OPTIMIZATION OF TYPE 2 DIABETES PATIENT ASSISTANCE THROUGH ENHANCED TELECOACHING CAPACITY FOR PRIMARY HEALTHCARE NURSES IN KENDARI CITY

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ABSTRACT

Diabetes Mellitus (DM) is a health problem that requires a multidisciplinary approach, including the important role of community health center nurses. Telecoaching conducted by nurses has proven effective in improving glycemic levels in DM patients. This community service program aimed to enhance the capacity of primary healthcare center (puskesmas) nurses in providing telecoaching to Type 2 Diabetes Mellitus (DM) patients in the coastal areas of Kendari City. The program was designed to address the limitations in nurses' knowledge and skills while increasing the intensity of remote patient support for DM. A total of 10 primary healthcare nurses participated in the training, which covered telecoaching techniques, motivational interviewing, and the use of the Diabetes Mellitus Patient Health Assistance Application (DMPHAA). Evaluations assessed improvements in nurses' knowledge and skills, as well as reductions in the fasting blood glucose levels of DM patients. The results showed a significant increase in nurses' knowledge of telecoaching by 40.30% and a 52.76% improvement in telecoaching skills after the intervention. In addition, there was a 20.61% reduction in the fasting blood glucose levels of DM patients, demonstrating the program's effectiveness in helping patients manage their diabetes. Statistical tests showed significant results for all three variables with $p<0.05$. This program demonstrated that telecoaching can be an effective solution for providing remote healthcare services, especially in areas with limited access. It is recommended that the sustainability of this program is integrated into the services of primary healthcare centers to improve diabetes management in remote regions.

Keywords: *Telecoaching, Diabetes Mellitus, Primary Healthcare Nurses, Blood Glucose, Community Service*

1. BACKGROUND

Diabetes Mellitus (DM) is a major global health issue, with an estimated 463 million people living with the condition in 2019, and this figure is expected to rise to 700 million by 2045 (WHO, 2016). This global burden is echoed in Southeast Asia, including Indonesia, where an increasing number of individuals are being diagnosed with Type 2 Diabetes Mellitus (T2DM). As one of the leading non-communicable diseases, diabetes significantly contributes to both morbidity and mortality, particularly due to complications such as cardiovascular diseases, kidney failure, and neuropathies (Tesfaye, 2019).

In Indonesia, diabetes is recognized as one of the top health priorities due to its high prevalence and the substantial burden it places on the healthcare system. According to the Ministry of Health's Basic Health Research (Kementerian kesehatan, 2018), the prevalence of diabetes in the adult population of Indonesia was 10.9%. This translates to millions of Indonesians living with diabetes, a number that is projected to continue rising due to changes in diet, lifestyle, and demographic factors such as population aging. The health system in Indonesia is already struggling to cope with the increasing incidence of diabetes, particularly in rural and remote regions where healthcare services are often inadequate.

In Kendari, the capital city of Southeast Sulawesi, the situation mirrors the national trend. The coastal areas of Kendari are particularly vulnerable due to a lack of access to healthcare facilities and limited resources for managing chronic diseases such as T2DM. Healthcare services in Kendari are primarily provided by primary healthcare centers, which serve as the front line of the healthcare system. However, these centers often face challenges in delivering comprehensive diabetes care due to a lack of trained personnel, limited time for patient education, and inadequate resources for ongoing diabetes management (Saltar, 2024).

Data from puskesmas in Kendari show a sharp increase in the number of new diabetes cases in recent years. For instance, the number of newly diagnosed T2DM cases in five puskesmas located in coastal areas of Kendari—Nambo, Kandai, Mata, Benu-Benua, and Kemaraya—rose from 456 cases in 2019 to 964 cases in 2022. This dramatic increase places a substantial strain on the healthcare system, particularly in terms of the ability to provide ongoing diabetes care, education, and support. The growing number of patients requiring care often exceeds the capacity of the available healthcare personnel, especially nurses, who play a key role in patient management at the puskesmas level.

Effective management of diabetes relies heavily on the patient's ability to engage in self-care practices. These include monitoring blood glucose levels, adhering to prescribed medications, following a healthy diet, engaging in regular physical activity, and attending regular medical check-ups (Saad et al., 2018). However, studies have shown that many patients with diabetes, particularly those in rural and remote areas, struggle to manage their condition due to a lack of knowledge and support. In Kendari, for example, research by Saltar, Sahar, & Rekawati, (2023)found that 59% of T2DM patients exhibited poor self-management behaviors, which contributed to their inability to maintain optimal glycemic control.

One of the key factors influencing poor self-management among diabetes patients is a lack of patient education. Education is critical for empowering patients to take control of their condition and make informed

decisions about their care. Without adequate knowledge about diabetes, its complications, and the importance of self-management, patients are less likely to adhere to their treatment plans or engage in preventive behaviors (Pamungkas & Chamroonsawasdi, 2020). This is particularly true in the case of T2DM, where lifestyle modification plays a crucial role in managing the disease.

Unfortunately, the limited time and resources available to nurses in puskesmas often mean that patient education is not prioritized. In many cases, nurses are only able to provide basic information about diabetes management during routine clinic visits, with little opportunity for follow-up or reinforcement of this information. As a result, many patients are left without the knowledge or skills needed to manage their condition effectively, leading to poor glycemic control and an increased risk of complications (Byers, 2016).

Glycemic control is a key indicator of how well a patient is managing their diabetes. It is typically measured by the level of glycated hemoglobin (HbA1c) in the blood, which reflects the average blood glucose concentration over the previous two to three months. The target for HbA1c in diabetes management is generally below 7%, although this may vary depending on individual patient factors (American Diabetes Association, 2020). However, achieving this target is often challenging, particularly in resource-limited settings like Kendari.

In response to the challenges faced by healthcare workers in providing continuous diabetes care, innovative solutions are needed to enhance the capacity of nurses and improve patient outcomes. One promising approach is telecoaching, which involves the use of telecommunication technologies to provide remote coaching and support to patients. Telecoaching has been widely used in other countries to improve the management of chronic diseases, including diabetes, and has been shown to be an effective method for enhancing self-management behaviors and improving glycemic control (Robson & Hosseinzadeh, 2021).

Telecoaching offers several advantages over traditional face-to-face diabetes care. First, it allows nurses to provide regular coaching and support to patients without the need for in-person visits, which is particularly beneficial in remote areas where access to healthcare services is limited. This can help to overcome the geographical barriers that often prevent patients in coastal and rural areas from receiving continuous care. Second, telecoaching provides patients with ongoing motivation and feedback, which can help to reinforce positive behavior changes and improve adherence to treatment plans (Pamungkas et al., 2020).

Several studies have demonstrated the effectiveness of telecoaching in improving diabetes self-management and glycemic control. For example, a study by Pamungkas et al., (2020) found that telecoaching significantly improved self-management behaviors among T2DM patients in Indonesia, leading to better glycemic control and a reduction in HbA1c levels. Similarly, a meta-analysis conducted by Robson & Hosseinzadeh (2021) found that telecoaching was associated with significant improvements in HbA1c levels, as well as other cardiovascular risk factors, such as blood pressure and cholesterol levels. These findings suggest that telecoaching could be a valuable tool for enhancing diabetes management in settings where access to healthcare services is limited.

In the context of Kendari, where healthcare resources are limited and access to continuous care is challenging, telecoaching presents a potential solution for improving diabetes management. By providing nurses with the tools and training needed to deliver telecoaching, it is possible to enhance the capacity of puskesmas to support diabetes patients, particularly those in remote and coastal areas. Telecoaching could help to bridge the gap between healthcare services and patients, ensuring that they receive the ongoing support and education needed to manage their condition effectively.

The use of telecoaching in Kendari would also address some of the key barriers to diabetes management, such as the lack of time available for nurses to provide patient education and the difficulties in conducting home visits in remote areas. Through telecoaching, nurses could provide regular support to patients over the phone or through digital platforms, helping to reinforce positive self-management behaviors and improve glycemic control. This approach would also allow for more frequent monitoring of patients, which is critical for identifying potential problems early and adjusting treatment plans as needed.

Despite the potential benefits of telecoaching, there are several challenges that need to be addressed in order to successfully implement this approach in Kendari. One of the main barriers is the lack of infrastructure for telecommunication in remote areas. Although telecoaching relies on the use of phones or digital platforms, many patients in remote areas may not have access to reliable internet or mobile networks, which could limit the reach of the program (Campos & Scherer, 2024). Additionally, patients may not have the necessary digital literacy skills to use telecoaching platforms effectively, which could further hinder the implementation of this approach.

Another potential barrier is the resistance to change among healthcare workers. While telecoaching offers a new way of delivering care, it requires a shift in how healthcare workers, particularly nurses, interact with patients. Nurses may need additional training and support to effectively deliver telecoaching, particularly in terms of using digital tools and conducting remote coaching sessions.

This community service program aimed to increase nurses' knowledge of diabetes care and coaching by at least 30%, improve nurses' telecoaching skills by at least 25%, and enhance DM patients' glycemic control, with a target of reducing fasting blood glucose levels by at least 10%.

2. PROBLEMS AND QUESTION FORMULATION

Research has shown that a significant proportion of diabetes patients in Kendari have poor glycemic control. In a study conducted by Saltar, Sahar, & Rekawati (2023), 48% of diabetes patients in Kendari were found to have HbA1c levels of ≥ 9.5%, indicating very poor glycemic control. This is well above the recommended target and suggests that many patients are at high risk of developing diabetes-related complications, including cardiovascular disease, neuropathy, retinopathy, and nephropathy (Tesfaye, 2019). Poor glycemic control is often associated with inadequate self-management behaviors, as well as a lack of access to continuous healthcare and support.

One of the major barriers to achieving optimal glycemic control is the lack of structured diabetes education programs in puskesmas. Although nurses are responsible for providing education and support to patients, they

are often limited by time constraints and a lack of resources. As a result, many patients receive only intermittent advice about managing their diabetes, without the ongoing support needed to sustain long-term behavior changes (Saltar et al., 2023). Additionally, the lack of follow-up care means that patients are not regularly monitored, which increases the risk of their condition worsening over time.

Several factors that influence poor glycemic control in DM patients include the lack of patient discipline in carrying out self-care and the low quality of health services provided (Saad et al., 2018; Byers, 2016). In health centers, these obstacles are exacerbated by limited human resources and the main focus of health workers on in-building services, such as outpatient services, administration, and reporting, so that time for home visits is very limited. Communication with 10 nurses in several health centers in Kendari City showed that they did not have enough time to accompany DM patients in the community. Nurses only visit the Integrated Development Post (IDP) for non-communicable diseases (IDP-NCD) once a month without home visits, and they also lack references to provide specific education about DM because they have never received training in patient assistance techniques.

The formulation of the questions of this community service program are:

a) Can increasing the capacity of telecoaching for community health center nurses in the coastal areas of Kendari City improve the knowledge and skills of nurses in conducting telecoaching?
b) Can increasing the capacity of telecoaching for community health center nurses in the coastal areas of Kendari City reduce fasting blood sugar levels in type 2 DM patients?

3. LITERATURE REVIEW

Telecoaching for Diabetes Self-Management

Telecoaching is an essential component of telehealth programs, especially in chronic disease management. In the context of diabetes, telecoaching typically involves guiding patients through lifestyle modifications and self-care activities aimed at improving glycemic control. Nurse-led telecoaching has been one of the most widely studied models, demonstrating positive effects on clinical outcomes such as HbA1c, blood pressure, and lipid levels (Odnoletkova et al., 2016).

A meta-analysis by Yu-Mei Chen et al. (2019) investigated the effectiveness of nurse-led telecoaching on cardiovascular risk factors in individuals with type 2 diabetes. The study included twelve RCTs with a total of 3,030 participants and found significant reductions in HbA1c (pooled mean difference = −1.23) and systolic blood pressure (pooled mean difference = −2.22). These findings support the use of nurse-led telecoaching as a viable method for improving diabetes management and controlling modifiable cardiovascular risk factors, which are crucial for preventing complications in diabetes patients.

Similarly, a systematic review and meta-analysis evaluated the efficacy of nurse-led telecoaching using telephone and mobile apps for improving self-care and clinical outcomes in individuals with diabetes mellitus. The analysis, which included 13 randomized controlled trials (RCTs) with a total of 3,300 participants, demonstrated that telecoaching significantly improved key clinical outcomes, including HbA1c, systolic blood

pressure, weight, and body mass index (BMI). Telecoaching, particularly in the form of remote support through telecommunication tools, has proven to be a cost-effective and feasible care model. Although the studies included in the review focused on non-COVID-19 patients, these findings suggest that telecoaching could be an effective strategy for managing diabetes during pandemics like COVID-19, improving self-care and clinical outcomes in the process (Platini et al., 2023).

Another study of a randomized controlled trial assessed the effects of telephone-based telenursing on glycated hemoglobin (HbA1c) levels among older adults with type 2 diabetes mellitus in Iran. The 3-month tele-nursing program, utilizing the Health Ministry Diabetes Mellitus Educational Material, demonstrated that telephone-based telenursing is an effective strategy for managing type 2 diabetes in this population. The intervention led to significant improvements in HbA1c levels, highlighting the potential of telenursing to enhance treatment outcomes, particularly for older adults with low literacy and financial constraints. These findings suggest that telephone-based telenursing could be a valuable approach to diabetes management, especially in resource-limited settings (Esmaeilpour-bandboni et al., 2021).

While the potential benefits of telehealth and telecoaching are clear, their adoption is not without challenges. One of the key barriers is the digital divide, with many individuals in low-income or rural areas lacking access to the necessary technology, such as smartphones or reliable internet connections, to participate in telehealth programs. Studies have shown that these technological limitations disproportionately affect older adults and those with lower educational levels, further exacerbating health disparities (AlQassab et al., 2024).

Moreover, healthcare providers may face resistance to adopting telehealth due to concerns about the efficacy of remote care and the impact on their practice workflows. Some providers also express apprehension about the lack of physical examination during telehealth consultations, particularly for patients with complex health needs (Rintyarna et al., 2023).

This literature review aligns with the objectives of the community service program, which aims to assess whether telecoaching provided by nurses can improve glycemic control in diabetes patients. The review synthesizes relevant studies demonstrating the effectiveness of nurse-led telecoaching in enhancing clinical outcomes such as HbA1c levels, systolic blood pressure, and overall diabetes management. These findings support the goal of the program to evaluate the impact of telecoaching on improving glycemic control in patients with diabetes mellitus.

4. METHOD

The implementation of this Community Partnership Program (CPP) focused on enhancing the capacity of primary healthcare (puskesmas) nurses in telecoaching for Type 2 Diabetes Mellitus (DM) patients. The program was carried out in four stages as follows:

a. Socialization and Preparation Stage

This stage involved coordination, participant recruitment, preparation of training materials, and venue and logistical arrangements. The steps carried out during this stage included:

1) Coordination with the Kendari City Health Office and puskesmas heads: Initial coordination was conducted with the Kendari City Health Office and puskesmas heads regarding the plan to implement the capacity-building program for puskesmas nurses. The aim of this coordination was to ensure administrative involvement from the puskesmas in Kendari City, particularly Puskesmas Nambo, Kandai, Mata, and Benu-Benua.
2) Recruitment of Puskesmas Nurses: A total of 10 primary healthcare nurses were recruited as program participants. These nurses were selected based on their qualifications as registered nurses and at least two years of work experience at the puskesmas.
3) Focus Group Discussion (FGD): An FGD was conducted involving coaching experts, IT specialists, nurses, and Type 2 DM patients. The purpose of this activity was to gather input for developing the training modules and the telecoaching application.
4) Preparation of Training Materials: The training materials were developed in the form of modules covering basic concepts of DM, motivational interviewing techniques, simulation videos, foot care training videos, and diabetes foot exercise videos. Additionally, the Diabetes Patient Health Assistance Application (PKPDM) was developed to facilitate the implementation of telecoaching.

b. Training Stage

The goal of this stage was to improve nurses' capacity to conduct remote coaching for DM patients. The training activities included the use of the PKPDM application and training on DM education, motivational interviewing techniques, foot care, and diabetes foot exercises. The training was divided into 4 sessions, as follows:

1) Session 1: Refresher on DM concepts and health coaching techniques (±120 minutes).
2) Session 2: Training on motivational interviewing techniques via telephone (±120 minutes).
3) Session 3: Simulation of foot care and diabetes foot exercises (±120 minutes).
4) Session 4: Simulation of motivational interviewing techniques via telephone (±120 minutes).

Figure 1. Nurse Training Activities

c. Technology Implementation Stage

After completing the training, the trained nurses began implementing motivational interviewing via telephone with DM patients. Each nurse managed 3 DM patients and provided one telecoaching session per week for four weeks. The topics covered in each telecoaching session were as follows:

1) Week 1: Motivation for healthy eating and physical exercise.
2) Week 2: Motivation for medication adherence.
3) Week 3: Motivation for monitoring and glucose level targets.
4) Week 4: Motivation for foot care and diabetes foot exercises.

Before the sessions began, DM patients were guided to download and install the PKPDM application on their mobile devices. This application helps patients monitor their blood sugar levels in real-time, reminds them of their medication schedule, and provides online education and consultation.

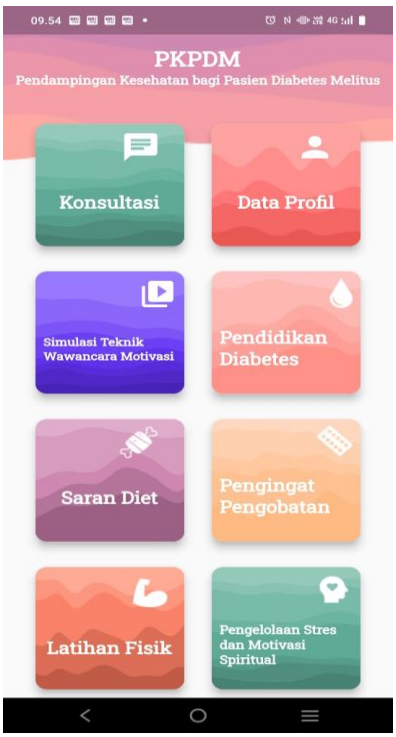

Figure 2. DMPHAA Application on Android Mobile Phone

d. Monitoring and Evaluation Stage

This stage aimed to evaluate the nurses' knowledge and skills and the impact of telecoaching on the glycemic control of Type 2 DM patients. The evaluation was conducted through:

1) Assessment of Nurses' Knowledge and Skills: Measuring the improvement in nurses' knowledge of DM education and their skills in motivational interviewing, as well as teaching foot care and diabetes foot exercises.
2) Evaluation of Patients' Blood Glucose Levels: Assessing changes in the fasting blood glucose levels of DM patients after the telecoaching implementation.

5. RESULTS AND DISCUSSION

a. Results

Table 1 below shows the results of data analysis on nurses' knowledge, telecoaching skills, and patients' fasting blood glucose levels before and after the telecoaching program intervention. The data were analyzed using the Wilcoxon test and paired t-test, with a significance level of $p<0.05$.

Table 1

Variable	Mean (SD) Before	Mean (SD) After	Difference (SD)	95% CI	P-value
Nurse Knowledge	67.00 (±10.59)	94.00 (±5.16)	27.00 (±8.23)	21.11 – 32.88	0.004*
Nurse Telecoaching Skills	49.75 (±7.11)	76.00 (±5.55)	26.25 (±3.17)	23.98 – 28.52	0.0001**
Patient Fasting Blood Glucose	242.70 (±63.08)	192.70 (±38.17)	-50.00 (±39.71)	-78.41 – -21.58	0.0001**

Note: *Wilcoxon test.
**Paired t-test.

1) Nurses' Knowledge of Telecoaching

After the intervention, there was a significant increase in nurses' knowledge of telecoaching. The mean knowledge score increased from 67.00 (SD ±10.59) before the intervention to 94.00 (SD ±5.16) after the intervention, with a mean difference of 27.00 (SD ±8.23). The 95% confidence interval (CI) ranged from 21.11 to 32.88, and the p-value of 0.004 indicates that this increase was statistically significant.

The 40.30% improvement in nurses' knowledge demonstrates the effectiveness of the training program. Better knowledge of telecoaching enables nurses to understand the concept of remote education, which is key to modern healthcare services, especially for chronic conditions like diabetes that require continuous monitoring.

2) Nurses' Skills in Delivering Telecoaching

Nurses' telecoaching skills also significantly improved after the intervention. The mean telecoaching skill score increased from 49.75 (SD ±7.11) before the intervention to 76.00 (SD ±5.55) after the intervention, with a mean difference of 26.25 (SD ±3.17). The 95% confidence interval ranged from 23.98 to 28.52, and the p-value of 0.0001 indicates a highly significant increase.

The 52.76% improvement in skills demonstrates the success of the intervention in enhancing nurses' technical abilities to provide more effective telecoaching services. This is crucial, as telecoaching skills are necessary to offer support to diabetes patients, particularly in coastal areas where access to direct healthcare services is limited.

3) Fasting Blood Glucose Levels in Type 2 Diabetes Mellitus Patients

There was a significant reduction in fasting blood glucose levels among T2DM patients after the intervention. The mean fasting blood glucose level dropped from 242.70 mg/dL (SD ±63.08) to 192.70 mg/dL (SD ±38.17) after the intervention, with a mean decrease of -50.00 mg/dL (SD ±39.71). The 95% confidence interval ranged from -78.41 to

-21.58, and the p-value of 0.0001 indicates that this reduction was statistically significant.

The 20.61% reduction in fasting blood glucose levels demonstrates that the telecoaching intervention significantly contributed to the improvement of glycemic control in DM patients. Maintaining good blood glucose control is a key factor in preventing long-term complications in DM patients, such as neuropathy, retinopathy, and cardiovascular disease.

b. Discussion

Enhanced Knowledge of Nurses Regarding Telecoaching for Diabetes Mellitus Patients

The findings of this study reveal a significant increase in nurses' knowledge of telecoaching, with a 40.30% improvement after the intervention and a statistically significant p-value of 0.004. This notable rise in knowledge can be attributed to the comprehensive training program that included foundational concepts of diabetes mellitus (DM), telecoaching methods, and the utilization of supportive digital applications. These results align with various studies that underscore the efficacy of technology-based health training in enhancing healthcare workers' understanding of chronic disease management, particularly Type 2 Diabetes Mellitus (T2DM). Pamungkas et al. (2020) demonstrated that such training approaches substantially improve health professionals' knowledge, equipping them with the necessary tools to manage chronic illnesses like T2DM effectively.

Furthermore, Izzah et al. (2017) reported that similar training initiatives significantly enhanced the knowledge of elderly workers within communities, contributing to improved patient education. This finding emphasizes the broader applicability of telecoaching training beyond the immediate context of clinical practice, highlighting its potential in community-based health interventions as well. By empowering healthcare providers with knowledge, telecoaching training not only improves the management of diabetes but also enhances patient education, enabling patients to become more active participants in their care.

The increased knowledge about telecoaching among nurses is further supported by research conducted by Robson & Hosseinzadeh (2021). Their study found that telehealth interventions, including telecoaching, are highly effective in raising healthcare professionals' awareness and understanding of chronic disease management, particularly in managing T2DM. Through a meta-analysis of multiple studies, Robson & Hosseinzadeh concluded that telehealth interventions significantly improve patients' self-management behaviors, resulting in a statistically significant reduction in HbA1c levels. This is a critical measure in diabetes management, as lower HbA1c levels are strongly associated with a reduced risk of diabetes-related complications, including neuropathy, retinopathy, and cardiovascular disease.

However, some research has yielded different results. For instance, Rush et al., (2018) noted that while training programs can enhance knowledge in the short term, their long-term impact is limited, particularly in regions where there is inadequate infrastructure to support sustained practice. In this context, the success of training interventions like telecoaching is contingent on the availability of ongoing resources,

technological infrastructure, and support in the field. This perspective is echoed by Almulhim et al. (2023), who argue that telecoaching training should be supplemented with behavioral change techniques such as goal setting and problem-solving to optimize outcomes, particularly in reducing HbA1c levels. Without these additional strategies, the long-term benefits of telecoaching may be diminished, especially in resource-constrained settings.

Improved Skills in Delivering Telecoaching Among Nurses

This study also documented a 52.76% increase in nurses' telecoaching skills after the intervention, with a p-value of 0.0001, indicating the intervention's significant success. Simulation-based training and hands-on practice proved effective in improving nurses' communication skills, particularly in the context of remote patient education. The integration of both theory and practice into the training program allowed nurses to build confidence in their telecoaching abilities, preparing them to effectively communicate with and support T2DM patients through telecommunication platforms.

The effectiveness of simulation-based learning in enhancing healthcare professionals' communication skills has been well-documented in the literature. Lin et al. (2016) found that motivational interviewing simulations, which were a core component of the telecoaching training in this study, significantly improved healthcare workers' communication skills. These findings suggest that interactive, practical training approaches are essential for fostering the development of key skills in healthcare providers, particularly when those skills involve patient interaction and support.

In addition, Yu-Mei Chen et al. (2019) demonstrated that nurse-led telecoaching interventions are particularly effective in improving cardiovascular risk management among T2DM patients. Their study highlighted that telecoaching not only improved HbA1c levels but also led to better control of other cardiovascular risk factors, such as blood pressure. These improvements are linked to the continuous education and feedback provided by telecoaching, which encourages patients to adhere to their treatment plans and make positive lifestyle changes. In this context, the skills acquired by nurses in this study through telecoaching training are likely to have a significant impact on patient outcomes, particularly in terms of glycemic control and overall diabetes management.

However, it is important to recognize that the success of telecoaching interventions is not universal. Campos & Scherer (2024) found that telecoaching skills may be less effective in areas with limited access to technology, such as regions with poor telecommunications infrastructure or a lack of adequate digital devices. In such areas, nurses may struggle to apply their telecoaching skills effectively, as they are dependent on patients' access to the necessary technology. Without reliable internet or mobile phone access, telecoaching sessions may be disrupted, reducing their effectiveness and limiting the potential benefits for patients.

Similarly, Odnoletkova et al. (2016) emphasized that the successful implementation of telecoaching interventions is heavily reliant on the availability of local resources and infrastructure. In settings where these

resources are lacking, telecoaching programs may face significant barriers, limiting their ability to deliver meaningful improvements in patient outcomes. To address these challenges, it is crucial that telecoaching programs are tailored to the specific needs and limitations of the regions in which they are implemented. This may involve investing in the necessary technological infrastructure or developing alternative strategies for delivering telecoaching in areas where digital access is limited.

Reduction in Fasting Blood Glucose Levels Among Diabetes Mellitus Patients

The significant reduction in fasting blood glucose levels, with a 20.61% decrease following the telecoaching intervention, further demonstrates the effectiveness of this approach in managing diabetes. This reduction was statistically significant ($p = 0.0001$), providing strong evidence that telecoaching can help patients achieve better glycemic control. The ability of telecoaching to influence blood glucose levels is particularly important in the context of diabetes management, as poor glycemic control is a major risk factor for the development of serious complications, including diabetic foot ulcers, retinopathy, and cardiovascular disease (Tesfaye, 2019).

Telecoaching's impact on glycemic control is consistent with findings from other studies. Platini et al. (2023) found that continuous communication between healthcare providers and patients through telecoaching significantly improved patients' adherence to self-management behaviors, including medication adherence and dietary modifications. These behaviors are essential for maintaining optimal blood glucose levels and preventing complications associated with diabetes. The study by Platini et al. (2023) also confirmed that telecoaching not only helps to lower blood glucose levels but also improves the overall quality of life for patients with diabetes, particularly in urban areas where access to technology is more readily available.

Robson & Hosseinzadeh (2021) also noted that telecoaching is more effective when healthcare providers are actively engaged with patients and when patients are motivated to participate in their care. The continuous support and encouragement provided by telecoaching help to foster a sense of accountability among patients, encouraging them to adhere to their treatment plans and make positive lifestyle changes. This sense of accountability is a key factor in achieving better glycemic control, as it motivates patients to take an active role in managing their condition.

However, not all studies have reported positive results regarding the effectiveness of telecoaching. For example, AlQassab et al. (2024) conducted a study in rural areas and found that telecoaching did not result in significant improvements in blood glucose levels. The researchers attributed this to the lack of family involvement and social support in the rural communities where the study was conducted. Social support has been identified as a critical factor in the success of telecoaching interventions, as it provides patients with additional motivation and encouragement to adhere to their self-management routines.

The findings from AlQassab et al. (2024) suggest that telecoaching programs may need to be adapted to include family members and other sources of social support, particularly in rural or underserved areas where patients may lack access to these resources. By involving family members in telecoaching sessions, healthcare providers can help ensure that patients receive consistent support at home, reinforcing the messages delivered during coaching sessions and helping to improve patient outcomes. Furthermore, community-based interventions that involve local support networks may also be effective in enhancing the impact of telecoaching, particularly in regions where social isolation is a barrier to effective diabetes management.

Telecoaching as a Behavior Change Tool

The effectiveness of telecoaching in improving patient outcomes can also be explained through the lens of behavioral change theory. Telecoaching aligns with several well-established models of behavior change, including the Health Belief Model (Hanif et al., 2020) and the Transtheoretical Model of Behavior Change (Selvaraj & Ramakrishnappa, 2021). These models suggest that individuals are more likely to engage in health-promoting behaviors when they perceive a high level of risk associated with their condition, believe in the efficacy of the recommended intervention, and feel confident in their ability to carry out the necessary actions.

Telecoaching addresses these factors by providing patients with personalized education about the risks of poor diabetes management, while simultaneously equipping them with the skills and knowledge needed to make meaningful lifestyle changes. The continuous feedback and encouragement provided by telecoaching help to build patients' confidence in their ability to manage their condition, fostering a sense of self-efficacy that is crucial for long-term behavior change.

Motivational interviewing, a core component of telecoaching in this study, is particularly effective in promoting behavior change by exploring and resolving patients' ambivalence about making lifestyle changes (Lin et al., 2016). By helping patients identify their personal reasons for wanting to improve their health, motivational interviewing increases their motivation to engage in self-management behaviors, leading to better glycemic control and overall health outcomes.

6. CONCLUSION

The telecoaching program implemented in this community service activity had a significant impact on improving nurses' knowledge and skills, as well as reducing fasting blood glucose levels in Type 2 Diabetes Mellitus (DM) patients. The 40.30% increase in nurses' knowledge demonstrates that the comprehensive training, both theoretical and simulation-based, effectively strengthened nurses' understanding of remote DM management.

Additionally, nurses' telecoaching skills improved by 52.76%, reflecting the effectiveness of the hands-on training approach used. These skills are crucial in the context of remote healthcare services, especially in the coastal areas of Kendari City, where access to healthcare facilities is limited. The results highlight the importance of mastering motivational interviewing and

remote communication techniques in improving the quality of care provided to DM patients.

From the patients' perspective, the 20.61% reduction in fasting blood glucose levels shows that the telecoaching intervention had a positive impact in helping patients manage their chronic condition. Remote support from nurses proved effective in increasing patient adherence to medication, diet, and physical activity. This reduction is critical for lowering the risk of long-term complications, which are often experienced by DM patients with poor glycemic control.

The results of this community service program demonstrate that telecoaching can be an effective alternative for improving nurses' knowledge and skills, as well as assisting patients in controlling their glycemic levels. However, the success of this program requires adequate supporting infrastructure and the involvement of families and communities in promoting lifestyle changes for DM patients.

Recommendations for future programs include: First, increasing the frequency of training to ensure the sustainability of improvements in nurses' knowledge and skills. Second, implementing telecoaching in remote areas with consideration of technical factors such as telecommunications infrastructure and social support. Third, developing a telecoaching application with additional features that support long-term monitoring, such as integration of patient blood glucose data, medication adherence reports, and routine reminders. Fourth, emphasizing the importance of family and community involvement in supporting this program. Families are expected to assist patients in using the telecoaching application and motivate them to adhere to treatment and recommended lifestyle changes. Support from family and the community will greatly help ensure that patients manage their DM optimally.

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