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NURSING

REDUCING THE PREVALENCE OF UNCONTROLLED BLOOD GLUCOSE IN PATIENTS UNDER TREATMENT IN THE NCD UNIT AT BUTARO HOSPITAL

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ABSTRACT

Purpose of Study: This quality improvement (QI) project aimed to reduce the prevalence of uncontrolled blood glucose among diabetic patients at Butaro Hospital's NCD Unit, focusing on patients with HbA1c levels above 7%.

Methodology: Ten patients with persistent uncontrolled blood glucose were selected for targeted interventions, which included educational sessions, home visits, regular monitoring, mobile reminders, and group therapy. The project utilized a pre-and post-test design, incorporating behavior change theories to identify barriers and encourage patients to self-manage their diabetes.

Results: Over six months, the project achieved a reduction in average blood glucose levels from 220 mg/dL to 150 mg/dL, and HbA1c levels from 9% to 7%. The results highlight the effectiveness of comprehensive, patient-centered care and community support in improving glycemic control.

Conclusion: The project demonstrated that a combination of targeted interventions, regular monitoring, and technology can significantly improve glycemic control in diabetic patients in low-resource settings.

Recommendation: To ensure sustainability, the project recommends continuous professional development for healthcare providers, involving families in patient care, and utilizing technology for ongoing patient follow-up. Future interventions should focus on maintaining a holistic, collaborative approach to diabetes management for improved long-term outcomes

Keywords: *Diabetes management, uncontrolled blood glucose, HbA1c, glycemic control, patient education, behavior change theories, Butaro Hospital, non-communicable diseases, quality improvement, low-resource settings*

INTRODUCTION

In today's healthcare landscape, managing non-communicable diseases (NCDs) has become a significant challenge, particularly in low-resource settings. Butaro Hospital, located in a rural area, faces the ongoing difficulty of providing effective care to patients suffering from NCDs, including diabetes mellitus. A critical aspect of NCD management is the control of blood glucose levels in patients with diabetes, as uncontrolled blood glucose can lead to numerous complications, such as heart disease, kidney problems, and neuropathy. This Quality Improvement Project is designed to address the issue of uncontrolled blood glucose among patients receiving treatment in the Non-Communicable Diseases Department at Butaro Hospital. The project aims to enhance the quality of care, improve patient outcomes, and reduce the prevalence of uncontrolled blood glucose levels among the diabetic patient population.

Problem Description

In non-communicable disease (NCD) unit at Butaro Hospital, we have currently registered 80 diabetic patients who come monthly at the hospital to take medicines. Despite that all of these patients attend regular health education sessions about self-care management and also take regularly medicines against diabetes, however, about 10 of these patients never attain normal range of glycaemia, they always come at the hospital with high and uncontrolled blood glucose, and the results of HbA1c done for once for every three months show as high more than 7%. some of them even are rushed at the hospitals with complications threatening their health, leading to increased risk of complications and poor health outcomes. After investigating the causes of this uncontrolled of this high blood sugar among these group of patients, we found out that all of them do not take medicines as prescribed, they do not respect the injection sites of insulin and they do not respect self-care management including not respecting the healthy behaviors needed for every diabetic patient including eating healthy diets, exercising, quit alcohol and smoking

Context

Butaro Level Two Teaching Hospital, located in Northern Rwanda's Burera district, was inaugurated in 2011 through a collaboration between the Rwandan Ministry of Health, Partners in Health, and the Clinton Health Access Initiative. The hospital, with 254 beds, serves a population of over 367,000, offering comprehensive healthcare services across multiple departments, including oncology, surgery, neonatology, and more. The NCD unit,

part of the outpatient department, sees around 360 patients monthly, 80 of whom receive regular diabetic care. The unit is staffed by two NCD nurse specialists, an endocrinologist, and a cardiologist who visit once a month. Diabetic patients undergo monthly follow-ups for monitoring vital signs and blood glucose levels, with Hemoglobin A1c (HbA1c) tests every three months to evaluate long-term blood sugar control, aiming for levels below 7%. Additionally, urine and creatinine tests are conducted semi-annually and annually to monitor kidney function.

A quality improvement project is being developed for a subset of ten diabetic patients with persistent HbA1c levels above 7%, indicating uncontrolled blood sugar. The initiative aims to assess the risk factors contributing to their elevated HbA1c levels and provide targeted support to help these patients achieve better glycemic control. The primary goal is to reduce potential complications like cardiovascular disease, neuropathy, nephropathy, and foot ulcers, thereby enhancing the overall health and well-being of this high-risk group.

Project Aim

To assist a group of 10 diabetic patients with uncontrolled high blood glucose in achieving and maintaining a normal range of glycaemia for seven consecutive months (from December 2023 to June 2024).

Project Objectives

i. To identify personal, family and social barriers to the self –care management of 10 patients with uncontrolled blood glycemia

ii. To enhance patient' education of self-care-management

iii. To empower patients to take an active role in their care

iv. To involve family in the patient's care

EMPIRICAL LITERATURE REVIEW

Uncontrolled blood glucose levels among diabetic patients pose a significant global health challenge, leading to various complications and increased mortality rates. Despite advancements in diabetes treatment modalities, many individuals struggle to maintain optimal glycemic control. Studies have reported high prevalence rates of uncontrolled blood glucose across different regions. For example, a cross-sectional study in urban India found that about 60% of diabetic patients had poorly controlled glucose levels,

experiencing hyperglycemia despite treatment (Mohan et al., 2018). In sub-Saharan Africa, high rates of uncontrolled glucose have been linked to limited access to healthcare services, medication non-adherence, and socioeconomic disparities (Kibirige et al., 2014). Contributing factors to poor glycemic control include medication non-adherence due to forgetfulness, financial constraints, or misconceptions (Basu et al., 2015), as well as inadequate healthcare access in resource-limited settings (Beran et al., 2019). Lifestyle factors such as poor diet, sedentary behavior, and obesity further exacerbate the challenge by promoting insulin resistance and hyperglycemia (Malik et al., 2010; Dempsey et al., 2014). Additionally, psychosocial factors like stress, depression, and lack of social support have been associated with poor glucose control (Fisher et al., 2010).

At Butaro Hospital, despite the provision of quality diabetic care, a group of ten patients has been identified with consistently elevated HbA1c levels above 7%. These levels indicate a persistent lack of glycemic control, posing significant risks of cardiovascular disease, neuropathy, nephropathy, and foot ulcers. In response, a targeted quality improvement project is being developed to assess contributing risk factors and provide tailored support and resources to this group. The aim is to achieve better blood sugar control, thereby reducing the risk of complications and improving overall health outcomes for these patients. A table detailing the HbA1c levels of the ten patients over six months, from January to June 2023, follows below.

Table 1. Uncontrolled Blood Sugar Among Identified Ten Patients Over Six Months

Month	**TOTAL PATIENTS**	**PATIENTS WITH UNCONTROLLED BLOOD SUGAR**
January	80	10
February	80	12
March	80	10
April	80	10
May	80	12
June	81	11
Total	**481**	**65**

As indicated in the table below, the prevalence of uncontrolled blood glucose in patients under treatment within 6 months is 13.5%. Therefore, this project aims to reduce the uncontrolled blood sugar among often diabetic patients from 13.5% to 2%. Previous research has highlighted the need for targeted interventions aimed at improving glycemic

control in patients with diabetes, particularly in resource-limited settings such as Rwanda (Kavishe st al., 2019; Beran et al.,2018). The use of standardized clinical guidelines, patient education and support, and quality improvement methods have been shown to be effective in improving glycemic control in patients with diabetes in resource-limited settings (Khattab et al., 2018; Cefalu et al.,2018).

Theoretical Review

The project aims to reduce the prevalence of uncontrolled blood glucose among diabetic patients at the NCD Unit of Butaro Hospital by addressing critical factors affecting glycemic control. The initiative will begin with an in-depth analysis of patient data to identify the key contributors to high blood glucose levels. Educational sessions will raise awareness among patients, families, and healthcare providers about the importance of glycemic control and adherence to treatment, while personalized care plans will be developed to address individual needs, including medication, diet, and physical activity. Regular monitoring of blood glucose and HbA1c levels will ensure timely identification of patients requiring further support, and technology integration, such as mobile phone reminders, will promote medication adherence and self-management. Community health workers will engage with patients through home visits, offering support and reinforcing educational messages, complemented by group therapy sessions to foster peer support and skills-building. The project ultimately aims to improve glycemic control, enhance health outcomes, and improve the quality of life for patients with diabetes, leading to a reduction in uncontrolled blood glucose levels at the NCD Unit.

Theoretical Framework

The theoretical framework guiding this project to reduce persistent blood sugar among diabetic patients at Butaro Hospital is grounded in behavior change theories, addressing the multifaceted aspects of self-care management. First, using the Health Belief Model (HBM) or the Theory of Planned Behavior (TPB), the project will identify barriers to self-care by assessing patients' perceptions and attitudes through interviews. Next, the Social Cognitive Theory (SCT) will guide patient education by tailoring materials to various stages of behavior change and utilizing social reinforcement through peer support. To empower patients, the Self-Determination Theory (SDT) and Empowerment Theory will be applied, offering goal-setting sessions and skill-building workshops to enhance autonomy and confidence. Finally, involving family in care will be informed by Family

Systems Theory or Social Support Theory, with family education sessions fostering support and engagement in the patient's care. This comprehensive approach, rooted in behavior change theories, aims to address psychological, social, and environmental factors, thereby promoting sustained behavior change and improved glycemic control among diabetic patients.

Research Methodology

The study sampled 10 patients from the NCD Unit at Butaro Level 2 Teaching Hospital who experienced uncontrolled blood glucose levels for more than six consecutive months. Using purposive sampling, these patients were monitored for blood glucose at every visit and HbA1c levels every three months to assess glycemic control, with levels below 7% being the target. A pre-and post-test study design was employed to measure the impact of interventions. The inclusion criteria were patients with uncontrolled blood glucose receiving care at the NCD Unit, while those not receiving care at the department were excluded. A key limitation of the study was poor adherence to follow-up appointments by some patients, which hindered the effectiveness of group discussions and peer learning between those with controlled and uncontrolled blood sugar levels.

Project Implementation Plan and Activities

i. Implementing Individual, peer, family and community support in the care of patients with persistent uncontrolled high blood glucose.
ii. Involve the family member in the care and follow up of the patients with uncontrolled glycaemia
iii. Group therapy between patients with controlled and those with uncontrolled glycemia
iv. Involve community health workers in the care and follow up of patients with uncontrolled glycemia
v. Practicing Home visits to the patient with uncontrolled glycaemia
vi. Practice individual and group education about self-care management
vii. Technology Integration: Utilize technology such as mobile phone by calling the patients in order to remind them to take medication at right time

Table 2. Activities Plan

S/O	Activity	Time allocated	Responsible person	Place

1.	Involve the family member in the care and follow-up of the patients with uncontrolled glycemia	From November 2023 to February 2024, one day per month when the patient comes for a follow-up at the hospital, we encourage him/her to come with his/her spouse or child	Norbert and NDC chief	NCD unit
2.	Group therapy between patients with controlled and those with uncontrolled glycaemia	Every day of follow up one-hour group discussion before starting patient one by one	Norbert and NCD chief	NCD unit
3.	Involve community health workers in the care and follow up of patients with uncontrolled glycaemia	Involving CHWs in home visits of the targeted gorp of patients (once/month) CHWs home visit once every two weeks	Norbert	NCD unit
5.	Practicing Home visits to the patient with uncontrolled glycaemia	Once per months home visit from October to January 2024.	Norbert and NCD Chief	At the patient home
6.	Practice individual and group education about self-care management	Every day of follow up at hospital from November 2023 to January 2024	Norbert and NCD chief	NCD unit
7.	**Technology Integration:** Utilize technology such as mobile phone by calling the patients in order to remind them to take medication at right time..	Once every week from November 2023 to 2024	Norbert and NCD chief	NCD unit

PROJECT FINDINGS

Below are two tables illustrating the activities undertaken and the outcomes achieved over

a period of six months in a project aimed at reducing uncontrolled blood glucose levels among patients under treatment.

Table 3: Activities Undertaken

Activity	Number Completed
Education session with families	10
Education sessions with patients	20
Home visit conducted by me	10
Home visits conducted by CHWs	60
HbA1c control every three months	3 times
Blood glucose control every visit	12
Technology Integration: Mobile phone reminders	180 calls
Group therapy sessions between patients	6 sessions

Table 4 further shows the outcomes of the project over 6 months period.

Table 4: Outcomes of the Project Over 6 Months

Outcome	Initial Measurements	Measurements After 6 Months
Average Blood Sugar Level	220mg/dL	150mg/dL
HbA1C	9%	7%

These tables provide a clear overview of the activities carried out during the project and the positive outcomes achieved in terms of reducing blood sugar levels and improving HbA1C levels among patients over a period of six months.

Interpretation of Project Findings and Recommendations

The project implemented various activities to improve glycemic control among diabetic patients, including education sessions for patients and families to enhance diabetes management awareness, and home visits by hospital staff and CHWs for personalized support, aligning with literature emphasizing education and adherence to treatment (Gagliardino & Atanasov, 2013; Clark et al., 2015). Regular HbA1c monitoring every three months and blood glucose checks at each visit ensured timely interventions, supporting evidence that frequent monitoring is vital for maintaining glycemic targets (Khunti et al., 2018). Mobile phone reminders improved medication adherence through 180 calls, reflecting the effectiveness of mobile health interventions in diabetes management (Pakpour et al., 2020). Group therapy sessions fostered peer support, encouraging behavior change, as shown to improve self-management and psychological well-being (Powers et al., 2017). As a result, the project achieved notable reductions in both average blood sugar levels and HbA1c, consistent with research demonstrating the benefits of comprehensive

diabetes care programs (Davies et al., 2018).

CONCLUSION

This quality improvement project aimed at reducing the prevalence of uncontrolled blood glucose in patients under treatment at the NCD Unit at Butaro Hospital has demonstrated significant success in improving diabetes management outcomes. Through a multifaceted approach involving education sessions, home visits, technology integration, and group therapy sessions, the project has successfully reduced average blood sugar levels and improved HbA1c levels among patients over a six- month period. These findings highlight the effectiveness of comprehensive and patient-centered interventions in enhancing glycemic control and ultimately improving the well-being of patients with diabetes.

The key take-home message from this project is the importance of a holistic approach to diabetes management, which includes education, empowerment, collaboration, and continuous quality improvement. By engaging patients, families, healthcare providers, and community health workers, and leveraging technology to enhance care delivery, significant improvements in glycemic control can be achieved. Additionally, ongoing monitoring and evaluation of diabetes care outcomes, along with advocacy for policies and resources that support long-term prevention and management efforts, are essential for sustaining the gains made in diabetes care.

RECOMMENDATIONS

The report recommends several actions for various stakeholders to enhance diabetes management and improve glycemic control. For hospital leaders, it suggests developing training and professional development opportunities related to diabetes care and patient education. To ensure sustainability, leaders should incorporate quality improvement processes into routine clinical practice, implement mechanisms for continuous monitoring and evaluation of diabetes outcomes, and advocate for supportive policies and resources for diabetes prevention and management. NCD Unit leaders and staff are encouraged to empower patients through education, counseling, and support, as well as engage in ongoing professional development to improve their skills and competencies in diabetes care. Patients are advised to take an active role in managing their condition by adhering to prescribed medications, regularly monitoring blood glucose levels, properly administering insulin, and following lifestyle recommendations. Open communication with healthcare

providers about any concerns or challenges is also essential. Families are recommended to foster a supportive home environment that encourages healthy eating, regular physical activity, and medication adherence, while providing emotional support and keeping healthcare providers informed of any challenges faced by the diabetic patient.

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