Original Article

Do diabetes-specialty clinics differ in management approach and outcome? A cross-sectional assessment of ambulatory type 2 diabetes patients in two teaching hospitals in Nigeria

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SUMMARY

Objectives: To evaluate management approach and outcome in two endocrinologist-managed clinics using data on treatment adherence, diabetes-specific parameters, prescribed medications and self-management practices among ambulatory type 2 diabetes patients. Opinion on cause(s) and perceived fear about diabetes were also explored.

Design: A cross-sectional prospective study using semi-structured interview among consented patients for eight-week, and a review of participants' case notes at 3-month post-interactive contact for details of diabetes-specific parameters and antidiabetes medications

Settings*:* The University College Hospital (UCH) and Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) in southwestern Nigeria.

Participants*:* Adult patients with type 2 diabetes, on therapies for >3-month and who had average fasting blood glucose (FBG)>6.0mmol/L were enrolled. All patients with type 1 diabetes, and type 2 diabetes who decline participation were excluded. Out of 185 participants who were approached, 176(95.1%) consented and completed the study including 113(64.2%) from UCH and 63(35.8%) in OAUTHC.

Results*:* Mean FBG for patients were 9.6mmol/L in UCH and 11.0mmol/L in OAUTHC (p=0.03). Medication adherence among patients was 47(46.5%) in UCH and 31(52.5%) in OAUTHC (p=0.46). Prescribed antidiabetes medications between the clinics significantly differ. Practice of self-monitoring of blood glucose among participants was 26(23.0%) in UCH and 13(20.6%) in OAUTHC (p=0.72). Thirty-two participants (29.4%) in UCH and 33(43.4%) from OAUTHC (p=0.02) mentioned complications as perceived fear about type 2 diabetes.

Conclusion: There are differences and similarities between the diabetes-specialty clinics with respect to diabetes management and outcome. This underscores the necessity for a protocol-driven treatment approach in ensuring improved diabetes care and outcome.

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Keywords: Ambulatory care, Diabetes-specialty clinic, Management approach, Type 2 diabetes

INTRODUCTION

Diabetes mellitus is a chronic disease with increasing prevalence worldwide.[1,2] It constitutes a significant health and socioeconomic burden for patients and the healthcare systems[3] and is the sixth leading cause of death in the United States.[4] The International Diabetes Federation (IDF) estimates that over five million people suffer from diabetes in Africa and the number is expected to increase to 150 million by 2025.[1, 5] Nigeria has the greatest number of people living with diabetes in Africa, with an estimated burden of about 1.7 million and is projected to increase to 4.8 million by 2030.[1, 5,6, 7]

According to the "Rule of Halves" only half of people living with diabetes have been diagnosed and only half of those diagnosed receive professional care.

Of the people receiving care, only half achieve their treatment targets and only half live a life free from diabetes-related complications.[8]

Globally, it is estimated that less than 40% of patients with diabetes receive medical care in accordance with established and recommended guidelines[9, 10] while only 6% manage to achieve glycaemic goals and avoid diabetes-related complications.[2, 11]

The reasons for the disappointing performance of patients and the healthcare system with respect to diabetes has been adduced to lack of a systematic and organized approach to diabetes management and care.[11]

It is well established that intensive control of blood glucose levels and control of other cardiovascular risks can delay the onset of chronic complications thereby reducing morbidity and mortality from diabetes.[12, 13, 14]

Studies reported that less than two-third of diabetes patients receive the "minimally acceptable standard of care" even in the specialty clinic.[11, 15] Specialists are found to be more knowledgeable about appropriate and effective intervention for some major chronic illnesses including diabetes; they have also been found to adopt new approaches more quickly[15, 16] and produce better outcome in hospital settings[17, 18, 19] than the generalist medical clinic. It is reported that when diabetes patients see specialists in the context of organized program such as hospital-based clinics, outcomes are improved.[19, 20, 21]

Levetan and colleague[19] have shown that diabetes specialists deliver better care to hospitalized patients with diabetes. Ho and colleague[22] also noted improved adherence to American Diabetes Association (ADA) clinical practice recommendations at ambulatory diabetes clinic in comparison with a generalist medical clinic in a Veteran Affair Hospital. These set of recommendations and guidelines by ADA as minimal level of care for diabetes patients serve as source document for developing local treatment guidelines for management of patients with diabetes by most institution in resource poor countries.[23, 24, 25, 26] Adherence to these recommendations would therefore be expected to have a favourable effect on preventing the development and progression of diabetes related complications.[27]

Recent surveys of healthcare received by patients with diabetes in managed care or fee-for-service settings[10, 27, 28] have shown poor rates of compliance with the ADA recommendations, especially for glycated hemoglobin determinations and monitoring of home blood glucose determination.[10, 27, 28] For a consistent and effective patient-provider's interaction to occur, practice systems must ensure that healthcare provider teams have requisite expertise, appropriate patient information, and organized clinical practice support, as well as patients having ready access to self-management support and resources.[11]

The chronic care model prescribes a set of activities that emphasize active monitoring of disease in a panel of patients which includes care delivery according to clinical care techniques and proactive patient interaction to assist patients in managing their disease.[28, 29, 30] However, in Nigeria and some developing countries, evidence-based research evaluating management approach between diabetes-specialty clinics are scarce.

This study therefore aimed at evaluating and comparing management approach and outcome between endocrinologist-managed clinics using data on treatment adherence, diabetes-specific clinical parameters, types and number of prescribed medications, as well as self-management practices among ambulatory type 2 diabetes patients in two teaching hospitals in southwestern Nigeria. Opinions on cause(s) and perceived fear about type 2 diabetes were also explored.

METHODS

Study sites

Endocrinology outpatient clinics of the University College Teaching Hospital (UCH), Ibadan, and Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, both located in south-western Nigeria.

Study setting

The University College Hospital and the Obafemi Awolowo University Teaching Hospitals Complex are federal teaching hospitals with established endocrinologist-managed clinics. Each hospital is affiliated with a federal university involved in undergraduate and postgraduate residency training for physicians, as well as clinical exposure and training for other healthcare practitioners including pharmacists, nurses and other ancillary healthcare personnel. In addition, UCH and OAUTHC are among the pioneer tertiary care facilities in Nigeria where different categories of ambulatory and institutionalized patients within and outside the region receive treatment and care; they also have specialists in different fields of medicine including endocrinology. Ethical clearance and approval for the study was obtained from the joint University of Ibadan/University College Hospital (UI/UCH) Health Research and Ethics Committee (NHREC/05/91/2008a), and OAUTHC Ethics and Research Committee.

Study design

The study was a prospective cross-sectional design using semi-structured interview among consented ambulatory type 2 diabetes patients for eight consecutive weeks. A review of patients' case notes was subsequently carried out at 3-month post-interactive contact to obtained data on prescribed medications and diabetes-specific parameters including blood glucose and blood pressure using pre-piloted data collection form.

Sample size determination
Representative sample size was calculated based on estimated sample population of 340 patients for the eight weeks study period, at 95% confidence level and 5% margin of errors. Average of between 40 and 45 ambulatory type 2 diabetes patients regularly attend the diabetes clinic of each hospital per week.[31] Based on these assumptions, a target sample size of approximately 185 was computed using a Raosoft® sample size calculator.[32]

Inclusion and exclusion Criteria
Adult patients with a primary diagnosis of type 2 diabetes, who had been on antidiabetes therapies [insulin and/or oral antidiabetes medications (OAM)] for more than three months prior to the time of this study were enrolled. Patients must also have average fasting blood glucose (FBG) for three most recent consecutive measurements > 6.0 mmol/L, so as to ensure that patients with mean FBG above the United Kingdom Prospective Diabetes Study Group recommended target for intensive glycaemic control[13, 14] were recruited. All patients with type 1 diabetes and type 2 diabetes patients who were scheduled for hospital admission on the clinic days or who declined participation were excluded.

Validation and pre-test of data collection instruments
The instruments for data collection were pretested for appropriateness of sampling procedure *vis-a-vis* the study design as well as assessed for content validity. Modifications were subsequently done to remove ambiguity and ensure clarity.

Patients' sampling process
Eligible patients were purposively selected from the list of type 2 diabetes patients who attend the weekly diabetes out-patient clinic of the hospitals. Selected patients were approached for participation while they were waiting to see the physician on the clinic days. The purpose and objectives of the study were explained verbally to individual patient after which voluntary informed consent was individually obtained to signify intention to participate in the study. Patients were informed that participation is voluntary and were assured of anonymity and confidentiality of responses. Only consented patients at every diabetes clinic day of the hospitals were enrolled and administered the questionnaire. Elderly patients were assisted by caregivers who accompanied them to the hospital, and clarifications were made for those who did not understand English language. Translation and back-translation of information in the study instrument was done to ensure response consistency.

Out of 185 patients who were approached within the study period from both hospitals, a total of 176 (95.1%) consented to participate and completed the study, including 113 (64.2%) from UCH and 63 (35.8%) from OAUTHC.

Design and construction of data collection instruments
The questionnaire for the study was divided into sections. Section A captured data on patients' socio-demographic characteristics and diabetes-specific clinical parameters precisely FBG, 2-hour post-prandial glucose (2-HPPG) and blood pressure. These are routine mandatory tests prior to physician's consultation on the clinic days.

Section B was sub-group of questions to evaluate patients' medication and dietary adherence, types of prescribed antidiabetes medications and self-management practices with emphasis on self-monitoring of blood glucose (SMBG) and keeping records of blood glucose results by patients. These parameters were referred to as core diabetes management tools in this study.

Medication adherence was assessed using a 4-item modified Morisky Adherence Predictor Scale (MMAPS)[33] administered in a dichotomous version (Yes/No). In this study, a "YES" response to item-statement on the scale was assigned a score of "one" and "NO" response was assigned a score of "zero". Adherence was defined as "NO" response to all the 4-item questions on the MMAPS. Binary variables using categorization of a total score of < 1 for adherent and a total score of ≥1 for non-adherent status were subsequently developed from patients' scores on the scale[31]. Self-reported Medication Adherence Score (SRMAS) by patients was also evaluated using numerical rating scale ranging from "one" (low commitment) to "ten" (total or complete commitment). A binary variable was created from the SRMAS utilizing a cut-off of ≥ 8 and < 8 for adherent and non-adherent status respectively, based on distribution of data and the previous studies.[34, 35]

Section B also contained open-ended modified "Show and Tell" questions (MSTQ) purposely phrased to obtain information on patients' current medication use with a view to ascertain the correctness or accuracy of patients' medication use *vis-à-vis* the prescribed regimens. Patients' responses in these regards were compared with the documented prescriptions in patients' case notes. Discrepancies between patients' responses and objective evidence from the case notes were noted and documented accordingly for individual participant.

Dietary adherence was assessed using Self-reported Dietary Adherence Score (SRDAS) with numerical rating scale ranging from "one" (low commitment) to "ten" (total commitment). Dietary adherence or a good commitment to dietary recommendations was defined as SRDAS ≥ 8 while SRDAS < 8 was adjudged dietary non-adherence or poor dietary commitment.
Patients' opinion on cause(s) of diabetes, perceived fears and expectations about type 2 diabetes, as well as frequency of verbal instructions and counseling from pharmacists were also evaluated. The investigator-patient interaction usually took between 30 and 45 minutes.

Pre-piloted data collection form was used to capture information on average blood glucose and blood pressure values documented in patients' case notes at contact/baseline and at 3-month post-interactive contact. Other information obtained from the case notes included total number of prescribed medications per physician's contact which was categorized into binary variables viz >4 versus ≤4 medications (as cut-off) to indicate polypharmacy and non-polypharmacy prescriptions, respectively. This classification was based on various definitions of polypharmacy from previous studies[36, 37] which ranges from two medications to more than four.

Data Analysis
Data were sorted, coded, and entered into Predictive Analytics Software version 18.0 for management and analysis. Descriptive statistics including frequency and mean ± standard deviation were used to summarize data. Chi-square or Fischer Exact test as appropriate was used to evaluate and compare data from the two diabetes-specialty clinics with respect to socio-demographic variables and core diabetes management tools. The mean glycaemic and blood pressure values between the clinics were evaluated and compared using Student's t-test with $p < 0.05$ considered significant.

RESULTS

A substantial proportion of the patients, 73 (64.6%) in UCH and 42 (66.7%) in OAUTHC were within the age range of 51 to 70 years. Participants were mostly female, 68 (60.2%) in UCH and 40 (63.5%) in OAUTHC. A sizeable proportion had no formal education, 36 (31.9%) in UCH and 18 (28.6%) in OAUTHC. There was no significant difference in socio-demographic characteristics of patients from both hospitals (Table 1).

The mean duration of diagnosis for patients from UCH was 6.9 years and 5.2 years for OAUTHC (t-test = 2.02, $p = 0.05$).

The mean baseline FBG for participants from UCH was 9.6 mmol/L compared to FBG of 11.0 mmol/L in OAUTHC ($p = 0.03$). There was also a significant difference in mean FBG values between the clinics at the 3-month post-interactive contact ($p = 0.00$). The mean baseline blood pressure for patients from UCH was 133/79 mmHg compared to 137/78 mmHg in OAUTHC.

Table 1 Patients' Socio-Demographic Characteristics in the Study Sites

Variables	UCH N (%)	OAUTHC N (%)	p –value
Age (year)			
30 – 40	3 (2.7)	4 (6.3)	
41-50	19 (16.8)	7 (11.1)	
51-60	31 (27.4)	22 (34.9)	
61-70	42 (37.2)	20 (31.7)	
Above 70	18 (15.9)	10 (15.9)	0.50
Sex			
Male	45 (39.8)	23 (36.5)	
Female	68 (60.2)	40 (63.5)	0.67
Educational qualification			
No formal education	36 (31.9)	18 (28.6)	
Primary	26 (23.0)	14 (22.2)	
Secondary	29 (25.7)	14 (22.2)	
Tertiary	22 (19.5)	17 (27.0)	0.71
Occupation			
Traders	42 (37.2)	28 (44.4)	
Retirees	26 (23.0)	11 (17.5)	
Civil servants	15 (13.3)	13 (20.6)	
Professionals	17 (15.0)	6 (9.5)	
Unemployed	8 (7.1)	2 (3.2)	
Artisans	5 (4.4)	3 (4.8)	0.47
Marital status			
Married	97 (85.8)	55 (87.3)	
Widowed	16 (14.2)	8 (12.7)	0.79

UCH = University College Hospital; OAUTHC = Obafemi Awolowo University Teaching Hospitals Complex; Level of statistical significance $p < 0.05$; N = number; *Significant difference with chi-square test

Out of the 100 (56.8 %) patients who had 2-hour post-prandial glucose (2-HPPG) values documented in their case notes at contact; 98 (98.0 %) were from UCH with mean 2-HPPG of 13.7±5.0 mmol/L, and 2 (2.0 %) from OAUTHC with mean 2-HPPG of 14.7±0.9 mmol/L (p=0.79). Diabetes-specific clinical parameters from both hospitals are shown in Table 2.

Table 2 Comparison of diabetes-specific parameters between the study sites

Variables	UCH		OAUTHC		t-test	p-value
	N	Mean ± SD	N	Mean ± SD		
Baseline/contact FBG *(mmol/L)*	113	9.6 ± 3.5	63	11.0 ± 4.6	-2.273	0.03*
Mean FBG in 3-month (*mmol/L*)	100	8.0 ± 3.0	58	10.5 ± 5.1	- 3.374	0.00*
Baseline/contact 2-HPPG (*mmol/L*)	98	13.7 ± 5.0	2	14.7 ±0.9	- 0.271	0.79
Mean 2-HPPG in 3-month (*mmol/L*)	86	11.5 ± 4.4	1	13.9 ± 0.0	- 0.547	0.59
Baseline/contact SBP (*mmHg*)	105	132.8 ± 22.6	59	137.0 ± 23.5	- 1.109	0.27
Baseline/contact DBP (*mmHg*)	105	78.5 ± 11.7	59	77.9 ± 11.8	0.294	0.77
Mean SBP in 3-month (*mmHg*)	93	132.4 ± 21.0	56	135.5 ± 18.3	- 0.932	0.35
Mean DBP in 3-month (*mmHg*)	93	77.1 ± 12.3	56	76.8 ± 10.8	0.173	0.86

UCH = University College Hospital; OAUTHC = Obafemi Awolowo University Teaching Hospital Complex; N = Number; SD = Standard deviation; FBG = Fasting Blood Glucose; 2-HPPG = 2-hour post-prandial glucose; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; *Significant difference with Student's t-test; Level of statistical significance $p < 0.05$

Details of data and patients' responses to core diabetes management and outcome evaluation tools from the two diabetes clinics are shown in Tables 3 and 4. Oral antidiabetes medications (OAM) alone were mostly prescribed in both hospitals, 76 (71.0%) in UCH and 54 (85.7%) in OAUTHC.

Table 3 Response parameters with significant differences between the study sites using the core diabetes management tools

Variables	UCH	OAUTHC	Chi-square	p-value
	N (%)	N (%)		
Types of antidiabetes medications				
Oral Antidiabetes Medications (OAM)	76 (71.0)	54 (85.7)		
Insulin + OAM	17 (15.9)	9 (14.3)		
Insulin alone	14 (13.1)	0 (0.0)	9.428	0.01*
Number of medication per contact				
≤ 4 medications	50 (46.7)	17 (27.0)		
> 4 medications	57 (53.3)	46 (73.0)	6.729	0.01*
Generic versus proprietary prescription				
Exclusively generic medications	76 (71.7)	25 (39.7)		
Exclusively proprietary medications	13 (12.3)	10 (15.9)		
Generic plus proprietary medications	17 (16.0)	28 (44.4)	19.130	0.00*
Pharmacist-patient interaction during prescription refills				
Yes	37 (33.6)	9 (14.3)		
No	73 (66.4)	54 (85.7)	7.684	0.01*
Antidiabetes prescriptions written with supplementary information				
Yes	27 (25.0)	1 (1.6)		
No	81 (75.0)	61 (98.4)	15.660	0.00*

Numbers may not add up to 176 in some cases because only valid responses for each item-statement or variable were considered for analysis; UCH = University College Hospital; OAUTHC = Obafemi Awolowo University Teaching Hospitals Complex; Level of statistical significance $p < 0.05$; N = number; *Significant difference with chi-square test

Table 3 continued. Response parameters with significant differences between the study sites using the core diabetes management tools

Patients' response to MSTQ and prescribed regimens in the case notes				
	UCH N (%)	**OAUTHC N (%)**	**Chi-square**	**p-value**
Accurate with medication name, dosage regimen, but not with respect to meal time	36 (33.6)	20 (31.7)		
Accurate with medication name, dosage regimen, and intake in relation to meal time	20 (18.7)	6 (9.5)		
Accurate with medication name only, but inaccurate with dosage regimen, and intake with respect to meal time	13 (12.1)	8 (12.7)		
Accurate with medication name and frequency, but inaccurate with dose and administration with regard to meal time	17 (15.9)	3 (4.8)		
Inaccurate with medication name, dosage regimen and meal time	9 (8.4)	6 (9.5)	15.340	0.01*
Unable to clarify medication usage	12 (11.2)	20 (31.7)		
Proportion that brought the prescribed medications (whole or part) to the clinic				
Yes	67 (65.0)	23 (36.5)		
No	36 (35.0)	40 (63.5)	12.830	0.00*
Awareness of kind of food to eat or avoid				
Yes	54 (85.7)	32 (51.6)		
No	9 (14.3)	30 (48.4)	16.930	0.00*

Numbers may not add up to 176 in some cases because only valid responses for each item-statement or variable were considered for analysis; UCH = University College Hospital; OAUTHC = Obafemi Awolowo University Teaching Hospitals Complex; Level of statistical significance $p < 0.05$; N = number; *Significant difference with chi-square test; MSTQ =Modified "Show and Tell" questions

Fourteen (13.1%) patients from UCH were placed on insulin therapy alone compared to none in OAUTHC ($p = 0.01$). Proportions of patients on more than four medications were 57 (53.3%) in UCH and 46 (73.0%) in OAUTHC ($p = 0.01$). Non-inclusion of supplementary instructions for antidiabetes prescriptions was common in both hospitals, 81 (75.0%) in UCH and 61 (98.4%) in OAUTHC ($p = 0.00$) Table 3. Patients who engaged in the practice of SMBG in UCH were 26 (23.0%) compared to 13 (20.6%) in OAUTHC ($p = 0.72$).

Ninety-seven (89.8%) patients from UCH and 60 (96.7%) in OAUTHC ($p = 0.10$) did not keep records of blood glucose results either self-measured or hospital-measured. Self-reported dietary adherence scores among patients showed that 40 (71.4%) were dietary non-adherent in UCH and 42 (68.9%) in OAUTHC ($p = 0.76$). Self-reported medication adherence score indicated that 21 (19.3%) patients from UCH had average scores > 8 (adherent) versus 9 (14.3%) in OAUTHC ($p = 0.41$) Table 4.

Summarily, 32 (29.4%) patients in UCH and 33 (43.4%) in OAUTHC mentioned complications arising from inadequate glycaemic control as the most common fear and concern about type 2 diabetes (Table 5).

Unguided dietary and drinking habits were mostly cited by patients, 49(39.8%) UCH and 32(47.8%) OAUTHC ($p = 0.45$), as probable cause(s) of diabetes. Details of patients' opinions on cause(s) of diabetes and perceived fear about type 2 diabetes are shown in Table 5. A substantial proportion of patients from both hospitals had expectation of a stable blood glucose control from ensuring maximal commitment to antidiabetes treatment recommendations, 35 (49.3%) in UCH versus 58 (80.6%) in OAUTHC. Twelve (16.9%) patients in UCH and 11 (15.3%) in OAUTHC desired to be off the antidiabetes medications completely or to have substantial reduction in the number of prescribed medications. Seventeen (23.9%) in UCH and 2 (2.8%) in OAUTHC wanted to be symptom-free, while 7 (9.9%) UCH and one (1.4%) OAUTHC wished for "peace of mind" as the main goal to accomplish from adhering to diabetes treatment plans.

Table 4 Response parameters without significant difference between the study sites using the core diabetes management tools

Variables	UCH N (%)	OAUTHC N (%)	Chi-square	p-value
Practice of SMBG				
Yes	26 (23.0)	13 (20.6)	0.132	0.72
No	87 (77.0)	50 (79.4)		
Keeping record of blood glucose results				
Yes	11 (10.2)	2 (3.2)	2.701	0.10
No	97 (89.8)	60 (96.7)		
Self-reported dietary adherence score				
Adherent (self-score ≥ 8)	16 (28.6)	19 (31.1)	0.092	0.76
Non-adherent (self-score < 8)	40 (71.4)	42 (68.9)		
Modified Morisky adherence predictor scale				
Adherent	47 (46.5)	31 (52.5)	5.380	0.46
Non-adherent	54 (53.5)	28 (47.5)		
Self-reported medication adherence score				
Adherent (self-score ≥ 8)	21 (19.3)	9(14.3)	0.688	0.41
Non-adherent (self-score < 8)	88 (80.7)	54 (85.7)		
Opinion on whether diabetes can be cured				
Yes, can be cured	25 (46.3)	32 (50.8)		
No, can only be managed	25 (46.3)	19 (30.2)	5.015	0.08
Do not know	4 (7.4)	12 (19.0)		

Numbers may not add up to 176 in some cases because only valid responses for each item-statement or variable were considered for analysis; UCH = University College Hospital; OAUTHC = Obafemi Awolowo University Teaching Hospitals Complex; Level of statistical significance p < 0.05; N = number; SMBG = Self-monitoring of blood glucose

Table 5 Summary of patients' opinion on cause(s) and perceived fear about diabetes

Perceived fear or concern about type 2 diabetes (n = 185)	UCH N (%)	OAUTHC N (%)	p-value
Complications due to poor management or inadequate glycaemic control	32 (29.4)	33 (43.4)	
Premature death	28 (25.7)	19 (25.0)	
Concurrent disease or organ damage	8 (7.3)	9 (11.8)	
Constant fluctuations or uncontrolled blood glucose levels	15 (13.8)	0 (0.0)	
Lifetime duration of diabetes treatment plans and possible medication side effects	1 (0.9)	2 (2.6)	
Continued dietary restriction despite the urge	3 (2.8)	0 (0.0)	0.02
Continued/perpetual financial burden of diabetes	0 (0.0)	2 (2.6)	
No fear	22 (20.2)	11 (14.5)	
Opinions on cause(s) of type 2 diabetes (n = 190)			
Unguided dietary and drinking habit	49 (39.8)	32 (47.8)	
Genetic/hereditary	24 (19.5)	10 (14.9)	
Sedentary lifestyle	5 (4.1)	1 (1.5)	
Satanic/devil's work	3 (2.4)	3 (4.5)	
Other disease conditions especially uncontrolled hypertension	5 (4.1)	0 (0.0)	0.45
Insufficient insulin	0 (0.0)	1 (1.5)	
Do not know the cause	37 (30.1)	20 (29.8)	

DISCUSSION

In this study, larger proportion of patients from the hospitals were above 50 years of age and had duration of diagnosis far less than 10 years. This perhaps corroborate the report stating that type 2 diabetes is commoner among older adults.[28, 38] The finding also substantiate the emphasis on screening for diabetes symptoms in adult above 40 years at least once every three year.[23, 38, 39]

The extent of blood glucose reduction for patients in individual clinic and necessity for achieving blood glucose targets may probably accounts for the significant differences between the two diabetes-specialty clinics with respect to types and number of prescribed medications. Compelling needs of patients' vis-à-vis the underlying comorbid diseases and existing diabetes complication is also a significant determinant of prescribed antidiabetes medications. However, variation in management approach in the diabetes clinics may further be associated with physician-related factors including inertia on commencing a particular regimen. [6 ,40, 41]

Healthcare system-related factors such as non-availability of requisite and competent personnel, as well as non-accessibility and non-availability of essential low-cost medicines[6, 39] may also be a possible contributory reason for variation in prescribing trends and management outcome in the hospitals. In this study, physician and healthcare system-related factors as well as the possibility of patients having an established comorbid disease or complication were not directly explored.

It is noted that fewer proportion of patients were placed on combination of OAM and insulin, while no patient was placed on insulin regimen alone in OAUTHC. Also, 2-HPPG was barely done for patients from OAUTHC compared to more than two-third from UCH who were recommended the test. These are clear distinctions between the two diabetes clinics that may partly be traced to difference in management approach in the hospitals. However, peculiarity of patients from each hospital, especially with respect to status of diabetes-specific clinical parameters including fasting and postprandial blood glucose levels is a significant factor to consider when deciding on choice of antidiabetes medication for patients.

In general, the American Diabetes Association and International Diabetes Federation have indicated that insulin therapy either alone or in combination with OAM should be instituted in type 2 diabetes whenever the blood glucose levels are consistently exceeding the glycaemic target after the patient has been on appropriate combination of oral agents at a maximum recommended daily dosage[23, 25, 41], and when non-adherence issues with the oral agents have been completely excluded. It should however be noted that, writing a prescription of tablets or of insulin takes perhaps the same amount of time and energy, the pre-prescription and post-prescription work involved in insulin therapy is quite significant, thereby creating the likelihood of reluctance to initiate insulin therapy for patients.[40 ,41]

In addition, larger proportion of patients from OAUTHC were placed on polypharmacy prescriptions (>4 medications) per physician contact compared to those from UCH. The conspicuously high blood glucose values among patients from OAUTHC might have necessitated the prescription of multiple drugs mostly for patients from OAUTHC compared to moderately high fasting and postprandial blood glucose levels among patients from UCH. Studies have shown that multiple medications may constitute a well-recognized trend in the comprehensive approach to management of type 2 diabetes patients who may require adjunct medications to treat comorbid diseases including hypertension and hyperlipidemia.[42, 43]

A higher percentage of patients in UCH were noted to benefit from pharmacist-patient interaction during prescription refill compared to those from OAUTHC. Also, a sizeable proportion of antidiabetes prescriptions from UCH compared to fewer from OAUTHC were written with necessary supplementary instructions. Provision of essential value-added services by pharmacists during filling or refilling of prescriptions, as well as inclusion of ancillary instructions on antidiabetes prescriptions need to be encouraged at every patient-provider's encounter. These are useful practice tips that may foster and facilitate reinforcement of medication instructions during prescription refill, as well as guide patient's accurate administration of prescribed antidiabetes medications. A study has shown that advice and counseling from other healthcare givers aside diabetes specialist play a valuable role in educating patients with diabetes with attendant positive results.[44]

In this study, most patients in the two diabetes clinics did not achieve the UKPDS recommended fasting blood glucose target of less than 6.0 mmol/L for intensive glycaemic control[13, 14] at the 3-month post-interactive contact. However, the systolic and diastolic blood pressure for patients in both clinics were within the JNC 8 recommended blood pressure goals of 140/90 mmHg for diabetes patients[45.] This partly suggest the need for patients' continuing enlightenment and education on the importance of ensuring adequate blood pressure and blood glucose control.

Studies have clearly shown that the benefits of intensive treatment of blood pressure are at least as great as the benefits of intensive control of blood glucose among patients with type 2 diabetes.[13, 14] The non-attainment of glycaemic goals by patients probably accounts for the high proportion of patients in both hospitals who were placed on more than four medications comprising the antihyperglycaemic and adjunct therapy. Notably, most patients were placed on oral antidiabetes medications alone either as a co-administered combination of glibenclamide or glimepiride and metformin, or as metformin monotherapy. Oral antidiabetes agents are largely considered to be the first line therapy of choice for management of type 2 diabetes.[5, 13, 25, 39]

Engagement in SMBG practice and keeping records of blood glucose results among patients from the two diabetes clinics was suboptimal. This seems consistent with previous studies.[46, 47, 48] Although, literature remains controversial on the benefits of SMBG for patients with type 2 diabetes, the benefits of regular SMBG in Type 1 diabetes is evidence-based.[49] However, RetrOlective Study Self-monitoring of blood glucose and Outcome (ROSSO) among patients with type 2 diabetes have provided clear evidence on the benefits of SMBG for type 2 diabetes. ROSSO reported that the risk for patients in the SMBG group to develop cardiovascular disease is about one-third lower than for group without self-monitoring and the mortality rate was 50% lower.[49, 50] It has also been reported that frequent SMBG is significantly associated with better glycaemic control.[51, 52] Self-monitoring of blood glucose is useful in helping patients to adjust dietary intake and insulin, and to help physicians recommend adjustments in timing and doses of medications.[6, 52, 53] Thus, providers who are directly involved in diabetes care need to encourage SMBG practice among type 2 diabetes patients, by emphasizing the benefits and importance of SMBG, as well as highlighting the advantages of keeping charts of blood glucose results. In general, type 2 diabetes patients with poor glucose control and those given a new medication or a new dose of a currently used medication may be asked to self-monitor once to greater than five times per day depending on patient's needs and ability, as well as complexity of the treatment regimen.[54] American Diabetes Association (ADA) in the Standards of Medical Care in Diabetes (2014) has also stressed the importance and necessity of diabetes self-management education at every encounter of diabetes primary care provider and patients so as to ensure improved diabetes care.[23, 25]

In this study, medication and dietary non-adherent patients from the two hospitals were glaringly more than their adherent counterparts.

This seems consistent with the previous studies which reported that treatment non-adherence is a pervasive medical problem that is common among patients with chronic diseases generally and type 2 diabetes in particular.[53, 55, 56] Expectedly, patient's non-adherence to treatment recommendations could decrease treatment effectiveness, leading to inadequate glycaemic control with subsequent manifestation of diabetes complications.[57, 58] The conspicuously high fasting and postprandial blood glucose levels in the diabetes clinics at contact and at the 3-month post-interactive contact may therefore be partly linked to high levels of treatment non-adherence among patients. Poor socio-economic status, low literacy level and restricted access to healthcare facilities have been largely identified as factors that may contribute to increasing incidence of treatment non-adherence among diabetes patients in resource poor countries including Nigeria.[59, 60, 61]

Summarily, only 0.5% and 17.9% correctly cited insufficient insulin and genetic factor respectively as the foremost cause(s) of type 2 diabetes, while larger proportion of patients in both hospitals believed that unguided dietary and drinking habits are the probable cause of type 2 diabetes. Although, unhealthy dietary habits may be detrimental to achieving better glycaemic control; patients need to understand and be enlightened on the clear difference between the risk factors and the leading cause(s) of type 2 diabetes including deficient insulin secretion due to pancreatic beta-cell dysfunction and insulin resistance. [62 ,63] Also, less than one-half of patients in both clinics knew that diabetes mellitus can only be managed and not be totally cured. Studies have shown that probing patient's perspective of their medical condition and determining what the patient knows, believes, and expects in terms of treatment will give the provider insight into the possible contradictory or conflicting thought and notion by the patient, as well as giving the provider an opportunity to relieve anxieties and respond appropriately to patient's concerns.[64, 65]

In this study, emergence of diabetes complications and premature death were the most common fear among patients. Studies have earlier shown that micro-and macro-vascular complications are the major cause of morbidity and premature death among patients with diabetes.[66, 67, 68] This perhaps imply that, at every encounter with patients, healthcare providers need to consistently stress the importance of ensuring and maintaining intensive glycaemic control necessary for prevention or delaying the onset of complications due to uncontrolled blood glucose levels.

Achievement of optimal and better glycaemic control was the expectation of a sizeable proportion of patients from both hospitals as they tend to increased efforts towards improved commitment to prescribed treatment plans. This perhaps suggests that if patients are appropriately guided on essentials of diabetes control, and were encouraged through quality and purposeful counseling, there may be improvement in treatment adherence.[69, 70] Studies have shown that the likelihood of success in treatment is meaningfully enhanced when patient's preferences and concerns can be accommodated in treatment decision, and regimens tailored accordingly.[70, 71]

The non-availability of glycated haemoglobin (HbA1c) as a measure to assess the glycaemic control constitutes a limitation of this study. Glycated haemoglobin value might have been an objective measure of long-term glycaemic control. The relatively high cost for HbA1c test (13 to 19 USD) in the health facility might limit its use for assessing patient's glycaemic status.[6, 31] Routine blood glucose assessment for patients in the hospitals is mostly done using fasting blood glucose results with or without 2-HPPG.

In addition, adherence assessment using self-reported approach may be associated with some inherent shortcomings such as patient who may report good adherence or under report poor adherence or simply do not know their current adherence status.[35, 37] Nonetheless, self-report measure of adherence using non-threatening and non-judgmental questions has been described as a reliable tool to assess adherence in most clinical settings.[71, 72]

Conclusion

From this study, it could be concluded that there are differences between the two diabetes-specialty clinics with respect to types and number of prescribed medications. Also, there are similarities between the clinics in relation to suboptimal practice of SMBG and diabetes-specific clinical parameters, as well as medication and dietary non-adherence. The differences and similarities between the clinics with respect to management approach and outcome may be largely linked to the extent of blood glucose reduction for patients in individual clinic. However, physician and healthcare system-related factors which were not directly explored in this study could also be contributory reasons for variation in management approach and outcome. Thus, the necessity for a protocol-driven treatment approach in ensuring consistent and improved diabetes care and outcome.

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