The Increasing Burden of Diabetes in the Elderly

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- Epidemiology
- Physical and biochemical pathophysiology
- Guidelines
- Considerations
Prevalence and Incidence of Diabetes in the Medicare Fee-for-service Population

McBean et al. Diabetes Care 27:2317, 2004
# Mortality Rates among Elderly Individuals with Diabetes

<table>
<thead>
<tr>
<th>Group by age</th>
<th>1994 mortality rate (deaths/1000 beneficiaries)</th>
<th>2001 mortality rate (deaths/1000 beneficiaries)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>92.1</td>
<td>87.2</td>
</tr>
<tr>
<td>67-69</td>
<td>42.9</td>
<td>38.4</td>
</tr>
<tr>
<td>70-74</td>
<td>56.7</td>
<td>50.1</td>
</tr>
<tr>
<td>75-79</td>
<td>83.1</td>
<td>75.1</td>
</tr>
<tr>
<td>80-84</td>
<td>119.2</td>
<td>112.5</td>
</tr>
<tr>
<td>≥85</td>
<td>198.1</td>
<td>202.1</td>
</tr>
</tbody>
</table>

McBean et al. *Diabetes Care* 27:2317, 2004
Mortality Rates among Elderly Individuals with Diabetes

<table>
<thead>
<tr>
<th>Group by race/ethnicity</th>
<th>1994 mortality rate (deaths/1000 beneficiaries)</th>
<th>2001 mortality rate (deaths/1000 beneficiaries)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>92.9</td>
<td>87.7</td>
</tr>
<tr>
<td>Black</td>
<td>91.3</td>
<td>91.7</td>
</tr>
<tr>
<td>Hispanic</td>
<td>69.1</td>
<td>72.5</td>
</tr>
<tr>
<td>Asian</td>
<td>71.2</td>
<td>56.3</td>
</tr>
</tbody>
</table>

McBean et al. *Diabetes Care* 27:2317, 2004
City of Galveston Demographics

- Population ~50,000 post Hurricane Ike
  - 46.9% White
  - 20.3% Black
  - 28.0% Hispanic
  - 3.1% Asian
- Age 65 or older: 12.9%
  - 10.9% Galveston County
  - 8.9% City of Houston
  - 10.1% State of Texas
In 2004, it was estimated that the prevalence of obesity in the elderly would rise from 32.0% in 2000 to 37.4% in 2010 (range 33.6–39.6%).

According to D-ATLAS®, Texas State House District 23 (Galveston, Texas City, Bolivar Peninsula, Chambers County), obesity prevalence is 27% or less.

Arteburn DE et al. JAGS 54:1907, 2004
Obesity Paradox

- The notion that there are equivalent or lower mortality rates in older obese individuals when compared to non-obese counterparts that have diagnoses of CKD, CHF, NSTEMI; this needs to be understood further.
- This paradox does not apply to “healthy” individuals.
Challenges in the Elderly

- Physical
- Biochemical
- Psychosocial
- Nutritional
- Economic
Principal Investigator--James S. Goodwin, M.D.

Major purpose is to study how muscle metabolism and function change with age and contributes to loss of independence in older persons.
Physical and Biochemical Influences in Elderly Diabetes

- Protein synthesis decreases with age, leading to sarcopenia in the elderly
  - Hormonal influences (decreased testosterone, growth hormone; muscle resistance to insulin)
  - Lifestyle influences (sedentariness, decreased amino acid intake)
- Patients have more arthritis
- As a result of the above, patients may have a decreased capacity for physical activity
- Fat mass may increase, so insulin resistance may still be a problem

Physical and Biochemical Influences in Elderly Diabetes

- Prolonged time with diabetes can lead to living with complications
  - Age-related nephropathy-related decline in renal function may increase the half-life of certain medications
  - Liver disease or congestive heart failure may decrease medication metabolism
  - Decreased counterregulation from glucagon
  - Autonomic neuropathy may lead to hypoglycaemic unawareness
Physical and Biochemical Influences in Elderly Diabetes

- Loss of physical capacity to prepare home-cooked meals lead to adjustments in elderly individuals
  - Eating out more
  - More prepackaged food
  - Relying on “meals on wheels”
Psychosocial Influences in Elderly Diabetes

- Acute or subacute dementia leads to a whole host of problems
  - Difficulty in remembering times for insulin administration and ingestion of oral medications may lead to extra or missed doses
  - Difficulty in mealtime nutrition (not eating enough calories)
- Loss of spouses, partners or other family members may lead to depression and alcoholism
Economic Influences

- Seniors are faced with a “fixed” income, usually savings from a defined-benefit plan, combined with Social Security; with the improvement in life expectancy in this group, the money has to be stretched out over an extended number of years.
- The increase in chronic diseases in this group leads to the increasing number of medications that one person takes; with many of them being branded medications, that can account for a significant amount of cash flow.
Economic Influences

- Seniors may “extend” the pills they take by taking less than prescribed (splitting the pills), or taking them every other day instead of daily.

- Seniors may purchase lower quality foods in supermarkets and restaurants, which tend to be cheaper.
  - Decreased mobility may prevent some from taking advantage of supermarket sales.
Nutritional Influences in Elderly Diabetes

- Inadequate caloric intake may result in significant weight loss, exacerbating sarcopenia. This may lead to increasing weakness, with failure to thrive
  - Vitamin deficiencies may also result
- An unbalanced diet may result in excess fat and simple carbohydrate ingestion, leading to weight gain, and the need for more medications
Therapeutic Considerations

- Because of the biochemical changes in elderly patients, judicious use of pharmaceuticals should be practiced
  - Sulfonylureas should be used with care; consider meglitinides for early diabetics
  - CKD stage III or above may require lower doses of oral medications, or avoidance (metformin)
  - In relatively insulin-sensitive patients that need insulin therapy, premixed insulins should be avoided, and split-mix or basal-bolus regimens should be considered if the patient can successfully learn them
  - Beware of polypharmacy
Other Considerations

- Check for thyroid and adrenal status
  - Hyperthyroidism and hypercortisolism worsens diabetes control
  - Hypothyroidism improves it, but causes other problems
  - Adrenal insufficiency can lead to hypoglycaemia
ADA Guidelines for Treatment of Older Adults With Diabetes

- Intensive therapy (same goals as younger patient) appropriate for older adult patients who are
  - functional and cognitively intact
  - expected to live long enough to reap benefits
  - able to undertake self-management
- Relax glycemic goals if not met using individual criteria, but avoid hyperglycemic complications
- Treating cardiovascular risk factors in older adults may have greater impact on reducing morbidity and mortality than tight glycemic control alone
- Treat older adults with same drug regimens as younger patients, using special care in prescribing and monitoring

How Tight Should Control Be?

- Lessons learned from three randomized controlled trials
  - ACCORD (average age 62.2 years, 27% Hispanic or African-American)
  - ADVANCE (average age 66 years, 37% Asian)
  - VADT (average age 60.5 years, 38% Hispanic, African-American or Native American)
- Average age in the UKPDS was 53

ACCORD. *NEJM* 358:2545, 2008
ADVANCE. *NEJM* 358, 2560, 2008
VADT. *NEJM* 360:129, 2009
How Tight Should Control Be?

<table>
<thead>
<tr>
<th>Outcome</th>
<th>ACCORD</th>
<th>ADVANCE</th>
<th>VADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA₁c (%) (Intensive vs. Standard)</td>
<td>6.4 vs. 7.5 †</td>
<td>6.4 vs. 7.0 †</td>
<td>6.9 vs. 8.4 †</td>
</tr>
<tr>
<td>Nonfatal MI (%) (Intensive vs. Standard)</td>
<td>3.6 vs. 4.6% †</td>
<td>2.7 vs. 2.8</td>
<td>6.3 vs. 6.1</td>
</tr>
<tr>
<td>CV Death (%) (Intensive vs. Standard)</td>
<td>2.6 vs. 1.8 †</td>
<td>4.5 vs. 5.2</td>
<td>2.1 vs. 1.7</td>
</tr>
</tbody>
</table>

† indicates statistical significance

• Lesson: Goal of HbA₁c <7.0% is appropriate for those with advanced age, but don’t break the bank or the patient trying to get there; use individualized, patient-centered approach
• Loosen targets for those with advanced cardiovascular disease

ACCORD. *NEJM* 358:2545, 2008
ADVANCE. *NEJM* 358, 2560, 2008
VADT. *NEJM* 360:129, 2009
Other Considerations

- Medical Nutritional Therapy through an ADA-approved diabetes education program is covered by Medicare, and patients should be referred to one.
- Unexplained weight loss should, among other things, prompt a workup for dementia.
- Encourage regular physical activity through a day center.