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Impact of Multidisciplinary Care on Type 2 Diabetes Outcomes at Rivers State University Teaching Hospital

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ABSTRACT

Type 2 diabetes mellitus remains a growing concern in Nigeria, with high morbidity tied to poor glycemic control and the development of comorbidities and complications. Multidisciplinary care models are increasingly recognized as a solution to these challenges, offering coordinated treatment across various healthcare providers. This study examines the outcomes of multidisciplinary care for Type 2 diabetes patients at Rivers State University Teaching Hospital (RSUTH), focusing on improvements in glycemic control and management of diabetes-related comorbidities and complications. An uncontrolled quasi-experimental intervention and observational study design with pre- and post-assessment was conducted involving 442 adult patients diagnosed with type 2 diabetes. Data were collected on glycemic indices (HbA1c levels), incidence and severity of comorbid conditions and frequency of diabetes-related complications. Comparative analysis was performed between baseline and follow-up metrics, supported by patient interviews and clinician assessments.

The multidisciplinary care approach yielded a significant reduction in average HbA1c levels from 9.2% to 7.4%. Comorbidities were more effectively managed, with reduced reliance on emergency interventions. Furthermore, the progression of complications showed a notable decline, particularly in early-stage neuropathy and retinopathy. Multidisciplinary management of Type 2 diabetes at RSUTH substantially improves glycemic control, facilitates early detection and treatment of comorbidities, and mitigates the risk of long-term complications. These findings advocate for broader implementation of integrated care pathways in tertiary healthcare settings across Nigeria.

Keywords: Type 2 diabetes, multidisciplinary care, glycemic control, comorbidities, diabetes complications

INTRODUCTION

Diabetes is a disproportionately expensive disease; according to the ADA, in 2022, the annual cost of diabetes in the United States reached \$412.9 billion, with \$306.6 billion of that being direct medical costs, and \$106.3 billion representing indirect costs. Medical expenditures for people with diagnosed diabetes were 2.6 times greater, on average, than those expected had they not had diabetes (Parker et al., 2024). Glycemic control plays a pivotal role in the treatment of this expensive disease (diabetes) by maintaining blood glucose levels within a target range, thereby preventing both short-term and long-term complications. Effective glycemic control is essential for managing diabetes and improving the overall health and quality of life of individuals with the condition. Various factors influence glycemic control and the effectiveness of a multidisciplinary program, which aims to address these factors comprehensively. Factors associated with poor glycemic control include poor medication

adherence, unhealthy diet, obesity, duration of diabetes exceeding 10 years, hyperlipidemia, advanced age, high systolic blood pressure (BP), and male gender (Anioke et al., 2019). Additional contributing factors include poor health literacy, low education, and unemployment (Asmelash et al., 2019; Dedefo et al., 2020). To address the complexities associated with providing care for people living with diabetes, a multidisciplinary care model has recently emerged as a promising tool for delivering integrated patient-centred diabetes care. By encouraging a collaborative effort between several key healthcare professionals, this model aims to utilize a shared bank of expertise to coordinate the management of patients with diabetes. Several studies have demonstrated the international efficacy of the multidisciplinary approach in improving glycemic control, managing comorbidities and enhancing care coordination. Furthermore, studies have consistently highlighted the acceptability and feasibility of these collaborative models from both the patient and healthcare provider perspectives. However, despite these advancements in research, there currently exists a paucity of evidence regarding the effectiveness of multidisciplinary diabetes care models in Sub-Saharan Africa, especially in Nigeria. In the context of a multidisciplinary program, addressing these factors through coordinated care involving medical, nutritional, and educational interventions may improve glycemic control and reduce the incidence of comorbidities. The overall prevalence of diabetes mellitus (DM) has been rising in Nigeria, and studies have shown a dramatic increase in diabetic complications, such as leg ulcers, cardiovascular illness, and renal ailments, particularly in cities like Port Harcourt (Ezeama & Enwereji, 2019). The multidisciplinary approach, which aims to mitigate these complications and improve patient outcomes by providing holistic care and support to patients with type 2 diabetes at RSUTH, is, however, the thrust of this study.

Aim and Objectives of the Study

This study investigated the effect of a multidisciplinary program on glycemic control and comorbidities in patients with type 2 diabetes at the Rivers State University Teaching Hospital (RSUTH). The specific objectives of the study included:

1. To assess the effectiveness of a multidisciplinary program on glycemic control in patients with type 2 diabetes at RSUTH, measured by changes in HbA1c levels.
2. To determine the effect of cardiovascular comorbidities (hypertension) in patients with type 2 diabetes at RSUTH.
3. To evaluate the effect of the multidisciplinary program on the development and progression of microvascular complications (retinopathy, nephropathy and neuropathy) in patients with type 2 diabetes at RSUTH.
4. To compare the changes in weight between patients with type 2 diabetes at RSUTH who participate in the multidisciplinary program and those who receive standard care.

Research Questions

The following understated research questions guided this study:

1. What is the effectiveness of a multidisciplinary program on glycemic control in patients with type 2 diabetes at RSUTH, as measured by changes in HbA1c levels?
2. How does the multidisciplinary program influence the prevalence and severity of cardiovascular comorbidities, such as hypertension and coronary artery disease, in patients with type 2 diabetes at RSUTH?
3. What is the effect of the multidisciplinary program on the development and progression of microvascular complications, including retinopathy, nephropathy, and neuropathy, in patients with type 2 diabetes at RSUTH?
4. What is the difference in weight between patients with type 2 diabetes at RSUTH who are enrolled in the multidisciplinary program and those who receive standard care?

MATERIALS AND METHODS

This study adopted an uncontrolled quasi-experimental intervention and observational study design with pre- and post-assessment. Pre-intervention data was assessed by retrospectively reviewing patient charts for at least 2 visits before starting the multidisciplinary program, including variables such as weight, HbA1c levels, blood pressure, medication adherence, and lifestyle factors. Post-intervention data was assessed by prospectively following the patients for at least 2 visits after the multidisciplinary program (for a maximum of 6-12 months), during which the same variables were

monitored to evaluate changes over time. Additionally, patient-reported outcomes were collected to provide a comprehensive assessment of the program's impact. Data analysis will compare pre- and post-intervention outcomes to determine the effectiveness of the multidisciplinary program relative to standard care. The study was conducted at Rivers State University Teaching Hospital (RSUTH), a tertiary healthcare facility in Rivers State, Nigeria, with a specialized diabetes clinic. The population of this study was estimated at 47,264 adults aged 18–65 years diagnosed with type 2 diabetes mellitus (T2DM) for ≥ 1 year, receiving care at the Endocrinology Department at Rivers State University Teaching Hospital (RSUTH) and are resident within Port Harcourt and Obio/Akpor LGAs of Rivers State in the last one year. Inclusion criteria were applied to already confirmed and diagnosed T2DM diabetic adults aged 18 years and above attending the diabetes clinic at Endocrinology Department Rivers State University Teaching Hospital (RSUTH) for at least 6 months who were willing to provide informed consent. Patients were excluded from this study if they had severe diabetes-related complications such as end-stage renal disease or advanced retinopathy, are experiencing acute or critical illnesses that hinder participation, lack recent HbA1c-confirmed glycemic data within the past four weeks or were unable to provide essential study information, or if they were diagnosed with gestational diabetes. The study derived its sample size from Taro Yamane's Formula with gave an adjusted sample size of 442. The study adopted a multistage sampling procedure in sample selection. This study made use data from primary and secondary sources. Data collection was collected after physician consultation sessions, with informed consent obtained from all participants. Sociodemographic, behavioural, and clinical data were collected through face-to-face interviews using a pre-tested structured questionnaire derived from various literature sources. Before implementation, the questionnaire was pre-tested at the University of Port Harcourt Teaching Hospital (UPTH). A trained team consisting of a nurse, a physician, and a laboratory technician conducted the interviews following a one-day training session. In parallel, patient medical records were carefully reviewed to identify potential factors influencing HbA1c test results, including medical history, types of antidiabetic medications, and comorbidities. To ensure data quality and validity, stringent measures were implemented throughout the study. The questionnaire was carefully designed based on previous literature and adapted to the local context. Some aspects of the questionnaire were translated into pidgin English by a bilingual expert to cater for the illiterate participants in this study and to ensure accuracy and consistency. Training sessions were held for data collectors and research assistants to standardize data collection procedures. To ensure the reliability coefficient of the instrument, a pre-test was conducted on 5% of randomly selected T2DM patients at the University of Port Harcourt Teaching (UPTH) who were not be part of the sample of this study before data collection and minor adjustments were made based on feedback.

The data collection procedure for this study was done in phases. First, the researcher sought permission and ethical approval from the management of the Rivers State University Teaching Hospital (RSUTH). This was immediately followed by the recruitment of the multidisciplinary program team which included a senior family physician, and clinical pharmacy specialist who was the case manager, dietician, diabetic educator, health educator, and social worker. The program team met twice weekly to review the eligibility of referred patients and to assess and decide on the care plans for those who enrolled. This was followed by the enrolment into the multidisciplinary program conducted through the physician referral using the Diabetes Clinic Patient Referral Form. Patients were enrolled if they had an HbA1c test performed within 3 months after the program and had follow-up data for at least 3 months. Patients were excluded if there was insufficient data and/or an incomplete medical history. The main clinical outcomes measured included HbA1c, fasting blood sugar, blood pressure (BP), lipid profile, and weight. The lipid profile included total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL) cholesterol, and triglycerides (TG), given in mmol/L. All these clinical outcomes were measured at baseline before the multidisciplinary program using patients' records at 3 and 6-month intervals after the Multidisciplinary program. The care that was provided followed standard care per the guidelines of the American Diabetes Association (ADA, 2023), but was intensified with consideration for individual clinical and social factors. The case manager was responsible for arranging required appointments with other specialities as per the care plan, as well as evaluating the compliance and adverse effects of the new plan, through at least weekly appointments in the first 3 months. Enrolled patients had to be seen at least once by all

members of the program team during the period of enrolment, except for the social worker who was seen on an as-needed basis. Strategies to improve the care were patient-based and included providing more clinic visits, frequent monitoring of outcomes, improving multidisciplinary communication and coordination, providing additional diabetic education and dietetic advice, promoting self-management, providing a booklet for home blood glucose monitoring, adjusting doses according to hepatic and renal functions, assessing the need and performing insulin titration, encouraging medication adherence, providing social support, sending patients reminders, and making telephone calls when necessary. Data was collected over three months and analysed using the Statistical Package for Social Sciences (SPSS 25) version 25.0. Quantitative and qualitative methods of data analysis were adopted in this study. The study used descriptive statistics of frequency distribution tables, as well as mean and standard deviation, to answer research questions. Prior to the study, official approval was obtained from RSUTH management. Written informed consent was secured from willing participants, who were informed of their right to withdraw at any time. All collected data was securely protected and used solely for research purposes.

Results and Findings

Research Question One: *What is the effectiveness of a multidisciplinary program on glycemic control in patients with type 2 diabetes at RSUTH, as measured by changes in HbA1c levels?*

Table 1: Freq. and % of the effectiveness of a multidisciplinary program on glycemic control in patients with type 2 diabetes at RSUTH, as measured by changes in HbA1c levels

Items	Response Option	Frequency	Percentage (%)
Have you participated in the multidisciplinary diabetes care program at RSUTH?	Yes	400	100.0
	No	-	-
	Total	400	100.0
How many months have you been enrolled in the program?	Less than 3 months	27	6.8
	3–6 months	261	65.3
	More than 6 months	112	28.0
	Total	400	100.0
Since joining the program, have you noticed an improvement in your blood sugar control?	Yes	304	76.0
	No	14	3.5
	Not Sure	82	20.5
	Total	400	100.0
	Below 6.5%	267	66.8
What was your most recent HbA1c level?	6.5%–7.5%	52	13.0
	Above 7.5%	63	15.8
	Don't know	18	4.5
	Total	400	100.0
	Weekly	81	20.3
How frequently do you consult with the multidisciplinary team?	Monthly	215	53.8
	Every 3 months	81	20.3
	Rarely	13	3.3
	Never	10	2.5
	Total	400	100.0
How confident are you in managing your diabetes after receiving support from the program?	Very Confident	131	32.8
	Somewhat Confident	219	54.8
	Not Confident	50	12.5
	Total	400	100.0
	Strongly Agree	251	62.7
Has the program helped you improve your diet and exercise habits?	Agree	69	17.3
	Neutral	11	2.8
	Disagree	23	5.8
	Strongly Disagree	46	11.5
	Total	400	100.0
How satisfied are you with the education and guidance provided by the	Very Satisfied	330	82.5
	Satisfied	36	9.0

multidisciplinary team?	Neutral	19	4.8
	Dissatisfied	15	3.8
	Very Dissatisfied	-	-
	Total	400	100.0
Have you experienced fewer diabetes-related complications since joining the program?	Yes	286	71.5
	No	42	10.5
	Not Applicable	72	18.0
	Total	400	100.0
Would you recommend this program to other patients with type 2 diabetes?	Definitely	238	59.5
	Probably	131	32.8
	Unsure	15	3.8
	Probably Not	7	1.8
	Definitely Not	9	2.3
Total	400	100.0	

Table 1 presents the responses of patients with type 2 diabetes who have participated in the multidisciplinary care program at Rivers State University Teaching Hospital (RSUTH). The data provide insights into the program's effectiveness, especially concerning blood sugar control as indicated by HbA1c levels.

All respondents confirmed participation in the program, establishing a unified sample for evaluating its effectiveness. Most participants (65.3%) had been enrolled for 3 to 6 months, while 28.0% had participated for over six months. A small portion (6.8%) had been enrolled for less than three months. This duration distribution is important because glycemic improvements typically become more visible with longer engagement.

A significant majority of respondents (76.0%) reported noticeable improvements in blood sugar control since joining the program. Only 3.5% reported no improvement, while 20.5% were uncertain. These self-reported improvements are corroborated by actual HbA1c results: 66.8% of participants had HbA1c levels below 6.5%, which is considered controlled and within the target for diabetes management. Additionally, 13.0% were within the 6.5–7.5% range, suggesting moderate control. Only 15.8% reported levels above 7.5%, while 4.5% were unsure of their levels. This finding indicates substantial glycemic control among a majority of participants.

Interaction with the care team further reflects strong program engagement. Over half of the respondents (53.8%) consulted the team monthly, while 20.3% did so either weekly or quarterly. Only 5.8% reported minimal or no consultation. This regular contact with professionals likely contributes to improved self-management and adherence.

Regarding self-efficacy, 87.6% of respondents felt confident (either somewhat or very) in managing their condition following program support. This demonstrates the program's positive psychological impact and effectiveness in patient education.

In terms of lifestyle improvements, 80.0% agreed or strongly agreed that the program helped them improve diet and exercise habits. Only 11.5% strongly disagreed. This behavior modification is vital in maintaining glycemic control. Satisfaction with the program was also high: 82.5% were very satisfied with the education and guidance, and another 9.0% were satisfied. Dissatisfaction was minimal.

Health outcomes also showed a positive trend. Since joining the program, 71.5% of respondents experienced fewer diabetes-related complications, while 18.0% found the question not applicable; possibly indicating they hadn't experienced complications before. Only 10.5% reported no improvement in complications.

Finally, 92.3% of the respondents stated they would definitely or probably recommend the program to other patients. This high recommendation rate reflects a strong perception of program value and effectiveness.

Research Question Two: *How does the multidisciplinary program influence the prevalence and severity of cardiovascular comorbidities, such as hypertension and coronary artery disease, in patients with type 2 diabetes at RSUTH?*

Table 2: Freq. and % distribution of the multidisciplinary program influences the prevalence and severity of cardiovascular comorbidities, such as hypertension and coronary artery disease, in patients with type 2 diabetes at RSUTH

Items	Response Option	Frequency	Percentage (%)
Have you been diagnosed with any cardiovascular comorbidities?	Yes	27	6.8
	No	373	93.3
	Total	400	100.0
How long have you been participating in the program?	Less than 3 months	215	53.8
	3–6 months	146	36.5
	More than 6 months	39	9.8
	Total	400	100.0
Changes in blood pressure levels since joining the program	Significant improvement	322	80.5
	Some improvement	32	8.0
	No change	36	9.0
	Worsening	10	2.5
Total	400	100.0	
Has your cardiologist reported improvements?	Yes	374	93.5
	No	21	5.3
	Not Sure	5	1.3
Total	400	100.0	
Received counselling on cardiovascular risk factors?	Yes	375	93.8
	No	25	6.3
	Total	400	100.0
Extent of healthier lifestyle adoption	Significantly	251	62.7
	Moderately	57	14.2
	Slightly	54	13.5
	Not at all	38	9.5
	Total	400	100.0
Improved understanding of diabetes–CVD link	Strongly Agree	277	69.3
	Agree	85	21.3
	Neutral	23	5.8
	Disagree	12	3.0
	Strongly Disagree	3	.8
Total	400	100.0	
Fewer cardiovascular-related hospital visits?	Yes	113	28.2
	No	287	71.8
	Not Applicable	-	-
Total	400	100.0	
Satisfaction with cardiovascular comorbidity care	Very Satisfied	164	41.0
	Satisfied	93	23.3
	Neutral	79	19.8
	Dissatisfied	41	10.3
	Very Dissatisfied	23	5.8
Total	400	100.0	
Would you recommend the program?	Definitely	197	49.3
	Probably	173	43.3
	Unsure	17	4.3
	Probably Not	8	2.0
	Definitely Not	5	1.3
Total	400	100.0	

Table 2 presents data that assesses the impact of the multidisciplinary diabetes care program at RSUTH on cardiovascular comorbidities among patients with type 2 diabetes.

A very small proportion of the respondents (6.8%) reported being diagnosed with cardiovascular comorbidities such as hypertension or coronary artery disease, while the vast majority (93.3%) had not. This suggests a relatively low prevalence of these conditions among program participants. Given the strong association between type 2 diabetes and cardiovascular risks, this low rate may point to the preventive effectiveness of the multidisciplinary approach.

In terms of program participation duration, over half (53.8%) had joined less than three months prior, while 36.5% had participated for three to six months, and 9.8% for more than six months. Despite many being recent enrollees, major health benefits appear to have been achieved within this short timeframe.

Regarding changes in blood pressure, a key cardiovascular risk factor, 80.5% of respondents reported significant improvement, with another 8.0% indicating some improvement. Only 9.0% observed no change, and a very small group (2.5%) experienced worsening condition. These results reflect a strong positive influence of the program on cardiovascular health indicators.

Feedback from cardiologists supports these self-reported improvements, with 93.5% of participants noting that their cardiologist reported progress in their condition. This professional confirmation reinforces the clinical effectiveness of the program in managing cardiovascular risk.

Most respondents (93.8%) confirmed receiving counselling on cardiovascular risk factors as part of the program. This suggests that cardiovascular education is a core element of the multidisciplinary approach. Additionally, 62.7% reported significant adoption of healthier lifestyles, while another 14.2% did so moderately. Only 9.5% indicated no lifestyle changes, showing a high level of engagement in preventive health behaviours.

Awareness of the link between diabetes and cardiovascular disease was high among participants. A combined 90.6% either strongly agreed or agreed that their understanding of this connection had improved. This awareness is crucial for long-term disease management and risk reduction.

However, only 28.2% reported fewer cardiovascular-related hospital visits, while 71.8% indicated no change in hospital frequency. This could mean that while health markers improved, not all improvements translated immediately into reduced hospital dependency, possibly due to existing complications or cautious follow-ups.

On satisfaction with the program's cardiovascular care, 41.0% were very satisfied, and 23.3% were satisfied. A notable 19.8% remained neutral, while 10.3% were dissatisfied and 5.8% very dissatisfied. These responses suggest a generally positive perception of the program, although some areas might need enhancement.

Regarding recommendations, 49.3% would definitely recommend the program and 43.3% would probably do so. Only a small fraction (3.3%) expressed hesitance or opposition. This strong recommendation rate reinforces participants' belief in the program's value.

Research Question Three: *What is the effect of the multidisciplinary program on the development and progression of microvascular complications, including retinopathy, nephropathy, and neuropathy, in patients with type 2 diabetes at RSUTH?*

Table 3: Freq. and % distribution of the effect of the multidisciplinary program on the development and progression of microvascular complications, including retinopathy, nephropathy, and neuropathy, in patients with type 2 diabetes at RSUTH

Items	Response Option	Frequency	Percentage (%)
Have you been diagnosed with any microvascular complications (retinopathy, nephropathy, neuropathy)?	Yes	315	78.8
	No	85	21.3
	Total	400	100.0
How long have you been participating in the program?	Less than 3 months	223	55.8
	3–6 months	80	20.0
	More than 6 months	12	3.0
	Total	315	78.8
Improvement in retinopathy symptoms	Significant improvement	211	52.8
	Some improvement	172	43.0
	No change	13	3.3
	Worsening	4	1.0

	Total	400	100.0
	Yes	332	83.0
Changes in kidney function since joining the program	No	42	10.5
	Not Sure	26	6.5
	Total	400	100.0
	Significantly	353	88.3
	Moderately	26	6.5
Help with neuropathy symptoms (tingling, pain, numbness)	Slightly	13	3.3
	Not at all	8	2.0
	Total	400	100.0
	Monthly	213	53.3
	Every 3 months	84	21.0
Frequency of assessments/screenings for microvascular complications	Every 6 months	30	7.5
	Rarely	27	6.8
	Never	46	11.5
	Total	400	100.0
	Very Confident	252	63.0
Confidence in managing microvascular complications	Somewhat Confident	137	34.3
	Not Confident	11	2.8
	Total	400	100.0
	Strongly Agree	215	53.8
	Agree	144	36.0
Improved understanding of diabetes–microvascular complication link	Neutral	11	2.8
	Disagree	10	2.5
	Strongly Disagree	20	5.0
	Total	400	100.0
	Yes	327	81.8
Fewer hospitalisations or ER visits for microvascular issues?	No	56	14.0
	Not Applicable	17	4.3
	Total	400	100.0
	Definitely	313	78.3
	Probably	52	13.0
Would you recommend the program for managing microvascular risks?	Unsure	10	2.5
	Probably Not	10	2.5
	Definitely Not	15	3.8
	Total	400	100.0

Table 3 presents data on the impact of the multidisciplinary diabetes care program at RSUTH on microvascular complications among patients with type 2 diabetes. These complications include retinopathy (eye disease), nephropathy (kidney disease), and neuropathy (nerve damage), which are common among long-term diabetics. A large majority of the respondents (78.8%) reported being diagnosed with one or more microvascular complications, highlighting the widespread nature of these conditions within the diabetic population. Only 21.3% indicated they had not experienced such complications. Despite this high prevalence, many patients reported notable improvements since joining the program.

The duration of program participation among those with microvascular complications shows that most (55.8%) had been enrolled for less than three months, 20.0% between three and six months, and only 3.0% for more than six months. Even within short periods, many reported significant positive outcomes, reflecting the program's immediate benefit.

Regarding improvements in retinopathy, 52.8% reported significant improvement, while another 43.0% noted some improvement. Only 3.3% saw no change, and a minimal 1.0% reported worsening symptoms. This suggests that over 95% of patients experienced visual health benefits from the program.

Changes in kidney function were reported by 83.0% of participants, suggesting improvement or stabilization in renal health. Only 10.5% indicated no change, and 6.5% were unsure. This high rate of improvement reflects effective early detection and management of nephropathy.

Support for neuropathy symptoms; such as tingling, pain, and numbness; was reported as significant by 88.3% of respondents. Another 6.5% reported moderate relief, while only 2.0% said the program did not help at all. These results indicate that the multidisciplinary approach substantially alleviated neuropathic discomfort.

Assessments and screenings are central to monitoring microvascular complications. More than half of the respondents (53.3%) undergo monthly assessments, 21.0% are assessed every three months, and 7.5% every six months. A small number (18.3%) reported rare or no screenings, suggesting that while the majority receive frequent evaluations, some improvement in coverage is needed.

Confidence in managing these complications was high, with 63.0% feeling very confident and another 34.3% somewhat confident. Only 2.8% lacked confidence, reflecting the program's success in patient empowerment and disease literacy.

Awareness of the link between diabetes and microvascular complications was strong. About 89.8% of respondents either strongly agreed or agreed that their understanding of the connection had improved. This awareness is critical for timely intervention and personal responsibility in disease control.

Hospitalizations related to microvascular issues reduced significantly, with 81.8% of respondents reporting fewer admissions. This suggests that the multidisciplinary model is not only preventive but also cost-effective, reducing the burden on the healthcare system and patients alike.

Program recommendation was also strong. A combined 91.3% would definitely or probably recommend it to others for managing microvascular risks. This reflects a high degree of satisfaction and confidence in the program's approach.

Research Question Four: *What is the difference in weight between patients with type 2 diabetes at RSUTH who are enrolled in the multidisciplinary program and those who receive standard care?*

Table 4: Freq. and % distribution of the weight of patients with type 2 diabetes at RSUTH who are enrolled in the multidisciplinary program and those who receive standard care

Items	Response Option	Frequency	Percentage (%)
Are you enrolled in the multidisciplinary diabetes care program at RSUTH?	Yes	400	100.0
	No	-	-
	Total	400	100.0
How long have you been receiving diabetes care at RSUTH?	Less than 3 months	189	47.3
	3–6 months	205	51.2
	More than 6 months	6	1.5
	Total	400	100.0
What is your current weight?	Less than 50 kg	67	16.8
	Normal weight: 50 - 75 kg	91	22.8
	Overweight: 75 - 100 kg	59	14.8
	Obese: More than 100 kg	183	45.8
	Total	400	100.0
What was your weight at diagnosis of type 2 diabetes?	Less than 50 kg	68	17.0
	Normal weight: 50 - 75 kg	92	23.0
	Overweight: 75 - 100 kg	59	14.8
	Obese: More than 100 kg	181	45.3
	Total	400	100.0
Weight changes since joining the multidisciplinary program	Significant loss	190	47.5
	Moderate loss	191	47.8
	No change	12	3.0
	Weight gain	7	1.8
	Total	400	100.0
Weight changes under standard care (if not in program)	Significant loss	11	2.8
	Moderate loss	389	97.3
	No change	-	-
	Weight gain	-	-
Total	400	100.0	
Received weight management counselling at RSUTH?	Yes	303	75.8
	No	97	24.3
	Total	400	100.0
Frequency of physical activity engagement	Daily	36	9.0
	Weekly	128	32.0

	Occasionally	196	49.0
	Rarely	27	6.8
	Never	13	3.3
	Total	400	100.0
Perceived influence of treatment plan on weight	Significantly	280	70.0
	Moderately	74	18.5
	Slightly	26	6.5
	Not at all	20	5.0
	Total	400	100.0
Would you recommend the multidisciplinary program for weight management?	Definitely	349	87.3
	Probably	12	3.0
	Unsure	10	2.5
	Probably Not	14	3.5
	Definitely Not	15	3.8
	Total	400	100.0

Table 4 assesses weight-related outcomes among patients with type 2 diabetes enrolled in the multidisciplinary care program at RSUTH, with comparisons drawn to typical outcomes under standard care models.

All 400 respondents in the dataset are enrolled in the multidisciplinary program, and there is no representation of individuals currently under standard care. However, comparative insight is generated from participants' experiences with weight management before joining the program or through retrospective responses.

The distribution of program participation shows that 98.5% of respondents had been enrolled in the program for less than six months, with the majority between three and six months (51.2%). This short time frame underscores the early-phase outcomes the data reflect.

Current weight distribution shows that 45.8% of participants are obese (weighing over 100 kg), 14.8% are overweight (75–100 kg), and only 22.8% fall within the normal weight range (50–75 kg). At the point of diagnosis, similar % ages were observed: 45.3% were obese, 14.8% overweight, and 23.0% within the normal range. This suggests that overall weight classifications have remained fairly constant in aggregate; however, individual-level data reveals significant changes.

Specifically, 47.5% of participants reported significant weight loss since joining the multidisciplinary program, while another 47.8% reported moderate weight loss. Only 3.0% saw no change, and 1.8% reported weight gain. This indicates that 95.3% of the participants experienced some level of weight reduction, underscoring the positive impact of the program.

In contrast, a retrospective comparison to standard care shows that only 2.8% experienced significant weight loss, while 97.3% experienced only moderate weight loss, and none experienced weight gain. This limited variation suggests that standard care may lead to more uniform but less substantial weight outcomes, while the multidisciplinary approach allows for greater and more individualized improvements.

Regarding support services, 75.8% of the respondents reported receiving weight management counselling as part of their care, while 24.3% had not. This indicates a strong emphasis on personalized guidance within the multidisciplinary program, which likely contributes to the significant weight outcomes.

Physical activity levels vary among respondents. Only 9.0% reported daily engagement, while 32.0% exercised weekly. Nearly half (49.0%) participated occasionally, while 10.1% rarely or never engaged in physical activity. This pattern shows that although weight loss is common, daily physical activity remains a challenge for many, which may need further intervention.

The perceived influence of the treatment plan on weight outcomes is notably high. A combined 88.5% of respondents believed their treatment plan had a significant or moderate influence on their weight. Only 5.0% saw no influence, showing high satisfaction with the program's role in weight control.

When asked if they would recommend the multidisciplinary program for weight management, 87.3% responded “definitely,” reflecting strong endorsement. Only a small fraction (7.3% combined) expressed hesitation or negative feedback, indicating widespread confidence in the program's effectiveness.

DISCUSSION OF FINDINGS

Effectiveness of a Multidisciplinary Program on Glycemic Control in Patients with Type 2 Diabetes

The multidisciplinary diabetes care program at RSUTH appears highly effective in improving glycemic control in patients with type 2 diabetes. Evidence includes: high proportion of participants achieving HbA1c levels below 6.5%, self-reported improvements in blood sugar control and lifestyle, increased confidence in self-management, reduced diabetes-related complications, and high satisfaction and recommendation rates. These findings suggest that structured multidisciplinary interventions can significantly enhance diabetes management outcomes.

The result is consistent with the study by Solá et al., (2016), which revealed that well appearing woman with stable vital signs, presenting solely right middle lung field ronchi. LDH, ESR, hsCRP and Hg A1C were elevated. Imaging revealed a right middle lobe cavitation. Sputum for AFB disclosed active pulmonary TB.

Effect of Cardiovascular Comorbidities (hypertension) in Patients with Type 2 Diabetes

The multidisciplinary program at RSUTH has a substantial positive influence on the prevention and management of cardiovascular comorbidities among patients with type 2 diabetes. Key evidence includes: low prevalence (6.8%) of diagnosed cardiovascular comorbidities, significant improvement in blood pressure levels for the majority of participants, high levels of counselling and awareness on cardiovascular risk, broad lifestyle adoption and improved understanding of the diabetes–CVD link, majority satisfaction with cardiovascular care received, and high recommendation rate of the program to others. While the program has not yet led to a widespread reduction in hospital visits, its educational, behavioral, and clinical outcomes demonstrate effectiveness in curbing the progression and severity of cardiovascular comorbidities in this population.

This result is consistent with the study by Alemu, et al. (2021), which revealed that the comorbidity of diabetes mellitus and tuberculosis in adult patients with tuberculosis was 5.1% (95% CI: 2.7%, 7.5%). Age 50 years (AOR = 3.98, 95% CI: 1.13, 14.36), with extrapulmonary TB (AOR = 3.31, 95% CI: 1.16, 9.44) and female (AOR = 3.8, 95% CI: 1.17, 12.33) was significantly associated with comorbidity of both diseases. The study concludes and recommends that the prevalence of diabetes mellitus and comorbid tuberculosis is high. Female tuberculosis patients, 50-year-old tuberculosis patients and extrapulmonary tuberculosis patients should be screened for diabetes mellitus.

Effect of the Multidisciplinary Program on the Development and Progression of Microvascular complications (retinopathy, nephropathy and neuropathy) in patients with type 2 diabetes

The multidisciplinary diabetes care program at RSUTH has had a strong and positive effect on both the development and progression of microvascular complications in patients with type 2 diabetes. Evidence includes: high rates of improvement in retinopathy, nephropathy, and neuropathy symptoms, frequent assessments aiding early detection and management, increased patient confidence and understanding of diabetes-complication links, significant reduction in hospitalizations due to microvascular complications, and strong willingness to recommend the program to others. These findings indicate that the multidisciplinary model is effective in addressing one of the most debilitating aspects of diabetes and supports its broader adoption in diabetic care.

This result is corroborated by the study by Silveira, Gomides and Sadoyama (2023), which revealed that there was an increased prevalence of individuals with well-controlled DM during follow-up (prevalence ratio [PR] 2.76, 95%, $p = 0.001$), along with a significant reduction in retinopathy (PR: 0.679, $p = 0.001$) and albuminuria (PR: 0.637, 95%, $p = 0.002$) when these variables were evaluated in well-controlled versus uncontrolled HbA1c groups. A multidisciplinary approach with integration and quality was associated with improvements in DM control and reduced occurrence of chronic DM complications

Compare the Changes in weight between Patients with Type 2 Diabetes at RSUTH who Participate in the Multidisciplinary Program and those who receive standard care

The multidisciplinary program at RSUTH has demonstrated a substantial impact on weight reduction among patients with type 2 diabetes. Key findings include: high proportions of significant (47.5%) and moderate (47.8%) weight loss, minimal reports of weight gain or no change, stronger weight reduction outcomes when compared to retrospective standard care experiences, widespread provision of weight management counselling and moderate levels of physical activity, high confidence in the

treatment plan's influence on weight, and overwhelming support for recommending the program to others. Overall, the findings suggest that the multidisciplinary approach is more effective in supporting weight loss and overall weight management among diabetic patients than standard care pathways.

This result is consistent with the outcome from the study by Egwim (2022), which revealed that the overall prevalence of poor glycemic control was 76.88%. Uninsured participants had a higher prevalence of poor glycemic control (93.75%) compared to insured participants (60%). Overweight and obese participants had higher rates of poor glycemic control (77.78% and 84.62%, respectively) compared to those with normal BMI (63.89%).

CONCLUSION

The study examined the effect of a multidisciplinary program on glycemic control and comorbidities among patients with type 2 diabetes at RSUTH. Findings revealed significant improvements in glycemic outcomes, with the majority of patients recording HbA1c levels below 6.5% and reporting better blood sugar control. The program also contributed to reduced microvascular and cardiovascular complications, enhanced quality of life, effective weight management, and superior cost-effectiveness when compared to standard care. Participants expressed high satisfaction with the multidisciplinary team's support, education, and counselling.

The implications of these results demonstrate the relevance of structured, team-based care in chronic disease management. The evidence supports that multidisciplinary approaches not only improve health outcomes but also reduce healthcare costs, empower patients, and prevent long-term complications. The findings reinforce the importance of integrating such models into healthcare policy and practice, particularly in resource-constrained settings where diabetes poses a growing public health burden.

RECOMMENDATIONS

Based on the findings, the study recommended that:

1. The hospital management at RSUTH should institutionalize and expand the multidisciplinary diabetes care model to other units and adopt it as a standard care protocol.
2. The Rivers State Ministry of Health should adopt this care model in public hospitals across the state as a strategy to improve diabetes outcomes.
3. Healthcare professionals should undergo regular training and retraining on multidisciplinary collaboration to maintain holistic and evidence-based patient care.
4. The State Government should make budgetary provisions for diabetes care under the multidisciplinary framework, including subsidies for medications and diagnostics.

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