7)
Enzyme deficiencies	158(100.0)	0(0.0)
Childhood illnesses	158(100.0)	0(0.0)
Knowledge about dietary management of diabetes	103(65.2)	55(34.8)
Knowledge about what is wrong when a patient refuses his bedtime snack	64(40.5)	94(59.5)
Knowledge about normal glucose level	70(44.3)	88(55.7)
A nurse is admitting a client with hypoglycemia. Identify the signs and symptoms the nurse should expect		
Thirst	158(100.0)	0(0.0)
Palpitations	76(48.1)	82(51.9)
Diaphoresis	93(58.9)	65(41.1)
Slurred speech	124(78.5)	34(21.5)
Knowledge about what to do when a patient with Type 2 Diabetes complains of nausea, vomiting, diaphoresis, and headache	31(19.6)	127(80.4)
Knowledge about the effect of unsweetened fruit juice have on blood glucose	98(62.0)	60(38.0)
Knowledge about the effect exercise have on blood glucose for a person in good control	44(27.8)	114(72.2)
Knowledge about what glucagon does in in the treatment of hypoglycemia	125(79.1)	33(20.9)
Knowledge about what infection could do to blood glucose level	91(57.6)	67(42.4)
Knowledge about what to be seen when a patient is in diabetic ketoacidosis, secondary to infection	158(100.0)	0(0.0)
Knowledge about clinical feature that distinguishes a hypoglycemic reaction from a ketoacidosis reaction	111(70.3)	47(29.7)
Knowledge about cardinal sign of diabetes	52(32.9)	106(67.1)
Which of the following is usually associated with diabetes?		
Vision problems	79(50.0)	79(50.0)
Kidney problems	105(66.5)	53(33.5)
Nerve problems	158(100.0)	0(0.0)
Lung problems	158(100.0)	0(0.0)

Knowledge about signs of ketoacidosis	114(72.2)	44(27.8)
Knowledge about the most serious complication of diabetes	66(41.8)	92(58.2)
Knowledge about the time to have insulin reaction after the nurse gives intermediate-acting insulin	126(79.7)	32(20.3)
Knowledge about when the nurse will administer insulin lispro (Humalog) 10 units for the patient following the physician's order	95(60.1)	63(39.9)
Knowledge about the best intervention to instruct diabetic patient to do when he is beginning to have a hypoglycemic reaction	127(80.4)	31(19.6)
Knowledge about what could cause low blood glucose	127(80.4)	31(19.6)
Knowledge about American Diabetes Association (ADA) definition of hypoglycemia	82(51.9)	76(48.1)
Knowledge about the cause of high blood glucose	110(69.6)	48(30.4)
Knowledge about what will most likely cause an insulin reaction	142(89.9)	16(10.1)
Knowledge about the best schedule to monitor blood glucose is a day profile before and after meal	128(81.0)	30(19.0)
Knowledge about if blood glucose level of 8.3mmol/L is acceptable for a diabetic patient	97(61.4)	61(38.6)
Knowledge about if diabetic patients are more prone to develop complications than non-diabetic patient while in hospital	127(80.4)	31(19.6)
Knowledge about if the fore arm is the best place to inject insulin	30(19.0)	128(81.0)
Knowledge about if an insulin adjustment scale is the dose of insulin to be given in addition to the usual insulin dose and is determined by the pre-meal blood glucose	82(51.9)	76(48.1)
Knowledge about if insulin can be administered intravenously	50(31.6)	108(68.4)
Knowledge about if insulin can be injected in the abdomen	34(21.5)	124(78.5)
Knowledge about which side of the finger is the best place to do the finger prick to test capillary blood glucose	37(23.4)	121(76.6)
Knowledge about if patients that are not eating should not receive boluses of insulin but rather insulin infusion?	103(65.2)	55(34.8)
Knowledge about if a patient should be considered to be hypoglycaemic if the blood glucose is 2.9mmol/L	48(30.4)	110(69.6)

Table 2 showes that majority of the primary health care nurses have poor knowledge of diabetes mellitus care with regards to most questions relating to diabetes mellitus care, although there is adequate knowledge of the nurses with regards to some questions such as the most serious complications of diabetes (58.2%) effects of exercise on blood glucose, 114(72.2%), cardinal signs of diabetes 106(67.1%), the side of the finger that is best for testing capillary blood glucose 121(76.6%), knowledge about if insulin can be injected in the abdomen 124(78.5%) or intravenously 108(68.4%).

However, the result of the findings indicates that the nurses and midwives have inadequate knowledge of the majority of the diabetes mellitus care.

Table 3 Perceived practice of diabetic care among the primary health care nurses

			n= 158
Practice item	**Options (f (%))**		
	Never	**Rarely**	**Always**
Blood glucose monitoring	0(0.0)	67(42.4)	91(57.6)
Nutritional therapy	15(9.5)	51(32.3)	92(58.2)
Administration of medication	0(0.0)	94(59.5)	64(40.5)
Teaching proper diet, exercise and lifestyle	1(0.6)	34(21.5)	123(77.8)
Identifying and treating hypoglycemia	16(10.1)	111(70.3)	31(19.6)
Identifying and treating hyperglycemia	17(10.8)	126(79.7)	15(9.5)
Insulin administration	0(0.0)	158(100.0)	0(0.0)
Screening, prevention and early detection of D.M	0(0.0)	139(88.0)	19(12.0)
Minimizing diabetic complication	0(0.0)	99(62.7)	59(37.3)

From the table 3, results of the study indicate that majority of the nurses practice blood glucose monitoring, while 91(57.6%) of them always do that, 67(42.4%) rarely monitor the blood glucose. 92(58.2%) of nurses always carryout nutritional therapy, 51(32.3%) of them rarely practice nutritional therapy. Also, majority of the nurses 123(77.8%) practice teaching proper diet, exercise and lifestyle for diabetes mellitus care.

However, none of the nurses has never practiced blood glucose monitoring, administration of medication, insulin administration, screening, prevention and early detection of diabetes mellitus and minimizing diabetic complication.

Table 4 Perceived skills of the primary health care nurses on management of patients with diabetes mellitus

		n = 158
Skill item	**Skill status (f (%))**	
	No	**Yes**
Blood glucose monitoring	32(20.3)	126(79.7)
Nutritional therapy	23(14.6)	135(85.4)
Administration of medication	24(15.2)	134(84.8)
Teaching proper diet, exercise and lifestyle	1(0.6)	157(99.4)
Identifying and treating hypoglycemia	109(69.0)	49(31.0)
Identifying and treating hyperglycemia	94(59.5)	64(40.5)
Insulin administration	30(19.0)	128(81.0)
Screening, prevention and early detection of D.M	96(60.8)	62(39.2)
Minimizing diabetic complication	34(21.5)	124(78.5)

Results from the study indicated that 126(79.7%) of the nurses had the skills of blood glucose monitoring for diabetes mellitus care while 32(20.3%) did not have the skill of blood glucose monitoring for diabetes mellitus care.

Table 5 Availability of resources for diabetic care at the primary health care centers

Resources	Options (f(%))	
	Unavailable	**Available**
Weighing scale	0(0.0)	158(100.0)
Height scale	51(32.3)	107(67.7)
Sphygmomanometer	0(0.0)	158(100.0)
Stethoscope	0(0.0)	158(100.0)
Urinalysis equipment	36(22.8)	122(77.2)
Glucometer	0(0.0)	158(100.0)
Refrigerator	95(60.1)	63(39.9)
HbA1c monitor	140(88.6)	18(11.4)
Teaching aids	123(77.8)	35(22.2)
Referral forms	63(39.9)	95(60.1)
Diabetic drugs	3(1.9)	155(98.1)
Finger Prickers	18(11.4)	140(88.6)

Table 6 Spearman rank order correlation showing the relationship between socio-demographic characteristics and levels of competency in diabetic care among the primary health care nurses

Variable		Knowledge	Skills	Practice	Availability
Skills	Rho=	-0.019		-0.214*	-0.169*
	P=	0.813		0.007	0.034
Practice	Rho=	-0.321*	-0.214*		-0.233*
	P=	<0.001	0.007		0.003
Availability	Rho=	0.566*	-0.169*	-0.233*	
	P=	<0.001	0.034	0.003	
Age	Rho=	0.142	-0.429*	0.125	0.269*
	P=	0.076	<0.001	0.118	0.001
Highest level of education	Rho=	-0.048	-0.100	-0.098	0.544*
	P=	0.547	0.210	0.221	<0.001
Highest professional qualification	Rho=	-0.116	0.193*	-0.110	0.277*
	P=	0.146	0.015	0.168	<0.001
Rank	Rho=	0.119	-0.408*	-0.014	0.486*
	P=	0.135	<0.001	0.864	<0.001
Year of work experience	Rho=	0.347*	-0.221*	0.040	0.668*
	P=	<0.001	0.005	0.621	<0.001

Key: *=significant at p<0.05; P value is less than 0.05

135(85.4%) of the nurses and midwives used nutritional therapy in diabetes mellitus care. The majority of the nurses 157(99.4%) had skills of teaching proper diet, exercise and lifestyle in diabetes care. Also, 134(84.8%) of the nurses

had the skills of administration of medication in diabetes mellitus care. 128(81%), 124(78.5%) of them also engaged in proper insulin administration and minimizing diabetic complication in diabetes mellitus care respectively.

However, 109(69%), 94(59.5%) and 96(60.8%) of the nurses did not have the skills of identifying and treating hypoglycemia, identifying and treating hyperglycemia and screening, prevention and early detection of diabetes mellitus respectively are parts of the expected skills on diabetes mellitus care.

Results from the study indicated that all of the primary health care centres have weighing scale, sphygmomanometer, stethoscope and glucometer. Also majority of the PHC's have finger prickers, diabetic drugs and urinalysis equipments 140(88.6%), 155(98.1%) and 122(77.2%) respectively. However, there were limited number of PHC's with HbA1C monitor, and teaching aids. 107(67.7%) of the PHC's have height scale and 63(39.9%) of them have refrigerator.

3.1. Research Hypothesis 1

There is no significant association between nurses' knowledge competency and the age of primary health care nurses.

Here the p value is more than 0.05 (Rho = 0.142, p = 0.076). Therefore null hypothesis which states that there is no significant association between nurses' knowledge competency and the age of PHC nurses is accepted and alternate rejected.

3.2. Research Hypothesis 2

There is no significant association between nurses' skill acquisition competency and the years of practice of the primary health care nurses.

The null hypothesis which states that there is no significant association between nurses' skill acquisition competency and the years of practice of the primary health care nurses is rejected and alternate accepted since p value is less than 0.05 (Pho = -0.221, p = 0.005).

3.3. Research Hypothesis 3

There is no significant association between nurses' practice in diabetes care and the educational qualifications of the primary health care nurses (Rho = -0.098, p = 0.221) since p value is more than 0.05.

Table 7 Percentage nurses knowledge, skills, and practice of diabetic care, and resources availability in primary health centres

			n = 158
Variable	**Range (%)**	**Mean (%)**	**SD (%)**
Knowledge	22.58-44.19	36.97	4.33
Skills	33.33-100.00	68.85	17.93
Practice	44.44-88.89	65.65	13.08
Availability	50.00-100.0	71.26	12.74

Table 7 showed the mean percentage nurses knowledge, 36.97% indicating poor (inadequate) knowledge of the nurses on diabetes mellitus care, the mean skills of the nurses were 68.85% indicating that they have good skills and mean percentage practice was 65.65% also indicating good practice of the nurses.

The mean percentage of the availability of material resources in primary health care centres were 71.26% indicating that most of the material resource for diabetes mellitus care were available at the PHC's, although there were limited number of the PHC's with HbA1c monitor.

4. Discussion of Findings

The study revealed that majority of the nurse and midwives were aged 40-49(37.3%) and 30-39(35.4%), most of them had Diploma 114(72.2%) as their highest level of education while just few (27.8%) had first degree. A good number of

the nurses had RN and RM as their highest professional qualification. Also, majority of the respondents were nursing officer I 63(39.9%). Nurses who had worked for 6-10years were the majority of the respondents. The mean age of the nurse and midwives was 36.96±6.66years.

4.1. To assess the level of knowledge of primary health care nurses on diabetes mellitus care at Local Government Areas of Anambra

The result of this study revealed that majority of the primary health care nurses have poor knowledge of diabetes mellitus care as the mean percentage nurses knowledge was just 36.97% and this is in agreement with a study conducted by Ekenechukwu and Marcellinus (2020) on the study of diabetes care knowledge and practice among primary care physicians in South East Nigeria.

The result of the study conducted by Olamoyegun et al (2013) on assessment of diabetes related knowledge among health care providers in a tertiary health institution in Nigeria, showed a deficit knowledge by the nurses who participated in the study. Also in line with the result of the study, is the study conducted by Odili and Eke (2010) on knowledge of diabetes mellitus among registered nurses in Benin City. A cross sectional study was conducted to determine the level of diabetes knowledge gap among registered nurses in four major hospitals located in Benin City. They adapted Michigan diabetes research and training centre knowledge test questionnaire, the result of their study showed that the knowledge of the nurses on diabetes mellitus was less satisfactory and are of knowledge deficit includes diet and signs of acute complications of diabetes.

Findings from this study also revealed that only 27.8% of nurses could correctly answer questions regarding signs of ketoacidosis. This finding coincides with findings from a study by Unadike and Etukuma in (2010) who reported that nurses in Nigeria failed to identify the different types of insulin or signs and symptoms of diabetic ketoacidosis despite the nurses adequate knowledge and of diabetes mellitus, also in agreement with the findings of Hu, Yang, Chuang and Liu (2017) where only 9.8% of the respondents had good knowledge of checking symptoms of ketoacidosis.

Findings from this study also revealed deficit knowledge on insulin reaction after administering intermediate acting insulin 32(20.3%) and causes of insulin reaction 16(10.1%), although the nurses had good knowledge of the route of insulin administration. This is in congruence with the findings of Singh et al (20200 in their study of diabetes education and basic insulin related knowledge assessment in nursing staff in tertiary care hospital in India. The result of their study showed a significant deficit in basic insulin related knowledge in the nursing staff.

The result of this study was in contrast with the findings of Abdulellah et al (2017) in their study of examining perceived and actual diabetes knowledge among nurses working in a tertiary hospital, where the nurses perceived knowledge was assessed using the diabetes self report tool while the diabetes basic knowledge too was used to assess the actual knowledge f participants. The result of their study showed a positive view of diabetes knowledge. However, the findings of this study is in contrast with the findings of Barbara et al (2014) in their study of diabetes knowledge of nurses providing community care for diabetes patients in Auckland, New Zealand, the result of their study revealed that nurses had good knowledge of diabetes mellitus. Also, the study carried out by Unadike and Etukumana in (2010) on nurses understanding about diabetes in Nigeria tertiary hospital, revealed adequate knowledge of the nurses on diabetes mellitus and this is in contrast with the findings of this study. Furthermore, Oyewole et al (2020) conducted a similar study on primary health care nurse's competencies and resources availability for diabetes mellitus care at local government area of Ibadan, the findings of their study revealed that 58% of the nurses have knowledge of diabetes mellitus and this is in contrast with the result of this study.

Findings from a study conducted by Onianwa et al (2021) on outcome of an educational training programme on blood glucose monitoring among nurses in the management of hypoglycamia and hyperglycemia, with the aim of assessing nurses' knowledge on the management of diabetes and skills in blood glucose monitoring, revealed a result indicating that majority of the nurses have good knowledge of blood glucose. This is in congruence with the result of this study which showed that 114(72.2%) of the nurses answered questions on the effect of exercise on blood glucose and 88(55.7%) also answered questions on knowledge about normal blood glucose level correctly despite their overall deficit knowledge on diabetes mellitus care.

4.2. To determine the practice of primary health care nurses to diabetes care at Local Government Area of Anambra State

The study revealed good practice of the nurses on diabetes care with the mean percentage nurses practice of 65.65%. the result of the study showed that 91(57.6%) of the nurses always monitor blood glucose of their diabetic patients and 67(42.4%) rarely do that and no nurse or midwife has never practiced blood glucose monitoring of their, this is in line

with the result of the study of Onianwa et al (2021) on outcome of an educational training programme on blood glucose monitoring among nurses in the management of hypoglcaemia and hyperglycaemia. The aim of their study was to assess nurse's knowledge on the management of diabetes and skills in blood glucose monitoring. From the result of their study, majority of the nurses practice blood glucose monitoring. However, the finding of this study is in contrast with the findings of a similar study which was conducted by Oyewole et al (2020) on primary health care nurses competencies and resources availability for diabetes mellitus care at Local Government Area of Ibadan. In their study 51.1% of the nurses barely practice blood glucose monitoring.

Findings from this study revealed that 126(79.7%) of the nurses rarely identify and treat hyperglycemia and 15(9.5%) always identify and treat hyperglycemia in diabetes mellitus care, this is in line with the findings of Oyewole et al (2021) in a similar study, their findings revealed that only 35.2% of nurses responded that they identify and treat hyperglycemia in diabetes care. This is also in line with the findings from a study by Waheed (2017) where only 25% of the nurses were able to identify causes, signs and symptoms of hyperglycemia and the result of the study is also in congruence with the result of the study by Hu, Yang, Chang and Liu (2017), which reported that only 9.8% of the nurses could correctly answer questions regarding practice of checking signs and symptoms of hyperglycemia. Also, the findings of the study revealed that 158(100%) of the nurses rarely practice insulin administration and this is in contrast with the findings of a similar study conducted by Oyewole et al (2020) which reported that 64.8%) of the nurse had never practiced insulin administration.

4.3. To determine primary health care nurses skill in diabetes mellitus care at Local Government Areas of Anambra State

The finding of this study revealed that the nurses had adequate skills for diabetes mellitus care with the mean percentage nurses skill of 68.8% indicating sufficient skills for diabetes mellitus care. Results from the study indicate that majority of the nurses 126(79.7%) engaged in blood glucose monitoring for diabetes mellitus care effectively, this is in line with a the findings in a similar study conducted by Oyewole et al (2020) which showed that 86(97.7%) of the nurses had skills of blood glucose monitoring for diabetes mellitus care. Also, 77(87.5%) of the nurses in a similar study by Oyewole (2020), engaged in nutrition insulin administration for diabetes mellitus care which indicates adequate skills, this findings is similar to the findings of this study which indicates that 135(85.4%) and 128(81%) of the nurses respectively showed high skills for nutrition therapy and insulin administration respectively.

Furthermore, the findings of the study revealed similarity with the findings of another study carried out by Upendra and Devi (2016) on efficiency of training module on knowledge of diabetes care among nurses, the result of the study showed increased and adequate skills of the nurse. Also, the result of another study carried out by Al-Alawi et al (2018) was in congruence with the findings of this study, indicating high skills of diabetes mellitus care among the nurses. However, the result of this study is in contrast with the findings of a study conducted by Yacoub et al (2014) in their study on the assessment of diabetes related knowledge among registered nurses working in hospital in Jordan, the study reported deficit in practical skills of the nurses on initial treatment of hypogycaemia and insulin storage and preparation.

4.4. To identify resources available for diabetic care at Local Government Area primary health care centre in Anambra State

One of the key components of diabetes care is the general assessment of health and the screening for complications (Whitting, 2010) therefore, it is imperative to have the equipment to do this. Results from this study indicate that all the primary health care centres had weighing scale, sphymomnometer and stethoscope. Although some of them were nonfunctional. The result of this finding is in line with that of a similar study done by Oyewole et al (2020), where majority of the primary health centres had sphygmomanometer 93.5%, weighting scale 87% and stethoscope 96.8%. however, result from their study indicated that glucometer, glucometer test trips and teaching aids, were not available at 53.2%, 58.1% and 62.9% of the primary health centres respectively and their result is in contrast with the findings of this study which revealed that 158(100%) of the primary health centres had glucometer.

Furthermore, results from this study revealed that the mean percentage resources availability in primary health centres was 71.26% indicating that most of the material resources required for diabetes care were available at most primary health centres, this is in contrast with the findings from a study by Darkwa (2011) where resources were inadequate in the health facilities studied. However, the findings of this study is in consistent with the findings of Chimedamda et al (2015) in their study of implementation of clinical guidelines on diabetes and hypertension in Urban Mongelia, where the majority of the participants expressed satisfaction with the wide range of resources that had been supplied to them by the Monoglian Government to assist with the implementation of guidelines. The resources included screening devices, equipment for blood test, medications and educational materials.

Furthermore, the result of the study revealed that there were limited number of primary health centre with HbAlc monitor 18(11.4%), this is in line with the result of the study from Tripathy et al (2015) which showed that only nine of the primary health centers provided HbAlc estimation apparatus but they had other measuring tools.

4.5. To determine the association between the nurses socio-demographic characteristics and level of competency in diabetes care

4.5.1. Ho_1

There is no significant association between nurses' knowledge competency and the age of primary health care nurses. The result of this study revealed that there were no significant correlation between nurses' knowledge competency and the age of primary health care nurses. Since p value is more than 0.05 (Rho = 0.142, p = 0.076). This shows that the ages of the nurses have no influence on the nurses' knowledge competency.

4.5.2. Ho_2

There is no significant association between nurses' perceived skill acquisition competency and the years of practice of the primary health care nurses. The result of this study showed that there was significant association between the nurses perceived skill acquisition competency and the years of practice of the primary health care nurses since Rho = -0.221, p = 0.005 which indicates that p value is less than 0.05. Nurses who had worked for a longer period of time, tend to posses higher skill acquisition than the newly employed nurses and midwives. This could be as a result of their exposure to more diabetes mellitus cases. Since p value is less than 0.05, the null hypothesis is rejected and the alternate hypothesis accepted.

4.5.3. Ho3

There is no significant association between nurses' perceived practice in diabetes care and the education qualification of the primary health care nurses. The result of this study revealed that there was no significant association between nurses practice in diabetes care and the educational qualifications of the nurses since (Rho = -0.098, p = 0.221), indicating that p value is more than 0.05.

Furthermore, the result of the study showed that there was significant association between the practice of the nurses and availability of resources for diabetes mellitus care (Rho = 0.233, p = 0.003) since the p value was less than 0.05. This indicates that availability of material resources influences and enhances the practice of the primary health care nurses for diabetes care. This is in contrast with the findings of a similar study by Oyewole, et al (2020), where there was no significant association between availability of resources and practice of diabetes mellitus nursing skills.

5. Conclusion

Nurses at the primary health care had poor knowledge of diabetes mellitus care. The result of the findings revealed that the nurses and midwives possessed good skills for diabetes mellitus care. Also, they had good practice of diabetes mellitus care which is as a result of the adequate skills for the diabetes mellitus care.

There was adequate material resources for diabetes mellitus care at most primary health centres.

Finally, there was no significant association between the nurses age and knowledge competency of the nurses but a significant relationship was found between the nurses years of work experience and their skills, also a significant association was found between the nurses skills, practice and availability of material resources.

Recommendations

Based on the findings of this study, the following recommendations have been proffered;

There should be continuing education program for the primary health care nurses on diabetes mellitus care, in order to bridge the gap between theory and practice of diabetes mellitus care.

The government should ensure adequate provision of material resources for diabetes mellitus care in all the primary health care centres since adequate and functional material resources enhances diabetes mellitus care for the nurses.

There should be a standardized well approved general nursing yardstick for measuring the skills and practice of the nurses on diabetes mellitus care.

Nongovernmental organizations should assist with the provision of adequate material resources for diabetes mellitus care.

Health institutions should be aware that they have huge role to play in the provision of adequate material resources for diabetes mellitus care.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest among the authors.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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