“Optimizing Diabetes Control: A Case Based Approach”

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Woodstock, Georgia
Program Faculty

• Dr. Jonathan Marquess is the Vice-President of Professional and Clinical Affairs at the American Pharmacy Cooperative, Inc. (APCI) a leading Independent Pharmacy Buying Group. He is owner and diabetes educator at two AADE recognized Diabetes Education Centers in Atlanta. In Addition, Dr. Marquess, and his Pharmacist wife, Pam, are the owners of nine Community Pharmacies in Georgia.
Learning Objectives:

1. Analyze the impact of Diabetes
2. List and Discuss the American Diabetes Association (ADA’s) 2015 Standards of Medical Care in Diabetes
3. State the ADA’s recommended goals for glycemic control, blood pressure, and lipid management.
4. Describe treatment algorithms for managing Type 2 Diabetes
5. Assess patient cases for appropriate diabetes management and care.
6. Identify key interventions that will make a difference for Patients with Diabetes
Ground Rules

• Be interactive
• Ask questions
• Think about the future of your Pharmacy
• Enjoy and learn!!
Personal Learning Objectives

Three things you would like to learn today:

1) 

2) 

3) 


Diabetes management is something a lot of insurance companies say they are doing, but there is ONE thing they don’t have:
Four Questions
Ask at your Pharmacy...
(How to start thinking about patients who need extra coaching)

• What % is DM?
• What is average A1C?
• How many of my DM patients are at least 80% adherent?
• How much $$ is being spent at your Pharmacy on DM??
Audience Response

How many people in this country have diabetes?

A) 5 million
B) 15 million
C) 30 million
D) 100 million
E) 4 trillion
We Have an Epidemic of Diabetes!!

Why Diabetes???

Number of Persons With Diagnosed Diabetes

Source: National Institutes of Health and Centers for Disease Control and Prevention
Diabetes: A Human Drama

- 29.1 million Americans have diabetes;
  - 44 million are obese
  - 8.1 million undiagnosed
  - 79 million pre-diabetes
- 25 million increase projected by 2020
- 1.9 million new cases yearly
- >231,404 deaths
- 65,700 amputations
- 202,290 chronic dialysis
- 24,000 become blind

According to the ADA, how often should a patient with Diabetes be seen by a Healthcare Provider??

1) Once a year
2) Twice a year
3) Every 3 months
4) Every month
5) When their feet hurt
Diabetes IS Serious Business

- Only 55% of people with diabetes remain on therapy after 12 months.
- There are significant knowledge deficits in 50-80% of individuals with diabetes.
- Each $1 spent on outpatient diabetes education saves $2-3 in hospitalization costs.
- Diabetes costs $245 billion/year* 
  ~10% from medications and supplies.
- 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.

*ADA March 2014
APhA Foundation Statistics
What is the percentage of patients with diabetes in the United States who are NOT achieving A1C goal?

A) 20 %
B) 40 %
C) 60 %
D) 90 %
E) Less than 20%
Proportion of Patients With Diabetes Achieving A1C <7%

N=1333.
NHANES=National Health and Nutrition Examination Survey.
Do you think there is a NEED to provide Diabetes Management??
According to the ADA, what is the recommended A1C for Patients with Diabetes?

A) below 10%
B) below 9%
C) below 8%
D) below 7%
E) below 6.5%
A1C reduction is associated with decreased risk of diabetes-related complications

Epidemiological Analysis of UKPDS Data: Correlation Between Each 1% Decrease in A1C and Reduced Risk of Diabetes-Related Complications in Patients With T2DM

- Risk of Amputation or PVD Death: 43% (P<0.0001)
- Risk of Microvascular Complications: 37% (P<0.0001)
- Risk of Diabetes-Related Death: 21% (P<0.0001)
- Risk of Myocardial Infarction: 14% (P<0.0001)
- All-Cause Mortality: 14% (P<0.0001)

Study Design: Prospective observational study of 4585 UKPDS patients with T2DM from 23 hospital-based clinics in the United Kingdom. Total of 3642 patients were included in relative-risk analyses. Data adjusted for age, blood pressure, gender, ethnic background, smoking, albuminuria, HDL, LDL, and triglycerides.

UKPDS, United Kingdom Prospective Diabetes Study; PVD, peripheral vascular disease.
Recommendations for Patients With Diabetes

<table>
<thead>
<tr>
<th></th>
<th>ADA</th>
<th>AACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1C level</td>
<td>&lt; 7%*</td>
<td>≤ 6.5%</td>
</tr>
<tr>
<td>Fasting/preprandial glucose (mg/dL)</td>
<td>80–130</td>
<td>&lt; 110</td>
</tr>
<tr>
<td>Postprandial glucose (mg/dL)</td>
<td>&lt; 180</td>
<td>&lt; 140</td>
</tr>
</tbody>
</table>

*The A1C goal for patients in general is an A1C goal of 7%. The A1C goal for the individual patient is an A1C as close to normal (6%) as possible without significant hypoglycemia.*

## Goals for the Management of Diabetes

<table>
<thead>
<tr>
<th></th>
<th>American Medical Directors Association&lt;sup&gt;1&lt;/sup&gt;</th>
<th>American Geriatrics Society (AGS)&lt;sup&gt;2&lt;/sup&gt;</th>
<th>American Diabetes Association (ADA)&lt;sup&gt;3&lt;/sup&gt;</th>
<th>American Association of Clinical Endocrinologists (AACE)&lt;sup&gt;4&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A1C goal</strong></td>
<td>Set target range appropriate for individual residents, staying close to ADA guidelines. More modest goals maybe set for those with a life expectancy &lt; 5 years</td>
<td>&lt;7% for adults with good functional status &lt;8% for frail older patients</td>
<td>&lt;7%</td>
<td>≤6.5%</td>
</tr>
<tr>
<td><strong>PPG Goal</strong></td>
<td>Not specified</td>
<td>Not specified</td>
<td>&lt;180 mg/dL</td>
<td>&lt;140 mg/dL</td>
</tr>
<tr>
<td><strong>FPG Goal</strong></td>
<td>Not specified</td>
<td>Not specified</td>
<td>&lt;126 mg/dL</td>
<td>&lt;110 mg/dL</td>
</tr>
</tbody>
</table>

## ADA-recommended framework for considering glycemic targets in older adults with diabetes

<table>
<thead>
<tr>
<th>Health status/patient characteristics</th>
<th>Rationale</th>
<th>Reasonable A1C goal&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Fasting or preprandial glucose (mg/dL)</th>
<th>Bedtime glucose (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy (Few coexisting chronic illnesses, intact cognitive and functional status)</td>
<td>• Longer remaining life expectancy</td>
<td>&lt;7.5%</td>
<td>90-130</td>
<td>90-150</td>
</tr>
<tr>
<td>Complex/intermediate (Multiple coexisting chronic illnesses or 2+ instrumental daily living activity impairments or mild to moderate cognitive impairment)</td>
<td>• Intermediate remaining life expectancy • High treatment burden • Hypoglycemia vulnerability • Fall risk</td>
<td>&lt;8%</td>
<td>90-150</td>
<td>100-180</td>
</tr>
<tr>
<td>Very complex/poor health (Long-term care or end-stage chronic illnesses or moderate to severe cognitive impairment or 2+ daily living activity dependencies)</td>
<td>• Limited remaining life expectancy makes benefit uncertain</td>
<td>&lt;8.5%&lt;sup&gt;b&lt;/sup&gt;</td>
<td>100-180</td>
<td>110-200</td>
</tr>
</tbody>
</table>

<sup>a</sup> A lower goal may be set for an individual if achievable without recurrent or severe hypoglycemia or undue treatment burden.

<sup>b</sup> A1C of 8.5% equates to an estimated average glucose of ~200 mg/dL. Looser glycemic targets than this may expose patients to acute risks from glycosuria, dehydration, hyperglycemic hyperosmolar syndrome, and poor wound healing.

Case 1: Bob

- 57 year old with T2D for 4 years presents to your Pharmacy for some help and questions.....
- A1C = 8.5%
- BP = 140/92
- BMI = 34kg/m2
- SMBG: Erratic; didn’t understand targets
- Patient admits to missing medication frequently, and A1C has not improved over the past year despite promises form patient to be “better”.
- LDL = 120 mg/dL
- HDL = 45 mg/dL
- TG = 180 mg/dL

<table>
<thead>
<tr>
<th>Medications</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>1000mg BID</td>
</tr>
<tr>
<td>Metoprolol</td>
<td>50mg BID</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>40mg QD</td>
</tr>
</tbody>
</table>
ARS: What agent would you likely recommend for this patient?

A) SU  
B) Basal insulin  
C) GLP-1  
D) SGLT2  
E) DPP4
The Lower the A1C...the More It Is Impacted by Postprandial Glucose Levels

So what does this mean?

- A1C >8.0% → probably means a problem with fasting bG
- A1C <8.0% → probably means a problem with postprandial bG

Adapted from Monnier et al. Diabetes Care 2003;26:881-885.
ARS: Would your decision change if he was a truck driver? What would your choice be now?

A) SU
B) Basal insulin
C) GLP-1
D) SGLT2
E) DPP4
UKPDS: 1% A1C Decrease and Reduced Risk of Complications

Lower-extremity amputation or fatal peripheral vascular disease†
Microvascular disease†
Cataract extraction†
Heart failure* Myocardial infarction† Stroke*
Cardiovascular complications

*P<0.05; †P<0.0001.
UKPDS=United Kingdom Prospective Diabetes Study.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure</td>
<td>&lt;140/90 mm Hg</td>
</tr>
<tr>
<td>Lipids</td>
<td></td>
</tr>
<tr>
<td>LDL</td>
<td>&lt;100 mg/dL*</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>&lt;150 mg/dL</td>
</tr>
<tr>
<td>HDL</td>
<td>&gt;40 mg/dL (men)</td>
</tr>
<tr>
<td></td>
<td>&gt;50 mg/dL (wm)</td>
</tr>
</tbody>
</table>

*LDL <70 mg/dL is a therapeutic option.
<table>
<thead>
<tr>
<th>Age</th>
<th>Risk factors</th>
<th>Recommended statin dose*</th>
<th>Monitoring with lipid panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40 years</td>
<td>None</td>
<td>None</td>
<td>Annually or as needed to monitor for adherence</td>
</tr>
<tr>
<td></td>
<td>CVD risk factor(s)***</td>
<td>Moderate or high</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overt CVD**</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>40–75 years</td>
<td>None</td>
<td>Moderate</td>
<td>As needed to monitor adherence</td>
</tr>
<tr>
<td></td>
<td>CVD risk factors</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overt CVD</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>&gt;75 years</td>
<td>None</td>
<td>Moderate or high</td>
<td>As needed to monitor adherence</td>
</tr>
<tr>
<td></td>
<td>CVD risk factors</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overt CVD</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

*In addition to lifestyle therapy.

**CVD risk factors include LDL cholesterol \(\geq 100 \text{ mg/dL} (2.6 \text{ mmol/L})\), high blood pressure, smoking, and overweight and obesity.

***Overt CVD includes those with previous cardiovascular events or acute coronary syndromes.
Case 2 - Dorothy

- 62 year old female, 5’5”, newly diagnosed with T2DM, lives at ALF
- Has recently lost 10 pounds due to depression, weighs 150 pounds
- Patient has renal insufficiency (SCr 2.2)
- A1C 8.3%
- BP 145/82
- FLP WNL

<table>
<thead>
<tr>
<th>Medication</th>
<th>剂量</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crestor</td>
<td>20mg QD</td>
</tr>
<tr>
<td>Citalopram</td>
<td>40mg QD</td>
</tr>
<tr>
<td>Lisinopril</td>
<td>10mg QD</td>
</tr>
</tbody>
</table>
What agent would you **NOT** recommend for this patient?

A) Glimiperide  
B) Basal Insulin  
C) Pioglitazone  
D) Metformin  
E) None of the above
ADA/EASD Consensus Statement

Recommendations

- Achievement and maintenance of normal glycemic goals
- Initial therapy with lifestyle intervention and metformin
- Rapid addition of insulin, and transition regimens, when target glycemic goals are not achieved or sustained

ADA=American Diabetes Association; EASD=European Association for the Study of Diabetes

Adapted from Nathan DM et al. Diabetes Care. 2011; 31:1–11.
Audience Response

How many classes of drugs are currently available to treat Type 2 Diabetes?

A) Six
B) Eight
C) Nine
D) Ten
E) Twelve
F) Not sure
Ten Classes of Therapy

• Insulins
  – Long and Short Analogs (aspart, detemir, glargine, glulisine, lispro)
• Secretogogues (can cause hypoglycemia)
  – Sulfonylureas (glimiperide, glipizide, glyburide)
  – Meglitinides (nateglinide, repaglinide)
• Biguanides (metformin)
• Insulin Sensitizers: Glitazones (pioglitazone, rosiglitazone)
• Carbohydrate Blockers (acarbose, miglitol)
• Incretin Mimetics (exenatide, liraglutide)
• Neuroendocrine Hormones (pramlintide)
• DPP-IV Inhibitors (sitagliptin, saxagliptin, linagliptin)
• Dopamine Agonist (bromocriptine)
• Sodium-glucose co-transporter 2 (SGLT2) - canagliflozin
Healthy eating, weight control, increased physical activity, and diabetes education

**Metformin**
- high
- neutral / loss
- GI / lactic acidosis
- low

If A1C target not achieved after ~3 months of monotherapy, proceed to 2-drug combination (order not meant to denote any specific preference—choice dependent on a variety of patient- and disease-specific factors):

<table>
<thead>
<tr>
<th>Metformin +</th>
<th>Metformin +</th>
<th>Metformin +</th>
<th>Metformin +</th>
<th>Metformin +</th>
<th>Metformin +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfonylurea</td>
<td>Thiazolidinedione</td>
<td>DPP-4 inhibitor</td>
<td>SGLT2 inhibitor</td>
<td>GLP-1 receptor agonist</td>
<td>Insulin (basal)</td>
</tr>
<tr>
<td>high</td>
<td>high</td>
<td>intermediate</td>
<td>intermediate</td>
<td>high</td>
<td>highest</td>
</tr>
<tr>
<td>moderate risk</td>
<td>low risk</td>
<td>low risk</td>
<td>low risk</td>
<td>high</td>
<td>high risk</td>
</tr>
<tr>
<td>gain</td>
<td>gain</td>
<td>neutral</td>
<td>loss</td>
<td>loss</td>
<td>loss</td>
</tr>
<tr>
<td>hypoglycemia</td>
<td>edema, HF, fx</td>
<td>rare</td>
<td>GI, dehydration</td>
<td>GI</td>
<td>gain</td>
</tr>
<tr>
<td>low</td>
<td>low</td>
<td>high</td>
<td>high</td>
<td>hypoglycemia</td>
<td>variable</td>
</tr>
</tbody>
</table>

If A1C target not achieved after ~3 months of dual therapy, proceed to 3-drug combination (order not meant to denote any specific preference—choice dependent on a variety of patient- and disease-specific factors):

<table>
<thead>
<tr>
<th>Metformin +</th>
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<th>Metformin +</th>
<th>Metformin +</th>
<th>Metformin +</th>
<th>Metformin +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfonylurea +</td>
<td>Thiazolidinedione</td>
<td>DPP-4 inhibitor</td>
<td>SGLT2 inhibitor</td>
<td>GLP-1 receptor agonist</td>
<td>Insulin (basal)</td>
</tr>
<tr>
<td>or TZD</td>
<td>or SU</td>
<td>or SU</td>
<td>or SU</td>
<td>or SU</td>
<td>or SU</td>
</tr>
<tr>
<td>or DPP-4-i</td>
<td>or DPP-4-i</td>
<td>or TZD</td>
<td>or TZD</td>
<td>or TZD</td>
<td>or TZD</td>
</tr>
<tr>
<td>or SGLT2-i</td>
<td>or SGLT2-i</td>
<td>or SGLT2-i</td>
<td>or SGLT2-i</td>
<td>or SGLT2-i</td>
<td>or SGLT2-i</td>
</tr>
<tr>
<td>or GLP-1-RA</td>
<td>or GLP-1-RA</td>
<td>or GLP-1-RA</td>
<td>or GLP-1-RA</td>
<td>or GLP-1-RA</td>
<td>or GLP-1-RA</td>
</tr>
<tr>
<td>or Insulin</td>
<td>or Insulin</td>
<td>or Insulin</td>
<td>or Insulin</td>
<td>or Insulin</td>
<td>or Insulin</td>
</tr>
</tbody>
</table>

If A1C target not achieved after ~3 months of triple therapy and patient (1) on oral combination, move to injectables; (2) on GLP-1-RA, add basal insulin; or (3) on optimally titrated basal insulin, add GLP-1-RA or mealtime insulin. In refractory patients consider adding TZD or SGLT2-i:

**Metformin +**
- Basal insulin +
- Mealtime insulin or GLP-1-RA
Typical A1C Reduction by Treatment Regimen

<table>
<thead>
<tr>
<th>Medication</th>
<th>Route of Administration</th>
<th>Year of Introduction or FDA Approval</th>
<th>Efficacy as Monotherapy (% Reduction in A1C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin</td>
<td>Parenteral</td>
<td>1921</td>
<td>≥2.5</td>
</tr>
<tr>
<td>Sulfonylureas</td>
<td>Oral</td>
<td>1946</td>
<td>1.5</td>
</tr>
<tr>
<td>Metformin*</td>
<td>Oral</td>
<td>1995</td>
<td>1.5</td>
</tr>
<tr>
<td>Alpha-glycosidase Inhibitors</td>
<td>Oral</td>
<td>1995</td>
<td>0.5-0.8</td>
</tr>
<tr>
<td>Thiazolidinediones</td>
<td>Oral</td>
<td>1997</td>
<td>0.8-1.0</td>
</tr>
<tr>
<td>Glinides</td>
<td>Oral</td>
<td>1997</td>
<td>1.0-1.5</td>
</tr>
<tr>
<td>GLP-1 Analogs</td>
<td>Parenteral</td>
<td>2005</td>
<td>0.6</td>
</tr>
<tr>
<td>Amylin Analogs</td>
<td>Parenteral</td>
<td>2005</td>
<td>0.6</td>
</tr>
<tr>
<td>DPP-IV Inhibitors</td>
<td>Oral</td>
<td>2006</td>
<td>0.5-0.9</td>
</tr>
</tbody>
</table>

*Metformin has been available in other countries since 1957, but the United States did not approve it until 1995.

GLP = glucagon-like peptide; DPP-IV = dipeptidyl peptidase IV.

Why Metformin From The Start?

What is the FDA Maximum dose (per day) of Metformin?

A) 500mg
B) 1000mg
C) 1550mg
D) 2000mg
E) 2550mg
F) 3000mg
Why Metformin From The Start?

What is the “Best Clinical Dose” (per day) of Metformin?

A) 500mg
B) 1000mg
C) 1550mg
D) 2000mg
E) 2550mg
F) 3000mg
Why Metformin From The Start?

- Typical lowering of A1C by 1.5-2.0% according to dosage
- Absence of weight gain and hypoglycemia
- Relatively low level of side effects
- High level of acceptance by patients
- Relatively low cost

Metformin (Glucophage®)

Significant Contraindications

- Renal dysfunction with SCr levels:
  - >1.5 mg/dL in males
  - >1.4 mg/dL in females
- Generally not indicated during pregnancy, for breast-feeding women, or children
- CHF requiring drug therapy
- Hepatic dysfunction
- History of alcoholism or binge drinking
- Age >80 years (without adequate renal function or creatinine clearance)
Glitazones
“Insulin Sensitizers”

- Troglitazone (Rezulin®)
- Rosiglitazone (Avandia®) – restricted use
- Pioglitazone (Actos®)

- MOA: ↑ glucose uptake in skeletal muscle (1°)
- Novel class of antidiabetic agents
- Directly reduces insulin resistance by activating PPAR-gamma nuclear receptors
  - Increase glucose uptake in skeletal muscle and fat cells
  - Lower hepatic glucose output
Which of the following agent(s) is associated with weight loss?

A. Liraglutide
B. Sitaglipitin
C. Saxagliptin
D. Both A and B
E. All of the above
Case 3: Gloria

- 40 year old female with T2D presents for DSME, referred from her PCP.....
- A1C = 7.9%
- BP = 120/80
- BMI = 38kg/m2
- SMBG: Fasting BG 150s-200s; pre-meal “erratic” (no log)
- Recently prescribed a GLP-1 receptor agonist in addition to her other medications.

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>1000mg BID</td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>20mg QD</td>
</tr>
<tr>
<td>Liraglutide</td>
<td>0.6mg QD</td>
</tr>
<tr>
<td>Levothyroxine</td>
<td>137mcg QD</td>
</tr>
</tbody>
</table>
ARS: She has been reading on the internet about adverse events of GLP-1s? What is the most likely AE?

A) hypoglycemia  
B) injection site reaction  
C) nausea  
D) thyroid tumors  
E) pancreatitis
ARS: What is her next dosage strength?

A) 0.7 mg  
B) 0.8 mg  
C) 0.9 mg  
D) 1.2 mg  
E) 1.8 mg
Exenatide (Byetta®)

- FDA Approved in June 2005
- Developed as we have learned that other hormones are involved in blood glucose control
- Incretin is a hormone secreted by the GI tract after digestion of food. Acts on the beta cells in the pancreas to produce insulin.
- Byetta mimics the action of Incretin
- Indicated when oral meds are not giving the control that you need.
- Works by telling the pancreas to make the correct amount of insulin at meal time then stops when blood sugar returns to normal
  - Eat meal within 1 hour of injecting Byetta.
  - Dosed twice a day at morning and evening meals.
Liraglutide (Victoza®)

- Liraglutide is a once daily human GLP-1 analogue for the treatment of Type 2 Diabetes
- Half-life after subcutaneous injection is 13 hours making it suitable for once daily dosing
- 97% homology to human GLP-1
- Liraglutide is indicated as an adjunct to diet and exercise to improve glycemic control in adults with type 2 diabetes
- Lowers body weight and SBP
Liraglutide dosing

Starting once-daily liraglutide is easy

Start with 0.6 mg for at least one week¹

1.2 mg for at least one week¹*

1.8 mg if required¹*

*Some patients may benefit from an increase in dose from 1.2 mg to 1.8 mg and, based on clinical response after at least 1 week, the dose can be increased to 1.8 mg to further improve glycaemic control.
Exenatide ER (Bydureon®)

For adults with type 2 diabetes in addition to diet & exercise

Tap Into the Power of BYDUREON.
One pen. One dose. One time a week.

BYDUREON is an injectable prescription medicine that may help improve blood sugar and is not recommended as the first medication to treat diabetes.

Pen Instructions
Albiglutide (Tanzeum®)

- **Place in therapy:** Adjunct therapy to diet and exercise, may be used alone or in combination but not recommended as first-line for patients without previous drug therapy for glycemic control.

- **Dose:** 30 mg subQ once weekly. May increase to 50 mg subQ once weekly if additional glycemic control is required.

- **Expected A1C reduction:** Dose of 30 mg - 0.7% and dose of 50 mg - 0.9%
Albiglutide (Tanzeum®)

• **Mechanism of Action:** Glucagon-like peptide agonist that increases the release of insulin in the presence of elevated glucose concentrations, decreases glucagon secretion in a glucose-dependent manner, and delays gastric emptying, thereby reducing the rate at which postprandial glucose appears in circulation.

• **Common Side Effects:** injection site reaction, diarrhea, nausea, vomiting, headache.

• **Contraindications**
  – Hypersensitivity to albiglutide
  – Personal or family history of Medullary Thyroid Carcinoma (MTC)
  – Multiple endocrine neoplasia syndrome type 2 (MEN 2)
Rx Only

**Once-weekly Tanzeum™ (albiglutide) for injection**

30 mg

Each prefilled pen will deliver one 30-mg dose in 0.5 mL. For subcutaneous use only.

Contents:
- 4 SINGLE-DOSE PREFILLED PENS
- 4 NEEDLES
- PRODUCT LITERATURE (Read carefully the Instructions for Use)

Dispense the enclosed Medication Guide to each patient.

To fully dissolve the medicine the 30-mg pen must sit upright in a cup for 15 minutes.

---

Repeat Rocking

5 Times

Do not shake the pen hard.

---

Rx Only

**Once-weekly Tanzeum™ (albiglutide) for injection**

50 mg

Each prefilled pen will deliver one 50-mg dose in 0.5 mL. For subcutaneous use only.

Contents:
- 4 SINGLE-DOSE PREFILLED PENS
- 4 NEEDLES
- PRODUCT LITERATURE (Read carefully the Instructions for Use)

Dispense the enclosed Medication Guide to each patient.

To fully dissolve the medicine the 50-mg pen must sit upright in a cup for 30 minutes.

---

THE 50-MG PEN HAS A DIFFERENT WAIT TIME

IMPORTANT

TO FULLY DISSOLVE THE MEDICINE THE PEN MUST SIT UPRIGHT IN A CUP FOR 30 MINUTES
Dulaglutide (Trulicity®)

- FDA approved in September 2014
- A1C mean reduction 0.7-1.6%
- Administer 0.75 mg SubQ once weekly. Dose may be increased to 1.5 mg SubQ for additional control
DPP-IV Inhibitors

- **Place in therapy:** combination therapy
- **Typical A1C reduction:** 0.8-1%
- **Mechanism of Action:** inhibits dipeptidyl peptidase-4 enzyme inhibitor that prevents the breakdown of GLP-1 and GIP to increase insulin release and decrease glucagon levels in circulation in a glucose-dependent manner.

- **Medications:**
  - Sitagliptin (Januvia) - 2006
  - Saxagliptin (Onglyza) – 2009
  - Linagliptin (Tradjenta) - 2011
  - Alogliptin (NESINA) - 2013

- **Common side effects:** Headache, UTI, and sinusitis
Overview of SGLT-2 Inhibitors
SGLT2 Inhibitors

Canagliflozin (Invokana®)
100-300mg QAM
Hyperkalemia
eGFR: <45 ml/min/1.73 m2

Dapagliflozin (Farxiga®)
• 5-10mg QAM
• Bladder CA
• eGFR: <60 ml/min/1.73 m2

Empagliflozin (Jardiance®)
10-25mg QAM
eGFR: <45 ml/min/1.73 m2

Expected A1c reduction: 0.7-1.03%
Reduce dose: with concomitant use of insulin or secretagogues in order to decrease risk of hypoglycemia
Weigh risks vs. benefits
SGLT2 Inhibitors

- **Common adverse effects:**
  - Vaginal yeast infections
  - UTI
  - Polyuria
  - Increased SCr
  - Hyperkalemia
  - Dehydration
  - Hypotension

- **Drug Interactions**
  - Rifampin increases elimination
  - Monitor digoxin levels

- **Contradictions**
  - Patients on dialysis
  - End-stage renal disease
Case 3: Gloria continued

• She comes back to your Pharmacy 1 year later for more education and some advice.
• A1C = 8.0%
• BP = 126/80
• BMI = 32kg/m², weight has decreased 20 pounds
• SMBG: Fasting BG elevated, PPGs normal range (download)

<table>
<thead>
<tr>
<th>Medications</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>1000mg BID</td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>20mg QD</td>
</tr>
<tr>
<td>Liraglutide</td>
<td>1.8 mg QD</td>
</tr>
<tr>
<td>Levothyroxine</td>
<td>137mcg QD</td>
</tr>
</tbody>
</table>
Audience Response

What agent would you recommend for Gloria NOW?

A) Glimiperide
B) Basal Insulin
C) Pioglitazone
D) Metformin
E) SGLT2
Natural History of Type 2 Diabetes

Glucose (mg/dL)

Relative Function (%)

Years of Diabetes

-10 -5 0 5 10 15 20 25 30

Post-meal Glucose
Fasting Glucose
Insulin Resistance
Insulin Level

Beta-cell failure

Adapted from International Diabetes Center (IDC) Minneapolis, Minnesota
Over time, most patients will need insulin to control glucose
How comfortable are you in counseling patients on the use of insulin?

1. Very
2. Somewhat
3. Not at all
Normal Insulin Secretion

<table>
<thead>
<tr>
<th>Time of day</th>
<th>Insulin (mU/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM</td>
<td>30</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>50</td>
</tr>
<tr>
<td>6:00 PM</td>
<td>70</td>
</tr>
<tr>
<td>9:00 PM</td>
<td>10</td>
</tr>
<tr>
<td>12:00 AM</td>
<td>10</td>
</tr>
<tr>
<td>3:00 AM</td>
<td>10</td>
</tr>
<tr>
<td>6:00 AM</td>
<td>10</td>
</tr>
</tbody>
</table>

Which insulin has the longest duration of action?

A) Regular
B) Aspart
C) Lispro
D) Glargine
E) NPH
Different insulins fulfill different physiologic needs

Conceptual profiles of different therapeutic insulins

Insulin *Analogs* Closely Match the Physiologic Insulin Profile

- Bolus (meal-related) insulin analogs
  - “Rapid-acting”
    - Rapid absorption
    - Peak actions coincide with peak carbohydrate absorption
  - **Control PPG**

- Basal insulin analogs
  - “Long-acting”
    - Slow and steady rate of absorption
    - Protracted actions
  - **Control FPG**
Insulin Glargine U300 (Toujeo®)

- Once-daily, long-acting basal insulin, received FDA approval to treat Type 1 and Type 2 diabetes
- Same active ingredient as lantus, but three times the concentration, 1/3 less volume and suggested to have a design to release insulin more gradually
- Lower rates of hypoglycemia were seen in clinical trials by not mentioned in the FDA-approved label
U-500 Insulin

- Unmodified regular insulin
  - Does not contain any agent that may prolong its action
- Five times more potent than standard U-100
- Pharmacokinetics resemble basal rate delivery similar to NPH insulin
- Single doses are usually active for 8 hours, however activity may last up to 24 hours
  - Depends on sensitivity of insulin receptors
- Onset of 30 minutes and peak effects within 1 to 3 hours
- Dosed similar to NPH with 2-3 injections per day

Audience Response

Which insulin would you adjust if a resident had elevated fasting BG?

1) Basal
2) Pre-Breakfast
3) Pre-Lunch
4) Pre-Dinner
5) Short acting
Case 4: Initiation of Insulin

Q: If you are asked to recommend a starting dose of basal insulin for a patient.

What are you going to use, what dose, how often, and when do you see him/her again?

(predictability, hypoglycemia, and weight gain)
# Pharmacokinetics of Current Insulin Preparations

<table>
<thead>
<tr>
<th>Insulin Type</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin Aspart/Lispro/Glulisine</td>
<td>&lt;15 min</td>
<td>1 hour</td>
<td>3 hours</td>
</tr>
<tr>
<td>Regular</td>
<td>0.5-1 hour</td>
<td>2-3 hours</td>
<td>3-6 hours</td>
</tr>
<tr>
<td>NPH</td>
<td>2-4 hours</td>
<td>7-8 hours</td>
<td>10-12 hours</td>
</tr>
<tr>
<td>Ultralente</td>
<td>4 hours</td>
<td>Varies</td>
<td>18-20 hours</td>
</tr>
<tr>
<td>Insulin glargine</td>
<td>1-2 hours</td>
<td>Flat/Predictable</td>
<td>24 hours</td>
</tr>
<tr>
<td>Insulin detemir</td>
<td>1-2 hr</td>
<td>Predictable</td>
<td>24 Hours</td>
</tr>
</tbody>
</table>
Options for Initiation

• Add 10 units to oral agents (insulin naïve)
• 1 to 1 conversion (NPH once daily)
• 80% of NPH dose (NPH BID)
• 80% of intermediate-acting portion of premix
• Calculations
Starting Background Insulin

• Example: Patient with A1C of 7.9%, FBGs ~ 170s
• 242#, so Determine weight in kg
• Weight in lbs ______ ÷ 2.2 = ______ kg
• Calculate initial dose of background insulin
• Weight in kg ___ x units/kg ____ = ____units
Implementing New Titration Strategies With a Basal Insulin

• An ADA/EASD consensus algorithm for the initiation and adjustment of a basal insulin regimen at 10 IU per day is indicated as follows:

Start with a long-acting basal insulin, initiated at 10 IU/day or 0.2 u/kg/day

Check fasting glucose daily and increase dose by 2 IU every 3 days until fasting levels are in target range (70-130 mg/dL)

Audience Response

Are there any barriers to starting insulin?
Possible Barriers to the Initiation of Insulin¹-³

- Patient/Family
  - Fear of self-injection¹
  - Fear of needles¹
  - Negative misconceptions about initiating insulin¹
  - Inconvenience¹
  - Patient perception as personal failure¹

- Health care professional
  - Fear of hypoglycemia¹
  - Weight gain¹
  - Cost³
  - Lack of available educational tools/resources¹⁻³
  - Lack of familiarity/comfort with insulin³
  - Time constraints¹

Key Behaviors
AADE Self-Care Behaviors

- Healthy Eating
- Being Active
- Problem Solving
- Healthy coping
- Reducing risks
- Medication adherence
- BG monitoring
Control Portion Sizes

1 serving of raw vegetables
1 serving of meat
1 serving of cooked vegetables
1 serving of cheese
1 serving of pasta
Using a Food Label

Nutrition Facts
Serving Size 1 Cup (239g)
Servings Per Container about 2

Amount Per Serving
Calories 100 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2%
  Saturated Fat 0g 0%
Cholesterol 15mg 5%
Sodium 850mg 35%
Total Carbohydrate 15g 5%
  Dietary Fiber 1g 5%
  Sugars 1g
Protein 7g

Vitamin A 25%  •  Vitamin C 0%
Calcium 0%  •  Iron 2%

*Percent Daily Values are based on a 2,000 calorie diet
Case 5: Which breakfast has more carbohydrate?

A
1 cup oatmeal
1 slice toast
1 tsp margarine
8 oz apple juice

B
Two 4” pancakes
2 tsp margarine
2 Tbsp regular syrup
2 eggs
2 slices bacon
Which lunch has more carbohydrate?

A 6” ham/cheese sub on wheat (Subway)
Baked Lays
Coke ZERO

B McDonalds Happy Meal
Hamburger
Small fries
Diet Coke
Which dinner has more carbohydrate?

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tossed salad</td>
<td>Tossed salad</td>
</tr>
<tr>
<td>2 Tbsp Ranch</td>
<td>2 Tbsp FF Ranch</td>
</tr>
<tr>
<td>8 oz steak</td>
<td>4 oz steak</td>
</tr>
<tr>
<td>1 large baked potato</td>
<td>1 small baked potato</td>
</tr>
<tr>
<td>4 Tbsp sour cream</td>
<td>2 Tbsp FF sour cream</td>
</tr>
<tr>
<td>1 dinner roll w/butter</td>
<td>1 dinner roll w/butter</td>
</tr>
<tr>
<td>½ cup broccoli</td>
<td>1 cup broccoli</td>
</tr>
<tr>
<td>½ cup ice cream</td>
<td>½ cup FF ice cream</td>
</tr>
</tbody>
</table>
Vaccinations

– People with diabetes are more likely to die from vaccine-preventable diseases
– Vaccination rate is less than 50%
  ✓ Influenza vaccine EVERY fall (Oct-Dec)
  ✓ Pneumococcal vaccine now and booster after 65
  ✓ Tetanus toxoid (Td) booster every 10 years or Tdap vaccine
CDC: Deaths by flu up; too few get shots

By M.A.J. McKENNA
mmckenna@ajc.com

The number of deaths caused each year by influenza has more than tripled in 25 years and could continue to soar, researchers at the Centers for Disease Control and Prevention said Tuesday.

In the United States, the flu now kills three times more people than AIDS each year.

“Influenza and other respiratory viruses have been under-appreciated health problems,” said the CDC’s

Most people die from secondary infections that cause pneumonia or worsen pre-existing problems such as heart disease or high blood pressure.

The elderly are more likely to have such pre-existing problems. In addition, they are more likely to contract influenza, because the immune system’s ability to fight infections declines with age.

Thus, the researchers said, the risk of death from influenza rises sharply in the elderly. For children 1 to 4 years old, the risk of death from flu
Exercise and Diabetes

- Diabetic patients should perform at least 150 min/week of moderate-intensity aerobic physical activity at 50-70% of maximum heart rate

- Type 2 diabetics are encouraged to complete resistance training three times per week
  - Improves insulin sensitivity in older men with type 2 diabetes to the same or even a greater degree as aerobic exercise
A Pre-Diabetes Day Program

Provides you with

• Lists of possible new Pharmacy Patients
• Lists of possible new store patients
• Contacts with Physicians and Offices
• Working relationship with physicians

And

You can take advantage of the professional reps to help you interact with offices and increase attendance
New Services

- New Monitor Training
  - Provide new free monitor and education
  - Download data service
- Insulin starts/pen device training
- Byetta /Victoza starts
- Symlin starts
- Small group educational classes
- Educational Materials
- Know your Diabetes Programs
- Diabetes Education Referral
- Cooking demonstration
- CGMS Training
- Insulin Pump Training
Moving Out Individually

• The biggest fears for a pharmacist is to...
  – ASK FOR CASH
  – THE PATIENT MAY SAY NO

• Have to get out of your comfort zone
  – I started asking people to pay me for consults in 1990s and
    • They said yes
      – I started low price because I was scared
      – I raised my prices as my confidence grew
Learn More About Diabetes and Diabetes Education

• Join professional organizations
  – American Diabetes Association (ADA)
  – American Association of Diabetes Educators (AADE)
  – Juvenile Diabetes Foundation (JDF)

• Read Journals
  – Diabetes Care (ADA)
  – Diabetes Forecast (ADA)
  – The Diabetes Educator (AADE)

• Continuing Education in Diabetes
Discussion

Comments?

Questions?
For More Information:
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jmarquess@apcinet.com
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Thank You !!!