Welcome to UVM ECHO: Treatment of Diabetes Mellitus Type II

Facilitators: Mark Pasanen MD, Liz Cote
January 28, 2021
“Introduction” to ZOOM

• Please mute microphone when not speaking
• Please use camera as much as possible
• Test both audio & video before joining
• Communicate clearly during clinic:
  • Can use “raise hand” feature to comment
  • Speak clearly
  • Use chat function for technical issues
• We are recording the didactic section
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Disclosures: None or have been resolved

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Treating Diabetes in Special Populations

Elderly
Pregnant Woman

Dr. Muriel H. Nathan, Endocrinology
Aims

• To discuss the changes with aging that impact on manifestations of DM in the elderly.
• To review which medications are best for those with co-morbidities
• To review why pregnancy is “diabetogenic.”
• Goals for pregnant women in pregnancy
• Use of insulin pumps versus multiple daily shots.
## Incidence of DM complications by age
(Incidence/1000 by survey 2009)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Amputation</th>
<th>ESRD</th>
<th>Hypoglycemia (ER visit)</th>
<th>Stroke</th>
<th>Ischemic Heart Disease</th>
<th>CHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 20-44</td>
<td>2</td>
<td>3</td>
<td>18</td>
<td>1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Age 45-64</td>
<td>2</td>
<td>4</td>
<td>15</td>
<td>1</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Age 65-74</td>
<td>4</td>
<td>4</td>
<td>14</td>
<td>12</td>
<td>28</td>
<td>18</td>
</tr>
<tr>
<td>Age 75 and older</td>
<td>4</td>
<td>4</td>
<td>30</td>
<td>20</td>
<td>35</td>
<td>38</td>
</tr>
</tbody>
</table>
Reasons for DM in older adults

• Lifestyle and genetics lead to obesity
• Co-morbid conditions and aging lead to irregular diets and decreased activity
• Increased resistance to metabolic effects of insulin
  • Prediabetes with A1c 5.7-6.4%  (FBS 100-125)
  • Diabetes 2 with A1c 6.5% or higher (FBS 126 or greater or random glucose 200 or higher)
• Decreased pancreatic beta cell mass and function
  • Impaired adaption to insulin resistance
  • “Balding of islet cells” can lead to insulin deficiency
General Health Assessment

• Functional status, ADLs, cognition, depression, fall risk, WT, BP, Tobacco and ETOH use. Medication review, cancer screening, Hearing, visual acuity, frailty, co-morbidities.

• General Health tests
  • EKG, lipids, bone density, AAA U/SD, diabetes screening

• Diabetes-specific health
  • Retinopathy
  • Nephropathy
  • Neuropathy
  • Medical nutrition
  • Diabetes treatment
  • Diabetes self-management training
## Goals of therapy

<table>
<thead>
<tr>
<th>Overall Health</th>
<th>Good</th>
<th>Intermediate</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Characteristics</td>
<td>No co-morbidities or 1-2 chronic non-DM illnesses No ADL impairment or just 1</td>
<td>3 or more non-DM chronic illnesses Mild cognitive impairment or early dementia 1-2 ADL impairments</td>
<td>End-stage medical condition Moderate-severe dementia &gt;2 ADL impairments Resides in NH</td>
</tr>
<tr>
<td>SU (Glipizide, Glyburide, Glimepiride) or insulin</td>
<td>No-FBS 90-130 Bedtime 90-150 A1c &lt; 7.5%</td>
<td>FBS 90-150 Bedtime 100-180 A1c &lt;8%</td>
<td>FBS 100-180 Bedtime 110-200 A1c &lt; 8.5%</td>
</tr>
<tr>
<td></td>
<td>Yes-FBS 90-150 Bedtime 100-180 A1c 7-7.5%</td>
<td>FBS 100-150 Bedtime 150-180 A1c 7.5-8%</td>
<td>FBS 100-180 Bedtime 150-250 A1c 8-8.5%</td>
</tr>
</tbody>
</table>
## Drugs that do not cause Hypoglycemia

<table>
<thead>
<tr>
<th>Medication</th>
<th>Older Adults</th>
<th>CKD 3-5</th>
<th>CAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>Diarrhea, GI, B12 lower</td>
<td>Reduce dosage if GFR &lt; 45</td>
<td>Beneficial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stop if GFR &lt; 30?</td>
<td>May avoid in severe CHF</td>
</tr>
<tr>
<td>TZDs (Pioglitazone)</td>
<td>Increase fluid retention</td>
<td>No dose change needed</td>
<td>Reduces CV mortality</td>
</tr>
<tr>
<td></td>
<td>Increase fracture risk</td>
<td></td>
<td>Can increase CHF</td>
</tr>
<tr>
<td>Alpha-glucosidase</td>
<td>GI side effects-gas,</td>
<td>Avoid if Cr &gt; 2</td>
<td></td>
</tr>
<tr>
<td>(Precose)</td>
<td>bloating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPP4 (Sitagliptin)</td>
<td></td>
<td>Decrease dose if GFR &lt;50 to 50 mg and decrease to 25 mg if &lt; 30 Linagliptin needs no dose change</td>
<td>May increase risk for CHF</td>
</tr>
<tr>
<td>SGLT2 (Empagliflozin)</td>
<td>Volume depletion</td>
<td>Avoid use if GFR &lt; 45</td>
<td>Cardio-protective</td>
</tr>
<tr>
<td>GLP-1 (Liraglutide)</td>
<td>GI side effects</td>
<td>No dose change needed</td>
<td>Reno-protective</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Reduce CVD events</td>
</tr>
</tbody>
</table>
# Drugs that cause Hypoglycemia

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<thead>
<tr>
<th>Medication</th>
<th>Older Adults</th>
<th>CKD 3-5</th>
<th>CAD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUs (Glimepiride, Glyburide, Glipizide)</strong></td>
<td>Can cause wt gain Avoid glyburide ! Low glucoses</td>
<td>Glimepiride-stop if GFR&lt;30 Glipizide-no dose change needed but use caution if GFR &lt; 30 Glyburide should not be used if GFR &lt; 60</td>
<td>No benefit Potential lows can cause arrhythmias, stroke, falls</td>
</tr>
<tr>
<td><strong>Glinides (Nateglinide, Repaglinide)</strong></td>
<td>Low glucoses</td>
<td>Nateglinide-stop if GFR &lt;60 but can use on dialysis Repaglinide use with caution if GFR &lt; 30</td>
<td>Same as SUs, just shorter acting</td>
</tr>
<tr>
<td><strong>Insulin</strong></td>
<td>Low glucoses</td>
<td>Dose can be adjusted to avoid lows</td>
<td>Same as SUs</td>
</tr>
</tbody>
</table>
Why pregnancy is diabetogenic

Physiology

• Placenta makes hormones that stimulate growth that cause insulin resistance as does the wt gain in pregnancy.

• Hyperglycemia can lead to pre-eclampsia (OR 3.4), congenital defects (OR 2-4), pre-term delivery (OR 3.4), macrosomia (OR 1.9) and stillbirth (OR 3.5). Neonatal hypoglycemia often seen (OR 26), while respiratory distress is not that common (OR 2).

• Fetal exposure can lead to cognitive defects with worse school performance later, increased ADHD, higher rates of obesity and DM as adults.

Pattern of Requirement

<table>
<thead>
<tr>
<th>Stages of pregnancy</th>
<th>Insulin requirements</th>
</tr>
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<tbody>
<tr>
<td>0-9 wks</td>
<td>Increase</td>
</tr>
<tr>
<td>9-14 wks</td>
<td>Decrease</td>
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<tr>
<td>14-16 wks</td>
<td>Low</td>
</tr>
<tr>
<td>16-37 wks</td>
<td>At least double</td>
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<tr>
<td>37-40 wks</td>
<td>May decrease</td>
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<tr>
<td>Immediate Postpartum</td>
<td>50% pre-preg needs.</td>
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</tbody>
</table>

Multiparous women may need 15-35% more.
DKA in pregnancy

Pregnant women are predisposed to DKA, 1s>2s, since pregnancy promotes insulin resistance, accelerated lipolysis and surplus free fatty acids (which can be shunted to ketone bodies).

hCG levels that are high can lead to nausea and vomiting.

Check for ketones if glucose > 250 or nausea/vomiting or inability to eat/drink.
Pregnancy goals

Monitor FS fasting, pre-prandial and 1-2 hrs prandial

<table>
<thead>
<tr>
<th>Timing</th>
<th>Target</th>
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<tbody>
<tr>
<td>Preconception</td>
<td></td>
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<tr>
<td>A1c</td>
<td>&lt;6.5%</td>
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<tr>
<td>During pregnancy</td>
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</tr>
<tr>
<td>A1c</td>
<td>&lt;  6%</td>
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<tr>
<td>Fasting glucose</td>
<td>&lt;  96</td>
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<td>1 hr / 2hrs after meals</td>
<td>&lt; 141/ &lt; 121</td>
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Glucose outside goals

- Hyperglycemia
  - Rule out infections, esp. UTI and use of steroids
  - Insulin requirements increase week 18-24

- Nocturnal hypoglycemia
  - Rule out fetal death, hypothyroidism, adrenal insufficiency (rare primary, hypophysitis can occur) and hepatic or renal failure
  - Give high protein, complex carbohydrate snack at bedtime
Insulin delivery in pregnancy

MDI (multiple daily shots, basal and mealtime insulin)
• Detemir and N are preferred, but Glargine is also fine.
• Mealtime-Regular, Humalog and Novolog.
• Usually need requirement increased each few weeks after 18-36

CSII-Continuous SQ Insulin Infusion (insulin pumps)
• Pumps are ideal for managing IDDM, but there is an increased risk for DKA if site lost due to no basal insulin on board. Less lows.
• Smart pumps-670 G, Tandem and Omnipod use algorithm to keep FS <150, may not be tight enough for pregnancy but Tandem does shut off if glucose is low (<70). And patients on smart pumps have to give insulin for meals main cause of hyperglycemia so can use more insulin/gm carb ratios to keep glucoses in range.
<table>
<thead>
<tr>
<th>24</th>
<th>3A</th>
<th>6A</th>
<th>8A</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
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<td>161</td>
<td>99</td>
<td>138</td>
<td>161</td>
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</tbody>
</table>

Started pump at 1600

Basal rate is 0.475, CHO ratio is 1:20, correction is 1/60>110

What would you change ????
Non-insulin medications and pregnancy if DM2

• Controversy if Metformin is safe.
  • ADA advises stopping
  • Some with PCOS continue Metformin through the first trimester
  • Glyburide (chosen as least likely to cross placenta among SUs) has been used by some practices and seemed non-inferior to insulin for macrosomia, neonatal hypoglycemia and hyperbilirubinemia, but data is lacking for safety and can lead to wt gain.
  • Do not recommend DPP4, GLP-1 or SGLT2
    • GLP-1 Exenatide does not seem to cross the placenta-future role???
Delivery Plan

• Increased fetal monitoring, with anatomy scan at 18-20 weeks.
• Non-stress test starting at 32 weeks, 1-2x/week.
• Delivery at 39 weeks, slightly longer if well controlled and no DM complications
  • Often use IV insulin in labor
  • After delivery insulin is cut 50% of pre-pregnancy needs for 48 hrs or so.
References


Cases/HIPAA

→ stop recording

• Names
• Address
• DOB
• Phone/Fax #
• Email address
• Social Security #
• Medical Record #
THANKS TO EVERYONE!!!

• Please complete evaluation forms
  • CME will be processed once session evaluation form is received
• UVM Project ECHO materials available at www.vtahec.org
• Please contact us with any questions/suggestions
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