Diabetes in the Latino Population: A Case-based Approach to Optimal Management

www.diabetes.org 1-800-DIABETES

Upon completion, attendees should be able to:
• List the medical, social, and economic ways in which diabetes impacts the Latino population;
• Describe strategies to overcome barriers to improving diabetes outcomes in the Latino population;
• Utilize current standards of care for the detection of diabetes and the monitoring of complications of diabetes in the Latino patient;
• Assess current treatment options to maximize glycemic control in order to minimize the complications of diabetes in the Latino population;
• Access appropriate national and local resources available to assist in caring for the Latino patient with diabetes.

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Learner Objectives

Why are We Concerned about Diabetes? Every 24 hours...
• 3,600 new cases of diabetes are diagnosed
• 580 people die of diabetes-related complications
• 225 people have a diabetes-related amputation
• 120 people with diabetes progress to end-stage renal disease
• 55 people with diabetes become blind

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Why Are We Concerned about Diabetes Among Latinos?
• Prevalence of type 2 diabetes is 1.5 times higher than in non-Hispanic whites.
• 2 million Latinos 20 years or older have diabetes.
• Latinos have a greater number of risk factors for diabetes.
• Increased prevalence of retinopathy, nephropathy, and peripheral vascular disease in Mexican Americans.

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A Constellation of Complications

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Diabetes Care in the U.S. Improvements Needed

<table>
<thead>
<tr>
<th>Goal</th>
<th>Percent at Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1C &lt; 7.0</td>
<td>43% (18% at &gt; 9.5)</td>
</tr>
<tr>
<td>LDL &lt; 100</td>
<td>11% (58% at &gt; 130)</td>
</tr>
<tr>
<td>BP &lt; 140/90 (ADA goal is 130/80)</td>
<td>66%</td>
</tr>
<tr>
<td>Dilated Eye Exam</td>
<td>63%</td>
</tr>
<tr>
<td>Foot Exam</td>
<td>55%</td>
</tr>
</tbody>
</table>

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National Diabetes Information Clearinghouse, NIDDK 2002
Projected Increase in the US Population with Diagnosed Diabetes by 2020 by Ethnicity

Geographic Distribution of Latino Americans

Clinical Discussion

• Prevalence of diabetes
• Prevalence of complications
• Pathophysiology
  - obesity
  - insulin resistance
  - metabolic syndrome
• Treatment
  - nonpharmacologic
  - medications

Prevalence of Type 2 Diabetes

Complications of type 2 diabetes 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

No Difference In Complications When Good Control Is Achieved

San Luis Valley Study
Caucasian and Latino (n=279)
- Similar glucose control in both study groups
- Similar severity of retinopathy, nephropathy and diabetic neuropathy

Diabetes: Dual Impairment
Insulin Resistance and Impaired β-Cell Function

Insulin Resistance
- Genetic
- Acquired
  - Central obesity
  - Medications
  - In 80-90% of type 2 patients
  - Clusters with metabolic disease syndrome
  - Associated with increased macrovascular disease

Visceral Fat, Insulin Resistance and Endothelial Dysfunction
Insulin Sensitivity in Healthy Subjects in Various Ethnic Groups

Prevalence of the Insulin Resistance Syndrome in the US Population

Progressive Nature of Type 2 Diabetes

UKPDS: Glucose Control Study Results

Effect of Each 1% Rise in A1C on Risk of Developing Complications

Why Aren’t Patients Achieving Blood Glucose Goals?
- Physicians not setting appropriate glycemic targets
- Type 2 diabetes is progressive - what works now may not work in the future
- Type of medications used and/or doses not appropriate
- Insulin therapy only used as a “threat”
Diagnosing Diabetes

<table>
<thead>
<tr>
<th>Stage</th>
<th>Test</th>
<th>Casual Plasma Glucose (≥100 mg/dl)</th>
<th>Oral Glucose Tolerance Test (2hPG) ≥140 mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>FPG &gt; 126 mg/dl</td>
<td>Casual plasma glucose ≥200 mg/dl</td>
<td>Impaired Glucose Tolerance (HbA1c) ≥6.5%</td>
</tr>
<tr>
<td>Impaired</td>
<td>Impaired Fasting Glucose (HbA1c) ≥140 and &lt;126 mg/dl</td>
<td>FPG 100 mg/dl</td>
<td>FPG ≥100 mg/dl</td>
</tr>
<tr>
<td>Normal</td>
<td>FPG &lt; 100 mg/dl</td>
<td>2hPG ≥140 mg/dl</td>
<td></td>
</tr>
</tbody>
</table>

*In the absence of unequivocal hyperglycemia, these need to be repeated on the second day.

Goals for Glycemic Control

- A1C* < 7.0% 43% achieve goal
  - Pre-Prandial glucose 90-130 mg/dl
  - Postprandial plasma glucose < 180 mg/dl

*For non-pregnant individuals

Goals for Blood Pressure, Lipids, and Microalbumin

- Blood Pressure <130/80 mmHg 66% achieve goal
- Lipids (mg/dl)
  - LDL-C < 100 (<70) 11% achieve goal
  - HDL-C < 40 (male)
  - HDL-C > 50 (female)
  - Triglycerides < 150
- Microalbumin < 30 (mg/g creatinine)

Goals of Medical Nutrition Therapy

- Achieve blood glucose goals
- Achieve optimal lipid levels
- Provide appropriate calories for:
  - Renal weight
  - Normal growth and development
  - Pregnancy and lactation
- Prevent, delay or treat nutrition-related complications
- Improve health through optimal nutrition
Non-pharmacological Medical Therapy for Type 2 Diabetes

- Monitor blood glucose to adjust therapy
- Optimize BG Control
- Improve blood lipids
- Control blood pressure
- Moderate weight loss
- Space meals
- Increase physical activity

ADA Nutrition Recommendations

Total Daily Energy Intake

- Carbohydrate – 60-70%
- Protein – 15-20%
- Fat
  - 10% from polyunsaturated fats
  - < 10% from saturated fats

Preventing or Delaying Type 2 Diabetes

- Exercise can lower risk, delay or prevent, type 2 diabetes
- Important for individuals with risk factors
  - Obesity
  - Sedentary lifestyle
  - Family history of type 2 diabetes
  - Native American, Hispanic, African American, Asian American, Pacific Islander

Effects of Exercise

- Increased insulin sensitivity
- Improved lipids
- Lower blood pressure
- Weight control
- Improved blood glucose control in type 2 diabetes

Exercise Precautions for Type 2 Diabetes

- Check with referral source for medical clearance
- Lower VO2max may require a gradual training program
- Autonomic neuropathy or blood pressure meds do not allow for increased heart rate perceived exertion important
- Blood pressure may go higher, avoid exercise if systolic BP >180-200

Exercise Precautions Related to Complications of Diabetes

- Peripheral neuropathy can cause loss of sensation in feet
- Pre-existing CVD can cause arrhythmias, myocardial ischemia, or infarction during exercise
- Proliferative retinopathy does not increase risk for retinal or vitreous hemorrhage with exercise
Treatment of Type 2 Diabetes

Principles of Diabetes Treatment

• Define target goal
• Diabetes education is essential
• Monitoring glycemic control is necessary
• Lifestyle modification
• Stepwise and combination pharmacologic therapy

ADA Recommendations

• Glycemic goals should be individualized
• Certain populations (children, pregnant women, and elderly) require special considerations
• Less intensive glycemic goals may be indicated in patients with severe or frequent hypoglycemia
• More stringent glycemic goals (i.e. a normal A1C, 6%) may further reduce complications at the cost of increased risk of hypoglycemia.
• Postprandial glucose may be targeted if A1C goals are not met despite reaching pre-prandial glucose goals.

Targeted Glucose Control

• Therapy based on glycemic goals
• Monotherapy usually not effective long-term
• Step-wise approach
• Whatever therapy is necessary to achieve glycemic goals

Pharmacologic Therapy

Selection of therapy should be individualized based upon potential side effects.

Therapeutic Agents for Type 2 Diabetes

<table>
<thead>
<tr>
<th>Mechanism of Action</th>
<th>Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sensitize the body to insulin</td>
<td>Thiazolidinediones, Biguanides</td>
</tr>
<tr>
<td>2. Control hepatic glucose production</td>
<td>Biguanides, Thiazolidinediones</td>
</tr>
<tr>
<td>3. Stimulate the pancreas to make more insulin</td>
<td>Sulfonylureas</td>
</tr>
<tr>
<td>4. Slow the absorption of starches</td>
<td>Meglitinides</td>
</tr>
<tr>
<td>5. Decreases hepatic glucose production and increases peripheral glucose uptake</td>
<td>Alpha-glucosidase inhibitors, Insulin</td>
</tr>
</tbody>
</table>
### Impact of Therapies on A1C Levels

<table>
<thead>
<tr>
<th>Therapy</th>
<th>A1C Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet and Exercise</td>
<td>0.5 - 2.0%</td>
</tr>
<tr>
<td>Sulfonylureas and Glititides</td>
<td>1.0 - 2.0%</td>
</tr>
<tr>
<td>Metformin</td>
<td>1.0 - 2.0%</td>
</tr>
<tr>
<td>Glycosidase Inhibitors</td>
<td>0.5 - 1.0%</td>
</tr>
<tr>
<td>Thiazolidinedione</td>
<td>0.5 - 1.0%</td>
</tr>
<tr>
<td>Insulin</td>
<td>&gt;5.0%</td>
</tr>
</tbody>
</table>


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### Biguanides

Decrease hepatic glucose production and secondarily may increase insulin-mediated peripheral glucose uptake

- **Efficacy**
  - decrease blood glucose ~ 60 mg/dl
  - reduce HbA1c 1.0 - 2.0%
  - cause small decrease in LDL-C and triglycerides
  - no specific effect on blood pressure
  - no weight gain

- **Other Effects**
  - diarrhea and abdominal discomfort
  - lactic acidosis if inappropriately prescribed
  - contraindicated in patients with impaired renal function

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### Sulfonylureas

Increase endogenous insulin secretion

- **Efficacy**
  - decrease blood glucose ~ 60 mg/dl
  - reduce HbA1c 1.0 - 2.0%
  - no specific effect on plasma lipids or blood pressure

- **Other Effects**
  - hypoglycemia
  - weight gain

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### Thiazolidinediones

Potentiate insulin action on muscle and adipose tissue

- **Efficacy**
  - decrease FPG ~ 25 - 40 mg/dl
  - reduce HbA1c ~ 0.5 - 1%
  - combined with sulfonylureas reduce HbA1c ~ 0.8 - 1.0%
  - combined with insulin reduce HbA1C by 0.8 - 1.4%
  - Beneficial effect on lipids
  - Possible cardiovascular effects

- **Other Effects**
  - contraindicated with abnormal liver function
  - weight gain, edema

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### Meglitinides

Non-sulfonylurea insulin releasing agent; taken before each meal

Rapid onset of action with a duration of action of several hours

- **Efficacy**
  - decrease peak postprandial glucose
  - decrease blood glucose 60 - 70 mg/dl
  - reduce HbA1c 1.0 - 2.0%

- **Other Effects**
  - hypoglycemia
  - weight gain
  - safe at higher levels of creatinine than sulfonylureas

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### Alpha-Glucosidase Inhibitors

Competitive inhibitor of alpha glucosidase enzymes in small intestines; taken before meals

- **Efficacy**
  - decrease fasting plasma glucose 20-30 mg/dl
  - decrease peak postprandial glucose 40-50 mg/dl
  - no specific effect on lipids or blood pressure
  - reduce HbA1c 0.5-1.0%

- **Other Effects**
  - abdominal discomfort and flatulence
  - contraindicated with inflammatory bowel disease or cirrhosis
Insulin

Decreases hepatic glucose production and increases uptake and use of glucose by muscle and adipose tissue

• **Efficacy**
  - can lower plasma glucose to any level
  - reduces HbA1c > 5.0%
  - limited by hypoglycemia

• **Other Effects**
  - hypoglycemia
  - weight gain

Anticipated Response to Treatment

<table>
<thead>
<tr>
<th>Agent</th>
<th>Time to Response</th>
<th>SMBG Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secretagogues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-acting</td>
<td>Immediate</td>
<td>Fasting</td>
</tr>
<tr>
<td>Rapid-acting</td>
<td>Immediate</td>
<td>Postprandial</td>
</tr>
<tr>
<td>Metformin</td>
<td>2 – 3 weeks</td>
<td>Fasting</td>
</tr>
<tr>
<td>Glitazones</td>
<td>6 – 8 weeks</td>
<td>Postprandial</td>
</tr>
<tr>
<td>AGIs</td>
<td>Immediate</td>
<td>Postprandial</td>
</tr>
<tr>
<td>Insulin</td>
<td>Immediate</td>
<td>Postprandial</td>
</tr>
<tr>
<td>Rapid Acting</td>
<td>Immediate</td>
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</tr>
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<td>Long-acting</td>
<td>Immediate</td>
<td>Postprandial</td>
</tr>
</tbody>
</table>

Insulin Therapy in Type 2 Diabetes

- Most patients with type 2 diabetes will eventually need insulin.
- As insulin deficiency progresses, a more physiologic multi-component insulin regimen will be required to adequately replace normal insulin secretion.
  - Basal insulin
  - Meal-Related (prandial, bolus) insulin

Indications for Insulin Therapy in Type 2 Diabetes

- Severe hyperglycemia at glucose toxicity
- To meet glycemic goals
- Hyperglycemia despite maximum doses of oral agents
- Most patients with type 2 diabetes will eventually need insulin

Insulin Action Comparison

<table>
<thead>
<tr>
<th>Insulins</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lispro* or Aspart</td>
<td>~15 minutes</td>
<td>1 – 2 hours</td>
<td>4 – 6 hours</td>
</tr>
<tr>
<td>Human Regular</td>
<td>30 – 60 minutes</td>
<td>2 – 4 hours</td>
<td>6 – 10 hours</td>
</tr>
<tr>
<td>Human NPH or Lente</td>
<td>2 – 4 hours</td>
<td>6 – 12 hours</td>
<td>12 – 20 hours</td>
</tr>
<tr>
<td>Human Ultralente</td>
<td>4 – 6 hours</td>
<td>Unpredictable</td>
<td>18 – 24 hours</td>
</tr>
<tr>
<td>Glargine*</td>
<td>2 – 4 hours</td>
<td>Peakless</td>
<td>20 – 26 hours</td>
</tr>
</tbody>
</table>

*Insulin analog

Profiles of Human Insulins and Analogs
**Pharmacologic Therapy**  
Possible Treatment Steps

**STEP 1**  
• Add metformin or insulin secretagogue

**STEP 2**  
• If on metformin, add insulin secretagogue  
• If on insulin secretagogue, add metformin

**STEP 3**  
• Add insulin  
• Switch to insulin  
• Add a thiazolidinedione

**STEP 4**  
• Add an oral drug to insulin  
• Use multiple component insulin therapy

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**Studies Aimed at Prevention of Type 2 DM**

**Lifestyle Modification Studies**  
- DPP (Diabetes Prevention Program)  
- DPN (Diabetes Prevention Study, Finnish Study)  
- Da Qing (Chinese Study)  
- Malmo Study (Males, Sweden)

**Drug Intervention Studies**  
- DPP  
- Step-NIDDM (Acarbose)  
- Prevention Evaluation (Ramipril)  
- TRIPOD Study (Troglitazone)  
- DREAM Study (Rosiglitazone, Ramipril)*  
- Navigator Study (Nateglinide, Valsartan)  
- Xendos trial (Orlistat)*  
- Sibutramine Study*

*Trial still underway

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**Summary**

- The Latino Population is the largest minority group in the country

- The prevalence of diabetes and its complications is higher in Latinos when compared to the non-Latino White group

- Genetic and environmental factors influence the development of obesity, metabolic syndrome and type 2 diabetes in Latinos

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**Summary**

- Multiple cultural factors influence diabetes care in Latinos

- Goals for glycemic control, BP, weight, lipids and smoking cessation need to be established

- Aggressive Management to reach these goals is important

- Early use of available pharmacologic treatment tools needs to be considered