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The Need for Community-Centered Intervention Strategies on Promoting Health Living in Individuals with Type 2 Diabetes Mellitus (T2DM) and Human Immunodeficiency Virus (HIV) in South Africa

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ABSTRACT

Introduction: Equally, type 2 diabetes mellitus (T2DM) and human immunodeficiency virus (HIV) are significant global health concerns, especially in low- and middle-income countries where the burden of both conditions is rising. In particular, making it essential to develop comprehensive health promotion strategies This narrative review aims to explore the role of community-centered intervention strategies in promoting healthy living among individuals with T2DM and HIV.

Methods: The review systematically analyzed literature from peer-reviewed journals and grey literature, focusing on studies that implemented community-based strategies, such as health education, peer support, and physical activity programs, targeting individuals with T2DM and those living with HIV and T2DM.

Results: Evidence suggests that community-centered interventions significantly improve health outcomes, including better glycemic control, reduced viral load, and increased physical activity levels. Peer-led initiatives and culturally tailored programs showed greater success in maintaining long-term adherence to lifestyle modifications compared to conventional clinic-based care.

Conclusion: Community-centered interventions hold great potential in promoting healthier living for individuals with T2DM and HIV. Future programs should prioritize culturally relevant, scalable models to ensure sustainability and inclusivity, addressing the dual challenges posed by T2DM and HIV in vulnerable populations.

Keywords: Type 2 diabetes mellitus (T2DM), HIV, community-centered interventions, health promotion, peer support

Introduction

Type 2 diabetes mellitus (T2DM) is a prevalent chronic condition globally and it contributes significantly to morbidity and mortality due to its association with various complications that include, among others, cardiovascular diseases (CVDs) and viral infections such as human immunodeficiency virus (HIV).[1] Although new HIV infections have declined since its peak in 1995, over a million people are still infected annually with exponential increase reported in South Africa.[2] Nonetheless, the availability and/or access to antiretroviral drugs (ARVs) results in HIV-infected persons living longer.[3,4] While there is no direct correlation between T2DM and HIV, studies have found that long-term use of ARVs increases the risks of developing T2DM.[5,6] Managing T2DM, particularly in resource-constrained settings, requires more than conventional medical approaches. There is growing recognition of the role of community-centered interventions in promoting healthy living and improving health outcomes in individuals with T2DM, particularly those co-infected with viral.[5,6]

Community-based programs offer tailored support, education, and resources that empower individuals to adopt healthier lifestyles that lead to improved adherence to their medication regime. Moreover, such programs foster social support networks that enhance self-management.[7] These strategies emphasize peer support, cultural relevance, and the integration of healthcare services within community settings, addressing both medical and psychosocial aspects of T2DM management. This review explores the need for community-centered intervention strategies that effectively promote healthy living in individuals with T2DM and viral infections, offering insights into their potential impact on health outcomes and quality of life.

The Role of Community Health Workers in South Africa

Community-centered intervention strategies are crucial in promoting healthy living among individuals with T2DM in South Africa, where the burden of diabetes is rising rapidly. Type 2 diabetes mellitus management requires ongoing lifestyle modifications, such as dietary changes, regular physical activity, and medication adherence, all of which are difficult to maintain without consistent support. In South Africa, community-centered approaches provide localized, culturally relevant interventions that address both medical and social determinants of health. [4,5,6]

Community-centered interventions involve community participation, meaning that community health workers (CHWs) and peer support systems form the bedrock to offering tailored education and guidance. CHWs play a vital role in South Africa's healthcare system, especially in under-resourced communities, by bridging the gap between patients and healthcare providers. This support enhances self-management behaviors, it improves adherence to treatment, and helps individuals make sustainable lifestyle changes.[8] Additionally, these strategies are essential for reducing health inequalities, particularly in rural and low-income areas where access to healthcare is limited. Community-centered programs target these underserved populations, ensuring culturally appropriate care and ongoing support, thereby improving the overall management of T2DM in South Africa.[8]

Importance of Community-Centered Interventions in Promoting Health

Community intervention strategies play a vital role in fostering dynamic relationships and ongoing dialogue between communities and health authorities. Such strategies empower communities to actively participate in decision-making and collaborate with local health professionals. This shared control enhances community ownership of health outcomes motivating individuals to work meaningfully with healthcare providers. Durrance-Bagale et al.[9] emphasized that culturally sensitive, community-based programs were most effective when communities were fully engaged and reciprocally involved. Taffere [10] further highlights that community engagement strategies are particularly beneficial for underdeveloped countries, where they offer numerous advantages in addressing health disparities.

In this context, community engagement is an essential component of health intervention strategies that is aimed at the recognition of the value of sustained, long-term partnerships with healthcare systems.[11] These strategies not only align with the Primary Health Care (PHC) delivery system but also ensure that interventions are grounded in the felt needs of the community. By focusing on issues that are most relevant to the community, the strategies could foster genuine engagement and commitment, leading to better health outcomes and long-term benefits for the population. Therefore, the success of community intervention strategies lies in their ability to build trust, collaboration, and mutual respect between communities and healthcare providers.

Types of Community Interventions

Community engagement strategies vary widely depending on the objectives and the specific context in which they are implemented. It is essential to recognize the differences in community structures, cultures, and norms when developing these strategies.[12] The effectiveness of these interventions relies on a clear understanding of the community's needs, diversity, credibility, organization, and communication of results. Some of the key approaches include Participatory Action Learning and Action Research (PALAR), Community-Based Action Research (CBR), and participatory action learning (PAL).

Community engagement strategies are typically implemented through consultations, co-creation, or co-designed community-based participatory models. Community-driven intervention strategies that involve multiple stakeholders tend to enhance healthcare access, as they are focused on the people's needs and priorities.[9] This approach often includes the participation of both traditional and community leaders during the strategic planning phase, ensuring that any proposed solutions are culturally appropriate and acceptable. By incorporating community voices, these interventions not only foster trust but also promote ownership of the health initiatives.

Accountability is cultivated among all stakeholders, which is critical for sustaining long-term engagement and mobilizing resources to address health challenges effectively.

Application of Community Intervention Strategies

Our community-focused project aims to collaboratively enhance awareness of healthy living in the King Cetshwayo District. The King Cetshwayo District is in the northern part of KwaZulu-Natal and is situated in a rural setting. We will promote lifestyle modifications that include, among others, nutritious diets, physical activity, and strategies to prevent complications in individuals already diagnosed with T2DM. However, our strategy has broader application in that we want to promote lifestyle modifications generally aimed at the prevention of a T2DM diagnosis, where possible. This initiative will utilize the PALAR approach to foster community engagement and collective decision-making. We anticipate that the interventions are culturally sensitive and address the specific needs of the population by involving them early on in the planning and implementation processes. This approach not only empowers individuals to take ownership of their health but it also facilitates a supportive environment where healthy living becomes a community norm.[9,13,14] Through this collaboration, we aspire to create sustainable health improvements and foster resilience in the community.

Impact on Individuals with type 2 diabetes mellitus

Individuals with T2DM face significant health challenges that can affect their overall well-being and quality of life. Type 2 diabetes mellitus is often associated with various complications, including, among others, cardiovascular diseases, neuropathy, and retinopathy. Such complications may lead to severe health deterioration if not properly managed.[15] Furthermore, the burden of managing diabetes could contribute to psychological stress, anxiety, and depression that might affect adherence to treatment and lifestyle changes.[16] Community-centered intervention strategies might assist to address such challenges by providing education and support, fostering self-management skills, and encouraging lifestyle modifications such as improved diet and physical activity.[8,17]

Impact on Individuals living with Human Immunodeficiency Virus

Individuals living with HIV, are at an increased risk of developing complications related to T2DM. The risk of complication is exacerbated by the fact that the glycemic control of individuals living with HIV was found to be substantially poorer than people who have T2DM but are not HIV.[4] The presence of diabetes in HIV positive individuals might exacerbate the severity of opportunistic infections that could lead to poorer health outcomes.[4,18] Moreover, the metabolic dysregulation associated with T2DM could impair the immune response, making individuals living with HIV more susceptible to infections and prolonging recovery times.[20] Community-centered interventions that focus on health education and resource accessibility could assist individuals to manage their medical conditions more effectively, thereby improving their health status and quality of life.

Preventative Measures and Health Education

Effective management of T2D primarily relies on three core components: diet, pharmacotherapy, and regular physical activity. Health education is vital for individuals diagnosed with diabetes, beginning at diagnosis and continuing through regular follow-up appointments. Key educational topics include nutrition, blood glucose monitoring, medication adherence, screening for complications, and the importance of physical activity.[22] The same holds true for individuals who are HIV positive.

Uncontrolled hyperglycemia can lead to immunological and physiological changes in the body that could increase one's susceptibility to various infectious diseases that include, *inter alia*, viral infections like influenza, human papillomavirus infections (warts), and herpes simplex virus (cold sores). Therefore, it is important to maintain optimal blood glucose levels as a crucial preventive strategy against infections in individuals with T2DM. This applies equally to people without diabetes.[21] Furthermore, poor glycemic control in persons living with HIV increases the risk of other illnesses, such as tuberculosis (TB).[4] Consequently, diabetes education should focus on self-management techniques like healthy lifestyle modifications and glycemic control, which have shown to improve health outcomes significantly.[22]

Culturally tailored Diabetes Self-management Education (DSME) interventions have proven effective in enhancing glycemic control in diverse populations.[17] The World Health Organization[24] recommends lifestyle modifications, such as reducing caloric intake and favoring low glycemic index foods like legumes and whole grains.[24] Lifestyle modification is needed by people with T2DM irrespective of their HIV status.[25] Research has found that regular exercise, such as brisk walking three times a week for 30 minutes, positively influence physical fitness, glycemic control. Moreover, studies found that regular exercise by individuals with T2DM reduce the risk of cardiovascular diseases.[6]

Case Studies and Success Stories

The Kimi Ora community lifestyle program, designed specifically for Māori communities in New Zealand, has shown remarkable success in managing T2DM as well as those diagnosed with pre-diabetes. This program is notable for its responsiveness and flexibility that leads to improved biomedical outcomes, high patient engagement, and retention.[26] The program emphasized culturally sensitive practices, which helped participants feel more connected to the interventions and fostered a greater sense of ownership over their health.

Another promising initiative, the Beat It program, assessed the long-term efficacy of a community-based intervention targeting older adults with T2DM. This eight-week, twenty-hour clinician-led program focused on exercise and lifestyle modification. A follow-up study revealed that participants maintained significant

improvements in physical activity, waist circumference, and overall fitness one-year post-completion.[27] The findings suggest that structured community interventions can lead to sustainable health benefits for older individuals with T2DM, highlighting the potential for similar programs to be effective in managing various health conditions, including viral infections, by promoting physical activity and lifestyle changes.

Differences and Similarities in Intervention Strategies for individuals with T2DM and those living with HIV

The global burden of HIV and T2DM poses significant public health challenges, necessitating various intervention strategies that may overlap in some aspects.[1,17] Although ARVs may increase an HIV positive person's life expectancy, there is no cure. It might therefore be said that HIV is a chronic disease. Both T2DM and HIV require lifelong management. Understanding the distinctions and similarities between intervention strategies for these health issues is crucial to optimize patient outcomes and efficiently allocating healthcare resources.

Unlike other viral infections, HIV infects the white blood cells of a person's immune system (CD4 cells) thereby leaving an infected person with an inability to fight off infections.[23,25] The treatment goals for HIV center around suppressing the virus, preventing transmission, and reducing the risk of secondary infections, like influenza and TB, that are commonly associated with HIV infections.[22] On the other hand, T2DM is a chronic metabolic disorder characterized by insulin resistance and impaired insulin secretion. It necessitates long-term management strategies focused on achieving stable blood glucose levels, preventing complications such as neuropathy and retinopathy, and maintaining overall metabolic health. People who are living with HIV and who have T2DM are even more likely to suffer the same complications due to their weakened immune system.[4]

A review of literature from 2016 to 2023, including clinical guidelines and consensus reports, highlighted key areas of comparison: the nature of the conditions, treatment objectives, pharmacological and lifestyle interventions, monitoring, prevention, and patient education. The analysis showed that T2DM management focuses on long-term blood glucose control through pharmacotherapy and lifestyle modifications. The pharmacological interventions for T2DM primarily include insulin therapy and oral hypoglycemic agents like metformin, sodium-glucose cotransporter-2 (SGLT2) inhibitors, and glucagon-like peptide-1 (GLP-1) receptor agonists.[24,25,27] Antiretroviral therapy (ART) is the primary treatment method of treating HIV through ARVs. Antiretroviral drugs reduce the replication of the virus enabling one's immune system to repair. Furthermore, ARVs are taken to reduce a person's risk of secondary infections. Regular monitoring of one's CD4 count is important to determine the efficacy of the ARV regime. A reduction in the CD4 count increases the risk of secondary infections and/or mortality. Strict adherence to the ART is required for optimal results. For people living with HIV, physical, mental, emotional and sexual health are imperative. Healthy lifestyles are equally beneficial for persons who are not HIV positive.[25] Despite these differences, both conditions benefit from tailored, patient-specific treatment plans, multidisciplinary care, and the integration of technology for monitoring patient health. Furthermore, patient education plays a critical role in managing both T2DM and HIV, emphasizing the importance of informed decision-making in both contexts.[1,28] Safe sex education is particularly important in South Africa, as it has one of the highest HIV infection rates in the world.

Monitoring and follow-up differ significantly between the two conditions. T2DM patients require continuous glucose monitoring and regular hemoglobin A1C (HbA1C) testing to assess their long-term blood sugar control and screen for complications. On the other hand, newly diagnosed HIV persons need to test their CD4 count every three to six months for the first two years or up and to the CD4+ count exceeds 300 cells/mm^3, whereafter every 12 months is recommended.[28]

Although prevention strategies are crucial, they also vary in the two conditions. For T2DM, lifestyle modifications and weight management are pivotal in preventing the onset of the disease.[29] In contrast, prevention of HIV transmission is primarily predicated on safe sexual practices. If the person with HIV is an intravenous drug user, needles should not be shared. Notwithstanding the differences in prevention and intervention strategies, T2DM and viral infections share several similarities. Patient education is vital for managing both conditions as it equips patients with the necessary knowledge to adhere to treatment regimens, to implement lifestyle modifications, and to recognize early signs of complications. Moreover, both conditions benefit from a multidisciplinary approach, involving a team of healthcare professionals—including physicians, nurses, dietitians, and mental health specialists—to address the comprehensive needs of patients.

Technological advancements also play a critical role in managing both T2DM and HIV. The use of mobile health applications, telemedicine for remote consultations, and electronic health records facilitate patient monitoring and progress tracking, enhancing the overall management of a patient's health care experience.[29] Ultimately, tailored treatment plans are essential for effectively managing both T2DM and individuals living with HIV. Individualized approaches based on specific health statuses, comorbidities, and risk factors are necessary to ensure successful outcomes in patient care. By understanding the differences and similarities in intervention strategies, healthcare professionals can develop integrated approaches that improve care for patients suffering from these significant health challenges.

Outcomes and Effectiveness: Measurable Health Outcomes, Long-Term Benefits, Sustainability, and Community Engagement and Support Systems

Community engagement and support systems are essential for promoting the well-being of individuals living with T2DM and/or HIV. Despite the fact that These

support systems are integral to national health strategies there has been a limited focus on evaluating their outcomes and effectiveness. Engaging communities in healthcare planning, delivery, and assessment promotes transparency and accountability, fostering a sense of ownership among participants.[7] Such engagement ensures that health services are tailored to specific community contexts.

While Durrance-Bagale et al.[9] emphasized the importance of community involvement, Mathunjwa[29] noted the challenges in assessing effectiveness due to the diverse approaches to community engagement. Several key outcomes have been identified in the literature as indicators of effectiveness. One significant outcome is the impact of social support on health. Research has shown that community engagement and social support can positively influence health outcomes for individuals with chronic conditions like T2DM and/or HIV. Support may come from family, friends, support groups, or community health programs, playing a critical role in managing these diseases. Additionally, health vlogs have emerged as a valuable form of social support. Hill-Briggs et al.[30] highlighted that the video medium allowed for rich personal disclosure, fostering community-building and social support among viewers, including those with T2DM and/or HIV. These vlogs positively impact both informational and emotional aspects of chronic disease management, enhancing the overall quality of life for individuals affected by these conditions.

Managing Diabetes and HIV: The Role of Community Support

The management of diabetes could be significantly complicated by HIV, which adversely affect immune function and metabolic control. Community support systems play a vital role in mitigating these effects by promoting adherence to treatment plans and offering practical assistance during illness. Collaborative relationships with healthcare providers empower patients, families, and communities to effectively manage self-care tasks. According to Wagner,[31] collaborative management care not only strengthens self-care in chronic illnesses but also ensures that effective medical and preventive interventions are executed.

Glycemic control is a crucial aspect of diabetes management, often assessed through glycated hemoglobin (A1C) levels.[32] Community engagement programs can lead to better blood sugar management by enhancing awareness, education, and support. For instance, Fakiya[33] found that spousal support, religious activity frequency, and social network size positively correlated with glycohemoglobin levels. These findings underscore the significant role community engagement and support systems play in enhancing glycemic control.

Access to resources and education is another critical outcome of community engagement. Programs offering diabetes education, safe sex education, healthcare access, and nutritional support enable individuals to manage their condition more effectively. Fisher et al.[34] emphasized that ongoing support in daily management significantly promoted health among individuals living with T2DM and concurrent viral infections. Moreover, effective diabetes management often requires substantial lifestyle changes. The American Diabetes Association[35] highlighted the importance of diabetes self-management education and support (DSMES), medical nutrition therapy, and psychosocial care. Similarly, the importance of HIV Self-Management is well established.[35] Community engagement provides essential behavioral support, encouraging physical activity and healthy eating while offering psychological assistance to manage the stress associated with chronic conditions.

Integrating community-centered strategies into public health policy is essential for addressing the complexities of managing diabetes especially in the context of HIV. Recent studies highlighted the need for effective community engagement techniques that fostered multidisciplinary knowledge co-creation to address social problems affecting real people and communities.[29] By focusing on the values and needs of participants, researchers can create value-based engagement strategies that enhance community involvement in health initiatives, ultimately leading to improved health outcomes.

Limitations

This study has several limitations. Firstly, the research predominantly relies on self-reported data that could introduce bias due to personal perceptions of health and support. Additionally, the diverse socioeconomic backgrounds of participants could affect the generalizability of the findings. Likewise, the complexity of diabetes management and HIV makes it challenging to isolate the impact of community engagement from other influencing factors, such as individual behavior and healthcare access. Future research should consider longitudinal studies to better understand these dynamics over time.

Conclusion

In summary, the management of T2DM alongside HIV highlights the critical role of community engagement in improving health outcomes. It has been found that viral infections complicated diabetes management due to their adverse effects on immune function and metabolic control.[31] It stands to reason that the compromised immune system of a person living with HIV would further complicate the management of T2DM. Community support systems can alleviate these challenges by promoting treatment adherence and providing practical assistance during illness. As noted by Mosca et al,[32] effective community engagement often results in better glycemic control, as increased awareness and education fostered healthier lifestyle choices.

Studies demonstrated that social support significantly influenced health outcomes for individuals with chronic conditions. For instance, Fakiya[33] found that strong social networks and support from family and friends positively correlated with improved glycohemoglobin levels. This highlights the importance of community-based interventions in promoting health. Furthermore, Fisher et al.[34] asserted that linking individuals to resources such as

diabetes education and healthcare services enhanced their ability to manage diabetes effectively.

Finally, community engagement plays a vital role in managing T2DM and mitigating the effects of viral infections. By fostering supportive networks, enhancing education, and facilitating access to resources, community initiatives significantly improve health outcomes. Addressing the limitations identified will strengthen future studies and further elucidate the importance of community support in chronic disease management.

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