Older adults with diabetes are a growing population with unique challenges. Many of the conditions associated with management of diabetes in older adults are not obvious and their impact on self-care is not well understood by caregivers or providers. It is important to understand these barriers to self-care in older adults so that safe and effective management plans can be developed. Successful management of diabetes in this population should be guided to achieve optimal glycemic control without the risk of hypoglycemia. Hypoglycemia has poor outcomes in older adults and the benefits of tight control are limited. A1C as the sole parameter for quality assessment of glycemic control should be used cautiously in older adults as many co-morbidities interfere with A1C measurement.

References:

1. Kirkman MS, Briscoe VJ, Clark N, Florez H, Haas LB, Halter JB, Huang ES, Korytkowski MT, Munshi MN, Odegard PS, Pratley RE, Swift CS: Diabetes in Older Adults; 2012 Dec; 35(12); 2650-64; PMID 23100048
Older Adults with Diabetes
They are not all the same

Medha Munshi, M.D.
Joslin Diabetes Center
Harvard Medical School
Beth Israel Deaconess Medical Center
Boston MA

Presenter Disclosure Information
Presenter: Medha Munshi
Consultant /Advisory Panel: Sanofi

Objectives
older adults with diabetes

- What are the Unique aspects?
- What are the Barriers to self-care?
- What are some Effective methods to manage DM?

Scope of the Problem
Diagnosed and Undiagnosed Diabetes

Percentage
(25.6 million)
(10.9 million)

Heterogeneous Population

Physiological reserve
Poor outcomes

Physiologic limit beyond which Homeostasis can not be restore
An insult that may be withstood by a younger person can push elderly beyond their functional capacity causing decompensation, disease or death

Homeostenosis
Progressive constriction of homeostatic reserve

AGE

Comorbidities in Aging and Diabetes

- Macrovascular diseases
- Microvascular diseases
- Cognitive dysfunction
- Depression
- Physical disability
- Polypharmacy
- Other geriatric syndrome

Cognitive Dysfunction
Executive Dysfunction

- Frontal lobe-mediated: higher function
  - Insight into the problem
  - Planning and judgment
  - Problem-solving
  - Starting, changing, or stopping behavior

Case History – Mr. D

- 82 yo male
- Engineer—computer savvy
- DM duration 17 yrs
- Glargine BID and lispro before meals
- A1C 6.5%

Error in Problem Solving

Modified Clock-in-a-Box (CIB)

Instruction Form:

- In the blue box on the next page:
  - Draw a picture of a clock
  - Put in all the numbers
  - Set the time to ten after eleven

Response Form:

Hand this sheet back and go to the next page
MMSE: 28/30
GDS: 1/15

Memory loss: Mr. JB

Difficulty With Problem-Solving

Mrs. MB

Mr. JW

Caregiver Support
Cognitive Dysfunction Associated With Poor Diabetes Control


Health and retirement study (CDC).

Depression in Older Adults With and Without DM


Health and retirement study (CDC).

Depressive Symptoms Associated With ↑ Risk of Functional Disability


Health and retirement study (CDC).

Mrs. M Age: 92 years, legally blind, 14 meds/day

Women Living Alone Glycemic control worsens as medications taken increase

CIAO study (Correcting Insulin Adherence Online)


8 patient data

100% of patients had deviation from their insulin prescription

- 13% doses were missed / under-bolused
- 26% were extra doses / over-bolused
- 54% doses were taken outside the ±1 hour window

On average, over 14-day period

- 58 min/day spent in hypo range (<70)
- 734 min/day in hyper range (>180)
Management of Diabetes in Older Adults

- Screening for barriers
  - Clinical / functional / psychosocial
- Management of hyperglycemia
  - Medications
  - Diet
  - Exercise / physical activity
- Management of risk factors
  - BP control
  - LDL cholesterol
  - Cessation of cigarette smoking
  - Low-dose aspirin therapy
  - Yearly screening for microalbuminuria (ACE inhibitors), retinopathy, foot examination

Glycemic Goal

Hyperglycemia (A1C) 
Hypoglycemia

Conditions common in the elderly that may affect A1C levels

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Possible mechanisms</th>
<th>Change in A1C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Race – AA / Hispanic</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Iron deficiency anemia</td>
<td>↓ RBC turnover</td>
<td></td>
</tr>
<tr>
<td>Transfusion</td>
<td>↑ RBC turnover</td>
<td></td>
</tr>
<tr>
<td>Hemodialysis</td>
<td>↓ RBC life span</td>
<td></td>
</tr>
<tr>
<td>Erythropoietin therapy</td>
<td>↑ young RBC</td>
<td></td>
</tr>
<tr>
<td>Metabolic acidosis / uremia</td>
<td>Carbamylation of hemoglobin</td>
<td></td>
</tr>
<tr>
<td>Anemia of chronic diseases</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Hemolytic anemia</td>
<td>↑ RBC turnover</td>
<td></td>
</tr>
<tr>
<td>Sickle cell anemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thalassemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polycythemia</td>
<td>↑ RBC life span</td>
<td></td>
</tr>
<tr>
<td>Hemoglobinopathies</td>
<td>Interference from Hb variance</td>
<td></td>
</tr>
</tbody>
</table>

Recent infection can impact glucose levels / insulin resistance

Hypoglycemia in older adults

Co-morbidities mimicking hypoglycemic symptoms

Cognitive dysfunction interfering with identification / treatment of hypoglycemia

Noncompliance

Even mild hypoglycemia may result in poor outcome

Frequent Hypoglycemic Episodes
Detected by CGM
age > 70 yrs; A1C > 8%; n = 40

Patients with hypoglycemia  n = 26 (65 %)
- Patients with A1C 8-9 %  14 (54 %)
- Patients with A1C > 9 %  12 (46 %)

Severity of hypoglycemic episodes

- Even mild hypoglycemia may result in poor outcome

Munshi et al; Arch Intern Med. 2011;171(4):362-364
National Trends in US Hospital Admissions for Hyper/Hypoglycemia
Medicare Beneficiaries 1999-2011
Lipska et al; JAMA Intern Med 2014; 174(7): 1116-24

Absolute risk of hypoglycemia; 100,000 ED admissions /year

<table>
<thead>
<tr>
<th>Health Status</th>
<th>Rationale</th>
<th>A1C</th>
<th>BP</th>
<th>Lipids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>- Longer life expectancy</td>
<td>&lt;7.5%</td>
<td>&lt;140/80</td>
<td>Not tolerated</td>
</tr>
<tr>
<td>Complex/Intermediate</td>
<td>- Intermediate life expectancy</td>
<td>&lt;8%</td>
<td>&lt;140/80</td>
<td>Not tolerated</td>
</tr>
<tr>
<td>Very Complex/Poor Health</td>
<td>- Limited life expectancy, Benefits uncertain</td>
<td>&lt;8.5%</td>
<td>150/90</td>
<td>Consider risks and benefits</td>
</tr>
</tbody>
</table>

Position Statement for DM in Older adults
Framework for goal-setting
Kirkman MS et al; Diabetes Care. 2012 Dec;35(12):2650-64

Current A1c

Multiple Comorbidities or medications that may cause hypoglycemia
Few Comorbidities and Medications unlikely to cause hypoglycemia

- Multiple Co-morbidities
- Limited Life Expectancy
- Difficulty coping

Medications may cause hypoglycemia
Carefully assess for hypoglycemia or glucose excursions

At Goal with caution (Continually assess for hypoglycemia)
At goal with caution (Continually assess for hypoglycemia)
At Goal

Goal-setting Algorithm in Elderly

Simple Insulin Management (SIMPLE)

Prospective Study

To evaluate the effect of simplification of insulin regimen on

Primary aim:
Frequency and duration of hypoglycemic episodes
(measured by CGM)

Secondary aim:
Glycemic control (A1C)


Algorithm for Insulin Regimen Simplification
from basal-bolus to one injection/day

SIMPLE study

- Age >70 yrs
- ≥1 insulin injection/day
- High stimulated c-peptide
- ≥1 episode of glucose <70
- Hypo duration ↓ from 277 min to 111 min at 5 months
- Further ↓ to 97 min at 8 months
- No significant change in A1C 7.7 %, 7.5 %, 7.7%

Table 3A: Change in Hypoglycemia duration and A1C in groups with different A1C at baseline

<table>
<thead>
<tr>
<th>Baseline A1C</th>
<th>≤ 7%</th>
<th>7.1-8%</th>
<th>8.1-9%</th>
<th>&gt;9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypo duration (mins/5 days)</td>
<td>292±306</td>
<td>146±225</td>
<td>76±184</td>
<td>280±260</td>
</tr>
<tr>
<td>Change in A1C</td>
<td>0.37±0.65</td>
<td>0.48±0.54</td>
<td>-0.06±0.68</td>
<td>-0.52±0.54</td>
</tr>
</tbody>
</table>

Table 3B: Duration of hypoglycemia by A1C levels at 5 months and 8 months

<table>
<thead>
<tr>
<th>5-month A1C</th>
<th>≤ 7%</th>
<th>7.1-8%</th>
<th>8.1-9%</th>
<th>&gt;9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypo duration (mins/5 days)</td>
<td>103±120</td>
<td>59±85</td>
<td>23±55</td>
<td>151±179</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8-month A1C</th>
<th>≤ 7%</th>
<th>7.1-8%</th>
<th>8.1-9%</th>
<th>&gt;9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypo duration (mins/5 days)</td>
<td>34±63</td>
<td>21±43</td>
<td>14±31</td>
<td>104±75</td>
</tr>
</tbody>
</table>

Summary

- Unique aspects
  - Heterogeneous population with unique challenges
  - Caution with use of A1C as a sole parameter of glycemia

- Barriers to self-care
  - Medical, functional, psychosocial
  - Changes occur frequently

- Effective methods to manage DM
  - Simpler the better
  - Match patient’s coping abilities with treatment complexity
Geriatrician’s Serenity Prayer
Wisdom to know when not to mess with it!