Workshop: 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:

Geralyn R Spollett

Research Support: None
Employee: None
Board Member/Advisory Panel: Eli Lilly Co
Stock/Shareholder: None
Consultant: Eli Lilly Co
Other: None
Objectives for this Workshop

1- Review the 2019 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- Use case presentations to compare and contrast diabetes treatments in older adults recognizing the key aspects of aging
Older Adults as Largest Demographic and Growing

Physiological Changes with 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
Aging - A Spectrum
Active and Independent to Frail and Needing Care
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—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

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, 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

Pearl G. Lee, and Jeffrey B. Halter Dia Care 2017;40:444-452

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Type 1 Diabetes in the Older Adult

- 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 T2D
  - Increased frequency of microvascular disease
  - Concomitant health care concerns, illnesses
  - Use of insulin and complex medication regimens
  - At higher risk for hypoglycemia
  - More difficulty accepting a relaxation of therapeutic goals
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
– 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

Diabetes Care 2019;42(Suppl. 1) S139-147
ADA Standards of Care- 2019

• Screening- at initial visit and then annually for
  – cognitive impairments, dementia, and depression
  – geriatric syndromes (frailty) 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
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</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&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</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&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</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 150/90</td>
</tr>
</tbody>
</table>
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
Individualize the Plan-A Patient Centered Approach
Consider Multiple Factors...

- Patient preferences
- Age and duration of disease
- Comorbidities
- Cognitive status
- Manual dexterity
- Social and concrete 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
  - Want 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 asa

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
- Assessment tool used with categories with these factors/scores used to suggest possible glycemic targets

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

Inzucchi et al, Diabetes Care 2015; 38:41
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

Diabetes Education-Self Care Behaviors

- Healthy Eating
- Being Active
- Monitoring
- Taking Medications
- Problem Solving
- Reducing Risks
- Healthy Coping

- All can be impacted with cognitive impairments
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
- Clinical changes-
  - glucose pattern changes (increased hyper/hypo), self-care/ hygiene issues, forgetfulness, difficulty changing treatment plan
CRITICAL CHANGES IN HEALTH STATUS INDICATE THE NEED FOR RE-EVALUATION OF MENTAL STATUS AND SELF-CARE ABILITIES

Since so much of diabetes management relies on self-care behaviors, any cognitive changes can detrimentally affect health and well-being.
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
## Antihyperglycemic Agents- Pros/Cons

<table>
<thead>
<tr>
<th>Class</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biguanide</td>
<td>No wgt gain</td>
<td>GI s/e-diarrhea, distress, Rare lactic acidosis, Contraindicated-renal insufficiency (eGFR&lt; 30mL/min), liver or cardiac failure</td>
</tr>
<tr>
<td>Metformin</td>
<td>Minimal hypo</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extensive Clinical experience $</td>
<td></td>
</tr>
<tr>
<td>Sulfonylureas</td>
<td>Decreased microvascular events</td>
<td>Hypoglycemia (glyburide), Weight gain, Skin rash, Higher secondary failure rate (beta cell dysfunction)</td>
</tr>
<tr>
<td>Glipizide, glyburide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glimepiride</td>
<td>Extensive experience $</td>
<td></td>
</tr>
<tr>
<td>Meglitinides</td>
<td>Reduce PP rise</td>
<td>Hypoglycemia</td>
</tr>
<tr>
<td>Repaglinide, nateglinide</td>
<td>Flexible dosing (before meals)</td>
<td>Weight gain</td>
</tr>
<tr>
<td></td>
<td>Short acting $$$$</td>
<td>Frequent dosing</td>
</tr>
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<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</td>
<td>Minimal hypoglycemia</td>
<td>Weight gain/fluid retention</td>
</tr>
<tr>
<td>pioglitazone, rosiglitazone</td>
<td>Increase HDL-C</td>
<td>Edema/heart failure</td>
</tr>
<tr>
<td></td>
<td>Decrease TG (pio)</td>
<td>Bone fractures</td>
</tr>
<tr>
<td></td>
<td>$-$-$-$</td>
<td>Increase LDL-C (rosi)</td>
</tr>
<tr>
<td>DPP-4 inhibitors</td>
<td>Minimal hypoglycemia</td>
<td>? Increase risk of pancreatitis</td>
</tr>
<tr>
<td>sitagliptin, saxagliptin, linagliptin,</td>
<td>Well-tolerated</td>
<td>Urticaria/angioedema</td>
</tr>
<tr>
<td></td>
<td>Once a day dosing</td>
<td>? Heart failure risk</td>
</tr>
<tr>
<td></td>
<td>$-$-$-$</td>
<td></td>
</tr>
<tr>
<td>SGLT-2 inhibitors</td>
<td>Minimal hypoglycemia</td>
<td>Caution in pts with RI</td>
</tr>
<tr>
<td>canagliflozin,</td>
<td>Weight reduction</td>
<td>GU infections/UTI</td>
</tr>
<tr>
<td>empagliflozin,</td>
<td>BP reduction</td>
<td>Mycotic/yeast genital</td>
</tr>
<tr>
<td>dapagliflozin</td>
<td>Effective at all stages of T2D</td>
<td>Bone fracture/amp (cana)</td>
</tr>
<tr>
<td></td>
<td>Once-a day dosing</td>
<td>Hyperkalemia</td>
</tr>
<tr>
<td></td>
<td>Cardiac benefits</td>
<td>Orthostatic hypotension</td>
</tr>
<tr>
<td></td>
<td>Preferred with HF/CKD</td>
<td>Pancreatitis</td>
</tr>
<tr>
<td></td>
<td>$-$</td>
<td>Increased risk for DKA (T1D)</td>
</tr>
</tbody>
</table>
## Antihyperglycemic Agents

<table>
<thead>
<tr>
<th>Medication</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-glucosidase inhibitors</td>
<td>Minimal hypoglycemia</td>
<td>Modest A1C reduction, Flatulence/Abd discomfort, Freq dosing (with meals), Contraindicated with cirrhosis, Blocks certain CHO used in treating hypoglycemia</td>
</tr>
<tr>
<td></td>
<td>Decreases PP rise</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Titration of dosage</td>
<td></td>
</tr>
<tr>
<td>Injectable Medication (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 and medullary thyroid tumors</td>
</tr>
<tr>
<td>Exenatide/Exenatide ER</td>
<td>~weight reduction-appetite reduction</td>
<td></td>
</tr>
<tr>
<td>Liraglutide</td>
<td>Decreases PP glucose rise</td>
<td></td>
</tr>
<tr>
<td>Dulaglutide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semaglutide</td>
<td></td>
<td></td>
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<tr>
<td>Lixisenatide</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lira/Sema- cardiac benefits</td>
<td></td>
</tr>
</tbody>
</table>
# Action Chart for Commonly Used Insulin

<table>
<thead>
<tr>
<th>Insulin</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-acting-</td>
<td>2h</td>
<td>No peak</td>
<td>20 to &gt;24h</td>
</tr>
<tr>
<td>Glargine 100</td>
<td></td>
<td>3-9h</td>
<td>6-24h+</td>
</tr>
<tr>
<td>Detemir</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultra-long acting</td>
<td>2h</td>
<td>No peak</td>
<td>&gt;40h</td>
</tr>
<tr>
<td>Degludec</td>
<td>6h</td>
<td>No peak</td>
<td>28-36h</td>
</tr>
<tr>
<td>Glargine 300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate-acting</td>
<td>2h</td>
<td>4-12h</td>
<td>18-28h</td>
</tr>
<tr>
<td>Human NPH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid-acting</td>
<td>5-15 min</td>
<td>45-75 min</td>
<td>2-4h</td>
</tr>
<tr>
<td>Lispro</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspart</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glulisine</td>
<td></td>
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</tbody>
</table>
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

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:
    - Titrate dose of basal insulin based on testing 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

**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)

**Patient on premixed insulin**

- Use 70% of total dose as basal only in the morning

- Add noninsulin agents:
  - If eGFR is ≥60 ml/min, start metformin 500 mg daily and increase dose every 2 weeks, as tolerated
  - If eGFR is <60 ml/min, patient is already taking metformin, or metformin isn't tolerated, proceed to second-line agent

**Additional Tips**

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

Using patient and drug characteristics to guide decision making, as depicted in Fig. 6.1 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 premal fingerstick values over 2 weeks are above goal, increase the dose or add another agent
- If ≥2 premal fingerstick values/week are <90 mg/dl (4.9 mmol/L), decrease the dose of medication

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## Simplification of Regimen

<table>
<thead>
<tr>
<th>Difficulty with Regimen</th>
<th>Possible strategies</th>
</tr>
</thead>
</table>
| Forgot meal insulin     | Use basal insulin to control FBG  
Try non-insulin medications for PP control (Metformin ER, GLP-1 daily, SGLT2 i) |
| Errors in insulin scale | Replace with fixed dose  
Use a 1 or 2 dose scale (250-300=2 units, 300+=3 units)                          |
| Hypo at fasting but hyper during the day | Switch basal to AM and titrate to fasting goal; Add oral agents if necessary |
| Caregiver support       | Simplify to meds taken on once daily regimen if possible                            |
| Forgot oral meds        | Pillbox /Once daily preparations                                                   |

Adapted from: Munshi MN. Diab Care 40. April 2017:461-467
CASE STUDIES

SMALL GROUP DISCUSSION GROUPS
Instructions for Using the Case Studies

• Read through the cases and try to place yourself in the role of the provider. What information would you need in your assessment and plan of care?

• Discuss your case study in a small group. What are the salient points that will help you to determine the course of action?

• Design a care plan to address the needs of your patient. Discuss the strategies you might use to help implement it.
Case Study 1 - John

- 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
  - HTN, increased LDL-
  - Hypothyroidism, ED
- Married with 2 grown children, Recently retired mechanical engineer
- BP 132/86 BMI-27
- eGFR-48 HDL 50/LDL 87
Case Study 2- Anna

- Anna-age 78-dx with T2D 4 years ago.
- Discharged from hospital 3 weeks ago- community-acquired pneumonia
  - BG-167-320 mg/dL-Required insulin therapy
- Today c/o lethargy, nocturia x 3, lack of appetite
- PMH- HTN, chronic constipation, pernicious anemia, peripheral neuropathy
- Tx with oral agents- piogliazone, metformin and sitagliptin
- Lives alone
Case Study 3 - Helen

• Helen-age 86 with Type 2 diabetes for 9 years
• On insulin therapy x 2 years; 9 mos ago-A1C=7.0-7.4%
• c/o-poor eating habits with weight loss, limited activity
• PMH- CVD (hx MI), HTN, OA, Gout, Recurrent UTI
• Lives alone with daughter nearby, Divorced x 50+ yrs
• Glargine 70 units daily, Carvedilol, lisinopril, allopurinol, ECASA
• A1C now 8.6%, FBG-286 mg/dL
• 11 lb weight loss, BP 144/90
Key Points of this Workshop

• View each person holistically, and avoid developing a plan of care based on age alone.
• Individualize glycemic goals, medication regimens and self-care behaviors considering 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