Clinical Pharmacotherapeutic Applications of the American Diabetes Association Standards of Care 2018

RACHEL NAIDA, PHARM D, C DE
CLINICAL ASSOCIATE PROFESSOR
UNIVERSITY OF NEW ENGLAND COLLEGE OF PHARMACY
Objectives

- Describe pertinent updates in the American Diabetes Association (ADA) Standards of Medical Care in Diabetes 2018
- Select appropriate, individualized pharmacotherapy to target glycemic goals
- Identify individualized pharmacotherapy to address obesity and cardiovascular disease risk management
Outline of Presentation

- Review diabetes and discuss major components of the ADA Standards of Care 2018
- Review updates in the ADA Standards of Care 2018
- Highlight specific updates pertinent to therapeutic optimization of pharmacotherapy
- Overview of pharmacotherapy agents and risk/benefit discussion of each
Diabetes Overview (In a Nutshell)
Quick Diabetes Overview

Classification

- **Type 1 Diabetes**: autoimmune destruction of β-cells
  - Absolute insulin deficiency
- **Type 2 Diabetes**: Insulin resistance leads to progressive loss of β-cell insulin secretion
- **Gestational Diabetes**: Diagnosed in the 2nd or 3rd trimester of pregnancy
# Quick Diabetes Overview

## Diagnosis

<table>
<thead>
<tr>
<th>Test</th>
<th>Result at which Diabetes Diagnosis Confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting Plasma Glucose (FPG)*</td>
<td>≥ 126 mg/dL</td>
</tr>
<tr>
<td>2-Hour Plasma Glucose (2-h PG)*</td>
<td>≥ 200 mg/dL</td>
</tr>
<tr>
<td>Hemoglobin A1C*</td>
<td>≥ 6.5%</td>
</tr>
<tr>
<td>Random Plasma Glucose* (RPG)**</td>
<td>≥ 200 mg/dL</td>
</tr>
</tbody>
</table>

*Results should be confirmed by repeat testing unless there is clear symptomatic presentation of hyperglycemia.

**Must have classic symptoms of hyperglycemia or hyperglycemic crisis to utilize RPG as diagnostic test.
Quick Diabetes Overview

Complications and Comorbidities

Complications
- Macrovascular
  - Cardiovascular disease
  - Stroke
- Microvascular
  - Retinopathy
  - Neuropathy
  - Nephropathy

Common comorbidities
- Autoimmune disorders
- Cognitive impairment
- Dyslipidemia
- Hypertension
- Obesity
- Psychosocial conditions
Comprehensive Care Needs

- Aspirin therapy
- B12 level
- Dental/oral exam
- Depression screening
- Diabetes self-management education
- Dilated eye exam
- Foot exam
- Annual influenza vaccination
- Pneumococcal vaccination
- Hepatitis B vaccination
- Serum creatinine measurement
- Urine test for albumin-to-creatinine ratio
- Smoking cessation counseling

### ADA Recommended Glycemic Targets

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Target Value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1C</td>
<td>&lt;7%</td>
<td>• Reasonable target for most non-pregnant adults</td>
</tr>
</tbody>
</table>
|                 | <8%          | • Possibly appropriate for selected patients  
|                 |              | • History of severe hypoglycemia  
|                 |              | • Limited life expectancy  
|                 |              | • Advanced micro/macrovacular disease |
|                 | <6.5%        | • Possibly appropriate for selected patients  
|                 |              | • Without hypoglycemia/adverse effects of therapy  
|                 |              | • Long life expectancy  
|                 |              | • Without significant micro/macrovacular disease |

#### Glycemic Targets for A1C Goal <7%

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-prandial plasma glucose</strong></td>
<td>80 - 130 mg/dL</td>
</tr>
<tr>
<td><strong>Post-prandial plasma glucose</strong></td>
<td>&lt;180 mg/dL</td>
</tr>
</tbody>
</table>

Updates to the ADA Standards of Care 2018
Classification and Diagnosis, A1C testing:
- Informs providers to be aware of potential limitations in A1C testing that may affect results

Lifestyle Management:
- Delivery of education: Should include individual, group and technology based platforms
- Macronutrients: There is no universal ideal distribution, individualize eating patterns

Patient centered approach:
- Emphasizes importance of assessing financial limitations, access to healthy food, food insecurities, and community support
Management of diabetes in select populations:

- **Older adults**: Recommendations to reduce risk of hypoglycemia, avoid over treatment and simplify complex regimens

- **Pregnant women**: New recommendation for women with type 1 and 2 diabetes to take low dose aspirin at the end of the first trimester to lower risk of pre-eclampsia
Pharmacologic approaches to glycemic treatment:

Patient factors and choice of anti-hyperglycemic treatment: Highlights drug specific factors that should be used to guide therapy choices.

Cardiovascular disease and risk management:

Cardiovascular outcomes trial (CVOT) data: New pharmacotherapy recommendations for patients with atherosclerotic cardiovascular disease (ASCVD).

Blood pressure targets: Still <140/90 despite new ACC/AHA guidelines. Suggests patients monitor BP at home.
Pharmacologic Approaches to Glycemic Treatment
Pharmacologic Therapy for Type 2 Diabetes

Summary

- **Metformin** is the preferred initial agent
- Consider initiating dual therapy in newly diagnosed patients with HgA1C ≥ 9%
- Consider initiation of insulin in newly diagnosed patients presenting symptomatic and/or with HgA1C ≥ 10%

Patient centered approach to treatment

- Factors to consider:
  - Efficacy
  - Hypoglycemia risk
  - History of ASCVD
  - Impact on weight
  - Side effects
  - Renal effects
  - Delivery method
  - Cost
  - Patient preferences

Pharmacologic Therapy for Type 2 Diabetes

Summary

- Continuously reevaluate medication regimen and adjust as needed
- If glycemic goals are not achieved, drug intensification should **not** be delayed
- Continue metformin in combination with other agents, including insulin, in the absence of contraindications or intolerance
If A1C not controlled, advance to basal-bolus

Add ≥2 rapid-acting insulin injections before meals (‘basal-bolus’)

**Start:** 4 units, 0.1 U/kg, or 10% basal dose/meal. If A1C <8%, consider ↑ basal by same amount

**Adjust:** ↑ dose(s) by 1-2 units or 10-15% once or twice weekly to achieve SMBG target

**For hypo:** Determine and address cause; if no clear reason for hypo, ↓ corresponding dose by 2-4 units or 10-20%

If goals not met, consider changing to alternative insulin regimen

**Start:** Add additional injection before lunch

**Adjust:** ↑ doses by 1-2 units or 10-15% once or twice weekly to achieve SMBG target

**For hypo:** Determine and address cause; if no clear reason for hypo, ↓ corresponding dose by 2-4 units or 10-20%

If A1C not controlled, advance to 3rd injection

Change to premixed analog insulin 3 times daily (breakfast, lunch, supper)

**Start:** Add additional injection before lunch

**Adjust:** ↑ doses by 1-2 units or 10-15% once or twice weekly to achieve SMBG target

**For hypo:** Determine and address cause; if no clear reason for hypo, ↓ corresponding dose by 2-4 units or 10-20%
### Pharmacologic Therapy for Type 2 Diabetes

#### Brief Review of Agents – “Older Agents”

<table>
<thead>
<tr>
<th>CLASS</th>
<th>GENERIC NAME</th>
<th>BRAND NAME(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biguanides</td>
<td>Metformin</td>
<td>Fortamet®, Glucophage®, Glucophage XR®, Glumetza®, Riomet®</td>
</tr>
<tr>
<td>Alpha Glucosidase Inhibitors</td>
<td>Acarbose</td>
<td>Precose®</td>
</tr>
<tr>
<td></td>
<td>Miglitol</td>
<td>Glyset®</td>
</tr>
<tr>
<td>Thiazolidinediones</td>
<td>Pioglitazone</td>
<td>Actos®</td>
</tr>
<tr>
<td></td>
<td>Rosiglitazone</td>
<td>Avandia®</td>
</tr>
<tr>
<td>Sulfonyleureas (2nd generation)</td>
<td>Glimepiride</td>
<td>Amaryl®</td>
</tr>
<tr>
<td></td>
<td>Glipizide</td>
<td>Glucotrol®, Glucotrol XL®</td>
</tr>
<tr>
<td></td>
<td>Glyburide</td>
<td>Diabeta®, Glynase®</td>
</tr>
<tr>
<td>Glinides</td>
<td>Nateglinide</td>
<td>Starlix®</td>
</tr>
<tr>
<td></td>
<td>Repaglinide</td>
<td>Prandin®</td>
</tr>
<tr>
<td>Bile Acid Sequestrants</td>
<td>Colesevelam</td>
<td>Welchol®</td>
</tr>
</tbody>
</table>
### Pharmacologic Therapy for Type 2 Diabetes

#### Brief Review of Agents - “Newer Agents”

<table>
<thead>
<tr>
<th>CLASS</th>
<th>GENERIC NAME</th>
<th>BRAND NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DPP4 Inhibitors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alogliptin</td>
<td>Nesina®</td>
<td></td>
</tr>
<tr>
<td>Linagliptin</td>
<td>Tradjenta®</td>
<td></td>
</tr>
<tr>
<td>Saxagliptin</td>
<td>Onglyza®</td>
<td></td>
</tr>
<tr>
<td>Sitagliptin</td>
<td>Januvia®</td>
<td></td>
</tr>
<tr>
<td><strong>GLP-1 Receptor Agonists (GLP-1 RA)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albiglutide</td>
<td>Tanzeum®</td>
<td></td>
</tr>
<tr>
<td>Dulaglutide</td>
<td>Trulicity®</td>
<td></td>
</tr>
<tr>
<td>Exenatide</td>
<td>Byetta®</td>
<td></td>
</tr>
<tr>
<td>Exenatide ER</td>
<td>Bydureon®</td>
<td></td>
</tr>
<tr>
<td>Liraglutide</td>
<td>Victoza®</td>
<td></td>
</tr>
<tr>
<td>Lixisenatide</td>
<td>Adlyxin®</td>
<td></td>
</tr>
<tr>
<td>Sema glutide</td>
<td>Ozempic®</td>
<td></td>
</tr>
<tr>
<td><strong>SGLT2 Inhibitors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canagliflozin</td>
<td>Invokana®</td>
<td></td>
</tr>
<tr>
<td>Dapagliflozin</td>
<td>Farxiga®</td>
<td></td>
</tr>
<tr>
<td>Empagliflozin</td>
<td>Jardiance</td>
<td></td>
</tr>
<tr>
<td>Ertugliflozin</td>
<td>Steglatro</td>
<td></td>
</tr>
<tr>
<td>Drug Class</td>
<td>Efficacy</td>
<td>Hypoglycemia</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------</td>
<td>--------------</td>
</tr>
<tr>
<td>Metformin</td>
<td>High</td>
<td>No</td>
</tr>
<tr>
<td>SGLT2 Inhibitors</td>
<td>Modest</td>
<td>No</td>
</tr>
<tr>
<td>GLP-1 RAs</td>
<td>High</td>
<td>No</td>
</tr>
<tr>
<td>DPP4 Inhibitors</td>
<td>Modest</td>
<td>No</td>
</tr>
<tr>
<td>Thiazolidinediones (TZDs)</td>
<td>High</td>
<td>No</td>
</tr>
<tr>
<td>Sulfonylureas</td>
<td>High</td>
<td>Yes</td>
</tr>
<tr>
<td>Insulin</td>
<td>Highest</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table is adapted from information from Table 8.1: “Drug-specific and patient factors to consider when selecting antihyperglycemic treatment in adults with type 2 diabetes” from the ADA Standards of Care 2018.
<table>
<thead>
<tr>
<th></th>
<th>CV Effects</th>
<th>Renal Effects</th>
<th>Additional Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ASCVD</td>
<td>CHF</td>
<td>Progression of DKD</td>
</tr>
<tr>
<td>Metformin</td>
<td>Potential benefit</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>SGLT2 Inhibitors</td>
<td>Benefit: Canagliflozin</td>
<td>Benefit: Canagliflozin</td>
<td>Benefit: Canagliflozin</td>
</tr>
<tr>
<td></td>
<td>Empagliflozin**</td>
<td>Empagliflozin</td>
<td>Empagliflozin</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GLP1-RAs</td>
<td>Benefit: Liraglutide</td>
<td>Neutral</td>
<td>Benefit: Liraglutide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDP4 Inhibitors</td>
<td>Neutral</td>
<td>Potential Risk</td>
<td>Neutral</td>
</tr>
<tr>
<td>TZDS</td>
<td>Potential Benefit: Pioglitazone</td>
<td>Increased Risk</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfonlureas</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Insulin</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

Table is adapted from information from Table 8.1 from the ADA Standards of Care 2018
## Pharmacologic Therapy for Type 2 Diabetes

### Brief Review of Agents – Insulins

<table>
<thead>
<tr>
<th><strong>Rapid-acting</strong></th>
<th><strong>Short-acting</strong></th>
<th><strong>Intermediate-acting</strong></th>
<th><strong>Long-acting</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aspart</strong></td>
<td><strong>Human regular:</strong></td>
<td><strong>NPH:</strong></td>
<td><strong>Glargine:</strong></td>
</tr>
<tr>
<td>Novolog (Flexpen), Fiasp</td>
<td>Humulin R, Humulin U-500, Novolin R</td>
<td>Humulin N, Novolin N</td>
<td>Lantus Solostar, Basaglar</td>
</tr>
<tr>
<td><em>Fiasp is a ‘faster-acting’ formulation</em></td>
<td></td>
<td></td>
<td>Kwikpen [U-100], Toujeo [U-300]</td>
</tr>
<tr>
<td><strong>Lispro</strong></td>
<td></td>
<td></td>
<td><strong>Detemir:</strong></td>
</tr>
<tr>
<td>Humalog U-100 (Kwikpen, HumaPen Luxura), Humalog U-200 (Kwikpen); <em>Admelog is ‘faster-acting’ formation</em></td>
<td></td>
<td></td>
<td>Levemir Flextouch</td>
</tr>
<tr>
<td><strong>Glulisine:</strong></td>
<td></td>
<td></td>
<td><strong>Degludec:</strong></td>
</tr>
<tr>
<td>Apidra Solostar</td>
<td></td>
<td></td>
<td>Tresiba Flextouch (U-100, U-200)</td>
</tr>
</tbody>
</table>

### Mixtures

<table>
<thead>
<tr>
<th><strong>Humalog Mix 50/50</strong> (Kwikpen)</th>
<th><strong>Novolog Mix 70/30</strong> (Flexpen)</th>
<th><strong>Novolin 70/30</strong> (vials)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humalog Mix 75/25 (Kwikpen)</td>
<td>Humulin 70/30 (Kwikpen)</td>
<td>Relion Novolin 70/30 (vials)</td>
</tr>
</tbody>
</table>
# Brief Review of Agents - Combination Products

<table>
<thead>
<tr>
<th>Metformin-combos</th>
<th>SU/glinide/TZD-combos</th>
<th>DPP-4-combos</th>
<th>SGLT2-combos</th>
<th>GLP-1-combos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Met/glipizide:</td>
<td>Glimepiride/pioglitazone:</td>
<td>Sotaglipitin/metformin:</td>
<td>Canagliflozin/metformin:</td>
<td>Liraglutide/insulin degludec:</td>
</tr>
<tr>
<td>Met/highburide:</td>
<td>Glimepiride/metformin</td>
<td>J anumet®</td>
<td>Invokamet®</td>
<td>Xultophy®</td>
</tr>
<tr>
<td>Met/glimepiride:</td>
<td>Glimepiride/metformin</td>
<td>Sotaglipitin/ertugliflozin:</td>
<td>Dapagliflozin/metformin:</td>
<td>Lixisenatide/insulin glargine:</td>
</tr>
<tr>
<td>Met/repaglinide:</td>
<td>Glimepiride/metformin</td>
<td>Sotaglipitin/metformin:</td>
<td>Dapagliflozin/saxagliptin</td>
<td>Qtem®</td>
</tr>
<tr>
<td>Met/pioglitazone:</td>
<td>Glimepiride/metformin</td>
<td>Glimepiride/metformin:</td>
<td>Empagliflozin/metformin</td>
<td>Synjardy®</td>
</tr>
<tr>
<td>Met/sitagliptin:</td>
<td>Glimepiride/metformin</td>
<td>Glimepiride/metformin:</td>
<td>Empagliflozin/linagliptin</td>
<td>Glyxambi®</td>
</tr>
<tr>
<td>Met/saxagliptin:</td>
<td>Glimepiride/metformin</td>
<td>Glimepiride/metformin:</td>
<td>Empagliflozin/metformin</td>
<td>Segluromet®</td>
</tr>
<tr>
<td>Met/liraglutide:</td>
<td>Glimepiride/metformin</td>
<td>Glimepiride/metformin:</td>
<td>Ertugliflozin/metformin</td>
<td>Segluromet®</td>
</tr>
<tr>
<td>Met/empagliflozin:</td>
<td>Glimepiride/metformin</td>
<td>Pioglitazone/empagliflozin</td>
<td>Ertugliflozin/metformin</td>
<td>Ertugliflozin/sitagliptin</td>
</tr>
<tr>
<td>Met/ertugliflozin:</td>
<td>Glimepiride/metformin</td>
<td>Pioglitazone/empagliflozin</td>
<td>Ertugliflozin/metformin</td>
<td>Segluromet®</td>
</tr>
<tr>
<td>Met/aglitizin:</td>
<td>Glimepiride/metformin</td>
<td>Pioglitazone/empagliflozin</td>
<td>Ertugliflozin/metformin</td>
<td>Segluromet®</td>
</tr>
<tr>
<td>Met/canagliflozin:</td>
<td>Glimepiride/metformin</td>
<td>Jentadueto®</td>
<td>Ertugliflozin/metformin</td>
<td>Segluromet®</td>
</tr>
<tr>
<td>Met/dapagliflozin:</td>
<td>Glimepiride/metformin</td>
<td>Jentadueto®</td>
<td>Ertugliflozin/metformin</td>
<td>Segluromet®</td>
</tr>
<tr>
<td>Met/saxagliptin:</td>
<td>Glimepiride/metformin</td>
<td>Jentadueto®</td>
<td>Ertugliflozin/metformin</td>
<td>Segluromet®</td>
</tr>
<tr>
<td>Met/highburide:</td>
<td>Glimepiride/metformin</td>
<td>Jentadueto®</td>
<td>Ertugliflozin/metformin</td>
<td>Segluromet®</td>
</tr>
<tr>
<td>Met/glimepiride:</td>
<td>Glimepiride/metformin</td>
<td>Jentadueto®</td>
<td>Ertugliflozin/metformin</td>
<td>Segluromet®</td>
</tr>
</tbody>
</table>
Pharmacologic Therapy for Type 2 Diabetes
Metformin and Considerations with Use

- **Mechanism of action:**
  - Increases insulin sensitivity
  - Inhibits the formation of glucose

- **Efficacy:**
  - Reduces fasting plasma glucose
  - A1C lowering: 1.0 – 2.0%
  - Weight neutral

- **Adverse effects:**
  - GI - Diarrhea, abdominal cramping!!!
  - B12 deficiency
  - Lactic acidosis

- **Monitoring:**
  - B12
  - Renal function*
Pharmacologic Therapy for Type 2 Diabetes
Metformin and Considerations with Use

<table>
<thead>
<tr>
<th>DOSING: Normal renal function</th>
<th>DOSING: Renal insufficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial:</strong> 500mg to 1000mg daily or 850mg daily</td>
<td><strong>eGFR (mL/min)</strong></td>
</tr>
<tr>
<td><strong>Titration:</strong> Increase in 500mg or 850mg increments</td>
<td></td>
</tr>
<tr>
<td>Allow 1 – 2 weeks between titrations</td>
<td>≥ 60</td>
</tr>
<tr>
<td>Start low and go slow to limit GI side effects**</td>
<td>45 – 59</td>
</tr>
<tr>
<td></td>
<td>30 – 44</td>
</tr>
<tr>
<td></td>
<td>&lt;30</td>
</tr>
</tbody>
</table>
Pharmacologic Therapy for Type 2 Diabetes
Sulfonylureas and Considerations with Use

- **Mechanism of action:**
  - Stimulates insulin production

- **Efficacy:**
  - Reduces fasting plasma and post-prandial glucose
  - A1C lowering: 1.0 – 2.0%
  - Efficacy declines with prolonged use

- **Adverse effects:**
  - Hypoglycemia
  - Weight gain

- **Monitoring:**
  - Elderly patients
    - Monitor closely for hypoglycemia
  - Patients on insulin
    - Monitor closely for hypoglycemia
    - Discontinue in more complex insulin regimens (i.e. prandial use)
Mechanism of action:
- Inhibits degradation of GLP-1
- However, increase of GLP-1 is modest in comparison to GLP-1 RAs

Efficacy:
- Reduces postprandial glucose
- A1C lowering: 0.6 – 0.8%
- Weight neutral

Adverse effects:
- Well tolerated overall
- Joint pain
- Rare pancreatitis
Pharmacologic Therapy for Type 2 Diabetes

SGLT2 Inhibitors and Considerations with Use

- **Mechanism of action:**
  - Inhibits sodium-glucose co-transporter in kidneys resulting in increased glucose secretion

- **Efficacy:**
  - Reduces fasting plasma and post-prandial glucose
  - A1C lowering: 0.5 - 1.0%
  - **Weight Loss**

- **Adverse effects:**
  - Genital fungal infections and urinary tract infections
  - Increased urination
  - Hypotension
  - Increased LDL
  - Fractures

- **Monitoring:**
  - Blood pressure
    - Be aware of other antihypertensive agents on board!
  - Renal function
Pharmacologic Therapy for Type 2 Diabetes
GLP1-RAs and Considerations with Use

- **Mechanism of action:**
  - Increases glucose dependent insulin secretion
  - Slows gastric emptying, increases satiety

- **Efficacy:**
  - Reduces fasting plasma and post-prandial glucose
  - A1C lowering: 0.6 – 2.0%
  - Weight Loss

- **Adverse effects:**
  - Nausea, diarrhea, vomiting
  - Injection site reactions
  - Rare pancreatitis
Pharmacologic Therapy for Type 2 Diabetes
Insulins and Considerations with Use

- **Efficacy:**
  - Basal insulin: reduces fasting plasma glucose
  - Bolus insulin: reduces post-prandial glucose
  - Greatest A1C lowering efficacy of all agents

- **Adverse effects:**
  - Weight gain
  - Hypoglycemia

- **Monitoring:**
  - Self monitored blood glucose
    - Make sure patient is aware of their goals!
    - Assess for hyper + hypoglycemia
  - Assess for proper injection technique, dosing, administration (appropriate timing!!), storage
Practice Patient Case 1

JJ is a 58-year-old man with T2DM who is on metformin 1,000 mg twice daily. His A1C is 8.4% and BMI is 29 kg/m². Which agent could improve his glycemic control with low risk of hypoglycemia and potential weight loss?

a) JANUVIA (SITAGLIPTIN)
b) TRULICITY (DULAGlutide)
c) GLUCOTROL (GLIPIZIDE)
d) ACTOS (PIOGLITAZONE)
Practice Patient Case 2

SR is a 53-year-old Asian American woman with T2DM who is taking metformin 1,000 mg twice daily. Her A1C is 7.3% and her BMI is 25 kg/m². She has a history of irritable bowel syndrome. She has tolerated metformin well, but worries about GI adverse effects. She has agreed to adding a second diabetes drug to her regimen, provided it will not cause hypoglycemia or weight gain. What agent would you recommend adding to SR’s metformin?

a) **ONGLYZA**
(SAXAGLIPTIN)

b) **TANZEUM**
(ALBIGLUTIDE)

c) **AMARYL**
(GLIMEPIRIDE)

d) **VICTOZA**
(LIRAGLU TIDE)
Cardiovascular Disease and Risk Management
Interventions

Optimal CV Risk Reduction

- Lipid modification
- Lifestyle intervention
- BP lowering
- Glucose lowering
**Blood pressure:**
- Goal: <140/90
- Associated with reduction in CV events and microvascular complications

**Pharmacotherapy:**
- Prompt initiation and timely titration
- Choose agent(s) shown to reduce CV events in DM:
  - ACE inhibitors, ARBs, thiazide diuretics, dihydropyridine CCBs
  - ACEI/ARB recommended first line treatment if albumin-to-creatinine ratio ≥300 mg/g
No LDL “goals”, choose appropriate statin intensity

- Patients of all ages with ASCVD → **high** intensity statin
- Patients <40 with ASCVD risk factors → consider **moderate** intensity statin
- Patients 40 – 75 without ASCVD → **moderate** intensity statin
- Consider addition of other LDL-lowering therapies (ezetimibe or PCSK9 inhibitors) in patients on **maximally tolerated** statin, with ASCVD and LDL ≥ 70 mg/dL
Aspirin recommended for secondary prevention
Aspirin may be considered for primary prevention in patients at increased cardiovascular risk

- ≥ 50 yo with at least one of the following;
  - Family history of premature ASCVD
  - Hypertension
  - Dyslipidemia
  - Smoking
  - Albuminuria
In patients with type 2 diabetes and established cardiovascular disease:

- Antihyperglycemic therapy should begin with lifestyle management and metformin.
- Add-ons should include an agent proven to reduce major cardiovascular events and mortality:
  - Empagliflozin
  - Liraglutide
Practice Patient Case 3

CL is a 61-year-old African American man with T2DM, hypertension, dyslipidemia, and chronic stable heart failure. He is currently taking metformin 1,000 mg twice daily. His A1C is 8% and his BMI is 29 kg/m². He has agreed to adding a second diabetes drug to his regimen but does not want an injectable drug at this time. What agent would you recommend adding to CL’s metformin?

a) BYDUREON (EXENATIDE)
b) JARDIANCE (EMPA GLIFLOZIN)
c) ACTOS (PIOGLITAZONE)
d) SOLIQUA (GLARGINE/LIXISENATIDE)
Practice Patient Case 4

AM is a 55-year-old white female patient with T2DM. She is currently on metformin 1,000 mg twice daily and liraglutide 1.8 mg daily. During her visit with your pharmacy team, her SMBG shows fasting blood glucose readings average 180 mg/dL and post-prandial readings average 110 mg/dL. Her most recent A1C is 9%. What would be the BEST approach to AM’s diabetes regimen?

a) INCREASE METFORMIN TO 850 MG THREE TIMES DAILY
b) ADD GLIPIZIDE TO CURRENT REGIMEN
c) ADD SITAGLIPTIN TO CURRENT REGIMEN
d) ADD TRESIBA TO CURRENT REGIMEN
Summary

- Individualize glycemic targets and therapies
- Lifestyle modifications are the foundation of type 2 diabetes treatment
- Metformin is the optimal first line medication
- Limited data for guiding therapy after metformin
  - Consider cost
  - Consider contraindications/adverse events
- Consider insulin therapy either alone or in conjunction with other orals
  - Especially in patient’s with largely elevated A1Cs
- Cardiovascular risk reduction should be a major focus of therapy
Question 1

Which of the following SGLT2 inhibitors is recommended by the ADA Standards of Care 2018 as an add on anti-hyperglycemic agent for patient’s with type 2 diabetes and ASCVD due to the proven benefit on reduction in major cardiovascular events?

a) Empagliflozin

b) Metformin

c) Exenatide

d) Liraglutide
Which of the following agents would be the LEAST preferred as an add on to metformin in a patient with type 2 diabetes attempting to lose weight?

a) Dulaglutide
b) Canagliflozin
c) Sitagliptin
d) Glipizide
Which of the following GLP1 agonists is approved for use for use in obesity and marketed under the brand name of Saxenda?

a) Dulaglutide  
b) Exenatide  
c) Liraglutide  
d) Albiglutide  
e) All of the above
Thank You!!!