Diabetes 101

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Presentation Outline

- Diabetes in culturally diverse populations
- What is Diabetes
- Epidemiology
- Classifications
- Criteria for diagnosis
- Risk Factors
- Pathogenesis
- Approach to patient management
- Complications
- Self-management – nutrition, physical activity, medication….
- Treatment and ongoing care
- Case studies
Presentation Objectives

At the end of the presentation, attendees should be able to:

• Discuss the challenges of managing diabetes in culturally diverse populations.
• Describe the criteria for diagnosis and symptoms of diabetes.
• Discuss the risk factors and pathophysiology of diabetes.
• List the target for blood glucose, blood pressure and lipids.
• Discuss the role of nutrition and the benefits of physical activity in the management of diabetes.
• List the types of medication for the treatment of diabetes.
• Describe the complications and long-term risk of diabetes.
• Discuss the role of diabetes self-management education in assisting PWD to make behavioral changes to manage diabetes.
Important Points

• Diabetes affects racial/ethnic minorities disproportionately.
• Care provided to these groups is often suboptimal.
• Diabetes is a complex, chronic illness requiring continuous medical care with multifactorial risk-reduction strategies beyond glycemic control.
• Care relies heavily on patient participation, and self-management.
• Patient-centered interactions are difficult when significant socio-cultural-linguistic barriers exist.
• Skilled interpreters is vital for PWD because essential concepts in diabetes are difficult to translate.
Medical Interpreters Perspective

• What types of patient do you translate for?
• What type of communication difficulties do you observe?
• To what do you attribute these difficulties?
• What things should providers know, understand to communicate effectively?
## Managing Culturally Diverse PWD

<table>
<thead>
<tr>
<th>Acculturation</th>
<th>Knowledge of disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>Language</td>
</tr>
<tr>
<td>Depression, emotional distress</td>
<td>Medication adherence</td>
</tr>
<tr>
<td>Education level</td>
<td>Nutrition</td>
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<tr>
<td>Fears</td>
<td>Alternative medicines</td>
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<tr>
<td>Group engagement</td>
<td>QOL</td>
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<td>Health literacy</td>
<td>Religion, faith</td>
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<tr>
<td>Intimacy/Sexual Dysfunction</td>
<td>SES</td>
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<tr>
<td>Body image</td>
<td>Technology</td>
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<tr>
<td></td>
<td>Exercise</td>
</tr>
</tbody>
</table>
Social Determinants

Influence of Social Determinants on Type 2 Diabetes

Disadvantages
- Poverty
- Personal financial burden of increased health care costs
- Insufficient access to the resources necessary to manage the condition: housing, nutritious food, and health care services

Consequences
- Diabetes can decrease an individual’s productivity at work, employment-related problems
- Limit educational attainment

Exacerbate the cycle of inequality
Provider Perspective

- **Judging** – unilateral approach to patient-provider communication
- **Cultural competence** – respecting cultural differences
- **Unconscious bias** – prejudice, unsupported judgement
• Interpreters represent an untapped source of insight into common patient-provider communication problems.
• MI interviewed to understand experiences, perceptions regarding Pt. - Provider communication difficulties.
  – Differences in ideas about illness, it causes, treatment, meaning
  – Expectations of clinical encounter
  – Verbal, non-verbal communication styles can have different meanings
• Recommendations:
  – Awareness of communication pitfalls
  – Important to show interest in Pt. country to establish rapport
  – Communication would be facilitated using simpler, less technical language
  – Use more conversational style with patients
  – Schedule time with MI to discuss communication issues
Interpreter-mediated diabetes consultations: a qualitative analysis of physician communication practices

- Analyzed transcripts from 8 audio recorded, outpatient consultations involving both interpreter and family members

Findings:
- Providers used closed ended questions when asking about symptoms and glucose control.
- When providing information, explanations, spoke in long, complex speech.
- Providers directed speech to interpreter, became sidetracked by family questions.
- Patients participation was minimal, limited to brief answers.
What is Diabetes?

What is diabetes?
What comes to mind when you think of diabetes?
Diabetes

• Diabetes is a disease that affects how your body handles sugar (glucose)
• “A metabolic disease in which the body’s inability to produce any or enough insulin causes elevated levels of glucose in the blood.”
Diabetes: Myth or Fact

• Diabetes is a relatively new disease that has come into existence with changing lifestyle habits.

• Diabetes symptoms go back to 1552 B.C. when an Egyptian physician Hesy-Ra, documented diabetic symptoms such as frequent urination and drastic weight loss for no apparent reason.

• 11th century “water tasters” would taste the urine of people thought to have diabetes. Diagnosis given if the urine tasted sweet.
History of Diabetes

• In 1921, J.J.R. Macleod, Charles Best, Frederick Banting, and James Collip succeeded in purifying insulin and successfully treating a diabetes patient with it.
History of Diabetes

- This discovery saved many people from dying in a coma due to high blood glucose levels. Diabetes has been around a long time, but we still need new and better therapies.
U.S. Prevalence

A Snapshot

Diabetes in the United States

Diabetes

29.1 Million

29.1 million people have diabetes

That's about 1 out of every 11 people

1 out of 4 do not know they have diabetes

Incidence - rate of newly diagnosed cases of diabetes
Prevalence - number of cases alive
Marked increase 1990 to 2007
Incidence 2007 7.8 per 1000; 2017 6.0 per 1000
Driven by decrease in non-Hispanic white, higher educated
Racial & Ethnic Disparities

Percentage of US Adults Aged 18 or Older with Diagnosed Diabetes, by Racial and Ethnic Group, 2013-2015

2017 Diabetes Report Card

- American Indian/Alaska Native (15.1%)
- Asian (8.0%)
- Hispanic (12.7%)
- Black, non-Hispanic (12.1%)
- White, non-Hispanic (7.4%)

Percentage

0 5 10 15 20
Percentage of US Adults Aged 18 or Older with Diagnosed Diabetes, by Education Level, 2013-2015

2017 Diabetes Report Card

- More than high school (7.2%)
- High school (9.5%)
- Less than high school (12.6%)
Global Prevalence
Although excess weight increases the rate of type 2 diabetes, it's worth remembering that most overweight people don't have diabetes, and many people with type 2 are of normal weight or only moderately overweight—so again, it's not clear-cut.
Cost of Diabetes (US):

Updated March 6, 2013

- $245 billion: Total costs of diagnosed diabetes in the United States in 2012
- $176 billion for direct medical costs
- $69 billion in reduced productivity

After adjusting for population age and sex differences, average medical expenditures among people with diagnosed diabetes were 2.3 times higher than what expenditures would be in the absence of diabetes.
Types of Diabetes

**Types of Diabetes**

**TYPE 1**
- **BODY DOESN’T MAKE ENOUGH INSULIN**
  - Can develop at any age
  - No known way to prevent it
- Nearly 18,000 youth diagnosed each year in 2011 and 2012
- In adults, type 1 diabetes accounts for approximately 5% of all diagnosed cases of diabetes

**TYPE 2**
- **BODY CAN’T USE INSULIN PROPERLY**
  - Can develop at any age
  - Most cases can be prevented
- In adults, type 2 diabetes accounts for approximately 95% of all diagnosed cases of diabetes

More than 5,000 youth diagnosed each year in 2011 and 2012

1.5 MILLION People 18 years and older diagnosed in 2015
Type 2 Diabetes

- Most common form of diabetes – about 90% of cases
- Previously called adult onset, non insulin dependent diabetes
- Body produces insulin, but does not use it properly
  - glucose doesn’t move into cells, they pile up in the bloodstream
- sx’s when they do occur are often ignored because they may not seem serious
What Happens When We Eat?

After eating, most food turns into glucose, the body’s main source of energy.
Normal Blood Glucose Control

- In people without diabetes, glucose stays in a healthy range because
  - Insulin is released at the right time and in right amounts
  - Insulin helps glucose enter cells
High Blood Glucose (Hyperglycemia)

- In diabetes, blood glucose builds up for several possible reasons
  - Too little insulin is made
  - Cells can’t use insulin well
  - Liver releases too much glucose
Development & Progression of T2D

Development and Progression of Type 2 Diabetes and Related Complications

Progression of Type 2 Diabetes Mellitus

4–7 years

Insulin resistance
Hepatic glucose production
Insulin level
Beta-cell function
Postprandial glucose
Fasting plasma glucose

Development of Microvascular Complications
Development of Macrovascular Complications

Impaired Glucose Tolerance
Frank Diabetes

Diabetes Diagnosis


*Conceptual representation.
Genes, Environment, Socio-Cultural Factors
Risk Factors for Diabetes?

Non-modifiable risk factors for type 2 diabetes
- Race/Ethnicity
- History of gestational diabetes
- Age over 45 years
- Family history of diabetes

Modifiable risk factors for type 2 diabetes
- Physical inactivity
- High body fat or body weight
- High blood pressure
- High cholesterol

Type 2 diabetes
# Diagnostic Criteria

## TABLE 3. Criteria for the Screening and Diagnosis of Diabetes

<table>
<thead>
<tr>
<th>Prediabetes</th>
<th>Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A1C</strong></td>
<td>≥6.5%†</td>
</tr>
<tr>
<td>5.7–6.4%*</td>
<td></td>
</tr>
<tr>
<td><strong>FPG</strong></td>
<td>≥126 mg/dL (7.0 mmol/L)†</td>
</tr>
<tr>
<td>100–125 mg/dL (5.6–6.9 mmol/L)*</td>
<td></td>
</tr>
<tr>
<td><strong>OGTT</strong></td>
<td>≥200 mg/dL (11.1 mmol/L)†</td>
</tr>
<tr>
<td>140–199 mg/dL (7.8–11.0 mmol/L)*</td>
<td></td>
</tr>
<tr>
<td><strong>RPG</strong></td>
<td>≥200 mg/dL (11.1 mmol/L)‡</td>
</tr>
</tbody>
</table>

*For all three tests, risk is continuous, extending below the lower limit of the range and becoming disproportionally greater at the higher end of the range. †In the absence of unequivocal hyperglycemia, diagnosis requires two abnormal test results from the same sample or in two separate samples. ‡Only diagnostic in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis. RPG, random plasma glucose.
Diabetes: Myth and Facts

- I can’t really have diabetes, I have not symptoms!

- Fact: Many people have no symptoms. You can have diabetes for many years and not have any symptoms, diabetes can cause damage to your body.
Symptoms of Hyperglycemia

- Increased thirst (polydipsia)
- Increased urination (polyuria)
- Blurry vision
- Feeling tired
- Slow health of wounds/cuts
- More frequent infections
- Weight loss
Diabetes Related Complications

Major Complications of Diabetes

**Microvascular**

**Eye**
High blood glucose and high blood pressure can damage eye blood vessels, causing retinopathy, cataracts and glaucoma.

**Kidney**
High blood pressure damages small blood vessels and excess blood glucose overworks the kidneys, resulting in nephropathy.

**Neuropathy**
Hyperglycemia damages nerves in the peripheral nervous system. This may result in pain and/or numbness. Feet wounds may go undetected, get infected and lead to gangrene.

**Macrovascular**

**Brain**
Increased risk of stroke and cerebrovascular disease, including transient ischemic attack, cognitive impairment, etc.

**Heart**
High blood pressure and insulin resistance increase risk of coronary heart disease.

**Extremities**
Peripheral vascular disease results from narrowing of blood vessels increasing the risk for reduced or lack of blood flow in legs. Feet wounds are likely to heal slowly contributing to gangrene and other complications.
Disparities

Type 2 Diabetes and its Complications in Minorities

- Disparate and Disproportionate prevalence of longterm complications of type 2 diabetes in minorities vs Whites
  - lower leg amputations 2-4x
  - retinopathy and blindness 2-4x
  - stroke 2x
  - ESRD 4-6x

Type 1 Diabetes

- Also known as juvenile diabetes
- Usually diagnosed in children and young adults
- When body’s own immune system destroys the insulin producing cells of the pancreas – beta cells – which produce insulin
- Only 5% of people have this disease
- Body does not produce insulin
- Is not preventable
  - No primary intervention
- Causes?
  - Predisposition to diabetes – genetics - and something (i.e. weather, virus ... etc ) in environment triggers the disease
Gestational Diabetes Mellitus (GDM)

- Having diabetes during pregnancy
  - Family Hx of diabetes, overweight prior to pregnancy, age?
- Having gestational diabetes puts you at risk for diabetes type 2
- Giving birth to a baby >9 lbs also puts you at risk for type 2
- 18 out of every 100 pregnant females will develop GDM

![Gestational Diabetes Diagram](image-url)
### Screening for and diagnosis of GDM

#### One-step strategy

Perform a 75-g OGTT, with plasma glucose measurement when patient is fasting and at 1 and 2 h, at 24–28 weeks of gestation in women not previously diagnosed with diabetes.

The OGTT should be performed in the morning after an overnight fast of at least 8 h.

The diagnosis of GDM is made when any of the following plasma glucose values are met or exceeded:

- Fasting: 92 mg/dL (5.1 mmol/L)
- 1 h: 180 mg/dL (10.0 mmol/L)
- 2 h: 153 mg/dL (8.5 mmol/L)

#### Two-step strategy

**Step 1:** Perform a 50-g GLT (nonfasting), with plasma glucose measurement at 1 h, at 24–28 weeks of gestation in women not previously diagnosed with diabetes.

If the plasma glucose level measured 1 h after the load is ≥130 mg/dL, 135 mg/dL, or 140 mg/dL (7.2 mmol/L, 7.5 mmol/L, or 7.8 mmol/L, respectively), proceed to a 100-g OGTT.

**Step 2:** The 100-g OGTT should be performed when the patient is fasting.

The diagnosis of GDM is made if at least two* of the following four plasma glucose levels (measured fasting and 1 h, 2 h, 3 h during OGTT) are met or exceeded:

<table>
<thead>
<tr>
<th></th>
<th>Carpenter-Coustan (86)</th>
<th>or</th>
<th>NDDG (87)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>95 mg/dL (5.3 mmol/L)</td>
<td></td>
<td>105 mg/dL (5.8 mmol/L)</td>
</tr>
<tr>
<td>1 h</td>
<td>180 mg/dL (10.0 mmol/L)</td>
<td></td>
<td>190 mg/dL (10.6 mmol/L)</td>
</tr>
<tr>
<td>2 h</td>
<td>155 mg/dL (8.6 mmol/L)</td>
<td></td>
<td>165 mg/dL (9.2 mmol/L)</td>
</tr>
<tr>
<td>3 h</td>
<td>140 mg/dL (7.8 mmol/L)</td>
<td></td>
<td>145 mg/dL (8.0 mmol/L)</td>
</tr>
</tbody>
</table>

NDDG, National Diabetes Data Group. *ACOG notes that one elevated value can be used for diagnosis (82).
Blood Glucose Targets

- Fasting < 95 mg/dL (5.3 mmol/L) and either
- One-hour postprandial < 140 mg/dL (7.8 mmol/L) or
- Two-hour postprandial < 120 mg/dL (6.7 mmol/L)
Prevention/Treatment of GDM

• Preconception planning
• Gestational diabetes:
  – Physical activity
    • Researchers found being physically active before and after their pregnancy reduced their risk of GDM by about 70% or more
  – Diet
    • A study showed that each 10 gram increase in fiber a day reduced their risk of GDM by 26%
Prediabetes

• When your blood sugar level is higher than normal but not high enough to be diagnosed with type 2 diabetes

86 million people — more than 1 out of 3 adults — have prediabetes

9 out of 10 do not know they have prediabetes

15–30% of people with prediabetes will develop type 2 diabetes within 5 years

30.3 million with Diabetes

86 million with Diabetes
Are You at Risk for Diabetes?

Are You at Risk for Type 2 Diabetes?

Diabetes Risk Test

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

2. Are you a man or a woman?
   - Man (1 point)
   - Woman (6 points)

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

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

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

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

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

Write your score in the box.

Height
4' 10”
4' 11”
5’ 0”
5’ 1”
5’ 2”
5’ 3”
5’ 4”
5’ 5”
5’ 6”
5’ 7”
5’ 8”
5’ 9”
5’ 10”
5’ 11”
6’ 0”
6’ 1”
6’ 2”
6’ 3”
6’ 4”

Weight (lbs.)
119-142
123-147
128-152
132-157
135-163
141-168
146-173
150-179
153-191
159-190
159-194
163-202
174-208
179-214
184-226
189-226
194-232
200-238
205-245

Add up your score.

If you scored 5 or higher:
You are at increased risk for having type 2 diabetes. However, only your doctor can tell for sure if you do have type 2 diabetes or prediabetes (a condition that precedes type 2 diabetes in which blood glucose levels are higher than normal). Talk to your doctor to see if additional testing is needed.

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

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

For more information, visit us at diabetes.org or call 1-800-DIABETES (1-800-342-2383)

Lower Your Risk
Type 2 diabetes. Small steps make a big difference.

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

Visit diabetes.org or call 1-800-DIABETES (1-800-342-2383) for information, tips on getting started, and lower your risk.
Diabetes Prevention

**WHAT CAN YOU DO TO PREVENT TYPE 2 DIABETES?**

- **Lose between 5% and 10% of your body weight if you’re overweight**
- **Start a moderate exercise routine — at least 30 minutes most days of the week**
- **Eat healthy foods like fruits, vegetables, and whole grains**

Source: Executive Office of Health and Human Services (HHS)
Diabetes Prevention Program (DPP)

- 1-2 year program
  - Education, resources, social support, accountable
- Goals of DPP
  - 7% weight loss
  - 150 min. physical activity
Treatment of Diabetes

Early diagnosis, patient education and treatment pays off with longer life, increased productivity, QOF and decreased long-term cost.
Know you ABCs

• A1c
  – Avg. blood sugar the past 2-3 mo.
  – Individualized <7%
  – At least 2x yr.

• Blood Pressure
  – Force of blood inside vessels
  – <130/80
  – Every medical visit

• Cholesterol
  – LDL “bad” <100 mg/dl
  – HDL “good” >50 women; >40 men
  – Triglycerides <150
Individualized Care

Approach to the management of hyperglycemia

PATIENT / DISEASE FEATURES

- Risks potentially associated with hypoglycemia and other drug adverse effects
  - low
  - high
- Disease duration
  - newly diagnosed
  - long-standing
- Life expectancy
  - long
  - short
- Important comorbidities
  - absent
  - few / mild
  - severe
- Established vascular complications
  - absent
  - few / mild
  - severe
- Patient attitude and expected treatment efforts
  - highly motivated, adherent, excellent self-care capacities
  - less motivated, nonadherent, poor self-care capacities
- Resources and support system
  - readily available
  - limited

Usually not modifiable

Potentially modifiable
A1c & Complications

- **A1CNow** Value
  - %
  - 10.5 and above
  - 10
  - 9
  - 8.5 - 10.4
  - 8
  - 7.0 - 8.4
  - 7
  - 6.1 - 6.9
  - 6
  - 4.0 - 6.0
  - 4

- **Estimated Average Glucose (eAG)**
  - (mg/dl)
  - 298
  - 269
  - 240
  - 212
  - 196 - 252
  - 183
  - 154 - 195
  - 127 - 153
  - 97
  - 68 - 126
  - 68

- **Relative Risk**
  - Retinopathy
  - Nephropathy
  - Neuropathy
  - Microalbuminuria

- **Blood Sugar Level**
Diabetes: A Self-Management Disease

- Meal plan
- Activity plan
- Medications
- BG monitoring; logging and interpreting results
- Regular health care appt. and lab work
- Diabetes-related technology
- Sick day plan
- Daily foot care
- Skin and dental care
Role of Diabetes Educator

- Healthcare professional who practices across a wide range of primary roles (nurse, dietician, pharmacists, exercise specialists, etc.) and focus on helping people at risk and with diabetes achieve behavior change goals which lead to better clinical outcomes and improved health status.
  - Counsel persons on how to incorporate healthy eating and physical activity into their life,
  - monitor their glucose to avoid the risk of complications and give them the ability to
  - problem solve and adjust emotionally to their diabetes/prediabetes
  - Educate and prevent diabetes-related conditions (e.g. cardiometabolic)
  - Leverage technology-driven diabetes care, education, and support
  - Promote the integration of behavioral and mental health
### Self-Monitoring (SMBG)

A blood sample is taken and put on a test strip. The strip is then put into a blood glucose meter. A log book is a helpful aid in keeping track of blood glucose levels.

<table>
<thead>
<tr>
<th>Blood Sugar Classification</th>
<th>Fasting Blood Sugar Levels</th>
<th>Post Meal Blood Sugar Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>70-100 mg/dL</td>
<td>70-140 mg/dL</td>
</tr>
<tr>
<td>Prediabetes</td>
<td>101-125 mg/dL</td>
<td>141-200 mg/dL</td>
</tr>
<tr>
<td>Diabetes</td>
<td>125 mg/dL and above</td>
<td>200 mg/dL and above</td>
</tr>
</tbody>
</table>
Regular Care

DIABETES CARE SCHEDULE
TAKE GOOD CARE OF YOURSELF

Every 3 Months
- Regular doctor’s office visit
- A1C blood test
  Every 3 months if your blood sugar (glucose) number is too high
- Blood pressure check
- Weight check
- Foot check

Every 6 Months
- A1C blood test
  Every 6 months if your blood sugar (glucose) number is good
- Teeth and gums exam by your dentist

Every Year
- Physical check-up (exam) by your doctor
- Complete foot exam
- Check cholesterol and other body fats (lipid profile test)
- Complete (dilated) eye exam by an eye doctor
- Flu shot
- Kidney tests

Provided as a FREE educational service by www.learnaboutdiabetes.com.
Always talk to your doctor or other member of your diabetes-care team before making any changes in your diabetes treatment plan.
Stretch Break
Diabetes: Myth or Fact

- It is dangerous for people with diabetes to exercise
Benefits of Exercise

**Uncertain or limited data**
- Microvascular disease
- Osteoporosis
- Cancer
- Beta cell function
- Blood pressure
- Glycaemic control

**Type 1 diabetes**
- Beneficial
  - Fitness
  - Insulin requirement
  - Lipids
  - Endothelial function
  - Mortality
  - Insulin resistance
  - CVD
  - Well-being

**Type 2 diabetes**
- Beneficial
  - Fitness
  - Insulin requirement
  - Lipids
  - Endothelial function
  - Mortality
  - Insulin resistance
  - CVD
  - Blood pressure
  - Beta cell function
  - Glycaemic control

**Uncertain or limited data**
- Microvascular disease
- Osteoporosis
- Cancer
- Well-being
Be Active Your Way

MyActivity Pyramid
for Adults (18-84)

Aerobic Activity
At least 150 minutes of moderate intensity each week or 75 minutes of vigorous intensity each week or a combination of both

- walking
- jogging
- swimming
- basketball

Strength and Flexibility
At least 2 times each week

- yoga
- stretching
- strength training

Inactivity Limit

Lifestyle
Every day

- biking
- yard work
- household chores
- walking

Relax
Milk
Fruits
Vegetables
Grains
Medication
Type 2 Diabetes Medications

Drug Sites of Action

**Glucose absorption:**
- GLP-1, DPP-IV inhibitors *delay gastric emptying*
- Alpha glucosidase inhibitors *block breakdown of complex carbs into glucose*

**Liver-glucose production:**
- Metformin (biguanide)

**Muscle- improved insulin sensitivity:** thiazolidinediones (TZDs), metformin (lesser effect)

**Pancreas- increased insulin secretion:**
- Sulfonylureas, non-sulf. insulin secretagogues, GLP-1, and DPP-IV inhibitors

**Kidney- increased glucose and sodium excretion:**
- Sodium-glucose co-transporter 2 (SGLT2) inhibitors
# Oral Medications

<table>
<thead>
<tr>
<th>CLASS</th>
<th>BRAND NAMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biguanides</td>
<td>Glucophage, Fortamet</td>
</tr>
<tr>
<td>GLP-1 receptor agonists</td>
<td>Trulicity, Tanzeum, Bydureon, Victoza</td>
</tr>
<tr>
<td>DPP-IV inhibitors</td>
<td>Januvia, Onglyza, Nesina</td>
</tr>
<tr>
<td>SGLT-2 inhibitors</td>
<td>Invokana, Farxiga, Jardiance</td>
</tr>
<tr>
<td>Sulfonylureas</td>
<td>Amaryl, Glucotrol, DiaBeta, Glynase</td>
</tr>
<tr>
<td>Insulin</td>
<td>Tresiba, Toujeo, Afrezza, Levemir, Lantus</td>
</tr>
<tr>
<td>Combination drugs</td>
<td>Janumet, Jentadueto, Kombiglyze, Tradjenta, Kazano, Oseni</td>
</tr>
</tbody>
</table>

*This chart provides examples of some, but not all, medications used to treat diabetes.*
Diabetes: Myth or Fact

• Taking insulin means my diabetes is out of control

• Fact: For some people, oral medication are not the answer to managing their blood sugar-insulin may be the best way to manage blood sugar.
Insulin Profile & Regimen

- Once-daily basal insulin
- Twice-daily mix-insulin
- Basal-bolus therapy
# Administering Insulin

## If You Use Insulin Pens

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove the pen cap and wipe the top of the pen with an alcohol swab to clean the area.</td>
</tr>
<tr>
<td>2</td>
<td>Remove the paper tab from the pen needle, then screw the needle tightly onto the top of the pen.</td>
</tr>
<tr>
<td>3</td>
<td>Prime your pen to remove air from the needle and insulin: Dial 2 units of insulin, hold the pen vertically with the tip facing the ceiling, and press the dose button. You should see a drop or stream of insulin at the tip of the pen needle. If you don’t, which is common the first time you prime a pen, repeat the process until a drop appears.</td>
</tr>
<tr>
<td>4</td>
<td>Set your dose. If you take 6 units of insulin, for instance, you’ll dial to 6 in the dose window.</td>
</tr>
<tr>
<td>5</td>
<td>Holding your pen at a 90-degree angle over your injection site, push the needle into the skin. Press the dose button.</td>
</tr>
<tr>
<td>6</td>
<td>Hold your pen still for about 10 seconds to make sure all the insulin is delivered. Remove the needle from your skin.</td>
</tr>
<tr>
<td>7</td>
<td>Put the plastic cap on the end of the needle, unscrew the needle from the pen, and dispose of it in your sharps container. Recap your pen.</td>
</tr>
</tbody>
</table>
# Administering Insulin

## If You Use Vials and Syringes

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Clean the top of the vial with an alcohol pad, then remove the cap from the syringe needle.</td>
</tr>
<tr>
<td>Step 2</td>
<td>Draw air into your syringe—an amount equal to the units of insulin you’ll be injecting. To do so, pull back the syringe’s plunger until its black stopper reaches your insulin dose amount on the syringe barrel. So if you will be taking 6 units of insulin, pull back the plunger until the stopper hits the 6 etched onto the barrel.</td>
</tr>
<tr>
<td>Step 3</td>
<td>Put the vial on a flat surface and hold it. Insert the syringe into the vial, and press down on the plunger to inject the air from Step 2 back into the vial.</td>
</tr>
<tr>
<td>Step 4</td>
<td>With the syringe still in the bottle, turn the vial and syringe upside down. The tip of the needle should be fully covered by insulin.</td>
</tr>
<tr>
<td>Step 5</td>
<td>Make air bubbles less likely by slowly pulling down on the plunger. Draw insulin past your dose. Tap the syringe a few times so any bubbles rise to the top.</td>
</tr>
<tr>
<td>Step 6</td>
<td>Without removing the syringe from the vial, slowly push the plunger until the edge of its black stopper reaches the number of units in your dose, as marked on the syringe. If you see any bubbles, push all that insulin back into the vial and repeat these steps until no bubbles are present.</td>
</tr>
<tr>
<td>Step 7</td>
<td>Identify an injection site. Pinch up a bit of skin (if necessary). Insert the needle at a 90-degree angle. Hold the needle in the skin for 5 seconds to ensure there is no leakage.</td>
</tr>
<tr>
<td>Step 8</td>
<td>Dispose of your syringe and needle in a sharps container.</td>
</tr>
</tbody>
</table>

## Insulin Injection Sites

- Upper outer arms
- Abdomen
- Buttocks
- Upper outer thighs
Injection Site Rotation

Injecting Insulin into Subcutaneous Fat Layer

- Dermis Layer
- Subcutaneous Fat Layer
- Muscle Layer

Shorter pen needles reduce the risk of IM injection.

5mm

8mm

12.7mm

A pinch up is recommended with 8mm and 12.7mm pen needles to reduce the risk of an IM injection.
Diabetes: Myth or Fact

- Avoiding all “white” food (white bread, potatoes, pasta) will cure my diabetes.

- Fact: Diabetes does not just go away and there is room for all foods in a healthy meal plan. Whole grains are higher in fiber and more healthier than processed foods.
Nutrition
Meal Plan
• Meal plan based on
  – What you like to eat/drink
  – Schedule
  – Health status
  – How many calories you need
  – Physical activity level
Affect on Blood Glucose

- Carbohydrates
- Protein
- Fat

Time (Hours)

Affect on Blood Glucose (%)
Carbohydrates

• Important part of healthy meal plan
• Raise blood glucose the most
• Keep the amount consistent can help you meet your blood glucose goals 2-4 servings 30-60 gms.
• Snacks 15-20 gms
• Serving = 15 gms.
### Carbohydrates

#### Carb Counting For Diabetes Made Easy

Each of these foods contains about 15 grams of carbohydrates.

<table>
<thead>
<tr>
<th>Item</th>
<th>Carbohydrate Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 small piece of fresh fruit</td>
<td>40g</td>
</tr>
<tr>
<td>1/2 cup of canned or frozen</td>
<td>20g</td>
</tr>
<tr>
<td>1/2 cup of oatmeal</td>
<td>15g</td>
</tr>
<tr>
<td>1 slice of bread (10g)</td>
<td>15g</td>
</tr>
<tr>
<td>1 (6-inch) tortilla</td>
<td>30g</td>
</tr>
<tr>
<td>4-6 crackers</td>
<td>20g</td>
</tr>
<tr>
<td>1/2 English muffin</td>
<td>15g</td>
</tr>
<tr>
<td>2 small cookies</td>
<td>30g</td>
</tr>
<tr>
<td>2/3 cup of plain, fat-free</td>
<td>30g</td>
</tr>
<tr>
<td>1/2 cup of a starchy vegetable</td>
<td>20g</td>
</tr>
<tr>
<td>1/3 cup of pasta or rice</td>
<td>15g</td>
</tr>
<tr>
<td>1/2 cup ice cream or sherbet</td>
<td>15g</td>
</tr>
<tr>
<td>1/4 of a large baked potato</td>
<td>20g</td>
</tr>
<tr>
<td>1 tablespoon syrup or jam</td>
<td>15g</td>
</tr>
<tr>
<td>1 cup of soup</td>
<td>15g</td>
</tr>
</tbody>
</table>

#### Glycemic Index

Low GI (<55), Medium GI (56-69) and High GI (70+)

<table>
<thead>
<tr>
<th>Grains / Starches</th>
<th>Vegetables</th>
<th>Fruits</th>
<th>Dairy</th>
<th>Proteins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice Bran</td>
<td>Asparagus</td>
<td>15</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>Bran Cereal</td>
<td>Broccoli</td>
<td>15</td>
<td>38</td>
<td>14</td>
</tr>
<tr>
<td>Spaghetti</td>
<td>Celery</td>
<td>15</td>
<td>42</td>
<td>14</td>
</tr>
<tr>
<td>Corn, sweet</td>
<td>Cucumber</td>
<td>15</td>
<td>42</td>
<td>14</td>
</tr>
<tr>
<td>Wild Rice</td>
<td>Lettuce</td>
<td>15</td>
<td>44</td>
<td>14</td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>Peppers</td>
<td>15</td>
<td>44</td>
<td>14</td>
</tr>
<tr>
<td>White Rice</td>
<td>Spinach</td>
<td>15</td>
<td>44</td>
<td>14</td>
</tr>
<tr>
<td>Cous Cous</td>
<td>Tomatoes</td>
<td>15</td>
<td>45</td>
<td>14</td>
</tr>
<tr>
<td>Whole Wheat</td>
<td>Chickpeas</td>
<td>15</td>
<td>56</td>
<td>14</td>
</tr>
<tr>
<td>Bread</td>
<td>Cooked Carrots</td>
<td>39</td>
<td>56</td>
<td>14</td>
</tr>
<tr>
<td>Muesli</td>
<td>Grapefruit</td>
<td>15</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td>Baked Potatoes</td>
<td>Apple</td>
<td>15</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td>Oatmeal</td>
<td>Peach</td>
<td>15</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td>Taco Shells</td>
<td>Orange</td>
<td>15</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td>White Bread</td>
<td>Banana</td>
<td>15</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td>Bagel, White</td>
<td>Mango</td>
<td>15</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Pineapple</td>
<td>15</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Watermelon</td>
<td>15</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Low-Fat Yogurt</td>
<td>25</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Plain Yogurt</td>
<td>14</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Whole Milk</td>
<td>14</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Soy Milk</td>
<td>14</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Fat-Free Milk</td>
<td>44</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Skim Milk</td>
<td>44</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Chocolate Milk</td>
<td>32</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Fruit Yogurt</td>
<td>32</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Ice Cream</td>
<td>32</td>
<td>66</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Peanuts</td>
<td>14</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Beans, Dried</td>
<td>14</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Lentils</td>
<td>14</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Kidney Beans</td>
<td>30</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Split Peas</td>
<td>45</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Lima Beans</td>
<td>46</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Chickpeas</td>
<td>47</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Pinto Beans</td>
<td>55</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Black Eyed Beans</td>
<td>59</td>
<td>61</td>
<td>21</td>
</tr>
</tbody>
</table>
Types of Carbohydrates

The Blood Sugar Fat Storage Cycle

- Hi Glycemic Meal
- Lo Glycemic Meal

Fat Storage

Time

Stress hormones: cortisol, adrenalin trigger cravings

Meal Consumed

High Blood Sugar

Normal Blood Sugar

Low Blood Sugar
Avoid the Rollercoaster
Label Reading

- Things to look at
  - Serving size
  - Type of fats
  - Carbohydrate, fiber, sugar
  - Protein gms.
Choose Fat Wisely

• Eat more
  – Mono, Poly, Omega-3 FA

• Eat less
  – Saturated, Trans, Cholesterol
Depression

- 3-4x more prevalent in PWD than in general pop.
- Lifetime rate 5-8% gen. pop.
- 15-20% among PWD
- Ass. with poor glycemic control
- 86% higher healthcare costs
- Poorer QOL
- More complications
- Be alert for s/s of depression who are struggling with SM
- Encourage treatment
Technology

How does the insulin get into your body?

- Insulin in the blood

Flexible tubing delivers insulin from the pump reservoir to the infusion set

A tiny tube called a cannula is inserted under your skin to deliver insulin

Continuous Glucose Sensor
Control Algorithm
Insulin Pump

Blood Level
Technology
Common Barriers to Self-Care

- Adjusting to diagnosis and to new lifestyle demands
- Not understanding the treatment plan
- Financial or insurance struggles
- Unrealistic expectations and perfectionism
- Time-management and goal-setting problems
- Poor motivation and burnout/diabetes distress
- Fear of complications
- Fear of hypoglycemia
- Anxiety, depression, eating disorders
- Denial
Behavior Change

ADKAR Model:
- Awareness of the need for change
- Desire to support the change
- Knowledge of how to change
- Ability to demonstrate skills & behaviors
- Reinforcement to make the change stick

Behavioral Stages:
- Pre-contemplation: No intention on changing behavior
- Contemplation: Aware of a problem but with no commitment to action
- Preparation: Intent on taking action to address the problem
- Action: Active modification of behavior
- Maintenance: Sustained change; new behavior replaces old
- Relapse: Fall back into old patterns of behavior

Upward Spiral: Learn from each relapse
Case Study - Jose

- Julio 52 y/o Hispanic male with limited English proficiency (LEP). Works as a gas station attendant. He went to a community health center having increased fatigue and intermittent blurred vision for approximately 1.5 years. He also reported tingling and decreased sensation in both his feet and noted that superficial wounds to his body healed more slowly than in the past. He said he recently began smoking again after having quit the habit 10 years previously. He said he attributed that to increased stress related to family issues. He is currently on no medications.
Examination and Laboratory Test Findings

- Ht., in 60 in, Wt. 212 lb., BMI 41.4 kg/m2
- Blood pressure 152/86, HR 88 bpm
- Fasting plasma glucose: 169 mg/dl
- Glycosylated hemoglobin: 7.8%
- Lipid Profile: Total Chol.: 228 mg/dL, LDL-C 146 mg/dL, HDL-C 32 mg/dL, TG 250 mg/dL

Physical Examination

- Eye examination revealed one microaneurysm.
- Foot examination revealed absent pulses. Absent ankle reflexes, absent plantar sensation and reduced distal vibratory perception.
Case Study - Maria

• Maria is a 62-year-old married Portuguese woman, with four adult children. Her husband works FT in manufacturing. She retired when the textile mill closed eight years ago. She speak limited English. She helps care for her 9 y/o grandchildren.

• Diagnosed with high blood pressure, and type 2 diabetes 25 years ago after the birth of her third child. During her pregnancy she was told that her blood sugar was “elevated” and instructed to watch her diet.

• She has been referred by her family physician to the diabetes specialty clinic. She presents with recent weight gain, suboptimal diabetes control, and foot pain. She has been trying to lose weight and increase exercise for the past 6 months without success.
Current medications: Lisinopril 10 mg once daily, glyburide (Diabeta) 5 mg once daily, Metformin (Glucophage) 1000 mg twice daily, Januvia (Sitagliptin) 100 mg once a day, Atorvastatin (Lipitor) 10 mg once daily. She tolerates her medication and adheres to the daily schedule. Takes a Cinnamon supplement.

She self-monitors her blood sugar first thing in the morning before breakfast.

Reading the past week: 192 mg/dL, 171 mg/dL, 202 mg/dL, 242 mg/dL, 179 mg/dL, 197 mg/dL, 138 mg/dL

Maria says “what ever I do, my blood sugar is high. I don’t understand why my blood sugar is so high. I don’t eat sugar”.

Nutrition: Breakfast – tea, roll or cookies with butter; Lunch – sandwich, chips; Dinner – fish, vegetables, rice, roll with butter; snack – tea, cookies.
Case Study - Jose

- Jose is an 18 year-old who moved from his native Puerto Rico six-months ago to live with his grandparents. He was admitted to the ER with vomiting and abnormal pain with a blood sugar of 842 mg/dl. He had a two week history of frequent urination and thirst, accompanied by a 20 lbs. wt. loss and blurred vision.

- He was hospitalized for three days and discharged on long acting insulin once daily and mealtime insulin as needed. On discharge, he was instructed to perform blood glucose measurements 4 times a day. The patient was seen as an outpatient 4 days after he is discharged from hospital.
• Jose speaks no English. He presents with glucometer. You have been asked to speak with him prior to his initial appointment with a diabetes educator.

• Conduct an initial visit with Jose.

<table>
<thead>
<tr>
<th></th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td>100</td>
<td>176</td>
<td>142</td>
</tr>
<tr>
<td>Lunch</td>
<td>72</td>
<td>54</td>
<td>50</td>
</tr>
<tr>
<td>Dinner</td>
<td>149</td>
<td>117</td>
<td>--</td>
</tr>
<tr>
<td>Bedtime</td>
<td>207</td>
<td>209</td>
<td>--</td>
</tr>
</tbody>
</table>
Questions?