Diabetes Management in the Long-term Care Setting

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Objectives

- Discuss treatment considerations for management of type 2 diabetes in the long-term care setting
- Review A1C goals and guidelines for older adults with diabetes
- Identify the hazards of sliding scale insulin
- Discuss strategies to avoid hypoglycemia in the long-term care setting
- Highlight type 2 diabetes treatment options
Diabetes Management Is Needed to Optimize Outcomes in the Growing Long-term Care Population

- Prevalence of diabetes in LTC is increasing\(^1\)
- Individuals with diabetes in LTC are more likely to require hospitalization and have a higher risk of unfavorable outcomes\(^2,3\)
- Avoidance of hyper- and hypoglycemia is essential for individuals with diabetes in LTC\(^4\)

LTC=long-term care

Barriers to Effective Diabetes Management for Individuals in the Long-term Care Setting

- Frailty and physical impairment
- Existence of multiple coexisting medical conditions
- Elevated risk for hypoglycemia
- Increased tendency to develop infections
- Presence of insulin resistance
- Preexisting complications of diabetes
- Presence of impaired cognition or dementia
Treatment Considerations for Individuals With Diabetes in LTC

- Comorbidities
- Duration of diabetes
- Blood glucose levels
- Prognosis
- Individual treatment goals
Elements of a good systematic approach to diabetes management in the LTC setting include:

- Incorporating an interdisciplinary team approach to overall diabetes management
- Reviewing glycemic control protocols and appropriate interventions
- Using outcome and process indicators to measure performance
- Monitoring residents’ clinical conditions on a regular basis
# A1C Goals for Older Adults With Diabetes

<table>
<thead>
<tr>
<th>American Medical Directors Association&lt;sup&gt;1&lt;/sup&gt;</th>
<th>American Geriatrics Society (AGS)&lt;sup&gt;2,3&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A1C goal</strong></td>
<td><strong>A1C goal</strong></td>
</tr>
<tr>
<td>Set target range appropriate for individual residents, staying close to ADA and AGS guidelines</td>
<td>≤7% for adults with good functional status</td>
</tr>
<tr>
<td>More modest goals may be set for those with a life expectancy &lt;5 years</td>
<td>Goals should be individualized</td>
</tr>
<tr>
<td></td>
<td>&lt;8% for frail older adults</td>
</tr>
</tbody>
</table>

ADA=American Diabetes Association
# ADA Consensus Guidelines on Diabetes in Older Adults

<table>
<thead>
<tr>
<th>Health Status</th>
<th>Rationale</th>
<th>A1C Goal, %</th>
<th>FPG, mg/dL</th>
<th>Bedtime BG, mg/dL</th>
<th>Blood Pressure, mm Hg</th>
<th>Lipids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>Longer life expectancy</td>
<td>&lt;7.5</td>
<td>90-130</td>
<td>90-150</td>
<td>&lt;140/80</td>
<td>Statin unless contraindicated or not tolerated</td>
</tr>
<tr>
<td>• Few other chronic illnesses</td>
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<tr>
<td>• Intact cognition and function</td>
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<tr>
<td>Complex/intermediate health</td>
<td>Intermediate life expectancy, high treatment burden,</td>
<td>&lt;8.0</td>
<td>90-150</td>
<td>100-180</td>
<td>&lt;140/80</td>
<td>Statin unless contraindicated or not tolerated</td>
</tr>
<tr>
<td>• Multiple chronic illnesses* or</td>
<td>hypoglycemia vulnerability, fall risk</td>
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<tr>
<td>• ≥2 instrumental ADL impairments or</td>
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<tr>
<td>• Mild to moderate cognitive impairment</td>
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</tr>
<tr>
<td>Very complex/poor health</td>
<td>Limited life expectancy makes benefit uncertain</td>
<td>&lt;8.5†</td>
<td>100-180</td>
<td>110-200</td>
<td>&lt;150/90</td>
<td>Consider likelihood of benefit with statin</td>
</tr>
<tr>
<td>• Long-term care or</td>
<td></td>
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<tr>
<td>• End-stage chronic illnesses† or</td>
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<tr>
<td>• ≥2 ADL dependencies or</td>
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<tr>
<td>• Moderate to severe cognitive impairment</td>
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</tr>
</tbody>
</table>

ADL=activities of daily living; BG=blood glucose; FPG=fasting plasma glucose.

* 3 or more chronic illnesses requiring medications or lifestyle management.† The presence of a single end-stage chronic illness such as stage III–IV congestive heart failure or oxygen-dependent lung disease, chronic kidney disease requiring dialysis, or uncontrolled metastatic cancer may cause significant symptoms or impairment of functional status and significantly reduce life expectancy.‡ A1C of 8.5% is ≈ 200 mg/dL estimated average glucose; looser targets may expose patients to risks from acute "acute risks from glycosuria, dehydration, hyperglycemic hyperosmolar syndrome, and poor wound healing.

Antihyperglycemic Therapy in Type 2 Diabetes: General Recommendations

Initial drug monotherapy

Healthy eating, weight control, increased physical activity

Metformin

2-drug combinations*

Metformin + Sulfonylurea
Metformin + TZD
Metformin + DPP-4i
Metformin + GLP-1RA
Metformin + Insulin (usually basal)

3-drug combinations

Metformin + Sulfonylurea + TZD or DPP-4i or GLP-1RA or Insulin
Metformin + TZD + SU or DPP-4i or GLP-1RA or Insulin
Metformin + DPP-4i + SU or TZD or Insulin
Metformin + GLP-1RA + SU or TZD or Insulin
Metformin + Insulin (usually basal) + TZD or DPP-4i or GLP-1RA

More complex insulin strategies

Insulin (multiple daily doses)

* Consider beginning at this stage in individuals with very high A1C (eg, ≥9.0%).
Antihyperglycemic Therapy in Type 2 Diabetes: General Recommendations (cont’d)

- **Non-insulin regimens**
  - **Basal insulin only** (usually with oral agents)
    - Basal insulin + 1 (mealtime) rapid-acting insulin injection
    - Basal insulin + ≥2 (mealtime) rapid-acting insulin injections
  - Premixed insulin twice daily

- **Number of injections**
  - 1
  - 2
  - +3

- **Regimen complexity**
  - Low
  - Mod
  - High

- **Flexibility**
  - More flexible
  - Less flexible

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Mod=moderate. 
Deciding When and How to Initiate Insulin Therapy

- All patients with type 1 diabetes
- Initiate insulin therapy earlier in individuals who are unable to achieve glucose targets with their current treatment strategy\(^1\)
  - A1C >9.0% and symptomatic hyperglycemia\(^1\)
  - Uncontrolled management on combination OADs\(^2\)
- Determine the appropriate insulin regimen and insulin type(s) based on the individual’s needs\(^2\)

AMDA Recommends Insulin in Patients With Diabetes for a Variety of Clinical Situations in LTC

<table>
<thead>
<tr>
<th>Clinical Situation</th>
<th>Suggested Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adding insulin to oral agents</td>
<td>• Basal insulin, predinner insulin mixture, or intermediate-acting insulin</td>
</tr>
<tr>
<td>Treating well-controlled individual who has consistent eating patterns</td>
<td>• Basal-bolus insulin regimen, twice-daily insulin mixture, or split-mixed intermediate- and short-acting insulin</td>
</tr>
<tr>
<td>Treating poor glycemic control</td>
<td>• Insulin regimen per physician’s recommendation</td>
</tr>
</tbody>
</table>
What Is Sliding Scale Insulin (SSI)?

- SSI utilizes dosing of short-acting insulin based on current blood glucose measurements, without a basal insulin component in the individual’s regimen\(^1\),\(^2\)

- Although exclusive use of SSI is not recommended, it is still widely used in some hospitals as a treatment option\(^2\)-\(^4\)

- AMDA does not recommend the prolonged use of SSI.\(^5\)

Individuals on SSI should be:
- Re-evaluated within 1 week
- Converted to fixed daily insulin doses that minimize the use of correction dosing

Physicians Prescribe Sliding Scale Insulin Despite Potential Risks

- Approximately 54% of residents* received SSI at the time of insulin initiation
- Of these, 83% of residents remained on SSI through the end of the study†

* A total of 5482 residents received insulin therapy during their stay at a nursing home until the end of study follow-up.
† Individuals included in this study were followed for a mean of 6.4±6.1 months.
Hazards of Sliding Scale Insulin

- Increases the risk of both hypoglycemia and hyperglycemia
- Uses a reactive approach that can lead to rapid swings in blood glucose, resulting in hyperglycemia and hypoglycemia
- Is likely to continue without appropriate modification when used as an admission regimen

Hazards of sliding scale insulin use exceed the advantage of its convenience

Basal-Bolus Therapy Is Effective for the Maintenance of Glycemic Control

Effective insulin therapy may contain basal, bolus, and supplemental doses to achieve target goals\(^1\)

Basal-bolus is more effective at glycemic control vs sliding scale therapy in medical and surgical patients\(^3,4\)

Adapted from Bray et al\(^2\)

Diabetes management must be individualized based on an individual’s medical and functional status.

- Determine appropriate insulin regimen and insulin type based on individual needs
- Estimate the total daily dose (TDD) requirements based on:
  - Body weight
  - Level of physical activity
  - Comorbid conditions

Insulin Initiation Begins With an Estimation of the Total Daily Dose

Key Steps in the Initiation of a Basal-Bolus Dosing Regimen

- Use the estimated total daily dose to determine the basal and bolus insulin dose\(^1\)

- Guidelines and treatment protocols provide detailed strategies for the initiation of basal-bolus therapy\(^1-4\)

Benefits of Insulin Analogs vs Human Insulin

- Insulin analogs are derivatives of human insulin that have undergone one or more chemical modifications to alter the time-action profile of the insulin
  - Both are produced by recombinant DNA (rDNA) technology
- Time-action profile of subcutaneous human insulin does not always match physiologic demand
- Insulin analogs were designed to more closely mimic normal physiologic insulin secretion patterns

Basal Analogs Offer Advantages for Individuals on Basal Therapy in LTC

Theoretical insulin profile

Compared to NPH, basal insulin analogs provide:
- Reduced rate of hypoglycemia
- Once-daily dosing in T2DM
- Similar reduction in FPG

FPG=fasting plasma glucose; NPH=neutral protamine Hagedorn.

Advantages of Rapid-Acting Insulin Analogs for Individuals on a Basal-Bolus Regimen in LTC

Compared to RHI, rapid-acting insulin analogs\(^2,3\):
- Provide a more physiologic response
- Have a more rapid onset and shorter duration of action
- Are associated with less severe episodes of hypoglycemia

* Theoretical representations of insulin levels over time. Adapted from Freeman JS.\(^1\)

Avoidance of Hypoglycemia Is Essential for Individuals With Diabetes in LTC
## Risk Factors for Hypoglycemia

### Patient Characteristics
- Older age
- Female gender
- African American ethnicity
- Longer duration of diabetes
- Neuropathy
- Renal impairment
- Previous hypoglycemia

### Behavioral and Treatment Factors
- Missed meals
- Elevated A1C
- Insulin or sulfonylurea therapy

### Relative Rates of Severe Hypoglycemia With Insulin

<table>
<thead>
<tr>
<th>Increasing rates of hypoglycemia</th>
<th>Most frequent</th>
<th>More frequent</th>
<th>Less frequent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prandial and premix</strong></td>
<td>Human insulin analog insulin</td>
<td>Basal +</td>
<td>Basal only</td>
</tr>
<tr>
<td>Premix insulins</td>
<td>Premix insulins</td>
<td>Basal +</td>
<td>NPH</td>
</tr>
<tr>
<td>Basal plus 2-3 prandial</td>
<td>Basal plus 1 prandial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basal plus 1 prandial</td>
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Addressing Hypoglycemia in the LTC Setting: AMDA Recommendations for Policy and Procedures

Rule of 15

- Treatment of hypoglycemia generally follows the “Rule of 15”
  - Give 15 g of glucose or carbohydrate (e.g., ½ cup juice, ½ cup apple sauce, 1 cup milk, 1 tube glucose gel, 3 glucose tablets)*
  - Wait 15 minutes
  - Recheck blood glucose levels. If blood glucose is below target, give another 15 g of glucose or carbohydrate

Consider the Individual

- Consider the specific needs of the individual in LTC (e.g., unconscious or comatose individuals, or individuals who cannot receive glucose by mouth or feeding tube)
  - Consider other subcutaneous, intramuscular, or intravenous options

Avoid Overtreating

- Avoid the overtreatment of hypoglycemia. Overtreatment can result in significant hyperglycemia within the next 4-6 hours

* Treat hypoglycemia with a sandwich or snack containing protein.
Summary

- Individualized goals and treatment strategies are recommended for patients with type 2 diabetes in LTC
- Insulin analogs offer advantages to patients with type 2 diabetes
- Basal-bolus insulin therapy is the preferred approach for glycemic control; sliding scale insulin is discouraged
- Avoidance of hypoglycemia is essential for individuals with diabetes in LTC
Questions?