



# Endocrine Workshop: Diabetes and obesity essentials



**Endocrine Workshop:  
Diabetes and obesity essentials**

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U.S. Veterans Administration APRN Council  
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Executive Advisory Board Carelix by Sharecare launched by WebMD founder Jeff Arnold, Oprah, Sony and Discovery  
Montana State Diabetes Advisory Coalition  
Montana State Stroke Workgroup  
Recognized from the floor of the U.S. Senate for work with Veterans Health and Stroke

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**Disclosure**

- No real or potential conflict of interest to disclose.
- No off-label, experimental or investigational use of drugs or devices will be presented.

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**Section 1: Diabetes**

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# Endocrine Workshop: Diabetes and obesity essentials

## Objectives

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

1. Synthesize strategies to build a framework to deliver quality diabetes care.
2. Examine nutrition and physical lifestyle changes to reduce the risk of developing diabetes.
3. Identify key pharmacologic modalities to treat prediabetes and obesity.

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## Objectives (continued)

- At the end of this presentation, the participant will be able to: (cont.)

4. Contrast different types of diabetes, diagnostics and glycemic targets.
5. Acquire the knowledge and tools necessary to launch, land and sustain a quality driven shared medical appointment program for diabetes.

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## Tips



- References
  - Listed throughout and at the end of the presentation
- To facilitate your learning
  - Specific tables/images can be viewed full page at the end of your handout.

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## Diabetes Essentials for Primary Care

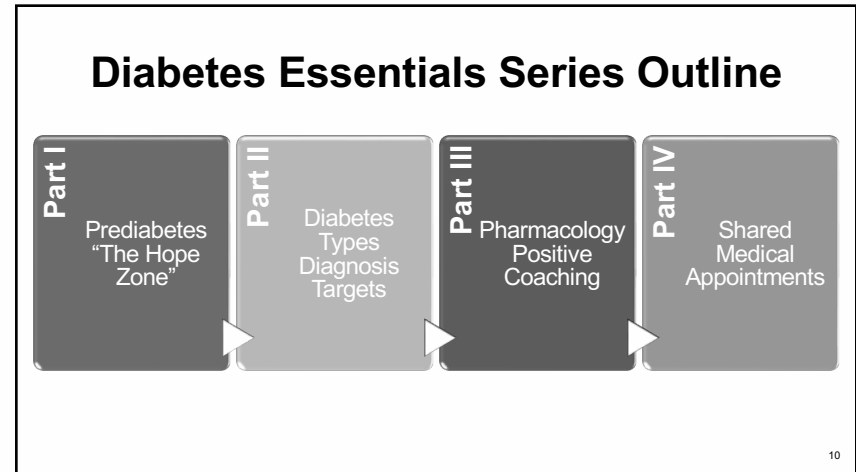
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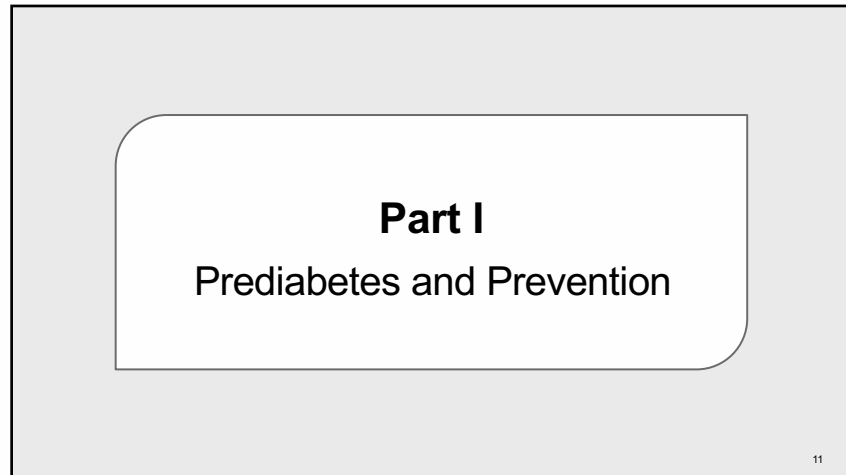
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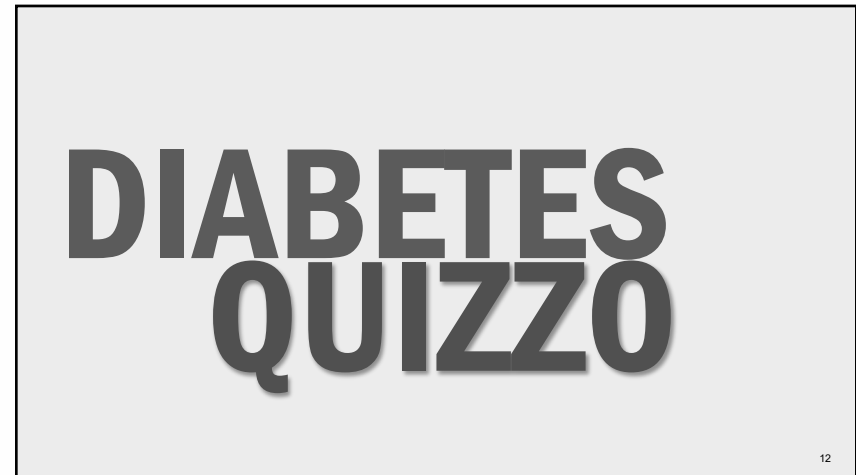
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## Question

How many Americans are estimated to have prediabetes?

- A. 96 million
- B. 750,000
- C. 48 million
- D. 875,000

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## Answer

How many Americans are estimated to have prediabetes?

- A. **96 million**
- B. 750,000
- C. 48 million
- D. 875,000

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## The Care Team

Strategies to improve team-based patient care and outcomes

- Collaborative goal setting with patient and family
- Identify and address language, literacy and cultural barriers.
- Integrate EBP guidelines and information tools into plans of care.
- Provide formal case management and patient education resources.
- Incorporate, empower and sustain a multi-disciplinary team

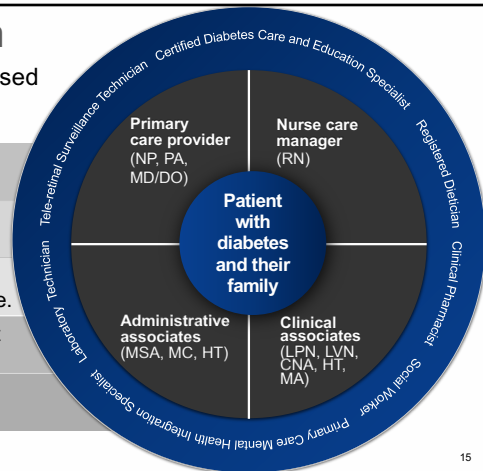


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## Faces of Diabetes Quizzo

- Janice, age 64 years old
- History: Prediabetes, hypertension
- BMI: 29 kg/m<sup>2</sup>

Janice has questions about carb-counting and would like a nutrition evaluation. Which member of the team should you refer her to?

- A. Social worker
- B. Tele-retinal specialist
- C. Mental health provider
- D. **Registered dietician**

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## Answer

- Janice, age 64 years old
- BMI: 29 kg/m<sup>2</sup>
- History: Prediabetes, hypertension

Janice has questions about carb-counting and would like a nutrition evaluation. Which member of the team should you refer her to?

- A. Social worker
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- C. Mental health provider
- D. Registered dietician

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## The Problem of Prediabetes

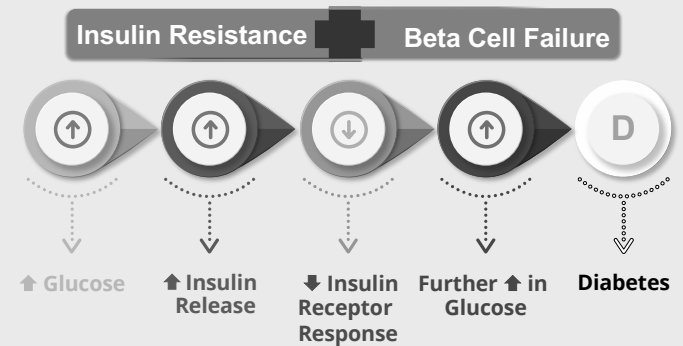


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## The Problem of Prediabetes<sup>4, 5</sup> (continued)

- Increases proatherogenic factors
  - Macrovascular disease
    - ↑ Fibrinogen
    - ↑ C-reactive protein
- Increase diastolic heart failure
  - Patients with A1C 5.7–6.4% (0.057–0.064 proportion)
    - Lower peak mitral inflow in diastole
    - Late diastolic atrial filling velocity
    - Higher left atrium volume
  - All signs of diastolic dysfunction



Image source: Shutterstock

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## The Problem of Prediabetes<sup>6</sup> (continued)

- Increases risk of myocardial infarction
  - 25% increased risk of MI
  - 45% increased risk of needing coronary stents
  - Double the risk of having bypass surgery
- Retrospective study looked at 1.8 million patients (2022)



Image source: Shutterstock

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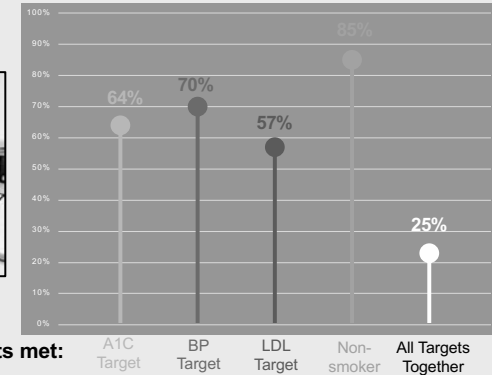
## The Problem of Prediabetes<sup>6</sup> (continued)

- 50% of TIA and stroke patients have prediabetes.
- Associated with early forms of...
  - Small fiber neuropathy
  - Diabetes retinopathy
  - Nephropathy
  - Chronic kidney disease
  - Retinopathy



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## The Problem of Prediabetes<sup>1</sup> (continued)



2013–2016: 1,746 patients met:

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## Prevalence of Prediabetes<sup>6</sup>

- Risk factors for prediabetes
  - Overweight or obesity
  - Family history of diabetes
  - Diabetes during pregnancy
  - High-risk ethnic groups
  - Hypertension
  - Physical inactivity
  - Dyslipidemia
  - Polycystic ovarian syndrome



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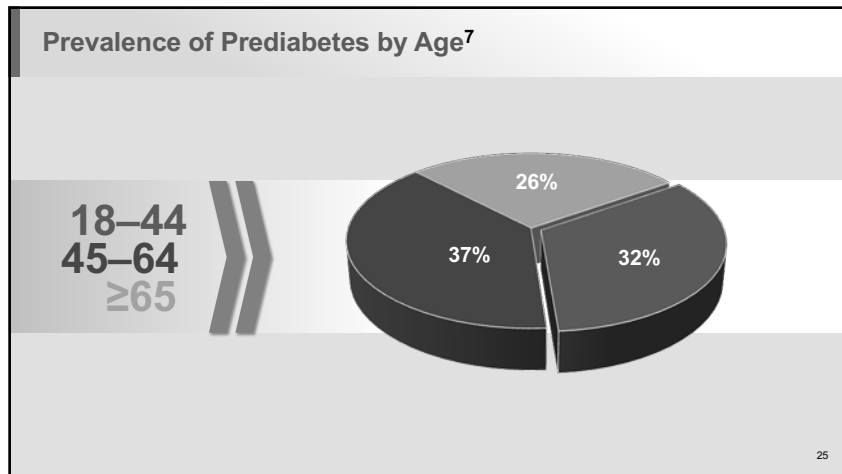
## Prevalence of Prediabetes<sup>6</sup> (continued)

**96 million**  
American adults are estimated to have prediabetes.

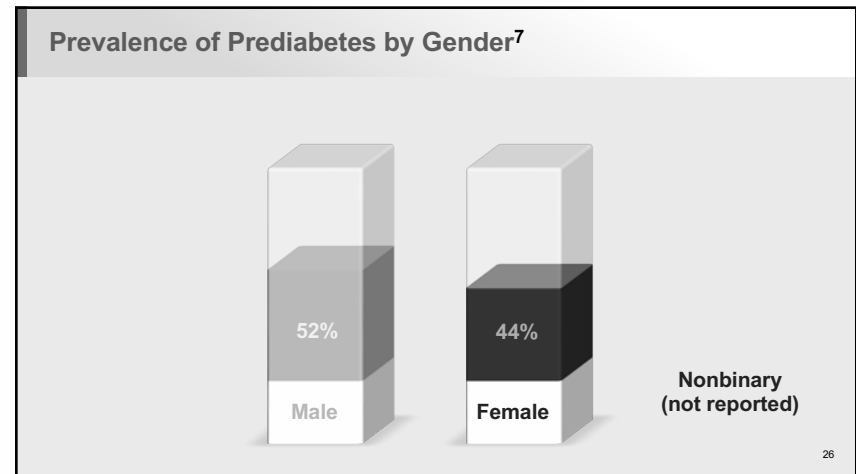
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### Screening for Prediabetes<sup>8</sup>

- Adults ages 35–70 years old
- Screen every 3 years.
  - Obtain height and weight.
  - Calculate BMI.
    - $\geq 25 \text{ kg/m}^2$  = Overweight
    - $\geq 30 \text{ kg/m}^2$  = Obesity
- Screening tests
  - Fasting plasma glucose
  - Hemoglobin A1C
  - Oral glucose tolerance test

Image source: Shutterstock

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### Faces of Diabetes Quizzo

- Jack, age 68 years old
- BMI:  $25 \text{ kg/m}^2$
- History: Hypertension, tobacco use

Jack is seeing his nurse practitioner today for a wellness visit. How often should he be screened for prediabetes and diabetes?

- A. Every 3 years
- B. Every 6 months
- C. Every 5 years
- D. He no longer needs screening

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## Answer

- Jack, age 68 years old
- BMI: 25 kg/m<sup>2</sup>
- History: Hypertension, tobacco use

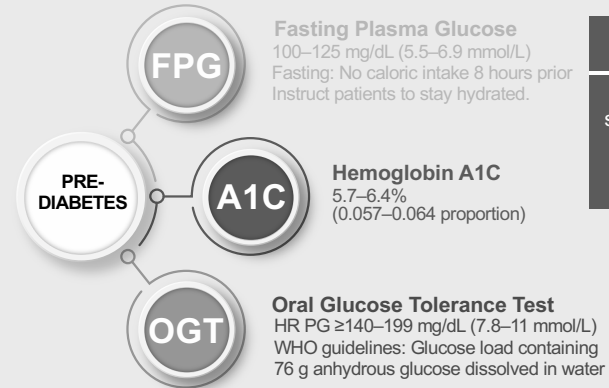
Jack is seeing his nurse practitioner today for a wellness visit. How often should he be screened for prediabetes and diabetes?

- A. Every 3 years
- B. Every 6 months
- C. Every 5 years
- D. He no longer needs screening

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## Prediabetes Diagnosis<sup>10</sup>



### Monitor for Diabetes

Type 2 diabetes screening at least annually for all patients with prediabetes

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## Lifestyle Changes<sup>6, 9</sup>

- Refer to an intensive lifestyle behavior change program.
- Achieve and maintain weight reduction of at least 7% of initial body weight.
- Individual health coaching
- Group visits
- Telehealth monitoring



Image source: Shutterstock

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## Lifestyle Changes



Image source: Shutterstock

*Intensive lifestyle intervention reduces the risk of Type 2 diabetes by*

# 58%

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## Lifestyle Changes (continued)



Image source: Shutterstock

- Weight loss 7% or more
  - 1–2 lbs. (0.4–0.9 kg) per week
- Daily calories
  - Calories needed to maintain current weight: 500–1,000 calories per day
- Moderate intensity exercise
  - 150 minutes per week
  - 75 minutes of strength training
  - Activity goal without the weight loss goal = 44% risk reduction

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## Lifestyle Changes: Nutrition<sup>11</sup>



Image source: Shutterstock

- Variety of eating patterns
  - Mediterranean style
  - Low carbohydrate eating plans
  - Vegetarian, plant-based plans
  - DASH diet (hypertension)
- Whole grains, legumes, nuts, fruits, vegetables
- Minimal refined and processed foods = Lower T2 diabetes risk

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## Faces of Diabetes Quizzo

- Manuel, age 45 years old
- BMI: 32 kg/m<sup>2</sup>
- History: Prediabetes, hyperlipidemia

Manuel wants to start eating healthier. Saturated fat intake should remain below what percentage per day?

- A. 15%
- B. 25%
- C. 7%
- D. 45%

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## Answer

- Manuel, age 45 years old
- BMI: 32 kg/m<sup>2</sup>
- History: Prediabetes, hyperlipidemia

Manuel wants to start eating healthier. Saturated fat intake should remain below what percentage per day?

- A. 15%
- B. 25%
- C. 7%
- D. 45%

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## Faces of Diabetes Quizzo

- Noora, age 42 years old
- BMI: 30 kg/m<sup>2</sup>
- History: Prediabetes, hypertension

Noora wants to improve her weight. Using the plate method for meals, how much of her plate should contain non-starchy vegetables?

- A. 75%
- B. 30%
- C. 50%
- D. 0%

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## Answer

- Noora, age 42 years old
- BMI: 30 kg/m<sup>2</sup>
- History: Prediabetes, hypertension

Noora wants to improve her weight. Using the plate method for meals, how much of her plate should contain non-starchy vegetables?

- A. 75%
- B. 30%
- C. 50%
- D. 0%

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## Lifestyle Changes: Physical Activity



Image source: Shutterstock

- 150 minutes of moderate to vigorous-intensity aerobic activity per week
- Spread over at least 3 days
- No more than 2 consecutive days without activity
- 75 minutes per week of vigorous-intensity or interval training for younger or more physically fit

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## Lifestyle Changes: Physical activity (continued)

- Two to three sessions per week of resistance exercise on nonconsecutive days
- Prolonged sitting interrupted at least every 30 minutes
- Flexibility training (yoga and tai chi) two to three times per week for older adults



Image source: Shutterstock

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## Faces of Diabetes Quizzo

- Alex, age 69 years old
- BMI: 32 kg/m<sup>2</sup>
- History: Prediabetes

Alex reports that he recently joined a gym. He wants to know how many minutes a week he needs to work out? The NPs answers...

- A. 150 minutes
- B. 30 minutes
- C. 240 minutes
- D. 40 minutes

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## Answer

- Alex, age 69 years old
- BMI: 32 kg/m<sup>2</sup>
- History: Prediabetes

Alex reports that he recently joined a gym. He wants to know how many minutes a week he needs to work out? The NPs answers...

- A. 150 minutes**
- B. 30 minutes
- C. 240 minutes
- D. 40 minutes

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## Lifestyle Changes: Exercise Clearance and Safety<sup>17</sup>

- Pre-exercise evaluation
  - Careful history
  - Assess cardiovascular risk factors.
  - Atypical presentation of CAD
    - Reports of decrease in exercise tolerance
  - Start with short periods of low intensity and duration as tolerated.

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## Prediabetes Pharmacologic Interventions<sup>18, 19</sup>

- No FDA approved pharmacologic agents for specific indication for Type 2 diabetes prevention
- Consider
  - Risk vs. benefit
  - Cost
  - Adverse effects
  - Efficacy



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## Prediabetes Pharmacologic Interventions<sup>20</sup> (continued)

- Metformin
  - Longest history of safety data for treatment of Type 2 diabetes prevention
  - Metformin as effective as lifestyle modifications
    - BMI  $\geq 35$  kg/m<sup>2</sup>
    - Younger age 25–44 years old



Image source: Shutterstock

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## Prediabetes Pharmacologic Interventions<sup>20</sup> (continued)

- Metformin (cont.)
  - Metformin + intensive lifestyle modifications = 50% reduction in diabetes risk
  - Recommended for...
    - BMI  $\geq 35$  kg/m<sup>2</sup>
    - Monitor vitamin B<sub>12</sub> levels.
      - B<sub>12</sub> absorbed in terminal ileum
      - Intrinsic factor required
      - Metformin interferes with production of intrinsic factor.



Image source: Shutterstock

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## Part II

### Diabetes Types, Diagnosis and Targets

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## Question

When was diabetes first recognized in history?

- A. 1552 B.C.
- B. 1932 A.D.
- C. 1843 A.D.
- D. 50 B.C.

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## Answer

When was diabetes first recognized in history?

- A. 1552 B.C.
- B. 1932 A.D.
- C. 1843 A.D.
- D. 50 B.C.

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## Question

Which healthcare professional first recognized diabetes?

- A. Fredrick Banting, MD
- B. Florence Nightingale, nurse
- C. Hesy-Ra, Egyptian physician
- D. Loretta Ford, EdD, PNP, FAANP

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## Answer

Which healthcare professional first recognized diabetes?

- A. Fredrick Banting, MD
- B. Florence Nightingale, nurse
- C. **Hesy-Ra, Egyptian physician**
- D. Loretta Ford, EdD, PNP, FAANP

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Image sources: Shutterstock

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**Classification is important as it determines type of therapy.<sup>1</sup>**

Traditional paradigms of Type 1 occurring in children and Type 2 occurring in adults **no longer** holds true

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Image source: Shutterstock

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Image source: Shutterstock

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Image source: Shutterstock

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## Type 1 and Type 2 Diabetes<sup>1</sup>

T1 Type 1	T2 Type 2
<ul style="list-style-type: none"> <li>• Autoimmune B-cell destruction</li> <li>• Younger age at diagnosis (&lt;35 years)</li> <li>• Lower BMI at diagnosis (&lt;25 kg/m<sup>2</sup>)</li> <li>• Unintentional weight loss</li> <li>• Ketoacidosis</li> <li>• Glucose &gt;360 mg/dL (20 mmol/L)</li> </ul>	<ul style="list-style-type: none"> <li>• Non-autoimmune progressive loss of adequate B-cell insulin secretion Insulin resistance</li> <li>• Older age at diagnosis (&gt;35 years)</li> <li>• Higher BMI at diagnosis (&gt;25 kg/m<sup>2</sup>)</li> <li>• No specific symptoms</li> <li>• Often found first on labs</li> </ul>

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## Type 1 and Type 2 Diabetes: Autoantibodies

- Persistent presence of **two or more** islet autoantibodies
  - **Near certain** predictor of clinical diabetes
- Children with islet autoantibodies progress to T1 diabetes **within 15 years.**
- Islet autoantibodies are markers which appear when insulin producing beta cells are damaged.
  - They do not cause the damage.
  - Elevated in patients with autoimmune destruction

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## Type 1 and Type 2 Diabetes: Autoantibodies (continued)

**Common islet autoantibodies**

- Islet Cell Cytoplasmic Autoantibodies (ICA)
- Glutamic Acid Decarboxylase Autoantibodies (GADA)
- Insulinoma-Associated-2 Autoantibodies (IA-2A)
- Zinc Transporter-8 Autoantibodies (ZnT8A)


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- Islet Cell Cytoplasmic Autoantibodies (ICA)**
- Glutamic Acid Decarboxylase Autoantibodies (GADA)**
- Insulinoma-Associated-2 Autoantibodies (IA-2A)**
- Zinc Transporter-8 Autoantibodies (ZnT8A)**

- Widespread screening not recommended.
  - Lack of appropriate therapeutic interventions
- Test positive
  - Counsel about risk of developing diabetes.
  - Diabetes symptoms
  - DKA prevention



**Type 1 Diabetes TrialNet**

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## Screening for Type 1 Diabetes<sup>2</sup>

- 5–10% of all diabetes
- Cell-mediated autoimmune destruction of pancreatic B-cells
- Islet cell autoantibodies are markers.
- Stage 1 of Type 1 diabetes
  - Presence of **two or more** autoantibodies
- Rate of B-cell destruction is variable.
  - Rapid in children and infants
    - They often present with DKA
  - Slower in adults
- Prone to other autoimmune disorders: Hashimoto's, Graves' disease, celiac disease, Addison's disease, vitiligo, myasthenia gravis, pernicious anemia

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Image source: Shutterstock

- At time of diagnosis 40–60% of patients with Type 1 have DKA.<sup>2</sup>
- Islet autoantibody tests can identify those who will develop Type 1.<sup>2</sup>
  - Study Finland, Germany, and U.S.
    - 585 children who had more than two autoantibodies
      - 70% developed Type 1 in 10 years
      - 84% in 15 years

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## Screening for Type 2 Diabetes

- 90–95% of all diabetes
  - Relative **NOT** absolute insulin deficiency
  - Peripheral insulin resistance
  - **No** autoimmune destruction of B-cells
  - Overweight or obesity
  - DKA seldom occurs unless...
    - Stress of other illness, infection, myocardial infarction, etc.
    - Certain drugs: Corticosteroids, antipsychotics, sodium-glucose co-transporter 2 inhibitors



American  
Diabetes  
Association  
Type 2  
Diabetes Risk  
Test

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Image source: Shutterstock

- Screen for those on medications.<sup>3</sup>
  - Glucocorticosteroids, thiazide diuretics, HIV medications, antipsychotics increase risk of diabetes = Screening

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Image source: Shutterstock

- Screen for those with HIV.<sup>3</sup>
  - Medications increase risk of PD and T2D
  - A1C may underestimate glycemia with HIV.
    - Not recommended for diagnosis
    - Challenges for monitoring
  - New onset diabetes
  - ≥5% of individuals infected with HIV
  - 15% of those with HIV may have prediabetes.

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### Community Screening for Diabetes<sup>4</sup>

- Community screening
  - Healthcare setting because of need for follow-up
  - People with positive tests may not seek follow-up.
  - Adequate referral system is established community screening may be helpful.

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### Community Screening for Diabetes<sup>4</sup> (continued)

- Screening in dental practices
  - Periodontal disease associated with diabetes
  - Screen in dental refer to primary care
  - 30% of patients ≥30 years of age seen in dental had hyperglycemia.
  - 1,150 dental patients >40 years old
    - 20.6% had prediabetes.
    - 14.6% had diabetes.

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Image source: Shutterstock

- Cystic fibrosis related diabetes<sup>5</sup>
  - Cystic fibrosis affects 1 in 2,500 to 3,000 births.
  - Viscous secretions in pancreas lead to dysfunction.
  - Most common comorbidity in people with cystic fibrosis
  - 20% of adolescents and 40–50% of adults

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Image source: Shutterstock

- Cystic fibrosis related diabetes<sup>5</sup> (cont.)
  - Associated with...
    - Worse nutritional status
    - More severe inflammatory lung disease
    - Greater mortality
  - Insulin insufficiency is the primary issue.

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Image source: Shutterstock

- Cystic fibrosis related diabetes<sup>5</sup>
  - Annual screening in patients with cystic fibrosis should begin by age 10 years old.
  - Screening for diabetes should begin 5 years after the diagnosis of cystic fibrosis.
  - A1C is **NOT** the recommended screening tool.
    - Inaccurate due to increased red blood cell turnover with CF
    - Annual oral glucose tolerance test is recommended.
    - Only 51% of patients with cystic fibrosis are screened.

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Image source: Shutterstock

- New onset diabetes after transplantation (NDOT)<sup>6-8</sup>
  - 90% of renal transplant patients experience hypoglycemia during first few weeks after transplant.<sup>6-8</sup>

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Image source: Shutterstock

- Hyperglycemia during early posttransplant period<sup>6-8</sup> (cont.)
  - 38% of heart transplant recipients develop diabetes within 1-year post-transplant.
  - Most stress and steroid induced hyperglycemia resolves prior to discharge
  - Related to immunosuppressive therapy
  - Risk of rejection outweighs risk of diabetes

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Image source: Shutterstock

- Screen every patient for post-transplant diabetes at follow-up visit.
- Oral glucose tolerance test is preferred test for screening.<sup>6-8</sup>
  - Post-transplant anemia can lead to inaccuracy of A1C.

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## Gestational Diabetes

- Often indicative of underlying B-cell dysfunction
- Marked increased risk of later development of diabetes
- 50% of women who have gestational diabetes **develop** Type 2 diabetes.




Image source: Shutterstock

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## Gestational Diabetes (continued)

- Placenta increases estrogen, cortisol and human placental lactogen excretion
  - Has a blocking effect on insulin
- Begins 20 to 24 weeks into pregnancy




Image source: Shutterstock

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## Gestational Diabetes<sup>11</sup> (continued)

- Screening and diagnosis
  - Screen all individuals who are planning to conceive prior to pregnancy.
  - Consider screening all patients at first prenatal visit.
  - Screen those at 15 week if risk factors are present.
  - Screen for gestational diabetes at 24–28 weeks.
    - Time when placental hormone release peaks
  - Screen gestational diabetes patients for prediabetes or diabetes at 4–12 weeks postpartum.
  - Gestational diabetes: Screen for prediabetes or diabetes every 3 years for life.

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## Prediabetes: Diagnosis<sup>1</sup>

### The “Hope Zone”

#### Fasting Plasma Glucose

- FPG: 100–125 mg/dL (5.5–6.9 mmol/L)
- Fasting: No caloric intake for at least 8 hours prior to test
- Clinical tip: Instruct patients to stay hydrated with non-caloric fluids

#### Hemoglobin A1C

- A1C ≥5.7–6.4% (0.057–0.064 proportion)

#### Oral Glucose Tolerance

- 2 HR PG ≥140–199 mg/dL (7.8–11 mmol/L)
- WHO guidelines
- Glucose load containing 75 g anhydrous glucose dissolved in water

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## Diabetes: Diagnosis<sup>1</sup>

#### Fasting Plasma Glucose

- FPG ≥126 mg/dL (7.0 mmol/L)
- Fasting: No caloric intake for at least 8 hours prior to test
- Clinical tip: Instruct patients to stay hydrated with non-caloric fluids

#### Hemoglobin A1C

- A1C ≥6.5% (0.065 proportion)

#### Oral Glucose Tolerance

- 2 HR PG ≥200 mg/dL (11.1 mmol/L)
- WHO guidelines: Glucose load containing 75 g anhydrous glucose dissolved in water

#### Random Plasma Glucose

- RPG ≥200 mg/dL (11.1 mmol/L)
- Classic symptoms of hyperglycemia or hyperglycemic crisis

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## Diabetes: Glycemic Control Tests

### A1C Measurement

- Used for ongoing monitoring
- Benefits of glycemic control

### Blood Glucose Monitoring

- Meal planning
- Physical activity
- Medication adjustments
- Insulin therapy

### Continuous Glucose Monitor

- Improved safety
- Improved glucose
- Decreased hypoglycemia
- Enhanced self-efficacy

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## Hemoglobin A1C<sup>13</sup>

- Average glucose over past 3 months
- Measures sugar coat on RBC
- Average life span of RBC 90 days
- Measured at time of diagnosis
- Every 6 months for controlled
- Every 3 months for uncontrolled

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## Diabetes Diagnosis: Advantages and Disadvantages of A1C<sup>12</sup>

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>Greater convenience (Non-fasting)</li> </ul>	<ul style="list-style-type: none"> <li>Lower sensitivity</li> </ul>
<ul style="list-style-type: none"> <li>Greater preanalytical stability</li> </ul>	<ul style="list-style-type: none"> <li>Greater cost</li> </ul>
<ul style="list-style-type: none"> <li>Fewer day to day variability</li> </ul>	<ul style="list-style-type: none"> <li>Lower availability</li> <li>Impacted by HIV pregnancy, age, race/ethnicity, anemia</li> </ul>

A1C

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- Continuous glucose monitoring<sup>14</sup>
  - Improved diabetes management
  - Time in range
    - Amount of time spent in target blood glucose range (70–180 mg/dL [3.9– 10 mmol/L])
  - Correlates well with A1C

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- Continuous glucose monitoring<sup>14</sup> (cont.)
  - Time below range (<70 mg/dL [3.9 mmol/L])
  - Time above range (>180 mg/dL [10 mmol/L])
    - Useful in adjusting insulin dose
    - Guide medical nutritional therapy
    - Guide physical activity
    - Reduce risk of hypoglycemia

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## Diabetes Targets<sup>1, 15, 16</sup>

Patients without Diabetes	Patients with Diabetes	
<b>&lt;5.6% (0.056 proportion)</b>	<7% (0.07 proportion) for most <8% (0.08 proportion) at age 80 years old	<b>Hemoglobin A1C</b>
<b>&lt;100 mg/dL (5.5 mmol/L)</b>	80–130 mg/dL (4.4–7.2 mmol/L) Fasting for 8 hours	<b>Fasting plasma glucose</b>
<b>&lt;140 mg/dL (7.8 mmol/L)</b>	<180 mg/dL (10 mmol/L) 1–2 hours post meal	<b>Peak postprandial</b>

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## Diabetes Quizzo

- Lucey, age 83 years old
- History of T2 diabetes; uses a cane
- BMI: 25 kg/m<sup>2</sup>
- A1C: 7.8% (0.078 proportion)
- BP: 120/82 mm Hg

Lucey is in the office for a routine check-up. Should her diabetes medications be adjusted to tighten up glycemic control?

- A. Yes, she needs to get below A1C 7% (0.07 proportion).
- B. No, she is at goal A1C <8% (0.08 proportion) for her age.
- C. Yes, she should go to the hospital.
- D. Yes, she should start insulin.

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## Answer

- Lucey, age 83 years old
- History of T2 diabetes; uses a cane
- BMI: 25 kg/m<sup>2</sup>
- A1C: 7.8% (0.078 proportion)
- BP: 120/82 mm Hg

Lucey is in the office for a routine check-up. Should her diabetes medications be adjusted to tighten up glycemic control?

- A. Yes, she needs to get below A1C 7% (0.07 proportion).
- B. No, she is at goal A1C <8% (0.08 proportion) for her age.**
- C. Yes, she should go to the hospital.
- D. Yes, she should start insulin.

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## Part III

### Pharmacology and Positive Coaching

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# Endocrine Workshop: Diabetes and obesity essentials

Connect – Empower – Inspire

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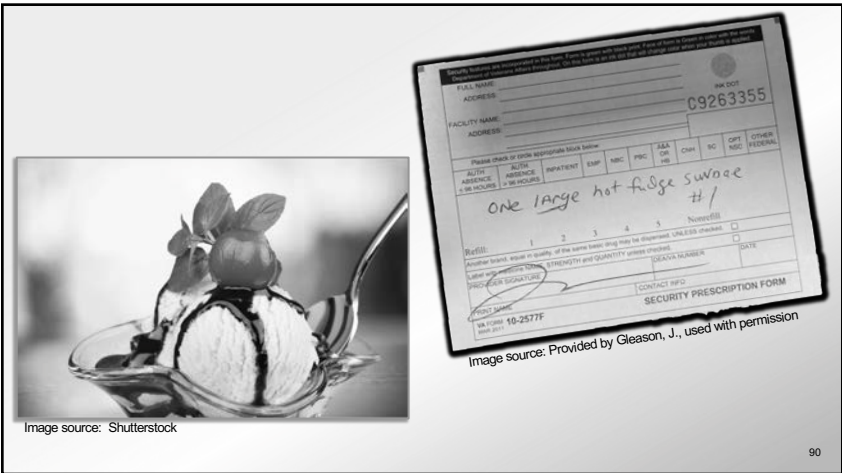


Image source: Shutterstock

Image source: Provided by Gleason, J., used with permission

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## Question

In what year was insulin first discovered?

- A. 1894
- B. 1946
- C. 1872
- D. 1921

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## Answer

In what year was insulin first discovered?

- A. 1894
- B. 1946
- C. 1872
- D. 1921

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# Endocrine Workshop: Diabetes and obesity essentials



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Image source: Toronto Daily Star, (1922). "Toronto Doctors on Track of Diabetes Cure" [https://en.wikipedia.org/wiki/File:Banting-front-page\\_Toronto\\_Daily\\_Star\\_1922.jpg](https://en.wikipedia.org/wiki/File:Banting-front-page_Toronto_Daily_Star_1922.jpg) In the public domain.

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Image source: Highfield, T. and Parker, B. (1930s?). Ward of Walsall Manor hospital (<http://www.historywebsite.co.uk/articles/WalsallManor/photos.htm>) in the public domain.

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Image sources: Univ. of Toronto Library, (1924). C.H. Best and F.G. Banting. [https://commons.wikimedia.org/wiki/File:C.\\_H.\\_Best\\_and\\_F.\\_G.\\_Banting\\_ca.\\_1924.png](https://commons.wikimedia.org/wiki/File:C._H._Best_and_F._G._Banting_ca._1924.png) In the public domain.; U.S. Patent Office. (1923). Patent #1,469,994. (<https://reslib.library.utoronto.ca/islandora/object/ensden%3A100117>) in the public domain.

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# Endocrine Workshop: Diabetes and obesity essentials

## Insulin Basics: Categories

- 1 Basal Insulin**  
NPH  
Long-acting  
Continuous delivery of rapid insulin via pump
- 2 Mealtime Insulin**  
Rapid-acting insulin  
Regular insulin
- 3 Correction Insulin**  
Rapid-acting insulin  
Regular insulin

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## Insulin Basics: Type 1<sup>1</sup>



- For most patients with Type 1 diabetes
  - Basal insulin: 50% of daily dose
  - Prandial insulin: 50% of daily dose
  - Total daily insulin requirements estimated based on weight
  - Typical dose range: 0.4 to 1.0 units/kg/day


Image source: Shutterstock

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## Insulin Basics: Type 1<sup>1</sup> (continued)




- For most patients with Type 1 diabetes (cont.)
  - Higher doses may be required during...
    - Puberty
    - Pregnancy
    - Medical illness

Image source: Shutterstock

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## Insulin Basics: Type 1<sup>1</sup> (continued)



- Typical insulin regimen for Type 1 diabetes
  - Calculate dose based on weight
  - Basal: 50%; Prandial: 50%
  - Long-acting basal dose covers overnight and fasting glucose.
  - Short-acting prandial dose covers carbohydrates consumed at mealtime.

Image source: Shutterstock

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# Endocrine Workshop: Diabetes and obesity essentials

## Insulin Basics: Type 1<sup>1</sup> (continued)



Image source: Shutterstock

- Typical insulin regimen for Type 1 diabetes (cont.)
  - Prandial dose should be individualized.
    - Carbohydrate intake
    - Premeal glucose level
    - Anticipated activity

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## Insulin Basics: Insulin Injection<sup>1</sup>



Image source: Shutterstock

- Insulin injection technique
  - Vital to ensuring efficacy and safety
  - Technique should include...
    - Injecting into subcutaneous tissue
    - Injection site rotation
    - Avoidance of IM injections
    - Use short needles (4 mm).
  - Recommended sites
    - Abdomen
    - Thigh
    - Buttock
    - Upper arm

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## Insulin Basics: Carb Counting

- Carbohydrate coverage
  - 1 unit of rapid-acting insulin covers 12–15 grams of carbohydrate
  - Depends on individual's sensitivity
- Correction coverage
  - Blood sugar measured at mealtime
  - 1 unit of rapid-acting insulin to reduce blood sugar by 50 mg/dL (2.8 mmol/L)
  - Depends on individual's sensitivity



Image source: Shutterstock

### Clinical Connection

Can I prescribe the same carbohydrate and blood sugar correction for all patients?

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## Insulin Basics: Carb Counting (continued)

- Carbohydrate coverage
  - 1 unit of rapid-acting insulin covers 12–15 grams of carbohydrate
  - Depends on individual's sensitivity
- Correction coverage
  - Blood sugar measured at mealtime
  - 1 unit of rapid-acting insulin to reduce blood sugar by 50 mg/dL (2.8 mmol/L)
  - Depends on individual's sensitivity



Image source: Shutterstock

### Clinical Connection

Titrate carb and correction insulin carefully as sensitivity can vary widely. Patients need a regimen tailored to them.

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# Endocrine Workshop: Diabetes and obesity essentials

## Insulin Basics: Carb Counting (continued)

Susan is going to eat 60 grams of carbohydrate for dinner. She tests her blood sugar before eating and it is 220 mg/dL (12.2 mmol/L).  
**How many units of rapid-acting insulin does she need?**

### Carbohydrate Correction

- 1 unit of rapid-acting insulin covers 10–15 grams of carbohydrates
  - Titrate carefully – Go low and slow.
  - 1 unit of rapid-acting insulin will decrease blood sugar by 50 mg/dL (2.8 mmol/L)
  - Premeal target 120 mg/dL (6.7 mmol/L)
- 1 unit covers 10 carbs  
60 divided by 10 = 6 units**
- BS: 220 mg/dL (12.2 mmol/L) – 120 mg/dL (6.7 mmol/L) = 100 mg/dL (5.5 mmol/L)  
100 mg/dL (5.5 mmol/L) divided by 50 mg/dL (2.8 mmol/L) = 2 units**



**Carbohydrate correction + blood sugar correction = 8 units**

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## Insulin Basics: Types<sup>2</sup>

### Rapid-acting insulin

Onset: 15 min; Peak: 1-hr; Duration: 4–5 hrs

- Lispro (Humalog®)
- Aspart (Novolog®)
- Lispro (Admelog®)
- Glulisine (Apidra®)
- Aspart (ReliOn-Novolog®)

### Short-acting insulin

Onset: 30–60 min; Peak: 2–4 hrs; Duration: 6–8 hrs

- Human Regular (Humulin-R®, Novolin-R®)

### Intermediate-acting insulin

Onset: 1–2 hrs Peak: 4–6 hrs Duration: 12 hrs

- Human NPH (Humulin-N, Novolin-N, ReliOn/Novolin-N®)

Image source: Created by Gleason, J. (2023), used with permission

### Concentrated insulin

Onset: Variable Peak: Variable Duration: up to 24 hrs

- U-500, U-300, U-200  
(Humulin-R U-500®, Toujeo U-300®, Tresiba U-200®, Lispro U-200®)

### Long-acting basal insulin

Onset: 30 min Peak: **None** Duration: up to 24 hrs

- Glargine (Lantus®, Basaglar®, Toujea®)  
Detemir (Levemir®) – **Novo Nordisc. D/C 12.31.24**

### Premixed Insulin

Onset: 30–60 min; Peak: Dual; Duration: 14–18 hrs

- NPH/Regular 70/30 (Humulin 70/30®)  
Lispro 50/50, 75/25 (Humalog 50/50, 75/25®)  
Aspart 70/30 (Novolog Mix 70/30®)

### Novel combination

- Glargine/Lixisenatide (Soliqua 100/33®)

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## Diabetes Quizzo

- Alex, age 69 years old
- BMI: 32 kg/m<sup>2</sup>
- History: Diabetes
- Current A1C: 12% (0.12 proportion)

Alex is starting to do carbohydrate coverage at meals. He asks on average how many units of rapid-acting insulin he needs to take for every 10 grams of carbs.

- A. 1 unit
- B. 50 units
- C. 10 units
- D. 5 units

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## Answer

- Alex, age 69 years old
- BMI: 32 kg/m<sup>2</sup>
- History: Diabetes
- Current A1C: 12% (0.12 proportion)

Alex is starting to do carbohydrate coverage at meals. He asks on average how many units of rapid-acting insulin he needs to take for every 10 grams of carbs.

- A. 1 unit
  - B. 50 units
  - C. 10 units
  - D. 5 units
- 1 unit of rapid-acting insulin covers  
10–15 grams of carbohydrates**

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# Endocrine Workshop: Diabetes and obesity essentials

## “Cost-related Medication Under Adherence”

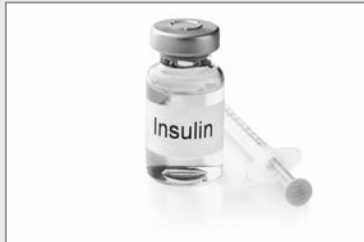


Image source: Shutterstock

*Of patients who are prescribed insulin report underuse due to cost*

# 25%

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## Alec Smith; 27-year-old

- Type 1 diabetes
- Single
- Lives on his own
- Recently off parents' insurance
- Worked full-time as a restaurant manager

- Income – \$35,000/year
- Made too much to qualify for Medicaid
- Insurance
  - \$450 per month
  - \$7,500 deductible

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## Alec Smith; 27-year-old (continued)



Image source: Nicole Smith-Holt, used with permission

- Insulin – \$1,300 per month
- Applied for assistance from all three insulin manufacturers and was **denied**
- Rationed his insulin
  - 27 days of rationing
  - 3 days before payday, slipped into diabetes ketoacidosis
  - Died June 27, 2017

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A collage featuring a news article snippet titled "'A great day': Minnesota Legislature finally passes emergency insulin bill" by Peter Callaghan. It includes a QR code linking to 'T1 International Affordable Insulin' and another QR code for 'Pay of Die Documentary on Paramount Plus'. A photo of a man and a woman is also visible.

News State Government  
**'A great day': Minnesota Legislature finally passes emergency insulin bill**  
The bill, named after Alec Smith, who died after rationing his insulin, creates a way for diabetics to access emergency insulin — and sets up a program to provide long-term supplies for lower-income Minnesotans who are under- or uninsured.  
By Peter Callaghan | MinnPost Staff Writer

T1 International Affordable Insulin

Pay of Die Documentary on Paramount Plus

Image source: Nicole Smith-Holt, used with permission

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# Endocrine Workshop: Diabetes and obesity essentials

## Insulin Basics: Containing Costs

**Medication Assistance Resources**

[www.needymeds.com](http://www.needymeds.com)



[www.goodrx.com](http://www.goodrx.com)



**U.S. Inflation Reduction Act**

- January 1, 2023
  - Out-of-pocket cost of insulin capped at \$35 for Medicare Part D
- July 1, 2023
  - Out-of-pocket cost of insulin capped at \$35 for Medicare Part B
- Pharmaceutical companies are launching price cutting measures.

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## Insulin Basics: Hypoglycemia





Image sources: Shutterstock

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## Insulin Basics: Hypoglycemia<sup>3</sup> (continued)

- Symptoms include...
  - Shakiness
  - Irritability
  - Confusion
  - Tachycardia
  - Hunger
- Can lead to...
  - Loss of consciousness
  - Seizure
  - Coma
  - Death

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# Endocrine Workshop: Diabetes and obesity essentials

## Insulin Basics: Hypoglycemia<sup>3</sup> (continued)

- Can cause acute harm...
  - Falls
  - Motor vehicle accidents
  - Work related accidents
- History of level 3 hypoglycemia among older adults associated with increased risk for dementia
- Reversible condition
  - Rapid-acting glucose or glucagon

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## Insulin Basics: Hypoglycemia<sup>3</sup> (continued)

- Treatment
  - Treat with BG of 70 mg/dL (3.9 mmol/L) or less.
  - Fast-acting carbohydrates
    - Pure glucose is preferred.
  - Added fat
    - Decrease treatment efficacy.
    - Prolong acute glycemic response.



Image source: Shutterstock

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## Insulin Basics: Hypoglycemia<sup>3</sup> (continued)

- Treatment (cont.)
  - Protein
    - Increase insulin response without increasing glucose – **AVOID**
  - Ongoing insulin or insulin stimulators may cause recurrent hypoglycemia.
    - Need to ingest more food: Meal or snack

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## Insulin Basics: Hypoglycemia<sup>3</sup> (continued)

- Treatment (cont.)
  - Glucagon
    - Treat in patients unable to take oral carbohydrates.
    - Guardians, family, friends and coworkers trained in use
    - Formulations
      - Glucagon injection: Powder requires reconstitution
      - Ready to inject subcutaneous injections
      - Nasal injections
      - Reach out to manufacturers for demonstration kits.

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# Endocrine Workshop: Diabetes and obesity essentials

## Insulin Basics: Hypoglycemia (continued)

- Mechanism of action
  - Induces liver glycogen breakdown and glucose release
- Dose
  - SC/IM 1 mg repeat in 15 min, if needed
  - Intranasal
  - Glucagon (Baqsimi®)
  - Cost
  - \$295–354 for 1 kit



Image source: Shutterstock

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## Certified Diabetes Care and Education Specialist

4 CRITICAL TIMES TO ASSESS, PROVIDE AND ADJUST DIABETES SELF-MANAGEMENT EDUCATION



Association of Diabetes Care and Education Specialists

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## Medications to Treat Type 2 Diabetes<sup>5</sup>

Drug Class, Drugs and MOA	A1C ↓	Hypoglycemia	Weight	Cost	Safety Issues	Added Benefits
<b>Metformin</b> Insulin sensitizer ↓ Liver glucose release ↓ Glucose absorption in gut	↓1–2%	Low	↓	\$	• First-line • Avoid if eGFR ≤30 mL/min. • Caution if eGFR ≤45 mL/min. • Lactic acidosis	• Generally safe and well tolerated • Inexpensive
<b>Thiazolidinediones (TZD)</b> Pioglitazone (Actos®) Insulin sensitizer ↓ Liver glucose release	↓1–2%	Low	★★	\$	• Edema and ↑ fracture risk • Avoid in heart failure. • Avoid with nitrates and insulin.	Improved non-alcoholic fatty liver disease (NASH)
<b>Sulfonylureas</b> Glipizide (Glucotrol®) Insulin releaser (Stupid)	↓1–2%	High	↑	\$	• Don't know when to quit • ↑ Hypoglycemia • Caution in elderly	Inexpensive
<b>DPP-4 Inhibitors</b> Sitagliptin (Januvia®) Insulin releaser (Smart)	↓0.75%	Low	↓	\$\$	• Avoid in pancreatitis, hypoglycemia and angioedema.	Decreases postprandial glucose
<b>GLP-1 and GLP-1/GIP Agonist</b> Semaglutide (Ozempic®) Tirzepatide (Mounjaro®) Insulin releaser (Smart)	↓1–2%	Low	↓↓↓	\$\$\$\$	• Slows gut motility • Avoid in gastroparesis. • Avoid in pancreatitis.	• 15–20% weight loss • 29% ↓ stroke risk • Cardiorenal protective
<b>SGLT2 Inhibitor</b> Empagliflozin (Jardiance®) Renal glucose off loader	↓0.75%	Low	↓	\$\$	• UTI/candida • Groin/GU skin infections • Avoid if eGFR ≤30 mL/min.	Cardiorenal protective

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## Medications to Treat Type 2 Diabetes<sup>5</sup>

Drug Class, Drugs and MOA	A1C ↓	Hypoglycemia	Weight	Cost	Safety Issues	Added Benefits
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<b>SGLT2 Inhibitor</b> Empagliflozin (Jardiance®) Renal glucose off loader	↓0.75%	Low	↓	\$\$	• UTI/candida • Groin/GU skin infections • Avoid if eGFR ≤30 mL/min.	Cardiorenal protective

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# Endocrine Workshop: Diabetes and obesity essentials

## Insulin Basics: Insulin for Type 2 Diabetes<sup>2</sup>

### Insulin Use in Type 2 Diabetes

- At time of diagnosis if A1C  $\geq 9\%$  (0.09 proportion) and symptomatic
  - Hyperglycemia impairs pancreatic B-cell function.
  - Short course (2–3 weeks) helps achieve normoglycemia
- When  $\geq 2$  oral or injectable agents at optimized doses are inadequate to maintain glycemic control.

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## Insulin Basics: Insulin for Type 2 Diabetes<sup>2</sup> (continued)

### Insulin Use in Type 2 Diabetes (cont.)

When acutely ill, surgical or nonsurgical patients with T1 or T2 DM blood glucose levels should be kept generally between 140–180 mg/dL (7.8–10 mmol/L).

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## Insulin Basics: Insulin for Type 2 Diabetes<sup>2</sup> (continued)

### INITIATING BASAL INSULIN

Start 10 IU a day or 0.1-0.2 IU/Kg a day

### TITRATING BASAL INSULIN

Self-titration is more effective

Set FPG target that correlates with A1C Target

Increase 2 units every 3 days to reach FBG target without hypoglycemia

### INITIATING PRANDIAL INSULIN

4 IU a day or 10% of basal dose  
One dose with largest meal

### TITRATING PRANDIAL INSULIN

Stepwise Approach to titration



Image sources: Created by Gleason, J. (2023), used with permission

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## Diabetes Quizzo

- Barbara, age 62 years old
- BMI: 36 kg/m<sup>2</sup>
- History: Diabetes, gastroparesis

Barbara is in the office for a recheck on her diabetes. She is taking metformin. She has great health insurance. Which of the following medications should be **avoided**?

- A. Insulin
- B. Glipizide
- C. Empagliflozin
- D. Semaglutide

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# Endocrine Workshop: Diabetes and obesity essentials

## Answer

- Barbara, age 62 years old
- BMI: 36 kg/m<sup>2</sup>
- History: Diabetes, gastroparesis

Barbara is in the office for a recheck on her diabetes. She is taking metformin. She has great health insurance. Which of the following medications should be **avoided**?

- A. Insulin
- B. Glipizide
- C. Empagliflozin
- D. **Semaglutide**

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## Bonus Content: Lipid Targets

Total Cholesterol	<200 mg/dL (5.2 mmol/L)
Triglycerides	<150 mg/dL (1.7 mmol/L)
Low-density lipoproteins	<100 mg/dL (2.6 mmol/L)
High-density lipoproteins	>40 mg/dL* (1.0 mmol/L*)

\*Ideal target is >60 mg/dL (1.55 mmol/L)

### NEW UPDATE:

American Diabetes Association now recommends an LDL target of **<70 mg/dL (1.8 mmol/L)** for patients with diabetes.

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## Positive Coaching<sup>6,7</sup>

- Helps patients excel at...
  - Living their best life
  - On their terms
- Similar to talk therapy
- Utilizes motivational interviewing
- Patient-directed goal setting



Image source: Shutterstock

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## Positive Coaching<sup>6,7</sup> (continued)

- Life coach
  - Broader domain includes career and professional coaching
- Health coach
  - Focuses on health issues



Image source: Shutterstock

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# Endocrine Workshop: Diabetes and obesity essentials

## Positive Coaching<sup>6,7</sup> (continued)



Image source: Shutterstock

- Patient centered
- Encourages patient to talk about...
  - Desire for change
  - Reasons to change
  - Commitment to change
- Provider focuses on listening more than talking.
- Patient focuses on self-reflection and goal setting.

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## Positive Coaching: Motivational Interviewing

- Open-ended questions
- Affirmations and feedback
- Reflective listening
- Helping patients arrive at answers
- Summarizing



Motivational  
interviewing  
in practice video

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**Connect – Empower – Inspire**

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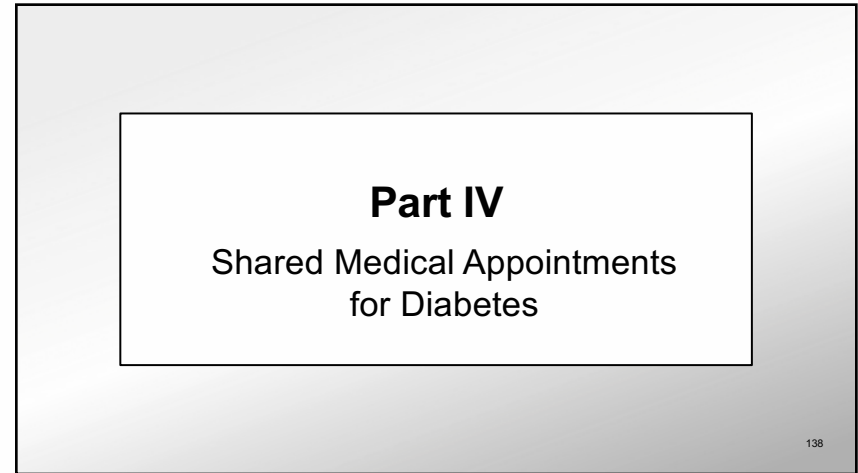
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# Endocrine Workshop: Diabetes and obesity essentials



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**Question**

In what year were shared medical appointments first used?

- A. 1907
- B. 1972
- C. 1978
- D. 1936

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**Answer**

In what year were shared medical appointments first used?

- A. 1907**
- B. 1972
- C. 1978
- D. 1936

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# Endocrine Workshop: Diabetes and obesity essentials

**Question**

Shared medical appointments were first used to manage which disease?

- A. COPD
- B. Obesity
- C. Diabetes
- D. Tuberculosis

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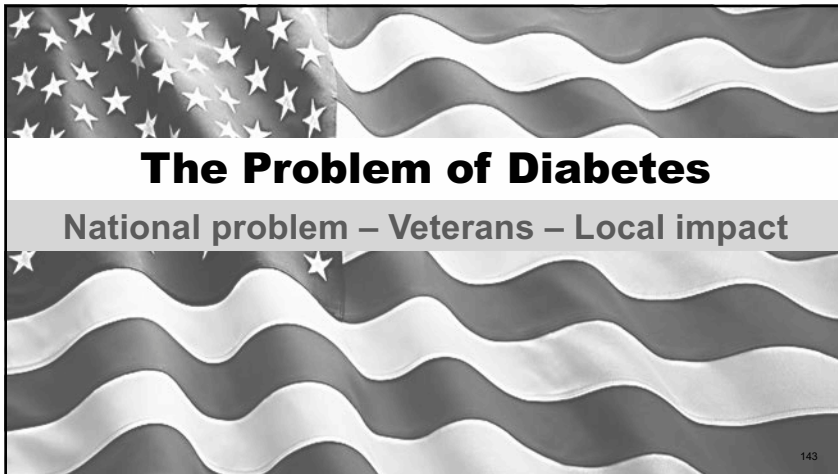
**Answer**

Shared medical appointments were first used to manage which disease?

- A. COPD
- B. Obesity
- C. Diabetes
- D. Tuberculosis

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**The Problem of Diabetes**

National problem – Veterans – Local impact

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**National Problem<sup>1</sup>**

**34.2 MILLION**  
Americans Have Diabetes

**77.8%**  
Receive Medical Care

**Nineteen Percent**  
A1C below 7.0%, BP below 140/90, LDL below 100mg/dL

**Sixteen Million**  
Visits to the Emergency Department in 2016  
were related to Diabetes

**7<sup>th</sup> LEADING**  
Cause of Death

**\$327 BILLION**  
Annual Cost for treating Diabetes  
per year in the United States

**83,564**  
Die from Diabetes Each Year

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# Endocrine Workshop: Diabetes and obesity essentials

## National Problem<sup>1</sup> (continued)

**Diabetes is More Prevalent Among U.S. Veterans 25% vs 20%**

**Leading cause of blindness, renal disease and amputations among Veterans**

**In 2001 Veterans Administration added Diabetes to list of diseases likely caused by agent orange**

**270,000 Vietnam Veterans are receiving disability payments for agent orange related diabetes**

Image source: Provided by Gleason, J., used with permission

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## Previous Model of Care Individual Patient + Group Education

- Limited attendance
- Patients who have graduated attend over and over again.
- Often have good diabetes control
- Difficult to recruit new patients
- Lack of standardized curriculum
- No shared medical appointments




Image source: Shutterstock

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## Shared Medical Appointments

History – Benefits – Limitations - Reimbursement

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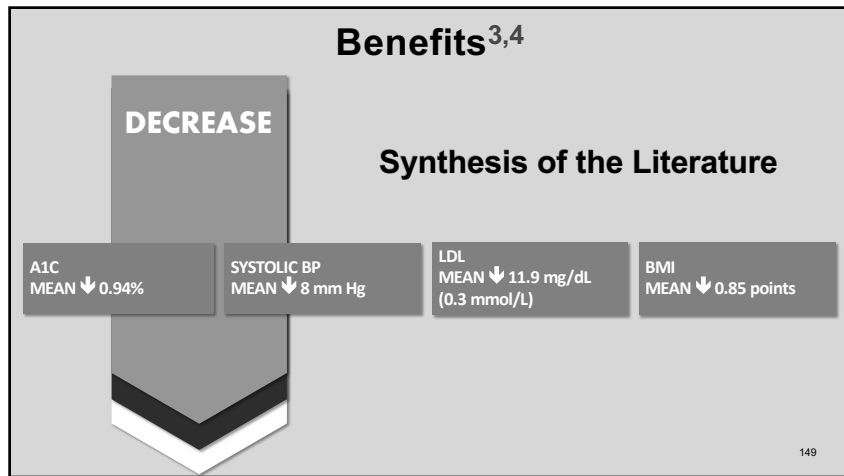
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## Multiple patients seen at once in an interactive setting to improve access, efficiency and peer support

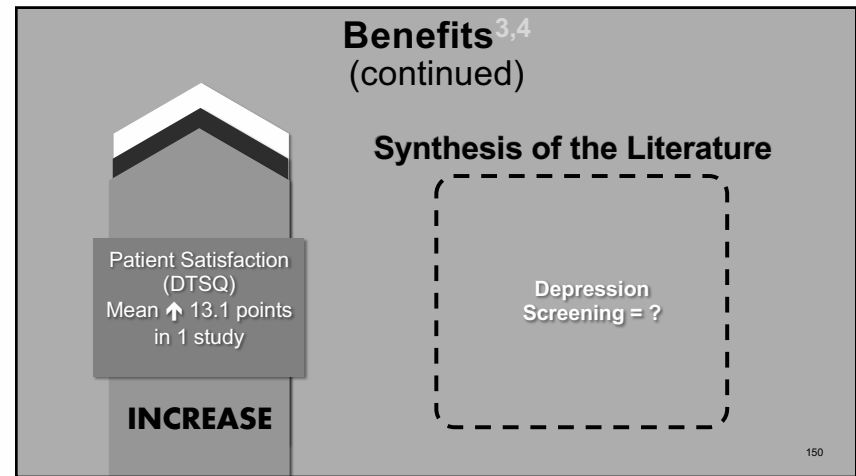
- Used in the early 1900s for treatment of tuberculosis
- Popularity waned in the 1940s with emergence of antibiotics
- Prevalent use in the 1990s returned for heart disease, COPD, mental health, dementia and diabetes

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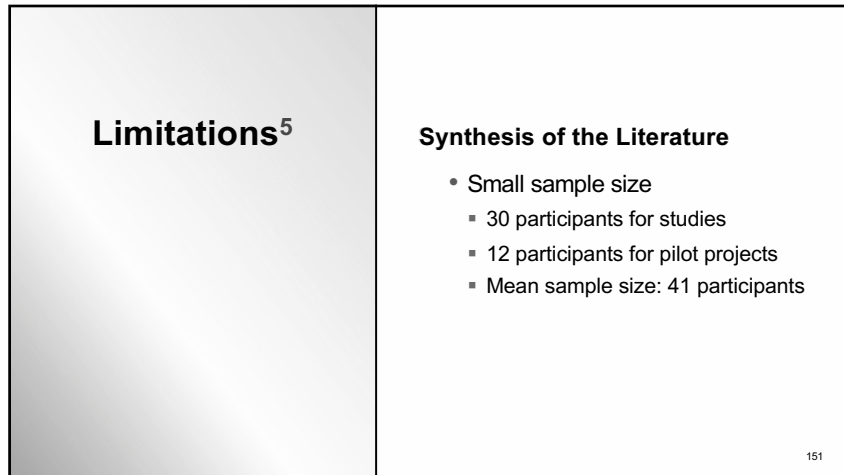
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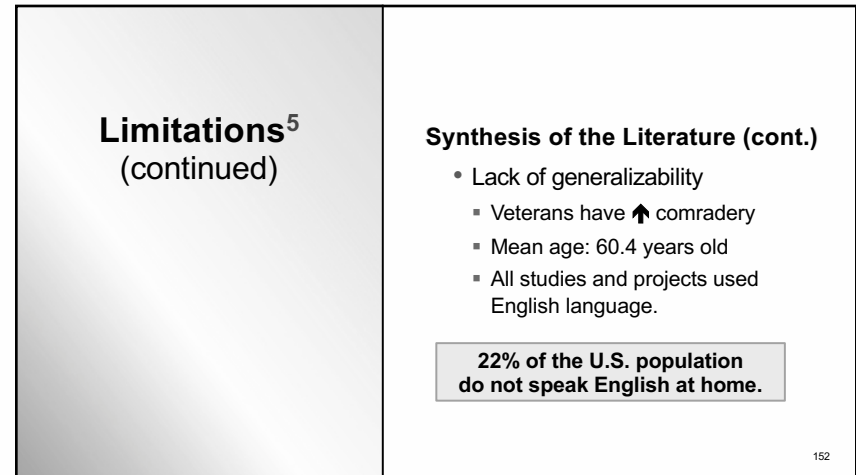
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## Reimbursement for Shared Medical Appointments

- Can provide medically necessary evaluation and management (E/M) visit that is observed by other patients
- Must not allow presence of observers to impact the level of service reported for history, exam, counseling, instruction and medical decisions



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## Reimbursement for Shared Medical Appointments (continued)



- Use appropriate CPT codes: 99212, 99213, 99214, 99215.
- Use appropriate ICD-10 codes: Diabetes, hypertension, hyperlipidemia obesity, etc.
- Use worksheet to document notes during shared medical appointment then enter into EHR and code accordingly.

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## Reimbursement – Other Charges to Consider

- Diabetes self-management training (INDIVIDUAL) G0108
  - 30 minutes duration
  - Medicare Part B reimbursement
  - Must be an accredited ADCES or program recognized by the ADA
  - Initial year: 10 hours
  - Subsequent years: 2 hours



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## Reimbursement – Other Charges to Consider (continued)



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- Diabetes self-management training (GROUP) G0109
  - 30 minutes duration
  - >2 participants
  - Medicare Part B reimbursement
  - Must be an accredited ADCES or program recognized by the ADA
  - Initial year: 10 hours
  - Subsequent years: 2 hours

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## Reimbursement – Other Charges to Consider<sup>6</sup> (continued)

- Foot exam (initial) G0245
  - Initial provider evaluation
  - Patient with diabetes
  - Diabetes sensory neuropathy
  - Loss of protective sensation
- Foot exam (follow-up) G0246
  - Follow-up provider evaluation
  - Patient with diabetes
  - Diabetes sensory neuropathy
  - Loss of protective sensation



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## Reimbursement<sup>6</sup> (continued)



- CMS
- Physician fee schedule
- Reimbursement calculator
- Healthcare Common Procedure Coding System (HCPCS aka CPT codes)

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## Winning the Race Against Diabetes

Setting – Vision – Approval – Consent Team Information  
Protection – Data Analysis – Timeline Tools – Methods

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# Endocrine Workshop: Diabetes and obesity essentials



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Jason Gleason, DNP, NP-C USAF LIEUTENANT COLONEL (RET)

## WINNING THE RACE AGAINST DIABETES WITH SHARED MEDICAL APPOINTMENTS IN PRIMARY CARE

CASTING A VISION

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## CASTING a Vision

80 VA patients (>18 yo, Dx DM, A1C >8%, Living in Great Falls, MT)

12 Week SMA program for patients with diabetes to improve diabetes metrics, enhance patient satisfaction and reduce long-term complications

**SHARED MEDICAL APPOINTMENTS**  
Multiple patients seen at once for:

- Education
- Individualized Care
- Peer Support/Comradery

**Proven Efficacy in:**

- Reducing A1C
- Reducing Systolic Blood Pressure
- Reducing Lipids
- Reducing BMI
- Improving Patient Satisfaction

**12 WEEK PROGRAM**

RACE DAY: JANUARY 5, 2022

FINISH LINE: MARCH 23, 2022

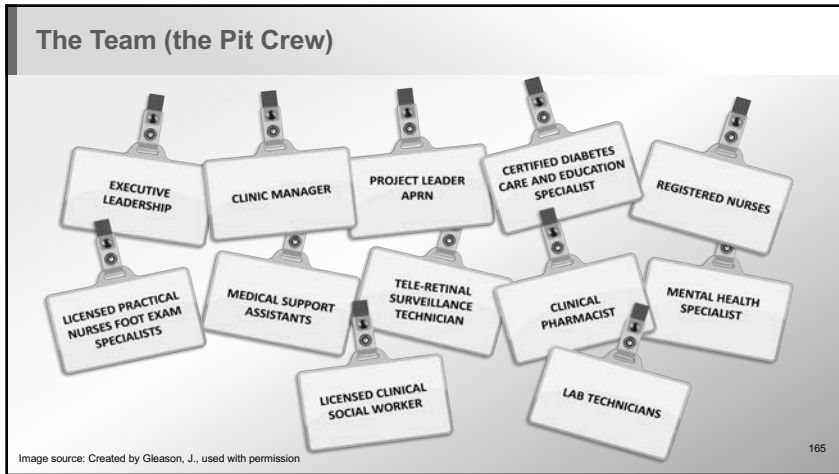
short-term	mid-term	long-term
<b>DAY ONE:</b> ≥ 12 participants  90% Complete baseline <ul style="list-style-type: none"> <li>A1C</li> <li>SBP</li> <li>LDL</li> <li>BMI</li> <li>DTSQ</li> <li>PHQ-9</li> </ul>	<b>END OF WEEK 12:</b> Primary Measures: A1C - ↓ by 1 point (Literature mean: ↓ 0.94) SBP - ↓ by 5 points (Literature mean: ↓ 8) LDL - ↓ by 10 points (Literature mean: 11.9) BMI - ↓ by 1 point (Literature mean: 0.85) DTSQ - ↑ by 5 points (1 study: ↑ 13.1) PHQ-9 - ↓ by 2 points  Secondary Measures: 80% attendance rate for 12 sessions	Prevent long term complications/target organ damage and premature death  Reduce the risk for: Retinopathy Nephropathy Myocardial Infarction Congestive Heart Failure Neuropathy Amputations Vascular Dementia Stroke

DATA ANALYSIS: Paired t-test and Wilcoxon signed-rank tests to determine statistical significance

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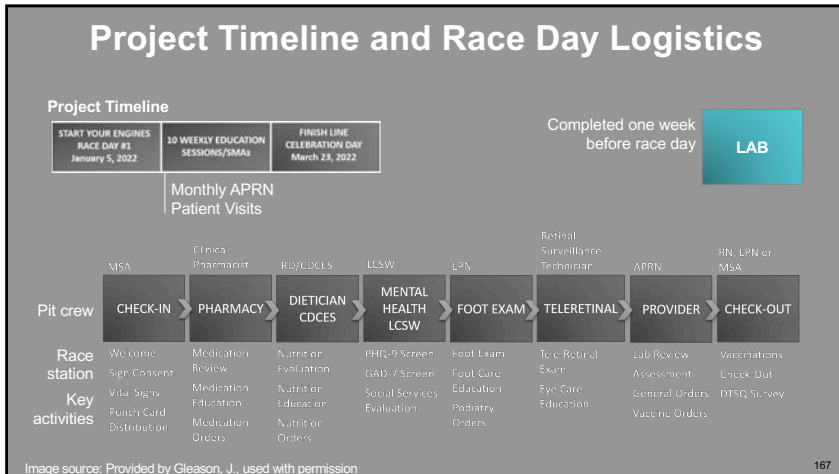
# Endocrine Workshop: Diabetes and obesity essentials



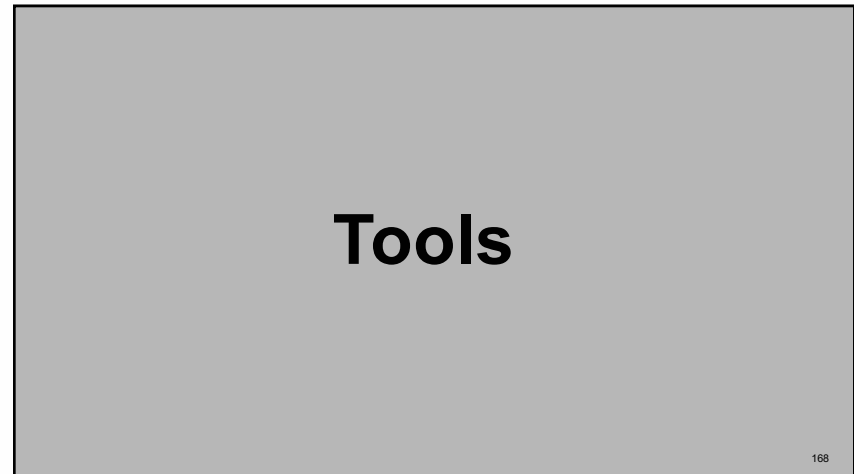
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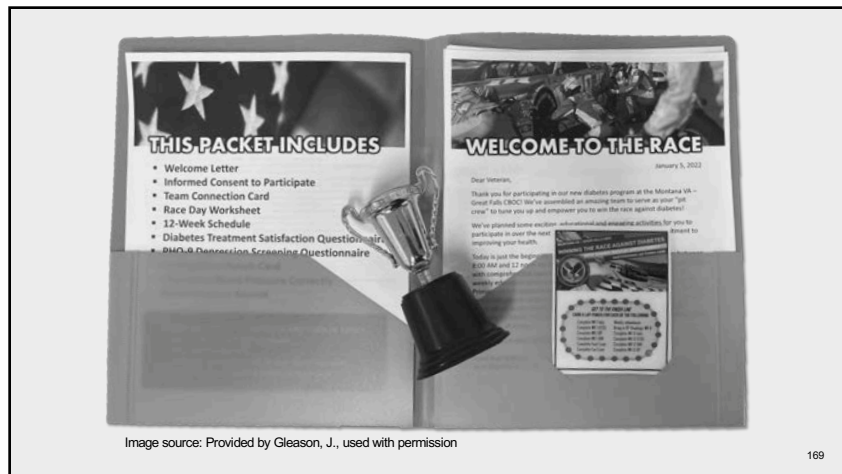


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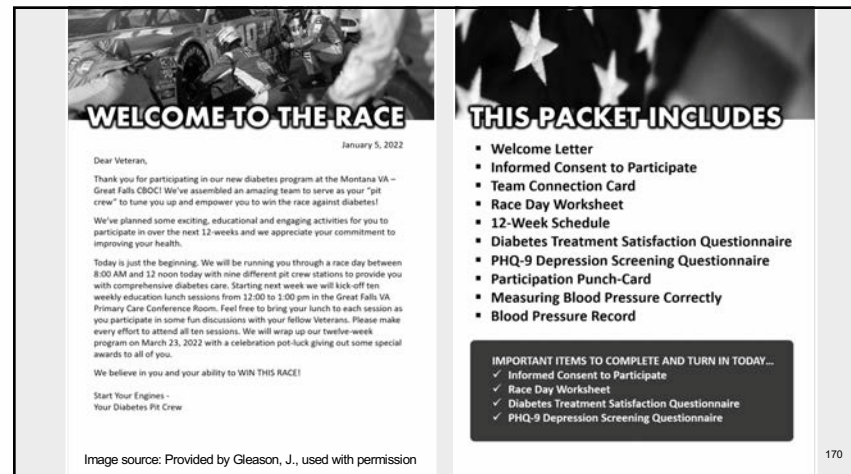


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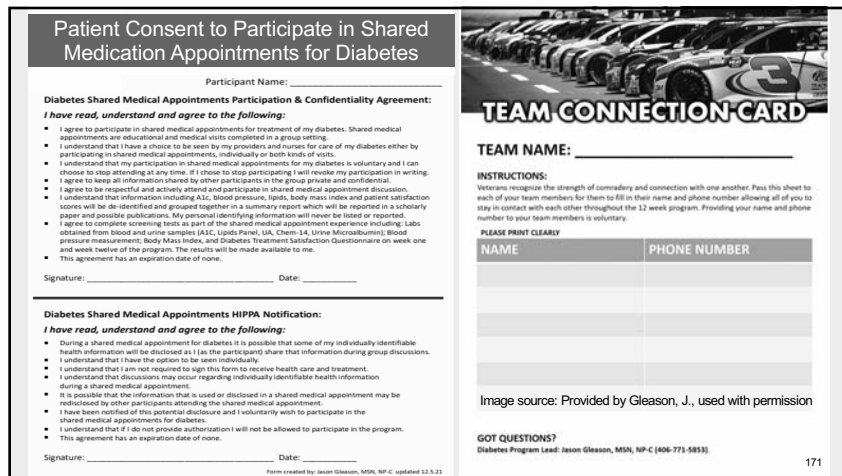


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# Endocrine Workshop: Diabetes and obesity essentials



### TWELVE WEEK SCHEDULE

WEEK	DATE AND TIME	TOPICS	PIT CREW
1	JAN 5, 2022 5:00- 1:00	Diabetes Race Day #1	
2	JAN 12, 2022 12:00- 1:00	Feelings about diabetes, Support systems, What is Diabetes, Types of Diabetes, Diagnosing Diabetes	
3	JAN 19, 2022 12:00- 1:00	The ABCs test, Diabetes risk factors and symptoms, Diabetes care plans, Checking blood glucose	
4	JAN 26, 2022 12:00- 1:00	Eating for better health, Being personally active, Readiness to make changes	
		Shared Medical Appointment with Glendon	
5	FEB 2, 2022 12:00- 1:00	Emotional health, Stress and diabetes, Whole health program and services	
		Interview with AC Johnson and Mary Taylor	
6	FEB 9, 2022 12:00- 1:00	Reversing diabetes blood sugars, High and low glucose, When you are sick, Mindful eating and dining out	
7	FEB 16, 2022 12:00- 1:00	Physical activity challenges, Weight loss for improved diabetes control, Goal setting and glucose checkups	
8	FEB 23, 2022 12:00- 1:00	Problem solving, Glucose patterns, Blood pressure, Tobacco Use, Eating better, Diabetes and alcohol	
		Bring Blood Pressure logs for review	
		Shared Medical Appointment with Glendon	
9	MAR 2, 2022 12:00- 1:00	Physical activity, Weight loss, Diabetes over time, Diabetes complications, Diabetes care schedule	
10	MAR 9, 2022 12:00- 1:00	Taking care of your feet, Getting through good times, Eating mindfully, not emotionally	
		Diabetes labs for next 30 days	
11	MAR 16, 2022 12:00- 1:00	Keeping diabetes active, When to get in the car, Getting more gear, Insulin's bottom, Staying in charge	
12	MAR 23, 2022 1:00- 1:00	<b>THE FINISH LINE - CELEBRATION NOT LUNCH!</b> Shared Breakfast, Race, Reverse Labs, Cornhole 57/52	

### Diabetes Treatment Satisfaction Questionnaire: DTSQs

The following questions are concerned with the treatment for your diabetes (including insulin, tablets and/or diet) and your experience over the past few weeks. Please answer each question by circling a number on each of the scales.

- How satisfied are you with your current treatment?  
very satisfied 6 5 4 3 2 1 0 very dissatisfied
- How often have you felt that your blood sugars have been unacceptably high recently?  
most of the time 6 5 4 3 2 1 0 none of the time
- How often have you felt that your blood sugars have been unacceptably low recently?  
most of the time 6 5 4 3 2 1 0 none of the time
- How convenient have you been finding your treatment to be recently?  
very convenient 6 5 4 3 2 1 0 very inconvenient
- How flexible have you been finding your treatment to be recently?  
very flexible 6 5 4 3 2 1 0 very inflexible
- How satisfied are you with your understanding of your diabetes?  
very satisfied 6 5 4 3 2 1 0 very dissatisfied
- Would you recommend this form of treatment to someone else with your kind of diabetes?  
Yes, I would definitely recommend the treatment 6 5 4 3 2 1 0 No, I would definitely not recommend the treatment
- How satisfied would you be to continue with your present form of treatment?  
very satisfied 6 5 4 3 2 1 0 very dissatisfied

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Health Psychology Research, LLC 50101 English Rd 30080 New York

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### PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Over the last 2 weeks, how often have you been bothered by any of the following problems?  
Use "0" to indicate your answer.

	Not at all	Seldom	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling that you are not as active or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite—being so busy or restless that you are never able to relax	0	1	2	3
9. Thoughts that you would be better off dead, or hurting yourself in some way	0	1	2	3


no counts:      TOTAL: \_\_\_\_\_

18. If you check off any problems, how difficult have these problems made it for you to do your work, take care of things at home or get along with other people?  
Not difficult at all \_\_\_\_\_  
Fairly difficult \_\_\_\_\_  
Very difficult \_\_\_\_\_

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## WINNING THE RACE AGAINST DIABETES

WITH SHARED MEDICAL APPOINTMENTS


PARTICIPATION LAP-PUNCH CARD

### GET TO THE FINISH LINE


EARN A LAP-PUNCH FOR EACH OF THE FOLLOWING

Complete WK 1 labs	Weekly attendance
Complete WK 1 DTSQ	Bring in BP Readings WK 8
Complete WK 1 BP	Complete WK 12 labs
Complete WK 1 BMI	Complete WK 12 DTSQ
Complete Foot Exam	Complete WK 12 BMI
Complete Eye Exam	Complete WK 12 BP

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### PHQ-9 Depression Screening Tool



### DTSQ Diabetes Treatment Satisfaction Questionnaire

*Health Psychology Research*



### Intellectus Statistics™

**\$59–85 per month**

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#### Quality Improvement or Research Worksheet

Rachel Neveloff, EdD

SL#	Issue and Guidance	Rating
1	Are patients represented into different intervention groups in order to enhance confidence in differences that might be observed by non-random selection? Randomization done to allow equitable allocation of a scarce resource must be considered and used for most trials.	Yes <input type="checkbox"/> No <input type="checkbox"/>
2	Does the project seek to test issues that are beyond current science and evidence, such as new treatments (i.e., is there much controversy about whether the intervention will be beneficial to actual patients – or is it designed simply to move existing evidence into practice)? Is the project a preformal or informal causal knowledge or improve care – rather than to develop new knowledge – project?	Yes <input type="checkbox"/> No <input type="checkbox"/>
3	Are researchers who have no ongoing commitment to improvement of the local care situation (and who may well have conflicts of interest with the patients involved) involved in key project roles? Generally answer "yes" even if not on the team, have professional connections, observe, when the project leader or the clinical committee are unaffiliated with the project site, or help to fund the project site or are engaged – and does not require IRB approval/oversight – some of the project leader's role to report IRB oversight or their institution.	Yes <input type="checkbox"/> No <input type="checkbox"/>
4	Is the proposal framed with a broad goal, methodological population, and time period? If frequent adjustments are made in the intervention, the researchers will not get precise or consistent answers, the answer is more likely "no."	Yes <input type="checkbox"/> No <input type="checkbox"/>
5	Will there be delayed or ineffective feedback of data from monitoring the implementation of changes? Answer "yes" if commonly checked or delayed or absent in your quality improvement or QI.	Yes <input type="checkbox"/> No <input type="checkbox"/>
6	Is the project funded by an outside organization with a commercial interest in the use of the results? Is the sponsor or manufacturer with an interest in the outcome of the project relevant to its products? Is it a non-profit foundation that typically funds research on internal research accounts? If the project is funded by third-party payers through clinical interventions or through internal clinical processes (i.e., usually funds the entire or the patient's medical bill) or "no."	Yes <input type="checkbox"/> No <input type="checkbox"/>

\*Based on Neveloff (2018), "The Ethics of Using Quality Improvement Data to Assess Health Care Quality and Safety." *Health Affairs*.  
If the weight of the answers tends toward "yes" overall, the project should be considered "research" and approved by an IRB prior to implementation. If the weight of the answers tends toward "no," the project is not "research" and is not subject to IRB oversight unless local institutional policies differ. Answering "yes" to questions #1 or #2 – even if all other answers are "no" – typically will result in a finding that the project constitutes research. It is important to consult with your local IRB if you are unsure how they would handle a particular case, as the analysis of the above issues cannot always be entirely objective and IRB policies and approaches vary significantly.

## no

Synthesizes current EBP literature based on completed research and applies it to improve the quality of existing diabetes care programs

- Weight of answers YES = RESEARCH
- Weight of answers NO = QI PROJECT
- Answers YES to #1 and #2 = RESEARCH




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**15**

- **Provider Visits (99213)**
- **Clinical Pharmacy Visits**
- **CDCES Visits**
- **Comprehensive Foot Exams**
- **HT, WT and BP Checks**
- **Mental Health Visits**
- **PHQ-9 Depression Screenings**
- **Patient Satisfaction Surveys**
- **Lab Reviews**
- **Signed Consents to Participate**

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**3 HOURS**

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# Endocrine Workshop: Diabetes and obesity essentials

**TWELVE WEEK SCHEDULE**

WEEK	DATE AND TIME	TOPICS	PIT CREW
1	JAN 5, 2022 9:00 - 1:00	Diabetes: Here They Are!	
2	JAN 12, 2022 1:00 - 1:00	Feelings about diabetes, Support systems, What is Diabetes, Types of Diabetes, Diagnosing diabetes	
3	JAN 19, 2022 1:00 - 1:00	The A1C test, Diabetes risk factors and symptoms, Diabetes care plan, Checking blood glucose	
4	JAN 26, 2022 1:00 - 1:00	Eating for better health, Being physically active, Readiness to make changes	
5	FEB 2, 2022 1:00 - 1:00	Diabetes Medical Appointment with Gleason SMAA	
6	FEB 9, 2022 1:00 - 1:00	Emotional health, Stress and diabetes, Whole health program and services Appointment with Dr. Johnson and Mary Treen	
7	FEB 16, 2022 1:00 - 1:00	Reviewing diabetes blood sugars, High and low glucose. When you are sick, Mealful eating and Dining out	
8	FEB 23, 2022 1:00 - 1:00	Physical activity challenges, Weight loss for improved diabetes control, Goal setting and glucose checkpoints	
9	FEB 30, 2022 1:00 - 1:00	Problem solving, Glucose patterns, Blood pressure, Tobacco Use, Eating Better, Diabetes and alcohol Bring Blood Pressure logs for review Diabetes Medical Appointment with Gleason	
10	MAR 7, 2022 1:00 - 1:00	Physical activity, Weight loss, Diabetes over time, Diabetes complications, Diabetes care schedule	
11	MAR 14, 2022 1:00 - 1:00	Taking care of your feet, Getting enough good sleep, Eating mindfully not emotionally	
12	MAR 21, 2022 1:00 - 1:00	Diabetes help to meet 90 days Reviewing physically active, What the goals in the week, Setting more goals, Support systems, Staying in charge	
	MAR 28, 2022 1:00 - 1:00	<b>THE FINISH LINE - CELEBRATION POT LUCK!</b> (Blood Pressure, A1C, Review with Complete DTSS)	

**WINNING THE RACE AGAINST DIABETES**  
WITH SHARED MEDICAL APPOINTMENTS  
PARTICIPATION LAP-PUNCH CARD

**GET TO THE FINISH LINE**  
EARN A LAP-PUNCH FOR EACH OF THE FOLLOWING

- Complete WK 1 labs
- Complete WK 1 DTSS
- Complete WK 1 BP
- Complete WK 1 BMI
- Complete Foot Exam
- Complete Eye Exam
- Weekly attendance
- Bring in BP readings WK 8
- Complete WK 12 labs
- Complete WK 12 DTSS
- Complete WK 12 BMI
- Complete WK 12 BP

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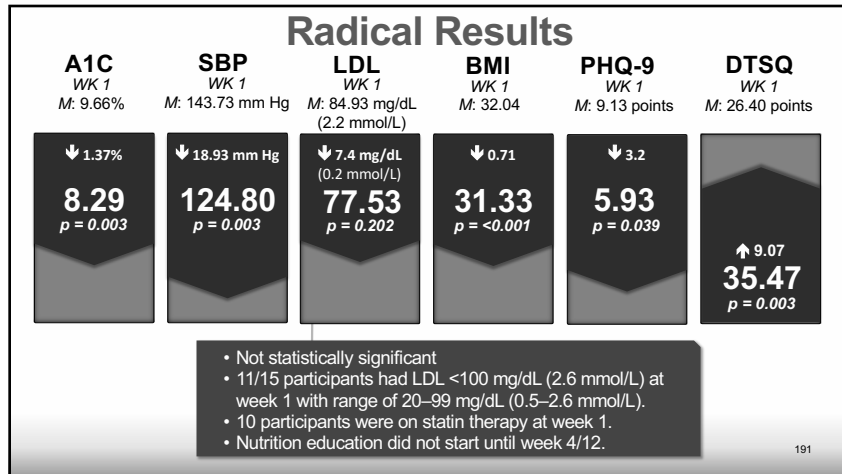
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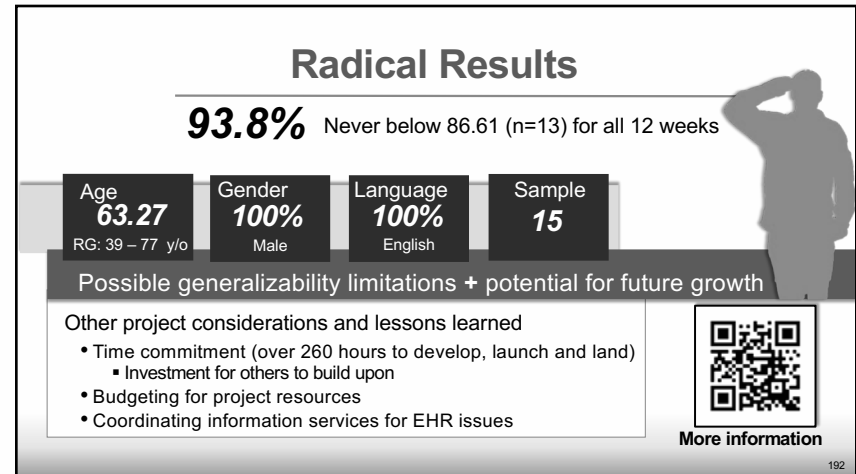
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# Endocrine Workshop: Diabetes and obesity essentials

## Dissemination: Television Media



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## Sustainment



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### Participant Sustainment

- Ten post-program telehealth coach visits
- Monthly support group
- FUEL – The winning the race alumni newsletter
- Three-month post-program reunion

### Program Sustainment

- Resources uploaded to website
- Implement project at other primary care clinics
- Serve as a best practice model of care

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# Endocrine Workshop: Diabetes and obesity essentials

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## Section 2: Obesity Essentials

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## Objectives

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

1. Synthesize the pathophysiology of obesity, prediabetes and Type 2 diabetes.
2. Utilize key evidence-based principles to educate patients with obesity about the importance of physical activity as a key link to promoting and maintaining weight loss.
3. Construct effective nutrition therapy plans of care for patients with obesity which can be utilized to promote and maintain weight loss.

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## Objectives (continued)

- At the end of this presentation, the participant will be able to: (cont.)

4. Contrast and utilize select pharmacological treatment options to promote and maintain weight loss in patients with obesity.
5. Compare and consider different metabolic/bariatric surgical options for patients with obesity.

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# Endocrine Workshop: Diabetes and obesity essentials

<h2>Obesity Essentials Series Outline</h2>	<ul style="list-style-type: none"><li>• Overview: Risk factors, prevalence and pathophysiology</li><li>• Physical activity modalities</li><li>• Behavioral health modalities</li><li>• Nutrition therapy modalities</li><li>• Pharmacology and surgical modalities</li></ul>
--------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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<h2>Obesity Essentials Series</h2> <h3>Background and Diagnosis</h3>
----------------------------------------------------------------------

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<b>Background: Which is true?</b>	
“Obesity is easily treatable, if patients would just eat less and get off the couch, they’d lose weight.”	“Obesity is a complex, multifactorial disease caused by genetic, cultural and societal factors.”

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<b>Background: Which is true?</b>	
<del>“Obesity is easily treatable, if patients would just eat less and get off the couch, they’d lose weight.”</del>	“Obesity is a complex, multifactorial disease caused by genetic, cultural and societal factors.”

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# Endocrine Workshop: Diabetes and obesity essentials

## Background: Which is true?

“Given its complex nature, obesity is best treated with individualized nutrition and activity plans, behavioral health, pharmacologic and surgical modalities.”

“Obesity can be best treated with diet, exercise plans and sometimes medications or surgery.”

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## Background: Which is true?

“Given its complex nature, obesity is best treated with individualized nutrition and activity plans, behavioral health, pharmacologic and surgical modalities.”

“Obesity can be best treated with diet, exercise plans and sometimes medications or surgery.”

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## Background: What is obesity?<sup>1,2</sup>

- Excessive or abnormal accumulation of fat or adipose tissue
- Epidemic which has worsened over the last 50 years
- Second most common cause of preventable death
  - Smoking is #1.
- Impairs health due to associated risk of developing...
  - Type 2 diabetes
  - Cardiovascular disease
  - Hypertension
  - Hyperlipidemia
  - Cancer
- Economic burden of obesity: \$147 to \$210 billion/annually in U.S.

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## Background: What causes obesity?<sup>1-3</sup>

- Multifactorial disease
  - Genetics
    - Extremely heritable
    - Eight genes are related to adiposity and weight gain.
      - Leptin (LEP)
      - Leptin receptor (LEPR)
      - Proopiomelanocortin (POMC)
      - Prohormone convertase 1 (PCSK1)
      - Melanocortin 4 receptor (MC4R)
      - Single-minded homolog 1 (SIM1)
      - Brain-derived neurotrophic factor (BDNF)
      - Neurotrophic tyrosine kinase receptor type 2 gene (NTRK2)
- Over 500 obesity-related genes

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# Endocrine Workshop: Diabetes and obesity essentials

## Background: What causes obesity?<sup>1-3</sup>

- Multifactorial disease (cont.)
  - Genetics (cont.)
  - 79 obesity related syndromes including...
    - Prader-Willi syndrome (PWS)
    - Down syndrome
    - Bardet-Biedl syndrome
    - Fragile X syndrome
    - Alström syndrome
    - Cornelia de Lange syndrome

Image source: Microsoft

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## Background: What causes obesity?<sup>1,2</sup> (continued)

- Multifactorial disease (cont.)
  - Other causes of obesity
    - Reduced physical activity
    - Excess calories
    - Insomnia and sleep apnea
    - Endocrine disorders
    - Medications
    - Decreased energy metabolism
    - Eating disorders
    - Depression, anxiety, etc.
    - Protective mechanism in trauma victims

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## Background: What causes obesity? (continued)

- Hormones: GLP-1 and GIP
  - Glucagon-like peptide-1 (GLP-1)
    - GLP-1 secreted by L cells of lower intestines and colon
  - Glucose-dependent insulinotropic polypeptide (GIP)
    - GIP secreted from K cells of upper small intestine
  - Degraded by dipeptidyl peptidase-4 (DPP-4)
    - Patients with obesity have increased levels of DPP-4.

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## Background: What causes obesity? (continued)

- Hormones: GLP-1 and GIP (cont.)
  - Stimulate insulin secretion only after an oral glucose load
  - Both contribute to 25–70% of postprandial insulin response.
  - Added benefits
    - Delayed gastric emptying
    - Inhibiting production of glucagon by pancreatic alpha cells
    - Promote pancreatic b-cell proliferation

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# Endocrine Workshop: Diabetes and obesity essentials

## Background: What causes obesity?<sup>4</sup> (continued)

- Hormones (cont.)
  - Leptin and adiponectin (secreted by adipocytes)
    - Appetite and energy balance regulation
    - Associated with adipose tissue dysfunction
  - Resistin (secreted by adipocytes)
    - Proinflammatory insulin-antagonist
    - Causes increased endogenous production of glucose
  - Visfatin (secreted by adipocytes)
    - Insulin-mimetic effect
    - Increases white adipose tissue

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## Background: Why is obesity a big deal?<sup>5-7</sup>

- Prevalence of obesity related diseases
  - Obesity in childhood struggle with obesity in adulthood
  - Common obesity-related chronic diseases
    - Type 2 diabetes
    - Coronary artery disease
    - Hypertension
    - Sleep apnea
    - Asthma and COPD
    - Fatty liver and gallbladder disease
    - Stroke
    - Dyslipidemia

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## Background: Why is obesity a big deal?<sup>5-7</sup> (continued)

- Prevalence of obesity related diseases (cont.)
  - Thirteen common obesity-related cancers
    - Breast cancer
    - Colorectal cancer
    - Renal cell cancer
    - Endometrial cancer
    - Thyroid cancer
    - Pancreatic cancer
    - Multiple myeloma
    - Liver cancer
    - Ovarian cancer
    - Esophageal cancer
    - Gastric cancer
    - Gallbladder cancer
    - Meningioma

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## Background: Why is obesity a big deal?<sup>1,2</sup> (continued)

- These aspects of obesity also increase morbidity and mortality.
  - Waist circumference
    - Abdominal fat = Poor prognosis
  - Fat distribution
    - Visceral fat (raps around organs in body) ↑ CVD risk
  - Intra-abdominal pressure
  - Age of onset of obesity

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# Endocrine Workshop: Diabetes and obesity essentials

## Background: Why is obesity a big deal?<sup>1,2</sup> (continued)

- Low-grade inflammation caused by obesity
  - Adipocytes – Inflammatory and prothrombotic activity = Stroke
    - Adipokines produced by adipocytes
    - Altered adipokine secretion = Low-grade inflammation

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## Background: Why is obesity a big deal?<sup>8</sup> (continued)

- Obesity leads to defective immune function
  - Effects monocytes, lymphocytes, neutrophils
  - Immune dysfunction = Inflammation and insulin deficiency
  - Obesity is also called chronic low-grade metabolic inflammation.
    - Related to coronary artery disease and insulin resistance
    - Adipose tissue = **Secretory organ** which can modulate...
      - Energy expenditure
      - Appetite
      - Insulin sensitivity
      - Bone metabolism
      - Reproductive function
      - Endocrine functions
      - Inflammation
      - Immunity

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## Background: Why is obesity a big deal?<sup>8</sup> (continued)

- Inflammatory components of obesity
  - Contribute to chronic disease (T2 diabetes, HTN, ASCVD, etc.)
  - Strong correlation between body fat and inflammatory markers
  - Obesity results in increased levels of inflammatory cytokines
    - IL-6
    - TNF alpha
    - Visfatin
    - IL-18
    - C-reactive protein
    - Resistin
  - Adipokines are also associated with...
    - Insulin resistance
    - Increased triglycerides

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## Background: Social and Economic Factors

- Decreased cost and growing prevalence of fast food
- Decrease in physical activity
- Access to affordable healthy food varies
  - 30% fewer supermarkets in lower income neighborhoods
- Poor neighborhood aesthetics, safety in the area, and distance to commercial facilities = Higher obesity rates
- Racial and ethnic variations of prevalence also exist.
  - Non-Hispanic black and Hispanics have increased obesity rates.
  - Asians have decreased obesity rates than others

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# Endocrine Workshop: Diabetes and obesity essentials

## Background: Lifestyle Factors<sup>9</sup>

- Sedentary lifestyles
- Amount of physical activity
  - Physical inactivity due to extended screen time
  - Early childhood athletics and outdoor recreation ↓ obesity
- Restful sleep time
  - <Six or greater than eight hours of sleep = Weight gain
- Abrupt smoking cessation contributes to weight gain.

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## Background: Dietary Factors

- The energy balance is established pathophysiology of obesity.
- Energy value of food is often measured in calories.
  - Average active female needs about 2000 calories per day.
  - Average active male needs 2500 calories per day.

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## Background: Dietary Factors (continued)

- Excess energy intake is often due to...
  - Consumption of energy-rich, high-fat, high-carb diets
  - Low intake of fiber, fruits, and vegetables
  - High intake of sugar-heavy beverages
  - Excessive alcohol intake (≥5 in men and ≥4 in women)
  - Irregular or late-night eating patterns
  - High consumption of processed foods

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## Background: Gastrointestinal Factors<sup>10</sup>

- Intestinal microbiota causes low-grade inflammation.
  - Affects fatty acid production
  - Increases the energy production of food
- Gut microbiome diversity protects against long-term weight gain.

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# Endocrine Workshop: Diabetes and obesity essentials

## Background: Gastrointestinal Factors<sup>10</sup> (continued)

- Amount of *Bacteroides* bacteria in stool samples and weight loss
  - Allow for improved metabolism of carbohydrates
  - Lipids by facilitating ↑ digestion of indigestible carbohydrates
  - Probiotics cause ↓ in biomarkers for obesity.
    - Interleukins
    - C- reactive protein level
  - Antibiotic exposure can alter microbiota = ↑ risk of obesity

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## Background: Developmental Factors

- Perinatal and intrauterine exposure to high-energy diets, toxins
- Maternal undernutrition increases obesity risk in the first trimester
- Exposure to maternal obesity with or without gestational diabetes
  - Heightened risk of adult obesity at later stages

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## Background: Public Health Impact of Obesity

- Life expectancy
  - Obesity in adulthood is a strong predictor of early death.
  - Adults who were obese at age 40 years lost 6–7 years of expected life.
  - People with obesity who smoked lose 12–14 years of expected life.
- Quality of life
  - Risk of suffering from any chronic medical condition is almost doubled in people with severe obesity.
  - Obesity causes a substantial psychological burden.
    - Exacerbated by the public's preoccupation with thinness
    - More significant psychosocial consequences in obese women when compared to obese men.

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## Background: Public Health Impact of Obesity (continued)

- Employment
  - Obesity is one of the leading causes for discrimination in hiring.
  - More frequently noticed among females than males
  - Reduced time working
  - Self-reported work limitations
- Economic impact
  - 20% of all annual healthcare expenditures in the U.S.
  - Medical costs are 30–40% higher for those with obesity.
  - Indirect costs from lost wages
  - Elevated costs for disability and insurance claims

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# Endocrine Workshop: Diabetes and obesity essentials

## Background: Public Health Impact of Obesity (continued)

- Obesity bias in the healthcare system
  - Can be explicit (consciously) or implicit (involuntarily)
  - Negative bias often are shared and exhibited by care providers.
  - Can impair the patient's health care quality
  - Most HCPs believe in the energy balance theory of weight control.
    - Obesity issues being a personal responsibility
    - Limits the scope of appropriate counseling
    - Sets patients up for rejection and failure

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## Background: Public Health Impact of Obesity (continued)

- Steps to reduce obesity bias in healthcare
  - Educate providers about complex etiology of obesity.
    - Genetic, metabolic and social factors
    - Make providers aware that bias can influence quality of care.
    - Communicate without implicit bias.
    - Expose counter-stereotypical exemplars of people with obesity who are successful.
    - Providers address patient's understanding of obesity
  - Use people-first language.
    - Patients "with obesity" not "obese people"

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## Background: Prevalence of Obesity<sup>11</sup>

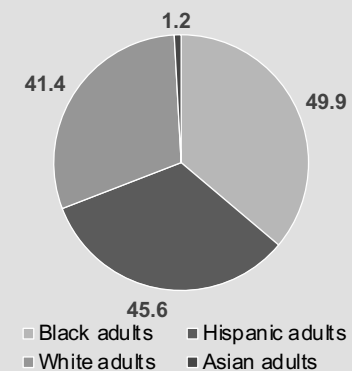
- Approximately 42% of Americans struggle with obesity.
  - Increased from 1999: 30.5%
- Approximately 9.2% of Americans struggles with severe obesity.
  - Increased from 4.7% in 1999
- Those with college degrees had lower obesity prevalence.
- Lowest and highest income brackets have less obesity.
  - Middle-income have highest obesity prevalence.

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## Background: Prevalence of Obesity<sup>11</sup> (continued)

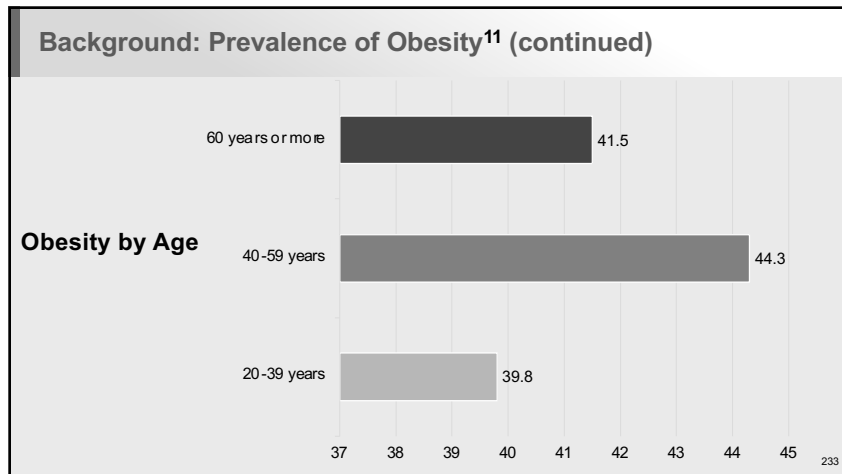
### Obesity by Race and Ethnicity



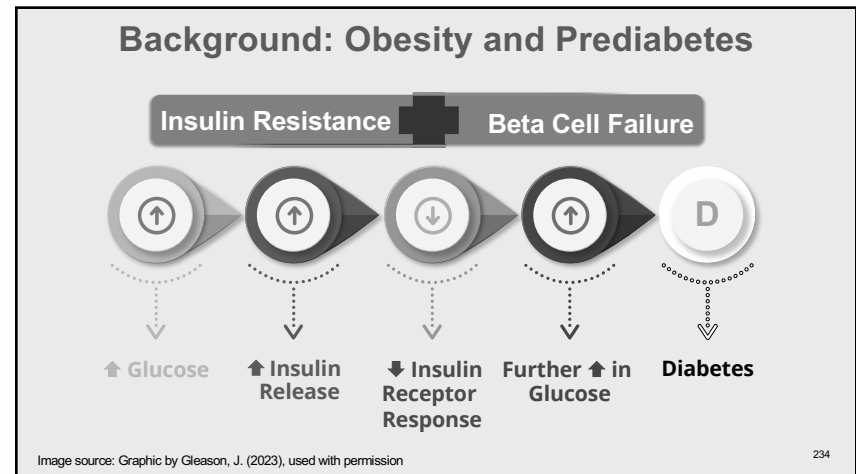
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# Endocrine Workshop: Diabetes and obesity essentials



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**Diagnosing Obesity<sup>13</sup>**

- Body mass index (BMI) is used to diagnose obesity.
  - BMI of  $\geq 30$  kg/m<sup>2</sup>
  - BMI is calculated by weight (kg)/height (m<sup>2</sup>).
  - BMI only used as a screening tool

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**Diagnosing Obesity<sup>13</sup> (continued)**

- Body mass index (BMI) is used to diagnose obesity. (cont.)
  - Limitations
    - Does not estimate adipose tissue mass
    - Overestimated in those with increased muscle mass or edema
    - Underestimate body weight in those who have lost muscle mass
    - If patient has increased or decreased muscle mass...
      - Measure body fat percentage using calipers or scanners.

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## Diagnosing Obesity<sup>14, 15</sup> (continued)

### • Assessment

- Height, weight and BMI annually
  - Overweight: 25–29.9 kg/m<sup>2</sup>
  - Obesity Class I: 30–34.9 kg/m<sup>2</sup>
  - Obesity Class II: 35–39.9 kg/m<sup>2</sup>
  - Obesity Class III: ≥40 kg/m<sup>2</sup>



Image source: Shutterstock

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## Diagnosing Obesity<sup>14, 15</sup> (continued)

### • Assessment (cont.)

- Misclassification can occur in muscular and frail patients.
- Ensure privacy for weigh in...
  - Weight distribution
    - Central/visceral deposition
  - Weight gain pattern

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## Diagnosing Obesity<sup>13</sup> (continued)

### • Waist circumference (WC) measurement

- Flexible tape
- Around the iliac crests in a horizontal plane
- Waist circumference at high risk
  - Man with WC >40 inches (101.6 cm) or woman >35 inches (88.9 cm)
- High WC for BMI value of 25–35 kg/m<sup>2</sup> increased risk of...
  - Cardiovascular disease
  - Type 2 diabetes

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## Diagnosing Obesity<sup>13</sup> (continued)

### Labs and other diagnostics to complete

- |                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Fasting glucose</li><li>• Hemoglobin A1C</li><li>• Lipids profile</li><li>• Thyroid stimulating hormone</li><li>• Chemistry panel</li><li>• Liver function studies</li><li>• Creatinine/eGFR</li></ul> | <ul style="list-style-type: none"><li>• Additional tests if indicated</li><li>• ECG</li><li>• Echocardiogram</li><li>• Stress test</li><li>• Abdominal MRI with contrast</li><li>• Eye exam (R/o retinal disease)</li><li>• Testosterone</li></ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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## Obesity Essentials Series Treatments Modalities “The Toolbox”

Physical activity  
Nutrition plans  
Behavioral support  
Pharmacology  
Surgery

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## Obesity Treatment: General Approach<sup>14</sup>

- General treatment approach
  - BMI 25–26.9 kg/m<sup>2</sup>
    - Nutrition, physical activity and behavioral counseling
  - BMI 27–29.9 kg/m<sup>2</sup>
    - Nutrition, physical activity and behavioral counseling
    - Pharmacotherapy
  - BMI ≥30 kg/m<sup>2</sup>
    - Nutrition, physical activity and behavioral counseling
    - Pharmacology
    - Metabolic surgery

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## Obesity Treatment: General Approach<sup>14</sup> (continued)

- Person-centered communication
  - Nonjudgmental
  - Active listening
  - Inclusive language
- Person first language – Avoid defining people by their condition.
  - Person with “obesity” instead of “obese person”



Image source: Shutterstock

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## Obesity Treatment: General Approach<sup>14</sup> (continued)

- As little as 3–7% weight loss
  - Can reduce risk for diabetes
  - Improves glycemia in those with diabetes



Image source: Shutterstock

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## Obesity Essentials Series

### Physical Activity

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### Physical Activity: Physiology

- Increasing energy expenditure can help reduce obesity.
- American College of Sports Medicine (ACSM)
  - Aerobic exercise (running, cycling, aerobics, etc.)
    - Exhausts oxygen in the muscles
    - Oxygen is sufficient to supply energy demands.
    - Does not need to derive energy from other sources

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### Physical Activity: Physiology (continued)

- American College of Sports Medicine (ACSM) (cont.)
  - Anaerobic exercise (weightlifting and resistance exercise, etc.)
    - Oxygen consumption is not sufficient to supply the energy demands placed on the muscles.
    - Muscles break down other energy supplies
      - Produces and lactic acid

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### Physical Activity: Physiology (continued)

- Physical activity in the general lifestyle includes...
  - Goal setting
  - Problem-solving
  - Leisure-time physical activity
  - Activity used for commuting
- Physical activity outcomes
  - Cardiorespiratory fitness
  - Body composition
  - Muscular fitness
  - Improved cognitive and emotional health

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: How Much and How Often?<sup>16</sup>

Maintain Health Weight and Prevent Weight Regain		Lose Weight
Moderate	Vigorous	Moderate to Vigorous
150–300 minutes/week	75–150 minutes/week	200–300 minutes/week

- Inactive individuals
  - Medically cleared
  - Start low and go slow.
- Spread out physical activity over the week.
- Maintain safety.
  - Appropriate equipment, trainer, safe environment
- Non-ambulatory status should not be a barrier.

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## Physical Activity: Recommendations

- Adults
  - 2–3 sessions per week of resistance exercise on nonconsecutive days
  - Prolonged sitting interrupted at least every 30 minutes
  - Flexibility training (yoga and tai chi) 2–3 times per week for older adults



Image source: Shutterstock

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## Physical Activity: Recommendations<sup>13</sup> (continued)

- Other considerations
  - Spread over at least 3 days
  - No more than 2 consecutive days without activity
  - Inactive individuals: "Start low and go slow."
  - Start with lower intensity activities.
  - Gradually increasing the frequency and duration
  - Utilize appropriate gear and sports equipment.
  - Chose safe environments.
  - Tailor exercises to meet needs (cycling instead of running)
  - Get creative.
  - Use good form.

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## Physical Activity: Recommendations (continued)



Image source: Shutterstock

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- Physical activity and exercise
  - Movement that increases energy use
  - Improves blood glucose levels
  - Reduces cardiovascular risk factors
  - Contributes to weight loss
  - Improves well-being
- Structured exercise over 8 weeks lowers A1C by 0.66%
- Lowers risk of heart failure

# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Considerations for Children<sup>17, 18</sup>

- 60 minutes or more per day of enjoyable moderate activity
  - Running, hopping, swimming, dancing, and bicycling
- Age-appropriate, muscle-strengthening exercises
  - Playground equipment participation
  - Physical exercise classes
    - Losing ground with shift to academic improvement

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## Physical Activity: Considerations for Children<sup>17, 18</sup> (continued)

- Age-appropriate, muscle-strengthening exercises (cont.)
  - Physical exercise classes (cont.)
    - Shift to afterschool sports
      - Most students don't participate
      - Unaffordable for some families
      - Scheduling demands
- Age-appropriate, bone-strengthening exercises 3 days per week

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## Physical Activity: Considerations for Older Adults

- Aerobic exercise increases physical function and mobility
  - Even in those with dementia or frailty
  - Chronic health conditions benefit from physical activity.
  - Should perform aerobic and muscle-strengthening exercises

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## Physical Activity: Considerations for Children<sup>17, 18</sup> (continued)

- Age-appropriate, muscle-strengthening exercises (cont.)
  - Physical exercise classes (cont.)
    - Shift to afterschool sports
      - Most students don't participate
      - Unaffordable for some families
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- Age-appropriate, bone-strengthening exercises 3 days per week

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Considerations for Older Adults

- Aerobic exercise increases physical function and mobility
  - Even in those with dementia or frailty
  - Chronic health conditions benefit from physical activity.
  - Should perform aerobic and muscle-strengthening exercises

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## Physical Activity: Considerations for Older Adults (continued)

- Aerobic exercise increases physical function and mobility (cont.)
  - If 150 minutes per week is not tolerated...
    - Encourage activity that they can do.
    - Get creative.
    - Always maintain safety.
  - Balance training and fall prevention exercises
    - Performed at least 3 times per week to reduce the risk of age-related function loss

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## Physical Activity: Considerations for Pregnancy

- Physical activity in pregnancy contributes to...
  - Improved cardiorespiratory fitness
  - Appropriate gestational and postpartum weight gain
- Perform at least 150 minutes of aerobic activity.
- Tailor exercise regimens to each woman's circumstances/risks.
- Activities to avoid after the first trimester
  - Lying supine and increasing intrabdominal pressure
    - Such as sit-ups and leg raises
  - Collision sports, high risk of falling or trauma should be avoided.
  - Always consult with Nurse Midwife, OB/GYN.

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## Physical Activity: Considerations for Chronic Disease<sup>19</sup>

- Pre-exercise evaluation is required.
- Inactivity should be avoided.
  - Moderate-intensity exercise (150–300 minutes) or vigorous-aerobic activity (75–150 minutes) weekly
  - Muscle-strengthening exercises at least 2 or 3 times weekly

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Considerations for Chronic Disease<sup>19</sup> (continued)

- Diabetes
  - Avoid resting for more than 2 consecutive days.
    - Increased insulin sensitivity dissipates in 2 to 3 days
  - Exercise-induced hypoglycemia is a risk.
  - Recommend abdominal instead of arm insulin injections.
    - Decrease rapid absorption and hypoglycemia.
  - Post-exercise, glucose levels can remain low for up to 48 hours.

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## Physical Activity: Considerations for Chronic Disease<sup>20</sup> (continued)

- Exercise plays a pivotal role in reducing the progression of high-normal blood pressure to hypertension.
- Low-impact aerobic conditioning and weight bearing exercises
  - Increase function and quality of life in those with osteoarthritis
- Patients with disabilities (There is **ABILITY** in disability.)
  - Improves the quality of life in people with disabilities
  - Physical activity is safe when appropriately supervised.
  - Wheelchair users should consider...
    - Light-intensity or high-intensity upper body exercises
    - Participate in parasports/group activities

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## Physical Activity: Best Types for Weight Loss

- Lifting weights
  - Focus on building lean muscle mass in addition to losing weight
  - Any type of resistance training that builds muscle
  - Can use dumbbells, kettlebells, resistance bands or machines
  - Need a “load” that challenges the muscles

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## Physical Activity: Best Types for Weight Loss (continued)

- Lifting weights (cont.)
  - Compound instead of isolated exercises may be helpful.
    - Compound – Moving more than one joint (squat, chest press)
    - Isolation – Moving only one joint (biceps curl, dumbbell fly)
    - Compound exercises increases heart rate more than isolation.
    - Compound exercises also prepare patients more for ADLs.

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## Physical Activity: Best Types for Weight Loss (continued)

- High-intensity interval training (HIIT)
  - Alternates bursts of intense exercise with low-intensity recovery
    - Pair 30-second intervals of running or sprinting as fast as possible with several minutes of slow, easy jogging
  - Extremely time-efficient way to exercise
    - Short HIIT workout (10–30 minutes) can burn as many calories as a longer steady-state workout.
  - Starting with a lower-intensity modality and longer rest periods
  - Work hard for 30 seconds then rest for at least 60 seconds.
    - 30 second jog then 60 second walk

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## Physical Activity: Best Types for Weight Loss<sup>21</sup> (continued)

- Aquatic exercises focus on increasing...
  - Cardiovascular endurance
    - Muscular strength
    - Flexibility
  - Minimal stress on joints
  - Avoids negative effects of gravity



Image source: Shutterstock

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## Physical Activity: Best Types for Weight Loss<sup>21</sup> (continued)

- Aquatic exercises focus on increasing (cont.)
  - Excellent job of challenging the muscles
    - Works both halves of each muscle pair
    - 12 times more resistance than air in every direction
    - Maximizes resistance by increasing the speed of movements
    - Makes the heart work more efficiently
  - Use tools and toys to keep engaging and fun.



Image source: Shutterstock

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## Physical Activity: Best Types for Weight Loss<sup>21</sup> (continued)

- Walking is one of the best exercise options for weight loss.
  - It's free.
  - Low-impact
  - Accessible
- Reduces heart disease and stroke risk
- Reduces visceral body fat (fat stored within the abdominal cavity)



Image source: Microsoft

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Best Types for Weight Loss<sup>21</sup> (continued)

- Total body fat is lost by walking at all speeds.
  - Slower pace over a long distance and duration is initially more effective for people with overweight.
- Start slow and work up with a goal of 10,000 steps or more per day, in addition to 150–300 minutes/week of moderate to vigorous exercise.

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## Physical Activity: Best Types for Weight Loss<sup>21</sup> (continued)

- Cycling has tremendous benefits.
  - Can burn 400 to 500 calories or more per hour
  - Low impact and accessible

Image source: Microsoft

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## Physical Activity: Best Types for Weight Loss<sup>21</sup> (continued)

- Cycling has tremendous benefits (cont.)
  - Effects overall body weight and fat mass reduction
    - Three cycling sessions per week over 12 weeks
      - No food restrictions
      - Study subjects had overweight loss an average of 3.2% of their body weight and 5% of their fat mass.
  - Also improves aerobic capacity, blood pressure, lipid profile and body composition

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## Physical Activity: Best Types for Weight Loss<sup>21</sup> (continued)

- Pilates strengthens muscles and improves posture.
  - Series of precise, rhythmic movements
  - Deep focus on breathing
  - Helps improve back and joint pain
  - Decreases body weight and improves body composition
- Yoga helps burn calories and increases muscle mass/tone.
  - Specific postures, breathing practices and meditation techniques
  - Promotes balance
  - Burns calories
  - Enhances mental health and balance
  - Promotes healthy sleep patterns

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Best Types for Weight Loss<sup>21</sup> (continued)



Image source: Microsoft

- Non-exercise activity thermogenesis (NEAT)
  - Can account for a significant portion of daily energy expenditure
  - Cleaning
  - Walking
  - Climbing stairs
  - Changing position – Sitting to standing

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## Physical Activity: Best Types for Weight Loss<sup>21</sup> (continued)



Image source: Microsoft

- Non-exercise activity thermogenesis (NEAT) (cont.)
  - Habit stacking: Doing squats while brushing teeth
  - Energy expenditure outside of purposeful exercise
  - Significant number of calories may be expended.
- Can burn up to an extra 2,000 calories per day

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## Physical Activity: Enhancing Outcomes

- Utilize exercise as a vital sign in individuals with obesity.
  - Obtain current exercise and physical activity.
    - Intensity, mode, frequency and duration of the exercise
  - Set reminders in electronic health records to ask at each visit.
  - Ask person getting vital signs to log this information in record.
- Utilize exercise tracker technology.
  - Track heart rate, rhythm, motion, exercise, etc.
  - Ensure that the patient is exercising.
  - Identify potential problems that may arise due to abnormal heart.
  - Smartwatches, smartphones, inexpensive pedometers

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## Physical Activity: Enhancing Outcomes (continued)

- Motivational Interviewing used by healthcare team
  - Reflect, plan, and execute different action plans
  - Ensure patients are meeting exercise goals.
- Provider-Patient check-ins...
  - Increase adherence to exercise programs.
  - Utilize technology.
    - Smart apps, smart watches, etc.
  - Utilize nonjudgmental approaches to inquire about barriers.

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Barriers

- Maintenance of weight loss is difficult.
  - Sustained long-term physical and psychological effort is required.
  - 200–300 minutes of exercise a week remains a large commitment.
  - Patients lose weight and fitness improves.
    - Energy expenditure for similar physical activity declines.
    - Continuing weight loss requires adjustments in diet and exercise.

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## Physical Activity: Barriers (continued)

- Poor adherence is common after long periods of intense change.
  - Unrealistic goal setting leads to...
    - Lack of results
    - Patient mistrust and discouragement – They “give up.”
    - Important to reinforce realistic, stay the course coaching

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## Physical Activity: Barriers<sup>22</sup> (continued)

- Patients can find physical activity difficult.
  - Walking is often the first-line recommendation.
  - Options for those with mobility issues
    - Non-weight-bearing aerobic or resistance training

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## Physical Activity: Barriers<sup>22</sup> (continued)

- Patients can find physical activity difficult. (cont.)
  - Options for those with mobility issues (cont.)
    - Prescription for aquatic therapy (Billing CPT 97113)
      - Medically necessary
        - Aquatherapy can be less strenuous than regular therapy.
        - Chronic musculoskeletal conditions typically accepted.
        - Individual payors may have different criteria.
      - Bill by time (15-minute increments)

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Barriers<sup>23</sup> (continued)

- Psychology of weight loss can have negative effects.
  - Can exacerbate mood and eating disorders
  - Weight loss can have negative effects in victims of abuse.
    - Obesity was a protective shield.
    - 1 in 4 women and 1 in 6 men sexually abused before age 18 years
    - Average age of disclosure
      - 2–3 decades after the trauma
      - Age: 52 years old
  - Screening and mental health specialist consultations are vital.

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## Physical Activity: Overcoming Barriers<sup>24</sup>

- Multidisciplinary approach to improve outcomes
  - Registered dietician
    - Develop an individualized nutrition plan.
  - Physical therapy, cardiac or pulmonary rehab
    - Safely maximize physical activity

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## Physical Activity: Overcoming Barriers<sup>24</sup> (continued)

- Multidisciplinary approach to improve outcomes (cont.)
  - Mental health experts
    - Coping strategies
    - Behavior modifications
    - Support for those with eating disorders or trauma history.
  - Lifestyle and pharmacology unsuccessful
    - Consider surgical referral.

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## Physical Activity: Medical Clearance<sup>13</sup>

- Must be cleared by provider to maximize patient safety
- Tools for clearance
  - Physical Activity Readiness Questionnaire (PAR-Q)
  - Health/Fitness Facility Preparticipation Screening Questionnaire
- Physical activity per week
  - Minimum of 150 to 300 minutes of **moderate** physical activity
  - 75 to 150 minutes of **vigorous** physical activity
  - At least 200 to 300 minutes of moderate to vigorous physical activity
    - Recommended to encourage long-term weight loss

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Medical Clearance<sup>13</sup> (continued)



Physical Activity  
Readiness  
Questionnaire (PAR-Q)



Health/Fitness Facility  
Preparticipation Screening  
Questionnaire

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## Physical Activity: Medical Clearance<sup>25</sup> (continued)

- Pre-exercise evaluation
  - Careful history
  - Assess cardiovascular risk factors.
  - Atypical presentation of CAD
    - Reports of decrease in exercise tolerance
  - Start with short periods of low intensity and duration as tolerated.

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## Physical Activity: Medical Clearance<sup>25</sup> (continued)

- Pre-exercise evaluation (cont.)
  - Also consider...
    - Uncontrolled hypertension
    - Proliferative retinopathy
    - Peripheral neuropathy
  - ECG, Zio-patch<sup>®</sup> (adhesive patch which monitors heart rhythms/storing EKG data), stress-test, echocardiogram, etc.

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## Physical Activity: Medical Clearance<sup>25</sup> (continued)

- Hypoglycemia
  - Pre-exercise glucose <90 mg/dL (5.0 mmol/L) add carbohydrate load.
  - Can occur and last for hours after exercise due to increased insulin sensitivity



Image source: Shutterstock

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Medical Clearance<sup>25</sup> (continued)

- Hypoglycemia (cont.)
  - Check blood glucose levels before and after exercise.
  - Always have glucose available to treat.
    - Glucose tabs
    - Glucose gel/cake gel



Image source: Shutterstock

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## Physical Activity: Medical Clearance<sup>26</sup> (continued)

- Retinopathy
  - Vigorous physical activity contraindicated with proliferative or severe nonproliferative retinopathy.
    - Trigger vitreous hemorrhage or retinal detachment
    - Consult eye care specialist prior to exercise.



Image source: Shutterstock

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## Physical Activity: Medical Clearance (continued)

- Peripheral neuropathy
  - Decreased pain sensation and higher pain threshold
  - Can lead to...
    - Skin breakdown
    - Infection
    - Charcot joint destruction
  - Thorough assessment
  - Use proper footwear.
  - Inspect feet daily.
  - 150 minutes/week improves neuropathy



Image source: Microsoft

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## Physical Activity: Medical Clearance (continued)

- Autonomic neuropathy
  - Increase risk of exercise-induced injury
  - Decreased cardiac responsiveness to exercise
  - Postural hypotension
  - Impaired thermoregulation
  - Impaired night vision due to impaired pupillary neuropathy
  - Increased risk of hypoglycemia
  - Independent risk factor for cardiovascular death and silent myocardial ischemia
  - **MUST** have cardiac investigation prior to intense physical activity

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# Endocrine Workshop: Diabetes and obesity essentials

## Physical Activity: Medical Clearance<sup>26</sup> (continued)

- Renal disease
  - Physical activity can increase urinary albumin excretion.
  - No evidence that vigorous-intensity exercise accelerates rate of progression of DKD.
  - No specific exercise restriction for people with DKD



Image source: Shutterstock

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## Obesity Essentials Series

### Nutrition Plans

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## Nutrition Plans: The Basics<sup>27</sup>

- |                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Most patients want a quick fix and rapid results.<ul style="list-style-type: none"><li>▪ Not sustainable in the long-term</li><li>▪ Focus on weight loss and ignore overall health promotion.</li></ul></li><li>• 3,500 calories in 1-pound (0.45 kg) of fat</li><li>• A deficit of 500 calories per day is needed to lose 1-pound (0.45 kg) per week</li></ul> | <ul style="list-style-type: none"><li>• Set realistic goals that can be achievable.</li><li>• No single diet can universally fit everyone.</li><li>• Weight and appetite regulation are maintained by a complex interaction of hormonal and neuronal pathways.</li><li>• Adaptive physiologic mechanisms resist change in weight from diet, exercise, or pharmacotherapy.</li></ul> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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## Nutrition Plans: The Basics<sup>27</sup> (continued)

- Meaningful improvement in overall health outcomes requires at least 10% weight loss.
- Weight loss of 5 to 10% is associated with reduced risk of...
  - Diabetes mellitus
  - Coronary artery disease
- Initial weight loss goal of 5% is reasonable.

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# Endocrine Workshop: Diabetes and obesity essentials

## Nutrition Plans: The Basics<sup>27</sup> (continued)

- Western diet is typically rich in...
  - Refined carbohydrates
  - Animal fats
  - Lack of fibers
  - Lack of micronutrients
  - Sugar
  - Processed meats
  - Lack of vitamins
  - Inadequate fruits
  - Salt
  - Food additives
  - Lack of antioxidants
  - Inadequate vegetables

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## Nutrition Plans: The Basics<sup>27</sup> (continued)

- Western diet accounts for high-caloric intake resulting in...
  - Insulin resistance
  - Weight gain
  - Elevated serum markers of inflammation
  - Genetics may also be responsible for food preferences.
  - Chronic overnutrition + a sedentary lifestyle...
    - Weight gain, chronic inflammation, and metabolic disorders

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## Nutrition Plans: The Basics<sup>27</sup> (continued)

- Western diet accounts for high-caloric intake resulting in... (cont.)
  - Metaflammation: Chronic inflammation + metabolic disorders
  - Chronic low-grade inflammation contributes to...
    - Obesity
    - Cardiovascular disease
    - Type 2 diabetes
    - Dementia
    - Fatty liver disease
    - Hypertension

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## Nutrition Plans: The Basics<sup>27</sup> (continued)

- There are three primary macronutrients.

<b>Micronutrient</b>	<b>Calories per gram</b>
▪ Carbohydrates	▪ 4 calories per gram
▪ Protein	▪ 4 calories per gram
▪ Fat	▪ 9 calories per gram
- Different nutrition plans manipulate micronutrients for weight loss.
- Must be tailored for each patient – One size does not fit all.

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# Endocrine Workshop: Diabetes and obesity essentials

## Nutrition Plans: The Basics<sup>27</sup> (continued)

- Most common nutrition plans/diets
  - Low-fat
  - Low-carbohydrate
  - Mediterranean
  - Ornish
  - Atkins
  - Paleolithic
  - Vegetarian
  - Intermittent fasting

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## Nutrition Plans: The Basics<sup>28, 29</sup> (continued)

- Medical nutrition therapy
  - Goals
    - Address individual nutrition needs based on...
      - Cultural preferences
      - Health literacy and numeracy
      - Access to healthful foods
      - Willingness and ability to make behavioral changes



Image source: Shutterstock

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## Nutrition Plans: The Basics<sup>28, 29</sup> (continued)

- Medical nutrition therapy (cont.)
  - Maintain the pleasure of eating.
  - Provide practical tools to develop healthy eating patterns.



Image source: Shutterstock

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## Nutrition Plans: The Basics<sup>29-31</sup> (continued)

- Nutrition plans
  - Mediterranean
  - Low carb
  - Low calorie with meal replacement
  - No single approach is superior.
  - Should be individualized
    - Health status
    - Personal preferences
    - Ability to sustain



Image source: Shutterstock

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# Endocrine Workshop: Diabetes and obesity essentials

## Nutrition Plans: The Basics<sup>32</sup> (continued)



Image source: Shutterstock

- No ideal percentage of calories from fat, protein or carbs
- Emphasize
  - Non-starchy vegetables
  - Minimize added sugars/refined grains
  - Whole foods over processed

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## Nutrition Plans: The Basics (continued)



Image source: Shutterstock

- Screen for food insecurity...
  - “Within the past 12 months we worried about whether our food would run out before we got money to buy more.”
  - “Within the past 12 months the food we bought just didn’t last and we didn’t have money to get more.”

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## Nutrition Plans: The Basics<sup>33</sup> (continued)

- Meal planning proven to lower A1C
  - Diabetes plate method
    - 9-inch (23 cm) plate
    - ½ plate non-starchy vegetables
    - ¼ plate protein
    - ¼ plate carbohydrates
    - Easy for literacy and numeracy

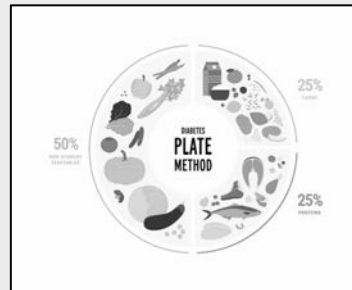


Image source: Shutterstock

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## Nutrition Plans: Fiber<sup>34</sup>

- Fiber
  - Gut microbiota increases gut microbial diversity
  - High fiber diets promote this.
  - Minimum of 14 gm of fiber
  - Half of grain consumption, whole intact grains
  - Caution when using psyllium fiber supplements
    - Helpful
    - Go low and slow.



Image source: Shutterstock

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# Endocrine Workshop: Diabetes and obesity essentials

## Nutrition Plans: Carbohydrates<sup>34</sup>

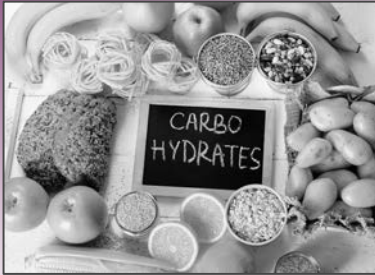


Image source: Shutterstock

- Reducing overall carbs improves glycemia
  - Reduces A1C and need for medications
  - Low carb (<26% total energy) = Reduced A1C

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## Nutrition Plans: Carbohydrates<sup>34</sup> (continued)



Image source: Shutterstock

- Questions – Optimal degree of carb restriction long-term effects
- Each 10% reduction in carb intake = Reductions in A1C, fasting plasma glucose, body weight, lipids, systolic BP at 6 months
  - Not maintained beyond 12 months

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## Nutrition Plans: Carbohydrates<sup>34</sup> (continued)

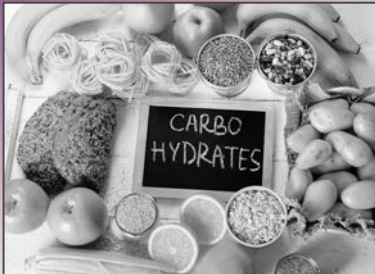


Image source: Shutterstock

- Carbohydrates
  - Amount nonconclusive
- Glycemic index
  - Ranks carb foods by glycemic response
    - No significant impact on A1C
    - Others: A1C 0.15–0.5%

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## Lifestyle Changes: Nutrition<sup>18</sup> (continued)

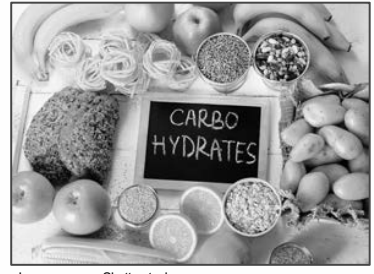


Image source: Shutterstock

- Glycemic index (cont.)
  - Others A1C 0.15 to 0.5%
  - Each 10% reduction in carb intake = Reductions in A1C, fasting plasma glucose, body weight, lipids, systolic BP at 6 months
  - Not maintained beyond 12 months

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# Endocrine Workshop: Diabetes and obesity essentials

## Nutrition Plans: Protein

- Protein
  - 1–1.5 g/kg body weight per day
  - 10–20% total calories
  - 20–30% per day increased satiety
  - Avoid restriction below 0.8g/kg/day.
    - Does not alter glycemic measures, CV risk or the eGFR while increasing risk of malnutrition

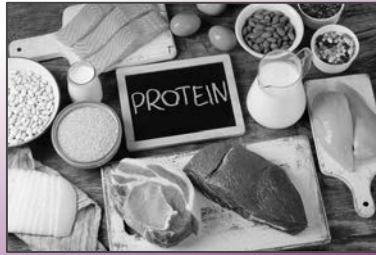


Image source: Shutterstock

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## Nutrition Plans: Protein (continued)

- Protein (cont.)
  - Increases insulin response to dietary carbohydrates
  - Use carbohydrates that are high in protein – Nuts.
  - Avoid to treat hypoglycemia due to potential concurrent risk in endogenous insulin.



Image source: Shutterstock

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## Nutrition Plans: Fat



Image source: Shutterstock

- Fat
  - No ideal percentage
  - Individualized
  - Type is more important than total.
  - Total fat
    - 20–35% of total daily calories
  - Saturated fats
    - <7% of total daily calories

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## Nutrition Plans: Calories<sup>35</sup>

Mostly sedentary multiply  $\times 10$   
Moderate activity multiply  $\times 15$

Calculating average total  
calories consumed per day to  
maintain current weight

### Minimal activity

Total weight  $\times 10$  = Number of calories currently consumed daily to maintain current weight

### Moderate activity

Total weight  $\times 15$  = Number of calories currently consumed daily to maintain current weight

### Example

Current weight = 250 lbs (113.4 kg)  $\times 10$  = 2,500 calories per day

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# Endocrine Workshop: Diabetes and obesity essentials

### Nutrition Plans: Calories<sup>35</sup> (continued)

<p>Mostly sedentary multiply × 10 Moderate activity multiply × 15</p> <hr/> <p>Calculating target calories per day for weight loss</p>	<p><b>Minimal activity</b> Total weight × 10 = Number of calories currently consumed daily to maintain current weight</p> <p><b>Moderate activity</b> Goal weight × 15 = Number of calories currently consumed daily to maintain current weight</p> <p><b>Example</b> Goal weight = 200 lbs (90.7 kg) × 10 = 2,000 calories per day</p>
--------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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### Nutrition Recommendations<sup>28, 29</sup>

Focus	Recommendation
<b>Energy Balance</b>	<ul style="list-style-type: none"> <li>At least 5% weight loss for all overweight or obesity</li> </ul>
<b>Eating Patterns</b> <b>Macronutrient Distribution</b>	<ul style="list-style-type: none"> <li>Variety of eating plans and patterns can be considered.</li> <li>Low carb eating plans demonstrated the most evidence of improving glycemic control.</li> </ul>
<b>Carbohydrates</b>	<ul style="list-style-type: none"> <li>Nutrient-dense carbohydrate sources that are high in fiber (14 g fiber per 1,000 kcal)</li> <li>Minimally processed foods</li> <li>Nonstarchy vegetables, fruits, legumes, and whole grains and dairy products</li> <li>Minimal added sugars</li> <li>Replace sugar containing beverages with low-calorie or calorie free beverages.</li> </ul>

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### Nutrition Recommendations<sup>28, 29</sup> (continued)

Focus	Recommendation
<b>Protein</b>	<ul style="list-style-type: none"> <li>Ingested protein increases insulin response without increasing glucose.</li> <li>Avoid protein-based carbohydrates when treating hypoglycemia.</li> </ul>
<b>Dietary Fat</b>	<ul style="list-style-type: none"> <li>Diets rich in monounsaturated fats and polyunsaturated fats improve glycemic control.</li> <li>Foods fatty acids such as fish (EPA and DHA) and nuts (ALA) are recommended.</li> </ul>
<b>Alcohol</b>	<ul style="list-style-type: none"> <li>No more than 1-drink per day for women and no more than 2-drinks per day for men</li> </ul>

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### Nutrition Recommendations<sup>28, 29</sup>

Focus	Recommendation
<b>Sodium</b>	<ul style="list-style-type: none"> <li>Sodium consumption should be below 2,300 mg/day.</li> </ul>
<b>Nonnutritive sweeteners</b>	<ul style="list-style-type: none"> <li>May reduce overall calorie consumption.</li> <li>Use in beverages are viable water alternatives.</li> </ul>

**Saturated fat is solid at room temperature.**  
Keep below 7% of total calories

**Clinical Connection**

White and light

↓

**Carbohydrates**

↑

Brown and heavy

Image source: Created by Gleason, J. (2023), used with permission

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# Endocrine Workshop: Diabetes and obesity essentials

## Nutrition Plans<sup>28, 29</sup>

- Medical nutrition therapy
  - Goals
    - Promote healthful eating patterns.
  - Emphasize
    - Variety
    - Quality
    - Portion size



Image source: Shutterstock

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## Nutrition Plans<sup>28, 29</sup> (continued)

- Medical nutrition therapy (cont.)
  - Achieve/maintain body weight goals.
  - Attain individualized glycemic, blood pressure and lipids goals.
  - Delay or prevent the complications.



Image source: Shutterstock

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## Nutrition Plans<sup>28</sup> (continued)

- Medical nutrition therapy (cont.)
  - No one-size-fits-all eating pattern or plan
  - Meal planning needs to be individualized.
  - Each patient should actively engage in...
    - Education
    - Self-management
    - Development of eating plan
- Refer to a registered dietician.
  - Type 1 diabetes: A1C ↓ by 1–1.9%
  - Type 2 diabetes: A1C ↓ by 0.3 to 2.0%



Image source: Shutterstock

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## Nutrition Plans: Intermittent Fasting<sup>33</sup>

- Three main forms
  - Alternate day fasting (energy restriction of 500–600 calories on alternate days)
  - 5:2 diet: Energy restriction of 500–600 calories on consecutive and nonconsecutive days with usual intake the remaining 5 days



Image source: Shutterstock

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# Endocrine Workshop: Diabetes and obesity essentials

## Nutrition Plans: Intermittent Fasting<sup>33, 36, 37</sup> (continued)



Image source: Shutterstock

- Three main forms (cont.)
  - Time restricted eating (daily calorie restriction based on window of time of 8–15 hours)
- Mild to moderate weight loss
  - 3–8% from baseline
  - Similar findings at 52 weeks
- Benefits
  - No need to count calories
  - Sustainability
  - Feasibility

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## Nutrition Plans: Low-Fat Diet<sup>38-40</sup>

- Advocated for the prevention of heart disease
- Low-fat diet consists of 20–25% of energy from fat.
- Very low-fat diet contains 10–20% of energy from fat.

- Meta-analysis: Low-fat diet was less effective than a low carbohydrate diet in achieving sustainable long-term weight loss.
- Low-fat diet versus a high-fat diet led to similar weight loss.

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## Nutrition Plans: Low-Fat Diet<sup>38-40</sup> (continued)

• Randomized control trials shows that a low-fat diet is not superior to other dietary interventions for obesity.

• A very low-fat diet is challenging to sustain over the long-term.

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## Nutrition Plans: Low-Carb Diet<sup>38-40</sup>

- American diet has 45–65% of energy intake from carbohydrates.
- Low carbohydrate diet can be defined as less than 45% dietary energy source from carbohydrates.
- Varying definitions of low carbohydrate diets
  - Challenging to study outcomes of a low carbohydrate diet
  - No precise definition of a low carbohydrate diet
- Typically contains 52–150 grams of carbohydrates per day

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# Endocrine Workshop: Diabetes and obesity essentials

## Nutrition Plans: Low-Carb Diet<sup>38-40</sup> (continued)

- Weight loss mechanism with a low carbohydrate diet
  - Reduced secretion of insulin secondary to low-carb intake
  - Stimulates lipolysis
  - Ketones are formed with carbohydrate restriction: 20–50 grams.
  - Gluconeogenesis with reduced glucose in diet
  - Gluconeogenesis reserve is exhausted.
    - Fat is broken down to fatty acid for oxidation.
  - Improves insulin sensitivity

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## Nutrition Plans: Low-Carb Diet<sup>38-40</sup> (continued)

- Long-term sustainability of a low-carb diet is questionable.
- Reduced intake of fibers and micronutrients
- Higher fat content can result in cardiovascular disease.

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## Nutrition Plans: Low-Carb Diet<sup>38-40</sup> (continued)

- Increase in LDL
  - Overall health benefits outweigh the risk associated with the rise in LDL.
  - Low carbohydrate diet leads to an increase in LDL due to large LDL particles size.
  - Low carbohydrate diet improves glycemic control.
  - High-fat diet may adversely impact the gut microbiome.

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## Nutrition Plans: Mediterranean Diet

- Based on a diet in the Mediterranean region, such as Italy, Greece, Spain, Lebanon, etc.
- Rich in fruits, vegetables, nuts, seeds, seafood, fish, and olive oil
- Primary source of nutrients is plant-based.
  - Rich in fibers, lower in glycemic load, and high in antioxidants and micronutrients
- Lower in saturated fat and omega-6 polyunsaturated fatty acid (n-6 PUFA) and higher in monounsaturated fatty acids (MUFA) and omega-3 polyunsaturated fatty acid (n-3 PUFA)
- Cardioprotective and health-promoting benefits
- Results in significant weight loss diet

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# Endocrine Workshop: Diabetes and obesity essentials

## Nutrition Plans: Mediterranean Diet (continued)

- Improved metabolic profile
- Reduced risk of developing
  - Type 2 diabetes mellitus
  - Metabolic syndrome
- After 12 months it produced
  - An average weight loss of 8.7 percent
  - Low carbohydrate Mediterranean diet produced an average weight loss of 10%



Image source: Shutterstock

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## Nutrition Plans

Mediterranean eating plan



Low-carb eating plan



DASH eating plan



Eating Plan Tools

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## Nutrition Plans: Where do we find support?

Find Registered Dietician  
Nutritionists (RDNs)



Academy of Nutrition  
and Dietetics

Find Diabetes Care and  
Education Specialists (CDCES)



Certification Board for  
Diabetes Care and Education

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Obesity Essentials Series  
Behavioral Support

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# Endocrine Workshop: Diabetes and obesity essentials

## Behavioral Support<sup>41</sup>

- Obesity is a complex and multifactorial neurobehavioral condition.
  - Imbalance between...
    - Strong physiologic forces that resist weight loss
    - Weak forces that resist weight gain
  - Eating behavior is also influenced by...
    - Environment
    - Five senses
    - Stress
    - Emotions
    - Habitual time cues
    - Reward
    - Sleep
    - Eating disorders
    - Information gap
    - Trauma history

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## Behavioral Support<sup>41</sup> (continued)

- Standard treatment approaches helpful in obesity treatment
  - **Motivational interviewing**
  - Behavioral therapy
  - Cognitive therapy
  - Cognitive-behavioral
  - Interpersonal therapy
  - Acceptance-based therapy
- Eliciting behavioral change is a significant challenge.
  - Limited time in an office or clinic setting
  - Refer patient to behavioral health specialists.
    - Psych NPs and others

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## Behavioral Support: Motivational Interviewing<sup>41</sup>

- Motivational interviewing (MI) is a collection of behavioral tools.
  - Proven to evoke change in patients who are ambivalent, reluctant, and otherwise not motivated to change
  - Patient must be ready for change for a weight management plan to be successful.
  - Successful patient encounter that utilizes MI techniques
    - Motivate the patient to...
      - Consider and increase confidence.
      - Help initiate change.
      - Facilitate commitment to change.
      - Foster continued commitment to change.

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## Behavioral Support: Motivational Interviewing<sup>41</sup> (continued)

- Motivational interviewing (MI) is a collection of behavioral tools. (cont.)
  - Successful patient encounter that utilizes MI techniques (cont.)
    - Draws out the patient's thoughts and ideas towards solutions
    - Fosters autonomy
  - Clinician acts as a guide towards these goals.
  - Motivational interviewing process involves...
    - Engaging
    - Focusing
    - Evoking
    - Planning



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# Endocrine Workshop: Diabetes and obesity essentials

## Behavioral Support: Five A's<sup>41</sup>

- The **Five A's** of obesity management
  - **Ask** permission to discuss weight.
    - Non-judgmental approach promotes autonomy
    - Explores patient's readiness for change
  - **Assess** basic parameters related to weight.
    - BMI, waist circumference, waist to hip ratio, and obesity stage
  - **Advise** the patient on...
    - Health risks of obesity and health benefits of 5–10% weight loss
    - Long-term strategies, treatment options

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## Behavioral Support: Five A's<sup>41</sup> (continued)

- The **Five A's** of obesity management (cont.)
  - **Agree** to realistic weight loss expectations.
    - Respectful negotiation
  - **Arrange/assist** by...
    - Identifying barriers to weight loss goals
    - Referrals to other providers for follow-up



Image source: Microsoft

342

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## Behavioral Support: Where to refer patients?

Psychology Today



Mental Health Specialist  
Directory by Location

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**Obesity Essentials Series**  
Pharmacology

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# Endocrine Workshop: Diabetes and obesity essentials

## Pharmacology<sup>42, 43</sup>

- Medications for weight loss
  - ↓ incidence of diabetes in patients with obesity and prediabetes
  - Improve adherence to nutrition and activity recommendations.
  - Modulate appetite and/or satiety.
- Contraindicated in pregnant or actively conceiving
- Not recommended while nursing
- As little as 3–7% weight loss
  - Can reduce risk for diabetes
  - Improves glycemia in those with diabetes

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## Pharmacology<sup>42, 43</sup> (continued)

- Consider pharmacologic options for weight loss.
  - Continue weight loss after changes in lifestyle and behavioral.
  - Treatment failure with lifestyle and behavioral modalities
  - Weight regain has happened.
  - Concomitantly to the initiation of a weight loss program
- Indications
  - BMI >30 kg/m<sup>2</sup>
  - BMI of 27–29.9 kg/m<sup>2</sup>
    - Presence of weight-related complications
    - Patients who have failed to achieve weight loss goals after implementing comprehensive lifestyle intervention
    - Medications alone have poor outcomes.

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## Pharmacology<sup>44</sup> (continued)



Image source: Microsoft

- Assessing efficacy and safety
  - Assess monthly for first 3 months.
  - Assess every 3 months after.
  - Early responders have better outcomes.

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## Pharmacology<sup>44</sup> (continued)



Image source: Microsoft

- Early efficacy (>5% weight loss after 3 months) should continue medication.
- Early inefficacy (<5% weight loss after 3 months) unlikely continued use is helpful.

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# Endocrine Workshop: Diabetes and obesity essentials

## Medications to Treat Obesity<sup>12</sup>

Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<b>Phentermine (Adipex-P®)</b> • Appetite suppressant • Only short-term ≤12 weeks	3–7%	• Stimulant, dry mouth, constipation, anxiety, • Headache, ↑ blood pressure	Avoid in any heart disease, uncontrolled BP, glaucoma, depression, anxiety dependence risk	<b>\$4–\$15 30 days</b>
<b>Orlistat (Xenical®) (Alli®)</b> • Gastric/pancreatic lipase inhibitor • Blocks 30% fat absorption	3–5%	Diarrhea, flatulence, oily stools (oil slick), abdominal discomfort	• ↓ Efficacy of cyclosporin • ↓ Efficacy of levothyroxine • ↓ Malabsorption of fat-soluble vitamins (A, D, E, K) • Cholelithiasis, nephrolithiasis	<b>Rx \$200 OTC \$71 30 days</b>

Image source: Graphic by Gleason, J. (2023), used with permission

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## Medications to Treat Obesity<sup>12</sup> (continued)

Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<b>Phentermine/topiramate (Qsymia®)</b> Appetite suppressant	6.7–8.9%	• Stimulant, dry mouth, constipation, anxiety, • Headache, ↑ blood pressure	• Avoid in any heart disease, uncontrolled BP, glaucoma, hyperthyroidism, depression, anxiety, pregnancy, nursing. • Dependence risk	<b>\$200 30 days</b>
<b>Naltrexone/bupropion (Contrave®)</b> Targets mesolimbic system and hypothalamus to decrease hunger	5–10%	• Dry mouth, dreams, constipation, anxiety, • Headache, ↑ blood pressure, N/V	• Avoid with uncontrolled BP, anorexia, bulimia, seizure disorder, opiate use, alcohol. • Can increase suicidal thoughts	<b>\$260 30 days</b>

Image source: Graphic by Gleason, J. (2023), used with permission

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## Medications to Treat Obesity<sup>12</sup> (continued)

Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<b>Liraglutide (Saxenda®)</b> • GLP-1 agonist • Injected daily	3–8%	Nausea, diarrhea, constipation, abdominal discomfort, headache, tachycardia	• Avoid gastroparesis or history of pancreatitis • Caused thyroid cancer in rodents	<b>\$1,345 30 days</b>
<b>Semaglutide (Wegovy®)</b> • GLP-1 agonist • Injected weekly • Semaglutide (Ozempic®) is <b>ONLY</b> for Type 2 diabetes	15%	Nausea, diarrhea, constipation, abdominal discomfort, headache, tachycardia	• Avoid gastroparesis or history of pancreatitis. • Caused thyroid cancer in rodents	<b>\$1,345 30 days</b>

Image source: Graphic by Gleason, J. (2023), used with permission

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## Medications to Treat Obesity<sup>12</sup> (continued)

Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<b>Tirzepatide (Mounjaro®)</b> • GLP-1 and GIP agonist • Injected weekly • <b>Only FDA-approved for Type 2 diabetes</b> • FDA-approval for obesity expected • Increases insulin secretion • Decreases glucagon secretion • Delays gastric emptying • Increases insulin sensitivity	20–22.5%	Nausea, diarrhea, constipation, abdominal discomfort, headache, tachycardia	• Avoid gastroparesis or history of pancreatitis. • Caused thyroid cancer in rodents.	<b>\$1,022 30 days</b>

Image source: Graphic by Gleason, J. (2023), used with permission

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# Endocrine Workshop: Diabetes and obesity essentials

Medications to Treat Obesity (continued)				
Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<b>Tirzepatide (Zepbound®)</b> • GLP-1 and GIP agonist • Injected weekly • <b>Mounjaro® Only FDA approved for Type 2 diabetes</b> • Increases insulin secretion • Decreases glucagon secretion • Delays gastric emptying • Increases insulin sensitivity	20–22.5%	Nausea, diarrhea, constipation, abdominal discomfort, headache, tachycardia	Avoid gastroparesis or history of pancreatitis Caused thyroid cancer in rodents.	<b>\$1,060</b> <b>30 days</b>

Image source: Graphic by Gleason, J. (2023), used with permission

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### Pharmacology: The Pipeline<sup>45</sup>

- Market for obesity drugs: \$37 billion by 2031
- Historic breakthrough
  - First-generation GLP-1s: 5–7% weight loss
  - Current generation: 15–22% weight loss

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### Pharmacology: The Pipeline<sup>45</sup> (continued)

- Most drugs are subcutaneous, but more options are on the way.
  - Semaglutide (Rybelsus®) – Oral but **ONLY** indicated for T2DM
  - Novo Nordisk: End of OASIS trial for oral semaglutide for obesity
    - Seeking FDA approval before end of 2023
  - Pfizer: Danuglipron tromethamine completed Phase II trial Sept. 2023
    - Targets GLP-1 and is being trialed for obesity and T2DM

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### Pharmacology: The Pipeline<sup>45</sup> (continued)

- Dual agonists
  - Glucose-dependent insulinotropic polypeptide (GIP)
  - Glucagon-like peptide-1 (GLP-1)
  - GIP makes GLP-1 more tolerable so increased dose can be tolerated.
    - Go from 2.4 mg up to 15 mg = More weight loss (Tirzepatide [Mounjaro®]) = 22%)
  - Assists in emptying fat from the liver beneficial for those with fatty liver

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# Endocrine Workshop: Diabetes and obesity essentials

## Obesity Essentials Series


### Surgery

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### Surgery: Benefits

**“Given the magnitude and rapidity of weight loss and improved glycemic control metabolic surgery should be considered for treatment of T2 Diabetes even in the absence of severe obesity”**  
*– Joint Statement International Diabetes Organization*



Metabolic surgery strongly demonstrates superior glycemic control and reduction of cardiovascular risk in patients with type 2 diabetes and obesity compared to nonsurgical interventions.

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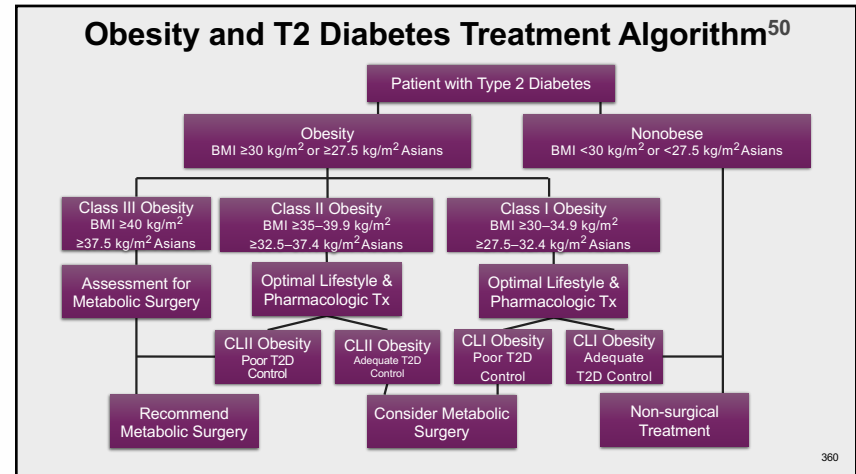
### Surgery: Benefits<sup>46-49</sup> (continued)

- Surgical treatment and medications potentially eradicate diabetes efficiently (STAMPEDE) trial
  - Randomized 150 patients with diabetes
  - Received metabolic surgery or medical treatment
  - 29% treated with RYGB\* and 23% treated with VGS.\*
    - A1C of 6.0% (0.06 proportion) or lower at 5 years
  - 35–50% have recurrent diabetes after remission.
    - Median years of recurrence return 8.3 years after RYGB\*
  - Substantial improvement of glycemia from baseline for at least 5–15 years

\*Roux-en-Y gastric bypass (RYGB); Vertical gastric sleeve (VGS)

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Predictors of Success<sup>51</sup>

- Predictors of surgical success associated with higher rates of diabetes remission
  - Younger age
  - Shorter duration of diabetes <8 years
  - Lesser severity of diabetes
    - Better glycemic control
    - Less or no use of insulin
- Metabolic surgery has greater initial costs.
- Retrospective analysis
  - Cost-effective and cost-saving

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## Surgery: Safety Considerations<sup>49-51</sup>



Image source: Shutterstock

- Safety has improved due to...
  - Refinement of minimally invasive approaches
    - Laparoscopic, robotic assist
  - Enhanced training and credentialing
  - Involvement of multidisciplinary teams

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## Surgery: Safety Considerations<sup>49-51</sup>(continued)



Image source: Shutterstock

- Peri-operative mortality rates 0.1–0.5%
  - Similar to cholecystectomy and hysterectomy
  - Proficiency of surgeon and team important
  - Performed at high-volume centers

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## Surgery: General Risks<sup>49-51</sup>



Image source: Shutterstock

- Vitamin and mineral deficiencies
  - Lifelong supplementation
- Anemia
- Osteoporosis

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: General Risks<sup>49-51</sup>



Image source: Shutterstock

- Dumping syndrome
  - Presents <1-year postop
  - 10–30 minutes after a meal
  - Diarrhea, nausea, vomiting, palpitations, fatigue
  - Hypoglycemia not present initially but may develop hours later.
- Severe hypoglycemia

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## Surgery: General Risks<sup>52, 53</sup> (continued)

- Mental health
- Increased risk of...
  - Substance abuse, depression, anxiety, suicidal ideation
  - Mental health follow-up prior to and after surgery
- Post-bariatric hypoglycemia (PBH)
  - Presents >1-year postop
  - Dumping syndrome typically occurs <1-year postop.
  - Occur with Roux-en-Y or vertical gastric sleeve
  - Altered gut emptying of ingested nutrients
  - Rapid intestinal glucose absorption
  - Excess postprandial secretion glucagon-like peptide 1 (GLP1)

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## Surgery: General Risks<sup>39, 40</sup> (continued)

- Post-bariatric hypoglycemia (PBH)
  - Excess postprandial secretion glucagon-like peptide 1 (GLP1)
  - Overstimulation of insulin release
  - Sharp drop in glucose 1–3 hours after high-carb meal
  - Symptoms
    - Sweating, tremor, tachycardia, increased hunger, impaired cognition, loss of consciousness, seizures
  - Decreases occurrence of PBH with education
    - Reduced amount of refined carbohydrates
  - Offer continuous glucose monitoring.

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## Surgery<sup>45, 54, 55</sup> (continued)



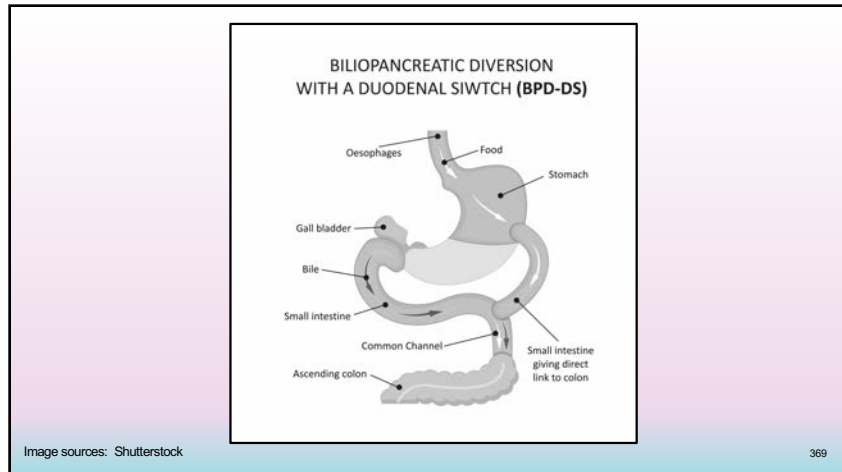
Image source: Shutterstock

- Common types of bariatric surgery
  - Sleeve gastrectomy
  - Roux-en-Y gastric bypass
  - Adjustable gastric band placement
  - Biliopancreatic diversion with duodenal switch

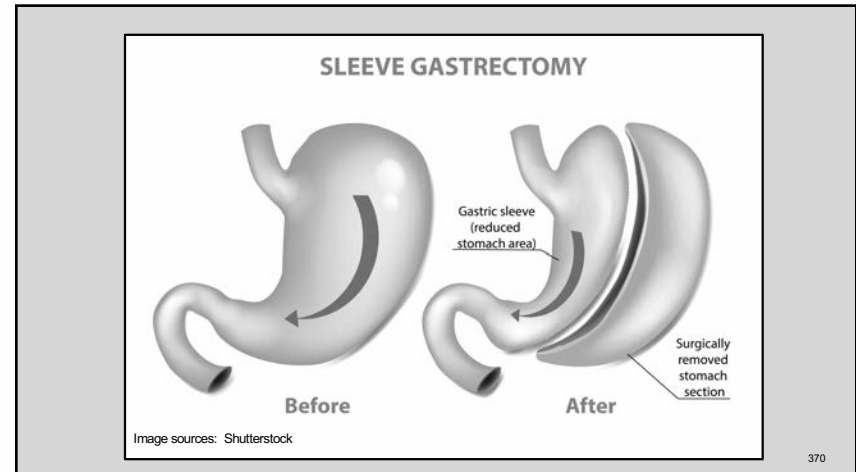
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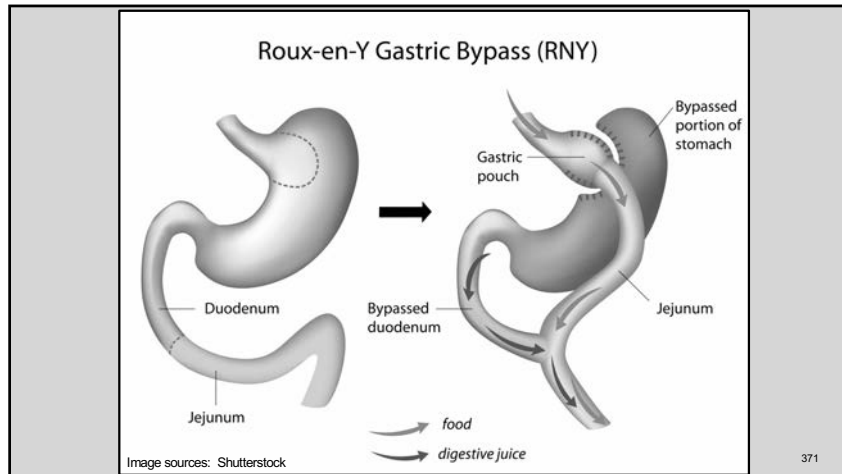
# Endocrine Workshop: Diabetes and obesity essentials



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**Surgery: Preoperative Assessment<sup>56</sup>**

- Strategies to try before surgery
- Assist patients in achieving weight loss of  $\geq 5\%$  of initial body weight.
- Choose a diet with the best chance of patient compliance.
- Encourage 14 counseling sessions.
  - Targeting the behavioral aspects of obesity
  - Regular follow-up appointments after surgery
- Increasing physical activity also promotes weight loss.

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Pharmacologic tools should be utilized as warranted
- Consider referral to surgery if above is unsuccessful
- Weight loss medications can be used after surgery if needed
- Obesity is a multifactorial disease process.
  - Genetics
  - Environment

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Preoperative assessment improves patient outcomes.
- Goals of the preoperative assessment
  - Identify appropriate candidacy for the procedure.
  - Identify, assess, and offer interventions for comorbidities that increase intraoperative morbidity and mortality.
  - Obtain informed consent.
  - Ensure the patient understands the procedure and its risks.
    - A thorough preoperative assessment improves outcomes in patients undergoing weight loss surgery.

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Body mass index
  - Patients failed nonsurgical weight management
  - BMI >40 kg/m<sup>2</sup>
  - BMI >35 kg/m<sup>2</sup> in the presence of an obesity-related comorbidity
    - Type 2 diabetes
    - Hypertension
    - Osteoarthritis
    - Coronary artery disease
    - Major depression

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Body mass index (cont.)
  - BMI <35 kg/m<sup>2</sup> in the setting of significant metabolic dysfunction
    - Uncontrolled diabetes despite maximized therapy



Image source: Shutterstock

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Contraindications for weight loss surgery
  - Poor surgical candidates based on physical health
    - Severe heart, lung or kidney failure
    - Active cancer treatment
    - Drug and alcohol dependency

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Contraindications for weight loss surgery (cont.)
  - Cognitive impairment
    - Poorly controlled mental illness, eating disorders, alcohol use disorder (referral to mental health specialist for preop screening)
    - Lack of postoperative medical and social support
      - Significant risk of medical tourism

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)



Image source: Microsoft

- Components of preoperative assessment
  - Conducted by multidisciplinary team
    - Bariatric surgeon
    - Nurse practitioner
    - Registered nurse
    - Registered dietician
    - Behavioral/mental health specialist
    - Subspecialists: Cardiology, endocrinology, etc.

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## Surgery: Preoperative Assessment<sup>56</sup>

- Components of preoperative assessment (cont.)
  - Required multiple appointments
    - Education
    - Laboratory and diagnostic testing
    - Physical and mental/behavioral health evaluation

Image source: Microsoft

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Preoperative Assessment<sup>56</sup> (continued)



Image source: Shutterstock

- Components of preoperative assessment (cont.)
  - Comprehensive medical history
  - Unsuccessful medical weight loss program must be documented.
  - Thorough physical examination

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Components of preoperative assessment (cont.)
  - Metabolic assessment includes...
    - Complete blood count
    - Complete metabolic panel
    - Fasting blood glucose
    - Hemoglobin A1C
    - Lipid panel
    - Urinalysis
    - TSH
    - Coagulation studies
    - B<sub>12</sub>
    - Folic acid
    - Vitamin D
    - Ferritin
    - Serum albumin and prealbumin

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- History of gastroesophageal reflux disease (GERD)
  - Evaluated by a gastroenterologist
  - Preoperative esophagogastroduodenoscopy (EGD)
    - Hiatal hernia
    - Barrett esophagus
    - *Helicobacter pylori* disease
    - Pathologic lesions

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- History of gastroesophageal reflux disease (GERD) (cont.)
  - Findings could affect choice of weight loss procedure
    - Roux-en-Y gastric bypass
      - Successful in decreasing GERD symptoms
    - Sleeve gastrectomy
      - Avoid in Barrett's esophagus.
      - Can worsen GERD

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- History of endocrine disorders
  - Uncontrolled endocrine disorders can affect outcomes.
  - Type 2 diabetes: Well-controlled before surgery
    - Hemoglobin A1C of 6.5–7% (0.065–0.07 proportion), a fasting blood glucose <110 mg/dL (6.1 mmol/L), and a 2-hour postprandial glucose <140 mg/dL (7.8 mmol/L)
    - Decrease perioperative risks such as poor wound healing

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)



Image source: Shutterstock

- Meet with a registered dietitian.
  - Clinical nutrition evaluation
  - Success of surgery hinges on modifying dietary habits.
  - Individualized nutrition plan
  - Ensure access to an expert for post-operative assistance.

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Meet with mental/behavioral health specialist.
  - Psychosocial and behavioral assessment must be done.
  - Patients with obesity frequently have...
    - Underlying mood, eating, and behavioral disorders
    - Can negatively impact outcomes
    - Lead to complications



Image source: Shutterstock

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Provide strategies for improving post-operative support for better outcomes.



Image source: Shutterstock

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Preoperative Assessment<sup>56</sup> (continued)



Image source: Shutterstock

- Educate patient about risk of excessive skin and tissue after weight loss.
  - Can challenge mental health and quality of life
  - Consultation with a plastic surgeon can mitigate these challenges.

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- History of respiratory disorders
  - Frequently present with COPD, obstructive sleep apnea or hypoventilation syndrome of obesity
  - Consultation with a pulmonologist is recommended.
  - Patients with obstructive sleep apnea require CPAP therapy.

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- History of respiratory disorders (cont.)
  - Preoperative weight loss
    - Treats hypoventilation syndrome of obesity
    - Reduces the weight on the chest and abdominal walls
    - Improves intraoperative ventilation
    - Eases surgical access to the peritoneal cavity
    - Decreases anesthesia-related risks

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## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Coagulation issues
  - Obesity is a risk factor for venous thromboembolic disease.
  - Risk assessment for all patients
    - Caprini, Aberdeen, Geneva, or IMPROVE scores can be used in different settings to quantify risk.
    - Postoperative anticoagulation therapies for those at risk
    - Postoperative sequential compression devices strongly advised.

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Preoperative Assessment<sup>56</sup> (continued)

- Smoking tobacco use
  - Increases risk of poor wound healing, DVT, CV events
  - Cessation 6 weeks before surgery and postoperatively



Image source: Microsoft

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## Surgery: Postoperative Care<sup>57</sup>

- Oral intake
  - Bariatric clear liquid diet
    - Started within 24-hours post-op
    - Start only if tolerating water well.
    - No signs of staple line or anastomotic leak
  - Discharged home (avg 2–5 days) when...
    - Tolerating low-fat, full-liquids
    - Ambulatory
- Discharged home with...
  - Protein supplements and vitamin regimen
  - Gradual progression in food consistency over months

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## Surgery: Postoperative Care<sup>57</sup> (continued)



- Outpatient follow-up typically involves...
  - Post-op visits between 2 and 6 weeks
  - Check-ups at three and six months
  - Bi-annually for 2 years

Image source: Microsoft

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## Surgery: Postoperative Care<sup>57</sup> (continued)

- Safely increase physical activity after surgery
  - Limit the loss of lean tissue.
  - Decrease the risk of regaining weight.
  - Encourage cardiovascular health.
  - Strength training and aerobic exercise
    - Minimum of thirty minutes per day
    - Increase activity incorporated into daily behaviors

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Postoperative Care<sup>57</sup> (continued)

- Post-operative nutrition measures
  - 1200 calories per day
  - 60–120 grams of protein per day
    - Protein malnutrition is rare.
  - Vitamin supplementation
    - Iron, calcium, vitamin D, and vitamin B
    - Routine monitoring of micronutrients
    - Customization of supplements based on labs and clinical status

Image source: Microsoft



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## Surgery: Postoperative Care<sup>57</sup> (continued)

- Post-operative nutrition measures (cont.)
  - Vitamin supplementation (cont.)
    - Evaluate for complications.
      - Dehydration
      - Steatorrhea
      - Dumping syndrome
      - Chronic nausea and vomiting

Image source: Microsoft



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## Surgery: Postoperative Care<sup>57</sup> (continued)

- Most frequent nutritional deficiency with RYGB
  - Iron and vitamin B<sub>12</sub> depletion: 60% and 70% of patients
    - Iron deficiency is due to the duodenum and proximal jejunum being bypassed as they both serve as iron absorption sites.
    - Vitamin B<sub>12</sub>: Absorbed after binding with intrinsic factor (IF)
      - Gastric antrum parietal cells secrete IF.
      - Resecting the gastric antrum during RYGB ↓ intrinsic factor

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## Surgery: Postoperative Care<sup>57</sup> (continued)

- Anticipated weight loss
  - Largest drop in weight within the first year
    - Most rapid weight loss in first three months
    - Can regain approximately 1/3 of their initial weight loss over the subsequent 2 to 6 years
    - Weight typically stabilizes between years 6–15 postop.
  - Biliopancreatic diversion/duodenal switch: 83% weight loss
  - Roux-en-Y gastric bypass: 77% weight loss at one-year
  - Sleeve gastrectomy: 57.6% at one-year and 73.8% overall
  - Adjustable gastric band: 15.9% at 3 years

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Postoperative Care<sup>57</sup> (continued)

### Adjustable Gastric Band (Lap Band)

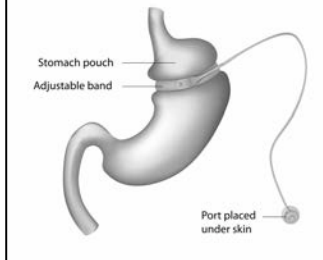


Image source: Shutterstock

- Postoperative complications
  - Adjustable gastric band
    - Lowest rate of morbidity and mortality
    - Erosion of the band into the gastric wall
    - Port-related infection
    - Band slippage
    - Obstruction and esophageal dilation
    - Band erosion
      - Requires surgical removal of the band

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## Surgery: Postoperative Care<sup>57</sup> (continued)

### SLEEVE GASTRECTOMY

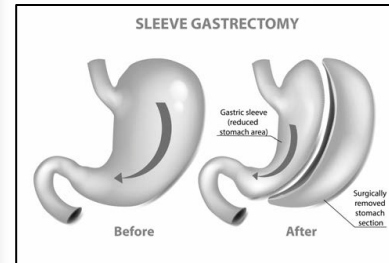


Image source: Shutterstock

- Postoperative complications
  - Sleeve gastrectomy
    - Complications are rare.
    - Staple line leak.
      - Proximal third of the stomach
    - Bleeding
    - Sleeve narrowing or stenosis

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## Surgery: Postoperative Care<sup>57</sup> (continued)

### Roux-en-Y Gastric Bypass (RNY)

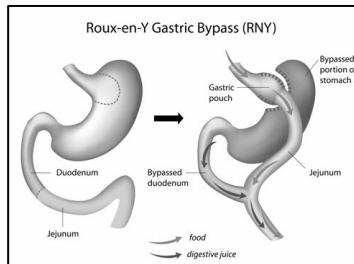


Image source: Shutterstock

- Postoperative complications (cont.)
  - Roux-en-Y gastric bypass
    - Venous thromboembolism
    - Anastomotic leak
    - Cardiac event
    - Small bowel obstruction due to internal hernia
    - Stenosis of the gastro-jejunal anastomosis

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## Surgery: Postoperative Care<sup>57</sup> (continued)

### BILIOPANCREATIC DIVERSION WITH A DUODENAL SWITCH (BPD-DS)

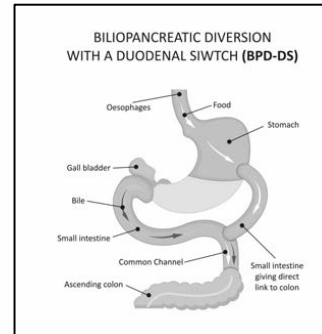


Image source: Shutterstock

- Postoperative complications (cont.)
  - Biliopancreatic diversion/duodenal switch
    - Highest morbidity and mortality rates
    - Anastomotic leaks
    - Marginal ulcers
    - High risk for nutritional deficits
      - Calcium
      - Iron
      - Fat soluble vitamins (A,D,E,K)

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Financial Considerations

- Financial considerations
  - Discuss weight of financial considerations.
  - Obtain insurance approval.
  - Significant post-operative costs
    - Nutrition supplements
    - Follow-up
    - Complications
      - Especially for medical tourism



Image source: Shutterstock

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Pre- and post-operative mental/behavioral health is vital.



Image source: Shutterstock

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## Surgery: Uncommon Modalities<sup>45, 54</sup>

- Gastric banding
  - Fallen out of favor
- Minimally invasive medical devices
  - Short-term weight loss
    - Implanted gastric balloons
    - Vagus nerve stimulator
    - Gastric aspiration therapy

### Gastric balloon

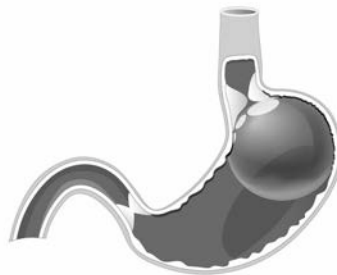


Image source: Shutterstock

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## Surgery: Uncommon Modalities<sup>45, 54</sup> (continued)

- Rarely utilized because of...
  - High cost
  - Limited insurance coverage

### Gastric balloon

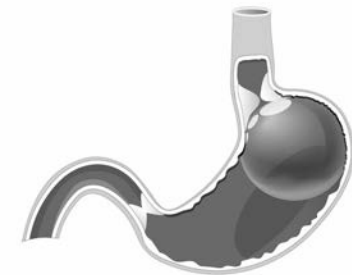


Image source: Shutterstock

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# Endocrine Workshop: Diabetes and obesity essentials

## Surgery: Uncommon Modalities<sup>45, 54, 55</sup> (continued)

- Oral hydrogel (Plenity®) approved for long-term use with BMI >25 kg/m<sup>2</sup>.
  - Simulate space-occupying effect of gastric balloons.
  - Take with water 30 minutes after meals.
  - Hydrogel expands
  - Small weight loss 2–3% than placebo
  - Subgroup prediabetes or diabetes 6.4% overall treatment vs. 4.4% control



Image source: Shutterstock

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## Medical Tourism<sup>52</sup>

### Average cost per surgery

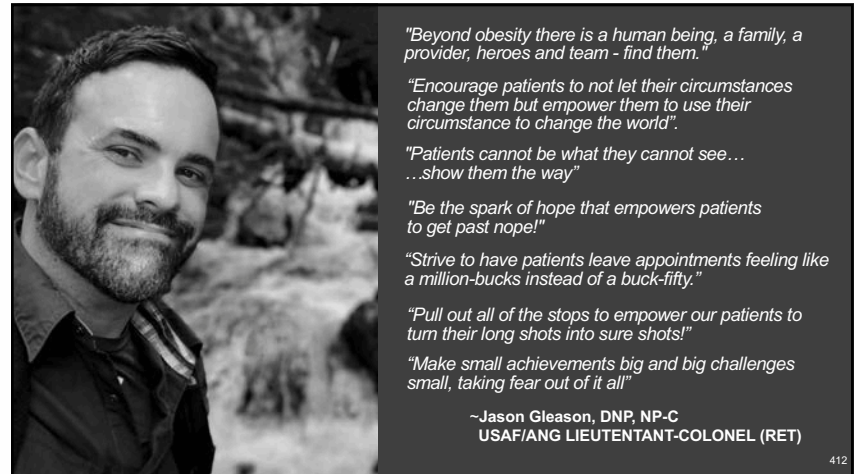
Surgery	Mexico	United States
Lap band	\$3,000–5,000	\$14,500
Vertical gastric sleeve	\$4,000–9,000	\$14,900
Roux-en-Y gastric bypass	\$6,500–11,000	\$23,000–25,000

### Important issues/considerations

- Lap band: Difficulty finding someone to adjust it
- Insurance coverage for complications/adjustments?
- Limited post-operative nutrition and mental health support
- Less regulation and quality control than the United States

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*"Beyond obesity there is a human being, a family, a provider, heroes and team - find them."*

*"Encourage patients to not let their circumstances change them but empower them to use their circumstance to change the world."*

*"Patients cannot be what they cannot see...  
...show them the way"*

*"Be the spark of hope that empowers patients to get past nope!"*

*"Strive to have patients leave appointments feeling like a million-bucks instead of a buck-fifty."*

*"Pull out all of the stops to empower our patients to turn their long shots into sure shots!"*

*"Make small achievements big and big challenges small, taking fear out of it all"*

~Jason Gleason, DNP, NP-C  
USAF/ANG LIEUTENANT-COLONEL (RET)

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# Endocrine Workshop: Diabetes and obesity essentials

**End of Presentation  
Thank you for your time and attention.**

**Jason Gleason**  
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# Medications to Treat Type 2 Diabetes<sup>5</sup>

Drug Class, Drugs and MOA	A1C ↓	Hypoglycemia	Weight	Cost	Safety Issues	Added Benefits
<b>Metformin</b> Insulin sensitizer ↓ Liver glucose release ↓ Glucose absorption in gut	↓1–2%	Low	↓	\$	<ul style="list-style-type: none"> <li>• First-line</li> <li>• Avoid if eGFR ≤30 mL/min.</li> <li>• Caution if eGFR ≤45 mL/min.</li> <li>• Lactic acidosis</li> </ul>	<ul style="list-style-type: none"> <li>• Generally safe and well tolerated</li> <li>• Inexpensive</li> </ul>
<b>Thiazolidinediones (TZD)</b> Pioglitazone (Actos®) Insulin sensitizer ↓ Liver glucose release	↓1–2%	Low	↑↑	\$	<ul style="list-style-type: none"> <li>• Edema and ↑fracture risk</li> <li>• Avoid in heart failure..</li> <li>• Avoid with nitrates and insulin.</li> </ul>	Improved non-alcoholic fatty liver disease (NASH)
<b>Sulfonylureas</b> Glipizide (Glucotrol®) Insulin releaser (Stupid)	↓1–2%	High	↑	\$	<ul style="list-style-type: none"> <li>• Don't know when to quit</li> <li>• ↑ Hypoglycemia</li> <li>• Caution in elderly</li> </ul>	Inexpensive
<b>DPP-4 Inhibitors</b> Sitagliptin (Januvia®) Insulin releaser (Smart)	↓0.75%	Low	↓	\$\$	<ul style="list-style-type: none"> <li>• Avoid in pancreatitis, hypoglycemia and angioedema.</li> </ul>	Decreases postprandial glucose
<b>GLP-1 and GLP-1/GIP Agonist</b> Semaglutide (Ozempic®) Tirzepatide (Mounjaro®) Insulin releaser (Smart)	↓1–2%	Low	↓↓↓	\$\$\$\$	<ul style="list-style-type: none"> <li>• Slows gut motility</li> <li>• Avoid in gastroparesis.</li> <li>• Avoid in pancreatitis.</li> </ul>	<ul style="list-style-type: none"> <li>• 15–20% weight loss</li> <li>• 29% ↓ stroke risk</li> <li>• Cardiorenal protective</li> </ul>
<b>SGLT2 Inhibitor</b> Empagliflozin (Jardiance®) Renal glucose off loader	↓0.75%	Low	↓	\$\$	<ul style="list-style-type: none"> <li>• UTI/<i>candida</i></li> <li>• Groin/GU skin infections</li> <li>• Avoid if eGFR ≤30 mL/min.</li> </ul>	Cardiorenal protective

# Medications to Treat Type 2 Diabetes<sup>5</sup>

Drug Class, Drugs and MOA	A1C ↓	Hypoglycemia	Weight	Cost	Safety Issues	Added Benefits
<b>Metformin</b> Insulin sensitizer ↓ Liver glucose release ↓ Glucose absorption in gut	↓1–2%	Low	↓	\$	<ul style="list-style-type: none"> <li>• First-line</li> <li>• Avoid if eGFR ≤30 mL/min.</li> <li>• Caution if eGFR ≤45 mL/min.</li> <li>• Lactic acidosis</li> </ul>	<ul style="list-style-type: none"> <li>• Generally safe and well tolerated</li> <li>• Inexpensive</li> </ul>
<b>Thiazolidinediones (TZD)</b> Pioglitazone (Actos <sup>®</sup> ) Insulin sensitizer ↓ Liver glucose release	↓1–2%	Low	↑↑	\$	<ul style="list-style-type: none"> <li>• Edema and ↑fracture risk</li> <li>• Avoid in heart failure..</li> <li>• Avoid with nitrates and insulin.</li> </ul>	Improved non-alcoholic fatty liver disease (NASH)
<b>Sulfonylureas</b> Glipizide (Glucotrol <sup>®</sup> ) Insulin releaser (Stupid)	↓1–2%	High	↑	\$	<ul style="list-style-type: none"> <li>• Don't know when to quit</li> <li>• ↑ Hypoglycemia</li> <li>• Caution in elderly</li> </ul>	Inexpensive
<b>DPP-4 Inhibitors</b> Sitagliptin (Januvia <sup>®</sup> ) Insulin releaser (Smart)	↓0.75%	Low	↓	\$\$	<ul style="list-style-type: none"> <li>• Avoid in pancreatitis, hypoglycemia and angioedema.</li> </ul>	Decreases postprandial glucose
<b>GLP-1 and GLP-1/GIP Agonist</b> Semaglutide (Ozempic <sup>®</sup> ) Tirzepatide (Mounjaro <sup>®</sup> ) Insulin releaser (Smart)	↓1–2%	Low	↓↓↓	\$\$\$\$	<ul style="list-style-type: none"> <li>• Slows gut motility</li> <li>• Avoid in gastroparesis.</li> <li>• Avoid in pancreatitis.</li> </ul>	<ul style="list-style-type: none"> <li>• 15–20% weight loss</li> <li>• 29% ↓ stroke risk</li> <li>• Cardiorenal protective</li> </ul>
<b>SGLT2 Inhibitor</b> Empagliflozin (Jardiance <sup>®</sup> ) Renal glucose off loader	↓0.75%	Low	↓	\$\$	<ul style="list-style-type: none"> <li>• UTI/<i>candida</i></li> <li>• Groin/GU skin infections</li> <li>• Avoid if eGFR ≤30 mL/min.</li> </ul>	Cardiorenal protective

# Casting a Vision

## SHARED MEDICAL APPOINTMENTS

Multiple patients seen at once for:

- Education
- Individualized Care
- Peer Support/Comradery

Proven Efficacy in:

- Reducing A1C
- Reducing Systolic Blood Pressure
- Reducing Lipids
- Reducing BMI
- Improving Patient Satisfaction

**12 WEEK PROGRAM**

**RACE DAY: JANUARY 5, 2022**

**FINISH LINE: MARCH 23, 2022**

80 VA patients (>18 yo, Dx DM, A1C >8%, Living in Great Falls, MT)

12 Week SMA program for patients with diabetes to improve diabetes metrics, enhance patient satisfaction and reduce long-term complications

### short-term

DAY ONE:

≥ 12 participants

90% Complete baseline

- A1C
- SBP
- LDL
- BMI
- DTSQ
- PHQ-9

### mid-term

END OF WEEK 12:

Primary Measures:

- A1C - ↓ by 1 point  
(Literature mean: ↓ 0.94)
- SBP - ↓ by 5 points  
(Literature mean: ↓ 8)
- LDL - ↓ by 10 points  
(Literature mean: 11.9)
- BMI - ↓ by 1 point  
(Literature mean: 0.85)
- DTSQ - ↑ by 5 points  
(1 study: ↑ 13.1)
- PHQ-9 - ↓ by 2 points

Secondary Measures:

80% attendance rate for 12 sessions

### long-term

Prevent long term complications/target organ damage and premature death

Reduce the risk for:  
Retinopathy  
Nephropathy  
Myocardial Infarction  
Congestive Heart Failure  
Neuropathy  
Amputations  
Vascular Dementia  
Stroke

**DATA ANALYSIS:** Paired t-test and Wilcoxon signed-rank tests to determine statistical significance

Image source: Provided by Gleason, J., used with permission

## The Team (the Pit Crew)



Image source: Created by Gleason, J., used with permission

# Project Timeline and Race Day Logistics

## Project Timeline



Completed one week  
before race day



Monthly APRN  
Patient Visits



Image source: Provided by Gleason, J., used with permission



January 5, 2022

Dear Veteran,

Thank you for participating in our new diabetes program at the Montana VA – Great Falls CBOC! We've assembled an amazing team to serve as your "pit crew" to tune you up and empower you to win the race against diabetes!

We've planned some exciting, educational and engaging activities for you to participate in over the next 12-weeks and we appreciate your commitment to improving your health.

Today is just the beginning. We will be running you through a race day between 8:00 AM and 12 noon today with nine different pit crew stations to provide you with comprehensive diabetes care. Starting next week we will kick-off ten weekly education lunch sessions from 12:00 to 1:00 pm in the Great Falls VA Primary Care Conference Room. Feel free to bring your lunch to each session as you participate in some fun discussions with your fellow Veterans. Please make every effort to attend all ten sessions. We will wrap up our twelve-week program on March 23, 2022 with a celebration pot-luck giving out some special awards to all of you.

We believe in you and your ability to WIN THIS RACE!

Start Your Engines -  
Your Diabetes Pit Crew

Image source: Provided by Gleason, J., used with permission



- Welcome Letter
- Informed Consent to Participate
- Team Connection Card
- Race Day Worksheet
- 12-Week Schedule
- Diabetes Treatment Satisfaction Questionnaire
- PHQ-9 Depression Screening Questionnaire
- Participation Punch-Card
- Measuring Blood Pressure Correctly
- Blood Pressure Record

#### IMPORTANT ITEMS TO COMPLETE AND TURN IN TODAY...

- ✓ Informed Consent to Participate
- ✓ Race Day Worksheet
- ✓ Diabetes Treatment Satisfaction Questionnaire
- ✓ PHQ-9 Depression Screening Questionnaire



## Patient Consent to Participate in Shared Medication Appointments for Diabetes

Participant Name: \_\_\_\_\_

### Diabetes Shared Medical Appointments Participation & Confidentiality Agreement:

*I have read, understand and agree to the following:*

- I agree to participate in shared medical appointments for treatment of my diabetes. Shared medical appointments are educational and medical visits completed in a group setting.
- I understand that I have a choice to be seen by my providers and nurses for care of my diabetes either by participating in shared medical appointments, individually or both kinds of visits.
- I understand that my participation in shared medical appointments for my diabetes is voluntary and I can choose to stop attending at any time. If I chose to stop participating I will revoke my participation in writing.
- I agree to keep all information shared by other participants in the group private and confidential.
- I agree to be respectful and actively attend and participate in shared medical appointment discussion.
- I understand that information including A1c, blood pressure, lipids, body mass index and patient satisfaction scores will be de-identified and grouped together in a summary report which will be reported in a scholarly paper and possible publications. My personal identifying information will never be listed or reported.
- I agree to complete screening tests as part of the shared medical appointment experience including: Labs obtained from blood and urine samples (A1C, Lipids Panel, UA, Chem-14, Urine Microalbumin); Blood pressure measurement; Body Mass Index, and Diabetes Treatment Satisfaction Questionnaire on week one and week twelve of the program. The results will be made available to me.
- This agreement has an expiration date of none.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### Diabetes Shared Medical Appointments HIPPA Notification:

*I have read, understand and agree to the following:*

- During a shared medical appointment for diabetes it is possible that some of my individually identifiable health information will be disclosed as I (as the participant) share that information during group discussions.
- I understand that I have the option to be seen individually.
- I understand that I am not required to sign this form to receive health care and treatment.
- I understand that discussions may occur regarding individually identifiable health information during a shared medical appointment.
- It is possible that the information that is used or disclosed in a shared medical appointment may be redisclosed by other participants attending the shared medical appointment.
- I have been notified of this potential disclosure and I voluntarily wish to participate in the shared medical appointments for diabetes.
- I understand that if I do not provide authorization I will not be allowed to participate in the program.
- This agreement has an expiration date of none.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Form created by: Jason Gleason, MSN, NP-C updated 12.5.21



TEAM NAME: \_\_\_\_\_

### INSTRUCTIONS:

Veterans recognize the strength of comradery and connection with one another. Pass this sheet to each of your team members for them to fill in their name and phone number allowing all of you to stay in contact with each other throughout the 12 week program. Providing your name and phone number to your team members is voluntary.

PLEASE PRINT CLEARLY

NAME	PHONE NUMBER

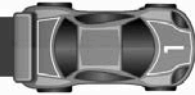
Image source: Provided by Gleason, J., used with permission

### GOT QUESTIONS?

Diabetes Program Lead: Jason Gleason, MSN, NP-C (406-771-5853).

# Endocrine Workshop: Diabetes and obesity essentials

MONTANA VA – GREAT FALLS CBOC 01.05.22  
**WINNING THE RACE AGAINST DIABETES**  
 RACE DAY #1 PARTICIPANT WORKSHEET



PATIENT NAME: \_\_\_\_\_  
 LAST FOUR: \_\_\_\_\_

## PIT CREW STATION #1: CHECK-IN

LOCATION: Outside Conference Room

KEY TASKS:

- Sign-In Roster     Consent Form  
 Welcome Packet

NOTES:

\_\_\_\_\_  
 \_\_\_\_\_

## PIT CREW STATION #2: HOLDING ZONE

LOCATION: Primary Care Conference Room

KEY TASKS:

- Height and Weight Measurements  
 DTSQ Survey completed – leave in packet

NOTES:

\_\_\_\_\_  
 \_\_\_\_\_

## PIT CREW STATION #3: PHARMACIST

LOCATION: Room 1059

KEY TASKS:

- Diabetes Medication Review/Questions  
 Follow-up Appointment with Pharmacist?  
 YES NO (order entered by Provider)

NOTES:

\_\_\_\_\_  
 \_\_\_\_\_

## PIT CREW STATION #4: DIABETES EDUCATION

LOCATION: Room 1075

KEY TASKS:

- Nutrition Education  
 Follow-up Appointment with CDCES?  
 YES NO (order entered by Provider)

NOTES:

\_\_\_\_\_  
 \_\_\_\_\_

## PIT CREW STATION #5: MENTAL HEALTH

LOCATION: Primary Care Conference Room

KEY TASKS:

- PHQ-9 Depression Screening Worksheet  
 Follow-up Appointment with PCMHI?  
 YES NO (order entered by Provider)

NOTES:

\_\_\_\_\_  
 \_\_\_\_\_

## PIT CREW STATION #6: FOOT EXAM AND CARE

LOCATION: Room 1067

KEY TASKS:

- Foot Examination (document under notes)  
 Follow-up Appointment with Podiatrist?  
 YES NO (order entered by Provider)

NOTES:

Monofilament: NORMAL ABNORMAL  
 Pedal Pulses: NORMAL ABNORMAL  
 Inspection: NORMAL ABNORMAL  
 NOTE: \_\_\_\_\_

## PIT CREW STATION #7: TELE-RETINAL SURVEILLANCE

LOCATION: Room 1075

KEY TASKS:

- Tele-Retinal Surveillance (if indicated)  
 Eye Care Education

NOTES:

\_\_\_\_\_  
 \_\_\_\_\_

## PIT CREW STATION #8: PROVIDER VISIT

LOCATION: Room 1088

KEY TASKS:

- Blood Pressure     BP Education  
 Vaccine Orders     BMI Measurement  
 Lab Review     Enter PHQ-9 Data  
 Orders for Pharmacy, CDCES, Podiatry  
 Collect DTSQ Survey

NOTES:

\_\_\_\_\_  
 \_\_\_\_\_

## PIT CREW STATION #9: CHECK-OUT - THE FINISH LINE!

LOCATION: Primary Care Conference Room

KEY TASKS:

- Vaccinations  
 Vaccines Due: Shingrix PPSV23 Tdap Flu  
 Remind patient of next meeting:  
 January 12, 2022 from 1200 to 1300

NOTES:

\_\_\_\_\_  
 \_\_\_\_\_



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# Endocrine Workshop: Diabetes and obesity essentials



WEEK	DATE AND TIME	TOPICS	PIT CREW
1	JAN 5, 2022 0800 – 1200	Diabetes Race Day #1	
2	JAN 12, 2022 1200 - 1300	Feelings about diabetes; Support systems; What is Diabetes; Types of Diabetes; Diagnosing diabetes	
3	JAN 19, 2022 1200-1300	The A1c test; Diabetes risk factors and symptoms; Diabetes care plan; Checking blood glucose	
4	JAN 26, 2022 1200-1400 SMA	Eating for better health; Being physically active; Readiness to make changes Shared Medical Appointment with Gleason	
5	FEB 2, 2022 1200-1300	Emotional health; Stress and diabetes; Whole health program and services Acupressure with KC Johnson and Mary Toren	
6	FEB 9, 2022 1200-1300	Reviewing diabetes blood sugars; High and low glucose; When you are sick; Mindful eating and Dining out	
7	FEB 16, 2022 1200-1300	Physical activity challenges; Weight loss for improved diabetes control; Goal setting and glucose checkpoints	
8	FEB 23, 2022 1200-1400 SMA	Problem solving; Glucose patterns; Blood pressure; Tobacco Use; Eating Better; Diabetes and alcohol Bring Blood Pressure logs for review Shared Medical Appointment with Gleason	
9	MAR 2, 2022 1200-1300	Physical activity; Weight loss; Diabetes over time; Diabetes complications; Diabetes care schedule	
10	MAR 9, 2022 1200-1300	Taking care of your feet; Getting enough good sleep; Eating mindfully not emotionally Obtain labs in next 10 days	
11	MAR 16, 2022 1200-1300	Keeping physically active; When life gets in the way; Setting more goals; Support system; Staying in charge	
12	MAR 23, 2022 1000 - 1300	<b>THE FINISH LINE – CELEBRATION POT LUCK!</b> (Blood Pressure, BMI, Review Labs, Complete DTSQ)	

## Diabetes Treatment Satisfaction Questionnaire: DTSQs

The following questions are concerned with the treatment for your diabetes (including insulin, tablets and/or diet) and your experience over the past few weeks. Please answer each question by circling a number on each of the scales.

- How satisfied are you with your current treatment?  
very satisfied      6   5   4   3   2   1   0      very dissatisfied
- How often have you felt that your blood sugars have been unacceptably high recently?  
most of the time      6   5   4   3   2   1   0      none of the time
- How often have you felt that your blood sugars have been unacceptably low recently?  
most of the time      6   5   4   3   2   1   0      none of the time
- How convenient have you been finding your treatment to be recently?  
very convenient      6   5   4   3   2   1   0      very inconvenient
- How flexible have you been finding your treatment to be recently?  
very flexible      6   5   4   3   2   1   0      very inflexible
- How satisfied are you with your understanding of your diabetes?  
very satisfied      6   5   4   3   2   1   0      very dissatisfied
- Would you recommend this form of treatment to someone else with your kind of diabetes?  
Yes, I would definitely recommend the treatment      6   5   4   3   2   1   0      No, I would definitely not recommend the treatment
- How satisfied would you be to continue with your present form of treatment?  
very satisfied      6   5   4   3   2   1   0      very dissatisfied

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DTSQs © Prof Claire Bradley 1993. English for USA (rev. 7/94)  
Health Psychology Research, UK. [www.healthpsychologyresearch.com](http://www.healthpsychologyresearch.com)

# Endocrine Workshop: Diabetes and obesity essentials

## PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Over the last 2 weeks, how often have you been bothered by any of the following problems?  
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself	0	1	2	3

add columns  +  +

(Healthcare professional: For interpretation of TOTAL, TOTAL:   
please refer to accompanying scoring card.)

10. If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all	_____
	Somewhat difficult	_____
	Very difficult	_____
	Extremely difficult	_____

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A2663 B 10-04-2005

**WINNING THE RACE AGAINST DIABETES**  
**WITH SHARED MEDICAL APPOINTMENTS**  
**PARTICIPATION LAP-PUNCH CARD**

**GET TO THE FINISH LINE**  
**EARN A LAP-PUNCH FOR EACH OF THE FOLLOWING**

- Complete WK 1 labs
- Complete WK 1 DTSQ
- Complete WK 1 BP
- Complete WK 1 BMI
- Complete Foot Exam
- Complete Eye Exam
- Weekly attendance
- Bring in BP Readings WK 8
- Complete WK 12 labs
- Complete WK 12 DTSQ
- Complete WK 12 BMI
- Complete WK 12 BP

## Quality Improvement or Research Worksheet Rachel Nosovsky, Esq.

SEQ	Issue and Guidance	Rating
1	Are patients randomized into different intervention groups in order to enhance confidence in differences that might be obscured by nonrandom selection? <i>Randomization done to achieve equitable allocation of a scarce resource need not be considered and would not result in a "yes" here.</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No
2	Does the project seek to test issues that are beyond current science and experience, such as new treatments ( <i>i.e.</i> , is there much controversy about whether the intervention will be beneficial to actual patients – or is it designed simply to move existing evidence into practice?). <i>If the project is performed to implement existing knowledge to improve care – rather than to develop new knowledge – answer "no."</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No
3	Are researchers who have no ongoing commitment to improvement of the local care situation (and who may well have conflicts of interest with the patients involved) involved in key project roles? <i>Generally answer "yes" even if others on the team do have professional commitments. However, where the project leaders with no clinical commitments are unaffiliated with the project site, it may be that the project site is not engaged – and does not require IRB approval/oversight – even if the project leaders' roles do require IRB oversight at their institutions.</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No
4	Is the protocol fixed with a fixed goal, methodology, population, and time period? <i>If frequent adjustments are made in the intervention, the measurement, and even the goal over time as experience accumulates, the answer is more likely "no."</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No
5	Will there be delayed or ineffective feedback of data from monitoring the implementation of changes? <i>Answer "yes" especially if feedback is delayed or altered in order to avoid biasing the interpretation of data.</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No
6	Is the project funded by an outside organization with a commercial interest in the use of the results? Is the sponsor a manufacturer with an interest in the outcome of the project relevant to its products? Is it a non-profit foundation that typically funds research, or internal research accounts? <i>If the project is funded by third-party payors through clinical reimbursement incentives, or through internal clinical/operations funds vs. research funds, the answer to this question is more likely to be "no."</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No

Adapted from Hastings Center, "The Ethics of Using Quality Improvement Methods to Improve Health Care Quality and Safety" (June 2006)

If the weight of the answers tends toward "yes" overall, the project should be considered "research" and approved by an IRB prior to implementation. If the weight of the answers tends toward "no," the project is not "research" and is not subject to IRB oversight unless local institutional policies differ. Answering "yes" to sequence #1 or #2 – even if all other answers are "no" – typically will result in a finding that the project constitutes research. *It is important to consult with your local IRB if you are unsure how they would handle a particular case, as the analysis of the above issues cannot always be entirely objective and IRB policies and approaches vary significantly.*

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# Isn't this project a research study?

# no

Synthesizes current EBP literature based on completed research and applies it to improve the quality of existing diabetes care programs

- Weight of answers YES = RESEARCH
- Weight of answers NO = QI PROJECT
- Answers YES to #1 and #2 = RESEARCH



## Medications to Treat Obesity<sup>12</sup>

Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<b>Phentermine (Adipex-P®)</b> • Appetite suppressant • Only short-term ≤12 weeks	3–7%	• Stimulant, dry mouth, constipation, anxiety, • Headache, ↑ blood pressure	Avoid in any heart disease, uncontrolled BP, glaucoma, depression, anxiety dependence risk	<b>\$4–\$15</b> <b>30 days</b>
<b>Orlistat (Xenical®) (Alli®)</b> • Gastric/pancreatic lipase inhibitor • Blocks 30% fat absorption	3–5%	Diarrhea, flatulence, oily stools (oil slick), abdominal discomfort	• ↓ Efficacy of cyclosporin • ↓ Efficacy of levothyroxine • ↓ Malabsorption of fat-soluble vitamins (A, D, E, K) • Cholelithiasis, nephrolithiasis	<b>Rx \$200</b> <b>OTC \$71</b> <b>30 days</b>

Image source: Graphic by Gleason, J. (2023), used with permission

## Medications to Treat Obesity<sup>12</sup> (continued)

Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<b>Phentermine/ topiramate (Qsymia®)</b> Appetite suppressant	6.7–8.9%	<ul style="list-style-type: none"> <li>• Stimulant, dry mouth, constipation, anxiety,</li> <li>• Headache, ↑ blood pressure</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid in any heart disease, uncontrolled BP, glaucoma, hyperthyroidism, depression, anxiety, pregnancy, nursing.</li> <li>• Dependence risk</li> </ul>	<b>\$200 30 days</b>
<b>Naltrexone/ bupropion (Contrave®)</b> Targets mesolimbic system and hypothalamus to decrease hunger	5–10%	<ul style="list-style-type: none"> <li>• Dry mouth, dreams, constipation, anxiety,</li> <li>• Headache, ↑ blood pressure, N/V</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid with uncontrolled BP, anorexia, bulimia, seizure disorder, opiate use, alcohol.</li> <li>• Can increase suicidal thoughts</li> </ul>	<b>\$260 30 days</b>

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## Medications to Treat Obesity<sup>12</sup> (continued)

Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<b>Liraglutide (Saxenda®)</b> <ul style="list-style-type: none"> <li>• GLP-1 agonist</li> <li>• Injected daily</li> </ul>	3–8%	Nausea, diarrhea, constipation, abdominal discomfort, headache, tachycardia	<ul style="list-style-type: none"> <li>• Avoid gastroparesis or history of pancreatitis</li> <li>• Caused thyroid cancer in rodents</li> </ul>	<b>\$1,345</b> <b>30 days</b>
<b>Semaglutide (Wegovy®)</b> <ul style="list-style-type: none"> <li>• GLP-1 agonist</li> <li>• Injected weekly</li> <li>• Semaglutide (Ozempic®) is <b>ONLY</b> for Type 2 diabetes</li> </ul>	15%	Nausea, diarrhea, constipation, abdominal discomfort, headache, tachycardia	<ul style="list-style-type: none"> <li>• Avoid gastroparesis or history of pancreatitis.</li> <li>• Caused thyroid cancer in rodents</li> </ul>	<b>\$1,345</b> <b>30 days</b>

Image source: Graphic by Gleason, J. (2023), used with permission



## Medications to Treat Obesity<sup>12</sup> (continued)

Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<p><b>Tirzepatide (Mounjaro®)</b></p> <ul style="list-style-type: none"> <li>• GLP-1 and GIP agonist</li> <li>• Injected weekly</li> <li>• <b><u>Only FDA-approved for Type 2 diabetes</u></b></li> <li>• FDA-approval for obesity expected</li> <li>• Increases insulin secretion</li> <li>• Decreases glucagon secretion</li> <li>• Delays gastric emptying</li> <li>• Increases insulin sensitivity</li> </ul>	20–22.5%	Nausea, diarrhea, constipation, abdominal discomfort, headache, tachycardia	<ul style="list-style-type: none"> <li>• Avoid gastroparesis or history of pancreatitis.</li> <li>• Caused thyroid cancer in rodents.</li> </ul>	<p><b>\$1,022</b> <b>30 days</b></p>

Image source: Graphic by Gleason, J. (2023), used with permission

## Medications to Treat Obesity (continued)

Medication and MOA	Weight Loss	Common Adverse Effects	Safety	Cost
<p><b>Tirzepatide (Zepbound®)</b></p> <ul style="list-style-type: none"> <li>• GLP-1 and GIP agonist</li> <li>• Injected weekly</li> <li>• <b><u>Mounjaro® Only FDA approved for Type 2 diabetes</u></b></li> <li>• Increases insulin secretion</li> <li>• Decreases glucagon secretion</li> <li>• Delays gastric emptying</li> <li>• Increases insulin sensitivity</li> </ul>	20–22.5%	Nausea, diarrhea, constipation, abdominal discomfort, headache, tachycardia	Avoid gastroparesis or history of pancreatitis Caused thyroid cancer in rodents.	<b>\$1,060 30 days</b>

Image source: Graphic by Gleason, J. (2023), used with permission

# Obesity and T2 Diabetes Treatment Algorithm<sup>50</sup>

