

Executive Summary: Clinical Practice Guideline

***** Diabetes Type Two Self-Care Management**

by

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MS, Walden University, 2024

BS, Walden University, 2024

Executive Summary Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

November 2024

Summary

This project developed a clinical practice guideline (CPG) for nurse practitioners regarding evidence-based guidelines for Type 2 diabetes (T2DM) self-care management at a primary care clinic in Cleveland, OH (see Appendix A). The practice problem of T2DM is a prevalent disease affecting approximately 37.3 million people. T2DM can lead to complications of kidney disease, heart disease, diabetic neuropathy, eye damage, foot damage, infections, and is therefore important to address. Self-care in T2DM can improve management and affect overall outcomes. However, there is a lack of evidence-based guidelines to guide practitioners in the management of diabetes self-care at the project site. The lack of use of best practices in diabetes self-care management challenges the practitioner by creating uncertainty. The practice-focused question asked whether the evidence supported the development of a CPG for nurse practitioners regarding Type 2 diabetes self-care that was assessed by an expert panel using the Appraisal of Guidelines for Research & Evaluation II (AGREE II) Instrument and was approved for use in practice by end users. This CPG is developed based on a comprehensive Johns Hopkins literature review and synthesis of current evidence on diabetes self-care management. Thirty articles met project inclusion criteria with the levels of evidence from Level I to Level IV. The AGREE II Instrument was used by the selected panel of 3 experts to evaluate the quality of the CPG. Domain 1 received an average score of 92%, domain 2 of 92%, domain 3 of 90%, domain 4 of 98%, domain 5 of 97%, domain 6 of 100%, and global domains scored 100% each (see Appendix B). The themes of the CPG included the emphasis on strictly following medication regimen, preventative care, and monitoring of diabetes-related health outcomes in achieving optimal self-care. These guidelines may help reduce inequalities in healthcare by ensuring that all patients, regardless of their background, have access to the same high level of care.

Background

Diabetes is a chronic metabolic disorder that results from high blood sugar due to cells' insulin resistance. According to the Centers for Disease Control and Prevention (2020), 37.4 million Americans, or 11.3% of the population, have T2DM. In a larger spectrum, according to the World Health Organization (2021), approximately 422 million adults suffer from diabetes globally, and this number will likely rise up to 552 million by 2030. These findings highlight the need for changes in clinical practice to improve patient self-management and more effective management of T2DM treatment. These alarming figures also highlight gaps in current approaches to patient education and care. New clinical guidelines to support healthcare professionals in managing T2DM are needed to reduce the rise in incidence and improve quality of life for patients.

The aim of this project was to develop clinical guidelines for nurse practitioners on self-care in T2DM, assessed by an expert group using the AGREE II tool and endorsed for practical use by end users. The practice-focused question asked whether the evidence supported the development of a CPG for nurse practitioners regarding T2DM self-care that was assessed by an expert panel utilizing the AGREE II Instrument, received a quality score, and was also approved for use in practice by end users. The purpose of this project was to develop clinical guidelines to help nurse practitioners better assess and manage diabetes self-management in patients. This project aimed to produce guidance that would improve the quality of care for patients with diabetes and increase their ability to effectively manage their condition. The most common diabetes type is T2DM with 90-95% of all diabetes cases being T2DM (National Institutes of Health, 2023). For patients with T2DM, insulin resistance, in which the body does not use insulin effectively, plays a key role (Babazadeh et al., 2023). Treatment includes lifestyle

changes, oral medications such as metformin, and sometimes insulin (National Institutes of Health, 2023). An emphasis on appropriate treatment and medication selection for glycemic control is an important part of self-care for patients with T2DM. The role of nurses in educating, counselling and supporting patients with T2DM is key to successful disease management (National Institutes of Health, 2023). Nurses help patients understand their condition by teaching them the basics of diabetes, including the importance of monitoring blood sugar levels and following a diet (Dubois et al., 2021). They provide information about different treatments, such as oral medications and insulin, and teach patients how to use them correctly. In addition, nurses support patients in making lifestyle changes by helping them develop individualized diet and exercise plans that suit their needs. They also provide psychological support to build patients' self-confidence and encourage them to actively participate in their treatment (Dubois et al., 2021). This education and guidance enable patients with T2DM to better manage their condition and improve their quality of life.

Blindness, hypertension, kidney failure, heart attacks, stroke and lower limb amputation are some of the global significant morbidity and mortality contributions caused by diabetes (American Diabetes Association, 2020). Consequently, it is important for patients to take personal responsibility for their self-care to avoid or delay developing complications associated with diabetes. However, findings show that many diabetic individuals do not adhere to self-care practices leading to poor control, thereby increasing healthcare costs and resulting in poor patient health outcomes (Dubois et al., 2021). Patients often fail to adhere to diabetes care recommendations for several reasons. First, a lack of knowledge about the disease and its consequences may result in a failure to recognize the importance of following treatment (Rasoul et al., 2019). Many patients do not understand how poor diet or irregular medication intake can

negatively affect their condition (Babazadeh et al., 2023). Second, psychological factors such as depression and anxiety may reduce patients' motivation to follow recommendations. Stress associated with everyday life may also distract them from taking care of their health (Babazadeh et al., 2023). In addition, a lack of support from family and health care providers may create a sense of isolation, making it difficult to adhere to recommendations (Zewdie et al., 2022). Problems with access to health resources, including services and medications, may further aggravate the situation. All of these factors lead to patients failing to follow diabetes care recommendations, which may worsen their health. Therefore, there is need for evidence-based guidelines towards assisting providers in offering effective way of managing diabetes.

In order to support policy formulation and clinical decision making by providers, there is need for robust evidence base about best practices in prevention of complications from diabetes involving healthy lifestyle choices. Within this project, evidence has been reviewed supporting the need for change, including Level I and Level II Evidence by Asmat et al., 2022; Liu et al., 2020; Stevens et al., 2022, Alaslawi et al., 2022; Azmiardi et al., 2021; Boels et al., 2019; Jiang et al., 2019; Kong & Cho, 2020; Lee et al., 2019; Rasoul et al., 2019. These Level I studies provide recommendations as for diet: balanced meals improve control in diabetes; exercise and physical activity: exercises help in blood sugar control, mental health balancing and stress management and heart health; medication: appropriate drug use prevents complications; Monitoring: regular checks keep tabs on diabetes progress. Next, Level III and Level IV Evidence by Adhikari et al., 2021; Adu et al., 2019; Babazadeh et al., 2023; Eshete et al., 2023; Gagliardino et al., 2019; Zewdie et al., 2022 suggest importance of stress management: stress management is an essential part in diabetic self-care; support system facilitation: building a diabetes support system is important for effective self-management; working with socially

disadvantaged patients: when working with socially vulnerable patients with diabetes, it is important to consider their financial limitations and access to resources.

Clinical Practice Guideline Development

The expert panel played a key role in the evaluation of the CPGs, providing a comprehensive review of the quality and practical ability. A three-member expert panel was formed to evaluate the CPGs. The panel included a physician with many years of experience in the treatment of chronic diseases, including diabetes. His expertise and clinical experience in diabetes management were critical to assessing the effectiveness of the proposed guidelines. Also involved was a C-NP – a registered nurse practitioner with an emphasis on working with patients with chronic diseases, and her practical experience in the care of patients with diabetes was important to analyze the applicability and usefulness of the guidelines in practice. Finally, another C-NP was on the panel also a registered nurse practitioner with extensive knowledge of primary care, including diabetes management. Her clinical experience allowed her to assess the feasibility of implementing the guidelines into current work processes. The selection process for these experts to evaluate the guidelines was based on their expertise in diabetes management and working with clinical practice guidelines.

The experts used the AGREE II Instrument to comprehensively evaluate the CPG. The tool assesses aspects such as clarity of wording, scientific validity, applicability to practice, and end-user involvement. The assessment process involved a detailed analysis of the six AGREE II domains: objectives, participant involvement, rigor of development, clarity of presentation, applicability, and independence. AGREE II is a validated scale measuring the quality of CPGs. AGREE II also serves as an important tool for improving clinical guidelines, ensuring that they are in line with current evidence-based medicine standards and that they are more effective when

implemented in real-world clinical practice. This tool helps ensure that recommendations are not only evidence-based but can also be tailored to the needs of healthcare professionals and patients.

To conduct the project, I organized a meeting in person to which I invited the three members of the expert panel. During the meeting, I presented the CPG and the AGREE II instrument summarizing the guideline and how to assess and score using the Agree II tool. The introduction of the CPG and AGREE II was carefully designed so that the experts could understand the main goals and parameters of the proposed approach. I provided copies of the CPG to reviewers. After the presentation, I invited the experts to evaluate the CPG. Each participant in the meeting carefully read the content of the CPG and studied the AGREE II instrument, and then completed the evaluation and provided feedback including any possible improvements to adapt the CPG to the needs of patients.

To summarize, the three members of the expert panel received a copy of the guidelines and the AGREE II Instrument, which contains 23 items divided into 6 domains. Both the CPG and the Instrument were reviewed with the panel. As for the AGREE II Instrument itself, it is assessed against six criteria, each of which is assigned a score from 1 to 7. High scores indicate high quality recommendations, and low scores indicate a need for improvement. Each expert assessed the guidelines across six key AGREE II domains: scope and purpose, stakeholders, rigor of development, clarity of presentation, applicability, and editorial independence. The experts rated each item on a scale from 1 (strong disagreement) to 7 (strong agreement) based on their accuracy, validity, and applicability. After individual assessments, the experts met to discuss their assessments, identify any differences, and reach a consensus on approval for use in practice.

Results

The results of the AGREE II Instrument assessment for this CPG by the expert panel showed a high rating for the quality of the document. The AGREE II Instrument contains 23 items divided into 6 domains. Each item is rated on a 1-7 Likert scale. Results by domain include: domain 1 (scope and objectives) - the experts rated the clarity of objectives and scope highly, with an average score of 92%, indicating that the purpose of the guidelines is clearly defined. Domain 2 (stakeholders): this domain received a score of 92%, indicating the involvement of key professionals and patients in the development process. Domain 3 (rigor of development): the score was 90%. Although rigorous methods were used, the experts noted room for further improvement in the area of justification of the methodology. Domain 4 (clarity of presentation): the guidelines received a score of 98%, indicating a high degree of clarity and consistency of the evidence presented. Domain 5 (applicability): a score of 97% indicated that the guidelines are well applicable in practice, although there was a need for more specificity in some settings. Domain 6 (editorial independence): with a score of 100%, this domain showed the highest result, confirming the absence of influence from commercial interests. Expert comments were largely positive, with an emphasis on the clarity and relevance of the guidelines for healthcare professionals (see Appendix C for detail). Discussion with stakeholders and end users confirmed that the guidelines would be useful in their daily practice and were also considered important for improving patient care. Below, in table 1, details are provided with figures to illustrate the way the process of the CPG assessment was performed:

Table 1

Appraisers' Evaluation Results

	Reviewer 1	Reviewer 2	Reviewer 3	Overall Domain Score	Average
Domain 1	85%	96%	100%	59	92%
Domain 2	86%	100%	93%	39	92%
Domain 3	91%	93%	88%	155	90%
Domain 4	100%	100%	95%	62	98%
Domain 5	96%	100%	96%	82	97%
Domain 6	100%	100%	100%	63	100%

~~More details on the results of reviewers' assessment can be seen in Appendix B.~~

Adoption of this CPG can have a significant impact on the organization where the project is taking place by improving the quality of care for patients with T2DM and increasing the effectiveness of patient self-management. This is especially important for optimizing the work of health care professionals, such as nurse practitioners, who will be able to better assess their patients' condition and provide clear recommendations for self-management. The use of CPGs can also reduce the number of complications in patients, which will lead to lower treatment costs and increased patient satisfaction.

However, there are certain limitations that may affect the results of implementing these recommendations. First, differences in the level of training and experience of health care professionals may affect the effectiveness of CPG implementation. Also, not all patients may have access to the necessary resources for successful self-management, which may limit the results. Another limitation is the need to constantly update the guidelines due to changes in scientific evidence and diabetes treatment technologies.

Reflecting on the significance of current project, it is important not only for the local health care institution, but also for general medical practice. The problem of T2DM and the need for self-management are relevant to many health care institutions around the country and globally, so these recommendations may be useful for implementation in other organizations (Adhikari et al., 2021). They not only contribute to improved patient care, but also to positive social change, including greater equity and inclusion in health care, which is especially important for vulnerable groups such as patients with low incomes or limited access to health services (Adhikari et al., 2021).

Conclusions

The development of CPG for nurse practitioners regarding T2DM self-care may have a significant impact on the organization. These guidelines will help improve the quality of patient care, reduce the risk of complications, and increase patient awareness of appropriate self-management practices. Implementation of the guidelines will also ensure a standardized approach to treatment, which will improve coordination between nurses and other healthcare professionals. Further recommendations include periodic review and updating of the guidelines based on new evidence and research. This ensures that the guidelines remain relevant and based on the latest scientific advances. It is also important to strengthen educational programs for nurses and other professionals to improve their skills in working with patients with diabetes. Possible implications for nursing practice include improved assessment of patients' conditions and more effective management of their self-care. This will increase patient engagement in the treatment process, improve glucose control rates, and reduce the risk of complications. An important aspect is the integration of principles of positive social change, diversity, equity, and

inclusion into the approach to treatment. This will help to take into account the cultural, social and economic differences of patients and create individualized treatment plans. The selected panel of experts used the AGREE II instrument to comprehensively evaluate the CPG. The tool assesses aspects such as clarity of wording, scientific validity, applicability to practice, and end-user involvement. The assessment process involved a detailed analysis of the six AGREE II domains: objectives, participant involvement, rigor of development, clarity of presentation, applicability, and independence. Following the assessment, each domain was rated on a scale, allowing the experts to make a comprehensive judgment on the appropriateness of the guideline for use in practice. Since current CPG obtained over 70% in all domains and overall assessment, they were appraised as having received a quality score and were accepted for use in the practice site by the panel of experts.

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Appendix A

Literature Review and Synthesis

EBP Question: Does the evidence support the development and expert panel validation of a Clinical Practice Guideline (CPG) for self-care improvement education for diabetes patients that is also approved for use in the practice setting by end users?

Category (Level Type)	Total Number of Sources/Level	Overall Quality Rating	Synthesis of Findings Evidence That Answers the EBP Question
<p>Level I</p> <ul style="list-style-type: none"> ▪ Experimental study ▪ Randomized controlled trial (RCT) ▪ Systematic review of RCTs with or without meta-analysis ▪ Explanatory mixed method design that includes only a Level I quantitative study 	<p>3 (Asmat et al., 2022) (Liu et al., 2020) (Stevens et al., 2022)</p>	<p>Strong, compelling evidence, consistent results: Solid indication for a practice change is indicated.</p>	<p>(Asmat et al., 2022) The evidence falls under Level I, characterized by a systematic review of RCTs with a meta-analysis. The inclusion of multiple RCTs strengthens the study's evidence base and provides a high level of internal validity. The systematic review not only synthesizes the findings but also conducts a meta-analysis to quantitatively assess the impact of patient-centered self-management interventions on glycemic control. The results of the meta-analysis indicate a significant reduction in HbA1c, emphasizing the efficacy of these interventions. This evidence contributes valuable insights into the effectiveness of patient-centered self-management care interventions for adults with type 2 diabetes. The findings highlight the positive impact on glycemic control and self-care behaviors, emphasizing the importance of a patient-centered approach in diabetes care. Health professionals can use this evidence to inform and implement patient-centered interventions in their practice, potentially leading to improved health outcomes for individuals with type 2 diabetes. The study's rigorous methodology, including a systematic search and meta-analysis, enhances the reliability of the evidence.</p> <p>(Liu et al., 2020) The study found that mobile app-assisted self-care interventions were associated with significant reductions in hemoglobin A1c (HbA1c) levels, systolic blood pressure (SBP), and diastolic blood pressure (DBP). The interventions were also found to be effective in achieving improvements in fasting blood glucose (FBG) and waist circumference. The presence of certain features in the interventions, such as monitoring of medication, blood glucose, and blood pressure, communication with healthcare providers, automated feedback, personalized goal setting, reminders, education materials, and data visualization, was associated with positive outcomes. However, the effectiveness of some features on outcomes like HbA1c levels and DBP was not consistently observed. The evidence suggests that mobile app-assisted self-care interventions can be effective in improving glycemic and blood pressure management in patients with type 2 diabetes and hypertension. The study provides valuable insights into the specific features of interventions that are associated with positive outcomes,</p>

			<p>offering guidance for the design of effective interventions.</p> <p>(Stevens et al., 2022) The review identified 25 studies reporting results of RCTs of mHealth interventions for patients with T1DM, T2DM, and Prediabetes. Overall, participants diagnosed with T1DM, T2DM, and Prediabetes demonstrated greater improvements in HbA1c as a result of using a DHT compared with those who experienced usual care. The analysis revealed an overall improvement in HbA1c compared with usual care, with a mean difference of -0.56% for T1DM, -0.90% for T2DM, and -0.26% for Prediabetes. The evidence from this Level I systematic review suggests that diabetes-specific mHealth interventions, including mobile apps, may reduce HbA1c levels in patients with T1DM, T2DM, and Prediabetes. However, the methodological quality of included trials was mixed, and there is a need for further research on the wider clinical effectiveness of these interventions, especially within T1DM and Prediabetes. The review highlights the importance of including measures beyond HbA1c, such as short-term glycemic variability or hypoglycemic events, in future research.</p>
<p>Level II</p> <ul style="list-style-type: none"> ▪ Quasi-experimental studies ▪ Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis ▪ Explanatory mixed method design that includes only a Level II quantitative study 	<p>7 (Alaslwi et al., 2022) (Azmiardi et al., 2021) (Boels et al., 2019) (Jiang et al., 2019) (Kong & Cho, 2020) (Lee et al., 2019) (Rasoul et al., 2019)</p>	<p>Good and consistent evidence: Consider pilot of change or further investigation.</p>	<p>(Alaslwi et al., 2022) This study falls under Level II evidence, characterized by a quasi-experimental design. The pre-test and post-test approach allows for the assessment of changes in knowledge and self-efficacy related to diabetes self-care, providing valuable insights into the effectiveness of the educational intervention. The absence of a control group limits the ability to establish causal relationships definitively, but the observed improvements in knowledge and self-efficacy suggest a positive impact of the self-care improvement education program. The evidence contributes to the understanding of the efficacy of educational interventions in improving diabetes self-care among patients. Health professionals can consider incorporating similar programs into their practice to enhance patients' knowledge and self-efficacy, potentially leading to better diabetes management outcomes. While the study provides valuable insights, future research with a more robust study design, such as a randomized controlled trial, could further strengthen the evidence base for the effectiveness of self-care improvement education programs for diabetes patients.</p> <p>(Azmiardi et al., 2021) This evidence falls under Level II, characterized by a systematic review and meta-analysis of randomized controlled trials (RCTs). The inclusion of RCTs provides a robust study design, contributing to internal validity. The meta-analysis quantitatively assesses the impact of DSME interventions with peer support on glycemic control, demonstrating a statistically significant reduction in HbA1c levels. The Cochrane Collaboration's Risk of Bias tool was utilized to evaluate</p>

the risk of bias, enhancing the study's methodological rigor. The findings suggest that DSME integrated with peer support is effective in enhancing glycemic control in patients with type 2 diabetes. Subgroup analyses provide valuable insights into the characteristics of interventions that contribute to greater effectiveness. Specifically, programs with smaller participant groups, shorter durations, lower baseline HbA1c levels, group delivery, and higher frequency of contacts were associated with statistically significant effects on reducing HbA1c levels. Health professionals can utilize this evidence to inform the design and implementation of DSME programs integrated with peer support, potentially leading to improved glycemic control outcomes for individuals with type 2 diabetes. The study's adherence to the PRISMA guideline enhances transparency and reporting quality.

(Boels et al., 2019) The results demonstrated that the smartphone app had small and clinically irrelevant effects on the primary outcome (HbA1c at 6 months) and did not significantly impact secondary outcomes such as BMI, glycemic variability, and self-care behaviors. The odds of achieving an HbA1c level $\leq 7\%$ without hypoglycemic events were lower in the intervention group. No adverse events were reported. For practitioners, this study emphasizes the importance of considering the specific needs of patients on insulin therapy when designing mHealth interventions. Although the app did not yield significant clinical benefits, the recognition that more than half of the users found the messages motivating may guide future interventions.

(Jiang et al., 2019) The systematic review and meta-analysis included 8 quasi-experimental studies focusing on self-efficacy-focused education for persons with diabetes. The evidence from Level II studies suggests a strong association between self-efficacy-focused education and positive health outcomes in persons with diabetes. The interventions were associated with a statistically significant reduction in A1C levels, indicating improved metabolic control. Additionally, the interventions were found to enhance self-efficacy, regulate self-management behaviors, increase knowledge, and improve the quality of life for patients with diabetes.

(Kong & Cho, 2020) The study identifies self-efficacy, HbA1c, employment status, and smoking status as significant factors influencing self-care among patients with type 2 diabetes. Higher engagement in self-care is associated with higher self-efficacy, lower HbA1c levels, unemployment, and non-smoking status. The evidence suggests that interventions aimed at enhancing self-efficacy could contribute significantly to improving self-care among patients with type 2 diabetes. Moreover, the findings highlight the importance of addressing

employment status and smoking habits in tailoring nursing interventions for better self-care outcomes.

(Lee et al., 2019) The study investigated the effects of a customized diabetes education program through pattern management (PM) using continuous glucose monitoring system (CGMS) results on individual self-care behaviors and self-efficacy in patients with type 2 diabetes mellitus. The study employed a quasi-experimental design, where patients were sequentially assigned to either PM education or control groups. Self-efficacy showed statistically significant interactions between the two groups over time, indicating a significant difference in the degree of self-efficacy between the PM education and control groups. The results suggested that diabetes education by PM using CGMS result analysis improved life habits with a positive influence on self-care behaviors and self-efficacy for diabetes management. However, further studies are recommended to sustain the effects of self-care behaviors and self-efficacy in patients with diabetes who experience a decrease in self-efficacy after three months of education. The study falls under Level II (Quasi-experimental study), suggesting a moderate level of evidence. The evidence suggests that the customized diabetes education program through PM using CGMS results positively influenced self-care behaviors and self-efficacy in patients with type 2 diabetes mellitus.

(Rasoul et al., 2019) The study aimed to determine the effect of self-management education through weblogs on the quality of life of patients with diabetes. The research design was quasi-experimental, involving 98 diabetic patients randomly assigned to study and control groups. The intervention consisted of 60 sessions of self-management education delivered through a designed weblog. The data were collected using the Diabetes Quality of Life (DQOL) short form clinical questionnaire. The evidence suggests a positive effect of weblog-based self-management on the quality of life of diabetic patients. The intervention group showed improvements in anthropometric indicators, including waist circumference, BMI, and FBS. The study also observed reduced levels of systolic and diastolic blood pressure in the intervention group. The findings highlight the potential of weblogs as an effective digital medium for educating diabetic patients and improving their awareness, ultimately contributing to better self-management and health outcomes.

<p>Level III</p> <ul style="list-style-type: none"> ▪ Nonexperimental study ▪ Systematic review of a combination of RCTs, quasi-experimental and nonexperimental studies, or nonexperimental studies only, with or without meta-analysis ▪ Qualitative study or meta-synthesis ▪ Exploratory, convergent, or multiphase mixed-methods studies ▪ Explanatory mixed method design that includes only a level III Quantitative study 	<p>7 (Abd El Kader et al., 2023) (Adhikari et al., 2021)</p> <p>(Adu et al., 2019) (Babazadeh et al., 2023) (Eshete et al., 2023) (Gagliardino et al., 2019) (Zewdie et al., 2022)</p>	<p>Good and consistent evidence: Consider pilot of change or further investigation.</p>	<p>(Abd El Kader et al., 2023) The evidence suggests that there is an association between diabetes distress and self-care activities among patients with type II diabetes. The study found that 80% of patients practiced lower levels of diabetes self-care, and 37% of them had a high level of diabetes distress. The correlation analysis showed a negative association between self-care and diabetes distress ($R = -0.152$, $p\text{-value} = 0.032$). The conclusion emphasizes the potential benefits of sustained self-care education in minimizing diabetes distress and highlights the importance of self-care programs for effective distress management in diabetes patients.</p> <p>(Adhikari et al., 2021) The study explores barriers to and facilitators of Type 2 diabetes self-management practices in Rupandehi, Nepal, from the perspectives of multiple stakeholders, including people with Type 2 diabetes, caregivers, health care providers, health managers, and a social worker. Five main themes emerged: individual factors, socio-cultural and economic factors, health system and policy factors, availability and accessibility of resources, and environmental factors. The identified barriers include lack of knowledge about diabetes self-management practices, cultural practices, insufficient counseling, lack of guidelines and protocols for counseling, and financial problems. Facilitators include motivation, support from family, peers, and doctors, and availability of resources in the community.</p> <p>(Adu et al., 2019) The study falls under Level III evidence, characterized by a nonexperimental design and a mix of quantitative and qualitative methods. It includes a systematic review of a combination of RCTs, quasi-experimental and nonexperimental studies, or nonexperimental studies only, with or without meta-analysis. The qualitative component adds depth to the understanding of enablers and barriers. The study provides valuable insights into the gaps in skills and self-efficacy for diabetes self-management and highlights the importance of educational reinforcement using technological devices, particularly mobile applications, as an intervention to address these gaps. Additionally, the study emphasizes the need for improved approaches to tackle financial burden, work-related factors, and diabetes distress for enhancing diabetes self-management.</p> <p>(Babazadeh et al., 2023) This evidence falls under Level III, characterized by a cross-sectional study design. The study's objective was to predict self-care behaviors and glycemic control among patients with type 2 diabetes using the ETRA model. Data were collected through structured questionnaires covering demographic information, ETRA constructs, self-care behaviors, and HbA1c levels. Statistical analyses included one-way ANOVA, independent samples t-test, Pearson's</p>
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correlation coefficient, and hierarchical multiple regression.

The results indicated that ETRA constructs (attitude, subjective norms, self-efficacy, and behavioral intention) were associated with self-care behaviors. Demographic factors, knowledge, attitude, subjective norms, self-efficacy, and behavioral intention together explained a significant portion of the variance in self-care behaviors. Additionally, self-care behaviors were identified as the best predictor of HbA1c levels. The study's findings suggest that the ETRA model can be a valuable framework for understanding and predicting self-care behaviors and glycemic control in patients with type 2 diabetes.

(Eshete et al., 2023) The study investigated the association between stress management behaviors and self-care behaviors in people with Type II diabetes. The findings suggest a significant relationship between stress management and diabetes self-care. Patients with good stress management behaviors were found to be twice as likely to engage in diabetes self-care. The study also identified specific stress management techniques, such as getting enough sleep, daily relaxation, and balancing time between work and play, that were associated with better diabetes self-care practices. The evidence from this Level III study contributes to understanding the relationship between stress management and self-care in Type II diabetes patients. It suggests that interventions targeting stress management strategies may lead to improvements in diabetes self-care. However, being a Level III study, the evidence is not as robust as randomized controlled trials (RCTs) or systematic reviews, and more research at higher levels of evidence may be needed to strengthen these findings.

(Gagliardino et al., 2019) The study explored the impact of education on disease management and outcomes in 1316 participants with type 1 diabetes mellitus (T1DM) from Middle East countries. The overall quality of evidence is moderate, as it is a nonexperimental observational study. Participants who received diabetes education (59%) were more likely to practice self-management than those who did not (odds ratio [OR]: 2.51; 95% confidence interval [CI]: 1.7–3.69; $p < 0.001$). Moreover, those who practiced self-management were more likely to attain the target HbA1c than those who did not (OR: 1.49; 95% CI: 1.06–2.09; $p = 0.023$). The study suggests that diabetes education is associated with increased self-management practices, and these practices, in turn, are linked to better glycemic control.

(Zewdie et al., 2022) The study identifies a significant association between age and diabetes self-care practices among type 2 diabetes patients. Specifically, patients in

			<p>the age categories of 60–69 years old and ≥ 70 years old were less likely to exhibit good self-care practices. The findings highlight the need for tailored interventions considering age-related factors. The qualitative component of the study supports these findings, indicating a potential lack of awareness among older patients regarding self-care practices. The evidence suggests that age is a factor influencing diabetes self-care practices, with older individuals being less likely to engage in recommended activities. Tailoring interventions to address age-related barriers may be essential in improving self-care practices among older diabetes patients.</p>
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Appendix B

Clinical Practice Guideline for Nurse Practitioners:

Diabetes Type 2 Self-Care Management

Diabetes is a chronic metabolic disorder that results from high blood sugar due to cells' insulin resistance. According to the Centers for Disease Control and Prevention (2020), 37.4 million Americans, or 11.3% of the population, have diabetes. In a larger spectrum, according to World Health Organization (2021), approximately 422 million adults suffer from diabetes globally and this number will likely rise up to 552million by 2030.

The most common diabetes type is type 2 diabetes with 90-95% of all diabetes cases being diabetes type 2 (National Institutes of Health, 2023). For patients with type 2 diabetes, insulin resistance, in which the body does not use insulin effectively, plays a key role (Babazadeh et al., 2023). Treatment includes lifestyle changes, oral medications such as metformin, and sometimes insulin (National Institutes of Health, 2023). In this CPG, an emphasis on appropriate treatment and medication selection for glycemic control is an important part of self care for patients with diabetes type 2.

Population morbidity resulting from blindness, kidney failure, heart attacks, stroke and lower limb amputation are some of the global significant morbidity and mortality contributions caused by diabetes (American Diabetes Association, 2020). Consequently, it is important for patients to take personal responsibility for their self-care order to avoid or delay developing complications associated with diabetes. However, findings show that many diabetic individuals do not adhere to self-care practices leading to poor control, thereby increasing healthcare costs and resulting in poor patient health outcomes (Dubois et al., 2021). Therefore, there is need for evidence-based guidelines towards assisting provider's offer effective way of managing diabetes.

Intended Audience

The primary target audience for this tool includes nurse practitioners who work across various healthcare environments such as hospitals, community health centers as well as primary care clinics among others. Additionally, other healthcare providers like physicians and dietitians may also find them useful while caring for patients having diabetes.

How To Use This CPG

This CPG has been specifically designed as an easy-to-use reference document for providers providing best-evidence recommendations guidance on evaluating and managing diabetes self-care. The CPG is divided into sections that address different aspects of diabetes self-care, such as diet, physical activity, medication administration and monitoring of diabetes-related health outcomes. Each section will present the recommendations, evidence that supports them and the key considerations when implementing these recommendations in clinical practice. This can be employed by providers as a guide to their decision aid when they manage diabetics clients' needs.

Methods

This CPG is developed based on a comprehensive literature review and synthesis of current evidence on diabetes self-care management. In order to support policy formulation and clinical decision making by providers, there is need for robust evidence base about best practices in prevention of complications from diabetes involving healthy lifestyle choices. The search words used include “diabetes type 2,” “self-management,” “role of nurse practitioners on diabetes patients,” and “diabetes management”. To ensure use of up-to-date evidence-based information, only studies published within the last five years (2019-2024) will be considered.

The Agree II instrument is an effective tool for CPG assessment. It includes six domains: (1) scope and purpose, (2) stakeholder engagement, (3) rigor of development, (4) clarity of presentation, (5) applicability, and (6) editorial independence. Each domain is rated on a seven-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The final score for each domain is calculated as a percentage of the maximum possible score. High scores indicate high-quality methodology and reliability of the guidelines, while low scores may indicate weaknesses in development (Brouwers et al., 2021). AGREE II helps select the best clinical guidelines for use in practice. This tool will be used to assess the CPG through a panel of experts. The Agree II instrument is an acknowledged tool designed to appraise the methodological quality along with transparency found within CPGs (Brouwers et al., 2021). It will constitute a team made up of various professionals who are well conversant with diabetes care provision as well as guideline development. Finally, end-users such as providers among other health care providers will also be given copies.

Validation and assessment process is the determiner of achievement of this CPG. In the Agree II instrument, each domain must achieve a minimum rating of 70% for the CPG to be considered valid. The CPG will be revised and reassessed if it does not meet the 70% threshold until the desired score is achieved.

Evidence for Practice

The evidence that supports this CPG has been summarized below; also, there are main recommendations for each section of diabetes self-care management.

Diet

According to Dubois et al (2021), literature review indicates that healthy eating plays a significant role in managing diabetes and reducing related complications. Patients are expected

to have between 1200- to 1600 calories per day. It is advisable that patients with diabetes consume balanced meals which consist of fruits, vegetables, whole grains and lean proteins (Dubois et al., 2021). Carbohydrate counting and portion control can help maintain desirable levels of blood sugar as well as manage weight (Dubois et al., 2021). Meal spacing and timing may also affect blood sugar levels. This implies that providers ought to let patients know healthy food choices while planning their meals, they should find out how to read labels such as those on canned foods and other packaged items. Insulin dependent diabetics will have to monitor their blood glucose level 30 minutes before eating and take the necessary amount of short acting insulin needed based on their glucose level.

Physical Activity

To improve glycemic control, insulin sensitivity, and overall cardiovascular health in patients with diabetes regular physical activity has shown good results through research (American Diabetes Association, 2020). Providers should assess the level of patients' physical activity and provide personal recommendations for safe exercising. They are advised to exercise at moderate intensity for a duration not less 150 minutes per week by doing aerobic activities like swimming or resistance training such as weightlifting (Eshete et al., 2023). Besides medical treatment providers should advise patients on incorporating physical activities into their routine life too like using stairs instead elevators after dinner time walk taking.

Medication and Management

Medication management is important in attainment of appropriate glycemic control in preventing complications in individuals living with diabetes (American Diabetes Association, 2020). Providers must assess the patients' current drug regimen including any obstacles or difficulties in adhering to it (Liu et al., 2020). They ought to be educated on correct medicine

usage, what side effects might occur and why they should comply with prescriptions (Dubois et al., 2021). Providers need to work together with patients' healthcare team to develop personal medication plans adjusted depending on the patient's goals.

Metformin is the first-line treatment for type 2 diabetes and is widely recommended due to its effectiveness and safety. It improves the sensitivity of cells to insulin and reduces glucose production in the liver (American Diabetes Association, 2020). Another important reason for using metformin is that it causes one's body to continue producing its own insulin, which is a very important factor in selecting therapy. Metformin is usually prescribed to overweight patients, as it does not cause weight gain and may help reduce the risk of cardiovascular disease (Liu et al., 2020). It is recommended to start with a low dose to reduce the risk of gastrointestinal side effects. Other first-line drugs include SGLT2 inhibitors (eg, empagliflozin), which promote the excretion of glucose in the urine, and GLP-1 agonists (liraglutide), which stimulate insulin secretion (American Diabetes Association, 2020). These drugs are especially useful for patients with an increased risk of cardiovascular disease. When prescribing metformin, contraindications such as chronic renal failure or severe heart failure should be considered (American Diabetes Association, 2020). It is also important to monitor kidney function in patients on metformin to avoid the risk of lactic acidosis, a rare but serious side effect. If a patient cannot take metformin because of kidney dysfunction or other issues, Januvia is recommended because its mechanism of action allows for using in patients with compromised renal function. In patients with low Estimated Glomerular Filtration Rate (eGFR), Farxiga is used. Patients with cardiac issues will benefit from Jardiance because together with helping in control of blood glucose, it also has high heart-protective benefits (National Institutes of Health, 2023). Additionally, it is necessary to

avoid such medications as steroids because they raise blood glucose level (National Institutes of Health, 2023).

Monitoring of Diabetes-Related Health Outcomes

The CPG underlines the importance of regular monitoring of diabetes-related health outcomes, including self-care management efficacy review and identifying any potential problems. Providers should regularly assess patients' blood glucose levels (at each visit), lipids profile (annually or more often if therapy results need to be tested), kidney function (annually) and blood pressure (at each visit) (Kong & Cho, 2020). Apart from this, they should annually screen diseases such as retinopathy, neuropathy and foot ulcers among others which are related to diabetes (Hellqvist, 2021). Diabetic foot exams should be done routinely at patients 3 months primary care visit. Also, nail care should not be done by patient but by podiatry to avoid injury to the nail and skin infection. In line with this, nurses must partner with their clients when setting targets concerning specific areas of care through agreements made between both parties - for instance, blood glucose level readings two times daily before breakfast and supper (Alaslwi et al., 2022).

For patients with type 2 diabetes, it is important to educate them about blood sugar management, lifestyle changes, and understanding the disease (Alaslwi et al., 2022). Key aspects include regular glucose monitoring, medication adherence, and diet, especially portion and carbohydrate control (Hellqvist, 2021). The importance of regular physical activity and weight control should also be taught. Explaining possible complications such as cardiovascular disease and neuropathy can help motivate patients to take preventive actions. The teach-back method is effective for checking understanding. After an explanation, the provider asks the patient to repeat the information in his or her own words, which confirms that the patient has

understood the gist correctly and it allows for clarification of misunderstandings. Effective communication between the provider and the patient is key in diabetes management. Regular consultations allow for treatment adjustments, discussion of concerns, and patient motivation (Alaslawi et al., 2022). By creating an open and non-judgmental environment, the provider encourages patients to ask questions and actively participate in their care.

Assessment of Benefits and Harms of Alternative Care Options

There is little evidence on alternative care options for diabetes self-care management (Cooper et al., 2021). However, some studies have demonstrated potential benefits associated with the use of telehealth/mHealth interventions towards enhancing diabetic self-care (Cooper et al., 2021). It is therefore necessary for providers to weigh the potential benefits against risks associated with individualizing these alternatives into a self-care plan.

Recommendations:

1. Collaborative Care Plan: Nurse practitioners should work with patients to develop personalized diabetes self-management plans that include training on proper nutrition, meal planning, food labels, exercise, and medication use. This should be reviewed annually and changed as the patient's health status or personal circumstances change.
2. Personalized Exercise Plan: Providers should evaluate patient's physical activity levels and design tailored workout programs that are safe and achievable. The goal here is at least 150 minutes of moderate intensity exercise each week (Litchfield et al., 2023). Patient-involved periodic monthly reviews of these exercise schedules will enable addressing barriers or challenges that may arise.
3. Regular Monitoring: To assess self-care management effectiveness, providers should keep monitoring the blood glucose at each visit, blood pressure at each visit, lipids

annually, and renal function annually. In primary care, eGFR, lipids, and micro-albumin are monitored every 3 months on CMP (CDC, 2020). The A1C test measures the average blood glucose levels over the past 2-3 months (Allister-Price et al., 2019). It is used to diagnose diabetes and monitor the effectiveness of treatment. An A1C reading above 6.5% indicates diabetes, while a level between 5.7% and 6.4% indicates prediabetes (De la Fuente Coria et al., 2020). Regular testing helps prevent complications and adjust treatment (Dubois et al., 2021). It should be documented in the medical record of a given individual for future adjustment purposes when necessary.

4. **Screening for Complications:** These include tests like an HbA1c test, dilated eye exam, foot examination, and other screenings that can reveal such complications as retinopathy, peripheral neuropathy, and foot ulcers. These screening procedures should take place once a year but more often when certain symptoms indicate that a person has some complications resulting from diabetes. Eye exam is performed once a year but foot exam more often until patient is stable, and cooperation with podiatry is necessary. Neuropathy in lower extremities is a yet another severe risk, which must be monitored regularly. In case, problem is detected, gabapentin is prescribed (CDC, 2020).
5. **Utilization of Telehealth:** In cases where face-to-face visits are not feasible due to distance between patient's location and healthcare facility, providers may consider using telehealth or mHealth interventions for supporting their client's diabetes self-care management (Stevens et al., 2022). This continuous aspect will be integrated into the plan alongside collaboration with the patient regarding this issue plus regular monthly communication contact with check-ups made in order to ensure its efficacy.

6. **Stress Management:** Stress management in diabetes is important for controlling blood sugar levels. Relaxation, meditation, and exercise are recommended (Asmat et al., 2022). These techniques reduce stress and improve overall well-being, helping to maintain stable glucose levels (Abd El Kader et al., 2023).
7. **Support System Facilitation:** Building a diabetes support system is important for effective self-management. It is necessary to include family, friends, and healthcare professionals in patient's self-care. Support groups and counseling can help motivate, share experiences, and provide emotional support to improve patient quality of life (Zewdie et al., 2022).
8. **Working with Socially Disadvantaged Patients:** When working with socially vulnerable patients with diabetes, it is important to consider their financial limitations and access to resources (National Institutes of Health, 2023). It is recommended to provide accessible information, use support programs oriented to medical care, and develop individualized treatment plans that take into account their ability to effectively manage diabetes.

Intervals for Reassessment/Update

Every three years, this CPG should be reassessed and updated in order to contain the latest evidence and best practices in diabetes self-care management.

Guideline

A Clinical Practice Guideline for Nurse Practitioners Assessment and Management of Diabetes Patients

I. Diet

- For patients with diabetes, a healthy diet that embraces fruits, vegetables, whole grains as well as lean meats should be encouraged.

- Promote carbohydrate counting and portion control to patients with diabetes so as to control their blood sugar levels and manage their weight (Lee, 2019).
- Encourage patients to plan meals ahead of time by reading labels on food stuffs before they make informed choices about what they ingest.

Diet management should be reviewed and updated annually. However, taking into account any changes in the patient's health status or personal circumstances, dieting can be reviewed at any time to remedy the prevailing circumstances.

II. Physical Activity

- Evaluate levels of physical activity among patients before giving them personalized advice on safe exercise plans which are achievable.
- Those who have diabetes should do at least 150 minutes of moderate-intensity exercise every week that consists both aerobic exercises as well as resistance training (Hu et al., 2023).
- Urge the patient to ensure there is an integration of exercise into his or her daily schedule to guarantee regular physical activity.

Exercise plans should also be reviewed regularly, with patient involvement, to address any barriers or challenges that may arise.

III. Medication Management

- A1C in prediabetes is 5.8 to 6.4. A1C in diabetes is 6.5. Different medications are used to manage these conditions.
- Review a patient's current medication regimen; assess barriers or difficulties related to taking medications as prescribed.

- Teach about correct drug administration, possible adverse effects, non-adherence consequences, etc.
- With other healthcare professionals in the patient's care team, create a personal medication plan based on the needs and goals of the patient.

Review of a patient's current medication regimen and education on administration should be carried out on each visit by the patient to the healthcare facility or at any request by the patient (Chawla et al., 2020).

IV. Medications for Diabetes Type 2

- Diabetes type 2 medication-based management is aimed at improving the sensitivity of cells to insulin and controlling blood sugar levels.
- The main drug is metformin, which lowers glucose levels by reducing its production in the liver and improving its absorption by cells (National Institutes of Health, 2023).
- In some cases, drugs of the SGLT-2 inhibitor class are prescribed, which help remove glucose through the kidneys, and GLP-1 receptor agonists, which stimulate insulin secretion.
- Patients with type 2 diabetes may also need insulin therapy if other drugs do not provide sufficient sugar control. Patients with A1C is 8.0% or higher will need insulin, especially if symptoms of hyperglycemia including excessive thirst, frequent urination, and weight loss are noted.
- If on insulin with an A1C above 8.0%, it is recommended to use Dexcom or Freestyle Libre 30 minutes hour before eating and administering insulin.
- Concomitant diseases such as hypertension and hyperlipidemia are also taken into account, which may require the prescription of antihypertensive drugs (Beta blockers,

Diuretics, ACE inhibitors, Angiotensin II receptor blockers, Calcium channel blockers, Alpha blockers, Alpha-2 receptor agonists, Combined alpha and beta-blockers) and statins. As per the ADA, all pts are prescribed an ACE or ARB (Lisinopril or Losartan) and a statin for improving lipid profile.

- Weight control may include the prescription of weight loss drugs (GLP-1 receptor agonists: semaglutide, liraglutide; SGLT-2 inhibitors: dapagliflozin, canagliflozin; Orlistat).

V. Monitoring of Diabetes-related Health Outcomes

- Self-management effectiveness may be gauged through periodical monitoring of glycemic control (HbA1C), blood pressure (BP), lipids and renal function tests indicators in diabetic persons accordingly. Most providers see patients every 3 months and order A1C, CBC, CMP, Lipid Panel and Micro-albumin urine every 3 months.
- Test for complications that arise from diabetes like retinopathy, nephropathy or foot ulcers;
- Tests like an HbA1c test, dilated eye exam, foot examination, and other screenings that can reveal complications such as retinopathy, peripheral neuropathy, and foot ulcers respectively should be done at least once a year but more frequently if a patient shows signs or symptoms of complications (Azmiardi et al., 2021).
- Working together with the patient, set up goals to achieve and create a plan for monitoring these.
- The NIH and ADA diabetes self-management guidelines provide patients with clear recommendations for self-care. Key areas include glucose monitoring, dietary management, physical activity, stress management, and regular medical checkups.

- The NIH emphasizes regular blood sugar monitoring and early detection of complications (National Institutes of Health, 2023).
- The ADA expands on these recommendations by adding an emphasis on an individualized nutrition plan, regular exercise, especially for patients with type 2 diabetes, and comprehensive weight management (American Diabetes Association, 2020).
- Both guidelines agree on the need for patient education on self-management skills, adherence to treatment, and active communication with their care providers for continuous cooperation and achievement of optimal care results (American Diabetes Association, 2020). These principles help people with diabetes minimize complications and improve their quality of life by providing them with the tools they need to manage their condition.
- The latest guidelines for the treatment of type 2 diabetes emphasize the importance of preventing viral infections, including hepatitis B. Patients with type 2 diabetes are recommended to be vaccinated against hepatitis B, especially if they have not yet been vaccinated, as patients with diabetes have an increased risk of infection (National Institutes of Health, 2023). This is due to the possibility of glucometers and insulin syringes being shared by several people. Vaccination is recommended for adults up to 60 years of age and can also be prescribed to patients over 60 years of age based on an individual risk-benefit assessment (National Institutes of Health, 2023). The Hep B Vaccine is given in 3 doses - 30 days after the first dose, dose 2 is given, and dose 3 is given 6 months from 1st dose. Patient is then vaccinated for life.

Reassessment/Update

In every three years, this Clinical Practice Guideline should be reassessed, and updates made in order to have the latest evidence-based practices regarding diabetes self-management.

Appendix C

Appraisers' Evaluation Results*Domain 1*

	Item 1	Item 2	Item 3	Total
Appraiser 1	7	6	5	18
Appraiser 2	7	7	6	20
Appraiser 3	7	7	7	21
	21	20	18	

Domain 2

	Item 1	Item 2	Total
Appraiser 1	6	6	12
Appraiser 2	7	7	14
Appraiser 3	7	6	13
	20	19	

Domain 3

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Total
Appraiser 1	6	6	6	6	6	7	7	7	51
Appraiser 2	6	6	6	6	7	7	7	7	52
Appraiser 3	6	6	6	7	6	7	7	7	52
	18	18	18	19	19	21	21	21	

Domain 4

	Item 1	Item 2	Item 3	Total
Appraiser 1	7	7	7	21
Appraiser 2	7	7	7	21
Appraiser 3	6	7	7	20
	20	21	21	

Domain 5

Item 1	Item 2	Item 3	Item 4	Total
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Appraiser 1	6	7	7	7	27
Appraiser 2	7	7	7	7	28
Appraiser 3	6	7	7	7	27
	19	21	21	21	

Domain 6

	Item 1	Item 2	Item 3	Total
Appraiser 1	7	7	7	21
Appraiser 2	7	7	7	21
Appraiser 3	7	7	7	21
	21	21	21	