Management of Diabetes in Long-term Care (LTC) and Skilled Nursing Facilities
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Outline
- Diabetes, aging, and health status
- Subgroups of patients in real-world practice and LTC settings
- Risks and benefits of glycemic control
- ADA Position Statement
  - Goals of diabetes care for subgroups in LTC
  - Risks and benefits of major drug classes for glucose lowering for LTC populations
  - Strategies for replacing sliding scale insulin
  - Summary of recommendations

Diabetes Care 2016;39:308–318

Diabetes, Aging, and Health Status
Prevalence of Diagnosed & Undiagnosed Diabetes by Age, NHANES, 1999–2002

Projected Direct Medicare Spending on Diabetes and Its Complications for Different Cohorts, 2009-2034

Diabetes Increases Risk of Adverse Health Outcomes

- Cardiovascular events (Lancet 1997;350(Suppl 1):S14-S19)
- Geriatric conditions
  - Falls (AJEM 2003;34:1(1):62-3)
  - Dementia (JAM 1984;169:2(1):1-3)
  - Depression (Diabetes Care 2000 Jun;23:1049-57)
- Functional decline (Diabetes Care 2002; 25:1; 61-7)
Subgroups of Older Adults with Diabetes in Real-World Clinical Practice and LTC Settings

Variation in Duration of Diabetes

<table>
<thead>
<tr>
<th>Age Group</th>
<th>60-69 (N=1440)</th>
<th>70-79 (N=1030)</th>
<th>80+ (N=549)</th>
<th>65+ (N=2254)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of Diabetes, mean (SE)</td>
<td>11.6 (0.36)</td>
<td>14.8 (0.43)</td>
<td>17.0 (0.87)</td>
<td>14.7 (0.32)</td>
</tr>
<tr>
<td>&lt;5 years, %</td>
<td>29.1</td>
<td>21.3</td>
<td>21.6</td>
<td>23.0</td>
</tr>
<tr>
<td>5-&lt;10 years</td>
<td>23.5</td>
<td>21.4</td>
<td>17.9</td>
<td>20.4</td>
</tr>
<tr>
<td>≥10 years</td>
<td>47.4</td>
<td>57.3</td>
<td>60.5</td>
<td>56.6</td>
</tr>
</tbody>
</table>

Source: National Health Interview Survey

High Prevalence of Co-Occurring Chronic Diseases

<table>
<thead>
<tr>
<th>Index Condition (%)</th>
<th>Weighted Prevalence (%) of Other Conditions Among Respondents Having Index Condition</th>
<th>CAD</th>
<th>CHF</th>
<th>T2DM</th>
<th>UI</th>
<th>Falls</th>
<th>≥1 Other</th>
<th>≥2 Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD (8.7)</td>
<td>17% 29% 29% 34% 67% 30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CHF (4.8)</td>
<td>58% 37% 37% 43% 87% 56%</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>T2DM (19.4)</td>
<td>24% 9% 28% 29% 57% 23%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UI (25.0)</td>
<td>19% 7% 22% 37% 58% 20%</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falls (23.2)</td>
<td>23% 9% 24% 39% 64% 23%</td>
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<td></td>
</tr>
</tbody>
</table>

Classifying Older Adults with Diabetes by Comorbid Conditions (NSHAP)


Class 1: 9%  
Class 2: 17%  
Class 3: 33%

National Estimates of Numbers of Older Adults by Health Status (HRS)

Movement of Older Patients Across Locations

Characteristics of older adults, not community-dwelling

<table>
<thead>
<tr>
<th>General characteristics</th>
<th>Hospitalized</th>
<th>Inpatients</th>
<th>Skilled nursing facility (long-term)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADL/IADL dependency</td>
<td>ADL/IADL</td>
<td>ADL/IADL</td>
<td>ADL/IADL dependence</td>
</tr>
<tr>
<td>Caregiver support</td>
<td>ADL/IADL</td>
<td>ADL/IADL</td>
<td>ADL/IADL dependent</td>
</tr>
<tr>
<td>Comorbidities</td>
<td>ADL/IADL</td>
<td>ADL/IADL</td>
<td>ADL/IADL dependent</td>
</tr>
<tr>
<td>Diabetes Self-care</td>
<td>ADL/IADL</td>
<td>ADL/IADL</td>
<td>ADL/IADL dependent</td>
</tr>
<tr>
<td>Diabetes Treatment Goals</td>
<td>ADL/IADL</td>
<td>ADL/IADL</td>
<td>ADL/IADL dependent</td>
</tr>
</tbody>
</table>

Major challenges for Sub-Populations

- **Assisted Living facilities**
  - Blood glucose monitoring and/or insulin injection assistance usually not provided
  - Inadequate DM education for staff

- **Hospitalized inpatients**
  - Failure to switch to pre-hospitalization regimen at discharge

- **Skilled nursing facility**
  - Need to be able to perform self-care after discharge
  - New or complex regimen might be too difficult for home management
Major challenges for Nursing Facility (Long-Term)

- Erratic intake of food and fluids
- Inadequate DM education for staff
- Staff turnover
- Time constraints
- Lack of DM specific protocols
- Variation in practitioner practices
- Excessive use of SSI

Summary of Patient Subgroups

- Majority of older patients have advanced duration of diabetes
- Comorbidities are highly prevalent and can be used to identify classes of patients
- Multiple schemes for identifying subgroups
  - Comorbidity alone (NSHAP)
- Hypoglycemia is now a prominent outcome
- The LTC population can be further divided
  - Overlap of health status and place

Glycemic Control in Clinical Trials
United Kingdom Prospective Diabetes Study

Intervention Trial
Median follow-up 10.0 years

Intervention Trial + Post-trial monitoring
Median follow-up 16.8 years

RR=0.88 (0.79-0.99)
P=0.029

Conventional
Sulfonylurea/Insulin

Conventional
Sulfonylurea/Insulin


Myocardial Infarction Hazard Ratio
(fatal or non-fatal myocardial infarction or sudden death)

Intensive (SU/Ins) vs. Conventional glucose control

Recent Trials – Within Trial Results

<table>
<thead>
<tr>
<th></th>
<th>ACCORD</th>
<th>ADVANCE</th>
<th>VADOT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, mean</strong></td>
<td>62.2</td>
<td>66</td>
<td>60.4</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>10 yrs (median)</td>
<td>8 yrs (mean)</td>
<td>11.5 yrs (mean)</td>
</tr>
<tr>
<td><strong>A1C Achieved</strong></td>
<td>7.5% vs. 6.4%</td>
<td>7.3% vs. 6.5%</td>
<td>8.4% vs. 6.9%</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td>1.22, CI (1.01-1.46)</td>
<td>0.93, CI (0.83-1.06)</td>
<td>1.07, CI (0.81, 1.42)</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Non-fatal and fatal cardiovascular (disease) 0.80 (0.78-1.04)</td>
<td>0.94 (0.84-1.06)</td>
<td>Cardiovascular events 0.88 (0.74-1.05)</td>
</tr>
<tr>
<td>Microvascular</td>
<td>Non-fatal myocardial infarction 0.76 (0.62-0.92)</td>
<td>0.86 (0.77-0.97)</td>
<td></td>
</tr>
</tbody>
</table>

Recent Trials – Post-Trial Results

<table>
<thead>
<tr>
<th>Follow-up time</th>
<th>ACCORD</th>
<th>ADVANCE</th>
<th>VADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 years of additional intervention period</td>
<td>6 years</td>
<td>5 years</td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td>1.19, CI (1.03-1.38)</td>
<td>1.00, CI (0.92-1.08)</td>
<td>1.05, CI (0.89-1.25)</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary outcome (Non-fatal and fatal cardiovascular disease)</td>
<td>Macrovascular</td>
<td>Cardiovascular events</td>
<td></td>
</tr>
<tr>
<td>0.91 (0.81-1.03)</td>
<td>1.00 (0.92-1.08)</td>
<td>0.83 (0.70-0.99)</td>
<td></td>
</tr>
<tr>
<td>Non-fatal myocardial infarction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.82 (0.70-0.96)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microvascular</td>
<td>Microvascular (0.92 (0.80-1.05))</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recent Trials – Post-Trial Results
- ACCORD
- ADVANCE
- VADT

Clinical Trials and Expectations from Epidemiology
- Heterogeneity of diabetes population not fully appreciated
- Time to treatment effect not appreciated
- Glucose lowering drugs, at present, may not reproduce normal physiology
- Drugs used in unstudied complex combinations and high pace of change

Trials Attempting to Enroll Patients over 80
- ACCORD
  - Initially enrolled patients over 80 but stopped after observing high rates of hypoglycemia
- Japan Elderly Diabetes Intervention Trial
  - Attempted to evaluate a multiple risk factor intervention in patients 65-85 (N=1173)
  - Unable to achieve separation in A1C
  - Attributed to fear of inducing hypoglycemia
Summary of Clinical Trials

- Intensive glucose control reduces risk of microvascular events
- Intensive glucose control reduces risk of cardiovascular events but takes 10-20 years (Legacy Effect)
- Intensive glucose control may increase risk of mortality (ACCORD)
- Potentially important subgroups identified
  - Duration of diabetes (0-10 years, >10 years)
  - Age>80
  - Cardiovascular disease (yes, no)

Evaluating Glycemic Control Outside of Clinical Trials

Clinical Trials and Generalizability

- UKPDS inclusion criteria
  - Newly diagnosed diabetes
  - 26-65 years of age at baseline
- Applying UKPDS exclusions, 49% of patients with new onset diabetes would be excluded
- Among 7 major trials of glucose lowering, 39% of type 2 population would be excluded
- May ethically and practically not be possible to conduct trials in all patient subgroups

Glycemic Control and Complication Risk in Elderly (Diabetes and Aging Study)

<table>
<thead>
<tr>
<th>Baseline Glycosylated Hemoglobin</th>
<th>&lt;6.0</th>
<th>6.0-6.9</th>
<th>7.0-7.9</th>
<th>8.0-8.9</th>
<th>&gt;=9</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-69 HR</td>
<td>1</td>
<td>1.12</td>
<td>1.20</td>
<td>1.44</td>
<td>1.56</td>
</tr>
<tr>
<td>95% CI</td>
<td>--</td>
<td>1.00-1.25</td>
<td>1.07-1.35</td>
<td>1.26-1.64</td>
<td>1.36-1.81</td>
</tr>
<tr>
<td>70-79 HR</td>
<td>1</td>
<td>1.08</td>
<td>1.21</td>
<td>1.35</td>
<td>1.50</td>
</tr>
<tr>
<td>95% CI</td>
<td>--</td>
<td>0.98-1.19</td>
<td>1.09-1.35</td>
<td>1.19-1.53</td>
<td>1.30-1.73</td>
</tr>
<tr>
<td>80+ HR</td>
<td>1</td>
<td>1.11</td>
<td>1.18</td>
<td>1.28</td>
<td>1.43</td>
</tr>
<tr>
<td>95% CI</td>
<td>--</td>
<td>0.97-1.27</td>
<td>1.02-1.38</td>
<td>1.03-1.58</td>
<td>1.12-1.83</td>
</tr>
</tbody>
</table>


Glycemic Control and Mortality Risk in the Elderly (Diabetes and Aging Study)

<table>
<thead>
<tr>
<th>Baseline Glycosylated Hemoglobin</th>
<th>&lt;6.0</th>
<th>6.0-6.9</th>
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</tr>
</thead>
<tbody>
<tr>
<td>60-69 HR</td>
<td>1</td>
<td>0.92</td>
<td>0.83</td>
<td>0.91</td>
<td>1.17</td>
</tr>
<tr>
<td>95% CI</td>
<td>--</td>
<td>0.79-1.07</td>
<td>0.75-0.90</td>
<td>0.74-1.11</td>
<td>0.86-1.43</td>
</tr>
<tr>
<td>70-79 HR</td>
<td>1</td>
<td>0.83</td>
<td>0.85</td>
<td>0.86</td>
<td>1.11</td>
</tr>
<tr>
<td>95% CI</td>
<td>--</td>
<td>0.75-0.92</td>
<td>0.75-0.96</td>
<td>0.73-1.01</td>
<td>0.85-1.32</td>
</tr>
<tr>
<td>80+ HR</td>
<td>1</td>
<td>0.83</td>
<td>0.83</td>
<td>1.05</td>
<td>1.20</td>
</tr>
<tr>
<td>95% CI</td>
<td>--</td>
<td>0.74-0.93</td>
<td>0.72-0.95</td>
<td>0.88-1.27</td>
<td>0.96-1.50</td>
</tr>
</tbody>
</table>


A1C-Mortality Relationship in UK Diabetes Population

Simulation Model of Diabetes Complications

Assign initial patient characteristics
Simulate natural history of diabetes progression according to patient characteristics

Advance in disease progression one year

Retinopathy Module
Nephropathy Module
Neuropathy Module
Coronary Heart Disease Module
Stroke Module
Mortality Module
Alive
Dead
Select next patient

Results of Simulated Trials (UKPDS) in Older, Sicker Patients


Reduction in Cardiovascular Risk Associated with A1C≤6.5% by TIBI Subgroup

<table>
<thead>
<tr>
<th>TIBI Score</th>
<th>Unadjusted Hazard Ratio (95% CI)</th>
<th>Adjusted Hazard Ratio (95% CI)</th>
<th>P for interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;12</td>
<td>0.58 (0.41, 0.82)</td>
<td>0.60 (0.42, 0.85)</td>
<td>0.036</td>
</tr>
<tr>
<td>≥12</td>
<td>0.93 (0.68, 1.26)</td>
<td>0.92 (0.68, 1.25)</td>
<td></td>
</tr>
</tbody>
</table>

TIBI = Total Illness Burden Index
Models adjusted for age and sex
Summary of Glycemic Control Outside of Clinical Trials

• Clinical Epidemiology
  – A1C-outcome relationships are similar by age groups (60s, 70s, 80+)
  – A1C-mortality curve has a U-shape

• Simulation – Virtual Trials
  – Comorbid illness and functional impairment may help identify subgroups unlikely to benefit from intensive glucose control
  – Competing mortality risk

GOALS OF DIABETES CARE FOR SUBGROUPS IN LTC

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Recommended Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose control (A1C)</td>
<td>&lt;7.0%</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>&lt;130/80 mm Hg</td>
</tr>
<tr>
<td>Cholesterol (LDL cholesterol)</td>
<td>&lt;100 mg/dl</td>
</tr>
</tbody>
</table>

Standards of Medical Care. Diabetes Care 2011
**ADA Consensus Panel Framework**

<table>
<thead>
<tr>
<th>HEALTH STATUS</th>
<th>RATIONALE</th>
<th>FASTING OR PREPRANDIAL GLUCOSE (mg/dL)</th>
<th>BEDTIME GLUCOSE (mg/dL)</th>
<th>BLOOD PRESSURE (mmHg)</th>
<th>LIPIDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>Longer life expectancy</td>
<td>90 – 130</td>
<td>90 – 150</td>
<td>&lt;140/80</td>
<td></td>
</tr>
<tr>
<td>Complex Intermediate</td>
<td>Intermediate life expectancy; high treatment burden; hypoglycemia; fall risk</td>
<td>80 – 150</td>
<td>100 – 180</td>
<td>&lt;140/80</td>
<td></td>
</tr>
<tr>
<td>Very Complex Poor Health</td>
<td>Limited life expectancy; treatment benefit uncertain</td>
<td>80 – 180</td>
<td>110 – 200</td>
<td>&lt;150/90</td>
<td></td>
</tr>
</tbody>
</table>

Statin (unless contraindicated or not tolerated)

**Comparison of Guidelines**

<table>
<thead>
<tr>
<th>American Geriatrics Society</th>
<th>Department of Veterans Affairs</th>
<th>American Diabetes Association</th>
<th>European Diabetes Working Party for Older People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of patient stratum</td>
<td>A1C goal</td>
<td>Description of patient stratum</td>
<td>A1C goal</td>
</tr>
<tr>
<td>Healthy</td>
<td>7.0-7.5%</td>
<td>None or very mild microvascular complications; life expectancy of 10-15 years</td>
<td>7.0%</td>
</tr>
<tr>
<td>Moderate</td>
<td>7.5-8.0%</td>
<td>Long duration of diabetes (&gt;10 years); requires combination drug regimen including insulin</td>
<td>7.5%</td>
</tr>
<tr>
<td>Very Complex Poor Health</td>
<td>8.0-9.0%</td>
<td>Advanced microvascular complications and/or major comorbid illness; life expectancy &lt;5 years</td>
<td>8.0%</td>
</tr>
</tbody>
</table>

**ADA framework for considering diabetes management goals in LTC**

<table>
<thead>
<tr>
<th>Ideal/Above-normal Glucose Control</th>
<th>A1C</th>
<th>CGM/Pre-meal Blood glucose targets</th>
<th>Monitoring Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community dwelling Patients at SNF for short rehabilitation</td>
<td>Avoid relying on A1C due to recent acute illnesses Follow current glucose trends</td>
<td>50-200 mg/dL</td>
<td>Monitoring frequency based on complexity of regimen</td>
</tr>
<tr>
<td>Patients residing in LTC</td>
<td>No benefit of intensive glycemic control Focus needs to be on better quality of life</td>
<td>80-160 mg/dL</td>
<td>Monitoring frequency based on complexity of regimen and risk of hypoglycemia</td>
</tr>
<tr>
<td>Patients at end of life</td>
<td>No benefit of glycemic control except avoiding symptomatic hyperglycemia</td>
<td>80-160 mg/dL</td>
<td>Monitoring; periodically only to avoid symptomatic hyperglycemia</td>
</tr>
</tbody>
</table>

Strategies: Confusion, Cognitive Dysfunction, Delirium

• Offer a regular diet and preferred food items
• Offer food substitutions if meal intake <75%
• Administer prandial insulin immediately after meals to match carbohydrate intake to avoid hypoglycemia
• Block testing (monitoring at different times of the day to identify patterns, e.g., checking fasting glucose on some days, prelunch or predinner on other days) to provide pattern without multiple daily checks
• Increased glucose monitoring during acute mental status or behavior changes
• Switch to a long-acting form of oral meds that can be given once daily or to crushed or liquid format
• Switch to mixed insulin to decrease daily injections; although hypoglycemia risk will remain high

Strategies: Other Common Comorbidities

• Depression
  – Assess and treat depression
  – Encourage physical activity as possible
  – Encourage socialization, especially during meals
• Physical disability
  – Encourage activity that patient can perform, e.g., exercise pedals for non-weight bearing patients
  – Assessment for pressure ulcers
  – Encourage ADL independence
• Infections, ulcers, delayed wound healing
  – Nutrition consult
  – More frequent glucose monitoring and temporary regimen intensification
  – Exercises appropriate for non-weight bearing
  – Regular skin checks and foot assessments by nursing staff

RISKS AND BENEFITS OF MAJOR DRUG CLASSES
Advantages, disadvantages, and caveats of glucose-lowering agents

<table>
<thead>
<tr>
<th>Agent</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Caveats in LTC population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biguanides</td>
<td>- Low hypoglycemia risk - Low cost - Established safety record</td>
<td>- Many contraindications in population with high comorbidity burden - May cause weight loss, GI upset in frail patients - Can be used until eGFR&lt;30 - Extended release formulation has lower complexity and fewer GI side effects - Assess for vitamin B12 deficiency</td>
<td>- Many contraindications in population with high comorbidity burden - May cause weight loss, GI upset in frail patients - Can be used until eGFR&lt;30 - Extended release formulation has lower complexity and fewer GI side effects - Assess for vitamin B12 deficiency</td>
</tr>
<tr>
<td>Metformin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfonylureas</td>
<td>- Low cost - High risk of hypoglycemia - Glyburide has the highest risk of hypoglycemia and should be avoided</td>
<td>- Careful glucose monitoring during acute illness or weight loss - Consider discontinuing if already on substantial insulin dose (e.g. &gt;40 units/day)</td>
<td>- Avoid if inconsistent eating pattern - Careful glucose monitoring during acute illness or weight loss - Consider discontinuing if already on substantial insulin dose (e.g. &gt;40 units/day)</td>
</tr>
<tr>
<td>Meglitinides</td>
<td>- Short duration of action - Can be held if patient refuses to eat</td>
<td>- Some risk of hypoglycemia - Increased regimen complexity due to multiple daily mealtime doses</td>
<td>- Short duration of action - Can be held if patient refuses to eat - Some risk of hypoglycemia - Increased regimen complexity due to multiple daily mealtime doses</td>
</tr>
<tr>
<td>TZDs</td>
<td>- Low hypoglycemia risk - Low cost - Can be used in renal impairment</td>
<td>- Many contraindications in population with high comorbidity burden - Less concerns for bladder cancer if shorter life expectancy</td>
<td>- Low hypoglycemia risk - Low cost - Can be used in renal impairment - Many contraindications in population with high comorbidity burden - Less concerns for bladder cancer if shorter life expectancy</td>
</tr>
<tr>
<td>DPP-4 inhibitors</td>
<td>- Low hypoglycemia risk - Once a day oral medication - High cost - Lower efficacy</td>
<td>- Can be combined with basal insulin for a low complexity regimen</td>
<td>- Low hypoglycemia risk - Once a day oral medication - High cost - Lower efficacy - Can be combined with basal insulin for a low complexity regimen</td>
</tr>
<tr>
<td>GLP-1 agonists</td>
<td>- Low hypoglycemia risk - Once daily and once weekly formulation - High cost - Injection</td>
<td>- Monitor for anorexia, weight loss</td>
<td>- Low hypoglycemia risk - Once daily and once weekly formulation - High cost - Injection - Monitor for anorexia, weight loss</td>
</tr>
</tbody>
</table>

LEADER Trial: Liraglutide vs. Placebo

![LEADER Trial Graph](image_url)

NEJM 2016. 375 (4): 311
### CANVAS Trial: Canagliflozin vs. Placebo

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Canagliflozin (N=1,557)</th>
<th>Placebo (N=1,543)</th>
<th>Hazard Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death from cardiovascular causes, cardiovascular causes combined</td>
<td>10.6 (N=149)</td>
<td>10.9 (N=137)</td>
<td>0.96 (0.60, 1.53)</td>
<td></td>
</tr>
<tr>
<td>Death from respiratory causes, upper respiratory infections with sepsis</td>
<td>3.7 (N=53)</td>
<td>3.7 (N=54)</td>
<td>1.0 (0.38, 2.92)</td>
<td></td>
</tr>
<tr>
<td>Heart failure</td>
<td>0.7 (N=53)</td>
<td>0.4 (N=49)</td>
<td>1.0 (0.38, 2.92)</td>
<td></td>
</tr>
<tr>
<td>Fecal or urinary incontinence</td>
<td>0.8 (N=12)</td>
<td>0.8 (N=12)</td>
<td>1.0 (0.38, 2.92)</td>
<td></td>
</tr>
<tr>
<td>Hospitalization for any cause</td>
<td>18.9 (N=263)</td>
<td>18.9 (N=263)</td>
<td>1.0 (0.60, 1.72)</td>
<td></td>
</tr>
<tr>
<td>Death from any cause</td>
<td>17.9 (N=258)</td>
<td>18.1 (N=259)</td>
<td>0.97 (0.60, 1.53)</td>
<td></td>
</tr>
</tbody>
</table>

*NEJM 2017. 377 (7): 644*

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### CANVAS Trial: Canagliflozin vs. Placebo

### SLIDING SCALE INSULIN
### Advantages, disadvantages, and caveats of insulin

<table>
<thead>
<tr>
<th>Insulin</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Caveats in LTC Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- No ceiling effect</td>
<td>- High risk of hypoglycemia</td>
<td>Basal insulin combined with oral agents may lower post-prandial glucose while</td>
</tr>
<tr>
<td></td>
<td>- Many different types can be used to target hyperglycemia at different times of the day</td>
<td>- Matching carbohydrate content with prandial insulin if variable appetite</td>
<td>Reducing hypoglycemia risk and regimen complexity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Continue basal-bolus regimen in patient with type 1 or insulin-deficient type 2 diabetes</td>
</tr>
</tbody>
</table>

---

### Strategies to replace sliding scale insulin in LTC

<table>
<thead>
<tr>
<th>Current regimen</th>
<th>Suggested steps</th>
</tr>
</thead>
</table>
| Sliding scale is the sole mode of insulin treatment | - Review average daily insulin requirement over prior 5-7 days  
- Give 50-75% of the average daily insulin requirement as basal insulin  
- Stop SSI  
- Use non-insulin agents or fixed dose meal time insulin for post-prandial hyperglycemia  
- Consider giving basal insulin in the morning to impact post-prandial hyperglycemia and reduce risk of early morning hypoglycemia. |
| Sliding scale is being utilized in addition to scheduled basal insulin | - Add 50-75% of the average insulin requirement used as sliding scale to the existing dose of basal insulin  
- Use non-insulin agents or fixed dose meal time insulin for post-prandial hyperglycemia |

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### Strategies to replace sliding scale insulin in LTC

<table>
<thead>
<tr>
<th>Current regimen</th>
<th>Suggested steps</th>
</tr>
</thead>
</table>
| Sliding scale is being utilized in addition to basal and scheduled meal time insulin (i.e. Correction Dose Insulin) | - If correction dose is required frequently, add the average correction dose before a meal to the scheduled meal time insulin dose at the preceding meal. e.g. if glucose values are consistently elevated before lunch or dinner requiring 8-10 units corrections, the scheduled breakfast or lunch time dose of insulin could be increased by the average correction dose (2 units) respectively. Similarly, if glucose values are consistently elevated before breakfast requiring correction doses, the scheduled basal insulin dose could be increased by the average correction dose used.  
- Short term use may be needed for acute illness and irregular dietary intake  
- Use scheduled basal and meal time insulin based on individual needs with goal of avoiding hypoglycemia  
- May use simple scales such as "give 4 units of meal time insulin if glucose >300 mg/dl"  
- Keep patients hydrated, especially when glucose levels are high (e.g. >300 mg/dl) |
| Sliding scale is used in short term due to irregular dietary intake or due to acute illnesses |  
- Use scheduled basal and meal time insulin based on individual needs with goal of avoiding hypoglycemia  
- May use simple scales such as "give 4 units of meal time insulin if glucose >300 mg/dl"  
- Keep patients hydrated, especially when glucose levels are high (e.g. >300 mg/dl) |
| Wide fluctuations in glucose levels in patients with cognitive decline and/or irregular dietary intake on a chronic basis |  
- Use scheduled basal and meal time insulin based on individual needs with goal of avoiding hypoglycemia  
- May use simple scales such as "give 4 units of meal time insulin if glucose >300 mg/dl"  
- Keep patients hydrated, especially when glucose levels are high (e.g. >300 mg/dl) |
SUMMARY OF RECOMMENDATIONS FROM ADA POSITION STATEMENT

Goals and Strategies

• Hypoglycemia risk is the most important factor in determining glycemic goals due to the catastrophic consequences in this population (B).
• Simplified treatment regimens are preferred and better tolerated (E).
• Sole use of sliding scale insulin should be avoided (C).
• Liberal diet plans have been associated with improvement in food and beverage intake in this population. To avoid dehydration and unintentional weight loss, restrictive therapeutic diets should be minimized (B).
• Physical activity and exercise are important in all patients and should depend on current level of functional abilities (C).

Care Transitions (E)

• Care transitions are important times to:
  – Revisit diabetes management targets
  – Perform medication reconciliation
  – Provide patient and caregiver education
  – Re-evaluate the ability to perform diabetes self-care behaviors and have close communication between transferring and receiving care teams.
• Transitional care documentation should include:
  – Current meal plan, activity levels
  – Prior treatment regimen
  – Prior self-care education
  – Laboratory tests (including A1C, lipids and renal function)
  – Hydration status
  – Previous episodes of hypoglycemia (including symptoms and ability to recognize and self-treat).
Diabetes Management in Patients at End of Life (E)

- Goals for diabetes management at the end of life need to:
  - Promote comfort
  - Control distressing symptoms (including pain, hypoglycemia and hyperglycemia)
  - Avoid dehydration
  - Avoid emergency room visits, hospital admissions and institutionalization
  - Preserve dignity and quality of life.
- Decreasing complexity of treatment and testing.
- Respect a patient’s right to refuse treatment.

Overall Conclusion

- Diabetes is a common, morbid, and costly disease in older adults
- Population is heterogeneous and presents unique challenges pertaining to diabetes management
- Important for clinicians to understand the characteristics, challenges, and barriers for older patients in LTC
- Requires knowledge of patients as well as the functioning of the facilities
- Individualized approaches can improve diabetes management while lowering the risk of hypoglycemia and ultimately improving quality of life

Patient Feedback

“Thank you for your article in this week’s JAMA. In my 79th year, I still try to keep up with medicine and was shocked to find myself included in the very old age group. Having T2D, very mild without complications, I am pleased to note that my physician said she will allow my A1C to go as high as 7.0% without further ado. Evidence based medicine is a wonderful thing! Thanks for your article from a very old physician.”
Thank You

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