Prediabetes & Type 2 Diabetes Prevention

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American Diabetes Association®

Disclosures

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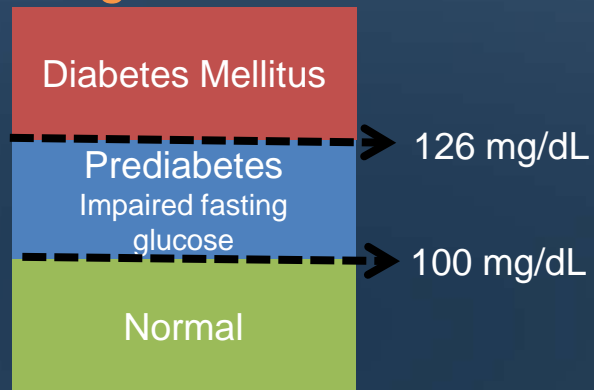
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Disclosed no conflict of interest
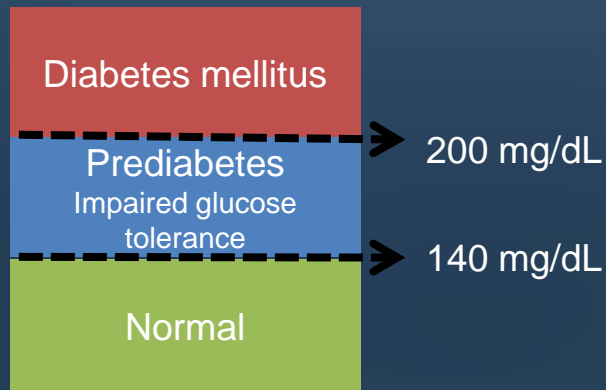
Learning Objectives

- List risk factors and clinical signs in individuals at risk for type 2 diabetes

- Identify interventions to modify risk factors to preventing type 2 diabetes

- Develop a strategic management plan to proactively screen, assess, follow-up and evaluate patients with prediabetes

- Discuss benefits of referrals to achieve target goals and objectives

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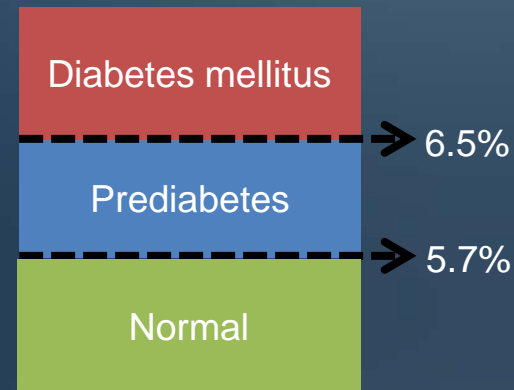
What is Prediabetes?

Fasting plasma glucose

Diabetes Mellitus
Prediabetes Impaired fasting glucose
Normal

→ 126 mg/dL
→ 100 mg/dL

2-hour plasma glucose on OGTT

Diabetes mellitus
Prediabetes Impaired glucose tolerance
Normal

→ 200 mg/dL
→ 140 mg/dL

Hemoglobin A1C

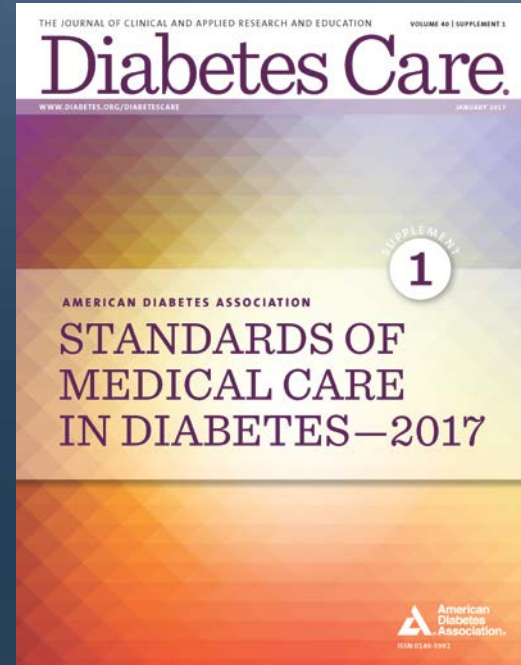| |
|---|
| Diabetes mellitus |
| Prediabetes |
| Normal |

→ 6.5%
→ 5.7%

Any abnormality must be repeated and confirmed on a separate day

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

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Guidelines

- Full version
- Abridged version for PCPs
- Free app
- Pocket cards with key figures
- Free webcast for continuing education credit

Professional.Diabetes.org/SOC

THE JOURNAL OF CLINICAL AND APPLIED RESEARCH AND EDUCATION   VOLUME 40 | SUPPLEMENT 1

Diabetes Care.

WWW.DIABETES.ORG/DIABETESCARE   JANUARY 2017

AMERICAN DIABETES ASSOCIATION

STANDARDS OF MEDICAL CARE IN DIABETES—2017

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Prediabetes

- An important risk factor for future diabetes and CV disease

- Risk for prediabetes is a continuum

- Important to identify early and begin intervention immediately

- Interventions can reduce the rate of progression from prediabetes to diabetes
  - Healthy diet
  - Physical activity
 - Weight loss
  - Pharmacotherapy

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Prediabetes

- Not clinical entity but rather risk factors for diabetes and cardiovascular disease
- Associated with:
  - Physical inactivity
  - Obesity (especially abdominal or visceral)
  - Dyslipidemia
  - High triglycerides and/or low HDL cholesterol
  - Hypertension

Prediabetes (NHANES 2012)

- 37% of (86 million) U.S. adults aged 20 years or older have prediabetes.[1]
  - Percentage was similar by race.

35%   **39%**   **38%**

Non-Hispanic Whites   Non-Hispanic Blacks   Hispanics
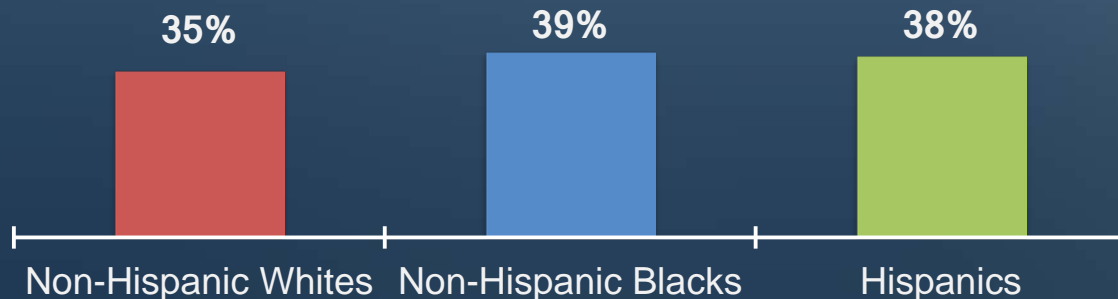
  - 51% aged ≥65 years

- Only 11% were aware they had it.[2]

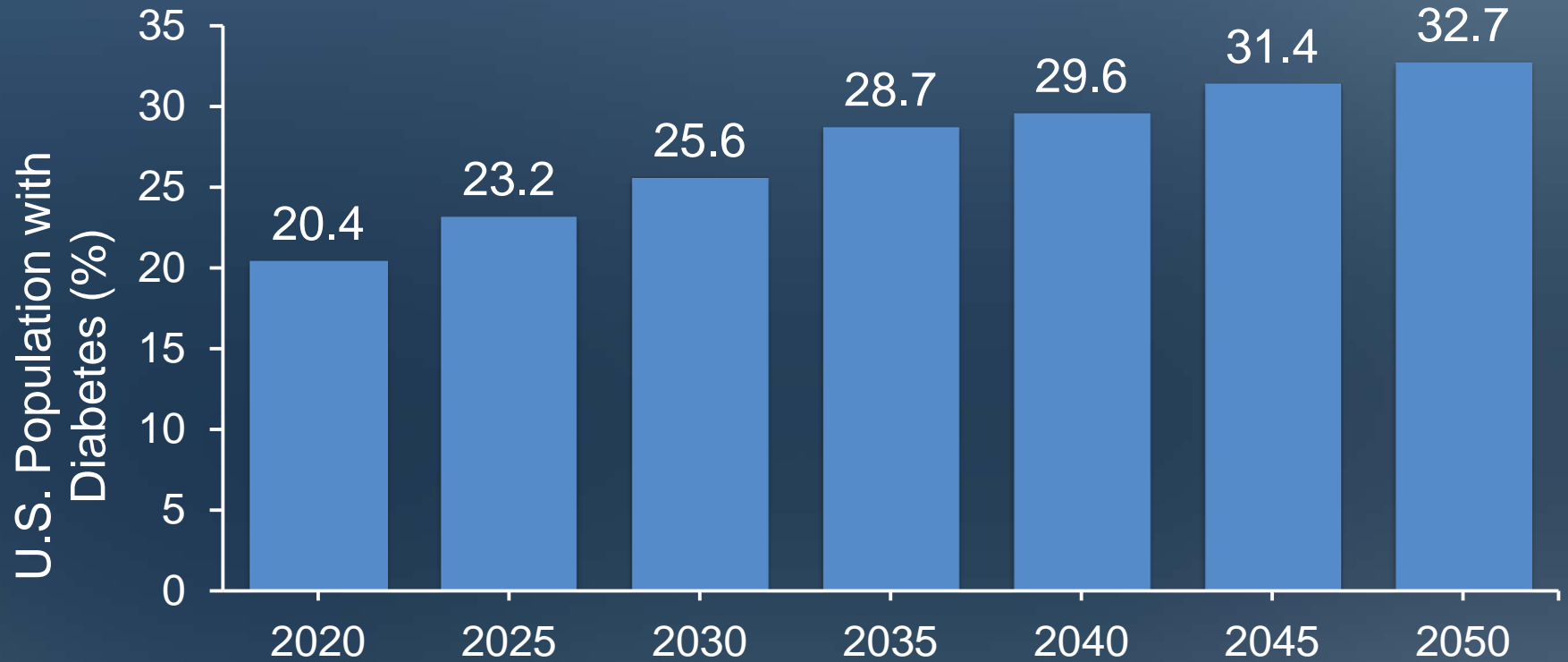- In adolescents aged 12 to 19 years, prevalence of prediabetes and diabetes increased from 9% to 23%.[3]

1. CDC. National Diabetes Statistics Report.
2. CDC. MMWR Morb Mortal Wkly Rep. 2013;62:209-212.
3. May AL, et al. Pediatrics. 2012;129:1035–1041.

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Projecting the Future Diabetes Population: It Is Growing

Bar chart showing U.S. Population with Diabetes (%) by year:
- 2020: 20.4
- 2025: 23.2
- 2030: 25.6
- 2035: 28.7
- 2040: 29.6
- 2045: 31.4
- 2050: 32.7

Boyle JP, et al. Popul Health Metr. 2010;8:1-12.

ASSESSMENT

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 is a-pack-a-day smoker but is considering quitting. He has no other health complaints and hasn't had a checkup in 3 years.

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

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

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Case Study (cont'd)

Diabetes Risk Test

1 How old are you?
- Less than 40 years (0 points)
- 40—49 years (1 point)
- 50—59 years (2 points)
- 60 years or older (3 points)

2 Are you a man or a woman?
- Man (1 point)   Woman (0 points)

3 If you are a woman, have you ever been diagnosed with gestational diabetes?
- Yes (1 point)   No (0 points)

4 Do you have a mother, father, sister, or brother with diabetes?
- Yes (1 point)   No (0 points)

5 Have you ever been diagnosed with high blood pressure?
- Yes (1 point)   No (0 points)

6 Are you physically active?
- Yes (0 points)   No (1 point)

7 What is your weight status? (see chart at right)

Write your score in the box.

Scores:
1
1
0
0
0
1
1

Height	Weight (lbs.)		
4' 10"	119-142	143-190	191+
4' 11"	124-147	148-197	198+
5' 0"	128-152	153-203	204+
5' 1"	132-157	158-210	211+
5' 2"	136-163	164-217	218+
5' 3"	141-168	169-224	225+
5' 4"	145-173	174-231	232+
5' 5"	150-179	180-239	240+
5' 6"	155-185	186-246	247+
5' 7"	159-190	191-254	255+
5' 8"	164-196	197-261	262+
5' 9"	169-202	203-269	270+
5' 10"	174-208	209-277	278+
5' 11"	179-214	215-285	286+
6' 0"	184-220	221-293	294+
6' 1"	189-226	227-301	302+
6' 2"	194-232	233-310	311+
6' 3"	200-239	240-318	319+
6' 4"	205-245	246-327	328+
	(1 Point)	(2 Points)	(3 Points)

You weigh less than the amount in the left column (0 points)

If you scored 5 or higher: You are at increased risk for having type 2 diabetes.

Continued...

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Case Study (cont'd)

Discussion Question

Should Mr. N be screened for type 2 diabetes?

A. Yes

B. No

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Criteria for Screening for Prediabetes in Asymptomatic Adults

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

- Consider testing (screening) all adults with a BMI ≥25 kg/m^2 ($\geq$ 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

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Risk Assessment for Diabetes

- Be proactive in an effort to improve outcomes.

- Find out who might have risk factors.

- Ask patients to take the ADA Diabetes Risk Test.*

- Depending on results, invite them into the office to be tested.

- If diagnosed with diabetes/prediabetes, follow up and evaluate.

* Available at: www.diabetes.org/risktest

Identify and Treat CV Risk Factors in People with Prediabetes

Non-modifiable
Age
Race/ethnicity
Gender
Family history

Modifiable
Physical inactivity
Overweight/obesity
Hypertension
Smoking
Abnormal lipid levels

American Diabetes Association. *Diabetes Care.* 2017:40(Suppl 1):S11-S24.

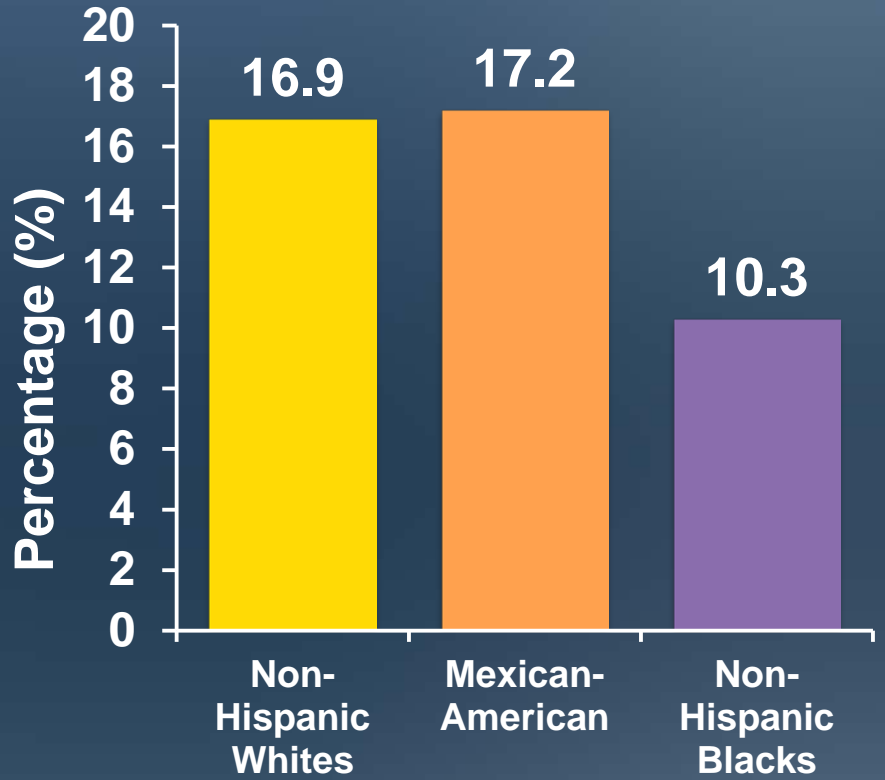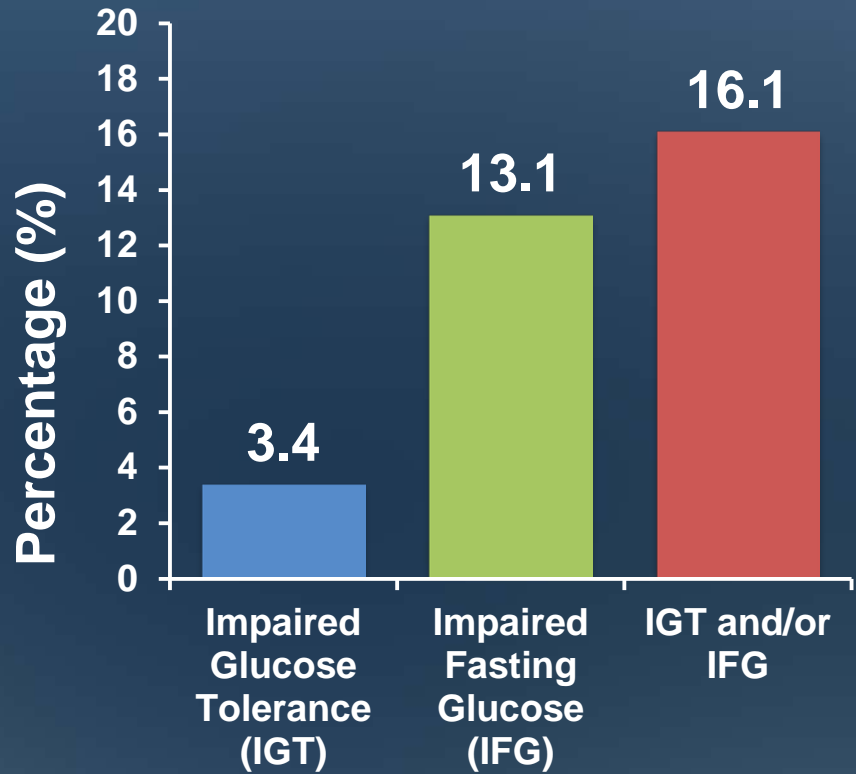American Diabetes Association.

Children/Adolescents – Prevalence of Prediabetes in the U.S.

Li C, et al. *Diabetes Care.* 2009;32:342-347.

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Think-Pair-Share

Mr. N mentions that he has a 15-year-old son who is overweight and his wife had GDM when she was pregnant with him.

- What are his son's risk factors?
- What steps would you recommend to Mr. N concerning his son?

Criteria for Testing for T2DM in Children & Adolescents

- Overweight plus any 2 :
  - Family history of type 2 diabetes in 1st or 2nd degree relative
  - Race/ethnicity
  - Signs of insulin resistance or conditions associated with insulin resistance
  - Maternal history of diabetes or GDM

- Age of initiation 10 years or at onset of puberty

- Frequency: every 3 years

- Test with FPG, OGTT, or A1C

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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

Study		n	Intervention	Treatment	Risk reduction
Da Qing[1,2]	IGT	577	Lifestyle	6 years 20 years	34% - 69%
Finnish DPS[3,4]	IGT	523	Lifestyle	3+ years 7 years	58%
Diabetes Prevention Program (DPP)[5,6]	IGT	3,324	Lifestyle	3 years 10 years	58% 34%

1. *Diabetes Care.* 1997;20:537-544.
2. *Lancet.* 2008;371:1783-1789.
3. *N Engl J Med.* 2001;344:1343-1350.
4. *Lancet.* 2006;368:1673-1679.
5. *N Engl J Med.* 2002;346:393-403.
6. *Lancet.* 2009;374:1677-1686.

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Diabetes Prevention Program

- Reduced type 2 diabetes by 58% over 3 years
  - 7% weight loss
  - 150 minutes of physical activity/week (brisk walking)
- Metformin as effective in participants with BMI ≥ 35 kg/m^2 and women with history of GDM

Diabetes Prevention Program Research Group. *Diabetes Care*. 2012;35:723-730.

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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

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Lifestyle Modification: *Physical Activity*

Adults

- ≥ 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 ≥ 2 times/week
- Break up extended periods of sedentary time (every 30 minutes)

Children

- ≥ 60 minutes/day of physical activity
- For children with diabetes and prediabetes

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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

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Technology Tools for Prevention

Technology-assisted tools may be useful elements of effective lifestyle modification to prevent diabetes.

- Internet-based social networks

- Distance learning

- DVD-based content

- Mobile Applications

Diabetes Prevention Program: 10-Year Cost-Effectiveness

- Lifestyle cost-effective, metformin marginally cost-saving vs. placebo
- Investment in lifestyle, metformin interventions for diabetes prevention in high-risk adults provides good value

DEPLOY Pilot Study:
Diabetes Prevention in the Community

- Adults BMI ≥24 kg/m^2, ≥2 diabetes risk factors, blood glucose 110-199 mg/dL

- Randomized to group-based DPP lifestyle intervention or brief counseling (control)

Outcome, 4-6 months	Control (n = 38)	Intervention (n = 39)	P value (vs. control)
% change in weight	−2.0 (−3.3, −0.6)	−6.0 (−7.3, −4.7)	< 0.001
% change BMI	−2.3 (−3.7, −0.8)	−5.8 (−7.3, −4.4)	0.001
Change total cholesterol	+6 mg/dL (−2.8, 14.8)	−21.6 mg/dL −29.9, −13.3)	< 0.001

Ackermann RT, et al. *Am J Prevent Med.* 2008;35:357-363.

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Overview of Prediabetes Trials: Pharmacologic Intervention

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

Study		n	Intervention	Treatment	Risk reduction
Diabetes Prevention Program (DPP)1,2	IGT	3,324	Metformin	3 years 10 years	31% 18%
DREAM3	IGT	5,269	Rosiglitazone	3 years	60%
STOP-NIDDM4,5	IGT	1,429	Acarbose	3 years	21%
ACT NOW6	IFG	~600	Pioglitazone	3 years	81%

1. *Diabetes Care.* 1997;20:537-544.   2. *Lancet.* 2008;371:1783-1789.
3. *N Engl J Med.* 2001;344:1343-1350.   4. *Lancet.* 2006;368:1673-1679.
5. *N Engl J Med.* 2002;346:393-403.   6. *Lancet.* 2009;374:1677-1686.

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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

Referrals

- National Diabetes Prevention Program
- Team-based approach to care
  - Physician
  - Nurse practitioner/physician assistant
  - Certified diabetes educator
  - Registered dietitian
  - Pharmacist
  - Exercise physiologist
  - Social worker/psychologist

Follow-up 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

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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

Funnell M. Role of Diabetes Education in Patient Management.
Therapy for Diabetes Mellitus and Related Disorders.

American Diabetes Association.

Follow-up Assessment Materials – *Documentation Logs*

- Use a log to track different parameters:
  - Weight
  - Calorie intake
  - Hours of sleep
  - Exercise time
  - Daily fitness and strength training

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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 asses 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

Guidelines

- Full version
- Abridged version for PCPs
- Free app
- Pocket cards with key figures
- Free webcast for continuing education credit

Professional.Diabetes.org/SOC
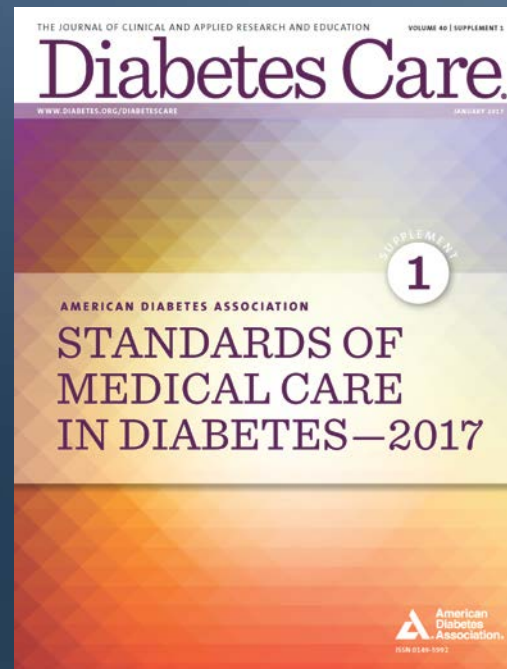
Professional Education

- Live programs

- Online self-assessment programs

- Online webcasts

Professional.Diabetes.org/CE
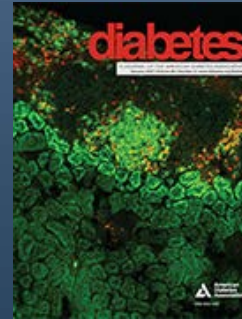
Diabetes Self-Management Education

- Find a recognized Diabetes Self-Management program

- Become a recognized DSME program

- Tools and resources for DSME programs

- Online education documentation tools

Professional.Diabetes.org/ERP

Professional Membership

- Journals
- Meeting, book and journal discounts
- Career center
- Quarterly member newsletter

Professional.Diabetes.org/membership

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Thank You!

ICD-10 Codes for Prediabetes Testing

ICD-10 Code*	Procedure/documentation
R73.01	• Impaired fasting glucose/ - Has yet to be diagnosed with diabetes
R73.02	• Impaired glucose tolerance test/ - Has not been diagnosed with diabetes

R73.03	• Evidence of other impairment of glucose metabolism/
	   - Has not been diagnosed with diabetes
	   - Make sure abnormal glucose levels has been documented when using this code

E88.81	• 3 of the 5 components of cardiometabolic syndrome (e.g., obese, hypertension, elevated triglycerides)/ - Must report which manifestation of the cardiometabolic syndrome the patient has