Increasing Physician Awareness of and Referral to the National Diabetes Prevention Program (DPP) using Continuing Medical Education (CME)

Justin T. Kelley
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Justin T. Kelley, MPH

Wright State University
Acknowledgements

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Abstract

Importance: Diabetes is a growing public health threat. One in eleven individuals have diabetes and one in three individuals have prediabetes. Without intervention, 15-30% of individuals with prediabetes will develop diabetes within five years. The National Diabetes Prevention Program (DPP) led by the Centers for Disease Control and Prevention (CDC) is proven to prevent or delay the development of diabetes in individuals with prediabetes.

Objective: A continuing medical education (CME) activity was created to increase physician awareness of and referral to the DPP. The goal was to promote the DPP among first-line treatments for prediabetes.

Methods: The types and requirements of different CME activities were examined. An AMA PRA Category 1 Credit™ online enduring materials format CME was chosen as the most effective and convenient activity to target primary care physicians. One CME credit was sought to maximize incentive for and ease of the activity. Fellow DPP stakeholders tested the activity and gave feedback.

Results: The CME activity included reading material highlighting awareness of prediabetes and the DPP followed by a ten question assessment. Stakeholders took approximately thirty minutes to complete the CME activity. A 0.5 credit AMA PRA Category 1 Credit™ online enduring materials format CME activity was established and approved by the local CME provider.

Conclusions: The DPP CME activity was designed with simplicity to maximize dissemination among primary care physicians. The burden of diabetes can be reduced for healthier communities with physician referral of patients with prediabetes to DPPs.

Keywords: healthy eating, physical activity, exercise, lifestyle, intervention, quality
Increasing Physician Awareness of and Referral to the National Diabetes Prevention Program (DPP) using Continuing Medical Education (CME)

Diabetes is a public health threat. According to the Centers for Disease Control and Prevention (CDC) (see Appendix A for a list of abbreviations), almost two million adults are diagnosed with type 2 diabetes mellitus (T2DM) each year. The number of adults with T2DM quadrupled from 5.5 million to 21.3 million between 1980 and 2012. In 2014, 29.1 million adults (9.3% of the population) had T2DM (Centers for Disease Control and Prevention [CDC], 2015a). Regional disparities are profound. For example, 10.5% of Ohio adults and 12.8% of Montgomery County adults had T2DM in 2013 (CDC, 2015d; CDC, 2015e). The extent of T2DM both nationally and locally place it among the top conditions of public health concern.

Prediabetes is a silent precursor of T2DM. Only 10% of individuals with prediabetes are aware of their condition. In 2012, 86 million adults had prediabetes. About 15-30% of individuals with prediabetes will progress to T2DM within five years without intervention. The projections are sobering. By 2025, one in five individuals could have diabetes if the trend continues (CDC, 2015a). An effective and widespread intervention is critically needed.

The National Diabetes Prevention Program (DPP) is an evidence-based lifestyle change program for preventing T2DM (CDC, 2015b). In 2010, the United States Congress established the National DPP as part of the Patient Protection and Affordable Care Act (ACA) (2010) and authorized the CDC to lead the program (National Association of Chronic Disease Directors, 2015). The CDC DPP is based on the National Institutes of Health’s study in 2002 (CDC, 2015c) and shows long-lasting results even after fifteen years (Bray et al., 2015). The goal is to help participants lose 5-7% of their body weight throughout a year-long course. Trained coaches
help participants make real lifestyle changes by including healthy eating and physical activity in their daily lives, while also teaching problem-solving and coping skills (CDC, 2015b).

The DPP brings together the community. Public and private partnerships are facilitated to address T2DM prevention. Healthcare providers represent an important stakeholder in the partnership, but few participants are currently recruited into the program from their providers (Blackwell et al., 2011). Primary care needs to be made aware of the DPP and local programs (Rattay & Rosenthal, 2014). Training opportunities most convenient to and preferred by primary care physicians should be explored.

Continuing medical education, commonly referred to as CME, is a fitting resource to expand awareness of the DPP to physicians (American Medical Association [AMA], 2015). Because physicians are required to obtain CME hours to maintain licensure and accreditation, a DPP CME topic could reach a large number of physicians to expand knowledge and improve care (Accreditation Council for Continuing Medical Education [ACCME], 2012b). It is hoped that increased physician awareness of and referrals to the DPP can bring further attention to prediabetes and help reverse the diabetes epidemic.

**Purpose Statement**

The purpose was to create a suitable and convenient CME activity to increase physician awareness of and referral to the DPP for patients with prediabetes. The goal was to promote the DPP among first-line treatments for prediabetes.

**Literature Review**

**Overview of Diabetes Mellitus**

**Diabetes mellitus.** Diabetes mellitus (“diabetes”) is a group of diseases categorized by high blood glucose. The underlying cause is either insufficient or inactive insulin. Insulin is a
hormone produced by beta cells of the pancreas and signals the body to absorb glucose. Without sufficient or active insulin, glucose accumulates in the blood. Uncontrolled diabetes is, therefore, harmful and leads to serious health complications, including death. In the United States, diabetes is the leading cause of kidney failure, adult blindness, and non-traumatic lower-limb amputations, and is the seventh leading cause of death. Five types span the spectrum of diabetes: type 1 diabetes, type 2 diabetes, gestational diabetes, prediabetes, and other (CDC, 2015a).

**Type 1 diabetes mellitus.** Type 1 diabetes mellitus (T1DM), previously known as juvenile diabetes, accounts for 5% of diabetes in the United States. T1DM is an autoimmune disease characterized by destruction of pancreatic beta cells. Without pancreatic beta cells, the body is unable to produce insulin and individuals must take replacement insulin. Children are most commonly affected, but T1DM can occur at any age (CDC, 2015a). As the disease is autoimmune, T1DM is unpreventable and not further discussed here.

**Type 2 diabetes mellitus.** Type 2 diabetes mellitus (T2DM), previously known as adult-onset diabetes, accounts for 90-95% of diabetes in the United States. T2DM is a multifactorial disease characterized by insulin resistance. Resistance occurs when the body no longer responds appropriately to insulin and the pancreas can no longer produce enough insulin. Risk factors include an age of 45 years or older, non-European ancestry, overweight, lack of exercise, hypertension, family history of diabetes, and history of gestational diabetes. Treatment options include lifestyle changes, medications, and insulins (CDC, 2015a). As the disease is largely influenced by lifestyle, T2DM is preventable.
Gestational diabetes mellitus. Gestational diabetes mellitus (GDM) is a condition of glucose intolerance during the second or third trimester of pregnancy. A pre-existing or new diagnosis of T2DM during the first trimester of pregnancy is considered T2DM and not GDM.

For the mother, GDM increases the risk for recurrence in later pregnancies and development of T2DM in her lifetime. Risk factors and treatment are similar to T2DM (CDC, 2011). In addition to risk for the mother, the child is at increased risk for birth defects, stillbirth, and future development of T2DM (American Diabetes Association [ADA], 2015). As the disease is largely influenced by lifestyle, GDM is preventable.

Prediabetes. Prediabetes, also known as impaired fasting glucose, is a condition of glucose intolerance. In prediabetes, blood glucose levels are higher than normal but not high enough to be diagnosed as T2DM. Prediabetes, similar to GDM, increases the risk for development of T2DM. Additionally, the risk for heart disease and stroke risk are increased (CDC, 2015a). Treatment includes lifestyle changes (CDC, 2015b). As the disease is largely influenced by lifestyle, prediabetes is preventable.

Other. Other types of diabetes account for 1-5% of diabetes in the United States. Examples include high glucose levels secondary to genetic conditions, surgeries, medications, infections, illnesses, and pancreatic diseases (CDC, 2015a). As the disease is secondary, other types of diabetes are considered unpreventable and not further discussed here.

Diagnosis. Diabetes can be diagnosed (Figure 1) using multiple methods: symptoms, hemoglobin A1c (A1c), fasting plasma glucose (FPG) and oral glucose tolerance test (OGTT). Symptoms (e.g., increased urination, thirst and hunger) and random plasma glucose at 200 mg/dl or greater are diagnostic. A1c measures the average plasma glucose over the past three months and is diagnostic at 6.5% or greater. FPG measures the current plasma glucose and is diagnostic
at 126 mg/dl or greater. OGTT (75 g) measures the current plasma glucose and is diagnostic at 200 mg/dl or greater two-hours post-prandial (PP). For comparison, normal values are less than 5.7% for A1c, less than 100 mg/dl for FPG, and less than 140 mg/dl for OGTT. GDM, however, is diagnosed at 24-28 weeks of gestation using OGTT either at 92 mg/dl or greater fasting, 180 mg/dl or greater one-hour PP, or 153 mg/dl or greater two-hour PP; a two-step strategy using a screening test is also available (ADA, 2015).

![Figure 1. Diagnosis of prediabetes and type 2 diabetes mellitus.](source: ADA, 2016)

**Type 2 Diabetes Mellitus and Precursors**

**Type 2 diabetes mellitus.** T2DM is a preventable disease. The etiology and pathogenesis, epidemiology, and cost will be summarized here.

**Etiology and pathogenesis.** T2DM is a condition of insulin resistance in which insulin does not behave normally. In the condition, insulin has a reduced action on cells and the pancreas can no longer produce enough insulin to compensate. Skeletal muscle, adipose tissue, and liver cells are predominately affected in the pathogenesis. Notably, skeletal muscle resistance contributes to the beginning stages of impaired glucose tolerance due to metabolic
dysfunction (Henriksen, Diamond-Stanic, & Marchionne, 2011). Therefore, metabolism plays a critical role in the development of T2DM.

Complex and increasingly understood metabolic pathways contribute to the manifestation of T2DM. Oxidative stress appears to be the driving force behind the metabolic dysfunction seen in T2DM. Stress occurs when oxidant production exceeds antioxidant activity and correlates with the degree of insulin resistance. Oxidant overproduction is specifically associated with mitochondrial inflammation. Inflammation is linked with characteristics of T2DM, including hyperglycemia, advanced glycation end-products (AGEs), and dyslipidemia (Akash, Rehman, & Chen, 2013; Cersosimo, Triplitt, Mandarino, & DeFronzo, 2000; Folli et al., 2011; Henriksen et al., 2011; Kohlgruber & Lynch, 2015; Patel et al., 2015; Polyzos, Kountouras, Deretzi, Zavos, & Mantzoros, 2012). An inflammatory environment is then established. The environment has been termed “sterile inflammation” to denote the absence of a microbial cause (Henriksen et al., 2011).

The metabolic dysfunction of T2DM is reversible. Recent research shows that exercise (Bianchi & Ribisl, 2015; Dincer et al., 2015; Farabi, Carley, Smith, & Quinn, 2015; Peeri & Amiri, 2015; Pittaluga et al., 2015; Vinetti et al., 2015) and healthy diet (Al-Shafei, 2014; Kahleova et al., 2011; Madec, Corretti, Santini, Ferrannini, & Solini, 2011; Shirani, Salehi-Abargouei, & Azadbakht, 2013) increase antioxidant activity and diminish oxidative stress by inhibiting mitochondrial inflammation. Ergo, the research not only supports the current understanding of diabetes, but also shows that it can be prevented. Insulin resistance, therefore, causes metabolic dysfunction leading to sterile inflammation and can be reversed with diet and exercise.
**Epidemiology.** T2DM is a growing health concern in the United States. The number of adults with T2DM quadrupled from 5.5 million in 1980 to 21.3 million in 2012. In 2014, 29.1 million adults (9.3% of the population) had T2DM. Almost two million adults are diagnosed with T2DM each year and could lead to one-third of adults with T2DM by 2050 (CDC, 2015a).

State and county data from 2013 highlight striking distributions. In Ohio, 10.5% of adults had T2DM (CDC, 2015e). The burden increases at the county level. In Montgomery County, 12.8% of adults had T2DM. One-fourth of Ohio counties, including Montgomery County, had a prevalence greater than the United States median of 9.0% (CDC, 2015a; CDC, 2015d). The extent of T2DM both nationally and locally stress the public health concern of diabetes.

The national T2DM epidemic appears to have plateaued (Figure 2) (CDC, 2015a). The number of new diagnoses has not grown as quickly since 2009. While the overall rate decreased, the burden fell on distinct populations. Diagnoses have increased among American Indians, African Americans, Hispanics, Asian Americans and individuals with less than a high school education. The racial disparities are significant. Individuals of non-European ancestry are 1.2-2.1 times more likely than individuals of European ancestry to have T2DM. Furthermore, half of Hispanic men and women and half of black women are predicted to develop T2DM during their lifetime. The tide may be changing, but now minority groups are at greater risk.
Figure 2. Type 2 diabetes mellitus prevalence in the United States from 1980-2012.

Source: CDC, 2015a

Cost. Healthcare cost for T2DM in the United States is substantial. In 2009, healthcare cost for T2DM was $11,700 per person. For comparison, healthcare cost for the average adult was $4,600 per person. Healthcare cost is also projected to increase. The total healthcare cost for T2DM was $148 billion in 2011 and is estimated to increase to $371 billion by 2021 (Vojta, De Sa, Prospect, & Stevens, 2012). The economic state of the healthcare system deserves special attention to T2DM.

Gestational diabetes mellitus. GDM is a risk factor for T2DM. The etiology and pathogenesis, epidemiology, and cost will be summarized here.

Etiology and pathogenesis. As GDM is a risk factor for T2DM, refer above to the discussion of etiology and pathogenesis for T2DM.

Epidemiology. GDM is a concern for pregnant women. It occurs in 2-10% of pregnancies and increases the risk for recurrence in future pregnancies and progression to T2DM in a
woman’s lifetime. Among women with GDM, T2DM occurs in 5-10% of women immediately after pregnancy and in 35-60% of women within ten years of their GDM diagnosis (CDC, 2011). The obesity and diabetes epidemics are increasing the number of GDM cases and putting mothers and children at risk.

Cost. GDM places a significant toll on the healthcare system in the United States. In 2012, total cost for treating GDM was $1,290 million and the average cost per person was $5,800 (Dall et al., 2014). While GDM is often overlooked when discussing T2DM, it has a large economic impact.

Prediabetes. Prediabetes is a risk factor for T2DM. The etiology and pathogenesis, epidemiology, and cost will be summarized here.

Etiology and pathogenesis. As prediabetes is a risk factor for T2DM, refer above to the discussion of etiology and pathogenesis for T2DM.

Epidemiology. Prediabetes is a silent threat to public health. In 2012, 86 million adults had prediabetes. About 15-30% of individuals with prediabetes will develop T2DM within five years without intervention. However, 90% of adults with prediabetes are unaware (CDC, 2015a). Both professional and public awareness are needed to address prediabetes.

Cost. Healthcare cost for prediabetes in the United States is enormous. From 2007 to 2011, cost for prediabetes treatment increased from $27 billion to $38 billion. Cost is estimated to increase to $93 billion by 2021 (Vojta et al., 2012). The current healthcare system is already scrambling to meet the needs of adults with T2DM and may struggle to cover the increasing number of adults who may develop T2DM.
National Diabetes Prevention Program (DPP)

The National DPP aims to reduce the burden of T2DM by preventing or delaying the progression to T2DM among individuals with prediabetes. In 2010, Congress passed the National DPP as part of the ACA (2010) and authorized the CDC to lead the program (National Association of Chronic Disease Directors, 2015). The CDC DPP curriculum is based on the National Institutes of Health’s clinical trial published in the February 7, 2002 issue of the *The New England Journal of Medicine* (Knowler et al., 2002). Subsequent studies determined the best recruitment strategies based on demographic factors (CDC, 2015c). A significant amount of time and research has been invested in the DPP.

The DPP is an evidence-based lifestyle change program designed to prevent T2DM. It is a year-long program during which participants meet weekly for the first six months and then monthly for the remaining six months. A trained lifestyle coach uses a CDC-approved curriculum and guides a small group of participants through the program. Coaches help participants make lifestyle changes by including healthy eating and physical activity in their daily lives. To overcome lifestyle-change barriers, problem-solving and coping skills are also included in the curriculum. The structured lifestyle change interventions incorporated in the DPP help participants lose 5-7% of their body weight and reduce the risk of developing T2DM by 58% (CDC, 2015b).

The literature is filled with positive outcomes from the DPP due to normal glucose regulation. T2DM incidence and microvascular complications were lowest in the lifestyle group compared to drug treatment, most commonly metformin, and placebo groups (Bray et al., 2015). Program results are also long-lasting. After fifteen years, T2DM development was reduced by 27% in the lifestyle group and 18% in the metformin group compared with the placebo group.
(Bray et al., 2015). Notably, two-year weight loss was the strongest predictor of T2DM risk reduction and cardiometabolic improvement among participants (Delahanty et al., 2014). Even transient reversion to normal glucose levels was associated with a significantly reduced risk of T2DM (Perreault et al., 2012). Clinically, FPG remains the best predictor of T2DM development (Maruthur et al., 2013; Sussman, Kent, Nelson, & Hayward, 2015). The DPP not only prevents T2DM, but is also long-lasting.

The DPP encourages stakeholder collaboration. Community organizations, healthcare organizations, faith-based organizations, government agencies, employers, and private insurers are brought together to achieve a greater impact on T2DM prevention. Healthcare providers are an important stakeholder in program support and referrals. In one study, however, only 2% of participants were recruited into the program from providers (Blackwell et al., 2011). Indubitably, provider referrals can be and need to be significantly improved.

The lack of referrals from the healthcare community is perplexing. Broad integration in the community would be expected since the initial clinical trial in 2002. However, Vojta, Koehler, Longjohn, Lever, and Caputo (2013) posit that new treatments are developed much faster than can be incorporated into healthcare. Sustainable linkages between primary care and community resources can address the problem. For example, electronic health records can prompt, flag, and remind providers to screen for and follow-up on patients at high risk for T2DM. A single keystroke can refer patients diagnosed with prediabetes to DPP classes. Emails, phone calls, and post cards can remind patients to attend DPP classes. Periodic reports from DPP classes can also be sent to providers to track patient attendance and progress. Finally, regular provider follow-ups can assess clinical effectiveness, reinforce learned skills, and
encourage continued progress (Rattay & Rosenthal, 2014). The gap between providers and communities needs to be closed.

Healthcare provider and community resource linkages are being developed. For example, the American Medical Association (AMA) has committed to prevent T2DM. Resources have been created and offered to primary care offices to help physicians learn about the DPP and refer patients with prediabetes to DPP classes. Ultimately, primary care needs to be made aware of the DPP and local programs to maximize the benefit to communities (Rattay & Rosenthal, 2014). Training opportunities most convenient to and preferred by primary care physicians should be explored.

**Continuing Medical Education**

Continuing medical education, commonly referred to as CME, contributes to continued physician competency after formal training is complete. Physicians are trained and accredited through multiple steps. In the United States, initial competency is evaluated during four years of medical school and then three-to-five years of residency training. CME thereafter establishes competency based on standards developed by various medical boards (ACCME, 2012b).

The Accreditation Council for Continuing Medical Education (ACCME) establishes CME standards in the United States. The mission of the ACCME is to identify, develop, and promote quality CME standards to improve physician performance. The ACCME is an independent, nonprofit organization that uses evidence-based content without commercial bias. The ACCME has partnered with numerous federal agencies and medical associations, such as the CDC and AMA (ACCME, 2012a). The AMA Physician’s Recognition Award (PRA) defines Category 1 and 2 credits. Category 1 credits are given for the acquisition of new knowledge and skills, including attending live educational events, learning new clinical procedures, and reviewing
journal manuscripts. Category 2 credits are given for using current knowledge and skills, including peer consultations, group discussions, and medical writing (AMA, 2010). CME facilitates lifelong learning in the rapidly changing field of healthcare to improve patient care.

Medical licensure boards determine CME requirements. Each state determines the number of CME hours required to maintain licensure and local organizations serve as CME providers. For example, the State Medical Board of Ohio (n.d.) requires that physicians complete 100 CME hours (40 Category 1 hours and 60 Category 2 hours) every two years; Wright State University (WSU) Boonshoft School of Medicine (BSOM) serves physicians of Southwest Ohio (Wright State University Boonshoft School of Medicine [WSU BSOM], 2015). Each medical association also determines the number of CME hours required to maintain accreditation. For example, the American Academy of Family Physicians (2015) requires 150 CME hours every three years.

CME is a fitting resource to expand the DPP to physicians. Prediabetes screening and DPP referrals are new guidelines and physicians need to learn about the program. Because physicians are required to obtain CME hours to maintain licensure and accreditation, a DPP CME activity could reach a large number of physicians to expand knowledge and improve care. It is hoped that increased physician awareness of and referrals to the DPP can bring further attention to prediabetes and help reverse the diabetes epidemic.

Methods

Overview

A CME activity was determined to be the best strategy to target physicians. The goal was to teach physicians new knowledge about the DPP using a web-based activity. Therefore, the credit and format were structured according to *AMA PRA Category 1 Credit™* and enduring
materials requirements, respectively. The CME activity was submitted for approval to WSU BSOM, an accredited CME provider.

**AMA PRA Category 1 Credit™ Requirements**

**Credit requirements.** *AMA PRA Category 1 Credit™* is designated for the acquisition of new knowledge. The DPP CME activity taught a new resource and, therefore, applied to Category 1 Credit. Ten core requirements are established for Category 1 Credit (Figure 3) (AMA, 2010). In reference to the first core requirement, the AMA defines CME as follows:

CME consists of educational activities which serve to maintain, develop, or increase the knowledge, skills, and professional performance and relationships that a physician uses to provide services for patients, the public, or the profession. The content of CME is the body of knowledge and skills generally recognized and accepted by the profession as within the basic medical sciences, the discipline of clinical medicine and the provision of health care to the public (AMA, 2010, p. 2).
<table>
<thead>
<tr>
<th>Core Requirement</th>
<th>Objective</th>
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<tbody>
<tr>
<td>1</td>
<td>Conform to the AMA’s definition of CME.</td>
</tr>
<tr>
<td>2</td>
<td>Address demonstrated educational needs.</td>
</tr>
<tr>
<td>3</td>
<td>Communicate to prospective participants a clearly identified educational purpose and/or objectives in advance of participation in the activity.</td>
</tr>
<tr>
<td>4</td>
<td>Be designed using AMA approved learning formats and learning methodologies appropriate to the activity’s educational purpose and/or objectives; credit must be based on AMA guidelines for the type of learning format used.</td>
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<tr>
<td>5</td>
<td>Present content appropriate in depth and scope for the intended physician audience.</td>
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<tr>
<td>6</td>
<td>Be planned in accordance with the relevant CEJA opinions and the ACCME Standards for Commercial Support, and be nonpromotional in nature.</td>
</tr>
<tr>
<td>7</td>
<td>Evaluate the effectiveness in achieving its educational purpose and/or objectives.</td>
</tr>
<tr>
<td>8</td>
<td>Document credits claimed by physicians for a minimum of six years.</td>
</tr>
<tr>
<td>9</td>
<td>Be certified for <em>AMA PRA Category 1 Credit™</em> in advance of the activity; i.e. an activity may not be retroactively approved for credit.</td>
</tr>
<tr>
<td>10</td>
<td>Include the AMA Credit Designation Statement in any activity materials that reference CME credit with the exception of “save the date” or similar notices.</td>
</tr>
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*Figure 3. AMA PRA Category 1 Credit™ core requirements.*

Source: AMA, 2010, p. 4

**Format requirements.** *AMA PRA Category 1 Credit™* offers seven learning formats: live activities, enduring materials, journal publication, test item writing, journal review, performance improvement, and Internet point-of-care learning. Enduring materials format is a CME activity that endures over a specified time, unlike live educational events. Examples of enduring materials include print, audio, video, and Internet materials. The DPP CME activity in this project was web-based and, therefore, applied to enduring materials. Five requirements are established for the enduring materials format (Figure 4). The amount of credit is determined by a good faith estimate of the expected amount of time required to complete the activity established by the CME provider. Physicians may only claim credit for the actual time spent on the activity, but no more than established by the CME provider. Credit is designated in 15
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One minute or 0.25 credit increments, rounded to the nearest quarter hour, and awarded to physicians who meet minimum performance established by the CME provider (AMA, 2010).

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Objective</th>
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<tbody>
<tr>
<td>1</td>
<td>Meet all AMA core requirements for certifying an activity.</td>
</tr>
<tr>
<td>2</td>
<td>Provide clear instructions to the learner on how to successfully complete the activity.</td>
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<tr>
<td>3</td>
<td>Provide an assessment of the learner that measures achievement of the educational purpose and/or objective(s) of the activity with an established minimum performance level; examples include, but are not limited to, patient-management case studies, a post-test, and/or application of new concepts in response to simulated problems.</td>
</tr>
<tr>
<td>4</td>
<td>Communicate to the participants the minimum performance level that must be demonstrated in the assessment in order to successfully complete the activity for AMA PRA Category 1 Credit™.</td>
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<tr>
<td>5</td>
<td>Provide access to appropriate bibliographic sources to allow for further study.</td>
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</table>

*Figure 4. AMA enduring materials format requirements.*

Source: AMA, 2010, p. 5

**DPP CME activity.** The DPP CME activity was developed from *AMA PRA Category 1 Credit™* and enduring materials format requirements with information provided by CDC and peer-reviewed journals indexed on PubMed. The CME activity reading material was outlined into preface, prediabetes, DPP, and postface sections (Table 1) with primary care physicians as the target audience. In addition to the reading material, a five-minute CDC-sponsored video highlighted a DPP session as individuals described their experience of being diagnosed with prediabetes and participating in the program. The CME activity was designed to take one hour to complete, including reading the materials, watching the video, and completing the assessment. One credit was chosen to maximize the CME activity’s reach through ease and incentive to complete the activity.
Table 1

Continuing Medical Education Reading Material Outline for DPP Activity

<table>
<thead>
<tr>
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<th>Components</th>
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<tr>
<td>Preface</td>
<td>About</td>
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<td>Objectives</td>
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<td></td>
<td>Abbreviations</td>
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<td>Introduction</td>
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<tr>
<td>Prediabetes</td>
<td>Overview</td>
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<td>Epidemiology</td>
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<td>Diagnosis</td>
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<td>Diabetes Prevention Program</td>
<td>About</td>
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<td>Referral</td>
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<td></td>
<td>Resources</td>
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<td>Risk Assessment Quiz</td>
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<td>DPP Search Locator</td>
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<td></td>
<td>Video</td>
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<tr>
<td>Postface</td>
<td>Summary</td>
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<tr>
<td></td>
<td>References</td>
</tr>
</tbody>
</table>

The CME activity was offered on the online learning gateway at WSU called Pilot (https://pilot.wright.edu) (see Appendix B for registration instructions). Pilot allowed secure enrollments, storable files, deliverable assessments, and anonymous surveys. The assessment could be completed with unlimited attempts to achieve the minimum passing score. A PDF certificate was then unlocked only after successfully passing the assessment.

Public health graduate students and faculty tested the CME activity before submission to the CME provider. The average time to complete the CME activity and ease of navigation through the Pilot webpage were determined. Feedback, such as content, opinions, and suggestions, were encouraged.
Results

Overview

A one-hour *AMA PRA Category 1 Credit™* enduring materials format CME activity was developed for the DPP and offered on Pilot. The goal was to increase physician awareness of and referral to the DPP for patients with prediabetes. The CME activity included a twelve-page reading material with a five-minute CDC-sponsored video and references (Appendix C), a ten question assessment with answer explanations and references (Appendix D), and a nine question survey (Appendix E). The CME activity was submitted to WSU BSOM for approval.

Trial

First, three first-year master of public health (MPH) students, three third-year medical students in the dual degree program (MD/MPH), and one physician faculty member tested the CME activity reading materials and assessment. Thirty minutes was the average time to complete the CME activity and students commented on a well-designed, informative, and straightforward activity. Second, stakeholders tested the CME activity on Pilot. Stakeholders also took approximately thirty minutes to complete the CME activity and commented on appropriate content and easy interface. The CME activity was then redefined for 0.5 credit.

Submission

Next, an application was completed for submission to WSU BSOM. Activity details, financial reports, and conflict of interest forms were completed. The WSU BSOM Center for Global Health paid the $300 application fee. Approval (Appendix F) was granted by the CME provider before dissemination.
Dissemination

Physicians were recruited through advertisements (Appendix G), emails, and word of mouth. The CME activity can be accessed by visiting Pilot (https://www.pilot.wright.edu), clicking *External Registration* at the bottom of the page, and registering for the *Diabetes Prevention Program CME*. Activity materials are downloadable and CME credit is available through 31 March 2019.

Discussion

Audience

A CME activity was designed for physicians to increase awareness of and referral to the DPP. Currently, a significant minority of participants in DPPs are referred from their physicians. The CDC began leading the DPP in 2010 and is urging nationwide dissemination. To recruit participants into the program, multiple stakeholders are brought together to prevent or reduce the burden of diabetes.

Physicians are unique stakeholders. They have strong relationships with their patients, can readily screen for prediabetes, and can diagnose prediabetes. Physician recommendation can add trust and value to the program and increase patient willingness to join the program. Physicians can also regularly follow up on progress made in the program. The goal is to establish the DPP, rather than medication alone, among first-line treatment options for prediabetes. Medication, specifically metformin, alone is less effective than the DPP at preventing or reducing the progression to diabetes among individuals with prediabetes and should no longer be the only treatment on which physicians rely.
Design

The CME activity was designed with ease and incentive to maximize physician reach. A one-credit online CME activity was, therefore, created. However, trial activities revealed that the CME activity could be completed in thirty minutes and it was redefined for 0.5 credits. The CME activity included a twelve-page reading material with a five-minute CDC-sponsored video and references plus a ten-question assessment with answer explanations and references that physicians can take anytime, anywhere. The intent was that greater convenience would lead to increased interest and completion among physicians.

Limitations

Difficulty. Because the CME activity was based on materials created for the general public, physicians may find the CME activity too simplistic and become disinterested. While the goal was to make the CME activity as easy as possible to maximize dissemination and diffusion, physician feedback will need to be sought to ensure appropriate depth and scope.

Dissemination. Dissemination is vital to the success of the CME activity. Physicians must be made aware of and encouraged to take the CME activity. Collaboration with community stakeholders will be crucial to deliver the CME activity to physicians, which is beyond the scope the project here.

Conclusions and Recommendations

The DPP CME activity was designed with ease and simplicity on Pilot to maximize dissemination among primary care physicians. The CME activity included reading material, video, and assessment to be completed in thirty minutes to incentivize physicians with sufficient credit and minimal time. An application was sent to WSU BSOM for approval of the CME activity for 0.5 AMA PRA Category 1 Credit™ as an enduring materials format. Substantial and
long-term research supports the effectiveness and superiority of the DPP over other strategies for the treatment of prediabetes. The goal was to include the DPP among first-line treatments for prediabetes. To accomplish the goal of awareness of and referral to the DPP, the CME activity designed here will be disseminated to physicians. CME providers were highly encouraged to advertise the DPP CME activity to increase the number of physicians who complete the CME activity. Recommendations include advertising to other healthcare and public health professionals, such as nurses and community health workers, and, if needed, obtaining credit approval for their respective CME providers. The burden of diabetes can be reduced for healthier communities with physician referral to DPPs of patients at high risk for or diagnosed with prediabetes.
References


Appendix A
Abbreviations

A1c — Hemoglobin A1c
ACA — The Patient Protection and Affordable Care Act
ACCME — Accreditation Council for Continuing Medical Education
ADA — American Diabetes Association
AMA — American Medical Association
BSOM — Boonshoft School of Medicine
CDC — Centers for Disease Control and Prevention
CME — Continuing medical education
DPP — Diabetes Prevention Program
FPG — Fasting plasma glucose
GDM — Gestational diabetes mellitus
OGTT — Oral glucose tolerance test
PP — Post-prandial
PRA — Physician’s Recognition Award
T1DM — Type 1 diabetes mellitus
T2DM — Type 2 diabetes mellitus
WSU — Wright State University
Appendix B

Diabetes Prevention Program Continuing Medical Education Pilot Registration Instructions

**Step 1:** Visit pilot.wright.edu and click *External Registration.*

![Login Screen](image)

**Step 2:** Choose whether or not you have an existing Pilot account and click *Submit.*

*Note: If you have an existing account, you will login to your account next. These instructions follow you through registration as a new user.*
Step 3: Click Diabetes Prevention Program CME

Step 4: Click Register

Step 5: Enter your First Name, Last Name, Email and click Submit.

Step 6: Confirm your account information and click Finish.
**Step 7:** Make note of your username and password then click *Login Now.*

**Step 8:** Enter your username and password then click *Sign In.*
**Step 9:** Click *Diabetes Prevention Program CME - BSOM.*

**Step 10:** Follow the instructions to complete the CME activity.
Appendix C

Diabetes Prevention Program Continuing Medical Education Reading Material

Diabetes Prevention Program
Awareness and Referral for Physicians
Boonshoft School of Medicine – Wright State University

YOU CAN MAKE A CHANGE FOR LIFE

DIABETES PREVENTION PROGRAM
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DPP AWARENESS AND REFERRAL USING CME

DIABETES PREVENTION PROGRAM

2
Continuing Medical Education

Wright State University Boonshoft School of Medicine designates this enduring material for a maximum of 0.5 AMA PRA Category 1 Credit. Physicians must score an 80% or better to receive credit and should only claim credit for the extent of their participation in the activity.

Conflict of Interest Statement

This educational activity was created by Justin Kelley, MD/MPH student, in coordination with Boonshoft School of Medicine faculty, Nikki Rogers, PhD, CPH and Michael Dohn, MD, MSc. None of the authors declare any conflict of interest.

Objectives

After completing this activity, learners will be able to:

- State the rates of prediabetes prevalence and progression to type 2 diabetes mellitus
- Discuss the diagnosis of prediabetes
- Locate CDC-registered Diabetes Prevention Programs
- Describe the Diabetes Prevention Program, including curriculum objectives, referral criteria and available resources
- Recognize the gap in Diabetes Prevention Program referrals from physicians

Abbreviations

A1c — Hemoglobin A1c
ADA — American Diabetes Association
CDC — Centers for Disease Control and Prevention
DPP — Diabetes Prevention Program
FPG — Fasting plasma glucose
OGTT — Oral glucose tolerance test
T2DM — Type 2 diabetes mellitus
Introduction

Diabetes mellitus ("diabetes") is a group of diseases categorized by high blood glucose. The underlying cause is either insufficient or inactive insulin. Insulin is a hormone produced by beta cells of the pancreas and signals the body to absorb glucose. Without sufficient or active insulin, glucose accumulates in the blood. Uncontrolled diabetes is harmful and leads to serious health complications and death. In the United States, diabetes is the leading cause of kidney failure, adult blindness and non-traumatic lower-limb amputations and the seventh leading cause of death. Five types span the spectrum of diabetes: type 1 diabetes, type 2 diabetes, gestational diabetes, prediabetes and other. Prediabetes will be the focus here.

Prediabetes

Overview

Prediabetes, also known as impaired fasting glucose, is a condition of glucose intolerance. In prediabetes, blood glucose levels are higher than normal but not high enough to be diagnosed as type 2 diabetes mellitus (T2DM). Risk factors are similar to T2DM and include: ≥45 years, non-white, overweight, hypertension, lack of exercise, family history and gestational diabetes. Prediabetes increases the risk for development of T2DM. Additionally, the risk for heart disease and stroke are increased. Treatment includes lifestyle changes. As the disease is largely influenced by lifestyle, prediabetes is preventable.

Epidemiology

Prediabetes is a silent threat to public health. In 2012, 86 million (1 in 3) adults had prediabetes. About 15-30% of individuals with prediabetes will develop T2DM in five years without intervention. However, 90% of adults with prediabetes are unaware. Both professional and public awareness are needed to tackle prediabetes.

Source: CDC
Cost

Healthcare cost for prediabetes is staggering. From 2007 to 2011, cost for prediabetes increased from $27 billion to $38 billion. Cost is estimated to increase to $93 billion by 2021. Diabetes cost even more. Patients with diabetes cost 2.3 times more than patients without diabetes. The current healthcare system is already scrambling to meet the needs of adults with T2DM and may struggle trying to cover the increasing number of adults with prediabetes.

Diagnosis

Source: ADA

Diabetes can be diagnosed using multiple methods: symptoms, hemoglobin A1c (A1c), fasting plasma glucose (FPG) and oral glucose tolerance test (OGTT). Symptoms (e.g., polyphagia, polydipsia and polyuria) and random plasma glucose at ≥200 mg/dl are diagnostic. A1c measures the average plasma glucose over the past three months and is diagnostic at ≥6.5%. FPG measures the current plasma glucose and is diagnostic at ≥126 mg/dl. OGTT (75 g) measures the current plasma glucose and is diagnostic at ≥200 mg/dl two-hours post-prandial (PP). For comparison, normal values are <5.7% for A1c, <100 mg/dl for FPG and <140 mg/dl for OGTT. Prediabetes is diagnosed when plasma glucose falls between normal and diabetes criteria.
Diabetes Prevention Program

About

The Diabetes Prevention Program (DPP) aims to reduce the burden of T2DM. In 2010, Congress passed the National DPP as part of the Affordable Care Act and authorized the Centers for Disease Control and Prevention (CDC) to lead the program. The CDC DPP is based on the National Institutes of Health study published in the February 7, 2002 issue of the New England Journal of Medicine. Subsequent studies determined the best recruitment strategies based on demographic factors. A significant amount of time and research has been invested in the DPP.

Source: CDC

The DPP is an evidence-based lifestyle change program designed to prevent T2DM. It is a year-long program during which participants meet weekly for six months then monthly for six months. A trained lifestyle coach uses a CDC-approved curriculum and guides a small group of participants through the program. Lifestyle coaches help participants make real lifestyle changes by including healthy eating and physical activity into their daily lives. To overcome barriers, problem-solving and coping skills are also taught. The structured lifestyle change interventions incorporated in the DPP help participants lose 5-7% of their body weight and reduce the risk of developing T2DM by 58%. The CDC DPP shows great promise in the fight against T2DM.

The literature is filled with positive outcomes from the DPP. T2DM incidence and microvascular complications were lowest in the lifestyle group compared to metformin and placebo groups. Program results are also long-lasting. According to Bray et al. (2015), T2DM development was significantly reduced throughout the fifteen year follow-up. Notably, two-year weight loss was the strongest predictor of T2DM risk reduction and cardiometabolic improvement among participants. Even transient reversion to normal glucose levels was associated with a significantly reduced risk of T2DM. Clinically, fasting plasma
glucose remains the best predictor of T2DM development. The DPP not only prevents T2DM, but is also long-lasting.

The DPP encourages stakeholder collaboration. Community organizations, healthcare organizations, faith-based organizations, government agencies, employers and private insurers are brought together to achieve a greater impact on T2DM prevention. Healthcare providers are an important stakeholder in program support and referrals. However, Blackwell et al. (2011) found that only 2% of participants were recruited into the program from physicians. Clearly, physician referrals can be and need to be significantly improved.

The lack of referrals from the healthcare community is perplexing. Broad integration in the community would be expected since the initial publication in 2002. However, new treatments are developed much faster than can be incorporated into healthcare. Sustainable linkages between primary care and community resources can address the problem. For example, electronic health records can prompt, flag and remind providers to screen for and follow-up on patients at high risk for T2DM. A single keystroke can refer patients diagnosed with prediabetes to DPP classes. Emails, phone calls and post cards can remind patients to attend DPP classes. Weekly reports from DPP classes can also be sent to providers to track patient attendance and progress. Finally, regular provider follow-ups can assess clinical effectiveness, reinforce learned skills and encourage continued progress. The gap between providers and communities needs to be closed.

**Referral**

Referral to the DPP is one of the most important steps physicians can do to protect the health of their patients. All patients at risk for T2DM or, preferably, diagnosed with prediabetes should be referred to the DPP. Currently, 51% of participants must have a diagnosis of prediabetes confirmed with a blood test. Physicians then become valuable resources. Patients not only trust the recommendations from their doctor, but also must see their doctor to receive necessary blood tests. Additionally, it is crucial to distinguish patients who are truly diabetic. 

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**Source:** CDC

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**Source:** ADA
Patients diagnosed with diabetes are not candidates for the DPP and must receive proper medical care. Separate programs, such as CDC’s National Diabetes Education Program and ADA’s Living With Type 2 Diabetes Program, serve patients with diabetes.

Referral is easy. Refer all patients at risk for T2DM or diagnosed with prediabetes to CDC-registered DPPs. To find CDC-registered DPPs, see DPP Search Locator below.

Resources

The CDC offers many resources to help increase awareness of and referral to DPPs. Two useful resources, risk assessment quiz and DPP search locator, will be discussed here.

Risk Assessment Quiz

The risk assessment quiz is a simple screening tool to identify patients at risk for prediabetes. The quiz is seven yes/no-style questions that can be completed in under one minute. To take the quiz, visit the CDC’s National DPP webpage at cdc.gov/diabetes/prevention and look for the quiz on the main page. Two options are available. Patients can either be encouraged to take it on their own or with their physician. The webpage can be saved to a smartphone’s homescreen to behave like an “app” for quick access.

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<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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<tr>
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<td>0</td>
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<tr>
<td>Do you have a parent with diabetes?</td>
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<td>0</td>
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<td>Do you have a brother or sister with diabetes?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Find your height on the chart. Do you weigh as much as or more than the weight listed for your height?</td>
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<td>0</td>
</tr>
<tr>
<td>Are you younger than 65 years of age and get little or no exercise in a typical day?</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Are you between 45 and 64 years of age?</td>
<td>5</td>
<td>0</td>
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</tr>
<tr>
<td>9+</td>
<td>High</td>
</tr>
</tbody>
</table>

Adapted from the CDC
DPP Search Locator

The search and recommendation of National DPPs are critical for effective patient results. Some lifestyle change programs call themselves DPPs, but deviate from the CDC-approved curriculum. It is, therefore, important to know how to locate CDC-registered DPPs. To locate a CDC-registered DPP, visit the CDC’s National DPP webpage at cdc.gov/diabetes/prevention and click “Find a Program Near You.”

Video

Now that the DPP has been discussed, watch “A Change for Life” video (5:27) from the CDC by visiting cdc.gov/diabetes/prevention/features.htm. A session from a DPP is showcased and individuals describe their experience of being diagnosed with prediabetes and participating in the program. The goal is for physicians to use the program as first-line treatment for prediabetes.

Summary

The Diabetes Prevention Program is a national effort led by the CDC to prevent or delay T2DM. The CDC ensures quality and standardization by disseminating curricula and training lifestyle coaches. Now, awareness of and referrals to the DPP are needed. Physicians are in a prime position to suspect increased risk for T2DM and diagnose prediabetes among individuals who are candidates for the DPP. Patients are also expected to reach out to their physicians to discuss prediabetes. Half of participants must have a diagnosis of prediabetes confirmed with a blood test and would need to visit their physician for the tests. The Ad Council also released a prediabetes campaign in January 2016 (dolhaveprediabetes.org) encouraging individuals at risk for prediabetes to see their physician. Physicians are likely to have an
increased patient demand for prediabetes and need to be aware of prediabetes and the DPP. It is hoped that increased physician awareness of and referrals to the DPP can bring further attention to prediabetes and help reverse the diabetes epidemic.

Source: Ad Council
References


Appendix D

Diabetes Prevention Program Continuing Medical Education Assessment

1. A 42-year-old black male presents for follow-up regarding his hypertension. Blood pressure in the office reads 134/84 and home measurements average <140/90. He takes lisinopril 20 mg qd and atorvastatin 10 mg qd. History reveals he feels well and physical exam is within normal limits. Labs show Na 142 mEq/L, K 4.8 mEq/L, FPG 124 mg/dl, total cholesterol 198 mg/dl, LDL cholesterol 97 mg/dl, HDL cholesterol 42 mg/dl and triglycerides 146 mg/dl. Which of the following is true?

A. The patient should be encouraged to maintain his healthy lifestyle
B. The patient should be referred to the Diabetes Prevention Program
C. The patient should be advised to diet and exercise
D. The patient should be prescribed metformin

Answer
B

Explanation
The Diabetes Prevention Program (DPP) is recommended for all adults with prediabetes. The DPP helps patients lose 5-7% of their body weight to reduce the risk of developing diabetes by 58% and is significantly better than metformin or placebo. In a 15 year follow-up, diabetes incidence was reduced by 27% in the lifestyle group versus 18% in the metformin group.

Reference
2. The Diabetes Prevention Program is led by the

A. National Institutes of Health
B. Centers for Medicare and Medicaid Services
C. Health Resources and Services Administration
D. Centers for Disease Control and Prevention

Answer
D

Explanation
In 2010, Congress passed the National Diabetes Prevention Program (DPP) as part of the Affordable Care Act and authorized the Centers for Disease Control and Prevention (CDC) to lead the program. The CDC DPP is based on the National Institutes of Health study published in the February 7, 2002 issue of the New England Journal of Medicine. The CDC creates curricula, trains lifestyle coaches and disseminates resources for the DPP.

Reference
3. Which of the following patients should be referred to the Diabetes Prevention Program?

A. A 6-year-old female with a FPG of 264 mg/dl
B. A 45-year-old male complaining of polyphagia, polydipsia and polyuria with a random plasma glucose of 232 mg/dl
C. A 32-year-old male with an A1c of 6.1%
D. A 20-year-old pregnant female at 26 weeks gestation with a two-hour OGTT (75 g) of 139 mg/dl

Answer
C

Explanation
The Diabetes Prevention Program (DPP) is recommended for all adults with prediabetes. Prediabetes, also known as impaired fasting glucose, is a condition of glucose intolerance. In prediabetes, blood glucose levels are higher than normal but not high enough to be diagnosed as type 2 diabetes mellitus (T2DM). Prediabetes increases the risk of T2DM, heart disease and stroke.

Diabetes can be diagnosed using multiple methods: symptoms, hemoglobin A1c (A1c), fasting plasma glucose (FPG) and oral glucose tolerance test (OGTT). Symptoms (e.g., polyphagia, polydipsia and polyuria) and random plasma glucose at ≥200 mg/dl are diagnostic. A1c measures the average blood glucose over the past three months and is diagnostic at ≥6.5%. FPG measures the current blood glucose and is diagnostic at ≥126 mg/dl. OGTT (75 g) measures the current blood glucose and is diagnostic at ≥200 mg/dl two-hours post-prandial (PP). For comparison, normal values are <5.7% for A1c, <100 mg/dl for FPG and <140 mg/dl for OGTT. Gestational diabetes mellitus (GDM) is diagnosed at 24-28 weeks of gestation using OGTT (75 g) either at ≥92 mg/dl fasting, ≥180 mg/dl one-hour PP or ≥153 mg/dl two-hour PP; a two-step strategy using a screening test is also available. However, patients with GDM should receive proper medical care instead of referral to the DPP.

Reference
4. A 57-year-old Latina female presents to discuss diabetes. You discuss general risk factors, including age, BMI, exercise habits, family history and obstetrics history. You review her most recent labs which are within normal limits. She asks for an estimated risk of having prediabetes or diabetes. Which of the following should you advise?

A. Advise her that she has no risk for diabetes with normal labs  
B. Advise her to take the risk assessment quiz  
C. Advise her to check her blood glucose daily  
D. Advise her to consult an endocrinologist

**Answer**  
B

**Explanation**  
The Centers for Disease Control and Prevention (CDC) offers the risk assessment quiz to estimate the risk of developing diabetes. The quiz has seven simple “yes/no” questions addressing diabetes risk factors. A score of 3-8 indicates low risk while 9+ indicates high risk for prediabetes. The quiz can be found on the CDC’s webpage at [cdc.gov/diabetes/prevention](http://cdc.gov/diabetes/prevention) and saved on a smartphone’s homescreen to allow quick access.

**Reference**  
5. A 66-year-old non-Hispanic white female presents to review her most recent labs. Her fasting plasma glucose was 119 mg/dL and she is diagnosed with prediabetes. She asks what she should do next and you recommend the Diabetes Prevention Program. Which of the following CDC-registered programs are available in Dayton, Ohio?

A. Diabetes Dayton only  
B. YMCA of Greater Dayton only  
C. Diabetes Dayton, Public Health - Dayton & Montgomery County and YMCA of Greater Dayton  
D. Diabetes Dayton, Public Health - Dayton & Montgomery County, YMCA of Greater Dayton and Wright State University

**Answer**  
C

**Explanation**  
The search and recommendation of Centers for Disease Control and Prevention (CDC)-registered Diabetes Prevention Programs (DPPs) are critical for effective patient results. Some lifestyle change programs call themselves DPPs, but deviate from the CDC-approved curriculum. It is, therefore, important to know how to locate CDC-registered DPPs. To locate a CDC-registered DPP, visit the CDC’s National DPP webpage at cdc.gov/diabetes/prevention and click “Find a Program Near You.”

**Reference**  
6. A 48-year-old Native American male is diagnosed with prediabetes. He shows ambivalence to accept the diagnosis. You refer him to the Diabetes Prevention Program (DPP) and he asks about the program. You discuss that the DPP encourages lifestyle changes to prevent or delay the onset of diabetes. He then asks what lifestyle changes he should expect to learn from the DPP. How do you respond?

A. Increased physical activity only  
B. Increased physical activity and healthier eating  
C. Healthier eating plus problem-solving and coping skills  
D. Increased physical activity and healthier eating plus problem-solving and coping skills

**Answer**  
D

**Explanation**  
The Diabetes Prevention Program is an evidence-based lifestyle change program designed to prevent or delay the onset of type 2 diabetes mellitus. A trained lifestyle coach uses a Centers for Disease Control and Prevention-approved curriculum and guides a small group of participants through the program. Lifestyle coaches help participants make real lifestyle changes by including healthy eating and physical activity into their daily lives. To overcome barriers, problem-solving and coping skills are also taught.

**Reference**  
7. A 37-year-old non-Hispanic white male presents to follow-up on his prediabetes diagnosis. He denies the significance of the diagnosis and is resistant to begin lifestyle changes. Without treatment, what is the chance he will develop diabetes in the next five years?

A. 1-5%
B. 5-15%
C. 15-30%
D. 30-60%

**Answer**

C

**Explanation**

Type 2 diabetes mellitus (T2DM) is a state of insulin resistance in which insulin does not behave normally. In the state, insulin has a reduced action on cells and the pancreas can no longer produce enough insulin to compensate. Skeletal muscle, adipose tissue and liver cells are predominately affected. Notably, skeletal muscle resistance contributes to the beginning stages of impaired glucose tolerance due to metabolic dysfunction. Metabolism plays a critical role in the development of T2DM.

The metabolic dysfunction of T2DM is reversible. Recent research finds that exercise and healthy diet increase antioxidant activity and diminish oxidative stress by inhibiting mitochondrial inflammation. The research not only supports the current understanding of diabetes, but also shows that it can be prevented. Therefore, insulin resistance causes metabolic dysfunction leading to sterile inflammation and can be reversed with diet and exercise.

**References**


8. A 16-year-old black female presents for a physical for her high school swim team. Upon reviewing her family history, you find multiple family members diagnosed with diabetes. She describes her family as physically inactive with an unhealthy diet. She is concerned about developing diabetes when she gets older. How many Americans have prediabetes?

A. 1 in 3  
B. 1 in 5  
C. 1 in 11  
D. 1 in 20  

**Answer**
A  

**Explanation**
Prediabetes is a silent threat to public health. In 2012, 86 million (1 in 3) adults had prediabetes. However, 90% of adults with prediabetes are unaware. The threat lies in the progression to type 2 diabetes mellitus (T2DM). The number of adults with T2DM quadrupled from 5.5 million in 1980 to 21.3 million in 2012. In 2014, 29.1 million adults (9.3% of the population) had T2DM. Almost 2 million adults are diagnosed with T2DM each year and could lead to one-third of adults with T2DM by 2050.

**Reference**
9. The Diabetes Prevention Program (DPP) encourages stakeholder collaboration. Physicians are an important stakeholder in program support and referrals. According to Blackwell et al. (2011), what percentage of participants in DPPs are referred from their physician?

A. 2%
B. 10%
C. 30%
D. 60%

Answer
A

Explanation
Unfortunately, a minuscule percentage of participants in Diabetes Prevention Programs (DPPs) are referred from their physician. According to Blackwell et al. (2011), only 2% of participants were recruited into the program from physicians. Physicians are an important gateway and source of trusted information for patients. It is hoped that increased physician awareness of and referrals to the DPP can bring further attention to prediabetes and help reverse the diabetes epidemic.

Reference
10. A 52-year-old Chinese-American female presents for her annual visit. She has hypertension and hyperlipidemia. A review of her history shows her mother and sister have diabetes. Vitals are HR 86, RR 16, BP 138/86 and BMI 32.4. Concerned about diabetes, you order a hemoglobin A1c while speaking with her. The results are 6.3%. You diagnose her with prediabetes and discuss a lifestyle change program to help prevent or delay diabetes. She shows interest and asks how long the program lasts. How long is the Diabetes Prevention Program?

A. No set duration. Individuals participate as often as they wish.
B. 1 month
C. 6 months
D. 1 year

**Answer**
D

**Explanation**
The Diabetes Prevention Program (DPP) lasts for one year. Participants meet weekly for six months then monthly for six months. Program results are long-lasting. According to Bray et al. (2015), diabetes incidence was significantly reduced throughout the fifteen year follow-up. Notably, two-year weight loss was the strongest predictor of diabetes risk reduction and cardiometabolic improvement among participants. Even transient reversion to normal glucose levels was associated with a significantly reduced risk of diabetes. Clinically, fasting plasma glucose remains the best predictor of diabetes development. The DPP not only prevents diabetes, but is also long-lasting.

**References**


10. Continued


Appendix E

Diabetes Prevention Program Continuing Medical Education Survey

1. What was your overall opinion of the CME activity?
   - Excellent
   - Good
   - Satisfactory
   - Poor

2. 5 = Excellent  4 = Good  3 = Average  2 = Fair  1 = Poor
   5 4 3 2 1 Value of Topic
   5 4 3 2 1 Quality of Learning Material
   5 4 3 2 1 Quality of Assessment
   5 4 3 2 1 Overall Rating

3. Did the CME activity meet the stated objectives?
   - Yes
   - No

4. What did you like most about this CME activity?

5. What did you like least about this CME activity?

6. Do you have specific suggestions as to how this CME activity might be improved?

7. Did you think the CME activity content was:
   - Just right
   - Too advanced
   - Too basic

8. Did you think the use of Pilot for this CME activity was (check all that apply):
   - Just right
   - Too complicated
   - Other (see below)

9. Comments on Pilot interface:
Appendix F

Diabetes Prevention Program Continuing Medical Education Approval

From: Clod-Svensson, Therina
Sent: Tuesday, April 05, 2016 1:50 PM
To: Dohn, Michael N
Cc: Rogers, Nikki Lynn
Subject: Diabetes Prevention Program/CME event approval

Dear Dr. Dohn:

Dr. Painter approved your application for Diabetes Prevention Program (4.1.16-3.31.19). The formal letter of approval will be forwarded to you as soon as possible.

I would appreciate it if you could forward to me COIs and an update of the planning committee.

Thank you.

Katia “Therina” Clod-Svensson
Coordinator,
Faculty and Clinical Affairs
Boonshoft School of Medicine
Wright State University
3640 Colonel Glenn Hwy
Dayton, OH 45435-0001
t.937.245.7640
f.937.245.7956
Appendix G

Diabetes Prevention Program Continuing Medical Education Advertisement

**Diabetes Prevention Program CME**

**DIABETES PREVENTION PROGRAM**

About

The Centers for Disease Control and Prevention (CDC)-led National Diabetes Prevention Program (DPP) is a lifestyle change program for preventing type 2 diabetes.

**FREE 0.5 CREDIT CME**

**Objectives**

After completing the activity, learners will be able to:

- State the rates of prediabetes prevalence and progression to type 2 diabetes mellitus
- Discuss the diagnosis of prediabetes
- Locate CDC-registered Diabetes Prevention Programs
- Describe the Diabetes Prevention Program, including curriculum objectives, referral criteria and available resources
- Recognize the gap in Diabetes Prevention Program referrals from physicians

**Instructions**

To access the activity:

1. Visit pilot.wright.edu
2. Click External Registration
3. Click Diabetes Prevention Program CME
4. Complete the program

Wright State University Boonshoft School of Medicine (WSU BSOM) is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. WSU designates this enduring materials activity for a maximum of 0.5 AMA PRA Category 1 Credit™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

For more information, contact:

Nikki Rogers, PhD, CPH
nikki.rogers@wright.edu
937-258-5655
## Appendix H

### Competencies Met in CE

#### Tier 1 Core Public Health Competencies

<table>
<thead>
<tr>
<th>Domain #1: Analytic/Assessment Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifies quantitative and qualitative data and information (e.g., vital statistics, electronic health records, transportation patterns, unemployment rates, community input, health equity impact assessments) that can be used for assessing the health of a community</td>
</tr>
<tr>
<td>Applies ethical principles in accessing, collecting, analyzing, using, maintaining, and disseminating data and information</td>
</tr>
<tr>
<td>Uses information technology in accessing, collecting, analyzing, using, maintaining, and disseminating data and information</td>
</tr>
<tr>
<td>Selects valid and reliable data</td>
</tr>
<tr>
<td>Uses quantitative and qualitative data</td>
</tr>
<tr>
<td>Describes assets and resources that can be used for improving the health of a community (e.g., Boys &amp; Girls Clubs, public libraries, hospitals, faith-based organizations, academic institutions, federal grants, fellowship programs)</td>
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<table>
<thead>
<tr>
<th>Domain #2: Policy Development/Program Planning Skills</th>
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<tbody>
<tr>
<td>Contributes to development of program goals and objectives</td>
</tr>
<tr>
<td>Describes organizational strategic plan (e.g., includes measurable objectives and targets; relationship to community health improvement plan, workforce development plan, quality improvement plan, and other plans)</td>
</tr>
<tr>
<td>Contributes to implementation of organizational strategic plan</td>
</tr>
<tr>
<td>Identifies current trends (e.g., health, fiscal, social, political, environmental) affecting the health of a community</td>
</tr>
<tr>
<td>Describes implications of policies, programs, and services</td>
</tr>
<tr>
<td>Implements policies programs, and services</td>
</tr>
<tr>
<td>Gathers information for evaluating policies, programs, and services (e.g., outputs, outcomes, processes, procedures, return on investment)</td>
</tr>
<tr>
<td>Applies strategies for continuous quality improvement</td>
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<thead>
<tr>
<th>Domain #3: Communication Skills</th>
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</thead>
<tbody>
<tr>
<td>Communicates in writing and orally with linguistic and cultural proficiency (e.g., using age-appropriate materials, incorporating images)</td>
</tr>
<tr>
<td>Solicits input from individuals and organizations (e.g., chambers of commerce, religious organizations, schools, social service organizations, hospitals, government, community-based organizations, various populations served) for improving the health of a community</td>
</tr>
<tr>
<td>Suggests approaches for disseminating public health data and information (e.g., social media, newspapers, newsletters, journals, town hall meetings, libraries, neighborhood gatherings)</td>
</tr>
<tr>
<td>Conveys data and information to professionals and the public using a variety of approaches (e.g., reports, presentations, email, letters)</td>
</tr>
<tr>
<td>Communicates information to influence behavior and improve health (e.g., uses social marketing methods, considers behavioral theories such as the Health Belief Model or Stages of Change Model)</td>
</tr>
<tr>
<td>Facilitates communication among individuals, groups, and organizations</td>
</tr>
<tr>
<td>Describes the roles of governmental public health, health care, and other partners in improving the health of a community</td>
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<tr>
<th>Domain #4: Cultural Competency Skills</th>
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<tr>
<th>Domain #5: Community Dimensions of Practice Skills</th>
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<tbody>
<tr>
<td>Describes the programs and services provided by governmental and non-governmental organizations to improve the health of a community</td>
</tr>
<tr>
<td>Recognizes relationships that are affecting health in a community (e.g., relationships among health departments, hospitals, community health centers, primary care providers, schools, community-based organizations, and other types of organizations)</td>
</tr>
<tr>
<td>Suggests relationships that may be needed to improve health in a community</td>
</tr>
<tr>
<td>Supports relationships that improve health in a community</td>
</tr>
<tr>
<td>Collaborates with community partners to improve health in a community (e.g., participates in committees, shares data and information, connects people to resources)</td>
</tr>
<tr>
<td>Engages community members (e.g., focus groups, talking circles, formal meetings, key informant interviews) to improve health in a community</td>
</tr>
<tr>
<td>Provides input for developing, implementing, evaluating, and improving policies, programs, and services</td>
</tr>
<tr>
<td>Domain #5: Community Dimensions of Practice Skills (continued)</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Uses assets and resources (e.g., Boys &amp; Girls Clubs, public libraries, hospitals, faith-based organizations, academic institutions, federal grants, fellowship programs) to improve health in a community</td>
</tr>
<tr>
<td>Informs the public about policies, programs, and resources that improve health in a community</td>
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<tr>
<th>Domain #6: Public Health Sciences Skills</th>
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<tbody>
<tr>
<td>Retrieves evidence (e.g., research findings, case reports, community surveys) from print and electronic sources (e.g., PubMed, Journal of Public Health Management and Practice, Morbidity and Mortality Weekly Report, The World Health Report) to support decision making</td>
</tr>
<tr>
<td>Recognizes limitations of evidence (e.g., validity, reliability, sample size, bias, generalizability)</td>
</tr>
<tr>
<td>Describes evidence used in developing, implementing, evaluating, and improving policies, programs, and services</td>
</tr>
<tr>
<td>Suggests partnerships that may increase use of evidence in public health practice (e.g., between practice and academic organizations, with health sciences libraries)</td>
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<tr>
<th>Domain #7: Financial Planning and Management Skills</th>
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<tbody>
<tr>
<td>Adheres to organizational policies and procedures</td>
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<tr>
<td>Operates programs within budget</td>
</tr>
<tr>
<td>Motivates colleagues for the purpose of achieving program and organizational goals (e.g., participating in teams, encouraging sharing of ideas, respecting different points of view)</td>
</tr>
<tr>
<td>Uses evaluation results to improve program and organizational performance</td>
</tr>
<tr>
<td>Describes program performance standards and measures</td>
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<tr>
<th>Domain #8: Leadership and Systems Thinking Skills</th>
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<tbody>
<tr>
<td>Incorporates ethical standards of practice (e.g., Public Health Code of Ethics) into all interactions with individuals, organizations, and communities</td>
</tr>
<tr>
<td>Describes public health as part of a larger inter-related system of organizations that influence the health of populations at local, national, and global levels</td>
</tr>
<tr>
<td>Describes the ways public health, health care, and other organizations can work together or individually to impact the health of a community</td>
</tr>
<tr>
<td>Contributes to development of a vision for a healthy community (e.g., emphasis on prevention, health equity for all, excellence and innovation)</td>
</tr>
<tr>
<td>Describes needs for professional development (e.g., training, mentoring, peer advising, coaching)</td>
</tr>
<tr>
<td>Participates in professional development opportunities</td>
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