Diabetes in Older Adults

Peggy S. Odegard, PharmD, CDE,
Professor , University of Washington

Key learning …

- Older adults are at greater risk for type 2 DM
- T2DM may be prevented in older adults
- Goals for control of DM in older adults should be individualized
- A holistic, patient-centered approach to treatment planning is vital
- Many factors should be considered when choosing a treatment to assure the safest and most effective plan for support and care

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Joseph

- 75 year old male diagnosed today with type 2 DM. His other medical conditions include hypertension, hyperlipidemia, neuropathy, chronic renal insufficiency, mild cognitive impairment, GERD, and constipation. He weighs 186 pounds, is 5'9" tall. He reports a diet of cereals for breakfast, sandwiches for lunch, and largest meal is dinner with meat/potato/vegetable/bread. He drinks 1-2 glasses of red wine daily. He does not exercise regularly except for occasional walking (once monthly). He lives alone, widowed x9 years. Two adult children out of state.
- Labs/PE today: Scr 1.3, BUN 12, BP 138/78 mmHg, P 80, K 3.9 mEq/L, A1c 8.3%, fasting glucose 158 mg/dL, PHQ-9: 12; other labs WNL
- Medications:
  - Hydrochlorothiazide 25 mg daily
  - Lisinopril 40 mg daily
  - Simvastatin 80 mg daily
  - Gabapentin 600 mg TID
  - Ranitidine 150 mg daily
  - TUMs antacid prn
  - Aspirin 81 mg daily
  - Docusate sodium 100 mg BID
  - Senna 2 tablets at HS prn (3-4 times monthly)
  - Ibuprofen 400 mg QID prn pain (use is 1-2 doses weekly)

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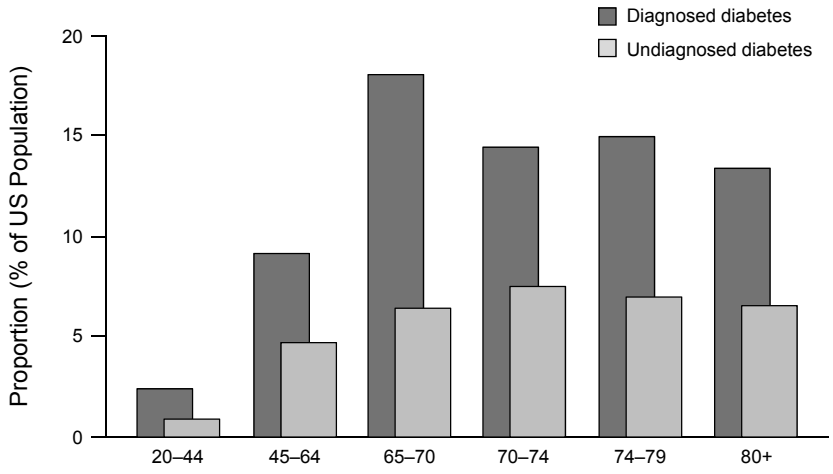
Prevalence of Diagnosed and Undiagnosed Diabetes by Age, NHANES, 1999–2002



NHANES = National Health and Nutrition Examination Survey.

Selvin E et al. *Diabetes Care*. 2006;29(11):2415–2419.

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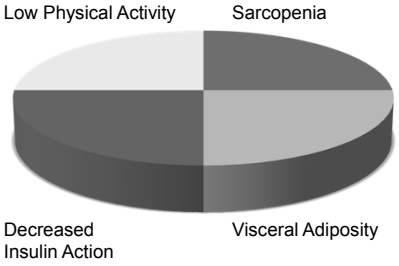
Pathophysiology of T2D in Older Adults: Two Primary Contributors

Increasing Insulin Resistance



Impaired Pancreatic Islet Function Associated With Aging

Kirkman MS et al. *Diabetes Care*. 2012;35(12):2650–2664.

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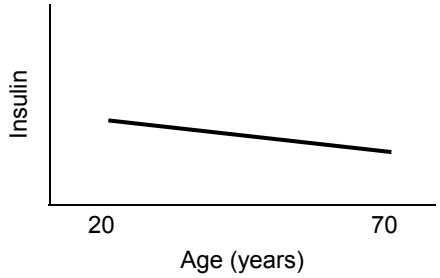
Aging and Glucose Metabolism: NGT

- Beta-cell function declines with age by about 1.1% yearly (P = 0.003)
  - First- and second-phase insulin release decrease linearly by about 0.7% per year (20- to 70-year span studied)



NGT = normal glucose tolerance.

Szoke E et al. *Diabetes Care*. 2008;31(3):539–543.

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Aging and Glucose Metabolism: IGT

- First-phase insulin secretion declines with age (r = –0.19, *P* = 0.03)
- Beta-cell function reduced with aging compared with NGT
- No independent effect of age on insulin sensitivity when BMI is factored into the equation

BMI = body mass index; IGT = impaired glucose tolerance.

Szoke E et al. *Diabetes Care*. 2008;31(3):539–543.

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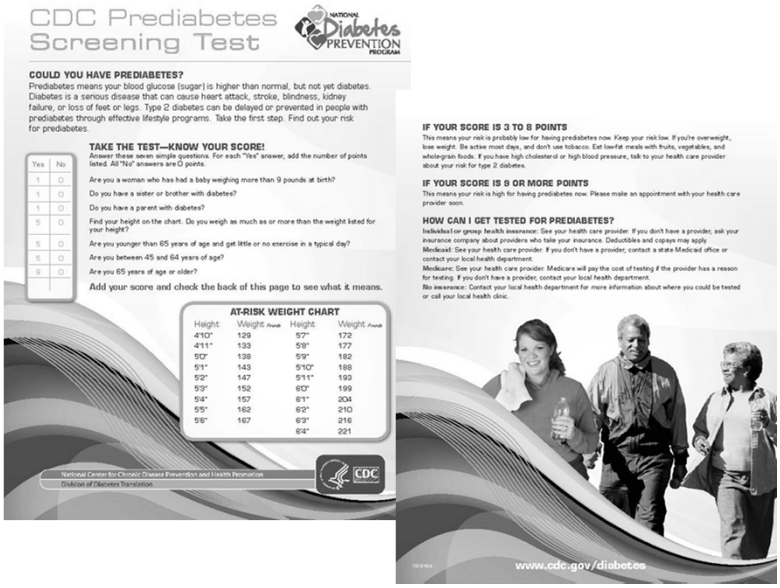
Could Joseph's T2DM have been prevented?



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ADA Recommendations for diabetes care of older adults 2016

- Consider the assessment of medical, functional, mental, and social geriatric domains for diabetes management in older adults to provide a framework to determine targets and therapeutic approaches. E
- Screening for geriatric syndromes may be appropriate in older adults experiencing limitations in their basic and instrumental activities of daily living, as they may affect diabetes self-management. E
- Older adults (>/=65 years of age) with diabetes should be considered a high-priority population for depression screening and treatment. B
- Hypoglycemia should be avoided in older adults with diabetes. It should be screened for and managed by adjusting glycemic targets and pharmacological interventions.B
- Older adults who are functional and cognitively intact and have significant life expectancy may receive diabetes care with goals similar to those developed for younger adults.E
- Glycemic goals for some older adults might reasonably be relaxed, using individual criteria, but hyperglycemia leading to symptoms or risk of acute hyperglycemic complications should be avoided in all patients.E

Diabetes Care 2016;39(Suppl. 1):S81–S85
|DOI: 10.2337/dc16-S013

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ADA 2016 Recommendations, continued

- Screening for diabetes complications should be individualized in older adults,but particular attention should be paid to complications that would lead to functional impairment. E
- Other cardiovascular risk factors should be treated in older adults with consideration of the time frame of benefit and the individual patient. Treatment of hypertension is indicated in virtually all older adults, and lipid-lowering and aspirin therapy may benefit those with life expectancy at least equal to the time frame of primary or secondary prevention trials.E
- When palliative care is needed in older adults with diabetes, strict blood pressure control may not be necessary, and withdrawal of therapy may be appropriate. Similarly, the intensity of lipid management can be relaxed, and withdrawal of lipid-lowering therapy may be appropriate.E
- Consider diabetes education for the staff of long-term care facilities to improve the management of older adults with diabetes.E
- Patients with diabetes residing in long-term care facilities need careful assessment to establish a glycemic goal and to make appropriate choices of glucose-lowering agents based on their clinical and functional status.E
- Overall comfort, prevention of distressing symptoms, and preservation of quality of life and dignity are primary goals for diabetes management at the end of life.E

Diabetes Care 2016;39(Suppl. 1):S81–S85
|DOI: 10.2337/dc16-S013

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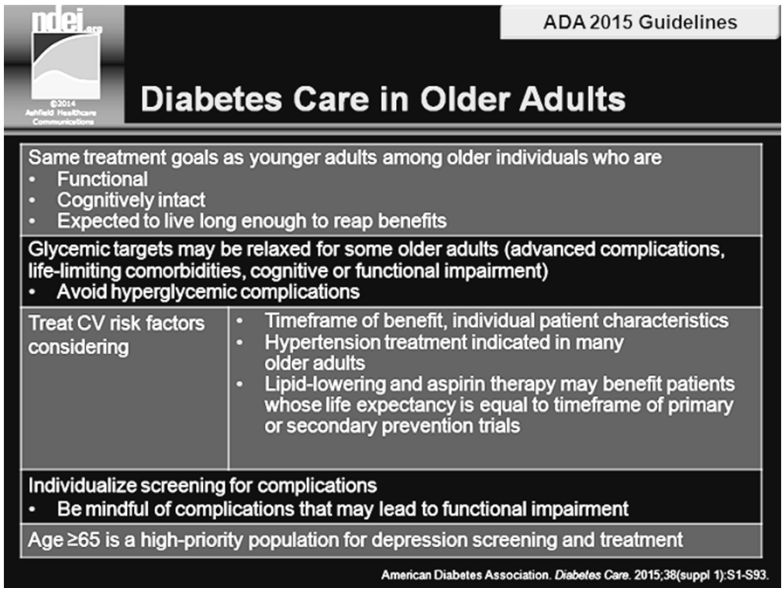

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Recommendations for the Comprehensive Care of Older Patients With T2D: Consensus Panel Framework

Health Status	Rationale	Reasonable A1C Goal	Fasting or Preprandial Glucose (mg/dL)	Bedtime Glucose (mg/dL)	Blood Pressure (mm Hg)	Lipids
Healthy	Longer life expectancy	<7.5%	90–130	90–150	<140/80*	Statin (unless contraindicated or not tolerated)
Complex/ Intermediate Health	Intermediate life expectancy; high treatment burden; hypoglycemia vulnerability; fall risk	<8.0%	90–150	100–180	<140/80*	Statin (unless contraindicated or not tolerated)
Very Complex/ Poor Health	Limited life expectancy; treatment benefit uncertain	<8.5%	100–180	110–200	<150/90	Consider benefit with statin; (secondary prevention > primary)

Healthy: few coexisting chronic illnesses, intact cognitive and functional status.
Complex/Intermediate Health: multiple coexisting chronic illnesses, or 2+ instrumental ADL impairments, or mild to moderate cognitive impairment.
Very Complex/Poor Health: long-term care or end-stage chronic illnesses or moderate to severe cognitive impairment or 2+ activities of daily living dependencies.
* Updated to <140/<90 mmHg 2015

Kirkman S et al. *Diabetes Care.* 2012;35(12):2650–2664.

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Diabetes Management Considerations With Aging

Physiology
- Postprandial hyperglycemia
- Increased risk of hypoglycemia
- Age-related PK and PD changes

Self-management ability
- Competing priorities
- Polypharmacy
- Depression
- Physical limitations

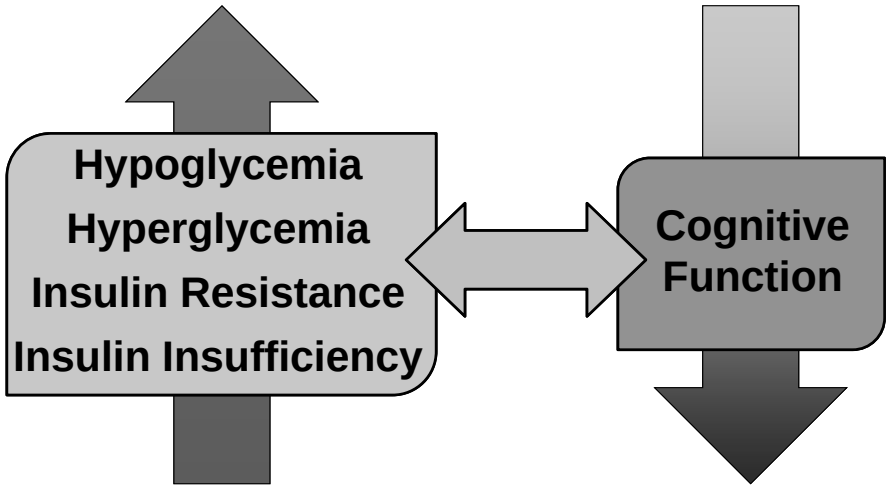
Environment
- Meal planning/access
- Physical activity
- Safety

Diabetes treatment
- Hyperglycemia affects cognition
- Hypoglycemia affects cognition
- Benefit of treatment over lifespan
- Risks of treatment

PD = pharmacodynamic; PK = pharmacokinetic.

Grossman S. *J Multidiscip Healthc*. 2011;4:149–154.
Kirkman MS et al. *Diabetes Care*. 2012;35(12):2650–2664.

Diabetes and Cognitive Impairment



Novak V, et al. Diabetes Care. 2012; 34(11):2438-2441.
Lauder LJ, et al. ACCORD STUDY. Lancet Neuro. 2011; 10:969–977.
Whitmer RA, et al. JAMA. 2009; 301:1565–1572.
Cukierman T, et al. Diabetologia. 2005; 48:2460–2469.

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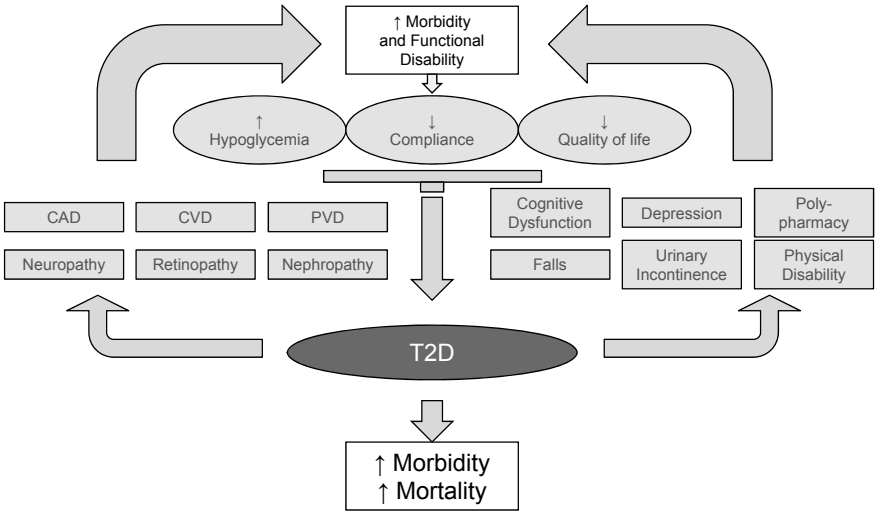
Complex Interactions in older adults with T2DM



CAD = coronary artery disease; CVD = cardiovascular disease; PVD = peripheral vascular disease.

Nobili A et al. *J Comorbidity*. 2011;1(1):28–44.

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Highest Rates of Complications

Age 65–74

- Lower-extremity amputation
- Myocardial infarction
- Non-retinopathy visual impairment
- CKD/end-stage renal disease
- Hyperglycemic crisis ⇒ death

Age 75+ also experience

- More complications
- 2 X rate of ER visits due to hypoglycemia

CKD = chronic kidney disease; ER = emergency room.

Li Y et al. *Diabetes Care*. 2012;35(5):273–277.

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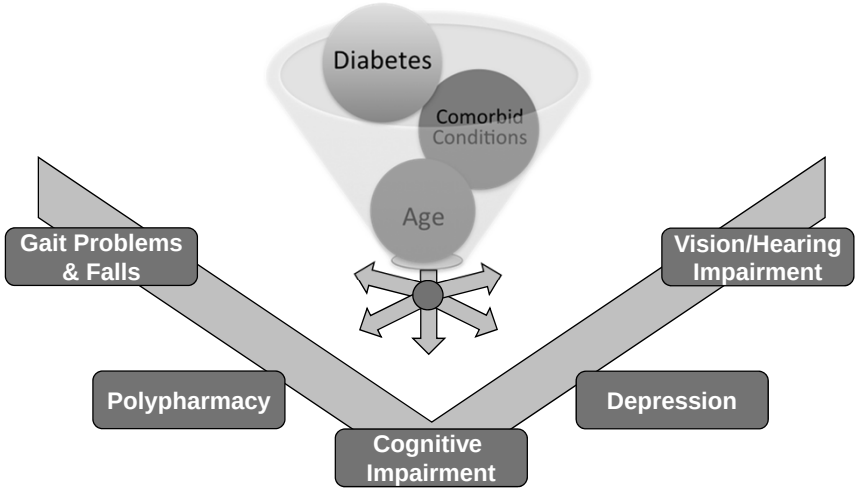
Diabetes and Geriatric Syndromes



Worsening Functional Impairments and Disability

Laiteerapong N et al. *Diabetes Care*. 2011;34(8):1749–1753.

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What is an appropriate A1c goal for Joseph?

1. <6.5%
2. <7%
3. <7.5%
4. <8%

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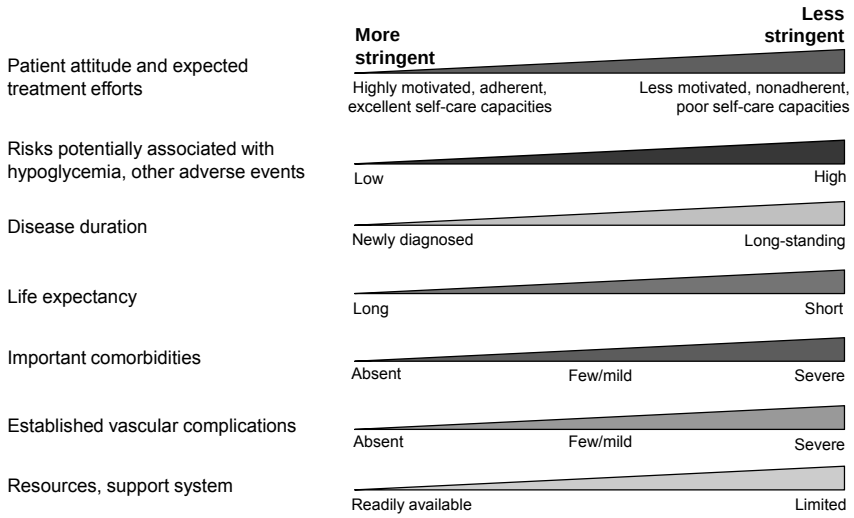
Setting a Glycemic Target: Multiple Elements to Consider



Inzucchi SE et al. *Diabetes Care*. 2012;35(6):1364–1379.

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What would be the initial approach to improve glucose control?

1. Increase physical activity
2. Reduce weight
3. Start metformin
4. All of the above
5. None of the above, he will need insulin

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What factors may impact tx choice?

- Kidney function
- Depression
- Social support network
- Cognition
- Treatment burden
- Finances
- Treatment time to benefit
- Functional ability
- Physical disability
- Other?

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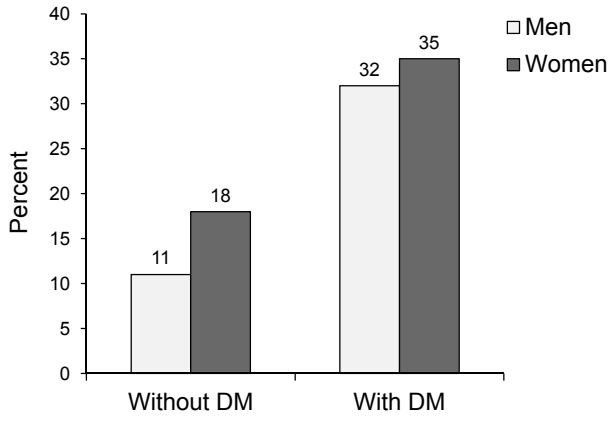
Depression: Elderly Patients With and Without DM



Munshi M et al. *Diabetes Care*. 2006;29(8):1794–1799.

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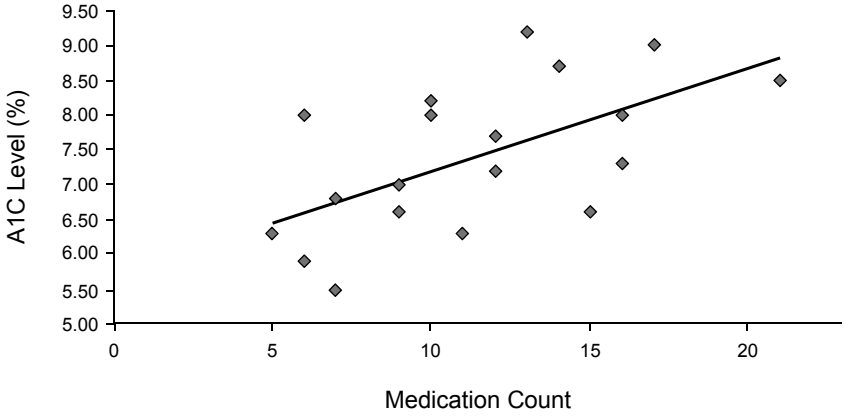
Treatment burden: Increased Risk of Poor Glycemic Control as Medication Count Increases



Joslin Diabetes Center.
http://www.joslin.org/CMEWeb/Activity/Uploads/Outpatient%20Diabetes%20Care%20for%20Older%20Ad

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Treatment risks: Hypoglycemia in older adults

- >50% higher rates of severe hypoglycemia (requiring assistance)
- Earlier and more severe deterioration of psychomotor coordination
- Impaired awareness of autonomic warning symptoms even when educated
  - 10 to 20 mg/dL plasma glucose difference between subjective awareness of hypoglycemia and onset of cognitive dysfunction
- Risk higher in cognitively impaired

Kirkman S et al. *Diabetes Care*. 2012;35(12):2650–2664;
Bremer JP et al. *Diabetes Care*. 2009;32(8):1513–1517.

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Predisposing and Precipitating Risk Factors for Hypoglycemia

Predisposing Factors (Predictors)	• Age • Body weight • Duration of disease • History of severe hypoglycemia • Use of SUs • Insulin intake • CKD • Chronic liver disease • Hypoglycemic unawareness/diminished counterregulatory response • Cognitive impairment
Precipitating Factors (Potentiating)	• Antidiabetic agents (eg, SUs, meglitinides, insulin) • Potentiators of SUs • Potentiators of hypoglycemia (eg, ACEIs) • Overmedication • Missed, delayed, or reduced meals • Alcohol intake • Acute illness (poor intake) • Addison's disease • Increased exercise • Gastroparesis

ACEIs = angiotensin-converting enzyme inhibitors; SU = sulfonylureas.

Alagiakrishnan K et al. *Postgrad Med*. 2010;122(3):129–137.

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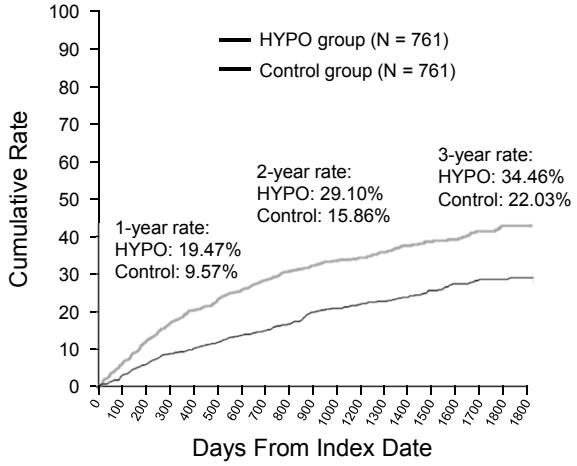
Risk for Adverse CV Events Increases in T2D Patients With Hypoglycemia

- Retrospective cohort study of T2D patients with hypoglycemia vs control



Zhao Y et al. *Diabetes Care*. 2012;35(5):1126–1132.

Sulfonylurea-Induced Hypoglycemia

- An estimated 50-66% of patients with type 2 diabetes use sulfonylureas (SFUs)
- Factors that predispose patients on SFUs to hypoglycemia
  - Advanced age
  - Caloric restriction
- When individual SFU agents are considered, glyburide (e.g. longer ½) life has an increased potential for causing hypoglycemia
- Glipizide and glimepiride pose reduced risk of hypoglycemia when compared to glyburide

J Am Geriatr Soc1996;44:751-5

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Summary of Tx considerations

Diabetes Care 2016;39(Suppl. 1):S81–S85

- Lifestyle is always key – movement and healthy nutrition make a difference
- Consider treatment burden, $, functional status - for patient & caregivers when considering each step
- Caution for safety during transitions of care
- Medications
  - Metformin is first-line med, however, consider dose adjustment for CKD; contraindication for GFR <30 ml/min.
  - Glyburide: avoid due to hypoglycemia risks
- Regularly assess patients for hypoglycemia
  - Ask patients and caregivers about signs/symptoms
  - Review blood glucose logs

Kirkman MS et al. *Diabetes Care*. 2012;35(12):2650–2664.

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Considerations for Antihyperglycemic Therapy in Elderly Patients

Drug Class	Possible Drug or Disease Interaction	Additional Information
Metformin	Impaired renal function	• Measure SCr and liver function periodically and with any increase in dose • Low hypoglycemia risk • Weight neutral • ~~Avoid initiating in patients >80 years unless eGFR within normal limits~~
SUs	Erratic oral intake can increase the risk of hypoglycemia	• Avoid long-acting SUs • Short-acting or meglitinides minimize risk of nocturnal hypoglycemia, and may also help avoid hypoglycemia in patients with erratic oral intake
TZDs	Class III and class IV CHF	• Hypoglycemia rare • Fluid retention possible • Risk of fractures (greater in women vs men)
GLP-1 RAs	• Concomitant use with insulin secretagogues increases risk of hypoglycemia	• Effects are glucose dependent, so low risk for hypoglycemia • Weight loss
Insulins	• Erratic nutrient intake and physical activity can increase risk of hypoglycemia • Low vision and dexterity may limit use of vials and syringes • Assistance may be needed	• Efficacious • Requires blood glucose monitoring • Patient education necessary • Insulin pens increase adherence for patients with low vision and/or dexterity issues
DPP-4is	• Concomitant use with SUs increases risk of hypoglycemia • Dose adjustments necessary for some agents in patients with renal impairment	• Effects are glucose dependent, so low risk for hypoglycemia • Weight neutral • Target PPG levels

Pratley RE, Gilbert M. *Postgrad Med*. 2012;124(1):133–143.

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Joseph – how can we best help him?

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  - Ibuprofen 400 mg QID prn pain (use is 1-2 doses weekly)

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Plan ideas?

- Strengthen social support
- A1c <8%
- Improve glucose while minimizing risks of hypoglycemia
  - Metformin, however, consider dose reduction for GFR
  - Encourage movement (e.g. walking, chair exercises)
  - Nutrition education
- Reduce use of unnecessary meds
  - e.g., GERD; NSAID as cause?; alternate pain management may help reduce chronic need for ranitidine and antacid
- Other?

Thank You

Questions?

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Helpful references

- Management of hyperglycemia in type 2 diabetes, 2015: A patient-centered approach. Update to a Position Statement of the American Diabetes Association and the European Association for the Study of Diabetes. Diabetes Care 2015;38:140–149 | DOI: 10.2337/dc14-2441
- American Diabetes Association (ADA) 2016 Clinical Practice Recommendations. Chapter 10, Older adults. Diabetes Care 2016; 339(suppl):S81-S85, available online at diabetes.org, doi: 10.2337/dc16-2013, accessed 2/2016