

2018

Education Protocol for Type II Diabetes Mellitus

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Walden University

College of Health Sciences

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Raegan Quandt

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Walden University

2018

Abstract

Education Protocol for Type II Diabetes Mellitus

by

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MSN, Walden University, 2012

BSN, Wichita State University, 2009

Project Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Nursing Practice

Walden University

November 2018

Abstract

Diabetes mellitus is one of the leading causes of death in the United States, contributing to rising health care costs and increased morbidity and mortality rates. Researchers demonstrated that aggressive health measures involving ongoing diabetes self-management education are paramount in minimizing associated complications of diabetes. The management and prevention of diabetes is not standardized and providers within a health clinic in Illinois reported challenges in providing self-management education during scheduled patient appointments due to limited resources and time. The purpose of this DNP project was to develop a clinical practice guideline to be used by all providers within the health care clinic for the management of Type 2 diabetes. The goal of the developed guideline was to optimize the time providers spend with patients diagnosed with diabetes and improve the consistency and quality of education and care. The health promotion model provided a guide for the development of the practice guideline. The method and design of this DNP project involved extensive research, literature review, evidence grading, and development of an evidence-based practice guideline for Type 2 diabetes management. A selected team of 3 diabetes experts appraised the developed guideline using the AGREE II instrument, and guideline usability was evaluated by nurse practitioners within the medical clinic using a 10-item questionnaire. Results of the appraisal confirmed the high quality, feasibility, and usability of the developed guideline for diabetes self-management education and support. Improving the delivery of care can bring about positive social change by improving health outcomes in individuals with Type 2 diabetes and reducing morbidity and mortality rates.

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Dedication

I dedicate this project to my beloved husband, Eric Quandt, who provided me with endless love and support throughout the DNP program and this project. His dedication, patience, and ongoing encouragement contributed to the completion and success of my DNP project. I hope that someday I can reciprocate the constant support and love he provided me throughout this journey.

Acknowledgments

I extend my sincere appreciation and gratitude to the individuals who assisted me in completing my DNP project. Without the guidance, time, dedication, and support from each of you, completing the proposal would have been impossible. I would like to extend my deepest thanks:

To my DNP project faculty advisor, Dr. Linda Matheson, for her continuous dedication, guidance, prompt feedback, time, and endless support and encouragement throughout the completion of this proposal.

To my DNP project preceptor for his ongoing support, commitment, time, and direction through this journey.

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Section 1: Nature of the Project

Introduction

Diabetes mellitus subsists as the seventh leading cause of death in the United States, affecting 30.3 million Americans (Centers for Disease Control and Prevention [CDC], 2017). According to the American Diabetes Association (ADA; 2017), one adult, 20 years of age or older, is diagnosed with diabetes every 21 seconds. Type 2 diabetes accounts for 90 to 95% of the total adult diabetes cases and exists as the primary origin for long-term complications, including retinopathy, neuropathy, renal failure, heart disease, stroke, amputation, and blindness (CDC, 2016a). The annual costs for individuals with diabetes are two times higher than the annual per capita medical spending for individuals without diabetes (Zhuo et al., 2014). Diabetes generates increased direct and indirect health care costs and remains a primary cause of morbidity and mortality throughout the nation (Jalilian, Motlagh, Solhi, & Gharibnavaz, 2014).

Traditional treatments for this chronic and progressive condition focus on pharmacological interventions rather than self-management and life style modifications (Jalilian et al., 2014). Long- and short-term follow-up data reveal that metabolic control, defined as the regulation of blood sugar levels using pharmacological interventions, deteriorates significantly over time; this demands an alternate strategy in the management of diabetes (Khunti et al., 2012). Adults diagnosed with Type 2 diabetes require high level cognitive and psychomotor skills to make multiple decisions daily correlated to the management of their disease, including choices related to dietary intake, exercise, and adherence with medication regimens, all with minimal to no input from health care

providers (Jalilian et al., 2014). The ADA (2017) stated that self-management is the key element in effective treatment for Type 2 diabetes and that the cornerstone of self-efficacy and self-management is patient education. Recommendations outlined in the 2018 Standards of Medical Care in Diabetes noted that adult clients with Type 2 diabetes benefit greatly from receiving diabetes self-management education and support (DSMES) upon diagnosis, follow up, and any change in medical status (ADA, 2018).

Type 2 diabetes is a preventable chronic disease, and the prevalence of diabetes continues to rise annually throughout the United States (CDC, 2017). The management of diabetes mellitus is shifting towards patient-centered practices that facilitate the development and integration of standardized self-management education that meets the needs of the specific individual (Funnell et al., 2010). Evidence-based multifaceted clinical guidelines can improve patient compliance by directing health care providers with up-to-date standards for the effective management of diabetes and delivery of quality care (ADA, 2017). The gap in health care results between the recommended best practice guidelines for managing Type 2 diabetes and the actual practice performed, which results in rising health care expenditures and increased population health consequences (CDC, 2016b).

The potential positive social implications of this DNP project encompass clinical, behavioral, and economical aspects of diabetes (Powers et al., 2016). The primary benefits of a clinical practice guideline (CPG) at the organizational level include improvements in clinical decision-making, policy development, and overall delivery of quality patient care (Powers et al., 2016). The cost effectiveness of this DNP project and

prospective benefits can positively impact quality patient care by improving organizational workflow, consistency of care, and optimizing time providers spend with patients (see Woolf, Schünemann, Eccles, Grimshaw, & Shekelle, 2012). Potential benefits for patients relate directly to the delivery of high quality care, which can lead to improved quality of life through the positive impact on patient health outcomes and decreased morbidity and mortality risks and rates (see Woolf et al., 2012). Improvements in health outcomes and the positive potential for social change directly link to nursing through the dissemination of evidence-based research into practice and to patients through improvements in the delivery of quality of care (Powers et al., 2016). Improving the delivery of care can significantly improve health outcomes in individuals with Type 2 diabetes and reduce morbidity and mortality rates (International Diabetes Federation, 2017).

Problem Statement

Approximately one-half of individuals with diabetes in the United States reported that they did not obtain continuous provider delivered diabetes self-management education (Haas et al., 2012). In addition, patients receiving diabetes education reported that the education was provided in point-of-care approaches and the encounters were brief due to time constraints (Funnell et al., 2010). The prevention and management of diabetes is not standardized, and this gap in quality care remains a major source of growing concern as rates of diabetes and associated comorbidities continue to rise (ADA, 2017). In this project, I sought to answer the following question: In adults aged 20 years

and older with Type 2 diabetes mellitus, how does the use of a CPG compared to no CPG impact the time providers spend with patients?

A multidisciplinary health care clinic in northern Illinois provides care to approximately 350 patients 20 years of age or older. Within this patient panel, approximately 90 (25%) have been diagnosed with Type 2 diabetes mellitus. The average glycated hemoglobin (HbA1c) of the patients diagnosed with Type 2 diabetes is 8.0% or higher, which is 1.5% higher than national diabetes medical recommendations and standards established by the ADA (2017). Providers within the health facility have limited time to spend with patients and need a CPG that will maximize time spent with patients and establish a guideline for providing ongoing diabetes self-management education and follow up. Deficient knowledge and self-management skills are significantly related to ineffective adherence to diabetes management and poor glycemic control (Adams, 2010). The developed CPG can allow providers to efficiently use time with patients and augment a plan of care with standardized diabetes self-management education to guide follow-up appointments and self-care for adults with Type 2 diabetes (see ADA, 2018).

Purpose Statement

The purpose of this project was to develop a CPG that outlines an education protocol for the management of diabetes in a healthcare clinic in northern Illinois. The education protocol will be used by all healthcare providers within the clinic to optimize the time spent with patients during schedule appointments and to ensure that providers are actively providing self-management education and support upon diagnosis, follow-up,

and with any changes in health status or condition. Health care provider responsibilities in managing Type 2 diabetes involve the facilitation of patient knowledge, ability, and competence to engage in a multitude of basic and complex decisions and skills related to self-management (Haas et al., 2012). The integration of standardized patient education remains a key strategy in improving blood glucose levels in adult patients diagnosed with diabetes mellitus (ADA, 2016). The goal this DNP project was to develop an evidence-based CPG to be used by all nurse practitioners within the health care facility while caring for individuals with diabetes.

Nature of the Project

Primary sources of evidence were comprised of scholarly research, literature, and national healthcare organizations such as the ADA 2018 Standards of Medical Care in Diabetes and the American Association of Diabetes Educators (AADE) 2018 Diabetes Self-management Education and Support in Type 2 Diabetes tool kit. The collection of research and literature included search terms containing *diabetes, Type 2, statistics, healthcare costs, complications, risks, management, self-management, self-care, self-efficacy, education, medical standards, and guidelines*. Databases such as CINAHL, PubMed, Medline, and Cochrane were used for procuring evidence. The 2018 Medical Standards of Care in Diabetes and 2017 national standards for DSMES, established by the ADA, served as sources of evidence for this project. The ADA (2017) noted that the standards are in place to deliver quality recommendations and guidelines for managing diabetes, including associated diabetes financial, economic, and healthcare practice issues. Additional resources for the project included representatives from the target

population, and involved internal and external input from health care providers in family and internal medicine, experts in diabetes management, and three nurse practitioners associated with the multidisciplinary healthcare clinic.

The project approach required extensive research with a comprehensive literature review and analysis to identify national standards, quality indicators, and effective management strategies. The translation of evidence involved the development and dissemination of the practice guideline to the multidisciplinary healthcare facility. Through the collection of quality sources of evidence, I formulated an education protocol for a medical clinic to be used by all providers in caring for patients with Type 2 diabetes. The CPG provides a framework for the administration of evidence-based education and management of diabetes for healthcare professionals within the healthcare facility.

Significance

Diabetes is a significant public health issue with critical consequences resulting in increased healthcare costs (CDC, 2017). This DNP project can positively impact social change and supports Walden University's School of Nursing mission to transform society through the translation of evidence into practice. Social significance refers to experienced health conditions and the condition's actual or potential influence on the individuals' quality of life (Fawcett & Garity, 2009). Standardized education protocols improve health care quality by reducing associated comorbidities of the chronic disease, decreasing healthcare costs, and improving quality of life in individuals with Type 2 diabetes (Vorderstrasse, Shaw, Blascovich, & Johnson 2014). According to the CDC (2017), approximately 20% of total health care costs in the United States are associated with

diabetes mellitus. The total annual cost of diabetes in 2007 was \$174 billion, and the projected cost of diabetes by 2030 is \$866 billion (Brunisholz et al., 2014). Effective implementation of diabetes education improves glycemic control and prevention of comorbidities, which lead to reductions in annual health care costs (Burke, Sherr, & Lipman, 2014). Integrating successful standardized health education that focuses on self-management shifts the focus from short- to long-term diabetes management through patient-centered care (Brunisholz et al., 2014).

Aggressive health measures involving the integration of individualized diabetes education have the potential to help millions of adults in preventing or delaying the development of Type 2 diabetes or associated complications and thus significantly aid in counteracting the dismal projections (Brunisholz et al., 2014). The goal of this project was to develop and provide a multidisciplinary healthcare clinic with a CPG that outlines standards of care for diabetes education to improve the consistency and delivery of quality of care. The overall objective was to improve the time providers spend with patients and thereby improve patient health outcomes. The reduction of diabetic complications and comorbidities can decrease financial afflictions and improve the individuals' overall quality of life (Vorderstrasse et al., 2014). This DNP project was guided by the health promotion model (HPM), which positively impacts social change through the expanded use of the model in various health care settings, including inpatient, outpatient, rehabilitation, and the home (Peterson & Bredow, 2013). The developed CPG provides evidence for the health clinic at the organizational level. According to Adams (2010), high quality practice guidelines for managing diabetes provide evidence at

community, state, and national levels for changing nursing practice and healthcare approaches in the quality of diabetes self-management education and care.

Summary

Diabetes mellitus affects millions of Americans annually, and the management of diabetes requires a multidisciplinary approach focusing on patient-centered care (ADA, 2016). Literature supports the integration of standardized patient education to improve patient outcomes, including blood glucose levels, compliance, self-management, and associated complications in (Powers et al., 2016). Reducing the prevalence of Type 2 diabetes through patient-centered care and self-management education will reduce health care costs and improve the economic burden associated with the treatment and management of the disease (Zhuo et al., 2014). The development of practice guidelines for the management of Type 2 diabetes promotes interdisciplinary collaboration through internal and external input from stakeholders and experts (Haas et al., 2014). Ongoing collaboration and research results in the delivery of evidence-based diabetes management and education, which in turn improves healthcare organization outcomes, including patient satisfaction rates (Haas et al., 2014). Delivering ongoing quality diabetes self-management education improves blood glucose management in adults diagnosed with diabetes; this decreases the development of long-term complications associated with diabetes (Haas et al., 2014).

Section 2: Background and Context

Introduction

Improving the management of Type 2 diabetes using evidence-based guidelines is critical to moderate health economic effects and counteract long-term consequences associated with poor glycemic control (CDC, 2016b). Optimal behavior change in individuals with diabetes involves innovative methods that support self-care and self-efficacy to improve clinical outcomes (Vorderstrasse et al., 2014). The purpose of this DNP project was to formulate a CPG to provide nurse practitioners within the multidisciplinary health care clinic with an education protocol to use when caring for adults with Type 2 diabetes. The CPG will guide health care providers within the health care clinic in northern Illinois with an education protocol specific for the patient population. The primary goal of the project was for all health care providers within the health clinic to use the CPG as a guide in managing adults with Type 2 diabetes care and in delivering diabetes self-management education. In this section, I provide an overview of the literature and the evidence-based framework and theory underlying the CPG in a health care clinic.

Concepts, Models, and Theories

Nursing theories organize central ideas, provide frameworks for research, and guide evidence-based practice (Fawcett & Garity, 2009). Identifying and evaluating theories for research is essential to determine the relationships, concepts, and scope of the model or theory best suited to lead research, influence change, and improve nursing practice and health outcomes (Allen, 2003). The model selected as the framework for this

DNP project was the health promotion model (HPM), developed in 1982 by Pender (Pender, Murdaugh, & Parsons, 2011). The purpose of the model is to guide nurses in identifying and understanding primary health behavior determinants involved in disease promotion, prevention, and education (Peterson & Bredow, 2013). The model theorizes that active communication and engagement in targeting an individual's perception, social, and situational influences and barriers can lead and explain optimal health behavior changes (Pender et al., 2011). Bandura's social cognitive theory and Fischbein's expectancy value theory are the theoretical foundation of the model (Pender et al., 2011). The social cognitive theory proposes that the individual's environment, behavior, and attitude interrelate, resulting in health behavior and perception changes (Pender et al., 2011). The expectancy value theory supports the notion that an individual's participation in activities and arrangements is linked to the ability to achieve health outcomes and goals (Pender et al., 2011).

According to the ADA (2016), models for health behavior, such as the HPM, have been used for over 20 years in the targeted examination and assessment of health behavior change in persons with Type 2 diabetes. The model investigates biological and psychosocial influences that focus on improving clinical practice in empowering individuals to engage in optimal health and behavior change, resulting in improved health outcomes (Pender et al., 2011). The parent theories of HPM are consistent with the philosophical claims of the model (Pender et al., 2011). The model was revised in 1996 by Pender to encompass nursing practice and to facilitate health promotion interventions (Peterson & Bredow, 2013). Self-efficacy and self-care in individuals with Type 2

diabetes are critical to reduce long-term consequences of the disease (Vorderstrasse et al., 2014). In addition, the design of HPM identifies individual behaviors to guide the development of patient-centered care plans that focus on improving the individuals' long-term quality of life (Peterson & Bredow, 2013). Self-management education is the root of diabetes care and exists as the pathway to facilitate improvements in diabetes self-management and self-efficacy skills (Haas et al., 2014).

Successful management of diabetes relies on the individuals' adherence to the treatment plan and engagement in self-management behaviors and skills, such as self-glucose monitoring, developing and adhering to an exercise regimen, and performing a multitude of decisions regarding nutrition and meal preparation (Haas et al., 2014). Effective diabetes self-management education led by health care providers generates environments for health behavior change (ADA, 2016). Health behavior change occurs in patients with diabetes who receive well-designed health education (ADA, 2016). Effective management requires knowledge, acquisition, competency, and value in the diabetes plan of care that extends beyond the health care setting and into the patients' lifestyles (Haas et al., 2014).

Relevance to Nursing Practice

Diabetes prevalence is considered to be at an epidemic level in the United States, and the effective management of the disease remains critical to health care professionals, patients, and families throughout the nation (Balamurugan, Rivera, Jack, Morris, & Allen, 2006). Poor compliance with diabetes management care plans contribute significantly to long-term complications, rising prevalence of disease and illness, and

increased health care costs (Vorderstrasse et al., 2014). Well-designed diabetes education that is individualized and patient-centered contains evidence-based strategies that can be customized to diverse patient or population requirements, including ethnic, religious, language, or cultural needs (ADA, 2016). Developing a program evaluation plan with adequate resources and support services is critical in the implementation of diabetes education using the DSMES national standards (Balamurugan et al., 2006). Evidence supports the implementation of diabetes education as a key component in diabetes care. Current literature provides evidence that the effective implementation of diabetes education improves glycemic control and prevention of comorbidities (Burke et al., 2014). The paradigms of diabetes care have shifted from acute to chronic management due to the aging population, anticipated health workforce shortages, and changes in the nations health care needs (Burke et al., 2014). The existing gap in health care delivery relates to the lack of emphasis health care professionals are placing on national evidence-based standards for diabetes care (ADA, 2017).

The complexity of diabetes management demands an evidence-based and multifaceted approach that emphasizes self-efficacy for longstanding self-management and glycemic control (CDC, 2016a). According to the ADA (2017), a standardized or single method treatment approach for the management of diabetes does not exist due to limited evidence in one strategy; however, more and more literature is published supporting diabetes self- management education. Self-management education and support is cost-effective and improves health care costs by reducing hospital readmissions and decreases the risks of associated complications (ADA, 2017). The positive impacts of

diabetes-self management education and support on psychosocial, physical, and behavioral features of diabetes proves to reduce the risks of long-term complications and improves glycemic control and quality of life in individuals with diabetes (ADA, 2017). According to Richardson, Derouin Vordestrasses, Hipkens, and Thomspson (2014), the majority of health care providers continue to focus on pharmacological treatment with minimal diabetes education services offered or provided to patients for managing Type 2 diabetes. In addition, current research on the integration of patient education focuses on short-term patient outcomes instead of the long-term effects (ADA, 2017). A survey of 605 individuals diagnosed with Type 2 diabetes revealed that only 4% of the participants stated that they did not receive any form of diabetes education; however, 53% of the participants who received education reported that it was poor, ineffective, and time limited (Rhee, Cook, & El-Kebbi, 2016). Additional results from the survey indicated that barriers to successful patient education include disabilities, poor vision and/or hearing, limited reading comprehension, health literacy, acceptance, and knowledge and understanding of disease pathology (Rhee et al., 2016). According to the ADA (2016), the identification of patient barriers prior to the administration of diabetes self-management education is critical for the delivery of effective patient education.

High percentages of individuals with Type 2 diabetes do not receive any form of diabetes self-management education; this contributes significantly to poor compliance with diabetes treatment plans and increased risks of associated comorbidities (ADA, 2017). The distribution and participation of health education programs are not adequately or evenly delivered to all socioeconomic groups in the United States (Adams,

2010). A primary barrier in the implementation of diabetes education relates to faulty program designs and/or gaps in the healthcare delivery system (ADA, 2016).

Fragmented patient education with deficits in evidence-based practice results in minimal to no impact on improving self-management or adherence to the plan of care (ADA, 2018). In addition, diabetes education that is poorly developed often lacks coordination and collaboration with the multidisciplinary healthcare team; this contributes to service duplications with repeat information, resulting in reduced self-care measures integrated into daily routines (ADA, 2016).

The implementation of diabetes self-management education involves collaboration among formally trained nurse educators who work in close consultation with advanced practice nurses and health care providers (Haas et al., 2012). Healthcare organizations implement CPGs by organizing multidisciplinary teams to effectively implement training and delivery of diabetes education to patients (Brunisholz et al., 2014). The active and ongoing involvement of advance practice nurses, providers, and health care professionals in diabetes self-management education proves to be a central element in facilitating health behavior change in individuals diagnosed with diabetes (ADA, 2018). A critical component in reducing the prevalence of diabetes and associated complications includes optimizing time spent with patients and educating and training healthcare providers in the prevention and management of Type 2 diabetes (ADA, 2017). Advanced practice nurses are in key positions to improve Type 2 diabetes management through research, translation and dissemination of evidence, and service in leadership roles to influence change in health policy and standards at the aggregate and

organizational level (ADA, 2018). Nurses collaborate with healthcare professionals to facilitate health care advancements and increase knowledge and awareness in the present state of diabetes and impact of diabetes on financial, economic, and health care systems (Powers, 2016). In addition, nurses work with professional health care organizations to lead change and improve the management of chronic diseases (Powers et al., 2016).

Limited publications are available on effective management interventions related to the delivery of patient education and integration of self-management strategies into their lifestyles (Rhee et al., 2016). Nurses play key roles in translating evidence into practice and communicating with the appropriate policy-makers, administrators, and stakeholders (Tomajan, 2012). The translation of research evidence into clinical practice is essential to ensure proficient, transparent, safe, and quality healthcare provisions (Tricco et al., 2016). Literature shows that the integration of high quality diabetes self-management education and support improves self-efficacy, self-management, and glycemic control in adults with Type 2 diabetes (Powers et al., 2016). Without up-to-date evidence, nursing practice along with the healthcare industry as a whole neglects the capacity to stay current with any changes and/or challenges society encounters (Harvey & Kitson, 2015). Translating evidence strengthens healthcare delivery and nursing practice by increasing knowledge on specific processes and/or systems and staying up-to-date with the most current technology and evidence available in the prevention and management of disease (Harvey & Kitson, 2015).

The ADA plays a key role in the annual generation and dissemination of recommendations and evidence-based practice guidelines for diabetes management

(ADA, 2017). The Medical Standards of Care in Diabetes established by the ADA are revised annually following a formal comprehensive literature review by the ADA Professional Practice Committee, expert consultants, and board directors (ADA, 2017). Revisions conducted in 2017 consisted of updates in all 14 standards and sections, which included revisions in target glycemic control (ADA, 2017). The International Hypoglycemia Study group provided evidence on the long-term benefits associated with hypoglycemia prevention using tight blood glucose monitoring. The target value for hypoglycemia, updated in the 2017 Medical Standards of Care in Diabetes, is now 70 mg/dL, and 54 mg/dL is now the alert value (ADA, 2017). Another significant update noted in the ADA (2017) Medical Standards of Care in Diabetes is the addition of *Lifestyle Management*; this section focuses on patient-centered care through self-efficacy and self-care measures. A critical element included in the ADA (2017) Medical Standards of Care in Diabetes is the 2017 national standards for DSMES.

The 2017 national standards for DSMES provide quality evidence-based strategies for health care professionals in managing Type 2 diabetes (Beck et al., 2017). The standards focus on the continuous facilitation of competent self-care measures and sustainment of self-efficacy and health behaviors that extend outside the health care setting (Beck et al., 2017). Diabetes self-management education facilitates the integration of knowledge and competencies that empower individuals with the disease to implement self-care measures into their daily lifestyles (Powers et al., 2016). The DSMES national standards were last updated in 2014 and although the standards are scheduled for revision every five years, the 2017 Standard Review Task Force noted that reviews will need to be

conducted more frequently moving forward due to ongoing health care advancements in diabetes management (Beck et al., 2017). In addition, the 2017 national standards for DSMES are in alignment with the Medicare diabetes self-management training guidelines, which provide quality evidence-based standards appropriate for the health care facility with potential opportunities for Medicare reimbursement (Beck et al., 2017). National standards for DSMES are reviewed every five years by the Standard Review Task Force, which was assembled by the ADA and AADE (Beck et al., 2017).

Evidence retrieved from systematic literature reviews support provider lead diabetes self-management education that can be adjusted to meet the specific needs of the target population (ADA, 2018). Health education that promotes health behavior change through empowering individuals with or at risk for diabetes to engage in the application of learned self-care skills (Richardson et al., 2014). Further, diabetes self-management education requires patients to build trust and rely on their individual abilities and competencies in managing their chronic disease (Richardson et al., 2014). The responsibility shifts from healthcare providers to the patient for long-term self-management that facilitates improved health outcomes including metabolic control (Richardson et al., 2014). Improving the management of Type 2 diabetes requires effective strategies in cultivating patient adherence to the plan of care to minimize risks for developing long-term complications of diabetes (ADA, 2017). Standardized diabetes self-management education directed by a facility CPG reveals improvements in glycemic control (Richardson et al., 2014). The National Institute of Diabetes and Digestive and Kidney Diseases conducted the Diabetes Control and Complications Trials, which

disclosed evidence that a 1% reduction in glycated hemoglobin in individuals with Type 2 diabetes mellitus decreased risks of developing micro vascular complications by 40% (Richardson et al., 2014).

The effectiveness of intensive patient education was examined in a controlled trial study involving the integration of a practice guideline for the management and delivery of diabetes education (Essien et al., 2017). Participants 18 years of age and older diagnosed with Type 2 diabetes were divided into two separate groups: an experimental group and a control group. The experimental group contained participants who received the CPG guided diabetes self-management education and the control group consisted of participants who obtained conventional education methods or no diabetes self-management education (Essien et al., 2017). Results of the study demonstrated substantial reductions in glycated hemoglobin levels and vast improvements in glucose control in members of the experimental group, who received CPG, guided diabetes self-management education (Essien et al., 2017). Outcomes of the control group were insignificant and indicate that conventional education is not effective in individuals diagnosed with Type 2 diabetes (Essien, et. al., 2017).

Unanticipated barriers identified in research conducted by Balamurugan et. al. (2006) provide strategies for improvements in future nursing practice. The impact of diabetes education was analyzed using the national standards of DSMES as a framework (Balamurugan et al., 2006). Diabetes self-management education was delivered to 734 participants with Type 2 diabetes in three 10 to 13 hour sessions within a 12-month time period (Balamurugan et al., 2006). Results revealed two significant barriers: 1) low

retention of participants and, 2) poor program design and evaluation (Balamurugan et al., 2006). Further, the evaluation plan in the study lacked sufficient resources required for inputting data in the electronic collection system; this contributed to large gaps in data including missing sections of data and no documented data in numerous participants (Balamurugan et al., 2006).

Local Background and Context

Approximately 921,093 adults residing in the state of Illinois are diagnosed with diabetes with calculated direct and indirect health care costs of \$8.98 billion (Illinois Department of Public Health [IDPH], 2017). In 2011, a reported 17.6% of adults with diabetes in the state of Illinois neglected seeking health care due to the associated expense of managing the disease including: medications, supplies, scheduled appointments with primary care provider, and hospital admission costs (IDPH, 2017). The healthcare costs are over two times higher for individuals with diabetes than individuals without diabetes (CDC, 2016a). The length and number of hospitalizations associated with diabetes has had severe negative impacts on the health care system in the state of Illinois. The mean hospitalization for individuals with diabetes was 4.4 days with average costs of \$23,707 in 2015 (IDPH, 2017). In addition, reports from Medicaid revealed that costs per person averaged \$5, 726 for individuals with diabetes with pharmacy expenditures at \$62 million and overall costs over \$1.4 billion (IDPH, 2017).

The IDPH (2017) restructured state priorities in 2012 to coordinator efforts to decrease the burden of diabetes mellitus in the state of Illinois. A five-year agreement plan with the CDC for the prevention and management of diabetes was signed by the

IDPH in 2013 (IDPH, 2017). The Illinois's state plan, Chronic Disease and School Health, follows the CDC's domains for health promotion and chronic disease, which includes: state surveillance, community environment strategies for health promotion, health care system process approaches targeted at improving the prevention and management of diabetes care, and public and community health efforts (IDPH, 2017). Specific funded interventions in place relate to Type 2-diabetes health promotion and awareness and active involvement in the ADA DSMES programs (IDPH, 2017). The state of Illinois continues to investigate methods for increasing the availability and access to DSMES; however, they actively endorse and support diabetes self-management education that is evidence-based and/or accredited by professional organizations such as, the ADA or the AADE (IDPH, 2017). In addition, initiatives for state wide health care professional training using evidence-based CPGs are actively being pursued to guide providers in glycemic measurements and control, diabetes health behavior modifications, and long-term complications associated with diabetes (IDPH, 2017).

The setting for the project was a multidisciplinary healthcare clinic in northern Illinois that specializes in family and internal medicine. The health clinic consisted of three family nurse practitioners, two registered nurses, and two ancillary staff members. Providers within the medical clinical provide services and care to over 350 patients in the clinic, community, and patient home settings. In addition, the facility holds contracts with over five outside healthcare providers allowing nurse practitioners within the clinic to work in close consultation with physicians and clinical specialists throughout the community. Clinical practice guidelines for the management of diabetes would benefit

the providers' patient panel as 25% of the patients have Type 2 diabetes. The facility did not have standards or guidelines in place for managing patients with Type 2 diabetes and provided a feasible setting to successfully complete my project. The goal of the project was to develop an evidence-based CPG to be used by all providers while caring for individuals with diabetes to maximize time spent with patients.

Role of the DNP Student

The purpose of this DNP project was to develop a CPG that provides a framework for health care providers within a multidisciplinary health care clinic in northern Illinois in the management of Type 2 diabetes mellitus. My role in the project involved comprehensive research including literature review, analysis, and synthesis and grading evidence using the 2014 Joan Briggs Institute evidence grading criteria. In addition, my role required ongoing collaboration and engagement with stakeholders, end-users, and the health care team throughout the development, appraisal, evaluation, and translation and dissemination of the CPG. Generating a high quality evidence-based practice guideline that met the needs of the target population and organizational culture existed as a vital responsibility for the project team and myself (Fewster--Thuente & Velstor-Friedrich, 2008). As the DNP student and project leader, my role encompassed the translation of evidence into clinical practice (Fewster--Thuente & Velstor-Friedrich, 2008). Through evidence-based diabetes education, health care professionals have the opportunity to emphasize self-efficacy in the management of diabetes to improve outcomes, prevent associated complications of diabetes, and decrease the costs of diabetes in the United States significantly (Brunisholz et al., 2014). According to Haas et al. (2012) the

development of evidence-based guidelines should include ongoing coordination and collaboration with a multi-disciplinary health care team that includes formally trained nurse educators in close consultation with the nurse practitioner and/or physician.

The specific motivations for this doctoral project derived from my personal experience with the long-term complications and burdens of diabetes. My experience with diabetes and the consequences associated with chronic disease on the individual and the family empowered this DNP project. Three of my immediate family members were diagnosed with Type 1 diabetes before the age of 11; this includes my father, sister, and brother. Risks for potential biases relate to my personal experience with chronic disease. Strategies to eliminate these potential biases involved ongoing collaboration and communication with the multidisciplinary health care team and stakeholders and the critical appraisal of the guidelines to ensure the generation of an evidence-based and high quality CPG. The health care team played a pivotal role in grading evidence and appraising the developed CPG for this DNP project.

Role of the Project Team

An advisory committee was organized for internal and external input from experts and stakeholders (ADA, 2017). The advisory committee served critical roles in this DNP project in appraising the developed CPG. Members of the advisory committee advised and assisted in all areas of this project. Interdisciplinary collaboration is a critical component of health care, nursing practice, and research (Fawcett & Garity, 2009). Coordination and collaboration across health care disciplines supports positive impacts on the safety and quality of patient care (Fewster--Thuente & Velstor-Friedrich, 2008).

The multidisciplinary team for this DNP project consisted of the administrator of the health care clinic, three nurse practitioners, a nurse educator, two DNP-prepared nurses, and myself.

I lead the development of the evidence-based CPG and established regular communication and meetings with the advisory committee. Members of the advisory committee played critical roles in the CPG development and appraisal using the Appraisal of Guidelines for Researching & Evaluation (AGREE) II instrument. As the DNP student and project leader, I was responsible for aligning the project design, outline, and objectives with the health care facility and actively communicating with the advisory committee throughout the project (see Fewster-Thuente & Velstor-Friedrich, 2008). In addition, I provided instructions on project tools involved in appraising guidelines and coordinating realistic time frames for completion. The timeline for team members to review and provide feedback using the AGREE II instrument was 14 days and all members provided input on this time frame in the initial project meetings (see Fewster-Thuente & Velstor-Friedrich, 2008).

Summary

Analyzing the clarity, consistency, and testability of the context of ideas, definitions, terminology, and propositions are critical components in reviewing evidence and formulating the CPG (see McEwen & Wills, 2014). Integrating diabetes education improves health care quality, by focusing on self-efficacy and self-management of diabetes to prevent long-term complications and/or death (Essien et al., 2017). In addition, DSMES has the potential to significantly decrease the financial burden of

diabetes mellitus and can be used as a guide for other chronic diseases (Vorderstrasse et al., 2014). Standardized education following the national standards of the ADA provides patients' with diabetes mellitus the resources, tools, skills, and knowledge to manage their diabetes (Brunisholz et al., 2014). Improving the management of diabetes, improves health care quality by reducing associated comorbidities of the chronic disease, decreasing healthcare costs, and improving the patients quality of life (Vorderstrasse et al., 2014). The model selected to guide this DNP project was the health behavior model, which provided patient centered assessment and individual treatment plans to facilitate health behavior change through self-efficacy (see Peterson & Bredow, 2013).

Section 3: Collection and Analysis of Evidence

Introduction

The prevalence of diabetes mellitus remains a global health problem as the rates of diabetes and pre diabetes have continued to increase for the last 30 years (Zheng, Ley, & Hu, 2018). Type 2 diabetes is one of the leading causes of death globally, affecting millions of adults worldwide (Zheng et al., 2018). According to the ADA (2017), the prevalence of diabetes requires increased coordination and collaboration in the prevention and management of the chronic disease. The purpose of this project was to develop a CPG outlining the protocol for delivering diabetes education in managing Type 2 diabetes within a multidisciplinary health care clinic in northern Illinois. The protocol will be used by all health care providers at the clinic to optimize time spent with patients during scheduled appointments and to ensure that the provider is delivering ongoing diabetes self-management education. The overall objective of this section is to review the collection, exploration, and evaluation of evidence for this DNP project.

Practice Focused Questions

Substantial gaps in health care delivery exist in diabetes management and relate to inadequacies in health care professional diabetes knowledge, clinical decision-making, and practice (CDC, 2016a). These gaps lead to uncoordinated diabetes care that fails to follow the recommended medical standards for diabetes and the delivery of ongoing evidence-based diabetes self-management education (ADA, 2017). Deficient knowledge and poor self-management skills are significantly related to ineffective adherence to diabetes management and poor glycemic control (Adams, 2010). The development of a

CPG to address these needs is critical for improving health outcomes in individuals with diabetes mellitus (ADA, 2017). I addressed the following research question to assist with the development of the education protocol for the management of Type 2 diabetes using the patient population, intervention, comparison, and outcome (PICO) framework: In adults aged 20 years and older with Type 2 diabetes mellitus, how does the use of a CPG compared to no CPG impact the time providers spend with patients?

The purpose and design of this DNP project was to develop a CPG for nurse practitioners working in outpatient settings. According to the Institute of Medicine (IOM) (2011), a CPG is defined as a systematical statement or recommendation intended to guide practice. Health care providers and organizations use CPGs to improve workflow, resource utilization, efficiency, and quality to reduce inconsistencies in practice (IOM, 2011). The developed evidence-based CPG will provide nurse practitioners within the multidisciplinary clinic in Illinois with an evidence-based protocol to guide diabetes care. All nurse practitioners will use the CPG to optimize time spent with patients. In addition, the CPG will serve as a tool for delivering coordinated diabetes self-management education to adults with Type 2 diabetes. The interdisciplinary health team at the facility consisted of two registered nurses and three family nurse practitioners working in consult with outside physicians in providing community-based care and services to a diverse population of adult clients. The design of the DNP project aligned with practice-focused question: in adults aged 20 years and older with Type 2 diabetes mellitus, how does the use of a CPG compared to no CPG impact the time providers spend with patients? The operational definitions used as key aspects in this DNP project included the following:

Clinical practice guideline: Written evidence based-recommendations established as a practice-focused framework for health care professionals to use for improving system processes and patient outcomes (IOM, 2011).

Diabetes self-management: A person's ability to recognize responsibility and accountability in conjunction with health care professionals and family in managing the disease symptoms and treatment (ADA, 2017).

Self-efficacy: Individuals' belief and/or perception of their ability to succeed in the accomplishment of a task (Pender et al., 2011).

Sources of Evidence

Published outcomes and research were used as the sources of evidence to address the practice-focused question for this DNP project. The sources of evidence included media, public websites and reports, peer reviewed journals, and books. The purpose of this DNP project was to develop a CPG to be used by providers for the management of diabetes. Practice guidelines are condensed versions of the evidence to support decision-making and are intended for use within the context of the provider's clinical judgment (Singleton & Levin, 2008). According to the IOM (2011), a systemic literature review involves a scientific investigation of similar but different research studies that focus on the practice problem. The development of quality guidelines involves a comprehensive literature review with a critical analysis of evidence and coordinated appraisal of guidelines using the selected expert panel (IOM, 2011). The IOM stated that a high quality CPG should be constructed on evidence from the systematic literature review and analysis from the identified advisory committee or board of experts.

The literature review for this DNP project involved a comprehensive analysis of Type 2 diabetes management, evidence-based interventions, and guidelines in effective diabetes self-management education. The comprehensive literature review involved the analysis of evidence from scholarly research, literature, national professional health care organizations, and experts in the management and treatment of adults diagnosed with Type 2 diabetes (see IOM, 2011). Primary databases to procure the evidence included CINAHL, PubMed, Medline, and Cochrane. The key search terms for the literature review included terms containing *diabetes, Type 2, education, self-management, self-efficacy, guidelines, standards, support, and barriers*. The scope of the review included literature developed between the years 2001 to 2018.

A systemic review on the effectiveness of diverse interventions for the management of diabetes demonstrated that diabetes education positively impacts patient outcomes (Render et al., 2001). Researchers analyzed 41 studies and revealed that interventions including diabetes education provide higher improvements than interventions lacking this component in the management of diabetes (Render et al., 2001). Another study revealed that only 45% of patients with diabetes Type 2 receive structured diabetes education, which contributes to high noncompliance rates in diabetic treatment plans (Quinn et al., 2011). Diabetes education provided through mobile coaching and patient portal systems demonstrates improvements in blood glucose levels (Quinn et al., 2011). Another study conducted by Hee-Seung and Jeong-Ah (2003) revealed similar results on the use of telephonic education and follow-up management in improving adherence to management of diabetes. Researchers have indicated that the

implementation of structured diabetes education using evidence-based practice guidelines reduces complications associated with diabetes, including retinopathy, neuropathy, cardiovascular disease, and renal disease (Taylor et al., 2003). Growing research on the effectiveness of educational interventions in diabetes management has revealed improvements in blood glucose levels, self-management and adherence, and reductions in vascular complications associated with diabetes (Menezes, Lopes, & Nogueira, 2016). However, limited research is available on the impact diabetes education has on metabolic complications (see Menezes et al., 2016).

Another source of evidence for this DNP project involved public reports and websites including ADA, CDC, Healthy People 2020, IOM, and the AADE. The ADA noted in the 2017 Medical Standards of Care in Diabetes that DSMES is a fundamental component of diabetes management and care (ADA, 2017). The national standards for DSMES provide a framework for high quality health education (Funnell et al., 2010). Furthermore, health care providers can use these standards in diverse populations and health care settings (Funnell et al., 2010). The DSMES is composed of 10 standards to guide the healthcare professional in delivering quality education to patients with diabetes and evaluating patient outcomes (Funnell et al., 2010). In addition, the DSMES national standards provide a framework and strategy for healthcare professionals in the administration of evidence-based diabetes education and management of diabetes (ADA, 2017). The AADE and the ADA assembled the Standard Review Task Force for DSMES to ensure that standards are reviewed annually and revisions are performed every 5 years (Haas et al., 2014).

Analysis and Synthesis

Practice guidelines summarize medical standards for health care screening, disease prevention, detection, management, and treatment (Singleton & Levin, 2008). Clinicians using CPGs need to know the strength and level of confidence that can be placed on the recommendation for healthcare practice (Kredo et al., 2016). The evidence was reviewed, analyzed, and evaluated using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system to ensure the development of high quality guidelines that reduce systematic errors (Kavanagh, 2009). The tool consists of four areas for assessing the quality and strength of the evidence including confidence, stability of outcomes, health preferences, and relevance of implications (Kavanagh, 2009). Relative strength was evaluated using GRADE to critique evidence and support the development of an evidence-based CPG (Kavanagh, 2009).

To minimize inconsistencies in the CPG quality and usability, the Appraisal of Guidelines for Research and Evaluation (AGREE) II Instrument was used to evaluate the guidelines. The AGREE II tool is used to perform quality assessment and provides strategies or guidelines for the development, implementation, and documentation of the proposed change (AGREE, 2013). According to Singleton and Levin (2008), the AGREE II instrument “provides a framework for assessing and evaluating the quality of clinical practice guidelines based on the potential for bias in guideline development as well as internal and external validity and feasibility for practice” (p. 2). The AGREE II tool is considered the standard of practice for CPG appraisal, consisting of 23 levels of criteria. The instrument assesses the CPG across six different domains: (a) scope, (b) involvement

of stakeholders, (c) consistency, (d) clarity, (e) applicability, and (f) editorial independence (Brouwers et al., 2010). The AGREE II instrument is permitted for CPG appraisal, quality assurance assessments, and educational reasons and does not require permission for the utilization of the tool (Brouwers et al., 2010). To strengthen the validity and reliability of the AGREE tool, one or more experts should evaluate the CPG (Brouwers et al., 2010). For this DNP project, an advisory committee of experts and stakeholders was established for the direct involvement of CPG appraisal. The CPG was evaluated using the AGREE tool 4-point scale, which individually scores the guideline across each domain (Brouwers et al., 2010).

The AGREE II instrument served as a critical component in evaluating and guiding modifications to improve quality and usability. Each member of the project team actively and directly participated in the evaluation of the CPG and meetings were recorded in the health care clinic minutes. Involving the multidisciplinary team and key stakeholders in the process of development and change were key strategies for successful evaluation and future implementation (Thomas, Seifer, & Joyner, 2016). To effectively disseminate evidence into practice, researchers must identify how the results of the research will influence healthcare practice, education, future research, and policies (Curtis, Fry, Shabon, & Considine, 2016). Further, conducting targeted dissemination is recommended and should include a reference or guide for the stakeholders, educators, healthcare professionals, and policy makers (Curtis et al., 2016). The DNP student was responsible for the ongoing evaluation during the phases of the DNP project including the development and evaluation of the CPG. However the administrators and stakeholders of

the health agency will be responsible for employing all future assessments related to CPG implementation, compliance, and impact.

The project evaluation plan was ongoing and required collaboration with the key stakeholders. A system leadership approach was followed in each stage of collection and analysis of evidence including project communication, decision- making, development, and dissemination processes (American Association of Colleges of Nursing [AACN], 2012). Effective project evaluation was a critical component of the planning process and is built to validate that the project goals are met (Hodges & Videto, 2011). The multidisciplinary project team of experts, nursing theory, and research guided this DNP project in the synthesis of evidence, development of the CPG and evaluation of CPG quality (AACN, 2012).

Summary

The identified health problem for this DNP project is the lack of a CPG available to nurse practitioners working in an outpatient clinic for the delivery of care to adults with Type 2 diabetes. The project was designed to optimize the nurse practitioners time spent with patients diagnosed with 2 diabetes. The setting for the project consisted of health care providers working at a multidisciplinary health care clinic in northern Illinois and the target population focus for the CPG includes adults with Type 2 diabetes mellitus. All members of the advisory committee appraised guidelines using the AGREE II instrument and/or the usability questionnaire. The project evaluation was continuous throughout each phase of this DNP project.

Section 4: Findings and Recommendations

Introduction

The incidence of diabetes continues to rise annually and is a significant public health issue with critical consequences (ADA, 2017). Improving the management of Type 2 diabetes requires effective strategies in cultivating patient adherence to the plan of care to minimize risks for developing long-term complications of diabetes (ADA, 2017). Gaps in practice at a multidisciplinary health clinic existed due to the increasing number of Type 2 diabetic cases and the unavailability of a practice guideline for providers on the management of the chronic disease. Evidence-based multifaceted clinical guidelines can improve patient compliance by directing health care providers with up-to-date standards for the effective management of diabetes and delivery of quality care (ADA, 2017). The practice-focused question created for this project was as follows: In adults aged 20 years and older with Type 2 diabetes mellitus, how does the use of a CPG compared to no CPG impact the time providers spend with patients? The purpose of this project was to develop a CPG outlining an education protocol for nurse practitioners in the health care clinic to use in the management of Type 2 diabetes. The protocol will be used by all health care providers at the clinic to optimize time spent with patients during scheduled appointments and to ensure that the provider is delivering ongoing diabetes self-management education.

Published outcomes and research were used as the primary sources of evidence in this project to address the practice-focused question. A comprehensive literature review was conducted using the following databases: CINAHL, PubMed, Medline, and Cochrane. The key search terms used included terms that contained *diabetes*, *Type 2*,

education, self-management, self-efficacy, guidelines, standards, support, and barriers.

Evidence was evaluated and graded using the 2014 Joan Briggs Institute evidence table (Appendix A). The guideline was constructed using the graded evidence from the systematic literature review and the project team conducted the evaluation of the developed CPG. Three experts in diabetes management completed the appraisal of the practice guideline using the AGREE II tool (Appendix B). The overall objective of this section is to review the findings, implications, recommendations, and strengths and limitations of the developed practice guideline for the management of Type 2 diabetes.

Findings and Implications

The advisory committee for this project consisted of seven members. Advisory members included three registered nurse practitioners currently practicing within the health clinic, one senior health administrator, two DNP prepared nurses with 10 plus years of experience in caring for adults with diabetes, and one DNP prepared nurse certified as a diabetes educator. The three doctoral prepared nurses and diabetes experts evaluated the CPG using the AGREE II Instrument. The appraisers were provided instructions (Appendix B), the AGREE II instrument user manual via email, and the developed CPG via email. Each appraiser was allotted 14 days to complete and return their evaluation scores and comments electronically.

The AGREE II instrument is a tool for evaluating the quality of the practice guideline and consists of 23 items organized into six domains (AGREE Next Steps Consortium, 2009). Domain 1 addressed the scope and purpose of the guideline through three key questions that concentrated on the aim, health questions, and target population

(AGREE Next Steps Consortium, 2009). All appraisers scored each item within this domain at a 100%. Domain 2 assessed the stakeholders' involvement through three questions that focused on guideline development (Brouwers et al., 2010). The reported score for this domain was 96.3%. The target population and users were clearly identified and are illustrated in the first two pages of the CPG presented in Appendix C. The views and preferences of the target population were analyzed and guided the development of the CPG; however, these preferences are not specifically listed in the guideline. The target population informed and guided the development of the practice guideline, and the stakeholders were involved throughout the project. For this reason, the diabetes experts/appraisers did not recommend modifying the CPG.

Domain 3 addressed the rigor and development of the guideline; this section contained eight items and focused on the method of gathering and analyzing evidence (AGREE Next Steps Consortium, 2009). The appraisers' combined score for this domain was 97.2%. Based on the analysis of the appraisal results, the item with the lowest score within Domain 3 was number nine (the strengths and limitations of the body of evidence are clearly described (see AGREE Next Steps Consortium, 2009). The strengths and limitations of the evidence were discussed with the project team, and the graded evidence table is illustrated in Appendix D. Domain 4 included three key items that evaluated clarity and presentation of the CPG (AGREE Next Steps Consortium, 2009). All appraisers scored this section at a 100%.

Domain 5 addressed the applicability of the guideline through four questions. One of the questions in this domain, Item 21 (the guideline present monitoring and/or auditing

criteria) did not apply, and adjustments were made to the domain (see AGREE Next Steps Consortium, 2009). The adjusted score for Domain 5 was 96.3%. The item with the lowest scores in this domain was Item 18, which addressed the guideline description of facilitators and barriers. The facilitators and barriers are described throughout the document, and appraisers reported no modification needed for this domain. Domain 6 evaluated the editorial independence of the guideline and consisted of two questions; however, one of the questions did not apply to this guideline, and the score was adjusted for this domain. In Domain 6, Question 23 (competing interests of guideline development group members have been recorded and addressed) was not calculated into the score because it did not apply to the developed guideline (see AGREE Next Steps Consortium, 2009). The combined score for Domain 6 was adjusted to reflect this, and the reported score was 94.4%.

The last two items in the AGREE II instrument were included in the section titled “overall guideline assessment”. The first item in this section required appraisers to rate the overall quality of the guideline and the combined score for this section was 100%. The scores for item one are presented in Table 1. The second item required participants to provide a response to the statement, “I would recommend this guideline for use.” The responses included *yes*, *yes with medication*, or *no* (AGREE Next Steps Consortium, 2009). All appraisers reported *yes* for this section and reported that no modifications were needed to the guideline. The scores for this section are included in Table 2. The AGREE II appraiser responses and scores for each domain are presented in Appendix E.

Table 1. Overall Guideline Assessment 1

Overall Guideline Assessment			
1. Rate the over all quality of this guideline			
	Rate	Total	Score
Appraiser 1	7	7	100%
Appraiser 2	7	7	100%
Appraiser 3	7	7	100%
Total	21	21	100%

Note. Maximum possible score = 7(strongly agree) x 1 (questions) x 3 (appraisers) = 21

Minimum possible score = 1 (strong disagree) x 1 (questions) x 3 (appraisers) = 3

Score: (Obtained score – minimum possible score) / (maximum possible score- minimum possible score)
 $(21-3) / (21-3) = 1 (1 \times 100 = 100\%)$

Table 2. Overall Guideline Assessment 2

Overall Guideline Assessment			
2. I would recommend this guideline for use:			
	Yes	Yes with modification	No
Appraiser 1	Yes		
Appraiser 2	Yes		
Appraiser 3	Yes		
Total	100%	-	-

The formative guideline evaluation was conducted using the usability questionnaire developed and distributed to all three nurse practitioners at the health care clinic. The three diabetes experts, who appraised the guideline using the AGREE II instrument, validated the usability questionnaire prior to distribution and evaluation. The questionnaire consisted of 10 questions to assess the applicability and usability of the guideline within the practice setting. The questionnaire was distributed to all three nurse practitioners who work within the health clinic. Each participant was allotted 7 days to complete and return the questionnaire via email. All participants completed the questionnaire, and responses confirmed the need of the guideline and validated the usability in clinical practice with. When asked if the nurse practitioners believed that the guideline is concise and easy to apply in clinical practice, 66.7% responded with *strongly agree* and 33.3% responded with *agree*. All providers *strongly agreed* that the guideline supported them as an educator in the management of Type 2 diabetes. The questions of the usability questionnaire are illustrated in Appendix F, and the results of the questionnaire are presented in Appendix G.

The conclusion from the advisory committee review based on the AGREE II appraisal scores and the usability questionnaire confirm guideline applicability, ease of use, and quality. Usability of the developed CPG is imperative, as all leaders need to establish compliance or adherence to the proposed practice change (see Haas et al., 2014). A critical component in the delivery of high quality care is the translation of evidence into practice (Kueny, Shever, Lehan, & Titler, 2015). The reported scores on both tools suggest that the guideline is applicable for clinical practice. Further combined

scores from guideline appraisers endorse that the guideline does not need any modifications and that it reflects the needs of the target population and health clinic.

The implications of this project in clinical practice involve assisting individuals with Type 2 diabetes in developing the knowledge and skills necessary to provide self-care (AADE, 2009). The importance of engaging representatives or stakeholders from the target population to be involved in program development is critical to ensure that the program benefits those affected directly (Pandi-Perumal et al., 2015). The guideline recognizes the role of the nurse practitioner and provides a standardized process for when to provide education and what to include in diabetes self-management education. Standardized education protocols improve health care quality by reducing associated comorbidities of the chronic disease, decreasing healthcare costs, and improving quality of life in individuals with Type 2 diabetes (Vorderstrasse, Shaw, Blascovich, & Johnson 2014). Incorporating diabetes self-management education in the care plan of every individual with Type 2 diabetes can promote self-efficacy and improve health outcomes (AADE, 2009). Further, the integration of the developed CPG into practice fosters evidence-based research and practice by health care professionals to improving the care of individuals' with Type 2 diabetes.

The clinical practice guideline will positively impact social change by improving the management of Type 2 diabetes and decreasing the prevalence of associated complications (AADE, 2009). The ADA (2018) recommended that all adults with Type 2 diabetes receive ongoing self-management education and support. Diabetes negatively impacts the individuals' physical and psychological health. Individuals living with Type

2 diabetes report increased stress and feelings of powerlessness related to the diagnosis and progression of the chronic disease (Vorderstrasse, Shaw, Blascovich, & Johnson 2014). The practice guideline developed in this project empowers individuals with diabetes to make more informed decisions with consideration to personal and cultural preferences (AADE, 2009). A quality practice guideline facilitates effective decision-making, communication, organization, and collaboration for positive social change (IOM, 2010). Effective implementation of diabetes education improves glycemic control and prevents diabetes-associated comorbidities (Burke, Sherr, & Lipman, 2014).

Recommendations

The developed CPG in this project is the proposed solution to addressing the gap in practice within the health care clinic. Providers within the health clinic reported limited time and resources during scheduled patient appointments resulting in the inability to provide diabetes self-management education to individuals with newly diagnosed or existing Type 2 diabetes. The health clinic did not have a practice guideline or education protocol available to providers for the management of Type 2 diabetes. The evidence-based guideline developed for this project will allow providers to efficiently use time with patients and augment a plan of care with standardized diabetes self-management education to guide follow-up appointments and self-care for adults with Type 2 diabetes (ADA, 2017). The purpose of the established guideline was to: a) recognize the role of the nurse practitioner, b) optimize time providers spend with patients, c) establish a standardized process for providing diabetes education, and d) outline an evidence-based protocol for providing diabetes self-management education to individuals with newly

diagnosed or existing Type 2 diabetes. All providers within the health clinic should use the practice guideline as self-supporting tool in providing high quality health education. Additionally, providers should collaborate with the patient and multidisciplinary health team in the management of diabetes and ongoing delivery of self-management education (AADE, 2009). Treatment plans should be individualized and consider the patients personal and cultural preferences (ADA, 2018). The CPG developed for this project is presented in Appendix C.

The CPG developed in the project includes four supplementary products placed within the guideline to assist the provider in providing high quality care and education to individuals with Type 2 diabetes. The first product is the website and link provided on page 3 in the Diabetes Self-Management Education section of the developed CPG presented in Appendix C. The ADA and the AADE established an online database for locating certified DSMES programs. Providers and individuals with diabetes can use this website to locate registered DSMES programs within or near their community. The second product available in the CPG is the Type 2 Diabetes Disease Process and Treatment document. The document is on page 7 of the developed CPG in Appendix C and should be distributed to individuals at initial diagnosis or to individuals' with existing diabetes exhibiting signs of knowledge deficiency (ADA, 2015). The document was excerpted from the American Diabetes Association (2015) Patient Education Materials- Taking Care of Type 2 Diabetes.

The third product within the guideline is the ADA (2018) Anti-hyperglycemic Therapy in Adults with Type 2 Diabetes document presented on page 12 of the developed

CPG presented in Appendix C. This product was excerpted from the ADA (2018) Standards of Medical Care in Diabetes, page 576. Providers can use this document and corresponding documents in the ADA (2018) Standards of Medical Care in Diabetes when prescribing medications to individuals with Type 2 diabetes mellitus. The fourth supplementary product within the CPG is the Type 2 Diabetes Comprehensive Checklist presented on page 15 of the developed CPG in Appendix C. The checklist was developed and excerpted from the National Diabetes Education Program (NDEP) comprehensive Diabetes Head to Toe Checklist Examination Report, page 2. Providers can use this document as a guide when conducting comprehensive health assessments in individuals' with Type 2 diabetes. In addition, this checklist is used for the early identification and prevention of complications associated with diabetes (CDC, 2017).

The DNP student will not be involved with the implementation of the developed CPG into practice within the medical clinic. The recommendations for implementation require ongoing collaboration of the health care team and stakeholders (ADA, 2018). The first recommendation of the proposed change is that all health care providers within the multidisciplinary clinic will use the clinical practice guideline for managing adults ages 18 year of age and older with Type 2 diabetes mellitus. The administrator at the health clinic will complete guideline auditing and monitoring; this section is not included in the developed guideline. Integrating the CPG into the electronic health record will allow the use of the guideline to be monitored and tracked electronically. Another resource that could facilitate effective integration and sustainment of the CPG includes personal digital assistance-based screening reminders for patients with Type 2 diabetes. Evidence from a

number of randomized controlled trials reveals that computer-based reminders increase CPG compliance (Bakken et al., 2008). Integrating reminders into the health information system could positively impact provider adherence to CPGs and improve patient outcomes (Bakken et al., 2008).

The second recommendation of the proposed change is that all individual with Type 2 diabetes will be provided ongoing diabetes self-management education or referred to a diabetes self-management education and support (DSMES) program. Evaluating whether or not self-management education is being delivered is critical to the overall health outcomes of individuals with Type 2 diabetes mellitus (ADA, 2017).

Administrators can review the electronic health record to analyze whether or not providers are adhering to the developed education protocol and practice guideline. The advisory board should review the developed CPG annually and update the guideline as needed to reflect evidence-based practice (AADE, 2009). Annual critical appraisal of the practice guideline by experts will ensure the generation, sustainment, and full adoption of evidence-based guidelines (ADA, 2017).

Contribution of the Doctoral Project Team

The doctoral project team members for this project consisted of three nurse practitioners, the health administrator, two DNP-prepared nurses with ten plus years of experience in Type 2 diabetes management, and one DNP-prepared nurse with a diabetes educator certification. The three external DNP-prepared nurses served as content experts and critique the guideline using the AGREE II tool. The results of the appraisals are presented in Appendix E. In addition to conducting the guideline appraisal, the three

diabetes experts validated the questionnaire developed to distribute to the three nurse practitioners that currently practice within the medical clinic. The roles of the team involved the review and evaluation of the finished guideline. The usability questionnaire consisted of ten questions and the three nurse practitioners that work in the health clinic completed this evaluation. Individual responses and scores of each evaluator are illustrated in Appendix G. The integration of the CPG will take place outside of the DNP project and the health administration at the medical clinic will lead this process.

Strengths and Limitations

The strengths of this project relate to the usability of the developed CPG. The practice guideline developed can be individualized to meet the needs of the specific individual or target population. In addition, providers can use the section(s) of the guideline that applies to the individual needs of the patient without using the entire guideline. Another key strength of the project is that the CPG was developed from high quality evidence that was graded using the Joann Briggs Institute (2014) criteria. All recommendations listed in the developed CPG were ranked as a category A (high quality evidence with strong recommendation) or category B (good quality evidence with strong recommendation) (The Joanna Briggs Institute, 2014). The graded evidence table is presented in Appendix G. In addition to the high quality evidence, the developed CPG includes supporting products from national expert committees to assist the nurse practitioner in managing Type 2 diabetes and providing diabetes self-management education.

The limitations of this project were that the CPG was developed to address the gap in practice within the medical clinic and meet the needs of the providers within that clinic. Type 2 diabetes is a complex disease that requires a multitude of knowledge in both biological and clinical sciences (AADE, 2009). The CPG was developed as a self-supporting tool with secondary products integrated into the guideline to assist the nurse practitioner in management diabetes and locating additional information if needed. The generalizability of the developed CPG may not apply due the small number of experts that critiqued that guideline. The key recommendation for any future products that address similar topics and use a similar method is to integrate the CPG into the electronic health record and include recommendations for providers on telephonic follow up with patients. Another proposal for future projects is to include a guideline for providers and nurse practitioners to distinguish roles and increase generalizability and use of the developed CPG (ADA, 2018).

Summary

The developed guideline for the management of Type 2 diabetes within the health clinic will provide an evidence-based protocol for nurse practitioners to integrate ongoing diabetes self-management education into care. The primary objective of the developed CPG was to improve the management of diabetes and optimize the time providers spend with patients during scheduled appointments. Through evidence-based diabetes education, providers will have the opportunity to emphasize self-efficacy in the management of diabetes to improve outcomes, prevent associated complications of diabetes, and decrease the costs of diabetes in United States significantly (Brunisholz,

2014). In addition, the guideline will empower individuals and families to make informed decisions and actively engage in the development of the treatment plan and self-management behaviors (AADE, 2009). Successful implementation of the practice guideline developed in this project should improve the quality of care in individuals with diabetes and reduce unnecessary variations or duplications (ADA, 2018).

Section 5: Dissemination Plan

Introduction

The translation of research evidence into clinical practice is essential to ensure proficient, transparent, safe, and quality healthcare provisions (Tricco et al., 2016). Practice decisions should be reflective of the best available evidence and take into consideration the individual values and preferences of the patient or target population (Williams & Cullen, 2016). The practice guideline developed for this project will be used by nurse practitioners within a health clinic in the management and care of individuals with Type 2 diabetes. Dissemination and adoption of the developed CPG has the potential to positively impact social change and improve the health outcomes within the target population (see Brunisholz et al., 2014). The dissemination of the developed CPG to the health care clinic includes a clear, concise, and well-organized plan involving staff orientation and training.

Target dissemination of the developed CPG to the health care clinic will take place during a scheduled staff meeting and involve an oral and visual presentation of the guideline. Each member of the team will be provided with a copy of the guideline to use as a reference during training (see Curtis et al., 2016). To effectively disseminate evidence into practice, the multidisciplinary team must share with the end users and stakeholder how the change will influence health care practice, education, future research, and policies (Curtis et al., 2016). The dissemination plan will involve staff training and orientation to the content, resources, and intended use of the developed CPG. In addition, the health administrator will review the guideline expectations and

requirements for all nurse practitioners within the clinic. Moreover, the health care team will practice applying the guideline into different case scenarios to ensure ease of usability and application of the developed CPG. Involving the multidisciplinary team and key stakeholders in the process of development and change exists as a key strategy in overcoming barriers in program development and change implementation (Thomas et al., 2016).

The nature of this project is ideal for disseminating findings into the broader nursing profession through professional nursing publications. The developed CPG provides a guideline for nurse practitioners in caring for individuals with Type 2 diabetes. In addition, the guideline was developed to optimize the time providers spend with patients during scheduled appointments. The *Journal of Nurse Practitioners* would provide an effective platform for disseminating findings of this project to nurse practitioners. The developed guideline recognizes the role of the nurse practitioner in the primary care setting and in the management of chronic disease. Delivering quality DSMES improves blood glucose in adult patients, which decreases the development of long-term complications associated with diabetes (Haas et al., 2014). The *Diabetes Care* journal is an option for disseminating findings of this project to the broader nursing profession. Publications in *Diabetes Care* focus on stimulating research and knowledge to improve the care and management of diabetes (ADA, 2016). Healthcare professionals incorporate evidence-based practice from research to improve the safety and quality of patient care in diverse settings (Nester, 2016).

Analysis of Self

Nurses are in key roles to guide healthcare standards and processes to influence evidence-based practice and high quality care quality (Allen, 2003). As a practitioner, project leader, and nursing scholar, I identified a gap in nursing practice at a health clinic in northern Illinois. Following the identification of the practice issue, I conducted a needs assessment of the target population, participated in comprehensive and extensive research, developed strategies to solve the identified issue, and developed a practice guideline that specifically addressed the identified problem. As a practicing nurse, I was able to recognize barriers that health care professionals encounter in caring for individuals with diabetes, including the lack of an education protocol or guideline. Through the analysis of multifaceted issues related to the management of Type 2 diabetes, I initiated, employed, and directed interprofessional collaboration and research to improve the quality of care within the health clinic. As a leader, I integrated effective decision-making, communication, and collaboration to influence change to address the identified gap in practice. My responsibilities in the role of the project manager involved effectively communicating the project goals and outcomes to the project team, stakeholders, and end users. As a leader, I was accountable for the development of the evidence-based practice guideline for the management of Type 2 diabetes.

Prior to this project, I had limited experience in leading health care teams in practice and system process changes. The leadership experiences and skills obtained throughout my role as a nurse educator involved planning and implementing changes at curricular levels rather than the health system or practice level. The DNP project process

provided me with both the knowledge and skills required to initiate future research, projects, and influence practice change. My goals as a practitioner, scholar, and leader are to continue advocating for the integration of evidence-based practice, like the developed CPG, through continued translation of evidence into practice and communication with identified policy-makers, administrators, and stakeholders. I aim to continue advancing my profession to support research and implementation of evidence-based practice that facilitates self-management behaviors in individuals with diabetes to improve health outcomes. In addition, I will develop and interpret research to positively impact the delivery of healthcare and nursing practice

Summary

The developed guideline for the management of Type 2 diabetes will provide nurse practitioners with a standardized process for providing ongoing diabetes education in the health care clinic. The practice guideline is comprehensive and includes supplementary products for providers and clearly outlines a concise evidence-based education protocol for individuals with Type 2 diabetes. The guideline will optimize the time providers spend with patients during scheduled appointments and improve the quality care for individuals with Type 2 diabetes.

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Appendix A: Grade Criteria

Evidence Levels, Criteria, and Grade Recommendations

Table 1. Levels of Evidence

Level	Study Design or Information Type
1	Evidence from randomized controlled trials (RCTs), systematic review of RCTs with or without meta-analysis
2	Evidence from one randomized controlled trial, quasi-experimental study, or systematic review of RCT and quasi-experimental studies.
3	Evidence from qualitative study, non-experimental study, or systematic review with or without meta-analysis.
4	Evidence from expert consensus from national expert committees or panels based on scientific evidence including: consensus panels and clinical practice guidelines.
5	Evidence from non-research evidence: literature reviews, quality improvement, case reports, or expert opinion from experiential evidence

(Joanna Briggs Institute, 2014).

Table 2. Grading Recommendations

Grade	Description
A	High quality, strong recommendation; evidence from Level 1, 2, and 3
B	Good Quality, good recommendation; evidence from Level 4
C	Low Quality, weak recommendation; evidence from Level 5

(Joanna Briggs Institute, 2014).

Walden IRB Approval # is 06-04-18-0274124

Appendix B: AGREE II Instrument

Instructions on Appraising the Guideline

Each of the AGREE II items and the two global rating items are rated on a 7-point scale (1–strongly disagree to 7–strongly agree). The User’s Manual provides guidance on how to rate each item using the rating scale.

- *All AGREE II items are rated on the following 7-point scale:*
 - **Strongly disagree 1 2 3 4 5 6 7 Strongly Agree**
- Scores increase as more criteria are met and considerations addressed. The “*How to Rate*” section for each item includes details about assessment criteria and considerations specific to the item.
 - **Score of 1 (Strongly Disagree)**

A score of 1 should be given when there is no information that is relevant to the AGREE II item or if the concept is very poorly reported
 - **Score of 7 (Strongly Agree)**

A score of 7 should be given if the quality of reporting is exceptional and where the full criteria and considerations articulated in the User’s Manual has been met.
 - **Score between 2 and 6**

A score between 2 and 6 is assigned when the reporting of the AGREE II item does not meet the full criteria or considerations. A score is assigned depending on the completeness and quality of reporting.

AGREE II Instrument

DOMAIN	SCORE (1-7)	COMMENTS
Domain 1. Scope and Purpose		
Q1. The overall objective(s) of the guideline is (are) specifically described		
Q2. The health question(s) covered by the guideline is (are) specifically described.		
Q3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.		
Domain 2. Stakeholder Involvement		
Q4. The guideline development group includes individuals from all relevant professional groups.		
Q5. The views and preferences of the target population (patients, public, etc.) have been sought.		
Q6. The target users of the guideline are clearly defined.		
Domain 3. Rigor of Development		
Q7. Systematic methods were used to search for evidence.		
Q8. The criteria for selecting the evidence are clearly described.		

DOMAIN	SCORE (1-7)	COMMENTS
Domain 3. Rigour of Development (CONTINUED)		
Q9. The strengths and limitations of the body of evidence are clearly described.		
Q10. The methods for formulating the recommendations are clearly described.		
Q11. The health benefits, side effects, and risks have been considered in formulating the recommendations.		
Q12. There is an explicit link between the recommendations and the supporting evidence.		
Q13. The guideline has been externally reviewed by experts prior to its publication		
Q14. A procedure for updating the guideline is provided.		
Domain 4. Clarity of Presentation		
Q15. The recommendations are specific and unambiguous.		
Q16. The different options for management of the condition or health issue are clearly presented.		
Q17. Key recommendations are easily identifiable.		

DOMAIN	SCORE (1-7)	COMMENTS
Domain 5. Applicability		
Q18. The guideline describes facilitators and barriers to its application.		
Q19. The guideline provides advice and/or tools on how the recommendations can be put into practice.		
Q20. The potential resource implications of applying the recommendations have been considered.		
Q21. The guideline presents monitoring and/or auditing criteria.		
Domain 6. Editorial Independence		
Q22. The views of the funding body have not influenced the content of the guideline.		
Q23. Competing interests of guideline development group members have been recorded and addressed.		
Overall Guideline Assessment		
1. Rate the overall quality of this guideline.		
2. I would recommend this guideline for use: 1) Yes 2) Yes with modifications 3) No		

Appendix C: Guideline

Clinical Practice Guideline for the Management of Type 2 Diabetes

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Purpose

The incidence of diabetes in the United States continues to increase annually contributing to rising health care costs and increased morbidity and mortality rates (Centers for Disease Control and Prevention [CDC], 2017). Diabetes is one of the leading causes of death in the nation and affects 30.2 million adults ages 18 years of age and older (American Diabetes Association [ADA], 2018a). Type 2 diabetes accounts for nearly 90% of all diabetes cases and remains the primary origin for the development of retinopathy, neuropathy, renal failure, blindness, and amputations (CDC, 2017). The management of diabetes mellitus is shifting towards patient-centered practices that facilitate the development and integration of standardized self-management education that meets the needs of the specific individual (Funnel & Anderson, 2004).

Multi-faceted and evidence-based approaches in diabetes management can improve adherence and provide effective management and delivery of diabetes care (ADA, 2018a). Health care provider responsibilities involve the facilitation of patient knowledge, ability, and competence to engage in basic and complex decisions and skills related to diabetes self-management (Haas et al., 2012). The integration of standardized patient education remains one of the key strategies in improving blood glucose levels in adults diagnosed with diabetes mellitus and preventing long term complications (ADA, 2018a).

The Purpose of the Clinical Practice Guideline is to:

- (a) Recognize the role of the nurse practitioner in diabetes self-management education and support.
- (b) Optimize the time nurse practitioners' spend with patients during scheduled appointments.
- (c) Establish a standardized process for providing diabetes education; and
- (d) Outline evidence-based diabetes self-management education for adults with Type 2 diabetes.

Sustainability

- The clinical practice guideline will be reviewed and updated annually by the advisory board.

Recommendation Guide

QUESTIONS

- The following questions served as the basis for the development of this clinical practice guideline to address the role of the nurse practitioner in providing self-management education to adults with Type 2 diabetes mellitus.
 - Q1.** When should an individual with Type 2 diabetes receive education?
 - Q2.** What should be included in self-management education for adults with Type 2 diabetes?
 - Q3.** What is the role of the nurse practitioner in self-management education for adults with Type 2 diabetes mellitus?
 - Q4.** When should the nurse practitioner refer the individual with Type 2 diabetes to a diabetes self-management education and support (DSMES) program?

TARGET POPULATION

- The recommendations delineated in this document are targeted for adults' ages 18 and older that are at risk for Type 2 diabetes mellitus or diagnosed with Type 2 diabetes mellitus.

Diabetes Self-Management Education

Diabetes is a chronic and progressive disease that requires those affected to perform a multitude of basic and complex decisions and skills (Haas et al., 2014). Effective management of diabetes integrates ongoing self-management education to facilitate the development of the individuals' knowledge and skill in understanding, comprehending, and applying effective self-care practices (Haas et al, 2014). The American Association of Diabetes Educators (AADE) (2009) 7 Self-Care Behaviors guided the development of the clinical practice guideline and include: healthy eating, physical activity, self-monitoring, taking medications, problem solving, healthy coping, and reducing risks.

RECOMMENDATIONS ON PROVIDING DIABETES EDUCATION

1. All individuals with T2DM should be provided ongoing self-management education and support including but not limited to the following circumstances:
 - Upon diagnosis
 - Annually at follow up visits with provider
 - When/if health status changes
 - When any transitions in care occurs
2. Primary care providers should refer adults with Type 2 diabetes mellitus to diabetes educators and provide ongoing follow-up care to ensure that the individual participated in a diabetes self-management education and support (DSMES) program (Chrvala, Dawn, Lipman, 2015).
3. The nurse practitioner will assist individuals with Type 2 diabetes mellitus in locating a diabetes self-management education and support (DSMES) program (ADA, 2018).

RESOURCE

- The American Association of Diabetes Educators (AADE) and the American Diabetes Association (ADA) developed an online database for providers and individuals with diabetes to locate certified diabetes self-management education and support (DSMES) programs within or near their community.

<https://www.diabeteseducator.org/living-with-diabetes/find-an-education-program>

Nurse Practitioner Role

Diabetes education requires health care professionals with the attained knowledge and skill in both social and biological sciences and experience in communication, education, monitoring, and caring for individuals with Type 2 diabetes (ADA, 2018). The nurse practitioner in the primary care setting is considered a Non-Credentialed Diabetes Educator or Level 3 educator (AADE, 2009). Roles of the nurse practitioner in diabetes management are essential for improvements in glycemic control, improving quality of care, and reducing health care costs (Richardson et al., 2014).

□ Level 3 or Non-Credentialed Diabetes Educator:

Health care professionals that are not certified diabetes educators, but meet the definition of the diabetes educator by the AADE (2009).

ROLE OF NURSE PRACTITIONER IN DIABETES EDUCATION

1. The nurse practitioner should conduct comprehensive and individualized assessments of all individuals with or at risk for developing Type 2 diabetes.
2. The nurse practitioner should guide all individuals with or at risk for T2DM in setting goals that based on the assessment and individuals preferences.
3. The nurse practitioner should collaborate with multidisciplinary health care team and patient with T2DM in developing a plan of care that focuses on self-management skills.
4. The nurse practitioner should delivery diabetes self-management education, assist individuals with locating resources, and refer individuals with T2DM to a DSMES program or certified diabetes educator as needed.
5. The nurse practitioner should provide ongoing and continuous follow care to all individuals with or at risk for Type 2 diabetes mellitus to reassess goals, plan, and self-management skills (AADE, 2008).

Education Protocol I

The diabetes education protocol serves as a guide for the delivery of quality evidence-based diabetes education that emphasizes self-efficacy as a promotion of positive behavior change to improve quality of life and patient outcomes (Haas et al., 2014). Lifestyle management is a central component of Type 2 diabetes management in adults and should include diabetes self-management education and support that incorporates nutritional therapy, physical Activity, counseling, and psychosocial considerations and management (ADA, 2018a).

RECOMMENDATIONS FOR THE NURSE PRACTITIONER:

1. Conduct a comprehensive diabetes medical evaluation upon initial visit with newly diagnosed adult with Type 2 diabetes (ADA, 2018a).
2. Involve the individual with Type 2 diabetes in the process of developing and modifying the care management plan (Powers et al., 2015).
3. Formulate a plan for ongoing care (ADA, 2018a).

I. INDIVIDUALS NEWLY DIAGNOSED WITH TYPE 2 DIABETES

1. Provide basic T2DM information and education on prescribed medications, signs/symptoms of hypoglycemia and hyperglycemia, nutrition, and review when individual should contact provider.
2. Provide all patients with diabetes self-management education that includes that following:
 - Disease process and treatment options
 - Nutrition
 - Physical Activity
 - Medications
 - Self-monitoring
 - Prevention and identification of T2DM complications
 - Psychosocial considerations
3. Provide individuals with appropriate resources and refer individuals to a diabetes self-management education and support (DSMES) program that is located in their community to support the sustainment of management goals.
4. Continue individualized management of Type 2 diabetes mellitus (AADE, 2009).

Education Protocol II

The benefits of diabetes education require a high-level of commitment from both the individual and the healthcare delivery system and multi-disciplinary team (Adams, 2010).

II. INDIVIDUALS WITH EXISTING DIAGNOSIS OF TYPE 2 DIABETES

1. Conduct comprehensive assessment of the individuals health education needs including:
 - Preferences and lifestyle
 - Self-care/ management skills
 - Beliefs and perceptions that impact care
 - Comorbidities
 - Social considerations and factors
2. Assess the individuals' knowledge and self-care deficit(s) on their management goals.
3. If individual exhibits multiple self-management and knowledge deficits or a desire to receive additional teaching provide comprehensive diabetes self-management education that incorporates:
 - Disease process and treatment options
 - Nutrition
 - Physical Activity
 - Medications
 - Self-monitoring
 - Prevention and identification of T2DM complications
 - Psychosocial considerations
4. Continue individualized management of Type 2 diabetes mellitus (AADE, 2009).

Disease Process and Treatment Fact Sheet

 American Diabetes Association.
THE DIABETES ADVISOR

Type 2 Diabetes

WHAT IS DIABETES?

Diabetes is a problem with your body that causes blood glucose (sugar) levels to rise higher than normal. This is also called hyperglycemia.

When you eat your body breaks food down into glucose and sends it into the blood. Insulin then helps move the glucose from the blood into your cells. When glucose enters your cells, it is either used as fuel for energy right away or stored for later use. In a person with diabetes, there is a problem with insulin. But, not all people with diabetes have the same problem.

The types of diabetes are type 1, type 2, and a condition called gestational diabetes, which happens when pregnant. If you have diabetes, your body either doesn't make enough insulin, it can't use the insulin it does make very well, or both.

WHAT IS TYPE 2 DIABETES?

In type 2 diabetes, your body does not use insulin properly. This is called insulin resistance. At first, the pancreas makes extra insulin to make up for it. Over time your pancreas isn't able to keep up and can't make enough insulin to keep your blood glucose levels normal. Type 2 is treated with lifestyle changes, oral medications (pills), and insulin.

Some people with type 2 can control their blood glucose with healthy eating and being active. But, your doctor may need to also prescribe oral medications or insulin to help you meet your target blood glucose levels. Type 2 usually gets worse over time—even if you don't need to take medications at first, you may need to later on.

HOW IS TYPE 2 DIFFERENT FROM TYPE 1?

In type 1, your body treats the cells that make insulin as invaders and destroys them. This can happen over a few weeks, months, or years. When enough of the cells are gone, your pancreas makes little or no insulin and blood glucose becomes dangerously high.

People with type 1 diabetes take insulin by injection with a syringe, an insulin pen, or an insulin pump.

WHAT CAUSES TYPE 2 DIABETES?

Scientists do not know the exact cause of type 2 diabetes. However, development of type 2 diabetes has been associated with several risk factors. These risk factors include:

- history of hyperglycemia, prediabetes, and/or gestational diabetes (GDM)
- overweight and obesity
- physical inactivity
- genetics
- family history
- race and ethnicity
- age
- high blood pressure
- abnormal cholesterol

Continued on page 2

WHAT TREATMENTS ARE USED FOR TYPE 2 DIABETES?

The two goals of diabetes treatment are to make sure you feel well day-to-day and to prevent or delay long-term health problems. The best way to reach those goals is by:

- taking medications, if your doctor prescribes them
- planning your meals—choosing what, how much, and when to eat
- being physically active

HOW WILL I KNOW IF MY DIABETES TREATMENT IS WORKING?

Getting an A1C test at least twice a year helps you and your health care team keep track of how well you are controlling your blood glucose levels. A1C is part of your diabetes ABCs, which will tell you if your overall diabetes treatment is working. The ABCs of diabetes are:

A is for A1C or estimated average glucose (eAG)

Your A1C test tells you your average blood glucose for the past 2 to 3 months. It's the blood check "with a memory." Your health care provider may call this your estimated average glucose or eAG. The eAG gives your A1C results in the same units (mg/dl) as the glucose meter you use at home.

B is for blood pressure

Your blood pressure numbers tell you the force of blood inside your blood vessels. When your blood pressure is high, your heart has to work harder.

C is for cholesterol

Your cholesterol numbers tell you about the amount of fat in your blood. Some kinds of cholesterol can raise your risk for heart attack and stroke.

More handouts about this and other topics can be found at <http://professional.diabetes.org/PatientEd>

For more information visit diabetes.org or call 1-800-DIABETES

Excerpted from the American Diabetes Association (2015) Patient Education Materials-Taking Care of Type 2 Diabetes pages 1-2.

Nutrition

The benefits of healthy eating for adults diagnosed with Type 2 diabetes include: improvements in blood pressure, weight loss and/or weight loss maintenance, glycemic control, and lipid profiles (Povey & Carter, 2007). No standardized diet plan applies to all individual with Type 2 diabetes (AADE, 2009). Providers should address healthy eating by assessing the individuals' current eating behaviors, habits, and preferences (Bantle et al. 2008). Following the assessment, providers in collaboration with the individual can identify the appropriate plan for nutrition education and goals.

RECOMMENDATIONS FOR HEALTHY EATING IN TYPE 2 DIABETES

1. Assess the individual's' current eating habits and preferences and collaborate to identify appropriate nutrition plan including education and goals (Heinrich, Schaper, & de Vries, 2009).
2. Facilitate individual eating behavior and lifestyle changes that will lead to improved health outcomes including: cultural preferences, meal planning, and grocery shopping (Povey & Carter, 2007).
3. Overweight and obese individuals with T2DM should be referred to a dietician for ongoing education and support (Coppell et al., 2010).

Rationale:

- The clinician, registered dietitian, or nutrition specialist should discuss recommendations at the appropriate health literacy level of the individual at initial visit and routinely at follow-up appointments (Heinrich, Schaper, & de Vries, 2009). Discussion should focus on foods that promote health, including information on specific foods, meal planning, grocery shopping, and dining-out strategies. Clinicians should be sensitive to patients' ethnic and cultural backgrounds and their associated food preferences (Povey & Carter, 2007). Referral to a registered dietician provides individuals with supportive education on high quality foods and healthy eating patterns and behaviors. In addition, dieticians work with providers in managing the individuals' cultural preferences and barriers to healthy eating (Coppell et al., 2010).

Physical Activity

Physical activity is important for adults with T2DM. Regular exercise improves glycemic control, maintenance of blood pressure, blood lipids, and weight loss, increases insulin sensitivity, and reduces the individual's risk for diabetes associated micro and macro vascular complications (AADE, 2018a). Evidence shows that regular physical activity reduces the risk for cardiovascular disease. Physical activity increases the uptake of glucose into activated muscles, which are normally balanced by glucose from the liver; this places increased dependence on carbohydrates to provide energy to muscles as the frequency and of exercise intensity increases (Colberg et al., 2010).

RECOMMENDATIONS FOR PHYSICAL ACTIVITY IN TYPE 2 DIABETES

1. All adults with T2DM should reduce daily sedentary lifestyle behaviors with no more than 30 minutes of prolonged sitting (ADA, 2018a).
2. Individuals with Type 2 diabetes should be evaluated prior to starting or increasing exercise regimens and obtain ongoing monitoring from the health care provider (Kirwan, Sacks, & Niewoudt, 2017).
3. Adults with Type 2 diabetes mellitus should perform 150-minutes/week of moderate intensity aerobic exercise or 75 minutes of high intensity aerobic activity with no more than 48 hours without activity (Smith, Crippa, Woodcock, & Brage, 2016).

Rationale:

- Physical activity improves glucose control and supports weight loss, which reduces risks of developing cardiovascular disease (ADA, 2018a). Physical activity for adults with T2DM should include adequate volume and intensity while evading injury to optimize benefits (Kirwan, Sacks, & Niewoudt, 2017). Long-term physical activity with no more than 48 hours in-between exercises proves to reduce risks of Type 2 diabetes in adults (ADA, 2018a). Aerobic and strength training or resistance training enhance the action of insulin, which improves glycemic control and corrosion of fat (Smith, Crippa, Woodcock, & Brage, 2016). Older adults should be encouraged to be as active as their functional status will allow (Colberg et al., 2010).

Taking Medications

Adherence to prescribed pharmacological therapy is essential to adults with T2DM for optimizing self-management and health outcomes. Poor adherence to diabetes management is the leading contributor to diabetes associated complications, increased healthcare costs, and high morbidity and mortality rates (American Diabetes Association [ADA], 2018a).

PROVIDER ROLES IN PHARMACOTHERAPY

- Perform comprehensive assessment to identify actual and/or potential barriers to medication compliance.**
- Facilitate strategies with the patient on overcoming actual and/or potential barriers to medication compliance.**
- Provide continuous follow-up to assess adherence (AADE, 2009).**

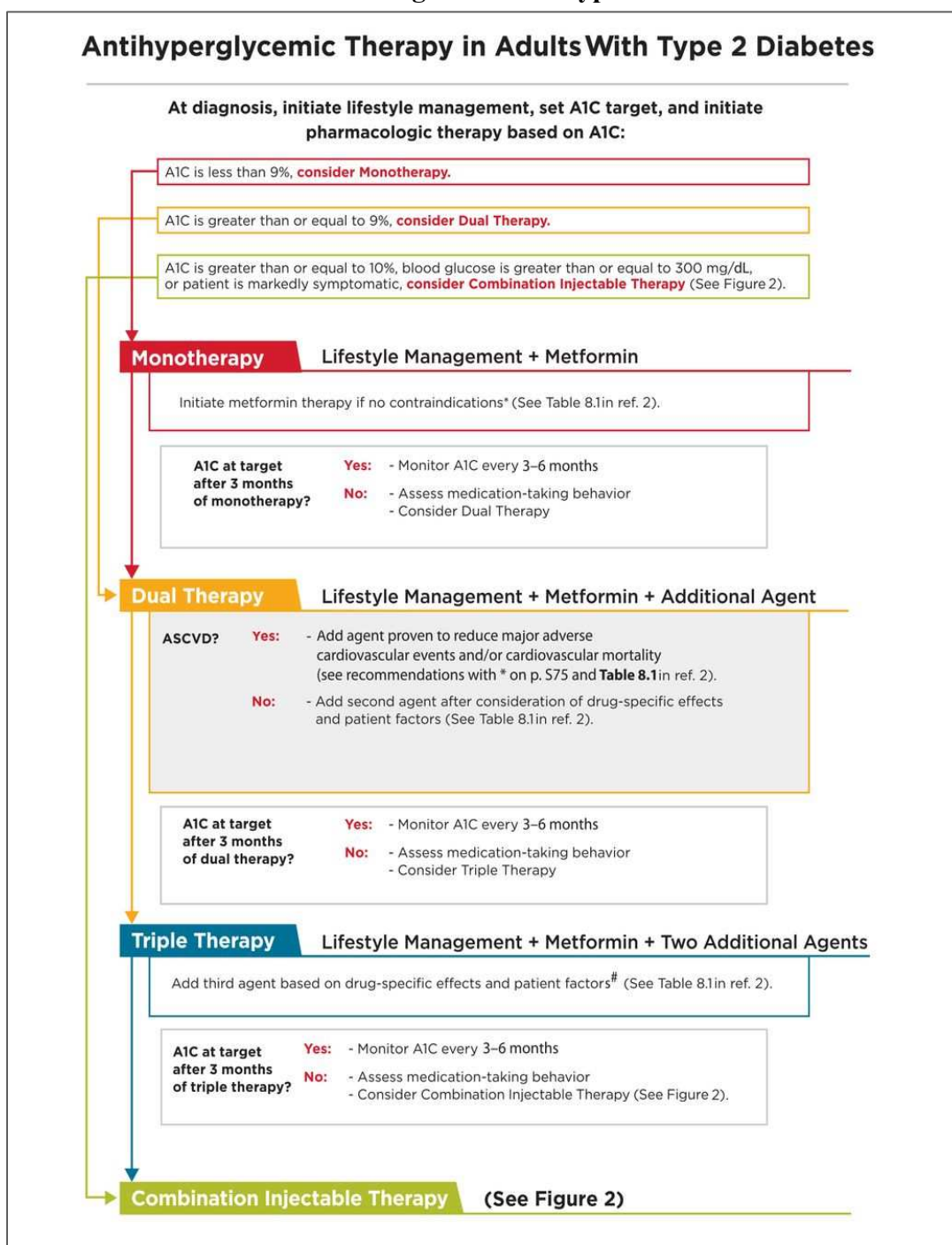
RECOMMENDATIONS FOR MEDICATIONS IN TYPE 2 DIABETES:

- 1. Prescribe metformin, if not contraindicated, when medication is required to improve glycemic control to individuals with Type 2 diabetes (ADA, 2018a).**
- 2. Prescribe medications that are not associated with severe hypoglycemia (Powers et al., 2015).**

Rationale

- Metformin is recommended as the first choice of pharmacological treatment for individuals' with Type 2 diabetes (International Diabetes Federation [IDF], 2017). Metformin is an effective medication in Type 2 diabetes if tolerated and reduces the risk of cardiovascular disease (ADA, 2018a). The low risk of hypoglycemia that metformin carries makes it safe to combine with other agents including insulin in individuals with poor glycemic control (Handelsman et al., 2015). The overall goal of prescribing medications to adults with Type 2 diabetes is to achieve and sustain biochemical targets with minimal adverse effects or consequences (Powers et al., 2015).

Medication Algorithm for Type 2 Diabetes



Excerpted from the American Diabetes Association (2018) Standards of Medical Care in Diabetes, page 576.

Self-Monitoring

The dynamic nature of diabetes management requires a multi-faceted and evidence-based practice approach that emphasizes self-efficacy for longstanding glycemic control (CDC, 2016). Self-efficacy is the individuals' ability to perform skills in diabetes self-management including: self-monitoring, healthy eating, and preventative care (CDC, 2016). Maintaining fasting glucose levels less than 100 mg/dL significantly reduces the risks of developing long-term complications of diabetes mellitus and improves patient outcomes (Hieronymus & O'Connell, 2017).

RECOMMENDATIONS FOR SELF-MONITORING IN TYPE 2 DIABETES:

1. All individuals with T2DM using insulin must be educated on daily self- glucose monitoring (Clar et al., 2010).
2. Glycemic targets for adults with Type 2 diabetes mellitus should be individualized and based on the individuals' age, past medical history, comorbidities, self-care skills, and compliance with treatment regimen (Powers et al., 2015).

Rationale:

- Research on the long-term effects of abnormal blood glucose levels indicated the need for change in the delivery and management of diabetes care and places focus on self-care strategies (Powers et al., 2015). Self-monitoring blood glucose levels has limited benefits in glycemic control improvements for individuals on oral medications or solely managing disease with diet and exercise alone (Car, Barnard, Cummins, Royle, & Waugh, 2010). Self-monitoring blood glucose is essential and effective in individuals prescribed insulin for self-adjusting doses (Car et al., 2010). Glycemic targets should be individualized and take into consideration components of therapeutic lifestyle changes including: healthy eating, physical activity, maintaining a healthy weight, and avoiding smoking and alcohol (Powers et al., 2015).

Prevention of Complications

Augmenting self-efficacy and increasing knowledge and skill in self-care are critical aspects of diabetes management and prevention of associated complications. Standardized education protocols improve health care quality by reducing associated comorbidities of the chronic disease, decreasing healthcare costs, and improving quality of life in individuals with Type 2 diabetes (Vorderstrasse, Shaw, Blascovich, & Johnson 2014). Through ongoing self-management education, the health care provider promotes and facilitates health behavior change that aids in the prevention of long-term complications of diabetes (AADE, 2018a).

RECOMMENDATIONS FOR EARLY IDENTIFICATION & PREVENTION

1. Identify & minimize risks of complications early through comprehensive and ongoing assessment, management, surveillance, and health education (ADA, 2018a).
2. Optimize glycemic and blood pressure control to reduce and/or slow the progression of diabetes associated complications (Chen et al., 2015).
3. All adults with Type 2 diabetes should avoid smoking and excess alcohol intake (IDF, 2017).
4. Perform comprehensive foot exams in all individuals with Type 2 diabetes at least annually to identify risk factors and/or complications (ADA, 2018a).
5. Refer all adults with Type 2 diabetes to ophthalmologist for a dilated eye exam to screen for retinopathy at diagnosis and every year following diagnosis (Scanlon, 2017).
6. Screen for neuropathy by testing urine for albumin annually in all individuals with Type 2 diabetes (ADA, 2018a).

Rationale:

- Managing blood glucose levels in adult patients' diagnosed with diabetes mellitus is essential in decreasing the risks of developing complications (Hieronymus & O'Connell, 2017). Hyperglycemia increases the risk for the development of cardiovascular disease, which is the leading cause of death in patients with Type 2 diabetes (ADA, 2018a). Individuals' with Type 2 diabetes mellitus are at an increased risk for developing cardiovascular disease and care plans should include blood pressure and lipid control, smoking cessation, and annual screening for retinopathy and neuropathy (IDF, 2017).

Type 2 Diabetes Comprehensive Head to Toe Checklist

Diabetes Head to Toe Checklist Examination Report			
Your organization's name here _____			
From: _____	To: _____		
Patient Information:			
Name: _____ DOB: _____			
Diabetes: <input type="checkbox"/> Type 1 <input type="checkbox"/> Type 2 <input type="checkbox"/> Gestational <input type="checkbox"/> Prediabetes HbA1c Goal: _____ <input type="checkbox"/> < 6 months <input type="checkbox"/> >/= 6 months <input type="checkbox"/> Unknown			
Duration of Diabetes (in years): _____ Current Diabetes Therapy: <input type="checkbox"/> Insulin <input type="checkbox"/> Oral Hypoglycemic <input type="checkbox"/> Diet Control <input type="checkbox"/> None			
Results of Last Finger-stick blood glucose reading (per patient): _____ <input type="checkbox"/> N/A Patient reports under control <input type="checkbox"/> Yes <input type="checkbox"/> No			
Dietary Counseling <input type="checkbox"/> Yes <input type="checkbox"/> No Type of Diet: _____			
MEDICINES	Date: _____ Patient has a written med list <input type="checkbox"/> Yes <input type="checkbox"/> No OTC Meds Used: (if none: <input type="checkbox"/>) Herbal Meds Used: (if none: <input type="checkbox"/>) Pharmacist reviewed meds on (date): _____ Patient has Rx for: (provide reason if "no") Aspirin <input type="checkbox"/> Yes <input type="checkbox"/> No; Cholesterol med <input type="checkbox"/> Yes <input type="checkbox"/> No; ACE Inh or ARB <input type="checkbox"/> Yes <input type="checkbox"/> No:	Reports Side Effects to Meds <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: Reports hypoglycemia events? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: Does patient know their current: A1c? <input type="checkbox"/> Yes <input type="checkbox"/> No Goal A1c? <input type="checkbox"/> Yes <input type="checkbox"/> No LDL? <input type="checkbox"/> Yes <input type="checkbox"/> No Goal LDL? <input type="checkbox"/> Yes <input type="checkbox"/> No BP? <input type="checkbox"/> Yes <input type="checkbox"/> No Goal BP? <input type="checkbox"/> Yes <input type="checkbox"/> No	Home Glucose Monitoring Frequency: <input type="checkbox"/> once daily <input type="checkbox"/> twice daily <input type="checkbox"/> 3-4 times daily <input type="checkbox"/> Other: _____ If on insulin, list current dose: List dosing times:
KIDNEY/HEART & VASCULAR	Date: _____ Risk factors in addition to diabetes: (give dates for all) Blood Pressure: Goal: _____ Measured: _____ Total, LDL and HDL cholesterol, triglycerides: (LDL goal and measured values for all)	Smoking status: (circle all that apply) Never Former Current Willing To Quit Assessments: (give dates for all) Urine albumin-to-creatinine ratio: _____ Serum creatinine and estimated GFR: _____ Potassium: _____ Hemoglobin: _____	History of myocardial infarction, heart failure, or stroke: _____ Heart or brain testing (e.g. stress test, echo, angiogram, CT scan, ultrasound, MRI): _____ History of dialysis or kidney transplant: _____ Kidney tests (ultrasound, CT Scan, Angiogram): _____
FEET	Date: _____ Current ulcer or history of a foot ulcer? <input type="checkbox"/> Yes <input type="checkbox"/> No Foot Exam: Skin, Hair, and Nail Condition Is the skin thin, fragile, shiny and hairless? <input type="checkbox"/> Yes <input type="checkbox"/> No Are the nails thick, too long, ingrown, or infected with fungal disease? <input type="checkbox"/> Yes <input type="checkbox"/> No Note Musculoskeletal Deformities <input type="checkbox"/> Toe deformities <input type="checkbox"/> Bunions (Hallus Valgus) <input type="checkbox"/> Charcot foot <input type="checkbox"/> Foot drop <input type="checkbox"/> Prominent Metatarsal Heads	Pedal Pulses - "P" for present or "A" for absent Posterior tibial Left: _____ Right: _____ Dorsalis pedis Left: _____ Right: _____ Risk Categorization check appropriate box. <input type="checkbox"/> Low Risk Patient <input type="checkbox"/> High Risk Patient All of the following: One or more of the following: <input type="checkbox"/> Intact protective sensation <input type="checkbox"/> Loss of protective sensation <input type="checkbox"/> Pedal pulses present <input type="checkbox"/> Absent pedal pulses <input type="checkbox"/> No deformity <input type="checkbox"/> Foot deformity <input type="checkbox"/> No prior foot ulcer <input type="checkbox"/> History of foot ulcer <input type="checkbox"/> No amputation <input type="checkbox"/> Prior amputation	
EYES	Date: _____ Visual Acuity (best corrected) Right: _____ Left: _____ Intraocular Pressure Right: _____ Left: _____ <input type="checkbox"/> Dilated Fundus Exam Performed Diagnosis: No Diabetic Retinopathy <input type="checkbox"/> Yes <input type="checkbox"/> No Non-Proliferative Diabetic Retinopathy <input type="checkbox"/> Yes <input type="checkbox"/> No	Plan: <input type="checkbox"/> Monitor Only <input type="checkbox"/> Repeat Dilated Exam in _____ months <input type="checkbox"/> Additional Testing/Treatment Recommended: Proliferative Diabetic Retinopathy <input type="checkbox"/> Yes <input type="checkbox"/> No Clinically Significant Macular Edema <input type="checkbox"/> Yes <input type="checkbox"/> No	
MOUTH	Date: _____ Examination Findings Intraoral/Extraoral: Caries: Periodontal (health, abscesses, gingivitis, periodontitis): Functional (eating, swallowing, etc) concerns: Additional Testing/Treatment Recommended: Refer to Specialist: _____	Xerostomia: Fungal infection: Parotid gland changes:	Re-evaluate in _____ months(s)
Management:			
<input type="checkbox"/> Follow-up: _____ months <input type="checkbox"/> Patient education/discussion <input type="checkbox"/> Information pamphlet given Referral To: _____ For: _____ Other: _____ Doctor's Signature: _____			

Excerpted from the National Diabetes Education Program (NDEP) comprehensive Diabetes Head to Toe Checklist Examination Report, page 2.

Psychosocial Considerations

Adults with Type 2 diabetes are at an increased risk for depression than individuals without depression (Handelsman et al., 2015). Depression can negatively impact self-efficacy and self-management and impair glucose control (ADA, 2018). The negative effects on self-care impair the individuals' ability to perform tasks associated with diabetes management including physician activity, diet, and medication adherence (Handelsman et al., 2015).

RECOMMENDATIONS FOR PSYCHOSOCIAL CONSIDERATIONS

1. Screen all adults with Type 2 diabetes mellitus routinely for depression (Lustman et al., 2000) (ADA, 2018a).
2. Refer individuals with depression to mental health care professional (ADA, 2018a), (Handelsman et al., 2015).

Rationale:

- Mental illness increases disease burden, severity of symptoms, and health care costs (Lustman et al., 2000). Providers should screen individuals with Type 2 diabetes routinely for depression using a validated tool (ADA, 2018a). Early recognition of depression can decrease negative short and long-term effects on the patients' health outcomes (Handelsman et al., 2015). Providers should refer individuals with positive depression screening tests to mental health providers (Handelsman et al., 2015).

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Appendix D: Graded Evidence Table

Clinical Practice Guideline Evidence and Grade Recommendations

Providing Diabetes Self-Management Education <i>Recommendations</i>	Evidence	Grade
1. All individuals with T2DM should be provided ongoing self-management education and support including but not limited to the following circumstances: <ul style="list-style-type: none"> ▪ Upon diagnosis ▪ Annually at follow up visits with provider ▪ When/if health status changes ▪ When any transitions in care occurs 	(Powers et al., 2015) (ADA, 2018a)	4 (B)
2. Primary care providers should refer adults with Type 2 diabetes mellitus to diabetes educators and provide ongoing follow-up care to ensure that the individual participated in a diabetes self-management education and support (DSMES) program.	(Chrvala, Dawn & Lipman, 2015)	1 (A)
3. The provider will assist individuals with Type 2 diabetes mellitus in locating a diabetes self-management education and support (DSMES) program.	(AADE, 2009)	4 (B)
Nurse Practitioner Role in Education Protocol <i>Recommendations</i>	Evidence	Grade
1. Conduct a comprehensive diabetes medical evaluation upon initial visit with newly diagnosed adult with Type 2 diabetes.	(ADA, 2018a)	4 (B)
2. Involve the individual with Type 2 diabetes in the process of developing and modifying the care management plan.	(Powers et al., 2015) (AADE, 2009)	4 (B)
3. Formulate a plan for ongoing care.	(ADA, 2018a)	4 (B)

Nutrition <i>Recommendations</i>	Evidence	Grade
1. Assess the individual's' current eating habits and preferences and engage patient in the identification and development of the nutrition plan and goals.	(Heinrich, Schaper, & de Vries, 2009), (IDF, 2017), (ADA, 2018a)	1 (A)
2. Provide all adults with Type 2 diabetes information and education on nutrition and lifestyle modifications for healthy eating.	(Povey & Clark-Carter, 2008)	2 (A)
3. Overweight and obese individuals with T2DM should be referred to a dietician for ongoing education and support.	(Coppell et al., 2010).	1 (A)
Physical Activity <i>Recommendations</i>	Evidence	Grade
1. All adults with T2DM should reduce daily sedentary lifestyle behaviors with no more than 30 minutes of prolonged sitting.	(ADA, 2018a), (Powers et al., 2015)	4 (B)
2. Individuals with Type 2 diabetes should be evaluated prior to starting or increasing exercise regimens and obtain continuous monitoring from health care provider.	(Kirwan, Sacks, & Niewoudt, 2017)	2 (A)
3. Adults with Type 2 diabetes mellitus should perform 150-minutes/week of moderate intensity aerobic exercise or 75 minutes of high intensity aerobic activity with no more than 48 hours without activity	(Colber et al, 2010), (Smith, Crippa, Woodcock, & Brage, 2016)	2 (A)
Taking Medications <i>Recommendations</i>	Evidence	Grade
1. Prescribe metformin, if not contraindicated, when medication is required to improve glycemic control in patients with Type 2 diabetes.	(ADA, 2018a), (Powers et al., 2015), (IDF, 2017).	4 (B)
2. Prescribe medications with minimal risk for severe hypoglycemic.	(Powers et al., 2015), (ADA, 2018a), (IDF, 2017)	4 (B)

Self-Monitoring <i>Recommendations</i>	Evidence	Grade
1. All individuals with T2DM using insulin must be educated on daily self- glucose monitoring.	(Clar, Barnard, Cummins, Royle, & Waugh, 2010)	1 (A)
2. Glycemic targets in adults with Type 2 diabetes mellitus should be individualized based on the individual's age, comorbidities and hyperglycemic risk.	(Powers et al., 2015)	4 (B)
Early Identification and Prevention of Complications <i>Recommendations</i>	Evidence	Grade
1. Health care providers can identify and minimize risks of complications early through comprehensive and ongoing assessment, management, surveillance, and health education	(ADA, 2018a)	4 (B)
2. Optimize glycemic and blood pressure control to reduce and/or slow the progression of diabetes associated complications.	(Chen et al., 2015) (ADA, 2018a) (Powers et al., 2015)	1 (A)
3. All adults with Type 2 diabetes should avoid smoking and excess alcohol intake.	(IDF, 2017), (ADA, 2017), (Powers et al., 2015)	4 (B)
4. Perform comprehensive foot exams in all individuals with Type 2 diabetes at least annually to identify risk factors and/or complications.	(ADA, 2018), (Powers et al., 2015), (IDF, 2017)	4 (B)
5. Refer all adults with Type 2 diabetes to ophthalmologist for a dilated eye exam to screen for retinopathy at diagnosis and every year following diagnosis.	(Scanlon, 2017) (Taylor-Phillips et al. 2016)	2(A)
6. Screen for neuropathy by testing urine for albumin annually in all individuals with Type 2 diabetes.	(IDF, 2017), ADA, 2018a), (Powers et al., 2015)	4 (B)
Psychological Considerations <i>Recommendations</i>	Evidence	Grade
1. Screen all adults with diabetes routinely for depression.	(Lustman et al., 2000), (ADA, 2018a)	1(A)
2. Refer individuals with depression to mental health care professional	(ADA, 2018a), (IDF, 2017), (Powers et al., 2015)	4(B)

Appendix E: AGREE II Appraisal Results

Results of AGREE II Instrument Appraisal of Clinical Practice Guideline

Table E1. Domain 1. Scope and Purpose

	Q1	Q2	Q3	Total	Score
Appraiser 1	7	7	7	21	100%
Appraiser 2	7	7	7	21	100%
Appraiser 3	7	7	7	21	100%
<i>Total Domain 1</i>	<i>21</i>	<i>21</i>	<i>21</i>	<i>63</i>	<i>100%</i>

Note: Maximum possible score = 7(strongly agree) x 3 (questions) x 3 (appraisers) = 63

Minimum possible score = 1 (strong disagree) x 3 (questions) x 3 (appraisers) = 9

Score: (Obtained score – minimum possible score) / (maximum possible score- minimum possible score)
 $(63-9) / (63-9) = 1$ (1 x 100 = 100%)

Table E2. Domain 2. Stakeholders Involvement

	Q4	Q5	Q6	Total	Score
Appraiser 1	7	6	7	20	95.2%
Appraiser 2	7	7	7	21	100%
Appraiser 3	7	6	7	20	95.2%
<i>Total Domain 2</i>	<i>21</i>	<i>19</i>	<i>21</i>	<i>61</i>	<i>96.3%</i>

Note: Maximum possible score = 7(strongly agree) x 3 (questions) x 3 (appraisers) = 63

Minimum possible score = 1 (strong disagree) x 3 (questions) x 3 (appraisers) = 9

Score: (Obtained score – minimum possible score) / (maximum possible score- minimum possible score)
 $(61-9) / (63-9) = 0.963$ (0.963 x 100 = 96.3%)

Table E3. Domain 3. Rigour of Development

	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Total	Score
Appraiser 1	7	6	6	7	7	7	6	7	53	94.6%
Appraiser 2	7	7	6	7	7	7	7	7	55	98.2%
Appraiser 3	7	7	7	7	7	7	7	7	56	100%
<i>Total Domain 3</i>	<i>21</i>	<i>20</i>	<i>19</i>	<i>21</i>	<i>21</i>	<i>21</i>	<i>20</i>	<i>21</i>	<i>164</i>	<i>97.2%</i>

Note: Maximum possible score = 7(strongly agree) x 8 (questions) x 3 (appraisers) = 168

Minimum possible score = 1 (strong disagree) x 8 (questions) x 3 (appraisers) = 24

Score: (Obtained score – minimum possible score) / (maximum possible score- minimum possible score)

$$(164-24)/(168-24)= 0.972 (0.972 \times 100= 97.2\%)$$

Table E4. Domain 4. Clarity and Presentation

	Q15	Q16	Q17	Total	Score
Appraiser 1	7	7	7	21	100%
Appraiser 2	7	7	7	21	100%
Appraiser 3	7	7	7	21	100%
<i>Total Domain 2</i>	21	21	21	63	100%

Note: Maximum possible score = 7(strongly agree) x 3 (questions) x 3 (appraisers) = 63

Minimum possible score = 1 (strong disagree) x 3 (questions) x 3 (appraisers) = 9

Score: (Obtained score – minimum possible score) / (maximum possible score- minimum possible score)
 $(63-9)/(63-9)= 1 (1 \times 100= 100\%)$

Table E5. Domain 5. Applicability

	Q18	Q19	Q20	Q21	Total	Score
Appraiser 1	6	7	7	N/A	20	95.2%
Appraiser 2	6	7	7	N/A	20	95.2%
Appraiser 3	7	7	7	N/A	21	100%
<i>Total Domain 2</i>	19	21	21	-	61	96.3%

Note: Maximum possible score = 7(strongly agree) x 3 (questions) x 3 (appraisers) = 63

Minimum possible score = 1 (strong disagree) x 3 (questions) x 3 (appraisers) = 9

Score: (Obtained score – minimum possible score) / (maximum possible score- minimum possible score)
 $(61-9)/(63-9)= 0.963 (0.963 \times 100= 96.3\%)$

Table E6. Domain 6. Editorial Independence

	Q22	Q23	Total	Score
Appraiser 1	6	N/A	6	85.7%
Appraiser 2	7	N/A	7	100%
Appraiser 3	7	N/A	7	100%
<i>Total Domain 2</i>	20	-	20	94.4%

Note: Maximum possible score = 7(strongly agree) x 1 (questions) x 3 (appraisers) = 21

Minimum possible score = 1 (strong disagree) x 1 (questions) x 3 (appraisers) = 3

Score: (Obtained score – minimum possible score) / (maximum possible score- minimum possible score)
 $(20-3)/(21-3)= 0.944 (0.944 \times 100= 94.4\%)$

Table E7. Overall Guideline Assessment: Overall Quality

1. Rate the over all quality of this guideline

	Rate	Total	Score
Appraiser 1	7	7	100%
Appraiser 2	7	7	100%
Appraiser 3	7	7	100%
<i>Total</i>	<i>21</i>	<i>21</i>	<i>100%</i>

Note: Maximum possible score = 7(strongly agree) x 1 (questions) x 3 (appraisers) = 21

Minimum possible score = 1 (strong disagree) x 1 (questions) x 3 (appraisers) = 3

Score: (Obtained score – minimum possible score) / (maximum possible score- minimum possible score)
 $(21-3) / (21-3) = 1 (1 \times 100 = 100\%)$

Table E7. Overall Guideline Assessment: Recommendation

2. I would recommend this guideline for use:

	Yes	Yes with modification	No
Appraiser 1	Yes		
Appraiser 2	Yes		
Appraiser 3	Yes		
<i>Total</i>	<i>100%</i>	<i>-</i>	<i>-</i>

Appendix F: Usability Questionnaire

Clinical Practice Guideline Usability Questionnaire

Question	Strongly Disagree	Disagree	N/A	Agree	Strongly Agree
1. The guideline is concise, and easy to apply in clinical practice.					
2. The guideline supports me as a provider in decision-making and clinical reasoning.					
3. The guideline supports me as an educator in Type 2 diabetes management.					
4. The guideline allows me to engage the patient in developing the plan of care and goal setting.					
5. Working with the guideline takes too much time.					
6. I cannot attempt aspects of the guideline without investing too much time.					
7. Providers at the clinic do not collaborate in adopting the guideline into practice.					
8. I believe that by using this guideline I could optimize time with patients during scheduled appointments.					
9. The guideline allows me to include patient cultural and personal preferences.					
10. The guideline organization flows effectively and is easy to understand and use.					

Appendix G: Usability Questionnaire Results

Clinical Practice Guideline Usability Questionnaire

Question	Strongly Disagree	Disagree	N/A	Agree	Strongly Agree
1. The guideline is concise, and easy to apply in clinical practice.				33.3%	66.7%
2. The guideline supports me as a provider in decision-making and clinical reasoning.				66.7%	33.3%
3. The guideline supports me as an educator in Type 2 diabetes management.					100%
4. The guideline allows me to engage the patient in developing the plan of care and goal setting.					100%
5. Working with the guideline takes too much time.	33.3%	66.7%			
6. I cannot attempt aspects of the guideline without investing too much time.	66.7%	33.3%			
7. Providers at the clinic do not collaborate in adopting the guideline into practice.	33.3%	66.7%			
8. I believe that by using this guideline I can optimize time with patients during scheduled appointments.				33.3%	66.7%
9. The guideline allows me to include patient cultural and personal preferences.					100%
10. The guideline organization flows effectively and is easy to understand and use.				33.3%	66.7%

Evaluator 1

1. Agree
2. Agree
3. Strongly Agree
4. Strongly Agree
5. Disagree
6. Strongly Disagree
7. Disagree
8. Agree
9. Strongly Agree
10. Agree

Evaluator 2

1. Strongly Agree
2. Agree
3. Strongly Agree
4. Strongly Agree
5. Disagree
6. Disagree
7. Disagree
8. Strongly Agree
9. Strongly Agree
10. Strongly Agree

Evaluator 3

1. Strongly Agree
2. Strongly Agree
3. Strongly Agree
4. Strongly Agree
5. Strongly Disagree
6. Strongly Disagree
7. Strongly Disagree
8. Strongly Agree
9. Strongly Agree
10. Strongly Agree