ABC’s of Diabetes

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Diabetes Is….

• Difficult
• Boring
• Tedious
• A Drag
• A Pain!
• So? What should we do?
Diabetes Background
Diabetes In America

• 30 million have diabetes (about 90% are type 2)
• Expect about 1/3 of population to have diabetes by 2050
• 1.7 million new in 2012
• 86 million have prediabetes
• Racial/ethnic/geographic disparities

CDC
Diabetes In The Region

- About 25% have diabetes over age 65
- In the region:

<table>
<thead>
<tr>
<th>State</th>
<th>Percentage</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Dakota</td>
<td>7.9</td>
<td>1</td>
</tr>
<tr>
<td>Montana</td>
<td>8.1</td>
<td>5</td>
</tr>
<tr>
<td>Wyoming</td>
<td>8.3</td>
<td>6</td>
</tr>
<tr>
<td>Minnesota</td>
<td>8.4</td>
<td>7</td>
</tr>
<tr>
<td>North Dakota</td>
<td>8.6</td>
<td>9</td>
</tr>
<tr>
<td>Nebraska</td>
<td>8.8</td>
<td>10</td>
</tr>
<tr>
<td>Iowa</td>
<td>9.3</td>
<td>14</td>
</tr>
</tbody>
</table>

SD DOH
Diabetes Disparities

- Native American 16.1%
- Black 12.6%
- Hispanic 11.8%
Diabetes Mellitus

- **Type 1**: Usually younger, insulin at diagnosis
- **Type 2**: Usually older, often oral agents (pills) at diagnosis
- **Type “1.5”** (Latent Autoimmune)  mixed features ~10% of type 2
- **Gestational**: Diabetes of Pregnancy
Diabetes Risk and Prevention

Risk:
- Type 1- mostly unknown, maybe family history
- Type 2- obesity, smoking, sedentary lifestyle, family history, high blood pressure

Prevention:
- Type 1- none known
- Type 2- lifestyle management (this matters a LOT)
## Diabetes Diagnosis

<table>
<thead>
<tr>
<th>Category</th>
<th>FPG (mg/dL)</th>
<th>A1C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;100</td>
<td>&lt;5.7</td>
</tr>
<tr>
<td>Prediabetes</td>
<td>100-125</td>
<td>5.7-6.4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>&gt;126**</td>
<td>≥6.5</td>
</tr>
</tbody>
</table>

*Or patients with classic hyperglycemic symptoms with plasma glucose >200*

** On 2 separate occasions

*Diabetes Care 37:Supplement 1, 2014*
Why Is Prediabetes Important?

- 86 million people have prediabetes
- Blood sugars are abnormal, but not high enough to be diagnosed with diabetes
- Lifestyle can prevent over half of prediabetes cases converting to type 2 diabetes (and the complications that go with it!)
- 150 minutes of exercise/week, weight loss of 5-7%
So What Do Diabetes Professionals Do?

Diabetes Guideline Management

- 2 main sets of guidelines utilized in U.S.
- American Diabetes Association (ADA)
- American Association of Clinical Endocrinology (AACE)
- Lots of overlap, AACE considered “more intense”
Risks for Complications in Diabetes

- Abnormal blood sugar
- Abnormal cholesterol
- Abnormal blood pressure
- Sedentary lifestyle
- Smoking
Diabetes Complications

• Macrovascular Disease
  – Heart Disease
  – Stroke
  – Peripheral Arterial Disease (risk for amputation)

• Microvascular Disease
  – Kidney disease (nephropathy)
  – Eye disease (retinopathy)
  – Nerve disease (neuropathy) (risk for amputation)

• Other
  – Liver Disease
  – Infections
ABC’s of Diabetes
Avoiding Diabetes Complications
ABC’s of Diabetes

• A1C (blood sugar) <7% (or what’s right for you)
• Blood pressure to target <140/<90
• Cholesterol- different guideline now
A1C (blood sugar)
Treating A1C (Blood Sugar) In Diabetes

• Evidence is strong that lower A1C’s are associated with fewer diabetes complications
• UKPDS: Type 2 research study
• DCCT/EDIC: Type 1 research study
• Both now have 30 years + of data
# A1C ~ “Average Glucose”

<table>
<thead>
<tr>
<th>A1C</th>
<th>eAG</th>
<th>mg/dL</th>
<th>mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td>126</td>
<td>7.0</td>
</tr>
<tr>
<td>6.5</td>
<td></td>
<td>140</td>
<td>7.8</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>154</td>
<td>8.6</td>
</tr>
<tr>
<td>7.5</td>
<td></td>
<td>169</td>
<td>9.4</td>
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<td>8</td>
<td></td>
<td>183</td>
<td>10.1</td>
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<tr>
<td>8.5</td>
<td></td>
<td>197</td>
<td>10.9</td>
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<tr>
<td>9</td>
<td></td>
<td>212</td>
<td>11.8</td>
</tr>
<tr>
<td>9.5</td>
<td></td>
<td>226</td>
<td>12.6</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>240</td>
<td>13.4</td>
</tr>
</tbody>
</table>

*Formula: 28.7 \times A1C - 46.7 - eAG*
Goals of Glucose Management

Targets for glycemic control for many patients:

<table>
<thead>
<tr>
<th></th>
<th>ADA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1c (%)</td>
<td>&lt;7</td>
</tr>
<tr>
<td>Fasting (preprandial) plasma glucose</td>
<td>80-130 mg/dL</td>
</tr>
<tr>
<td>Postprandial (after meal) plasma glucose</td>
<td>&lt;180 mg/dL</td>
</tr>
</tbody>
</table>
How Do We Pick A1C Target

• 7 or less is good for many, especially younger/little or no complications
• “magic number” for far fewer complications
• Some are not good candidates for A1C <7
  – Elderly
  – Advanced complications that already exist
  – Cardiovascular disease
  – Can’t recognize low blood sugar symptoms
What Patients Should Be Thinking About

• Weight loss- some meds are better for this
• Staying on the medications as prescribed
• Talking to your providers about what to watch out for
• What is working? What is not?
Common Diabetes Medications
Medications for Blood Sugar In Diabetes

- Type 1  Insulin
- Type 2  many different pills, non-insulin injectables, insulin
A1C Lowering

• Most oral agents 0.5-0.8 (SGLT-2 maybe more)
• GLP-1 agonists 0.5-1.5
• Insulin only limited by hypoglycemia
Metformin

Yes:
- recommended for most
- insulin sensitivity and action at liver
- weight neutral
- easy to use with other meds
- inexpensive
- rare hypoglycemia
- may reduce CVD

No:
- GI upset
- avoid in renal (GFR<45) or overt liver disease
- may cause B12 deficiency
Sulfonylureas
(glyburide, glipizide, glimiperide)

Yes:
• inexpensive
• stimulate pancreas insulin production

No:
• hypoglycemia
• renal or liver disease
• elderly
• weight gain
Thiazolodinediones (TZD) (pioglitazone-
Actos, rosiglitazone- Avandia)

Yes:
- improve insulin sensitivity
- may preserve betacell function
- rare hypoglycemia
- combine with many others

No:
- edema (swelling)
- CHF
- weight gain
- renal or hepatic disease
- heart disease risk ? (rosiglitazone)
- bladder cancer ? (pioglitazone)
DPP-IV inhibitors
Sitagliptin (Januvia)
Saxagliptin (Onglyza)
Linagliptin (Tradjenta)
Alogliptin (Nesina)

Yes:
- act on gut enzyme to raise native GLP-1 hormone
- weight neutral or weight loss
- rare hypoglycemia
- combined with many except GLP-1
- few drug interactions
- renal dosing
- mixed results CVD

No:
- pancreatitis
- nausea/vomiting
- joint pain
SGLT-2 inhibitors
Canagliflozin (Invokana)
Dapagliflozin (Farxiga)
Empagliflozin (Jardiance)

Yes:
- act at kidney to increase glucosuria
- weight neutral or weight loss
- combined with many others
- may lower BP
- Empagliflozin and Canagliflozin lowers risk of heart attack and stroke (Empagliflozin FDA indicated)

No:
- genitourinary infections (UTI or yeast)
- polyuria
- hypotension
- renal disease (GFR<45)
- elderly
GLP-1 Medications

• Mimic native GLP-1 gut hormone
• Exenatide (Byetta BID, Bydureon weekly)
• Liraglutide (Victoza daily)
• Semaglutide (Ozempic)
• Albiglutide (Tanzeum weekly)
• Dulaglutide (Trulicity weekly)
• Available in pen injectors (simple)
• Modest weight loss
• Combined with other agents except DPP-IV inhibitors
GLP-1 Benefit

- Liraglutide - reduces CVD in persons with CVD
- Weight loss
- Good A1C lowering (usually lower than oral agents)
GLP-1 Problems

• Nausea, vomiting
• Pancreatitis
• Medullary thyroid carcinoma in rodents (liraglutide)
• Hypoglycemia combined with sulfonylurea and / or insulin
• Caution in renal or hepatic impairment
Weight Favorable

- DPP-IV inhibitors (gliptins)
- GLP-1 (probably the most)
- Metformin
- SGLT-2 inhibitors
Who Gets What?

• Metformin for almost all
• Others in combo as needed
• Determining factors are often ease of use, side effect profile, presence of kidney disease
• We do a lot of metformin +
  – SGLT-2 and/or
  – GLP1-1 or
  – DPP-IV
Because these are weight friendly combinations with little chance of low blood sugar
Who Gets What?

- New addition to ADA Standards of Care
  - Empagliflozin
  - Liraglutide
- Recommended for those with established CVD, both drugs reduce CVD and are FDA indicated for these patients
Why Insulin in Type 2 Diabetes?

• The pancreas makes less insulin as time goes by
• Many pills may be less effective as a result
• Diabetes longer than 8-10 years and an A1C greater than 9, you may need insulin
• Many feel better
• Available in pens
How Much Insulin? What Kind?

• Long acting “basal” insulins are usually used first
• Lantus, Levemir, Tujeo, Tresiba
• Usually start on 10 units a day
• Not unusual to need 50 or more units a day, but this usually warrants addition of rapid acting mealtime insulin, GLP-1, or SGLT-2 inhibitor
Blood Pressure
Assess High Blood Pressure in Diabetes

• <140/<90 for most to reduce heart attack, stroke, kidney disease (ADA)
• ACC/AHA if >130/>80 is an “action step”
• Consider lifestyle management if >120/>80 (i.e., DASH diet)
• Almost all adults with type 1 or type 2 diabetes have hypertension (really hard for type 1’s to get their minds around this)
• DO NOT go on ACEI or ARB just because diagnosed DM
Treating High Blood Pressure in Diabetes

• First line treatment
  – Thiazide diuretics, dihydropyridine calcium channel blockers, ACE inhibitors, ARB
  – If albuminuria, ACEI or ARB
  – Most with CVD will also get beta blocker
  – Most patients need more than one medication
    (dose one at bedtime for better results)
  – Home monitoring
Cholesterol (Lipids)
Treating Dyslipidemia in Diabetes

- Very important in adults with diabetes
- Statin drugs are potent in reducing heart attack and stroke
- Adults with diabetes over 40 - nearly all should be on a statin to reduce heart attack and stroke
# Statin Recommendations

Table 9.2—Recommendations for statin and combination treatment in adults with diabetes

<table>
<thead>
<tr>
<th>Age</th>
<th>ASCVD</th>
<th>Recommended statin intensity* and combination treatment†</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40</td>
<td>No</td>
<td>None†</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>High&lt;br&gt;• If LDL cholesterol ≥ 70 mg/dL despite maximally tolerated statin dose, consider adding additional LDL-lowering therapy (such as ezetimibe or PCSK9 inhibitor)‡</td>
</tr>
<tr>
<td>≥40</td>
<td>No</td>
<td>Moderate‡</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>High&lt;br&gt;• If LDL cholesterol ≥ 70 mg/dL despite maximally tolerated statin dose, consider adding additional LDL-lowering therapy (such as ezetimibe or PCSK9 inhibitor)‡</td>
</tr>
</tbody>
</table>

*In addition to lifestyle therapy. †For patients who do not tolerate the intended intensity of statin, the maximally tolerated statin dose should be used. ‡Moderate-intensity statin may be considered based on risk-benefit profile and presence of ASCVD risk factors. ASCVD risk factors include LDL cholesterol ≥ 100 mg/dL (2.6 mmol/L), high blood pressure, smoking, chronic kidney disease, albuminuria, and family history of premature ASCVD. ‡High-intensity statin may be considered based on risk-benefit profile and presence of ASCVD risk factors. †Adults aged <40 years with prevalent ASCVD were not well represented in clinical trials of non-statin-based LDL reduction. Before initiating combination lipid-lowering therapy, consider the potential for further ASCVD risk reduction, drug-specific adverse effects, and patient preferences.
# Statin Intensity

## Table 9.3—High-intensity and moderate-intensity statin therapy*

<table>
<thead>
<tr>
<th>High-intensity statin therapy (lowers LDL cholesterol by ≥50%)</th>
<th>Moderate-intensity statin therapy (lowers LDL cholesterol by 30% to 50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin 40–80 mg</td>
<td>Atorvastatin 10–20 mg</td>
</tr>
<tr>
<td>Rosuvastatin 20–40 mg</td>
<td>Rosuvastatin 5–10 mg</td>
</tr>
<tr>
<td>Simvastatin 20–40 mg</td>
<td>Simvastatin 20–40 mg</td>
</tr>
<tr>
<td>Pravastatin 40–80 mg</td>
<td>Pravastatin 40–80 mg</td>
</tr>
<tr>
<td>Lovastatin 40 mg</td>
<td>Lovastatin 40 mg</td>
</tr>
<tr>
<td>Fluvastatin XL 80 mg</td>
<td>Fluvastatin XL 80 mg</td>
</tr>
<tr>
<td>Pitavastatin 2–4 mg</td>
<td>Pitavastatin 2–4 mg</td>
</tr>
</tbody>
</table>

*Once-daily dosing. XL, extended release.
Treating Older Adults

- Consider cognitive status, complexity
- Often less stringent targets (avoid hypoglycemia and orthostatic hypotension)
- Statins - case by case, if shorter lifespan, maybe not
- Aspirin - weigh risk of bleeding
Lifestyle Management
Lifestyle Management of Diabetes

• Most everyone can do something
• Even 10 minutes of activity a day is worthwhile
• Research exercise equipment before buying
• Even smaller communities now have fitness centers
• Make sure your heart health is appropriate for exercise
• What’s in your community?
• For a list of the DPPs in ND go to: http://www.diabetesnd.org/diabetes-prevention/find-a-lifestyle-coach/
Psychosocial Issues: Recommendations

• Psychosocial care should be integrated with a collaborative, patient-centered approach and provided to all people with diabetes, with the goals of optimizing health outcomes and health-related quality of life (QOL)

• Psychosocial screening and follow-up may include, but are not limited to, attitudes about diabetes, expectations for medical management and outcomes, affect or mood, general and diabetes-related QOL, available resources (financial, social, and emotional), and psychiatric history
Psychosocial Issues: Recommendations

• Providers should consider assessment for symptoms of diabetes distress, depression, anxiety, disordered eating, and cognitive capacities using patient-appropriate standardized and validated tools at the initial visit, at periodic intervals, and when there is a change in disease, treatment, or life circumstance. Including caregivers and family members in this assessment is recommended.

• Consider screening older adults (aged ≥65 years) with diabetes for cognitive impairment and depression.

ADA 2018
Psychosocial Issues

- Always consider complexity when assessing adherence
- The ideal plan may not be possible
Dealing with Cost Issues

• Be familiar with what plan covers
• Pharmacist is key in some of these decisions
• If you’ve had a big change in cost, may just need a medication/blood glucose monitor/test strips that are a different brand- that is almost always OK!
• Discount programs/coupons
How Often Should Blood Sugar Be Tested?

- On metformin only, history of good control:
  - 1-3 times a week (maybe less)
- More complicated:
  - may need more testing at different times of day
  - a 2 hour after meal blood sugar sometimes is more meaningful
  - sometimes more isn’t better, when matters
  - fasting and 2 hours after biggest meal gives me most info
- Don’t feel right? Illness? More often
- Travel? Change in routine? More often
Numbers......

- We aren’t just chasing numbers......
- These are numbers with meaning
- Meaningful targets are related to quality outcomes
- Data shows us reductions in complications when targets are met
In Closing.....

• A1C, BP, Lipids are all meaningful numbers with targets related to quality outcomes
• Diabetes success is often a result of connecting with diabetes, not separating from it
• Consider psychosocial factors and other barriers (i.e., complexity)