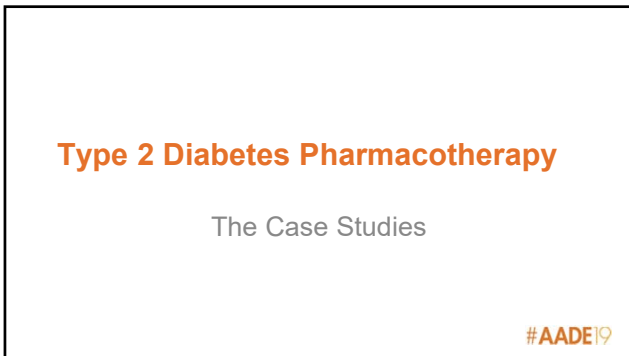


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Nathan A. Painter
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San Diego, CA

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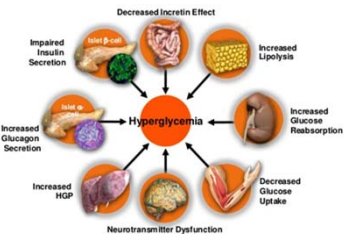
Disclosure to Participants

- Notice of Requirements For Successful Completion
 - Please refer to learning goals and objectives
 - Learners must attend the full activity and complete the evaluation in order to claim continuing education credit/hours
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Brief Pathophysiology Review



The diagram illustrates the pathophysiology of hyperglycemia. At the center is a red circle labeled "Hyperglycemia". Surrounding it are several factors with arrows pointing towards the center:

- Decreased Incretin Effect (top)
- Impaired Insulin Secretion (top-left)
- Increased Lipolysis (top-right)
- Increased Glucagon Secretion (middle-left)
- Increased Glucose Reabsorption (middle-right)
- Increased HGP (bottom-left)
- Decreased Glucose Uptake (bottom-right)
- Neurotransmitter Dysfunction (bottom)

DeFronzo RA. Diabetes. 2009;58(4):773-795.

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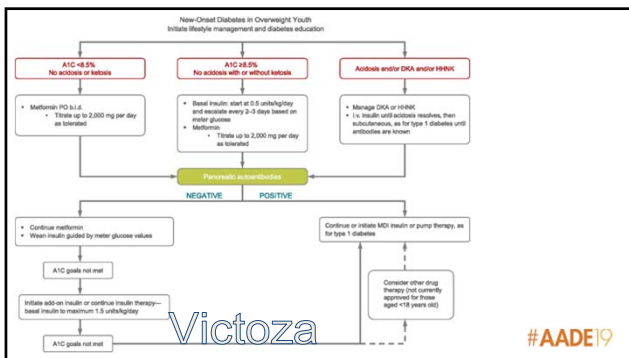
Pediatric Patient with Type 2 Diabetes

- 16 years of age (identical twin)
- Positive family history of diabetes in mom
- ADHD on Concerta 54 mg, Ritalin 10 mg
- Birth Control for heavy flow, but not irregularity
- BMI: 44.8
- A1c: 7.4%



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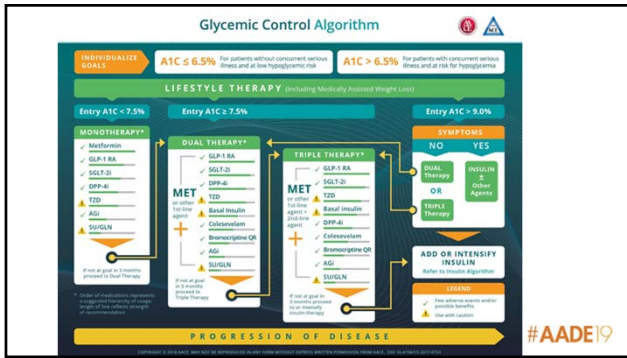
8

Medication consideration

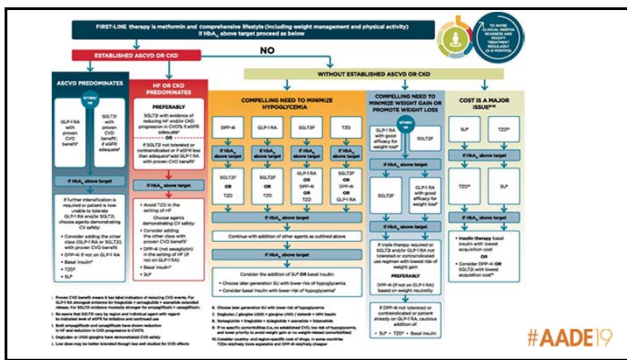
- FDA approved for kids
 - Metformin: max dosing 2000 mg
 - Insulin: Lantus, Basaglar, Tresiba, Humalog, Novolog, Apidra
- And most recently approved (6/17/19) - liraglutide (Victoza)
 - potential restoration of Beta-cells

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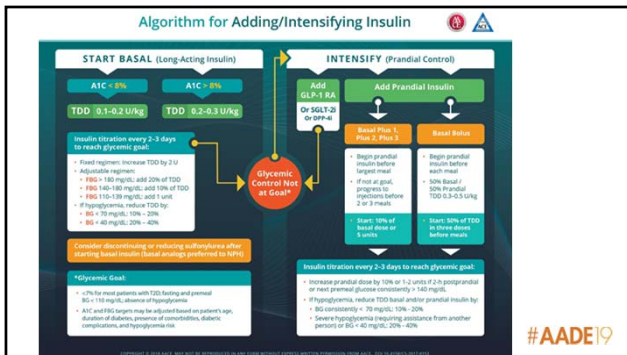
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Profiles of Antidiabetic Medications

	MET	GLP-1 RA	SGLT-2i	DPP-4i	AGI	TZD insulin sens	SU GLN	COLSVL	BCR-QR	INSULIN	PRAML
HYPO	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
WEIGHT	Slight Loss	Loss	Loss	Neutral	Neutral	Gain	Gain	Neutral	Neutral	Gain	Loss
RENAL / GU	Contra-Indicated eGFR < 30 eGFR 30-45 Caution eGFR 45-59	Contra-Indicated eGFR < 30 Caution eGFR 30-45	Not indicated for eGFR < 30 Caution eGFR 30-45	Caution eGFR < 30 Neutral eGFR 30-45	Caution eGFR < 30 Neutral eGFR 30-45	Caution eGFR < 30 Neutral eGFR 30-45	Caution eGFR < 30 Neutral eGFR 30-45	Caution eGFR < 30 Neutral eGFR 30-45	Caution eGFR < 30 Neutral eGFR 30-45	Caution eGFR < 30 Neutral eGFR 30-45	Caution eGFR < 30 Neutral eGFR 30-45
GI Sx	Moderate	Moderate	Neutral	Neutral	Moderate	Neutral	Neutral	Mild	Moderate	Neutral	Moderate
CVR	Neutral	See #1	See #2	See #3	Neutral	Moderate	Neutral	Neutral	Neutral	CVR Loss	Neutral
CARDIAC	Neutral	See #1	See #2	See #3	Neutral	May reduce myocardial infarction risk	Possible ACVD Risk	Neutral	Neutral	Safe	Neutral
BONE	Neutral	Neutral	Mild Fracture Risk	Neutral	Neutral	Moderate Fracture Risk	Neutral	Neutral	Neutral	Neutral	Neutral
KETOACIDOSIS	Neutral	Neutral	DKA Can Occur in Various Dosing Settings	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral

1. One adverse event or possible benefit. 2. Limitation of adverse effects. 3. Unavailable - FDA approved for prevention of MACE events. 4. Insulin-like - can be used to reduce HbA1c in healthy, nonpregnant women to reduce MACE events. 5. Possible increased hospitalizations for heart failure with apixiban and saxagliptin. 6. Possible increased hospitalizations for heart failure with apixiban and saxagliptin.


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Case 2

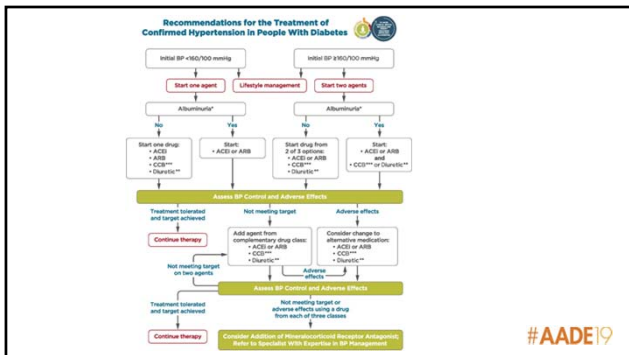
- 26 year old Hispanic Male
- Works as a school guidance counselor
- Sees his doctor once a year
- Latest Vitals:

Fasting Glucose 98 mg/dL, A1c 5.7%,
Total Cholesterol 165 mg/dL, HDL 39 mg/dL, Triglycerides 116 mg/dL, BP 157/83, BMI 26.9 (5'8", 177lbs)



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Case 3 Female of childbearing age/gestational

- 36 years of age, Filipino, G3P2
 - gestational dx with 1st
 - (baby birth weight: 8lbs, 10 oz)
 - diet & exercise management (8 years ago)
 - no gestational dx with 2nd
 - (baby birth weight: 10lbs, 6oz) (4 years ago)
- Works for the government in a sedentary job
- Latest Vitals:
 - Fasting Glucose 112 mg/dL, A1c 5.9% (up 0.2% in 6 months w/ lifestyle changes & weight loss)
 - Total Cholesterol 183 mg/dL, HDL 44 mg/dL, Triglycerides 107 mg/dL, non-HDL 117
 - BP 122/78
 - BMI 35.7 (5'4.5" - 152 lbs)



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Risk Factors

- Gestational (again)
 - Previous pregnancy with GDM
 - Currently with Prediabetes
 - Filipino
 - Overweight
- Type 2 diabetes
 - Previous history of GDM
 - Prediabetes
 - Filipino
 - Overweight
 - Potentially family history/genetics

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Case 4

- 48 year old African American Male
- Office manager
- Married with 2 teenage sons
- PMH: type 2 diabetes for 3 years, HTN for 5 years, dyslipidemia for 5 years, ED, osteoarthritis, obesity.
- Quit smoking 3 years ago when diagnosed with diabetes



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Case 4 (continued)

Current Medications:

- Metformin 1000 mg BID
- Rosuvastatin 10 mg daily
- Lisinopril/HCTZ 10/25 mg daily
- Acetaminophen 500 mg TID
- Sildenafil 50 mg PRN

Latest Vitals/Labs:

- BP 152/98, HR 68
- A1c 7.8%
- Total Cholesterol 187 mg/dL, HDL 37 mg/dL, LDL 102 mg/dL, Triglycerides 242 mg/dL
- BMI 30.4 (6'5", 256 lbs)



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ASCVD risk calculator (apps available)

Current Age: 48 | Sex: Male | Race: White

Systolic Blood Pressure: 152 | Diastolic Blood Pressure: 98

Total Cholesterol: 187 | HDL Cholesterol: 37 | LDL Cholesterol: 102

History of Diabetes: Yes | Smoker: Former | How long ago did patient quit smoking?: 2.5-3.5 years ago

On Hypertension Treatment: Yes | On a Statin: Yes | On Aspirin Therapy: No

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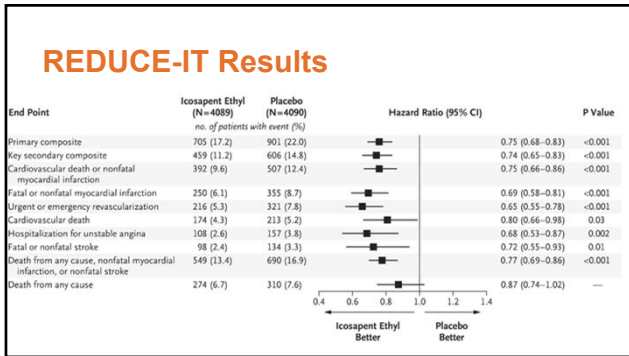
20

AMERICAN COLLEGE OF CARDIOLOGY ASCVD Risk Estimator Plus

Estimate Risk	Therapy Impact	Advice
21.0% Current 10-Year ASCVD Risk**		
Lifetime ASCVD Risk: 69%	Optimal ASCVD Risk: 3.5%	
10-year risk for ASCVD categories: Low-risk (<5%) Borderline risk (5% to 7.4%) Intermediate risk (7.5% to 19.9%) High risk (≥20%)	At least moderate intensity statin initiation is indicated (I, A). High-intensity statin therapy is reasonable to reduce LDL-C by ≥50%. (IIa, B-R). Addition of ezetimibe to statin therapy is also reasonable to reduce LDL-C by ≥50%.	

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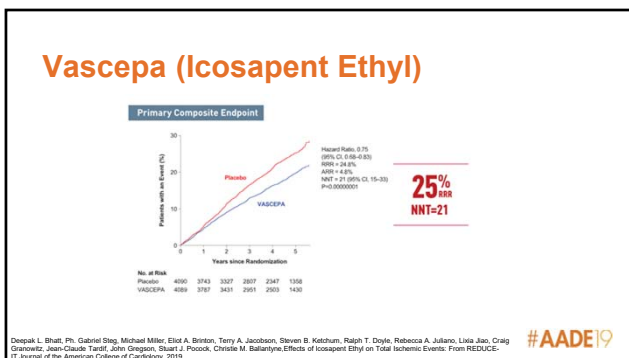
REDUCE-IT Recommendation

- Based on findings from the Reduction of Cardiovascular Event with Icosapent Ethyl Intervention Trial (REDUCE-IT), an additional recommendation has been officially added with the March 27, 2019 Living Standards of Care update.
- In patients with ASCVD or other cardiac risk factors on a statin with controlled LDL-C, but elevated triglycerides (135-499), the addition of icosapent ethyl should be considered to reduce cardiovascular risk.

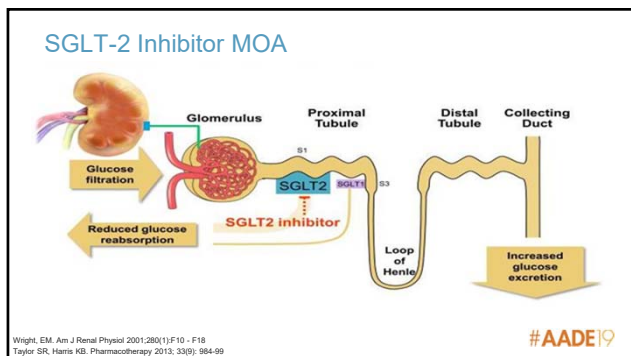
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Standards of Medical Care in Diabetes - 2019. Diabetes Care 2019;42(Suppl. 1):S61-S70

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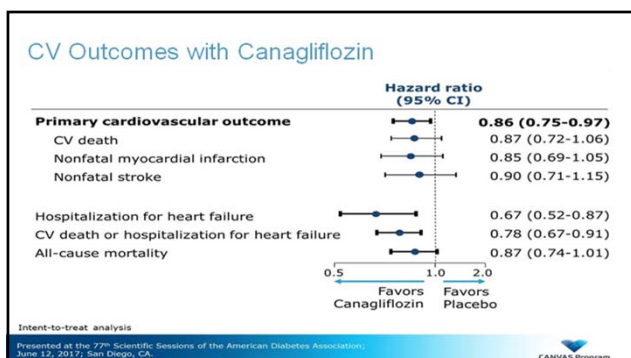
SGLT-2 Inhibitors

	Invokana (canagliflozin)	Farxiga (dapagliflozin)	Jardiance (empagliflozin)	Steglatro (ertugliflozin)
Power	0.5% - 1.0% reduction in A1c			
Dosing	100 mg daily GFR 45-60 mL/min before breakfast 300 mg daily GFR > 60 mL/min before breakfast	5-10 mg daily	10-25 mg daily	5-15 mg daily
ADRs	Hypotension, dehydration, hyperkalemia, DKA, yeast infections/UTI			
Outcomes	CKD, ASCVD, CHF	CKD, ASCVD, CHF	CKD, ASCVD, CHF	CHF

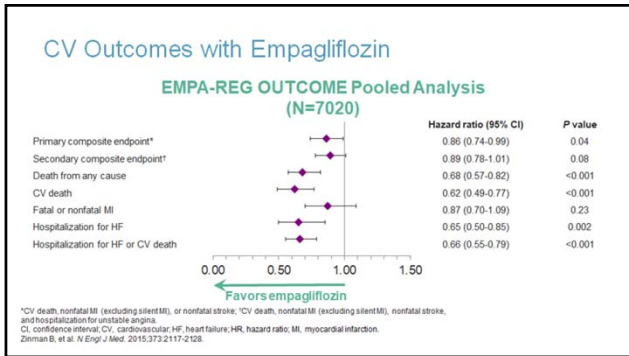
Pharmacology Approaches to Diabetes Treatment
Presented at the 77th Scientific Sessions of the American Diabetes Association, June 15-20, 2017, San Diego, CA

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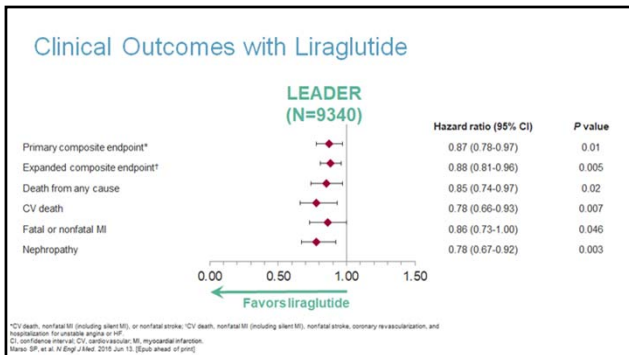
GLP-1 Agonists

	Byetta, Bydureon (exenatide)	Victoza (liraglutide)	Trulicity (dulaglutide)	Ozempic (semaglutide)	Adlyxin (lixisenatide)
Power					
Dosing	5-10 mcg twice a day ER: 2 mg weekly	1.2-1.8 mg daily*	0.75-1.5 mg weekly	0.5-1 mg weekly*	10 mcg x 2 weeks, then 20 mcg daily
ADRs	GI, pancreatitis, injection site reactions				
Outcomes	ASCVD (ER only)	ASCVD, CKD	ASCVD	ASCVD	CKD

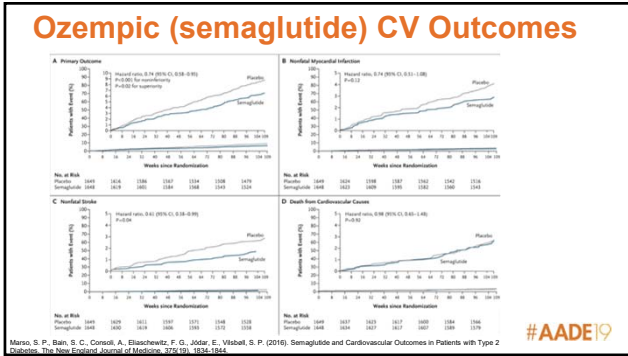
Pharmacology Approaches to Diabetes Treatment
 Diabetes Care 2018;41:1005-1016 | <https://doi.org/10.2337/18005>

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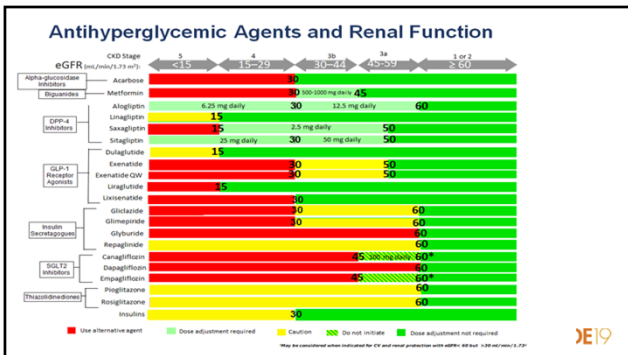
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Other considerations

- Renal prevention: ACE inhibitor
 - Current renal labs: GFR 63, albumin/creatinine 14
 - Nephrology (e)consult for Stage 2 kidney disease, near Stage 3
- Aspirin therapy?

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Case 5

- 69 year old Asian Female
- Type 2 diabetes for 17 years
- Saw her CDE every year for a few years
- Needed to care for her ailing mother, and stopped seeing her PCP for a few years
- MI at age 65 when her A1c reached 10.8%
- Attended Cardiac Rehab
- Went back to seeing her PCP regularly and returned to DSMES
- Was started on insulin



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Case 5 (continued)

Current Medications:

- Basaglar (glargine) 14 units at bedtime
- Lisinopril 5 mg daily
- Atorvastatin 40 mg daily
- Temazepam 15 mg at night
- Norco 5/325 mg every 6-8 hours PRN



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Asian patient - geriatric

Latest Vitals:

- FPG 135, A1c 8.2%
- Ht 5'6", Wt 189 lbs, BMI 30.5
- BP 130/80, GFR 52, Cholesterol 197, HDL 46, Triglycerides 142

Currently concerned about numbness of her feet and wanting to see her grandson's wedding

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Glycemic Targets

Approach to Individualization of Glycemic Targets

Patient / Disease Features More stringent ← A1C 7% → Less stringent

Standards of Medical Care in Diabetes - 2019. Diabetes Care 2019;42(Suppl. 1):S61-S70

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Deprescribing

65 + year old patient
Consider Deprescribing
Monitor and Follow-Up

<ul style="list-style-type: none"> At risk of hypoglycemia? Experiencing, or at risk of ADRs from other diabetes medications? Uncertain clinical benefits? 	<ul style="list-style-type: none"> Reduce dose(s) or stop medication(s) Switch to an alternative medication(s) Reduce dose(s) 	<p>Daily to weekly for 2 weeks (12 weeks for TZDs)</p> <ul style="list-style-type: none"> Signs and symptoms of hyperglycemia, hypoglycemia, other ADRs Increase SMBG
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Farrell B, Black C, Thompson W, et al. Deprescribing antihyperglycemic agents in older persons: Evidence-based clinical practice guideline. *Can Fam Physician*. 2017;63(11):832-843.

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Potentially Inappropriate Medications

<p>Beers Criteria</p> <ul style="list-style-type: none"> Sulfonylureas (except glipizide) Sliding scale insulin Benzodiazepines Tricyclic antidepressants <p>Drug interactions</p> <p>Renally cleared medications</p> <p>Liver function</p>	<p>Pharmacogenomics</p> <p>Other resources</p> <ul style="list-style-type: none"> STOPP/START criteria www.medstopper.com <p>Enlist a pharmacist for help</p> <ul style="list-style-type: none"> Comprehensive medication review Drug interactions Cost reduction
---	---

American Geriatrics Society 2019 Updated AGS Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. *J Am Geriatr Soc*. 2019 Apr;67(4):674-694.
O'Mahoney D, O'Sullivan D, Byrne S, et al. STOPP/START criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2015;44:213-218.

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DPP-4 Inhibitors

	Januvia (sitagliptin)	Onglyza (saxagliptin)	Tradjenta (linagliptin)	Nesina (alogliptin)
Power	0.5 - 0.9%			
Dosing	100 mg daily	5 mg daily	5 mg daily	6.25-25 mg daily
Renal dosing	CrCl 31-50 mL/min: 50 mg daily	CrCl ≤ 50 mL/min: 2.5 mg daily		CrCl 30-59 mL/min: 12.5 mg daily
	CrCl ≤ 30 mL/min: 25 mg daily			CrCl < 30 mL/min: 6.25 mg daily
Outcomes	ASCVD and CKD neutral	ASCVD and CKD neutral Possible increase CHF	ASCVD and CKD neutral	ASCVD and CKD neutral Possible increase CHF

Pharmacology Approaches to Optimize Treatment
Standards of Medical Care in Diabetes - 2019 (Diabetes Care 2019;42:Suppl 1):S100-S109

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Conclusion

- Medication Management in patients with diabetes takes a patient-centered, interprofessional approach
 - diverse patient population
 - comorbidities
- Should include
 - ethnopharmacology into practice
 - rational prescribing
 - ways to address clinical inertia

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