Prediabetes:
Exposing a Simmering Menace

Jonathan Weber MA, PA-C, DFAAPA
Yale School of Medicine Physician Associate Program
Yale Medicine, Endocrine & Metabolism Division

May 22, 2022

Yale SCHOOL OF MEDICINE
Physician Associate Program

Faculty

Jonathan Weber, MA, PA-C, DFAAPA

- Assistant Professor & Associate Director of Didactic Education, Section of General Internal Medicine, Yale School of Medicine
  Physician Associate Program, Yale University
  https://medicine.yale.edu/profile/jonathan_weber/

- Yale Medicine, Endocrine & Metabolism Division, Yale Diabetes Center
  https://www.yalemedicine.org/specialists/jonathan_weber

Disclosures

- **I have no relevant relationships with ineligible companies to disclose within the past 24 months.**

4 M's of the COVID-19 Pandemic…and life!

- Movement
- Mindfulness
- Meaningful Engagement
- Mastery

Pre-Session Questions

1. **Which of the following best fits 2022 ADA/EASD care guidelines for patients at risk for pre-diabetes?**

A. Screen for prediabetes beginning at age 40
B. Apply generalized treatment algorithms as 1st line therapy
C. Refer overweight patients to Certified Diabetes Care & Education Specialists (CDCES) at initial visit
D. Prescribe Metformin for prediabetes to prevent type 2 diabetes

Pre-Session Questions

2. What % of pancreatic β-cell dysfunction may be lost by the time patients are diagnosed with type 2 diabetes?

A. 50%
B. 60%
C. 70%
D. 80%

Pre-Session Questions

3. According to the American College of Lifestyle Medicine, what % of US adults live a healthy lifestyle?

A. < 5%
B. 6-10%
C. 11-15%
D. 16-20%

Session Objectives

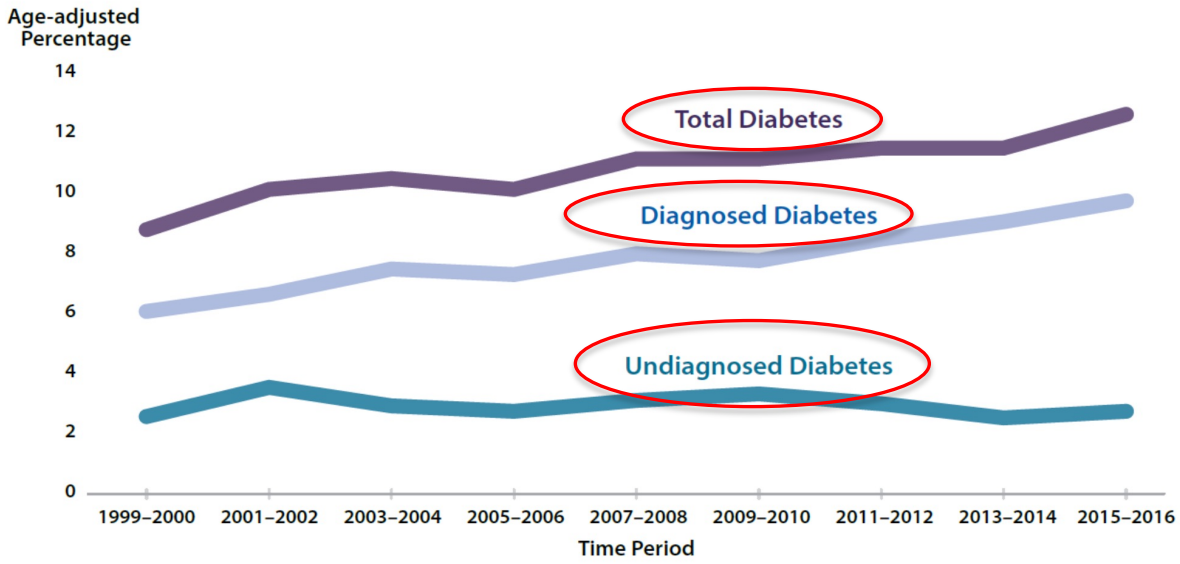
At the end of the presentation, the participant will be able to:

- ***Compare the epidemiology & pathophysiology of prediabetes to diabetes***
- ***Review risk factors, screening tools & diagnostic criteria for prediabetes***
- ***Analyze the relationship between prediabetes, diabetes & other chronic diseases***
- ***Develop screening strategies & evidence-based treatment plans for patients with suspected prediabetes***

Epidemiologic Trends of Diabetes: 1999-2016

- **Diabetes :** 34.2 million people have diabetes (10.5% of US population)
  - **Diagnosed:** 26.9 million people
  - **Undiagnosed:** 7.3 million people

Figure 1. Trends in age-adjusted prevalence of diagnosed diabetes, undiagnosed diabetes, and total diabetes among adults aged 18 years or older, United States, 1999–2016.



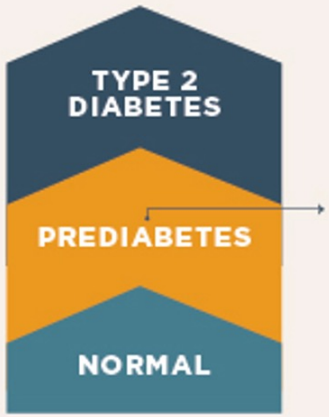
9.5% → 12.0%

Notes: Diagnosed diabetes was based on self-report. Undiagnosed diabetes was based on fasting plasma glucose and A1C levels among people self-reporting no diabetes.

Data source: 1999–2016 National Health and Nutrition Examination Surveys.

[1]Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2020. Dept of Health and Human Services. Accessed January 12, 2021. https://www.cdc.gov/diabetes/data/statistics-report/index.html

“Simmering” Prevalence & Impact of Prediabetes



PREDIABETES COULD IT BE YOU?

88 MILLION 88 million American adults — more than 1 in 3 — have prediabetes

MORE THAN **8** IN **10** adu
doi

Prediabetes increases your risk of:

TYPE 2 DIABETES

RR 5.88 (5.02-6.89)

HEART DISEASE

RR 1.21 (1.01-1.21)

STROKE

RR 1.42 (1.13-1.80)

-National Diabetes Statistics Report 2020: https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf
-Xu XY, Leung AYM, Smith R, Wong JYH, Chau PH, Fong DYT. The relative risk of developing type 2 diabetes among individuals with prediabetes compared with individuals with normoglycaemia: Meta-analysis and meta-regression. J Adv Nurs. 2020;76(12):3329-3345. doi:10.1111/jan.14557
-Mechanick JI et al. Dysglycemia-based Chronic Disease: An AACE Position Statement. Endocr Pract. 2018;24(11):995-1011.
-Pay Y, et al. Journal of Stroke and Cerebrovascular Diseases, 2019. 28:683- 692.

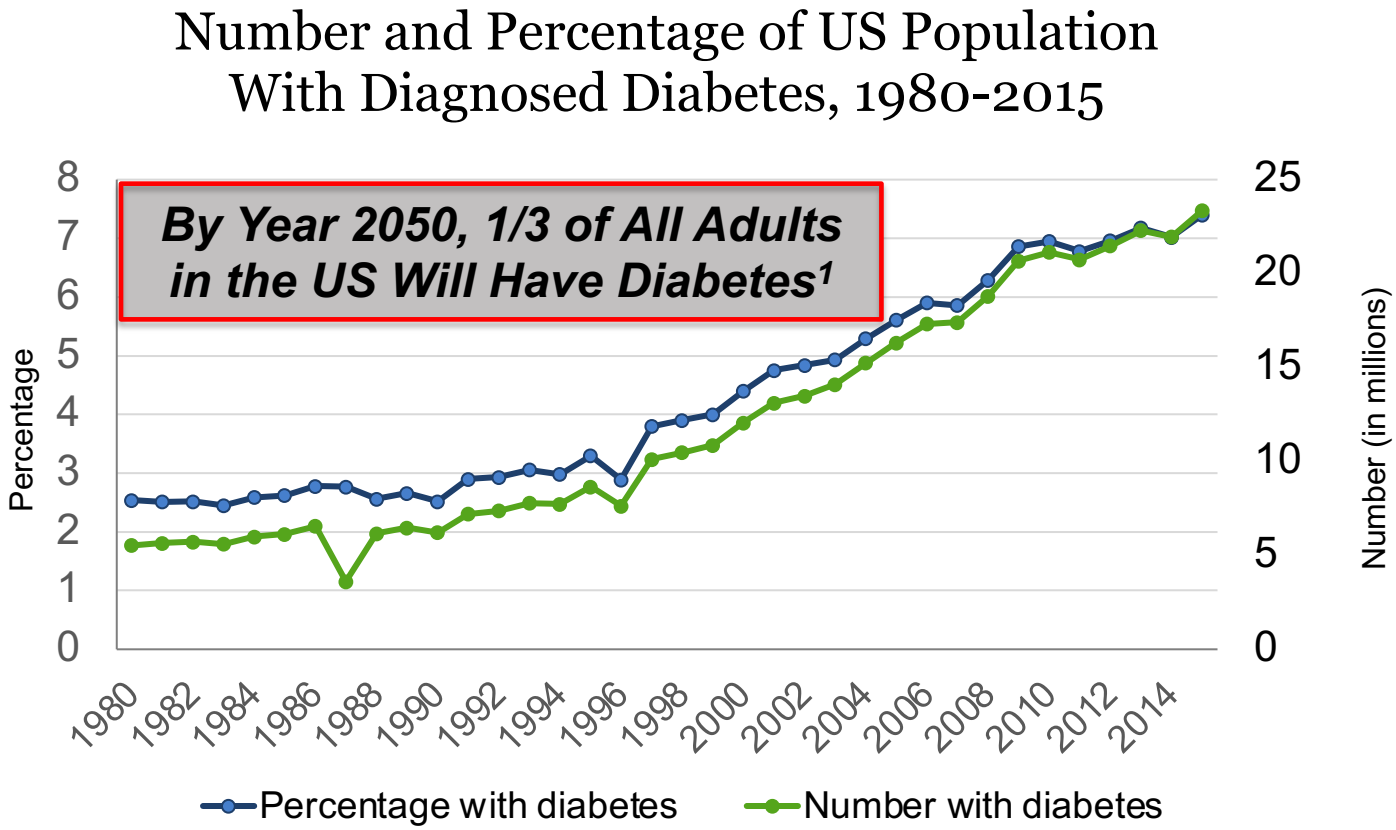
Prevalence of Prediabetes in Youth 12-19: 1999 to 2018

- **Prediabetes prevalence among youth**
  - 11.6% → **28.2%**
- **Prediabetes prevalence across BMI groups:**
  - Underweight or normal weight: 9.42% → **24.3%**
  - Overweight: 15.3% → **27.5%**
  - Obesity: 18.2% → **40.4%**

DOUBLED in 20 YEARS

Liu J, Li Y, Zhang D, Yi SS, Liu J. Trends in Prediabetes Among Youths in the US From 1999 Through 2018. *JAMA Pediatr.* Published online March 28, 2022. doi:10.1001/jamapediatrics.2022.0077

The Bad News: Diabetes Epidemic Starts with Prediabetes



[1]CDC's Division of Diabetes Translation. United States Diabetes Surveillance System available at http://www.cdc.gov/diabetes/data

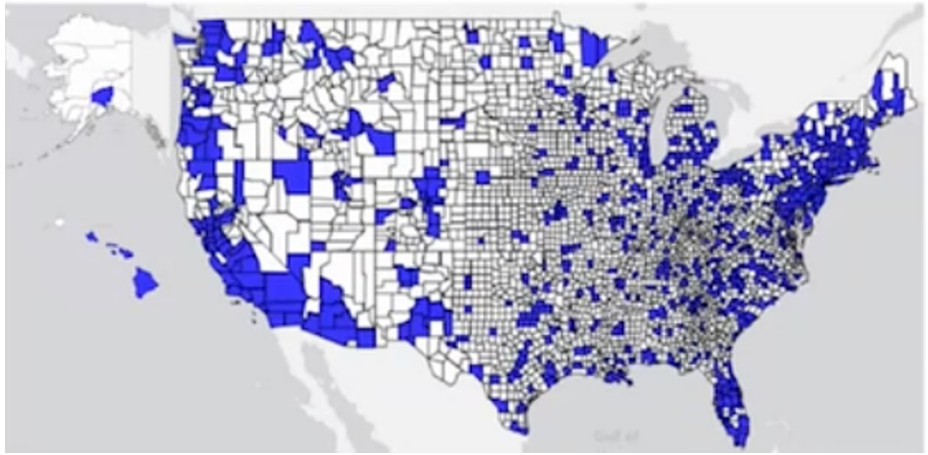
The Good News

- 90% of all pre-diabetes & diabetes management occurs within the primary care setting
- Early intervention can reduce incidence & prevalence rates of complications associated with the disorder, reduce cost & improve long-term quality of life

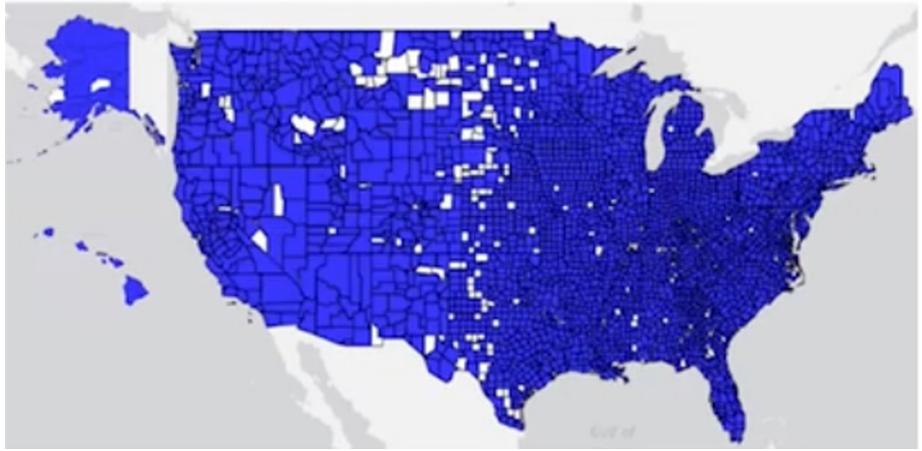
Mechanick JI et al. Dysglycemia-based Chronic Disease: An AACE Position Statement. Endocr Pract. 2018;24(11):995-1011.

Distribution of Endocrinologists/Diabetologists & PCPs in US[1]

US Counties with ≥ 1
Pediatric or Adult Endocrinologist/Diabetologist



US Counties with ≥ 1
Primary Care Provider



Total PCPs in the US[2]:

PAs: ~20%

NPs: ~30%

MD/DOs: ~50%

[1]Oser SM, Oser TK. Diabetes Technologies: We Are All in This Together. Clin Diabetes. 2020 Apr;38(2):188-189. doi: 10.2337/cd19-0046. PMID: 32327892; PMCID: PMC7164996.
[2]Petterson S, McNellis R, Klink K, Meyers D, Bazemore A. The State of Primary Care in the United States: A Chartbook of Facts and Statistics. January 2018.

Case: 35-year-old female presents for new patient visit

- **Medications/Supplements:**
  - None
- **Medical History:**
  - Gestational diabetes mellitus (GDM) 7 years ago
- **Family History:**
  - Obesity & T2DM: Mother & father
  - CKD: Mother
  - NSTEMI: Father at age 61
- **Lifestyle:**
  - Works night shift as a deputy sheriff
  - Sleeps 5-6 hours/night
  - No regular exercise, nicotine, or alcohol
  - Weight gain of 12 pounds over the past year

T2DM = Type 2 Diabetes Mellitus
CKD = Chronic Kidney Disease
NSTEMI = Non-ST-Elevation Myocardial Infarction

Case: 35-year-old female presents for new patient visit

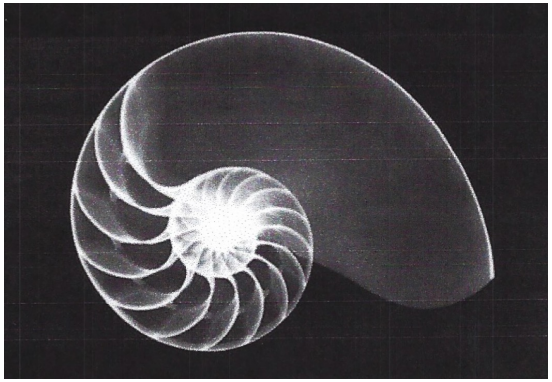
"I'm nervous."

"I don't like going to the doctor".

"All I'm ever told is what I'm doing wrong."

Five Practices for Promoting Patient-Centered Care[1,2]

- Prepare with intention
- Listen intently & completely
- Agree on what matters most
- Connect with the patient's story
- Explore emotional cues



JW Chambered Nautilus Approach…

[1]Sanders L, Fortin AH 6th, Schiff GD. Connecting with patients—the missing links. JAMA. 2020;323(1):33-34
[2]Zulman DM, Haverfield MC, Shaw JG, et al. Practices to foster physician presence and connection with patients in the clinical encounter. JAMA. 2020;323(1):70-81.

Systematic Approach to Patients at Risk for Diabetes

Engage & Explore

Screen & Monitor

Customize

Use Technology

Support & Follow

Biopsychosocial Factors in Health

Psychological & Behavioral Factors

Biological Factors

Social & System Factors

The Patient & Provider Connection

Optimal patient – provider communications & connections:

- Improve diagnoses[1]
- Improve adherence to prescribed regimens[2]
- Improve outcomes[3]

[1]Stewart MA. Effective physician-patient communication and health outcomes: a review. CMAJ. 1995;152(9):1423-1433.
[2]Harmon G, Lefante J, Krousel-Wood M. Overcoming barriers: the role of providers in improving patient adherence to antihypertensive medications. Curr Opin Cardiol. 2006;21(4):310-315. doi:10.1097/01.hco.0000231400.10104.e2
[3]Stewart M, Brown JB, Donner A, et al. The impact of patient-centered care on outcomes. J Fam Pract. 2000;49(9):796-804.

Systematic Approach to Patient with Diabetes

Engage & Explore

Screen & Monitor

Customize

Use Technology

Support & Follow

Physical Exam

- **BP**: 128/82, Pulse: 84
- **BMI:** 32 kg/m² (5'4"/186lbs)
- **Waist Circumference**: 38 inches
- **Skin Exam**: Acanthosis nigricans on axilla & neck

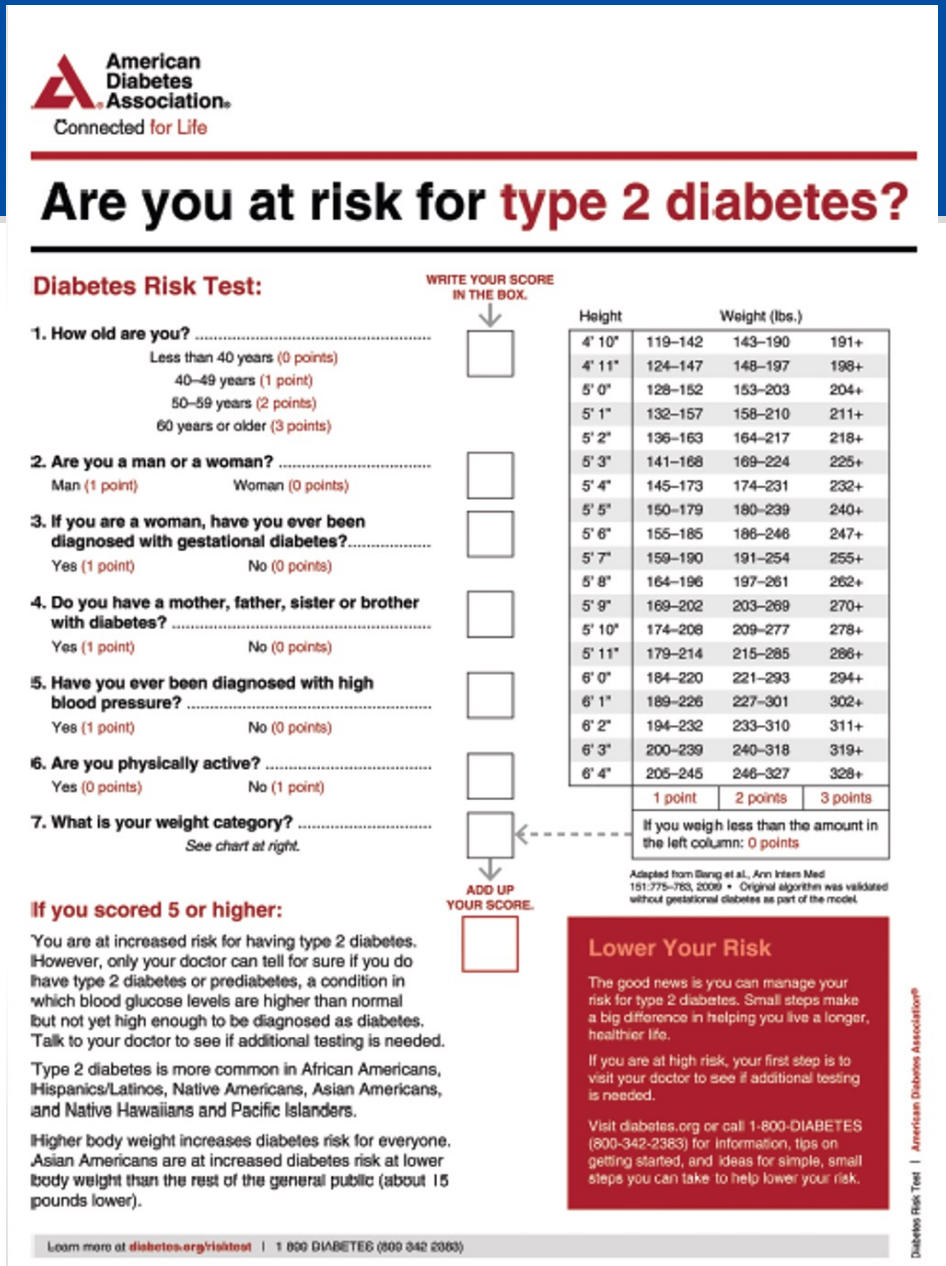
BP = Blood Pressure
BMI = Body Mass Index

Patients at Risk for Diabetes?

60-Second Type 2 Diabetes Risk Test
https://diabetes.org/socrisktest

Risk Factors:

- Weight
- Inactivity
- Family history
- Age
- Gender
- Gestational diabetes
- High blood pressure
- Polycystic ovary syndrome



American Diabetes Association.
Connected for Life

Are you at risk for type 2 diabetes?

Diabetes Risk Test:

WRITE YOUR SCORE IN THE BOX.

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 category?
See chart at right.

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

If you weigh less than the amount in the left column: 0 points

Adapted from Bang et al., Ann Intern Med 151:775–783, 2009 • Original algorithm was validated without gestational diabetes as part of the model.

ADD UP YOUR SCORE.

If you scored 5 or higher:

You are at increased risk for having type 2 diabetes. However, only your doctor can tell for sure if you do have type 2 diabetes or prediabetes, a condition in which blood glucose levels are higher than normal but not yet high enough to be diagnosed as diabetes. Talk to your doctor to see if additional testing is needed.

Type 2 diabetes is more common in African Americans, Hispanics/Latinos, Native Americans, Asian Americans, and Native Hawaiians and Pacific Islanders.

Higher body weight increases diabetes risk for everyone. Asian Americans are at increased diabetes risk at lower body weight than the rest of the general public (about 15 pounds lower).

Lower Your Risk

The good news is you can manage your risk for type 2 diabetes. Small steps make a big difference in helping you live a longer, healthier life.

If you are at high risk, your first step is to visit your doctor to see if additional testing is needed.

Visit diabetes.org or call 1-800-DIABETES (800-342-2383) for information, tips on getting started, and ideas for simple, small steps you can take to help lower your risk.

Learn more at diabetes.org/risktest | 1 800 DIABETES (800 342 2383)

Diabetes Risk Test | American Diabetes Association®

Classification and Diagnosis of Diabetes: *Standards of Medical Care in Diabetes - 2022*. *Diabetes Care* 2022;45(Suppl. 1):S17-S38

35-year-old patient: *ADA Diabetes Risk Assessment*

1. How old are you? **35**
2. AFAB (Assigned female at birth?) or AMAB (Assigned male at birth?) **Female**
3. If AFAB, have you ever been diagnosed with gestational diabetes? **Yes → 1**
4. Do you have a mother, father, sister or brother with diabetes? **Yes → 1**
5. Have you ever been diagnosed with high blood pressure? **No**
6. Are you physically active? **No → 1**
7. What is your weight category? (see height & weight chart) **5'4"/186lbs → 2**

Patient's 60-Second Type 2 Diabetes Risk Test Score:

5

≥ 5 = Elevated risk for T2DM

Prediabetes Screening Criteria: Adults

- Age ≥ 35 years
- BMI ≥ 25 kg/m²*
  - PLUS 1 or more risk factors below
- 1st Degree relative with diabetes
- High risk racial or ethnic group: Asian American, African American, Latino, Native American & Pacific Islander
- History of gestational diabetes every 3yrs
- A1c 5.7% should be screened annually
- Fasting glucose > 100 mg/dL
- History of CVD
- HTN (BP > 140/90 mmHg or Rx for HTN)
- Dyslipidemia
  - HDL-C < 35 mg/dL
  - Triglycerides > 250 mg/dL
- Physical inactivity
- Increased waist circumference (race specific)
- Conditions associated with insulin resistance
  - PCOS, acanthosis nigricans, NAFLD
- Patients with HIV & Sleep disorders
- Medication use:
  - Antipsychotic therapy
  - Chronic glucocorticoid exposure

- **Screen at-risk individuals with glucose values in the normal range every 3 years**
- **Consider annual screening for patients with 2 or more risk factors**

*At-risk BMI may be lower in some ethnic groups; consider using waist circumference.

Classification and Diagnosis of Diabetes: *Standards of Medical Care in Diabetes - 2022. Diabetes Care* 2022;45(Suppl. 1):S17-S38

IFG = Impaired Fasting Glucose;
IGT = Impaired Glucose Tolerance;
NAFLD = Nonalcoholic Fatty Liver Disease;
PCOS = Polycystic Ovary Syndrome

Type 2 Diabetes Screening Criteria: Children

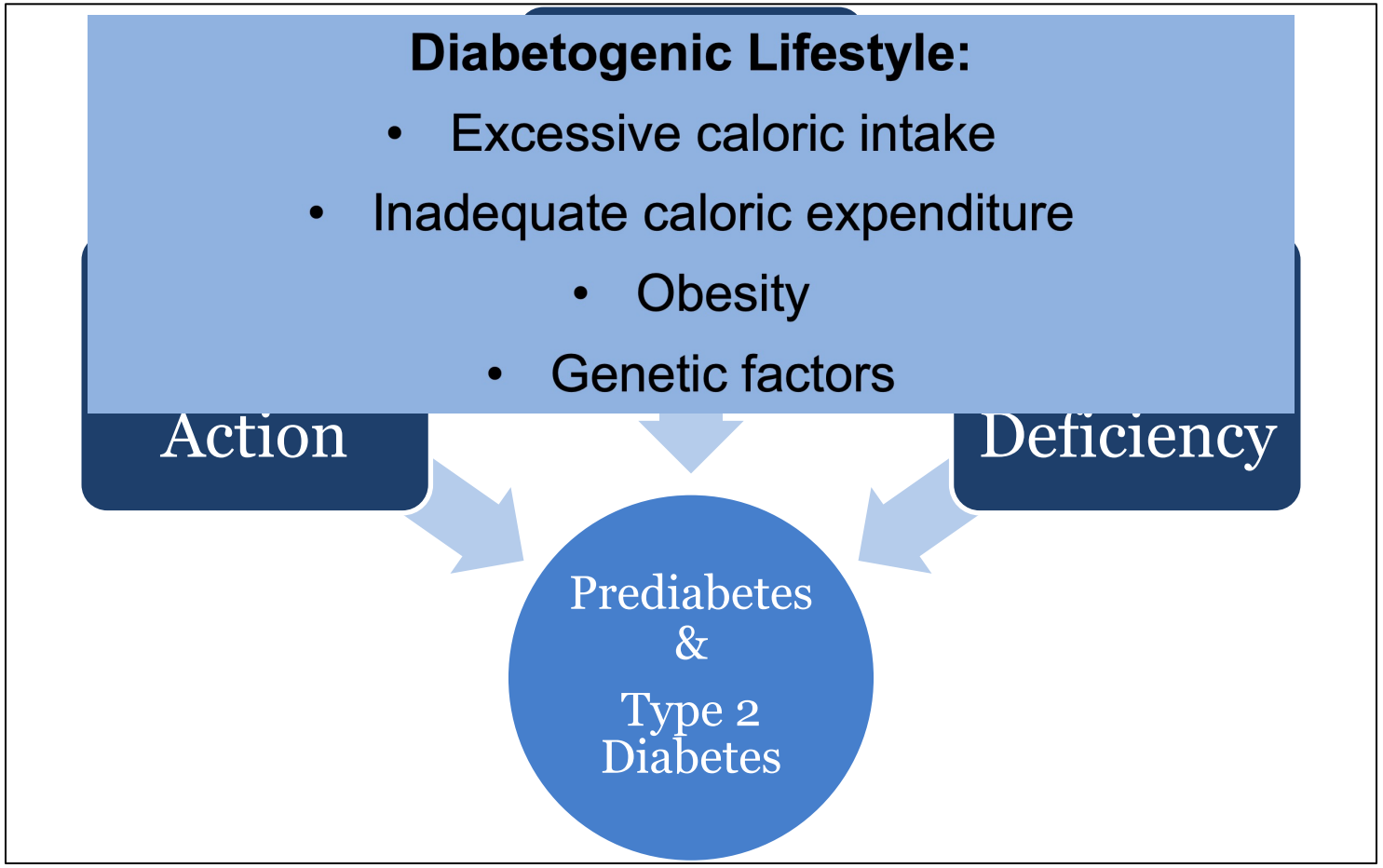
Consider for all children who are overweight & have 2 of any of the following risk factors:

- **Family history of type 2 diabetes in first- or second-degree relative**
- **High-risk race/ethnicity**
- **Signs of insulin resistance or conditions associated with insulin resistance**
- **Maternal history of diabetes of GDM during child's gestation**

Begin screening at age 10 years or onset of puberty
Screen every 3 years
A1C test is recommended for diagnosis in children

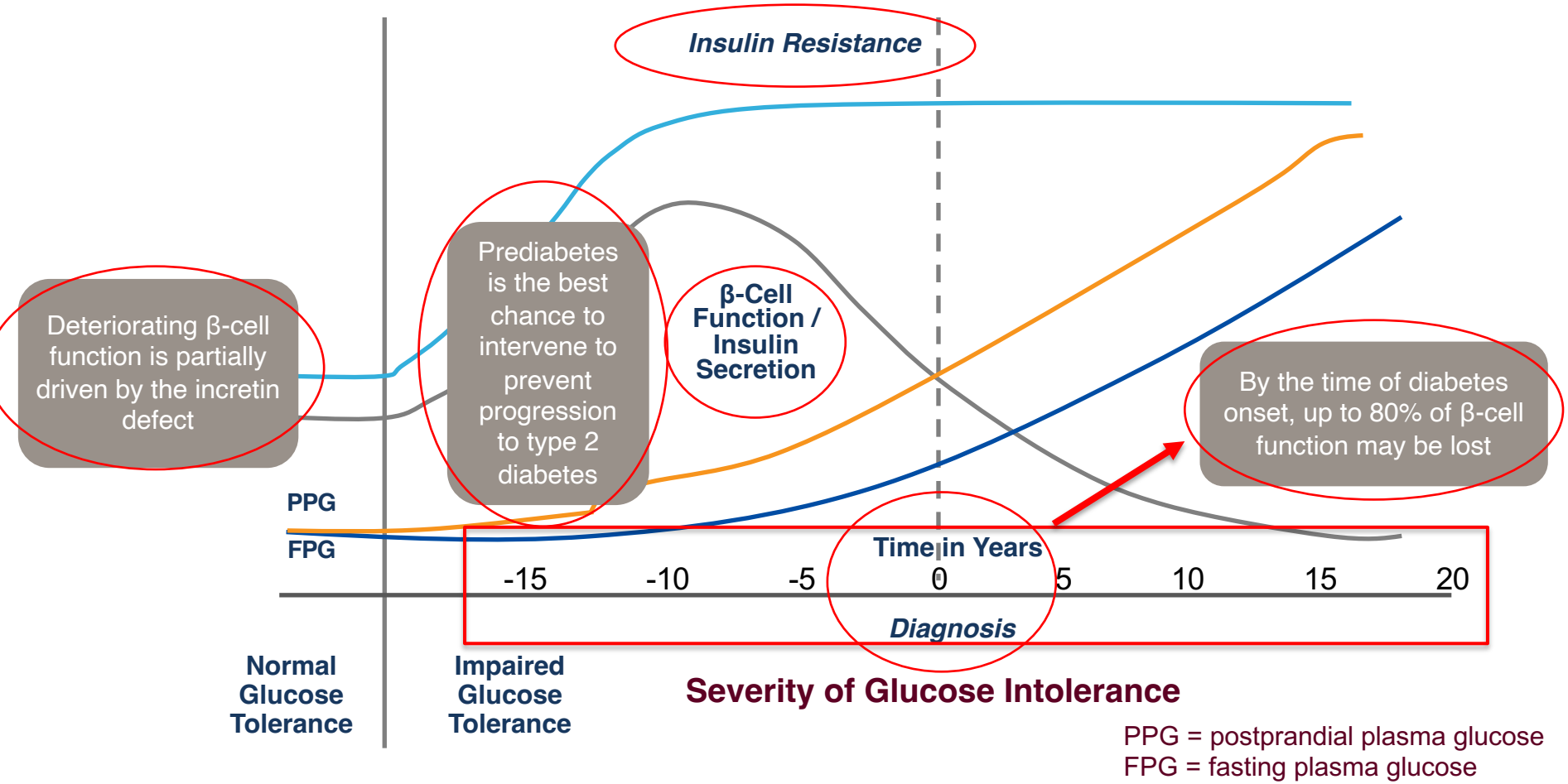
Adapted from ADA. Testing for Diabetes in Asymptomatic Patients. *Diabetes Care*. 2014;37(suppl 1):S17-18.

Redefining Pathophysiology of Prediabetes & Type 2 Diabetes



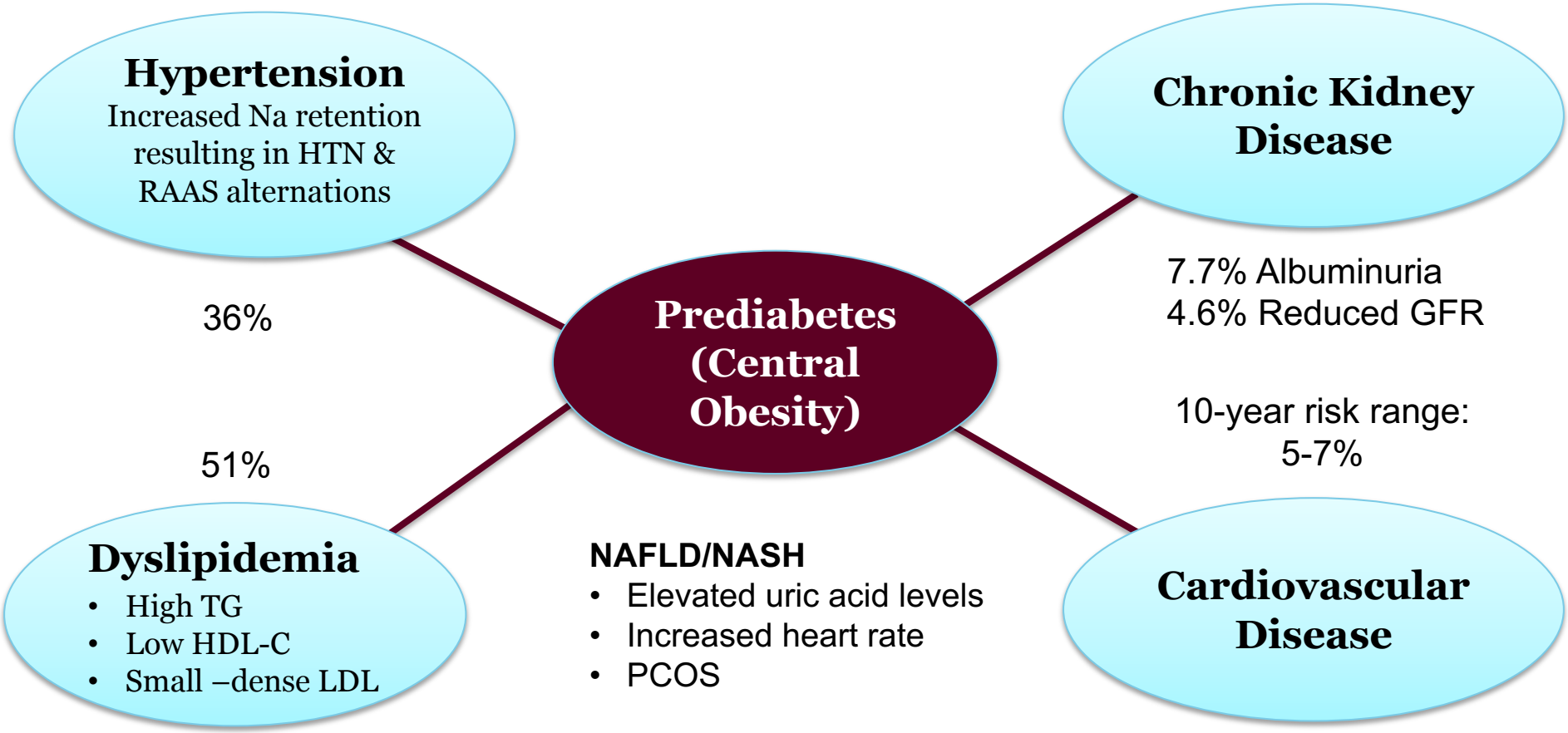
Adapted from Kendall DM, et al. *Am J Med*. 2009;122(6 Supp):S37-S50.

Progressive β-Cell Dysfunction: *Key Driver of Progressive Hyperglycemia*



Defronzo RA. *Diabetes.* 2009;58:773-795. 2. Fehse F, et al. *J Clin Endocrinol Metab*. 2005;90:5991-5997.
Adapted from Kendall DM, et al. *Am J Med*. 2009;122(6 Supp):S37-S50.

Prediabetes & Comorbidities



RAAS = Renin-Angiotensin-Aldosterone System
NAFLD = Non-Alcoholic Fatty Liver Disease
NASH = Nonalcoholic Steatohepatitis

Ali, MK, et al. Cardiovascular and renal burdens of prediabetes in the USA; analysis of data from serial cross-sectional surveys, 1988-2014. *Lancet Diabetes Endocrinol*. 2018: 6:392-403

35-year-old patient: Laboratory Results

- A1C = 6.0%
  - 1 year ago A1C was 5.8%
- eGFR = 87 mL/min
- Lipids:

Total Cholesterol: 212 mg/dL	LDL-C: 134 mg/dL
Triglycerides: 234 mg/dL	HDL-C: 31 mg/dL
APO B: 121 mg/dL	Non-HDL-C: 181 mg/dL

A1C = hemoglobin A1C
eGFR = Estimated Glomerular Filtration Rate
APO B = Apolipoprotein B-100
LDL = Low-Density Lipoprotein Cholesterol
HDL = High-Density Lipoprotein Cholesterol

Diagnostic Criteria for Prediabetes & Diabetes

Test	Normal	Prediabetes	Diabetes
Fasting Plasma Glucose (FPG)	< 100 mg/dL IFG	100-125 mg/dL	≥125 mg/dL[2]
2 Hour Plasma Glucose (PG) after OGTT	< 140 mg/dL IGT	140-199 mg/dL	≥200 mg/dL
A1C	< 5.6%	5.7 to 6.4% For screening of prediabetes[1]	≥6.5%
Random Plasma Glucose	<199 mg/dL		≥200 mg/dL[3]

[1]A1C only should be used for screening prediabetes. Diagnosis of prediabetes, manifested as either IFG or IGT, should be confirmed with glucose testing. Diagnosis should be confirmed on separate day by repeating glucose or A1C testing. When A1C is used for diagnosis, follow-up glucose testing should be done, when possible, to help manage diabetes.

[2]No caloric intake for at least 8 hrs.

[3]In patient with classic symptoms of hyperglycemia or hyperglycemia crisis

IFG = impaired fasting glucose
IGT = impaired glucose tolerance

Classification and Diagnosis of Diabetes: *Standards of Medical Care in Diabetes - 2022. Diabetes Care* 2022;45(Suppl. 1):S17-S38

Systematic Approach to Patient with Diabetes

Engage & Explore

Screen & Monitor

Customize

Use Technology

Support & Follow

”Pillars” of Type 2 Diabetes Prevention & Management

Restore normal glucose regulation

↓

Preserve beta cell function & mass

↓

Reduce A1C & glucose variability as surrogate markers for CVD & CV mortality

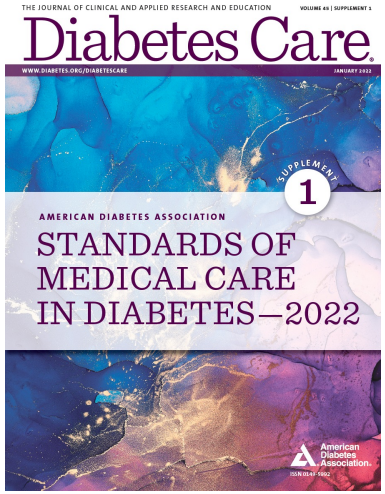
↓

Reduce “glycemic burden” to lower risk of disease progression & risk of complications

2022 ADA Guidelines - Selected Revision Highlights

- **Screening for prediabetes & diabetes should begin at age 35**

- **Integration of diabetes technology & self-management education & support (DSMES) for comprehensive diabetes care for all patients**



- **Metformin therapy recommended for type 2 DM prevention**
  - Adults with prediabetes especially all aged 25–59 years with:
    - BMI ≥35 kg/m2
    - Higher A1C (e.g., >6.0%)
    - Higher fasting plasma glucose (e.g., >110 mg/dL)
    - Women with prior gestational diabetes mellitus

- **Individualized approaches should be 1st line therapy for patients**
  - Intensive lifestyle interventions/programs for adults with overweight or obesity
  - Focused interventions to prevent complications of diabetes and/or CAD, HF, CKD

Summary of Revisions: *Standards of Medical Care in Diabetes - 2022. Diabetes Care* 2022;45(Suppl. 1):S4

ADA/EASD Diabetes Management Decision Cycle[1,2]

[1]Decision cycle for patient-centered glycemic management in type 2 diabetes. HbA_{1c}, glycated hemoglobin.
[2]Adapted from Davies MJ, D'Alessio DA, Fradkin J, et al. Diabetes Care 2018;41:2669–2701.
Clin Diabetes. 2022;40(1):10-38. doi:10.2337/cd22-as01

ADA/EASD Management Decision Cycle[1,2]

REVIEW & AGREE ON MANAGEMENT PLAN

- Review management plan
- Mutual agreement on changes
- Agree on time to start new plan to avoid clinical inertia
- Decision cycle undertaken regularly (Min: 1-2x/year)

- Emotional & spiritual well-being
- Check tolerability of medication
- Monitor glycemic status
- Biofeedback - BGM, wt, step count, A1c, BP, lipids

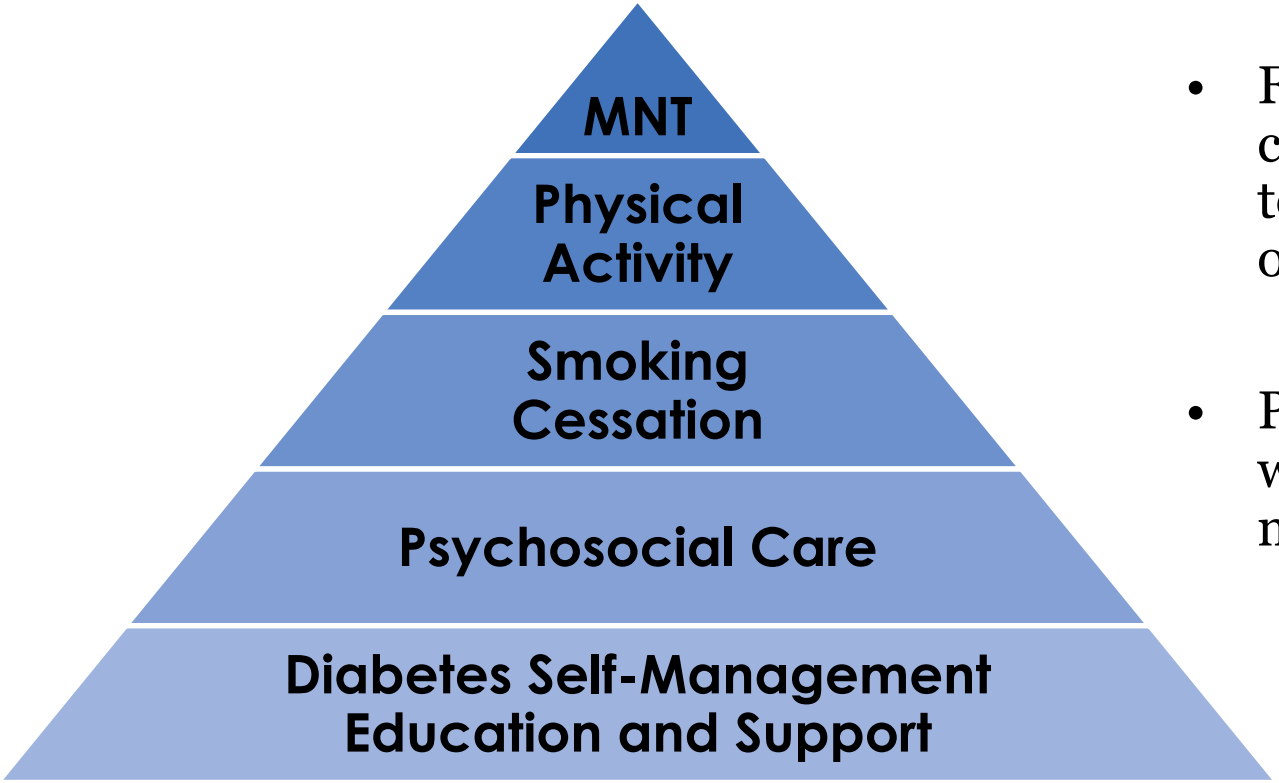
IMPLEMENT MANAGEMENT PLAN

- Patients not meeting goals should be seen every 3 months
- More frequent contact initially is desirable for DSMES

[1]Decision cycle for patient-centered glycemic management in type 2 diabetes. HbA_{1c}, glycated hemoglobin.
[2]Adapted from Davies MJ, D'Alessio DA, Fradkin J, et al. Diabetes Care 2018;41:2669–2701.
Clin Diabetes. 2022;40(1):10-38. doi:10.2337/cd22-as01

Lifestyle Modification & Patient Education

Healthy eating, weight control, increased physical activity & diabetes education

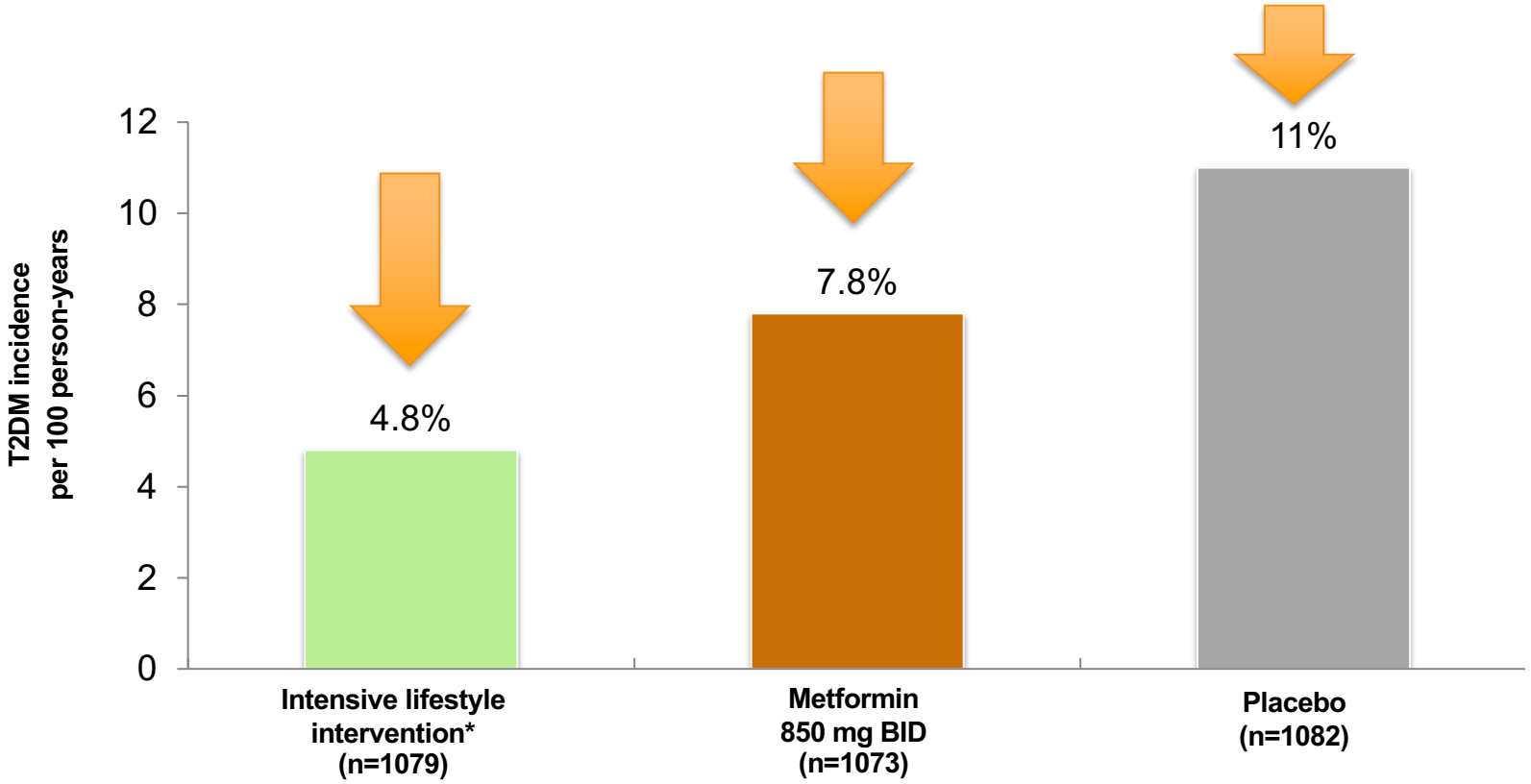


- Facilitating behavior change & well-being to improve health outcomes
- Patient-centered care with individualized management plan

ADA. Diabetes Care. 2022;45:S39-S59
ADA. Diabetes Care. 2022;45:S60-S82.
Evert AB, et al. Diabetes Care. 2019;42:731-54.
Powers MA, et al. Diabetes Care. 2015;38:1372-82.

Diabetes Incidence & Lifestyle Intervention from DPP

Lifestyle intervention with weight loss & exercise was most effective way & reducing progression from prediabetes to clinical diabetes in the Diabetes Prevention Program (DPP)



DPP Research Group. *N Engl J Med*. 2002;346:393-403.

DPP = Diabetes Prevention Program

Lifestyle Medicine: Evidence & Quandary

- Significant associations exist between lifestyle variables & incidence-rate reductions in concurrent diabetes, CVD & HF[1]
- Yet, only 3% of US adults live a healthy lifestyle as defined by the pillars of activity diet, sleep, substance use, relationships, and stress management.[1,2]
- Clinicians cite major barriers to counseling patients effectively on lifestyle medicine including lack of confidence, knowledge & skill.[3]

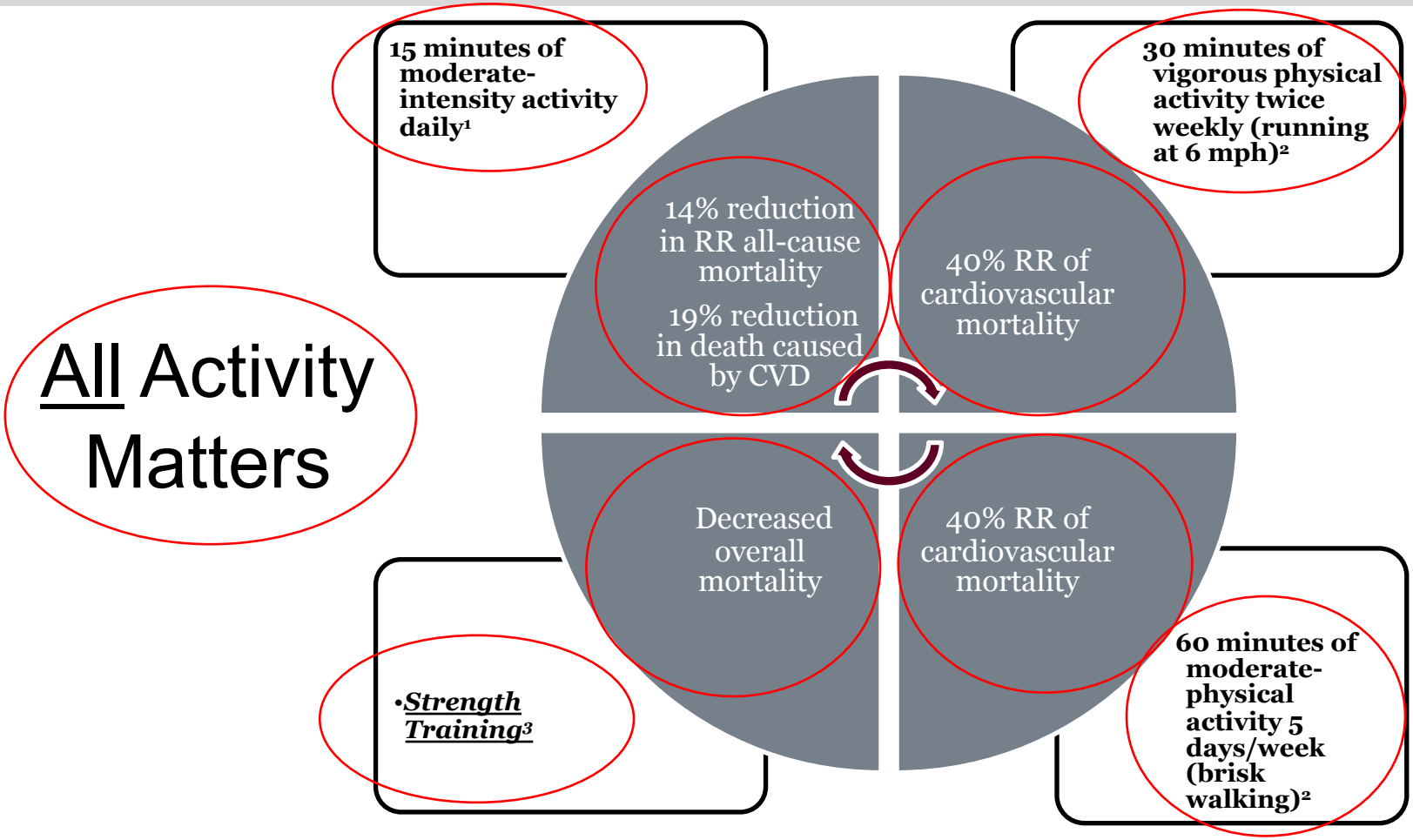
[1]Loprinzi PD, Branscum A, Hanks J, Smit E. Healthy lifestyle characteristics and their joint association with cardiovascular disease biomarkers in US adults. Mayo Clin Proc. 2016;91(4):432-442. doi:10.1016/j.mayocp.2016.01.009
[2]American College of Lifestyle Medicine. Accessed May 21, 2021. https://lifestylemedicine.org/What-is-Lifestyle-Medicine.
[3]Lianov L, Johnson M. Physician competencies for prescribing lifestyle medicine. JAMA. 2010;304(2):202-203. doi:10.1001/jama.2010.903

2022 ADA Guidelines: Activity & Exercise

- **Reduce sedentary time**
- **Most adults: 150 mins of mod-vigorous intensity aerobic activity/wk**
  - At least 3 days/wk, with no more than 2 consecutive days w/o activity
- **Shorter durations (min 75 min/wk) of vigorous-intensity**
- **2-3 days of resistance training/week** (non-consecutive days)
- **Flexibility training & balance training are recommended**
  - 2–3 times/week for older adults with diabetes
- **Yoga & Tai chi** may be included based on individual preferences
  - Increasing flexibility, muscular strength & balance

Diabetes Care 2022 Jan; 45(Supplement 1): S60-S82. https://doi.org/10.2337/dc22-S005

All Activity Matters



[1]Chi Pang Wen, et al. *Lancet* 2011
[2]Duck-chul, Lee, et al. *Am College of Cardiology* 2014
[3]Kraschnewski, JL, et al. *Prev Med*. 2016

Assessing Activity "Lifestyle Vitals"

What kinds of physical activity do you do each week?

What stops you from being more active?

Would you say you eat more for "fuel" or for "comfort"?

How many meals and/or snacks do you eat in a day?

How many meals a week do you eat out? Do you skip meals?

What is your biggest meal of the day?

35-year-old patient: *Lifestyle Vitals Analysis*

- Married with 2 children ages 8 & 11
- Works overnight shift from 6pm – 6am & sleeps 5 - 6 hours
- No regular exercise & unable to find time for exercise with home & work responsibilities
- Consumes regular soda 3 - 4 times a day
- Eats 2 meals a day
  - Largest meal in the evening at 4 - 5pm with family before heading to overnight work
  - ~50% of meals include processed meats & packaged food
  - Usually picks up fast food on her way home from work at 7 - 8am before going to sleep for the day
- Goes out to eat 3-4 times a week for convenience

Clinician & Patient Lifestyle Medicine Collaboration

Lifestyle

- Collaborate on a realistic activity plan
- Identify simple changes in diet/meal plan for weight loss & healthier eating habits
- Reduce alcohol consumption
- Encourage appropriate sleep hygiene
- Select technology (s) most appropriate for evaluating behavior change
  - BGM
  - CGM
  - Apps
  - Online portals

Behavioral

- Avoid use of fear or intimidation tactics
- Provide encouragement & kudos!
- Evaluate patient goals/health outcomes for their diabetes treatment
  - "What do you want?"
- Identify biggest challenges/barriers & fears
  - Knowledge deficits, costs, stress, family issues, psychologic obstacles, social support, competing priorities,
- Develop strategy for dealing with challenges & potential set-backs
- Consider DSMES referral

Diabetes Care 2022 Jan; 45(Supplement 1): S60-S82. https://doi.org/10.2337/dc22-S005

Activity Rx

RX

NAME_____AGE_____

ADDRESS_____DATE_____

DIRECTIONS:

1. Add 2-5 mins each week to your walking routine to reach 10,000 steps a day most days of the week
2. Take a 5-10 mins walk at work when able
3. Walk or march in place during commercials when at home

_____

SIGNATURE

Assessing Healthy Diet "Lifestyle Vitals"

What kinds of physical activity do you do each week?

What stops you from being more active?

Would you say you eat more for "fuel" or for "comfort"?

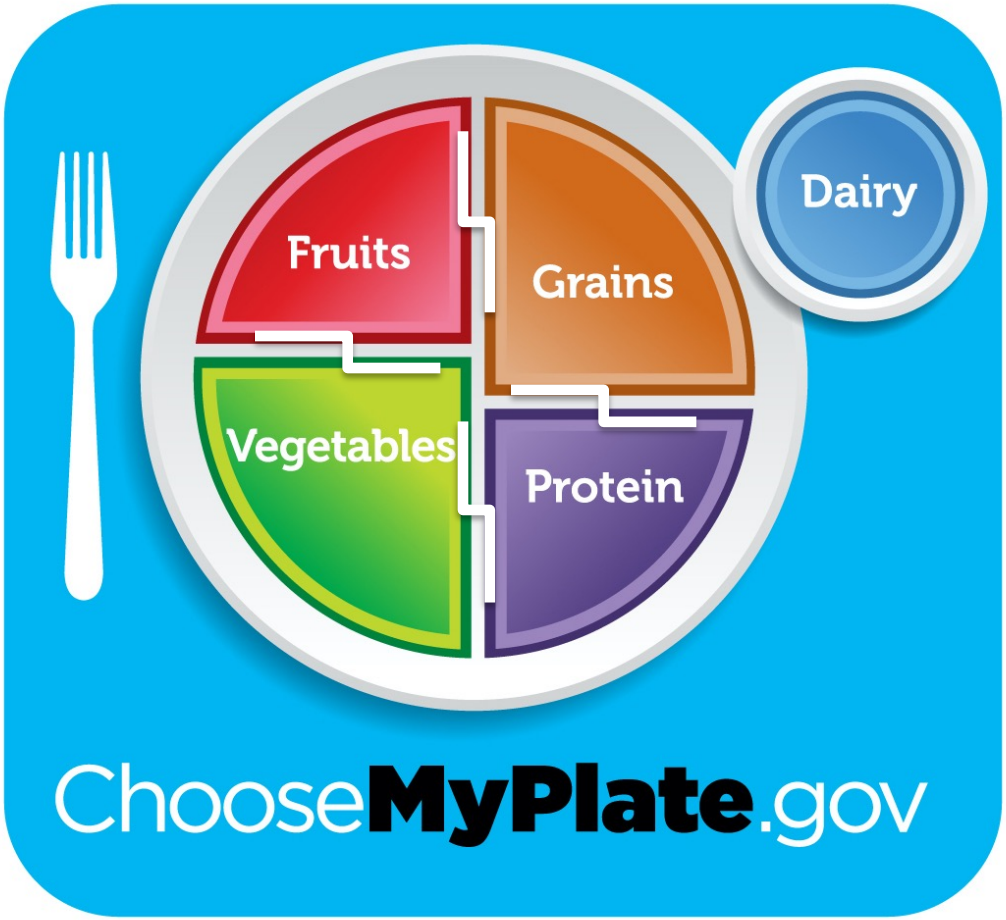
How many meals and/or snacks do you eat in a day?

How many meals a week do you eat out? Do you skip meals?

What is your biggest meal of the day?

Plate Portions

- Half plate of fruits & vegetables
  - Focus on whole fruits
- Half plate of grains & protein
  - Focus on whole grains
  - Vary the protein
    - Seafood, beans, peas, nuts, seeds, soy products, eggs, lean meats & poultry
    - Reduce/Avoid processed meats
  - Move to low fat or fat free milk
- Drink water; avoid sugary drinks



ChooseMyPlate.gov: https://www.choosemyplate.gov

Healthier Eating/Medical Nutrition Therapy

General	✓ Portion control is the key → See space between portions! ✓ Don't skip meals and keep serving sizes consistent
Carbohydrates	✓ Reduce overall carbohydrate intake → Cut your carbs in half! ✓ Nutrient dense-carbs - minimally processed & high in fiber (fresh fruits/ vegetables, legumes, whole grains)
Fats	✓ Consumption of mono & polyunsaturated fats (avocados, certain plant oils, fish) ✓ Limit saturated fats & trans fat → Switch to fat-free this week! ✓ Choose fat-free or low-fat dairy products
Proteins	✓ Consume protein foods with low saturated fats (fish, egg whites, beans) ✓ Limit processed meats → Reduce by 25-50%
Micronutrients	✓ Routine supplementation is not necessary ✓ No clear evidence on vitamins, supplements or herbs/spices improving BG control (Chromium; Vitamin D, cinnamon, aloe vera)

Grams J, et al. *Curr Obes Rep*. 2015 Jun;4(2):287-302. doi: 10.1007/s13679-015-0155-x

35-yearoold patient: *Lifestyle Recommendations*

Cut	Cut soda down to 0-1/day & replace rest with water or carbonated water
Drink	Drink full glass of water before sitting down to eat a meal
Start	Start tracking or logging your food with apps
Limit	Limit processed meats & reduce starchy vegetables to ¼ of your plate
Avoid	Avoid going back for 2nd helpings
Consume	Consume ½ order when eating out
Add	Add more activity in your daily routine - 10 mins/day or 5,000 steps/day

General Healthier Eating Recommendations

- Use visual tools such as healthy plate method
- Emphasize portion control
- Dispel misconceptions about “special diets”
- Help set realistic yet specifics goals (1-2 changes at a time)
- Provide various resources through internet sites, applications or written recommendations

Systematic Approach to Patient with Diabetes

Engage & Explore

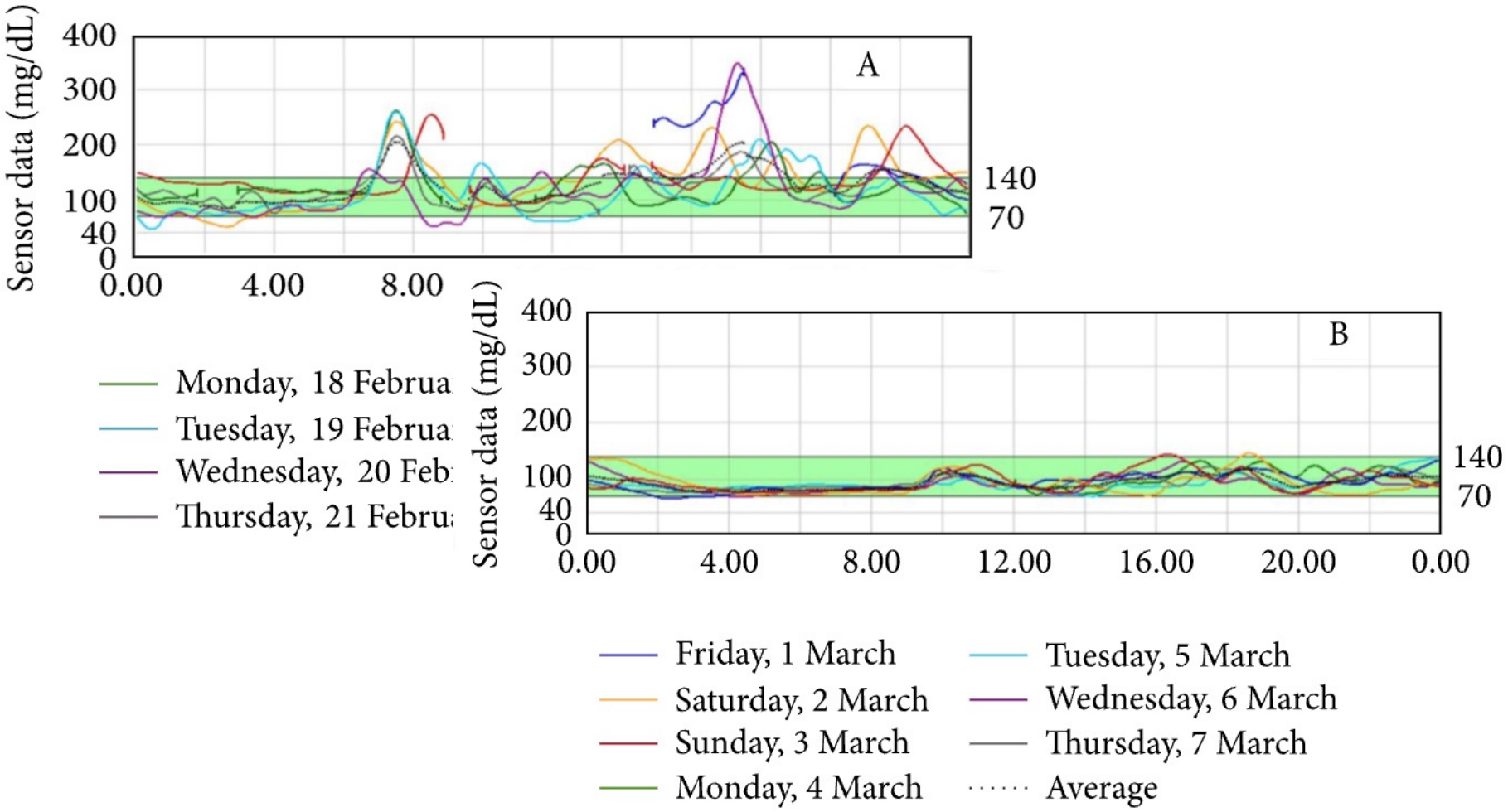
Screen & Monitor

Customize

Use Technology

Support & Follow

Glucose Monitoring in Prediabetes for Biofeedback



Lifestyle Medicine Apps & Resource Support

Applications

- CalorieKing ®
- MyFitness pal ®
- MyPlate Calorie Counter ®
- Pacer Pedometer ®
- DeckWorkout ®
- 30-day fitness ®
- Home Workout ®
- Map My Walk ®

Website Resources

- https://www.diabeteseducator.org
- https://www.choosemyplate.gov/
- https://www.cdc.gov/diabetes/prevention/resources/curriculum.html
- https://diabetes.org/diabetes

DM Complications:

Macrovascular Complications:	Microvascular Complications:

• CAD/MI: none
  • ASCVD Risk:
  • Statin: n/a
• CVA: none
• PVD/PAD: No hx of amputations
	• Neuropathy: none; Sensory
	• Retinopathy: none; DPR
	• Nephropathy: none;+proteinuria
	  • ACEI/ARB: n/a

35-year-old patient: 6 Week Follow-Up

A1C is 5.8% &
lost 3lbs

Walking 5,000 steps/day

Cut out soda & eats breakfast at home

Wants to lose more weight

Feels hungry “all the time”

Wants info on exercise programs & options to track diet

Lifestyle Recommendations: *Weight Loss*

IF YOU WEIGH:	LOSING 5-10% IS:
150 POUNDS	8 TO 15 POUNDS
175 POUNDS	9 TO 18 POUNDS
200 POUNDS	10 TO 20 POUNDS
225 POUNDS	11 TO 23 POUNDS
250 POUNDS	13 TO 25 POUNDS
300 POUNDS	15 TO 30 POUNDS

- Stress & set realistic goals
- Weight loss considerations:
  - Walk briskly (enough to break sweat)
    - 30 min 3x/week
  - Consider a more plant-based diet:
    - *Forks Over Knives*
    - https://www.forksoverknives.com/the-film/
- 5-10% weight loss goal in 3-6 mos

35-year-old patient: Follow-up Treatment Plan

Add	Add a few minutes of focused activity/week • 2-5 mins/week to walking routine to goal of 10,000 steps/day • 5-10 mins to move/walk at work when able • 5-15 mins exercise video 2 nights/week with kids after dinner
Consider	Consider small, convenient, lower carb snacks to prevent hunger in-between meals (10-15 grams/snack)
Refer	Refer to Certified Diabetes Educator (CDE) or certified diabetes care & education specialist (CDCES) for more structured program

Lifestyle Medicine: Home Activity & Exercise

- **Home activity & exercise videos**
  - Beginner-friendly
  - Can be done in a small space
  - Can be paused & stopped prn

- **Brain Injury Society of Toronto (BIST) & Toronto Rehab (LEAP)**
  - https://bist.ca/resources-covid-19/gentle-exercise-videos/

- **Gentle Exercise Videos & Chair Yoga, Tai Chi & Qi Gong Videos**
  - Designed therapists for people with mobility issues and/or pain
  - Variations allow to select the challenge most appropriate for patients

Systematic Approach to Patient with Diabetes

Engage & Explore

Screen & Monitor

Use Technology

Customize

Support & Follow

DSMES*

- **Comprehensive clinical, educational, psychosocial, & behavioral care**
- **Typically provided by DM specialty providers**
- **Four critical times to provide & modify DSMES**

*DSMES: Diabetes Self-Management Education & Support
DM: Diabetes mellitus

Powers MA, Bardsley JK et al. *Diabetes Self-management Education and Support (DSMES) in Adults with Type 2 Diabetes: A Consensus Report* of the ADA, ADCES, AND, AAFP, AAPA, AANP, APhA. The Diabetes EDUCATOR. Volume 46, Number 4, August 2020.

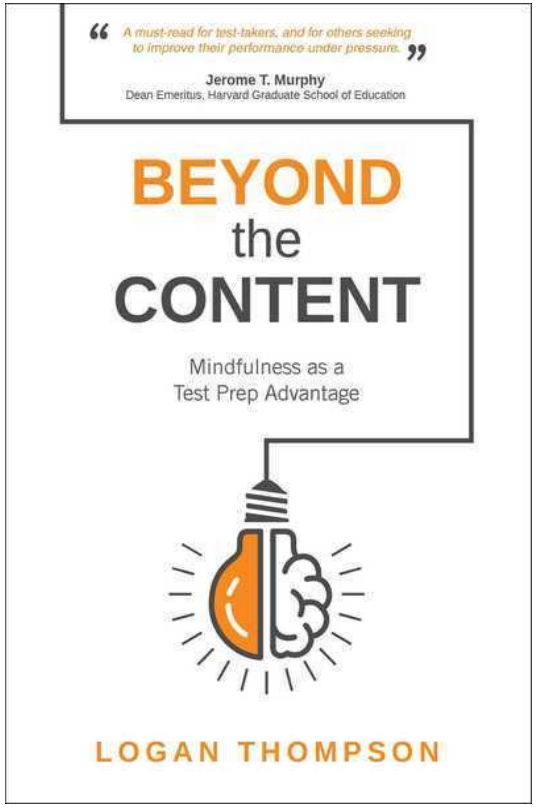
Acknowledgement & Affirmation

- **Identification of Barriers**
  - Based on patient's answers to your questions
  - What's the hardest thing right now? What do you fear the most?

- **Use Metaphors – "Yes, this is hard…not impossible."**
  - *"Prediabetes or diabetes care is like managing a 3-ring circus…"*
  - *"Controlling BG is sometimes like trying to carry a flat pan of water without spilling a drop…"*

- **But…<u>always</u> give positive reinforcement**
  - Underscore successes & reiterate support
  - "I'm in this alliance with you."

Impacts of "Passengers" or "Wilson"



- Naming allows to externalize "fleeting thoughts, feelings" & emotions"
- Helps allow them to be "understandable & workable"
- Some "passengers" are helpful & some are not…
- The NOT so helpful are those that begin to control our behaviors

Thompson, Logan. Beyond the Content: Mindfulness as a Test Prep Advantage. 2019. Kaplan Publishing, New York, NY. ISBN: 978-1-5062-4847-9.

Key contributors to poor diabetes adherence

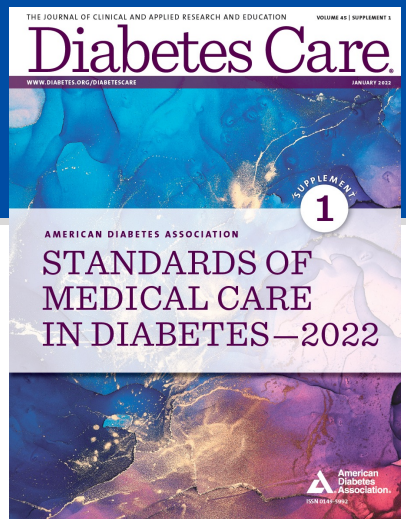
- Trust in clinician
- Perceived treatment efficacy
- Hypoglycemia
- Treatment complexity & convenience
- Cost of treatment
- Medication beliefs

"The patient is non-adherent…
…because…"

"Can you tell me why you're having a hard time?"
"How do you think I can help you with that?"

Polonsky WH, Henry RR. Poor medication adherence in type 2 diabetes: recognizing the scope of the problem and its key contributors. *Patient Prefer Adherence*. 2016;10:1299-1307. Published 2016 Jul 22. doi:10.2147/PPA.S106821

Proactive Management of Prediabetes & Diabetes



Diagnosis

Lifestyle modification & Diabetes Self-Management Education & Support (DSMES)

Glucose Control

Improve glycemic control to reduce symptoms & microvascular risk

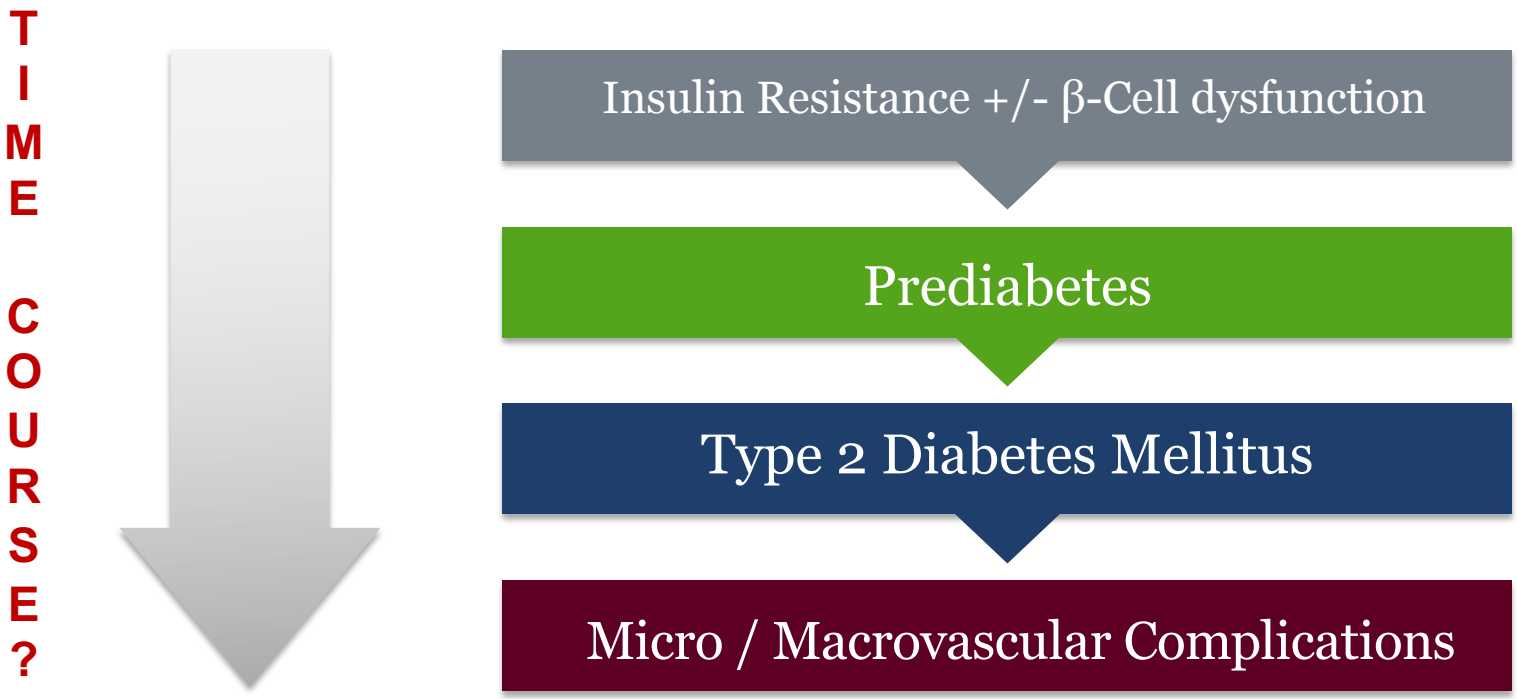
Cardiovascular Risk

Reduce macrovascular risk especially by controlling lipids & blood pressure

Comorbidities

Manage co-morbidities (obesity, CVD, CKD, depression, fatty liver, eye & neuropathic disease)

Making the Connection: Prediabetes to Diabetes



Systematic Approach to Patients with Prediabetes

Engage & Explore

Screen & Monitor

Use Technology

Customize

Support & Follow

Prediabetes Session Summary

- **Prediabetes should be assessed & managed within primary care**

- **Management strategies should focus on:**
  - Utilizing the "5 practices of patient-centered care"
  - Shared-decisions for "individual" & "incremental" changes
  - "Lifestyle Vital Signs" & interventions at every visit
  - Pharmacologic interventions (when appropriate)
  - Goals of "progress over perfection"
  - Routine follow-up

- **Prediabetes can progress to clinical diabetes & result in both microvascular & macrovascular complications**

- **Managing human & economic costs of prediabetes is minimal compared with cost of treating long term complications**

Post-Session Questions

1. **Which of the following best fits 2022 ADA/EASD care guidelines for patients at risk for pre-diabetes?**

A. Screen for prediabetes beginning at age 40
B. Apply generalized treatment algorithms as 1st line therapy
C. Refer overweight patients to Certified Diabetes Care & Education Specialists (CDCES) at initial visit
D. Prescribe Metformin for prediabetes to prevent type 2 diabetes

Post-Session Questions

2. What % of β-cell dysfunction may be lost by the time patients are diagnosed with type 2 diabetes?

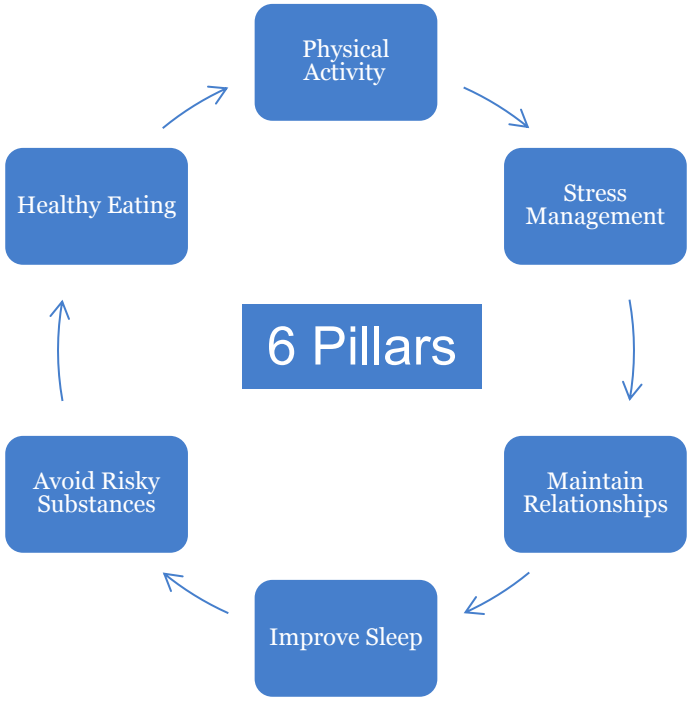
A. 50%
B. 60%
C. 70%
D. 80%

Kendall DM, Cuddihy RM, Bergenstal RM. Clinical application of incretin-based therapy: therapeutic potential, patient selection and clinical use. *Am J Med*. 2009;122(6 Suppl):S37-S50. doi:10.1016/j.amjmed.2009.03.015

Post-Session Questions

3. According to the American College of Lifestyle Medicine, what % of US adults live a healthy lifestyle?

A. < 5%
B. 6-10%
C. 11-15%
D. 16-20%



[1]Loprinzi PD, Branscum A, Hanks J, Smit E. Healthy lifestyle characteristics and their joint association with cardiovascular disease biomarkers in US adults. Mayo Clin Proc. 2016;91(4):432-442. doi:10.1016/j.mayocp.2016.01.009
[2]American College of Lifestyle Medicine. Accessed May 21, 2021. https://lifestylemedicine.org/What-is-Lifestyle-Medicine.

Resources - Harvard Institute of Lifestyle Medicine

"Our mission is to reduce lifestyle-related death and disease in society through clinician-directed interventions with patients."

Harvard School of Medicine – Institute of Lifestyle Medicine
https://www.instituteoflifestylemedicine.org/

Resources - Diabetes Education Programs

- Assist in developing customized plans
- Provide patients tools & ongoing support
- Improve diabetes outcomes including CVD risk reduction
- Covered by most commercial healthcare plans, Medicare & Medicaid

- Find a Diabetes Education Program in Your Area

  Association of Diabetes Care and Education Specialists

References

- Ali MK, Bullard KM, Saydah S, Imperatore G, Gregg EW. Cardiovascular and renal burdens of prediabetes in the USA: analysis of data from serial cross-sectional surveys, 1988-2014. Lancet Diabetes Endocrinol. 2018;6(5):392-403. doi:10.1016/S2213-8587(18)30027-5
- American Diabetes Association; Introduction: *Standards of Medical Care in Diabetes—2022*. *Diabetes Care* 1 January 2022; 45 (Supplement_1): S1–S2. https://doi.org/10.2337/dc22-Sint
- American Diabetes Association. Prevention or Delay of Type 2 Diabetes: Diabetes Care 2021 Jan; 45(Supplement 1): S39-S45. https://doi.org/10.2337/dc22-S003
- Dall TM, Yang W, Gillespie K, et al. The Economic Burden of Elevated Blood Glucose Levels in 2017: Diagnosed and Undiagnosed Diabetes, Gestational Diabetes Mellitus, and Prediabetes. Diabetes Care. 2019;42(9):1661-1668. doi:10.2337/dc18-1226
- Fang M, Wang D, Coresh J, Selvin E. Trends in Diabetes Treatment and Control in U.S. Adults, 1999-2018. *N Engl J Med*. 2021;384(23):2219-2228. doi:10.1056/NEJMsa2032271 https://pubmed.ncbi.nlm.nih.gov/34107181/
- Kendall DM, Cuddihy RM, Bergenstal RM. Clinical application of incretin-based therapy: therapeutic potential, patient selection and clinical use. *Am J Med*. 2009;122(6 Suppl):S37-S50. doi:10.1016/j.amjmed.2009.03.015
- Mechanick JI, Garber AJ, Grunberger G, Handelsman Y, Garvey WT. Dysglycemia-based Chronic Disease: An American Association of Clinical Endocrinologists Position Statement. Endocr Pract. 2018;24(11):995-1011. doi:10.4158/PS-2018-0139
- National Diabetes Statistics Report, 2020. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2020. https://www.cdc.gov/diabetes/data/statistics-report/index.html
- Powers MA et al. Joint Position Paper: Diabetes self-management education and support for type 2 diabetes. 2015. https://pubmed.ncbi.nlm.nih.gov/26047627/
- Wagner, R., Heni, M., Tabák, A.G. et al. Pathophysiology-based subphenotyping of individuals at elevated risk for type 2 diabetes. Nat Med 27, 49–57 (2021). https://doi.org/10.1038/s41591-020-1116-9
- Xu XY, Leung AYM, Smith R, Wong JYH, Chau PH, Fong DYT. The relative risk of developing type 2 diabetes among individuals with prediabetes compared with individuals with normoglycaemia: Meta-analysis and meta-regression. J Adv Nurs. 2020;76(12):3329-3345. doi:10.1111/jan.14557

Contact Information

Jonathan Weber MA, PA-C, DFAAPA

jonathan.weber@yale.edu