



Review Article

Nurses on the Front-Line of Diabetes Prevention

Terrye Moore-Harper^{1*}, JH Shubrook², Jacqueline Clavo-Hall³

¹Associate Professor, College of Education and Health Sciences, Master of Science in Nursing/ Chair, Touro University California, School of Nursing, USA

²Professor, Primary Care Department, Director of Clinical Research and Diabetes Services, Touro University California, USA

³ Former Assistant Director, Touro University School of Nursing; Rural Outreach Consultant, Betty Irene Moore School of Nursing, University of California Davis, Certified Registered Nurse Anesthetist, USA

*Corresponding author: Terrye Moore-Harper, Associate Professor, College of Education and Health Sciences, Master of Science in Nursing/ Chair, Touro University California, School of Nursing, USA

Citation: Moore- Harper T, Shubrook JH, Clavo-Hall J (2023) Nurses on the Front-Line of Diabetes Prevention. Int J Nurs Health Care Res 6: 1416. DOI: 10.29011/2688-9501.101416

Received Date: 24 March, 2023; Accepted Date: 29 March, 2023; Published Date: 03 April, 2023

Abstract

America is facing its first non-communicable, yet preventable, pandemic -Type 2 Diabetes Mellitus (T2DM) [1]. With approximately 14% of adults diagnosed with the disease and another 33% diagnosed with prediabetes, multiple stakeholders have committed to developing multilevel approaches to slow the rate of transition of prediabetes to T2DM [2]. Diabetes Prevention Program (DPP) is one evidence-based approach that has been referenced throughout many health care and health science journals. While physicians are noted as the gatekeepers of care, nurses and Advanced Practice Registered Nurses (APRNs) are employed across the care continuum to affect the incidence and outcomes of diabetes prevention and prediabetes management. Nurses, among the key providers of health care, are positioned to facilitate the implementation of evidence-based interventions (EBI), like the DPP, from clinical practice into community-based settings. However, the DPP remains largely an under-utilized approach within health care. There seems to be a knowledge-gap about the DPP and its scalability across diverse patient populations. The purpose of this educational manuscript is three-fold: (1) to provide background on the Diabetes Prevention Program, its use and scalability to real-world settings, (2) to address some of the challenges of DPP across cultures, and (3) to increase awareness of how policy supports and improves populations' access to the DPP and its translational delivery models – reducing the prevalence of prediabetes, and hence diabetes, in this country.

Keywords: Nurses; Advance Practice Registered Nurses (APRNs); Diabetes Prevention Program; DPP, Prediabetes; Health policy; Care access; Cultural translations

Introduction

Type 2 diabetes (T2DM) is fast becoming the world's first non-communicable pandemic. Approximately 14% of American adults (age 45-64) have T2DM, and nearly 33% of adults have prediabetes [2]. While the greatest risk factor for T2DM is genetic, it is well known that lifestyle modification can reduce the risk

by more than 50% in people susceptible to this disease [3]. This is largely due to the primary modifiable risk factor for T2DM, obesity. Unfortunately, more than two-thirds of US adults are overweight or obese [4]. To meet these challenges, health care providers must strategize their approaches to diabetes prevention and disease management. This includes implementing Evidence-Based Interventions (EBIs) to address risk factors and improve clinical outcomes among at-risk groups.

Nurses and Advanced Practice Registered Nurses (APRNs) – nurse practitioners, clinical nurse specialists, nurse midwives,

and Certified Registered Nurse Anesthetists are in unique positions to facilitate DPP to impact the diabetes pandemic across the entire care continuum and lifespan. Nurses are the largest health care workforce in America. They have been recognized as the most trusted profession in the US for 20 consecutive years (Gallup, 2023) [38]. Nurses spend more time with patients/clients than other health care professionals conducting various aspects of clinical care including assessment, diagnosis, treatment, care coordination, and patient education.

Discussion

The American Diabetes Association (ADA) recommends testing all adults who are overweight/obese (BMI > 25 kg/m², or BMI > 23 kg/m², if Asian) or who have at least one of the risk factors [5]. Further, all adults over the age of 45 should be screened for diabetes/prediabetes. If test results are normal, repeat testing should occur every 3 years (Table 1). While screening for prediabetes and diabetes is the responsibility of all nurses, medical management of prediabetes and diabetes is the responsibility of the APRN trained to do so.

Category	Risk Factors	Frequency
All adults over 35 years		Every 3 years
Overweight or obese adults BMI > 25 if non-Asian BMI > 23 if Asian	Who have at least one of these risk factors: <ol style="list-style-type: none"> 1. First degree relative with type 2 diabetes 2. High risk ethnic group (African American, Latino, Asian American, Native American, Pacific Islander) 3. History of cardiovascular disease 4. Hypertension (>140/90 mmHg) 5. Dyslipidemia (HDL < 35 mg/dL or triglyceride level >250 mg/dL) 6. Physical inactivity 7. Women who have polycystic ovarian syndrome 	Every 3 years
People with prediabetes		Every year

Table 1: Screening for prediabetes.

Note: This table references screening criteria for adults at risk for prediabetes [5].

If test results are abnormal, the American Diabetes Association recommends the following:

1. At least annual monitoring for the development of diabetes in those with prediabetes.
2. Patients with prediabetes should be referred to an intensive behavioural lifestyle intervention program modelled on the Diabetes Prevention Program to achieve and maintain 7% loss of initial body weight and increased moderate-intensity physical activity (such as brisk walking) to at least 150 min/week.
3. Technology-assisted tools, including Internet-based social networks, distance learning, and mobile applications that incorporate bidirectional communication, may be useful elements to achieve effective lifestyle modification to prevent diabetes.
4. Given the cost-effectiveness of diabetes prevention, third-party payers should cover such intervention programs.

Prediabetes management: Medications, surgery, and behavioural/lifestyle interventions

Numerous medications have been shown to reduce the risk of the progression to T2DM. These include diabetes medications such as metformin, acarbose, pioglitazone, rosiglitazone, liraglutide, and weight loss medications. Metabolic surgery, however, may be the most potent way to reduce the progression to T2DM, reported on studies of lifestyle management versus surgical management of obese adults at risk for T2DM. In these studies, metabolic surgery was shown to be more efficacious, with a 75% lasting reduction in new onset T2DM [6].

The Landmark Diabetes Prevention Program (DPP, 2002) [7] trial in the United States evidences the efficacy of DPP implementation. The trial randomized more than 3,000 US adults who had prediabetes or a history of gestational diabetes. Participants were randomized to routine care, metformin, or an intensive lifestyle program. While metformin was able to reduce new onset T2DM by 31%, the lifestyle intervention was able to reduce diabetes by 58%. There was also a reduction of 71% of the disease among participants older than 60 years (The Diabetes Prevention Program [DPP] Research Group, 2012) [8] Table 2.

Study	Country	N	Baseline BMI (kg/m ²)	Intervention duration (years)	RRR (%)	NNT
Diabetes Prevention Program	USA	3234	34.0	2.8	58	21
Diabetes Prevention Study	Finland	523	31	4	39	22
Da Qing	China	577	25.8	6	51	30

Table 2: Lifestyle programs shown to reduce new onset Type 2 diabetes.

Note: This table describes the Landmark DPP trials. Reprinted with permission.

Behavioural counselling on lifestyle interventions, based on the DPP curriculum, can delay or prevent more than one-half of newly diagnosed T2DM cases, annually [9]. Importantly, these lifestyle interventions have been shown to have lasting effects. Even 10 years after an initial intervention, lifestyle intervention reduced new onset diabetes by 30% (The Diabetes Prevention Program [DPP] Research Group, 2012) [8]. This result was replicated in other diabetes prevention programs [10,11]. In the Chinese Da Qing study (1997) [12], 23 years after the intervention, there was a lasting reduction of new onset T2DM and mortality [11] Table 3.

Antihyperglycemic agents	Follow-up Period	Reduction in Risk of T2D (P value vs placebo)
Metformin ¹	2.8 years	31% ($P<0.001$)
Acarbose ²	3.3 years	25% ($P=0.0015$)
Pioglitazone ³	2.4 years	72% ($P=<0.001$)
Rosiglitazone ⁴	3.0 years	60% ($P=<0.0001$)
Liraglutide (3 mg)	3.0 years	66% ($P=<0.0001$)
Semaglutide (2.4 mg)	10.0 years	60% ($P=<0.01$)
Weight loss interventions		
Orlistat ⁵	4 years	37% ($P=0.0032$)
Phentermine/topiramate ⁶	2 years	79% ($P=<0.05$)
Bariatric surgery ⁷	10 years	75% ($P=<0.001$)

Table 3: Medications and surgeries shown to reduce new onset of diabetes.

Note: This table describes studies on diabetes medications and surgical management of obese adults at risk for T2DM. Reprinted with permission.

Prediabetes management: Cost and covered benefits

The DPP Study and the DPP follow up Observational Study (DPPOS, 2012) [13] confirmed that both lifestyle intervention and metformin were cost effective treatments. A cost-effective modeling study evaluated the potential benefit of DPP intervention for Medicare recipients. The results showed that widespread implementation of DPP among Medicare recipients led to a 37% reduction in new onset diabetes and a savings of \$1.3 billion over 10 years [14,15]. The National DPP (NDPP) is now a mandated covered benefit for all eligible Medicare recipients- a once in a lifetime benefit. Further, some states such as California have made this a covered benefit for its Medicaid beneficiaries [16]. Cost comparison based on DPP delivery methods will be discussed later.

Prediabetes Management: Community-Based Approaches

The Young Men's Christian Association (YMCA) was an early partner with DPP and has substantial data on this community-based approach to the program. In the Diabetes Education and Prevention with a Lifestyle Intervention Offered at the YMCA (DEPLOY) study [17], the YMCA held group DPP classes led by lay peer coaches and showed that DPP was effective in the community setting [18,19].

Hays, Finch, Saha, Marrero, and Ackermann (2014) [20] used the YMCA setting to launch group-based DPP. In this pilot project, YMCA counsellors were used to improve self-efficacy and reduce weight-loss by 5% among participants over a one-year period. There is significant research that strongly supports the introduction of DPP into community-based and "real-world settings" using trained lay community workers to improve health outcomes within populations [20].

Employers seek to promote employee health by allowing "on-site" DPP classes. In fact, churches, schools, and workplace settings have become ideal sites for providing diabetes prevention programs to meet the needs of many populations within their "lived" experiences [20]. This approach has reduced barriers to access and transformed work environments to become places of health promotion. The National Diabetes Prevention Program (National DPP) [21] continues to work with partners in the public and private sectors to make it easier for people to engage in DPP classes that are sustainable, portable, affordable, and clinically effective.

Addressing Cultural Challenges

One of the challenges of DPP is to create a translatable curriculum to meet the unique individual and cultural needs of the patient. Providing DPP in this way helps to achieve targets and optimize clinical outcomes.

A critical review of 89 papers of ethnic translations of DPP

explored translation methods used, success of the methods, and alternative methods for future translation interventions [22]. To enhance DPP accessibility, cultural translation strategies have been tailored to address six diverse ethnic at-risk populations for developing T2DM in the United States: American Indians and Native Alaskans, African Americans, Hispanic/Latino Americans, Native Hawaiians (and other Pacific Islanders), and Arab Americans (Table 4).

These six broadly defined and culturally diverse groups are unique from one person to another and, in a collective sense, from one community to another. Each one's culture helps to shape their values, historical and political beliefs, and their health beliefs - which are often communicated from one generation to another. Therefore, to be effective, nurses and their advanced practice colleagues must understand how to provide culturally relevant care across the life continuum (Figure1).

To provide care that respects diversity among populations, nurses and APRNs must be aware of their own biases as they provide care. Cultural adaptation is an evidence-based intervention (EBI) which considers how DPP translations can be effective to meet the diversities of groups.

Tabak et al., (2015) [23] conducted a systematic review of 44 DPP program translations to evaluate the data on implementation outcomes, cultural adaptations, and translation strategies. Six translations of cultural adaptations emerged. The most noted adaptation was the modification of content (86.6%) for cultural-sensitivity and cultural competence in low-literacy populations. Program delivery using personnel that matched the ethnicity of the participants (67%) and the use of lay workers (41%) from within their specific communities were also noted.

Timelines of programs were considerably reduced from the original DPP format of one year to 16 weeks. In some studies, programs were as short as six weeks in length. The fourth adaptation included the use of group-based delivery (95%). This well-documented approach is effective in minority groups because of the value that minority populations place on community, family, and collectivism [22,23].

Location or setting for DPP delivery is an important cultural aspect of care. For example, among African Americans and Hispanic Americans, faith-based settings yielded significant outcomes and were most effective, with lasting impacts because their places of worship are at the epicenter of cultural and health beliefs [24].

Group-based delivery models of the DPP can strengthen social networks, improve attendance rates, and reduce the cost-impact significantly for participants. Table 4 shows the comparison of programs [25,26].

Type of Intervention	Cost (Median)	Program Strategy Used
Diabetes Prevention Program (Individual)	\$3519 -\$5881 per participant (\$102/session)	<ul style="list-style-type: none"> • One year to completion with 4 months intensive schedule • Resource intense
DPP Translations: Cultural adaptation (> 1,300 nation-wide) 6 translations by ethnicity	\$424 / participant (\$25/session)	<ul style="list-style-type: none"> • Changed content based on literacy of target audience • Timeline – 12 weeks & frequency of mtgs vary • Group-based (95%) • Used lay workers in community to deliver content (40%) • Ethnicity of presenter matched participants (67%) • Most common cultural translations found in AA in church settings. • Used pre/post designs; no control groups (58%)

Table 4: Comparison of Programs.

Note: This table compares program interventions based on cost and strategies used [23,25,26].

All nurse professionals at the point of care should consider how these six cultural translation methods (cultural content, ethnicity matching, use of lay workers, shorter timelines, and group-based delivery) can enhance their care strategies and help them achieve best clinical outcomes. Advanced practice nurses have been instrumental in the evolution of DPP translations and unarguably strong agents of change to move the translation of DPP beyond the bedside and into communities.

Addressing Literacy Challenges. There is significant data that shows a direct correlation between low literacy levels, socio-economic levels, and poor clinical outcomes. Health literacy is one’s ability to read, understand, and act on medical information (Bailey et al., 2014) [27] and is related to one’s level of self-efficacy and self-care. Nurses and APRNs must identify patient’s level of health literacy early and often - throughout the lifespan of care.

Bailey et al. [27] postulate that low literacy, less diabetes-related knowledge, and poor health outcomes are closely associated. Literacy and being “informed” seem to be on a predictive continuum. Having better communication with providers, understanding one’s available resources, and participating in self-care behaviours are associated with overall better clinical outcomes. Nurses practicing in a variety of roles-school nurses, staff nurses, nurse practitioners, nurse midwives, and nursing educators, nursing researchers-are in prime positions to disrupt the cycle of diabetes illiteracy and prevent the progression of pre-diabetes to T2DM. Figure 1 illustrates four natural points of nurse-patient encounters that offer opportunities to assess patient literacy level and ensure that the best clinical outcomes can be achieved [9].

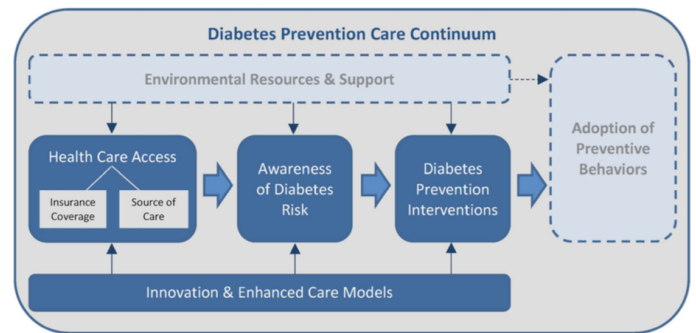


Figure 1: Diabetes Prevention Care Continuum (used with permission).

Note: Illustration of the four points for nurse-patient encounters. Nurses and APRNs are encouraged to optimize the nurse-patient encounters (e.g., Health Care Access, Awareness of Diabetes Risk, Diabetes Prevention Interventions, and Adoption of Prevention Behaviors) to introduce DPP, with the aim to delay the progression of prediabetes to T2DM. The care continuum allows for multiple opportunities for patient assessment, management, and treatment [9].

Description Figure 1

“The Diabetes Prevention Care Continuum: Policies, systems, and environmental changes are conceptualized here of potential to influence diabetes prevention via beneficial behavioural changes that occur by two major pathways. The first pathway, depicted by the light blue rectangle at the top of the figure, involves how policy changes in the social, cultural, economic, or physical environment function to either make healthy behaviours more accessible and

unhealthy exposures more difficult. The second pathway involves improvements in the functions or activities of health systems and the interfacing of those systems with public health agencies or community organizations to raise awareness and expand delivery of evidence-based diabetes prevention interventions. This second pathway, depicted in the middle of the figure with the large, solid arrows moving from left to right, is the primary focus of this review. The thin solid arrows indicate other forces, namely, the first pathway and innovation, which influences this second pathway. The dotted arrow represents the effect of the first pathway on the adoption of healthy behaviours at the individual level” [9].

Health Care Policies to Reduce Onset of Type 2 Diabetes

One of the initial health policies aimed at diabetes prevention occurred when the U.S. Congress authorized the Centers for Disease Control and Prevention (CDC) to launch the National Diabetes Prevention Program (NDPP). The goal of National DPP was to support organizational workforce development, quality monitoring, and evaluation of efforts to scale up delivery of DPP-like programs. The National DPP registry listed 1,370 organizations offering DPP-like interventions across all 50 states; 47 online programs and 1,332 organizations delivering face-to-face interventions. More than 100,000 people at high risk for developing T2DM have participated in DPP-like programs. This data supports how DPP can improve access to care on an expansive scale [2,28].

The Diabetes Prevention Act of 2009 (DPA) is a policy that emerged from the U.S. House of Representatives’ bill, H.R. 4124-at the 111th Congress (2009-2010). This Act authorized the Secretary of Health and Human Services (HHS) to award grants to recognize eligible entities to 1) support community-based diabetes prevention program model sites that work with the health care delivery systems and 2) evaluate methods of ensuring the scalability of DDP programs nationally for economic benefits and development of novel strategies. The Act authorizes, directs, and requires the CDC to work extensively with state and local health departments to facilitate programs aimed at disease control and prevention. These grants are essential to improving the scalability of DPP, while making it accessible, affordable, and effective in reducing certain risks factors for T2DM and improving the health outcomes of populations.

According to current U.S. health care policy, the Patient Protection and Affordable Care Act (2010) [29], diabetes prevention initiatives should be approached on multiple levels including policies, systems, and environmental changes in order to support delivery-system changes to improve chronic disease prevention and management [9]. The DPP is primary among those initiatives that provide states an option to enroll Medicaid beneficiaries with 2 or more chronic conditions, like diabetes and

obesity, into a “Health Home.” In doing so, providers can receive payment for a team-based approach for chronic care services. This also expands funds for Federally Qualified Health Centers (FQHC), school-based health centers, and nurse-managed health clinics offering health promotion/disease prevention services. States that participate in this option are offered grants to establish community-based interdisciplinary, inter-professional “health teams” to support primary care practices to ensure continuity of coverage [9].

The Affordable Care Act (ACA) was signed into law in 2010, shortly after the Diabetes Prevention Act of 2009 [30]. Legislators who wrote the ACA saw the need to address chronic diseases like diabetes by designing a long-term plan that addressed policies, systems, and environmental changes. Konchak et al. [9] postulate that policies and environmental changes should function to improve participation to healthy behaviors among community members.

Overall, the ACA expanded access to healthcare providers and services to enable risk assessment, raise awareness, and promote intervention for diabetes prevention at the consumer, community, and system levels [9,31].

One of the major goals of the ACA was to reduce the number of uninsured Americans. This policy encompassed a wide swath of the population impacted by prediabetes-the poor, the aged, and racial and ethnic minorities [31]. In an effort to definitively address the increasing incidents of diabetes, the federal government committed funding to the NDPP via an ACA created body called the Prevention and Public Health Fund. This demonstrated how the policies of the ACA and the DPA support the access, cost, and quality dimensions of the Triple Aim framework.

Under the original provisions of the ACA, every American was mandated to have health insurance or pay a penalty [31]. Yet, in 2012, the Supreme Court in a 5 to 4 ruling found that the individual mandate was unconstitutional [9]. It is feared that, consequently, fewer younger and healthier people will choose to purchase health insurance and may forego preventive health screenings that could lead to early diagnosis of prediabetes and interventions.

The Agency for Healthcare Research and Quality (AHRQ) is charged with producing evidence to make health care safer, of higher quality, more accessible, and more affordable as it collaborates with other agencies. AHRQ established measurable evidence-based quality indicators to identify variations in quality from both inpatient and outpatient care under the following four modules: Prevention Quality Indicators (PQIs), Inpatient Quality Indicators, Patient Safety Indicators, and Pediatric Quality Indicators (31). The policies derived from this federal agency impact diabetes prevention as they embody the access, cost, and quality dimensions of the Triple Aim.

From a policy perspective, when people diagnosed with prediabetes enroll in a diabetes prevention program, they usually use one of the following payment methods: out-of-pocket, employee insurance, private insurance, or public/government insurance. CDC data indicates that in 2016, over 3 million state employees in 11 states had health insurance coverage for National DPP; 65 private insurance companies provided some form of NDPP coverage. Additionally, the NDPP became the first preventive service program to become eligible for Medicare payment. NDPP qualified nearly 22 million Americans, age 65 or older, for the new Medicare Diabetes Prevention Program that went into effect in 2018 [32]. The ACA legislated funding for this Program to enable states [who chose] to provide incentives directly to Medicaid beneficiaries who participated in DPP type programs and services.

Aligning Policy and Access to DPP

Access to health care coverage does not necessarily mean access to diabetes prevention care. One challenge facing policy makers and health care leaders is to create legislation that addresses the plight of patients living in rural areas where there is often a maldistribution of critical resources. A second challenge for policy makers and health care leaders is to develop strategies to address the growing problem of diabetes among the youth population. A third challenge for health policy leaders is to make DPP affordable for out-of-pocket payers. Costs for DPP are direct barriers to the NDPP policy agenda, which aims to distribute diabetes prevention-type programs on a larger scale at the community, state, and national levels.

While there is synergy between the efforts of policy makers and health care leaders toward access and treatment for diabetes prevention, the reach of these programs remains limited. For example, national policies reduce barriers to participant enrollment, increase access to evidence-based lifestyle prevention programs, and improve health insurance coverage of diabetes screening tests. Yet, these efforts only reaches 11.6% of people with prediabetes [2]. Thus, more policy actions are needed to expand awareness and access of diabetes prevention-type programs.

Another major challenge for DPP is to align strategies among essential stakeholders (i.e., health care providers, policy makers, community leaders, health care systems) to work in collaboration as far upstream as possible to reduce the incidence of diabetes and improve care gaps. Nurses and APRNs must become aware of DPP-type programs to improve patient/community access and facilitate the translation and scalability of these programs into communities.

Maximizing the Internet to Address Diabetes Prevention

One way to address delivery platforms is through Internet-based diabetes education to improve potential care gaps. Pereira et

al., (2014) [33] conducted a systematic review of 14 studies that used web-based education for over 2,800 patients with diabetes. Their study concluded that Internet-based health classes can be flexible and effective to “overcome barriers such as travel/distance, class scheduling, and the limited supply of certified diabetes educators.”

Vadheim et al., (2017) [34] compared on-site versus telehealth groups of the DPP in rural communities. The study concluded that there was no statistically significant difference in participation rates, weekly physical activity, participant’s goals, and weight loss outcomes between the two groups. The study revealed that telehealth interventions were more expansive in its rural outreach, more cost effective than face-to-face classes, and reduced barriers, like access to educators. Furthermore, telehealth classes could be conducted simultaneously with non-rural sites [33,34]. Nurse providers should leverage the use of the Internet and telehealth-based DPP classes as a feasible, evidenced-based intervention for reducing certain logistical and geographical barriers, while improving clinical outcomes [35,36].

Web-based learning can be effective to achieve diabetes-related goals when used with a combined approach to care, however, the digital divide creates some of the greatest barriers to web-based DPP education. That discussion is beyond the scope of this manuscript.

Nursing Implications

In taking a preventative approach to the diabetes pandemic, nurses can ease the financial and clinical burdens that this disease places on individuals and health care delivery systems. Nurses must understand how policy and health intersect to expand health care access and improve clinical outcomes.

Effective diabetes prevention will require a multipronged strategy using interdisciplinary teams of health care professionals. The evidence indicates that training nurses and APRNs on the DPP curriculum and the core competencies for team-based care will require an investment of resources from policy makers to bridge the gaps in translation of DPP into community and real-world settings. The portability and scalability of DPP allows nurses and APRNs to deliver the program across settings.

The availability of DPP across the care continuum requires front line providers of care such as nurses and APRNs to understand the program’s impact on diabetes prevention and health care outcomes. Strategies should involve the collaboration with professionals from various disciplines -- health science, environmental science, social science, and information science. Translations of DPP continue to evolve to meet the changing landscape of our diverse communities.

Disclosure

Authors' Contributions:

Terrye Moore-Harper authored the sections on Recommendations (Prediabetes management: Community-based approaches, addressing cultural challenges, addressing literacy challenges), Maximizing the Internet to Address Diabetes Prevention, and Nursing Implications; provided Table 4.

JH Shubrook authored the Introduction, Recommendations (prediabetes management: medications, surgery, and behavioural; Cost and covered benefits); provided Tables 1, 2, and 3.

Jacqueline Clavo-Hall authored the sections on Health Care Policies to Reduce Onset of Type 2 Diabetes, aligning policy and access to DPP, and Nursing Implications; provided Figure 1.

Statement of Attestation

This is a statement of attestation ensuring that this manuscript has been submitted to the International Journal of Nursing and Health Care Research. This is an educational manuscript.

Data Availability Statement

Data supporting the study results can be provided followed by request sent to the corresponding author's e-mail.

Acknowledgements

We would like to thank the manuscript editor, Professor Samantha Shubrook for the work done to help us reach the point of submission. We appreciate your timely sacrifice and editing expertise in the many iterations of the process. There are no conflicts of interest in the production of this manuscript.

References

1. Evidence for the Prevention of Type 2 Diabetes Mellitus. *JAOA*. 118(11):730-737.
2. Centers for Disease Control and Prevention (2018) Diabetes Report Card 2017.
3. CDC Diabetes Basics Page (2017).
4. CDC Overweight and Obesity Report (2018).
5. American Diabetes Association (2018) 5. Prevention or Delay of Type 2 Diabetes: Standards of Medical Care in Diabetes-2018. *Diabetes Care*. 41: S51-S54.
6. Sjöström L, Lindroos A, Peltonen M, Torgerson J, Bouchard C, et al. (2004) Lifestyle, Diabetes, and Cardiovascular Risk Factors 10 Years after Bariatric Surgery. *N Eng J Med* 351: 2683-2693.
7. The Diabetes Prevention Program (DPP) Research Group (2002) Reduction in the Incidence of Type 2 Diabetes with Lifestyle Intervention or Metformin. *N Eng J Med* 346: 393-403.
8. The Diabetes Prevention Program (DPP) Research Group (2012) The 10-year cost effectiveness of lifestyle intervention or metformin for diabetes prevention: an intent-to-treat analysis of the DPP/DPPOS. *Diabetes Care*. 35: 723-730.
9. Konchak JN, Moran MR, O'Brien MJ, Kandula NR, Ackermann RT (2016) The state of diabetes prevention policy in the USA following the Affordable Care Act. *Curr Diab Rep* 16: 55.
10. Lindstrom J, Peltonen M, Eriksson J, Ilanne-Parikka P, Aunola S, et al. (2012) Improved lifestyle and decreased diabetes risk over 13 years: long-term follow-up of the randomised Finnish Diabetes Prevention Study (DPS). *Diabetologia*. 56: 284-293.
11. Li G, Zhang P, Wang J, Gregg EW, Yang W, et al. (2008) The long-term effect of lifestyle interventions to prevent diabetes in the China Da Qing Diabetes Prevention Study: a 20-year follow-up study. *The Lancet*. 371: 1783-1789.
12. Pan XR, Li GW, Hu YH, Wang JX, Yang WY, et al. (1997) Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance: The Da Qing IGT and diabetes study. *Diabetes Care*. 20: 537-545.
13. Costa B, Barrio F, Cabre JJ, Pinol JL, Cos X, et al. (2012) Delaying progression to type 2 diabetes among high-risk Spanish individuals is feasible in real-life primary healthcare settings using intensive lifestyle intervention. *Diabetologia*. 55:1319-1328.
14. Herman WH, Edelstein SL, Ratner RE, Montez MG, Ackermann RT, et al. (2013) Effectiveness and cost-effectiveness of diabetes prevention among adherent participants. *Am J Manag Care* 19: 194-202.
15. Herman WH, Hoerger TJ, Brandle M, Hicks K, Sorensen S, et al. (2005) The cost-effectiveness of lifestyle modification or metformin in preventing type 2 diabetes in adults with impaired glucose tolerance. *Ann Intern Med* 142: 323-332.
16. MediCAL to cover Diabetes Prevention Program. (2018).
17. Ackermann RT, Finch EA, Brizendine E, Zhou H, Marrero DG (2008) Translating the Diabetes Prevention Program into the community. The DEPLOY Pilot Study. *Am J Prev Med* 35: 357-363.
18. Ackermann RT, Marrero DG (2007) Adapting the diabetes prevention program lifestyle intervention for delivery in the community. *The Diabetes Educ* 33: 69-78.
19. Laatikainen T, Dunbar JA, Chapman A, Kilkkinen A, Vartiainen E, et al. (2007) Prevention of type 2 diabetes by lifestyle intervention in an Australian primary health care setting: Greater Green Triangle (GGT) Diabetes Prevention Project. *BMC Public Health*. 7: 249.
20. Hays LM, Finch EA, Saha C, Marrero DG, Ackermann RT (2014) Effect of Self-Efficacy on Weight Loss: A Psychosocial Analysis of a Community-Based Adaptation of the Diabetes Prevention Program Lifestyle Intervention. *Diabetes Spectrum*. 27: 270-275.
21. Ely EK, Gruss SM, Luman ET, Gregg EW, Ali MK, et al. (2017) A national effort to prevent type 2 diabetes: participant-level evaluation of CDC's National Diabetes Prevention Program. *Diabetes Care*. 40:1331-1341.
22. Hall D, Lattie EG, McCalla JR, Saab PG (2015) Translation of the Diabetes Prevention Program to ethnic communities in the United States. *J Immigr Minor Health* 18: 479-489.
23. Tabak R, Sinclair K, Baumann A, Racette S, Kuhlmann A, Johnson-Jennings J, et al. (2015) A review of diabetes prevention program translations: Use of cultural adaptation and implementation research. *Translational Behavioral Medicine*. 5: 401-414.

24. Samuel-Hodge CD, Johnson CM, Braxton DF, Lackey M (2014) Effectiveness of Diabetes Prevention Program translations among African Americans. *Obesity Reviews*. 15: 107-124.
25. Li R, Qu S, Zhang P, Chattopadhyay S, Gregg E, et al. (2015) Economic evaluation of combined diet and physical activity promotion programs to prevent type 2 diabetes among persons at increased risk: A systematic review for the community prevention task force. *Ann Intern Med* 163: 452-461.
26. Lawlor MS, Blackwell CS, Isom SP, Katula JA, Vitolins MZ, et al. (2013) Cost of a group translation of the diabetes prevention program: healthy living partnerships to prevent diabetes. *Am J Prev Med* 44: S381-S389.
27. Bailey S, Brega A, Crutchfield T, Elasy T, Herr H, et al. (2014). Update on health literacy and diabetes. *Diabetes Educ* 40: 581-604.
28. Ackermann RT (2017) From Programs to Policy and Back Again: The Push and Pull of Realizing Type 2 Diabetes Prevention on a National Scale. *Diabetes Care*. 40:1298-1301.
29. U.S Const Art I; 124 Stat. 119-1025 (Patient Protection and Affordable Care Act).
30. Avalere Health. Estimated federal impact of H.R. 962/ S. 452 "The Medicare Diabetes Prevention Act."
31. Teitelbaum JB, Wilensky SE (2017) *Essentials of health policy and law*. 3rd edition. Sudbury, Mass: Jones and Bartlett. ISBN-13: 978-1449653309.
32. CMS.gov Centers for Medicare & Medicaid Services. (2016) Medicare Diabetes Prevention Program (MDPP) Expanded Model.
33. Pereira K, Phillips B, Johnson C, Vorderstrasse A (2014) Internet delivered diabetes self-management education: A review. *Diabetes Technol Ther* 17: 55-63.
34. Vadheim LM, Patch K, Brokaw SM, Carpenedo D, Butcher M, et al. (2017) Telehealth delivery of the diabetes prevention program to rural communities. *Transl Behav Med* 7: 286-291.
35. Aziz Z, Absetz P, Oldroyd J, Pronk N, Oldenburg B (2015) A systematic review of real-world diabetes prevention programs: learnings from the last 15 years. *Implement Sci* 10: 172.
36. Supreme Court of the United States, "National Federation of Independent Business v. Sebelius" (2012). Patient Protection and Affordable Care Act Litigation. 333.
37. *Perreault, L., Davies, M., Frias, J., Laursen, P., Lingvay, I., Machineni, S., Varbo, A., Wilding, J., Wallenstein, S., le Roux, C. (2022). Diabetes Care* 2022;45(10):2396–2405
38. Gallup. (2023). "Nurses retain top ethics rating in U.S., but below 2020 high." <https://news.gallup.com/poll/467804/nurses-retain-top-ethics-rating-below-2020-high.aspx>