The Older Adult with Diabetes

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Presenter Disclosure Information

In compliance with the accrediting board policies, the American Diabetes Association requires the following disclosure to the participants:

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Consultant: Eli Lilly Co
Other: None
Objectives for this Workshop

1- Review the 2020 ADA Standards of Care for the older adult with diabetes

2- Discuss the aspects of heterogeneity of older adults and its impact on establishing treatment goals and developing treatment regimens

3- Compare and contrast diabetes treatments and their appropriate use in older adults with comorbid diseases
Older Adults as Largest Demographic and Growing

For the First Time in U.S. History Older Adults Are Projected to Outnumber Children by 2035

Note: 2016 data are estimates not projections.

Source: National Population Projections, 2017
www.census.gov/programs-surveys/popsProj.html

DM and Prediabetes in Older Adults

Sobering Numbers from CDC

- 37% of the total DM population are older adults
- 12 million older adults with DM /out of total population of 48 million older adults
- 1 out of 4 (25%) of those >65 years have diabetes
- 19% of those > 75 years
- Prediabetes-for over 65- 23.1 million, (almost 50% of OAs in the USA), with only about 14% aware of condition.
- As Boomers enter the >65 group, numbers will continue to increase. Older adults are developing diabetes at a rate 3 x higher than the younger cohort (age 22-45)
- Incidence and Prevalence of ASCVD-macrovascular events doubles in older adults with DM

Aging- A Spectrum
Active and Independent to Frail and Needing Care
Older Adults are a Heterogeneous Group
Holistic View to Individualize Glycemic Goals
and Plan Care

Vibrant
Healthy
Active
Independent

Frail
Cognitive Impairment
Co-morbidities
Functional Impairment
Available Social And Caregiver Support
Physiological Changes with Normal Aging

- Changes in hearing, vision, and taste
- Changes in hair, skin and nails-dryness and fragility
- Alterations in gait and balance
- Diminished perception of various sensations e.g. pain, thirst
- Alterations in cognition, memory (STM)
- Joint stiffness-wear and tear
- Sarcopenia-loss of lean muscle mass
- Thermoregulation
- GI changes – gut transit time, diminished saliva
- Reduction of beta cell mass; hormone signaling
- Liver- smaller, less dense
- Thyroid gland atrophy
- Decline in GFR
- Vascular changes
DM and Impact on Older Adults

- Older adults with DM have increased rates of
  - premature death
  - functional disability
  - co-existing illness
  - increased risk of geriatric syndromes, including frailty, depression, cognitive decline and institutionalization

Diabetes Care 2018;41(Suppl.1):S119-125
T2D Pathology in the OA

While IR is present and a player in altered glucose homeostasis...

The direct effect of aging is an impairment of beta cell function and decreased insulin secretion

Reduced capacity to regenerate beta cell in aging adults

Hyperglycemia in T2D develops when..

Imbalance of glucose production (hepatic glucose/fasting) and glucose intake (food ingestion) as opposed to insulin stimulated glucose uptake in target tissues, mainly skeletal muscle

Model for age-related hyperglycemia (12).

Aging → ↓β-cell function → Type 2 Diabetes

Diabetes risk factors:
- Genetic risk/background
- Lifestyle changes:
  - ↓physical activity;
  - obesity
- Comorbidities
- Inflammation

Insulin resistance
Type 1 Diabetes in the Older Adult

- Statistics confirm that most older adults will have T2D
- Those with T1D will make up ~10% of the diabetes population
- These patients will most likely have a longer duration of diabetes than those with T2D
- This means that there will be-
  - Increased frequency of microvascular disease
  - Concomitant health care concerns, illnesses not associated with diabetes
  - Use of insulin and complex medication regimens
  - A higher risk for severe hypoglycemia
  - The need to examine and readjust therapeutic goals
Consider the assessment of

- medical,
- psychological,
- functional (self-management abilities) and
- social geriatric domains in older adults to provide a framework to determine targets and therapeutic approaches for diabetes management.
• **Screening** - at initial visit and then annually for
  - cognitive impairments, dementia, and depression
  - *geriatric syndromes (fraility)* appropriate in older adults with ADL and IADL limitations

• **Hypoglycemia** should be avoided. It should be assessed and managed by adjusting glycemic targets and pharmacologic interventions.

• **Glycemic goals** may be relaxed but hyperglycemia leading to symptoms or risk of acute hyperglycemia complications should be avoided

• Screening for diabetes complications-individualized with emphasis placed on those that can lead to functional impairment

Diabetes Care 2019;42(Suppl. 1) S139-147
Cardiovascular Risk Factors

Management of CV risk factors may reduce morbidity and mortality more than tight hyperglycemia control

Strong evidence for treating HTN in older adults

Diabetes Care 2018;41(Suppl.1):S119-125
ADA Standards of Care-2019

• Treatment - HTN to individualized targets for most older adults.
  – other CV risk factor reduction should be individualized, consider time frame of benefit. (Use of statins/ASA)

• Overtreatment should be avoided

• Deintensification (or simplification) of complex regimens to reduce hypoglycemia risks, with consideration to individualized A1C target

• Palliative care considerations at end of life
  – include comfort, preservation of QOL and dignity- as primary goals for DM management

• Care in LTC-Consider diabetes education for the staff. Set goals in keeping with the clinical and functional status of the patient

Diabetes Care 2019;42(Suppl. 1) S139-147
## Standards of Care Treatment Goals 2019

<table>
<thead>
<tr>
<th>Status</th>
<th>Rationale</th>
<th>Reasonable A1C Goal</th>
<th>Glucose and BP Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy-Intact cognitive function and few co-morbidities</td>
<td>Longer remaining life expectancy</td>
<td>&lt;7.5%</td>
<td>FBG-90-130 mg/dl HS-90-150 &lt;140/90 mmHg</td>
</tr>
<tr>
<td>Complex/Intermediate-Multiple co-existing chronic illnesses, 2+ ADL or mild/moderate cognitive changes</td>
<td>Intermediate life expectancy High treatment burden Hypo vulnerability Fall risk</td>
<td>&lt;8%</td>
<td>FBG-90-150 mg/dl HS-100-180 &lt;140/90</td>
</tr>
<tr>
<td>Very Complex/Poor health-LTC or end stage chronic illnesses, mod-severe cognitive changes or 2+ ADL dependencies</td>
<td>Limited remaining Life expectancy</td>
<td>&lt;8.5%</td>
<td>FBG-100-180 mg/dl HS-110-200 &lt;150/90</td>
</tr>
</tbody>
</table>
Individualize the Plan-A Patient Centered Approach

Consider Multiple Factors

- Patient preferences
- Age and duration of disease
- Comorbidities
- Cognitive status
- Manual dexterity
- Social, physical and financial support
- Cost and complexity of medication regimens
- Functional and sensory capabilities
Priorities and Goals for Therapy

- Glucose control is important to consider
  - Risk of hypoglycemia is real with CDC stats showing ED visit rates for hypoglycemia are highest for those age 75+
    - Rates 3x higher than those age 45-64
  - Critically important to avoid hyperglycemic effects
    - Dehydration, falls, infection
- Control of CV risk factors may actually give better rates of lowering morbidity and mortality
  - Evidence is strongest for HTN control, less with lipids and aspirin therapy

http://www.cdc.gov/diabetes/statistics/hypoglycemia/fig5by age.htm
Multiple Considerations in the Decision-making Process

- Clinical characteristics
  - Life expectancy, duration of disease, glycemic history and risk factors, comorbidities

- Personal characteristics
  - Attitudes, DM knowledge, family supports

- Psychosocioeconomic factors
  - Resources/medical costs, cognitive function, Q of L

Subramanian and Hirsch, Diabetes Spectrum vol 27, number 2, 2014
Approach to the management of hyperglycemia

Inzucchi et al, Diabetes Care 2015; 38:41
Current Controversies

• What is the best A1C for our older patients?
• Is it determined by risk (generalized vs patient specific)?
• What is more dangerous – hypoglycemia or hyperglycemia – in this population?
• Are there differences in determining A1C levels for Type 1 DM vs Type 2 DM?
• Are older patients good candidates for transitioning to insulin therapy?
• What if an older patient with Type 1 diabetes wants to maintain an A1C of <7%?
• What role should quality of life or longevity play in setting goals?
Framework for Treatment Decisions

- Estimate **Benefits** of Intensive Glycemic Control
- Estimate **Harms** of Intensive Glycemic Control
- Establish an **Individualized Glycemic Target** that maximizes benefit and minimizes harm
- Minimize **Polypharmacy**
- **Know Patient’s Goals and Values** and engage in **Shared Decision-making**

Older Adults Values and Preferences for Type 2 Diabetes Care

• Qualitative study with 5 focus groups N=25
• Age > 60 years with T2D > 1 year duration
• Purpose: Values impact motivation and individual’s willingness to carry out self-care behaviors

1. Importance of effective physician-patient treatment relationship
2. Honesty regarding diabetes treatment and progression of illness
3. Prioritizing quality of life in diabetes care

Screening for Depression/Cognitive Changes

• Mini mental status exam (MMSE)
  – Brief, easier to score, 8 questions
• Montreal Cognitive Assessment Test (MoCA)
  – More sensitive-executive functioning, longer,
• Cognitive changes may range from subtle changes in executive function to dementia
• Assess changes in clinical picture
  – glucose pattern changes (increased hyper/hypo), self-care/ hygiene issues, forgetfulness, difficulty changing treatment plan
Diabetes Requires Self-Care

- Healthy Eating
- Managing Changes in Activity
- Monitoring
- Taking Medications
- Problem Solving
- Healthy Coping

Every aspect of self-care is complicated with cognitive impairments and needs evaluation.
Cognitive Decline

- Cognitive changes can happen *slowly over time*, eroding self-care abilities
  - Be alert for changes in:
    - personal hygiene
    - vague responses to specific questions
    - more frequent missed appointments
    - deterioration in glucose control that seems to have no overt cause

- More *rapid changes* may be associated with
  - A recent illness or hospitalization
  - Changes in medication
  - Change in life circumstances
Choosing Medications-The Challenges

• Persons >age 65 are underrepresented in clinical trials including medication trials
  – data is extrapolated from studies with younger populations
  – Medications may reduce insulin resistance but do not address the affects of aging on the beta cell

• In normal, aging kidney function declines affecting metabolism of medications
  – changes in renal clearance of medications
  – dose adjustments needed
  – “Start low and go slow”
Choosing Medications

• Polypharmacy- drug-to-drug interactions, complex regimens, cost
  – Beers Criteria-lists medications and medication classes to be avoided in older adults
  – Simplification of dosing schedules helps foster adherence
  – Review medication lists at every visit
    • be aware of dosage, frequency
    • duplication of types/classes
    • Use of over-the-counter or alternative therapies
## Antihyperglycemic Agents- Pros/Cons

<table>
<thead>
<tr>
<th>Class</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biguanide, Metformin</td>
<td>No wgt gain</td>
<td>GI s/e-diarrhea, distress</td>
</tr>
<tr>
<td></td>
<td>Minimal hypo</td>
<td>Rare lactic acidosis</td>
</tr>
<tr>
<td></td>
<td>Extensive Clinical experience $</td>
<td>Contraindicated-renal insufficiency (eGFR&lt;30mL/min),liver or cardiac failure</td>
</tr>
<tr>
<td>Sulfonylureas, glipizide, glyburide, glimepiride</td>
<td>Decreased microvascular events</td>
<td>Hypoglycemia (glyburide)</td>
</tr>
<tr>
<td></td>
<td>Extensive experience $</td>
<td>Weight gain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin rash</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Higher secondary failure rate –(beta cell dysfunction)</td>
</tr>
<tr>
<td>Meglitinides, repaglinide, nateglinide</td>
<td>Reduce PP rise</td>
<td>Hypoglycemia</td>
</tr>
<tr>
<td></td>
<td>Flexible dosing (before meals)</td>
<td>Weight gain</td>
</tr>
<tr>
<td></td>
<td>Short acting $</td>
<td>Frequent dosing</td>
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<tr>
<td></td>
<td>$-$$$</td>
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</tbody>
</table>
## Antihyperglycemic Agents

<table>
<thead>
<tr>
<th>Medication</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>TZDs pioglitazone, rosiglitazone</td>
<td>Minimal hypoglycemia, Increase HDL-C, Decrease TG (pio), $-$$</td>
<td>Weight gain/fluid retention, Edema/heart failure, Bone fractures, Increase LDL-C (rosi)</td>
</tr>
<tr>
<td>DPP-4 inhibitors</td>
<td>Minimal hypoglycemia, Well-tolerated, Once a day dosing, $$-$$$</td>
<td>? Increase risk of pancreatitis, Urticaria/angioedema, ?Heart failure risk</td>
</tr>
<tr>
<td>SGLT-2 inhibitors</td>
<td>Minimal hypoglycemia, Weight reduction, BP reduction, Effective at all stages of T2D, Once-a day dosing, Cardiac benefits, Preferred with HF/CKD, $$</td>
<td>Caution in pts with Renal Insufficiency, GU infections/UTI, Mycotic/yeast genital, Bone fracture/amp (cana), Hyperkalemia, Orthostatic hypotension, Pancreatitis, Increased risk for DKA (T1D)</td>
</tr>
</tbody>
</table>
# Antihyperglycemic Agents

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<thead>
<tr>
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<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
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<tr>
<td>A-glucosidase inhibitors</td>
<td>Minimal hypoglycemia</td>
<td>Modest A1C reduction</td>
</tr>
<tr>
<td></td>
<td>Decreases PP rise</td>
<td>Flatulence/Abd discomfort</td>
</tr>
<tr>
<td></td>
<td>Titration of dosage</td>
<td>Freq dosing (with meals)</td>
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<tr>
<td></td>
<td></td>
<td>Contraindicated with cirrhosis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blocks certain CHO used in treating hypoglycemia</td>
</tr>
<tr>
<td>INJECTABLE MEDS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(NON-INSULIN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GLP-1 RA</td>
<td>Minimal hypoglycemia</td>
<td>GI s/e –nausea, vomiting ? Acute pancreatitis ? C-cell hyperplasia</td>
</tr>
<tr>
<td>Exenatide/Exenatide ER</td>
<td>~weight reduction- appetite reduction</td>
<td>and medullary thyroid tumors</td>
</tr>
<tr>
<td>Liraglutide</td>
<td>Decreases PP glucose rise</td>
<td></td>
</tr>
<tr>
<td>Dulaglutide</td>
<td>Lira/Sema- cardiac benefits</td>
<td></td>
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<tr>
<td>Semaglutide</td>
<td></td>
<td></td>
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<tr>
<td>Lixisenatide</td>
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</tbody>
</table>
Use with Caution

Insulin clearance times may increase as GFR declines

Risk of hypoglycemia increases
Algorithm to simplify insulin regimen for older patients with type 2 diabetes

Simplification of Complex Insulin Therapy

Patient on basal (long- or intermediate-acting) and/or mealtime (short- or rapid-acting) insulins

Basal insulin

Change timing from bedtime to morning

Tritrate dose of basal insulin based on fasting fingerstick glucose test results over a week
- Fasting Goal: 90–150 mg/dL (4.9–8.3 mmol/L)
- May change goal based on overall health and goals of care

If 50% of the fasting fingerstick glucose values are over the goal:
- ↑ dose by 2 units
If >2 fasting fingerstick values/week are <80 mg/dL (4.4 mmol/L):
- ↓ dose by 2 units

Patient on premixed insulin

Mealtime insulin

If mealtime insulin >10 units/dose:
- ↓ dose by 50% and add noninsulin agent
  - Titrate mealtime insulin doses down as noninsulin agent doses are increased with aim to discontinue mealtime insulin

If mealtime insulin ≤10 units/dose:
- Discontinue mealtime insulin and add noninsulin agent(s)

Add noninsulin agents:
- If eGFR is ≥45 mg/dL, start metformin 500 mg daily and increase every 2 weeks, as tolerated
- If eGFR is <45 mg/dL, patient is already taking metformin, or metformin isn’t tolerated, proceed to second-line agent

Using patient and drug characteristics to guide decision making, as depicted in Fig. 9.1 and Table 9.1, select additional agent(s) as needed:
- Every 2 weeks, adjust insulin dose and/or add glucose-lowering agents based on fingerstick glucose testing performed before lunch and before dinner
- Goal: 90–150 mg/dL (4.9–8.3 mmol/L) before meals; may change goal based on overall health and goals of care
- If 50% of premeal fingerstick values over 2 weeks are above goal, increase the dose or add another agent
- If >2 premeal fingerstick values/week are <90 mg/dL (4.9 mmol/L), decrease the dose of medication

Additional Tips
- Do not use short-acting insulin at bedtime
- While adjusting mealtime insulin, may use simplified sliding scale, for example:
  - Premeal glucose >250 mg/dL (13.9 mmol/L), give 2 units of short- or rapid-acting insulin
  - Premeal glucose >350 mg/dL (19.4 mmol/L), give 4 units of short- or rapid-acting insulin
- Stop sliding scale when not needed daily

American Diabetes Association Dia Care 2019;42:S139-S147
Example of Simplifying Insulin Therapy from the ADA algorithm 2019

Additional Tips
- Do not use short-acting insulin at bedtime
- While adjusting mealtime insulin, may use simplified sliding scale, for example:
  - Pre-meal glucose >250 mg/dL (13.9 mmol/L), give 2 units of short- or rapid-acting insulin
  - Pre-meal glucose >350 mg/dL (19.4 mmol/L), give 4 units of short- or rapid-acting insulin
- Stop sliding scale when not needed daily
## Simplification of Regimen

<table>
<thead>
<tr>
<th>Difficulty with Regimen</th>
<th>Possible strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forgot meal insulin or erratic meal schedule</td>
<td>Use basal insulin to control FBG</td>
</tr>
<tr>
<td></td>
<td>Try non-insulin medications for PP control</td>
</tr>
<tr>
<td></td>
<td>(Metformin ER, GLP-1 daily, SGLT2 i)</td>
</tr>
<tr>
<td>Errors in insulin scale</td>
<td>Simplify by using a fixed dose</td>
</tr>
<tr>
<td></td>
<td>Use a 1 or 2 dose scale (250-300=2 units, 300+=3 units)</td>
</tr>
<tr>
<td>Hypo at fasting but hyper during the day</td>
<td>Switch basal to AM and titrate to fasting goal; Add oral agents if necessary</td>
</tr>
<tr>
<td>Mixed dose insulin</td>
<td>Give 70% of total as basal insulin only</td>
</tr>
<tr>
<td></td>
<td>Give as morning dosage</td>
</tr>
<tr>
<td>Forgets oral meds often</td>
<td>Once daily preparations used when possible/pill reminder devices</td>
</tr>
<tr>
<td></td>
<td>Pre-poured meds when appropriate</td>
</tr>
</tbody>
</table>

Adapted from: Munshi MN, Diab Care 40, April 2017:461-467
John-Type 1 diabetes for 48 years

- John-age 70
- Type 1 diabetes x 48 yrs
  - Pump therapy last 12 yrs with A1C 6.8-7.0% (Today-6.5%)
- + hypoglycemia- 2 x past 3 months
- PMH-
  - CVD with CABG 4 yrs ago, Hypertension, Hyperlipidemia,
  - Retinopathy
- Married with 2 grown children, Recently retired mechanical engineer
- BP 132/86  BMI-27  Creat-1.0
- eGFR-48  HDL 50/LDL 87
Issues

• Change in daily schedule since retirement
• Insistence on tight control to avoid further renal changes
• His wife has no involvement in SMBG, pump use
• No symptoms of hypoglycemia recognized by patient

• Plans to exercise more—would like to lose “a few pounds”
• Sees no need to de-intensify therapy—has done well in the past.

• She has noted hypoglycemia behavioral changes and called 911. She wants a more active role in care but patient has resisted this and sees it as “interference”.
Anna-Type 2 diabetes for 8 years

• Anna-age 82-dx with T2D 8 years ago.
• Discharged from hospital 3 weeks ago- community-acquired pneumonia
  − BG-167-320 mg/dL-Required insulin therapy in hospital
• Today c/o lethargy, nocturia x 3, lack of appetite
• PMH- CAD, Hypertension, chronic constipation, cataracts, peripheral neuropathy, polypharmacy
• Diabetes- glipizide ER, metformin and sitagliptin. Other meds-Diovan, Lasix, Atenolol
• Lives alone
Issues

Serious life-threatening illness

Hyperglycemia during and post hospitalization

CAD with hypertension

Lives alone. No family near by to assist. “Forgetful”

- Slow recovery with continued fatigue; unable to cook/prepare nutritious meals
- Nocturia indicating more severe hyperglycemia. No SMBG r/t fatigue
- Serious disease but not a candidate for CABG
- Home care needed? Medications taken regularly. Vision issues?
Take Home Points on Caring for Older Adults

• View each person holistically, and avoid developing a plan of care based on age alone.
• Individualize glycemic goals, medication regimens and self-care plan considering physical needs as well as the patient’s preferences and priorities.
• Evaluate for signs and symptoms of clinical changes at every visit indicating over/under treatment of diabetes
• Assess for physical and cognitive changes necessitating adjustment in goals and treatment regimen