How Sweet It Is: Caring for Diabetics Nearing the End of Life

Thomas R. Palmer M.D.
Attending staff, Henry Ford Hospital Palliative Medicine Service
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• I have no financial or other conflicts of interest related to this presentation. Any mention of off-label use of drugs will be clearly mentioned as such.
Lisa Z.

• 80 year old lady with breast cancer metastatic to her brain, bones, lungs, and liver. Eating 50 % of her meals. PPS 50 %. Mild confusion.

• Pain 10/10 worst in her mid back and chest wall accentuated by movements.

• Medications: Morphine ER 30 mg po q 12 hours, Morphine 20 mg/ml. 10 mg po q 2 hours PRN, Senna 8.6 mg po BID, Glipizide 10 mg po AC breakfast

• Her husband is her caregiver.
Lisa Z.

• You are asked to see her in Palliative consultation.

  – What would be a good RX to help her pain?

  – What are your feelings as you start this?

  – How do we treat her diabetes?
Diabetes prevalence, United States 2012

• 9.3 % of the entire population
  – 0.25 % age under 20
    • 81 % of those type 1
    • 19 % of those type 2
  – 12.3 % age 20 and above
  – 25.9 % age 65 and over

Age-adjusted* percentage of people aged 20 years or older with diagnosed diabetes, by race/ethnicity, United States, 2010–2012

- Non-Hispanic whites: 7.6%
- Asian Americans: 9.0%
- Hispanics: 12.8%
- Non-Hispanic blacks: 13.2%
- American Indians/Alaska Natives: 15.9%

*Based on the 2000 U.S. standard population.
Diabetic complications

• Heart disease
  – Noted on 68% of diabetics > 65 death certificates

• Stroke
  – Noted on 16% of diabetics > 65 death certificates

• Amputations
  – More than 60% of non traumatic limb amputations

• Kidney disease

• Blindness / visual impairment

Based on National Diabetes Information Clearinghouse (NDIC), Fast facts on Diabetes, 2011
Incidence of ESRD in US 2006

Diabetes 44%
Other 56%

Burrows NR, Li Y, Geiss LS. Incidence of Treatment for End-Stage Renal Disease Among Individuals With Diabetes in the U.S. Continues to Decline. *Diabetes Care* January 2010 vol. 33 no. 1 73-77
United States 2010, Causes of Death by Percent of Total Deaths

- Heart: 24.2%
- Malignancies: 23.3%
- Chronic lung: 5.2%
- CVA: 5.6%
- Accidents: 4.9%
- Alzheimers: 3.4%
- Diabetes: 2.8%
- Nephritis, etc: 2%
- Pneumonia, flu: 2%
- Suicide: 1.6%
- Septicemia: 1.4%
- Chronic liver: 1.3%
- Hypertension: 1.1%
- Parkinsons: 0.9%
- Aspiration p: 0.7%
- All others: 19.6%
Percentage of hospice admissions by primary diagnosis

- **Cancer**: 36%
- **Heart disease**: 14%
- **Debility, unspecified**: 13%
- **Dementia (including Alzheimer’s disease)**: 13%
- **Lung disease**: 8%
- **Stroke or coma**: 4%
- **Kidney disease**: 2%
- **Motor neuron diseases (non-ALS)**: 1%
- **Liver disease**: 2%
- **Amyotrophic lateral sclerosis**: 0.4%
- **HIV/AIDS**: 0.3%
### Part I. Enter the *chain of events* - diseases, injuries, or complications - that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute myocardial infarction</td>
<td>5 days</td>
</tr>
<tr>
<td>Arteriosclerotic cardiovascular disease</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**Sequentially list conditions, leading to the cause listed on line a. Enter the Underlying Cause (disease or injury that initiated the events resulting in death) LAST.**

**Part II. Other Significant Conditions contributing to death but not resulting in the underlying cause given in Part I.**

- Type 2 diabetes

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**37. Did tobacco use contribute to death?**
- No

**38. If female:**
- Not pregnant within past year
- Pregnant at time of death
- Not pregnant, but pregnant within 42 days of death
Types of diabetes commonly encountered in palliative care

• Type 1
  – Insulin lack
  – Immune mediated, usually
  – Onset in childhood, usually

• Type 2
  – Insulin resistance, relative insulin deficiency
  – 80 % obese
  – Onset as adults, usually

• Others
  – Pancreas damage (Chronic pancreatitis, cancer, cystic fibrosis)
  – Corticosteroid induced
Classification of cause specific deaths in early onset (0-14 years) type 1 diabetes cohort, Finland

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Number (%)</th>
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<tr>
<td>Acute diabetic complications (DKA, hypoglycaemia, hyperosmolar coma)</td>
<td></td>
</tr>
<tr>
<td>Alcohol/drug related</td>
<td>15 (7)</td>
</tr>
<tr>
<td>Other</td>
<td>37 (16)</td>
</tr>
<tr>
<td><strong>Total: Acute diabetic complications</strong></td>
<td><strong>52 (23)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic diabetic complications</td>
<td>15 (7)</td>
</tr>
<tr>
<td><strong>Cardiovascular:</strong></td>
<td></td>
</tr>
<tr>
<td>Acute myocardial infarction</td>
<td>18 (8)</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>10 (4)</td>
</tr>
<tr>
<td><strong>Total: Chronic diabetic complications</strong></td>
<td><strong>66 (29)</strong></td>
</tr>
<tr>
<td>Infection (septicaemia, Pneumonia, myocarditis, Other infections)</td>
<td>23 (10)</td>
</tr>
<tr>
<td><strong>Total: Neoplasm</strong></td>
<td><strong>11 (5)</strong></td>
</tr>
<tr>
<td>Sudden death</td>
<td>7 (3)</td>
</tr>
<tr>
<td>Suicide:</td>
<td></td>
</tr>
<tr>
<td>Alcohol/drug related</td>
<td>21 (9)</td>
</tr>
<tr>
<td>Other</td>
<td>15 (7)</td>
</tr>
<tr>
<td><strong>Total: Suicide</strong></td>
<td><strong>36 (16)</strong></td>
</tr>
<tr>
<td>Accidents (not intoxications):</td>
<td></td>
</tr>
<tr>
<td>Alcohol/drug related</td>
<td>16 (7)</td>
</tr>
<tr>
<td>Other</td>
<td>23 (10)</td>
</tr>
<tr>
<td><strong>Total: Other alcohol/drug related</strong></td>
<td><strong>39 (17)</strong></td>
</tr>
<tr>
<td>Other alcohol/drug related (alcoholic cirrhosis, alcohol/drug intoxications)</td>
<td>10 (4)</td>
</tr>
<tr>
<td><strong>Other cause</strong></td>
<td>9 (4)</td>
</tr>
<tr>
<td><strong>All alcohol/drug related deaths</strong></td>
<td><strong>63 (27)</strong></td>
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How closely should we control the blood glucose in a diabetic palliative patient?
# Prognosis based treatment

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Active disease but relatively stable

- Perfect control of glucose is not the goal
- Avoid hypoglycemia
- Avoid marked hyperglycemia
Diet

• Needs to be discussed with patient and family
• Usually a regular diet will be well tolerated
  – Especially if appetite is poor
  – Better intake
  – Acceptable glucose control

Coulston AM, Mandlebaum D, Reaven GM. 
*Am J Clin Nutr* 1990;51:67-71
Diet

• “The imposition of dietary restrictions on elderly patients with diabetes in long-term care facilities is not warranted. Residents with diabetes should be served a regular menu, with consistency in the amount and timing of carbohydrate. (C)”

C: Supportive evidence from poorly controlled or uncontrolled studies

One “advantage” of advanced illness

- Type 2 diabetes: insulin resistance
  - Obesity contributes to insulin resistance
  - With weight loss, diabetes may “disappear”
Fingerstick glucoses, benefits

- Determine degree of control
- Monitoring for hypo and hyperglycemia
- Adjusting doses of hypoglycemic medications
Sliding scale insulin coverage

• Frequently used in nursing homes
• 2008 study
  – Half of 9804 patients with diabetes admitted on SSI orders
  – After admission another 33% started on SSI
  – 83% of patients remained on SSI through out their average 6 month stay

Sliding scale insulin coverage monotherapy may be harmful

- Greater frequency of very high glucoses
- Greater risk of hypoglycemia
Basal / bolus insulin therapy

• Basal dose, long acting
  – Basal insulin shown to improve glucose control with less hypoglycemia
    • Insulin glargine (*Lantus*)
    • Insulin detemir (*Levemir*)

• Bolus doses, rapid acting
  – Before meals or for hyperglycemia
    • Lispro (*Humalog*)
    • Aspart (*Novolog*)
    • Glulisine (*Apidra*)
Caution !!!
Metformin

Advantages
- Hypoglycemia is rare
- Oral

Disadvantages
- Nausea is a common side effect
- Not used with renal insufficiency
- Not used with hepatic failure
- Not used in hypoxic states
  - CHF, emphysema
Sulfonylureas

- Risk of hypoglycemia increased
  - Renal failure
  - Liver failure
  - Elderly

- Avoid glyburide
  - More likely to cause hypoglycemia than glipizide or glimepiride
  - On Beer list
Factors increasing risk of hyperglycemia with oral / IV corticosteroid use

• Higher dose
• Longer length of treatment
• Family history of diabetes
• Obesity

• Existing diabetes
Incidence of diabetes over time among study groups

Mechanisms of glucocorticoid induced insulin resistance

Remember!

Monitor glucose and reduce doses of hypoglycemics when stopping corticosteroids!
• 80 year old lady with breast cancer metastatic to her brain, bones, lungs, and liver. Eating 50% of her meals. PPS 50%. Mild confusion.
• Pain 10/10 worst in her mid back and chest wall accentuated by movements.
• Medications: Morphine ER 30 mg po q 12 hours, Morphine 20 mg/ml. 10 mg po q 2 hours PRN, Senna 8.6 mg po BID, Glipizide 10 mg po AC breakfast
• Her husband is her caregiver.
• Prescribe dexamethasone 4 mg po with breakfast and with supper daily.
• Initially continue glipizide
• Fingerstick blood glucoses AC and HS
  – Initially with sliding scale aspart coverage
    • 200-250: 2 units, 251-300: 4 units, 301-350: 6 units, 351-400: 8 units, over 400: 10 units. Notify hospice nurse if over 400 twice in a row.
    • Ultimately begin insulin glargine daily depending on amount of needed aspart and stop glipizide.
Sam Z.

- Mrs. Z. had always taken care of her own diabetes in the past.
- She is unable to even remember if she has taken her medications now.
- Now Mr. Z. has to do finger stick gluoses, measure and inject insulin depending on the glucose levels, monitor for signs of hypoglycemia
- And ...
Information needs of carers of people with diabetes at end of life

• Performing diabetes care tasks
• The focus of care
• Blood glucose management
• End of life stages
• Involving patients and carers in decisions about diabetes care

Other needs of caregivers of very ill diabetics

• **Social support**
  – Personal medical problems / disabilities
  – Cognitive impairment?
  – Financial / place of care
  – Respite care

• **Spiritual support**
  – Lack of time
  – Search for meaning

• **Emotional support**
  – Depression
  – Anxiety
  – Substance abuse
  – Decreasing ability to communicate with loved one
Diabetic neuropathies

• Diabetic sensorimotor polyneuropathy
  – Chronic, symmetrical, length dependent
    • Painful diabetic polyneuropathy
    • Sensory neuropathy

• Diabetic autonomic neuropathy
  – Cardiovascular autonomic neuropathy
  – GI autonomic neuropathy
  – Erectile dysfunction
  – Bladder dysfunction
  – Sudomotor dysfunction
Painful diabetic polyneuropathy

- Affects 3 to 25% of patients
- Clinical diagnosis based on pain description
  - Burning, shooting, tingling
  - Often with allodynia and/or hyperalgesia
- Distal, symmetrical, often with nocturnal exacerbations
- Usually associated with sensory neuropathy
Painful diabetic polyneuropathy treatment

• Tricyclic antidepressants
  – nortriptyline, amitriptyline, desipramine

• Anticonvulsants
  – gabapentin, pregabalin (*Neurontin, Lyrica*)

• SNRI antidepressants
  – duloxetine, venlafaxine (*Cymbalta, Effexor*)

• Opiates
Cardiovascular autonomic neuropathy diagnosis

• Consider if unexplained tachycardia, postural fainting or dizziness, or poor exercise tolerance

• Parasympathetic function
  – Heart rate response to deep breathing, Valsalva maneuver, and postural change

• Sympathetic function
  – Blood pressure response to orthostatic change

• Medications, hydration, and activity may affect
Postural hypotension

• Always check postural blood pressures in diabetic patients
• Symptoms: Standing dizziness or syncope
• Postural drop of $> 20 \text{ mm Hg}$ systolic or $> 10 \text{ mm Hg}$ diastolic
  – Supine blood pressure may be high
  – Base antihypertensive use on standing pressure and symptoms
• Compression stockings, sodium, fludrocortisone, caffeine, midodrine, elevated head of bed
Diabetic gastroparesis

- Abnormal gastroduodenal motility with delayed gastric emptying and no obstruction

- Symptoms
  - Early satiety, bloating, vomiting undigested food, heartburn, nausea, anorexia, erratic blood glucoses

www.gicare.com
Diabetic gastroparesis etiology

• Causes are multi-factorial
  – Autonomic
    • Link with diabetic CAN is weak
  – Decreased interstitial cells of Cajal in gastric muscle
  – Fibrosis of gastric smooth muscle
  – Effect of hyperglycemia
    • Marked hyperglycemia >250 mg/dl slows gastric emptying
      – Hypoglycemia speeds gastric emptying
Other causes of gastroparesis

- **Drugs**
  - Opiates, anticholinergics, levodopa, alcohol, nicotine, beta blockers, calcium channel blockers
- **Post op ileus, critical illness, gastroenteritis**
- **Connective tissue diseases**
  - SLE, dermatomyositis or polymyositis, systemic sclerosis
- **Endocrine or metabolic**
  - Hypo or hyperthyroidism, Addison’s, CRF or ESLD
- **Irradiation, neoplasia, anorexia nervosa, HIV**

Diabetic gastroparesis treatment

• Low fat, low fiber diet

• Prokinetic drugs
  – Metoclopramide (*Reglan*)
    • Dopamine D2 receptor antagonist
  – Erythromycin
    • Motilin receptor agonist
  – Cisapride
    • 5-HT3 receptor antagonist, 5-HT4 receptor agonist
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Impending death or organ system failure

- Decisions with patient / family regarding when to withdraw treatments
  - Stopping fingerstick gluoses
  - Stopping hypoglycemic medications

- Continue general comfort measures
Actively dying

- All hypoglycemic medications and glucose monitoring is stopped
  - Continued education for family regarding the focus of care being comfort
Summary

• Diabetes is common and often causes or contributes to death
  – Treat it along with the “primary” illness
  – Don’t forget to list it on the death certificate
• Strict control of blood glucose is not necessary and may be dangerous near end of life
• Give comprehensive interdisciplinary support to the patient and caregiver
• Be aware of diabetic complications & treat them to optimize quality of life
Any questions?