Diabetes Mellitus in Older Adults

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

Presenter Disclosure Information

Medha Munshi

Research grant from Sanofi

Goals and Objectives

• Older patients vs younger adults
• Goals of treatment
• Management strategy
Diagnosed and Undiagnosed Diabetes


Case History

- 85 years old patient with diabetes

Questions:
- what is different in presentation?
- when does this patient need treatment?
- what is the best treatment for this patient?
Heterogeneity in Environment In Older Adult With Diabetes

- Community living
- Assisted care facilities
- Nursing home
- Alone
- Spouse
- Highly functional
- Functionally disabled
- Older adult
- With diabetes

Co-morbidities in Aging and Diabetes

- Macro/Micro vascular dz
- Cognitive dysfunction
- Depression
- Physical disability
- Polypharmacy

Cognitive Dysfunction

- Executive Dysfunction
  - Frontal lobe mediated higher functions
  - Insight in to the problem
  - Planning and judgment
  - Problem solving
  - Starting, changing or stopping behavior

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Case History – Mr. D

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

Modified Clock-In-a-Box(CIB)

Please read and do the following carefully:

- 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.

Hand this sheet back and go to the next page

Cognitive Dysfunction in Older Adults With and Without DM

<table>
<thead>
<tr>
<th>% of Patients with Cognitive Dysfunction</th>
<th>&gt;70 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older Adults without DM</td>
<td>18.5</td>
</tr>
<tr>
<td>Older Adults with DM</td>
<td>34</td>
</tr>
</tbody>
</table>

Health and retirement study (CDC).

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Cognitive Dysfunction Associated with Poor Diabetes Control

Munshi et al. Diabetes Care. 2006;29(8):1794-1799

Depression in Older Adults With and Without DM


Depressive Symptoms Associated with Increased Risk of Functional Disability


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Joslin Diabetes Center
Advances in Diabetes and Thyroid Disease 2013
Diabetes Mellitus in Older Adults

For Women Living Alone, Glycemic Control Worsens as Number of Medications Increases

![Graph showing the relationship between A1C and medication count.](Hayes M et al, Diabetes 2006; A212)

Functional Impairment in the Elderly With Diabetes

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing Impairment</td>
<td>48%</td>
</tr>
<tr>
<td>Vision Impairment</td>
<td>53%</td>
</tr>
<tr>
<td>History of Recent Falls</td>
<td>33%</td>
</tr>
<tr>
<td>Fear of Falls</td>
<td>43%</td>
</tr>
<tr>
<td>Independent in ADL</td>
<td>95%</td>
</tr>
<tr>
<td>Independent in IADL</td>
<td>38%</td>
</tr>
</tbody>
</table>


Complex Interactions in Older Adults with Diabetes

![Diagram showing complex interactions between diabetes and related conditions.](Diagram)

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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 <130/80 mm Hg
  - LDL cholesterol <100 mg/dl
  - Cessation of cigarette smoking
  - Low dose aspirin therapy
  - Yearly screening for microalbuminuria (ACE inhibitors), retinopathy, foot examination

Goal-Setting

- Glycemic Goal
  - Hypoglycemia
  - Social support and living situation
  - Financial issues
  - Life expectancy
  - Physical abilities

A1C: Marker of Glycemic Control

- Increases with increasing age
- Affected by red cell life span
- Role of renal dysfunction and anemia of chronic diseases not known
- Reflects average glucose – miss BG fluctuations
A1C - 8.2%
Insulin only

A1C - 8.3%
Insulin and oral

Hypoglycemia in older adults

Hypoglycemia unawareness
Cognitive dysfunction interfering with identification/treatment of hypoglycemia
Co-morbidities mimicking hypoglycemic symptoms

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
60-69 mg/dl 100 %
50-59 mg/dl 73 %
< 50 mg/dl 46 %

Munishi et al; Arch Intern Med. 2011;171(4):362-364

Even mild hypoglycemia may result in poor outcome
Patient characteristics

<table>
<thead>
<tr>
<th>Health Status</th>
<th>Rational</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>Statins unless not tolerated</td>
</tr>
<tr>
<td>Complex/Intermediate</td>
<td>Intermediate life expectancy</td>
<td>&lt;8%</td>
<td>&lt;140/80</td>
<td>Statins unless not tolerated</td>
</tr>
<tr>
<td>Very Complex/Poor Health</td>
<td>Limited life expectancy</td>
<td>&lt;8.5%</td>
<td>&lt;150/90</td>
<td>Consider risks and benefits</td>
</tr>
</tbody>
</table>

Goal-setting Algorithm in Elderly

- A1C < 7%
  - Liberalize goal
  - At goal with caution (Continually assess for hypoglycemia)

- 7% - 8%
  - Moderate risk of hypoglycemia
  - Mid-treatment burden
  - Consider risks and benefits

- > 8%
  - Multiple comorbidities
  - Consider life expectancy
  - Difficultly coping
  - At goal
  - Aim for goal < 8%

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## 15 Classes of Antidiabetes Medications

<table>
<thead>
<tr>
<th>Class</th>
<th>A1C Reduction</th>
<th>Fasting vs PPG</th>
<th>Hyperglycemia</th>
<th>Weight Gain</th>
<th>Dosing (times/day)</th>
<th>Other Safety Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>α-Glucosidase inhibitor</strong></td>
<td>0.0–0.8</td>
<td>PPG</td>
<td>No</td>
<td>Neutral</td>
<td>1</td>
<td>GI</td>
</tr>
<tr>
<td>Amylin mimetics</td>
<td>0.5–1.0</td>
<td>PPG</td>
<td>No</td>
<td>Loss</td>
<td>1, injected</td>
<td>GI</td>
</tr>
<tr>
<td><strong>DPP-4 inhibitors</strong></td>
<td>0.6–0.8</td>
<td>PPG</td>
<td>No</td>
<td>Neutral</td>
<td>1</td>
<td>Pancreatitis</td>
</tr>
<tr>
<td>Life-style intervention</td>
<td>0.5</td>
<td>Fasting</td>
<td>No</td>
<td>Neutral</td>
<td>1–2</td>
<td>GI</td>
</tr>
<tr>
<td><strong>SGLT-2 inhibitors</strong></td>
<td>0.5–1.5</td>
<td>Both</td>
<td>No</td>
<td>Loss</td>
<td>2, injected</td>
<td>GI, Pancreatitis, MI, HF</td>
</tr>
<tr>
<td><strong>GLP-1 agonists</strong></td>
<td>0.5–0.8</td>
<td>PPG</td>
<td>Rare</td>
<td>Gain</td>
<td>3</td>
<td>GI</td>
</tr>
<tr>
<td><strong>GLP-1 agonists</strong></td>
<td>1.0–1.5</td>
<td>Fasting</td>
<td>Yes</td>
<td>Gain</td>
<td>1</td>
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<td>2, injected</td>
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</tr>
<tr>
<td>TCA inhibitors</td>
<td>1.0–1.5</td>
<td>PPG</td>
<td>No</td>
<td>Neutral</td>
<td>1</td>
<td>GI</td>
</tr>
</tbody>
</table>

*ARF = acute renal failure; DPP-4 = dipeptidylpeptidase-4; GI = gastrointestinal; GLP = glucagon-like peptide; MI = myocardial infarction; SGLT-2 = sodium-glucose transporter-2*


## Insulin Action

**Aspar. Iprap. Glulisine**

- Regular
- NPH
- Detemir
- Glargine

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Higher contribution of post-prandial glucose in hyperglycemia in older vs younger adults


Algorithm for the metabolic management of older adults with diabetes

Uncontrolled With Oral Meds
- Post prandial hyperglycemia
  - Long acting insulin Am dosing
  - Long acting insulin Pm dosing
  - Or NPH at bedtime
- Low AM, high PM memory loss
  - Long acting and NPH or mix insulin in am

Algorithm for the metabolic management of older adults with diabetes

Diagnosis
- Normal
- Renal function Abnormal
- Cognitive function

Metformin
- Start @ 500 mg/d
- Increase by 500 mg
- Up to 2000 mg/d

Sulfonylurea
- Start low and increase dose as tolerated
- No CHF Normal LFT

Algorithm for the metabolic management of older adults with diabetes
Use of serum c-peptide to simplify regimen in older adults

- Normal/high serum C-peptide: 65/100
- Age: 79±14 yrs, DM duration: 21±13 yrs
- Number of medications: 11 (range 4-18)
- Simplification completed in 35 patients
- In 19 patients, patients completely off insulin
- In 16 patients number of insulin injections were decreased significantly
- Number of hypoglycemic episodes decreased
- A1c improved from 8% to 7.4% (p<0.002)

Munshi et al; American Journal of Medicine 2009;122;395-97

Simplification of Regimen Improves Glucose Excursions

<table>
<thead>
<tr>
<th>A1c 7.5%</th>
<th>Aspart Mix 70/30 30 units BID</th>
<th>Time &lt; 70mg/dL 500 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1c 7.2%</td>
<td>Glargine 40 units QID</td>
<td>Time &lt; 70mg/dL 0 min</td>
</tr>
</tbody>
</table>

Munshi et al; abstract presentation at ADA June 2013

Summary

- Older patients vs younger adults
  - Clinical presentation is variable

- Goals of treatment
  - Consider co-existing conditions
  - Risks vs Benefit of treatment
  - A1c vs hypoglycemia - parameters for glycemic goals

- Management strategy
  - Matching patients’ coping skills to the complexity of the treatment
  - KISS

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