Prediabetes & Type 2 Diabetes Prevention
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Disclosures

• None.
Learning Objectives

• Screen patients for prediabetes and type 2 diabetes risk

• Choose appropriate pharmacologic agents for diabetes management

• Identify and treat modifiable risk factors for cardiovascular disease

• Refer patients to a Diabetes Prevention Program or a Diabetes Self-Management Program

What is Prediabetes?

<table>
<thead>
<tr>
<th>Fasting plasma glucose</th>
<th>2-hour plasma glucose on OGTT</th>
<th>Hemoglobin A1C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>Prediabetes</td>
<td>Prediabetes</td>
</tr>
<tr>
<td>126 mg/dL</td>
<td>Impaired fasting glucose</td>
<td>Impaired glucose tolerance</td>
</tr>
<tr>
<td>Normal</td>
<td>100 mg/dL</td>
<td>Normal</td>
</tr>
<tr>
<td>200 mg/dL</td>
<td>140 mg/dL</td>
<td></td>
</tr>
<tr>
<td>6.5%</td>
<td>5.7%</td>
<td></td>
</tr>
</tbody>
</table>

Any abnormality must be repeated and confirmed on a separate day using the same test.

The diagnosis of diabetes can also be made based on unequivocal symptoms and a random glucose >200 mg/dL.
Prevalence of Prediabetes

- 84.1 million people (33.9% of U.S. adults aged 18 years or older) had prediabetes in 2015
- Nearly half of adults aged 65 years or older had prediabetes
- Among adults with prediabetes, 11.6% reported being told by HCP that they had this condition
- Prevalence of prediabetes was similar among racial and ethnic groups

2011–2014 National Health and Nutrition Examination Survey (NHANES), CDC

Risk Factors for Type 2 Diabetes and CVD

- Associated with:
  - Family history of diabetes
  - Obesity (especially abdominal or visceral)
  - Physical inactivity
  - Dyslipidemia
  - High triglycerides and/or low HDL cholesterol
  - Hypertension
- Interventions to reduce rate of progression to diabetes:
  - Healthy diet
  - Physical activity
  - Weight loss
  - Pharmacotherapy

Case Study

Introduction

• Mr. N is an Asian male who just turned 45 years old. He comes in for a routine checkup a week after his birthday. He has mild asthma and smokes one pack per day but is considering quitting. He has no other health complaints and hasn’t had a checkup in 3 years.

• He is an investment banker and spends long hours at the office on his computer. He claims that he has limited time to exercise. No one in his immediate family has had diabetes but his father has hypertension.

• Physical exam: height, 5’9” (175 cm); weight, 180 lbs (82 kg); BMI, 26.7 kg/m²; BP, 130/80 mmHg

Continued...
Consider testing (screening) all adults with a BMI ≥25 kg/m² (≥23 in Asian Americans) and additional risk factors:

- If no risk factors, consider screening no later than age 45 years.
- If normal results, repeat testing (screening) at ≤3-year intervals. More frequently depending on initial test results and risk factors.
- Test yearly if prediabetes.

### DIABETES RISK FACTORS

- Physical inactivity
- First-degree relative with diabetes
- High-risk race/ethnicity
- Women diagnosed with GDM
- Hypertension (≥140/90 mmHg or on therapy for hypertension)
- HDL-C <35 mg/dL and/or a TG >250 mg/dL
- A1C ≥5.7%, IGT, or IFG on previous testing
- Other clinical conditions associated with insulin resistance, such as severe obesity, acanthosis nigricans, PCOS
- History of CVD

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### Case Study (cont’d)

**Discussion Question**

Should Mr. N be screened for type 2 diabetes?

A. Yes
B. No
Risk Assessment for Diabetes

- Be proactive in an effort to improve outcomes
- Assess for risk factors
- Ask patients to take the ADA Diabetes Risk Test. *(5 or more=risk)*
- If diagnosed with diabetes/prediabetes
  - refer to a Diabetes Prevention Program
  - continue ongoing diabetes screening

* Available at: diabetes.org/risktest

PREVENTING OR DELAYING
TYPE 2 DIABETES
Overview of Type 2 Diabetes Prevention Trials: Lifestyle Modification Intervention

- Lifestyle intervention continues to have an effect, even after 20 years

<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>Intervention</th>
<th>Treatment</th>
<th>Risk reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Da Qing(^{1,2})</td>
<td>IGT</td>
<td>577</td>
<td>Lifestyle</td>
<td>6 years 20 years</td>
</tr>
<tr>
<td>Finnish DPS(^{3,4})</td>
<td>IGT</td>
<td>523</td>
<td>Lifestyle</td>
<td>3+ years 7 years</td>
</tr>
<tr>
<td>Diabetes Prevention Program (DPP)(^{5,6})</td>
<td>IGT</td>
<td>3,324</td>
<td>Lifestyle</td>
<td>3 years 10 years</td>
</tr>
</tbody>
</table>


Diabetes Prevention Program

Refer patients to an intensive behavioral lifestyle intervention program modeled on the Diabetes Prevention Program to:

- achieve and maintain 5-7% loss of initial body weight
- increase moderate-intensity physical activity (such as brisk walking) to at least 150 min/week

[cdc.gov/prediabetes](http://cdc.gov/prediabetes)
Diabetes Prevention Program

- Reduced type 2 diabetes by 58% over 3 years
  - 5-7% weight loss
  - 150 minutes of physical activity/week (brisk walking)
- Metformin most effective in individuals:
  - BMI ≥ 35 kg/m²
  - <60 years of age
  - History of GDM


Lifestyle Modification: *Facilitating Weight Loss*

- Initial target: 1-2 pound/week weight loss
- Long-range goal: 7% loss of body weight
- Increase physical activity to at least 150 min/week
- Individualized medical nutrition therapy

American Diabetes Association Standards of Medical Care in Diabetes. 5. Prevention or delay of type 2 diabetes. *Diabetes Care* 2018; 41 (Suppl. 1): S51-S54
Achieving Healthy Eating Habits: Plate Method

Non-starchy vegetables
- Spinach
- Carrots
- Lettuce
- Greens
- Cabbage
- Green beans
- Broccoli
- Cauliflower
- Tomatoes

Grains and starchy foods
- Whole grain breads
- Whole wheat or rye
- Whole grain
- High-fiber

Protein
- Chicken/turkey without skin
- Fish (tuna, salmon, cod, catfish)
- Tofu, eggs, low-fat cheese
- Lean cuts of beef and pork

American Diabetes Association. Create your plate.
Available at: diabetes.org/createyourplate/

Lifestyle Modification: Physical Activity

Adults
- \( \geq 150 \) minutes/week of moderate-intensity aerobic activity
  - Spread over 3 or more days every week
  - No more than 2 consecutive days without exercise
- Resistance training \( \geq 2 \) times/week
- Break up extended periods of sedentary time (every 30 minutes)

Children
- \( \geq 60 \) minutes/day of physical activity
- For children with diabetes and prediabetes

American Diabetes Association Standards of Medical Care in Diabetes.
5. Prevention or delay of type 2 diabetes. Diabetes Care 2018; 41 (Suppl. 1): S51-S54
Technology Tools for Prevention

Technology-assisted tools may be useful elements of effective lifestyle modification to prevent diabetes
- Telephone-delivered DPP
- Online DPP – with coach interaction

Tools that *may* assist
- Internet-based social networks
- Distance learning
- DVD-based content
- Mobile Applications
- Fitness Trackers

Diabetes Prevention Program: 10-Year Cost-Effectiveness

- Lifestyle cost-effective, metformin cost-saving *vs.* placebo
- Investment in lifestyle, metformin interventions for diabetes prevention in high-risk adults provides good value
Overview of Prediabetes Trials: Pharmacologic Intervention

- Pharmacologic intervention provides benefit but with increased adverse effects with some drugs

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<th>Treatment</th>
<th>Risk reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Prevention Program (DPP)1,2</td>
<td>IGT</td>
<td>Metformin</td>
<td>3 years</td>
<td>31%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 years</td>
<td>18%</td>
</tr>
<tr>
<td>DREAM3</td>
<td>IGT</td>
<td>Rosiglitazone</td>
<td>3 years</td>
<td>60%</td>
</tr>
<tr>
<td>STOP-NIDDM4,5</td>
<td>IGT</td>
<td>Acarbose</td>
<td>3 years</td>
<td>21%</td>
</tr>
<tr>
<td>ACT NOW6</td>
<td>IFG</td>
<td>Pioglitazone</td>
<td>3 years</td>
<td>81%</td>
</tr>
</tbody>
</table>


Metformin For Prediabetes

Consider metformin therapy for prevention of type 2 diabetes in those with prediabetes, especially for those with

- BMI $\geq$ 35 kg/m$^2$
- Age < 60 years
- Prior gestational diabetes
- Rising A1C despite lifestyle intervention

American Diabetes Association Standards of Medical Care in Diabetes. 5. Prevention or delay of type 2 diabetes. Diabetes Care 2018; 41 (Suppl. 1): S51-S54
Referrals

• National Diabetes Prevention Program
cdc.gov/prediabetes

• Team-based approach to care
  – Physician
  – Nurse practitioner/physician assistant
  – Certified diabetes educator
  – Registered dietitian
  – Pharmacist
  – Exercise physiologist
  – Social worker/psychologist

Identify and Treat CV Risk Factors in People with Prediabetes

<table>
<thead>
<tr>
<th>Non-modifiable</th>
<th>Modifiable</th>
</tr>
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<tbody>
<tr>
<td>Age</td>
<td>Physical inactivity</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>Overweight/obesity</td>
</tr>
<tr>
<td>Gender</td>
<td>Hypertension</td>
</tr>
<tr>
<td>Family history</td>
<td>Smoking</td>
</tr>
<tr>
<td></td>
<td>Abnormal lipid levels</td>
</tr>
</tbody>
</table>
Follow-up Screening/Counseling

- Shown to be important to success
- Provide follow-up screenings for the development of diabetes
  - At least every 12 months for those with prediabetes
  - At least every 3 years if screening is negative
- On a regular basis, search EHR to determine who needs to be screened/rescreened
- Continually screen for modifiable risk factors at each interaction

Evaluating Progress – What to Do

- Assess patient's concerns
- Reconcile their medications and lifestyle
- Revise the management plan as needed
  - If it doesn’t work in the patient’s life, it doesn’t work
- Ask the patient to identify one strategy/goal they would like to accomplish
- Provide information about materials available to achieve goals, such as weight loss or physical activity log
Conclusions

As a member of the healthcare team, YOU can make a difference.

• Only 11% of people with prediabetes are aware they have it
• Identify those at risk for diabetes:
  – Proactively assess risk and screen/rescreen
  – Assess/advise with management strategies
  – Refer to Diabetes Prevention Program
  – Continually follow-up and evaluate
• Collaborate with other members of the healthcare team

Helpful Resources
ADA’s DPP Charting Platform

• ~15% of ADA’s recognized DSMES programs are also Diabetes Prevention Programs

• ADA can assist your organization in becoming a CDC Recognized DPP provider with our web-based DPP Charting Platform that aligns with the CDC DPP data collection reporting requirements

• ADA conducts free monthly DPP Charting Platform webinars. Register at www.diabetes.org/erpqa

For more information on the DPP Charting Platform contact the ADA at:
erp@diabetes.org or 1.888.232.0822

Thank You!