Diabetes Management in the Long-term Care Setting

Scott R. Drab, Pharm.D., CDE, BC-ADM
Director, University Diabetes Care Associates
Associate Professor of Pharmacy & Therapeutics
University of Pittsburgh School of Pharmacy

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

1. Zhang X et al. *J Am Geriatr Soc*. 2010;58(4):724-730. 2. Dybicz SB et al. *Am J Geriatr Pharmacother*. 2011;9(4):212-223. 3. Resnick HE et al. *Diabetes Care*. 2008;31(2):287-288. 4. American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline.* Columbia, MD: American Medical Directors Association; 2010.

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

American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline.* Columbia, MD: American Medical Directors Association; 2010.

Treatment Considerations for Individuals With Diabetes in LTC

- Comorbidities
- Duration of diabetes
- Blood glucose levels
- Prognosis
- Individual treatment goals

American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline*. Columbia, MD: American Medical Directors Association; 2010.

American Medical Directors Association (AMDA) Has Established Diabetes Management Guidelines for LTC

- 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

American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline.* Columbia, MD: American Medical Directors Association; 2010.

A1C Goals for Older Adults With Diabetes

	American Medical Directors Association[1]	American Geriatrics Society (AGS)[2,3]
A1C goal	**Set target range appropriate for individual residents, staying close to ADA and AGS guidelines** **More modest goals may be set for those with a life expectancy <5 years**	**≤7% for adults with good functional status** **Goals should be individualized** **<8% for frail older adults**

ADA=American Diabetes Association

1. American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline.* Columbia, MD: American Medical Directors Association; 2010. 2. Brown AF et al; California Health Care Foundation/American Geriatrics Society Panel on Improving Care for Elders With Diabetes. *J Am Geriatr Soc*. 2003;51(5 suppl):S265-S280. 3. Kirkman MS et al; Consensus Development Conference on Diabetes and Older Adults. *J Am Geriatr Soc*. 2012;60(12):2342-2356.

ADA Consensus Guidelines on Diabetes in Older Adults

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

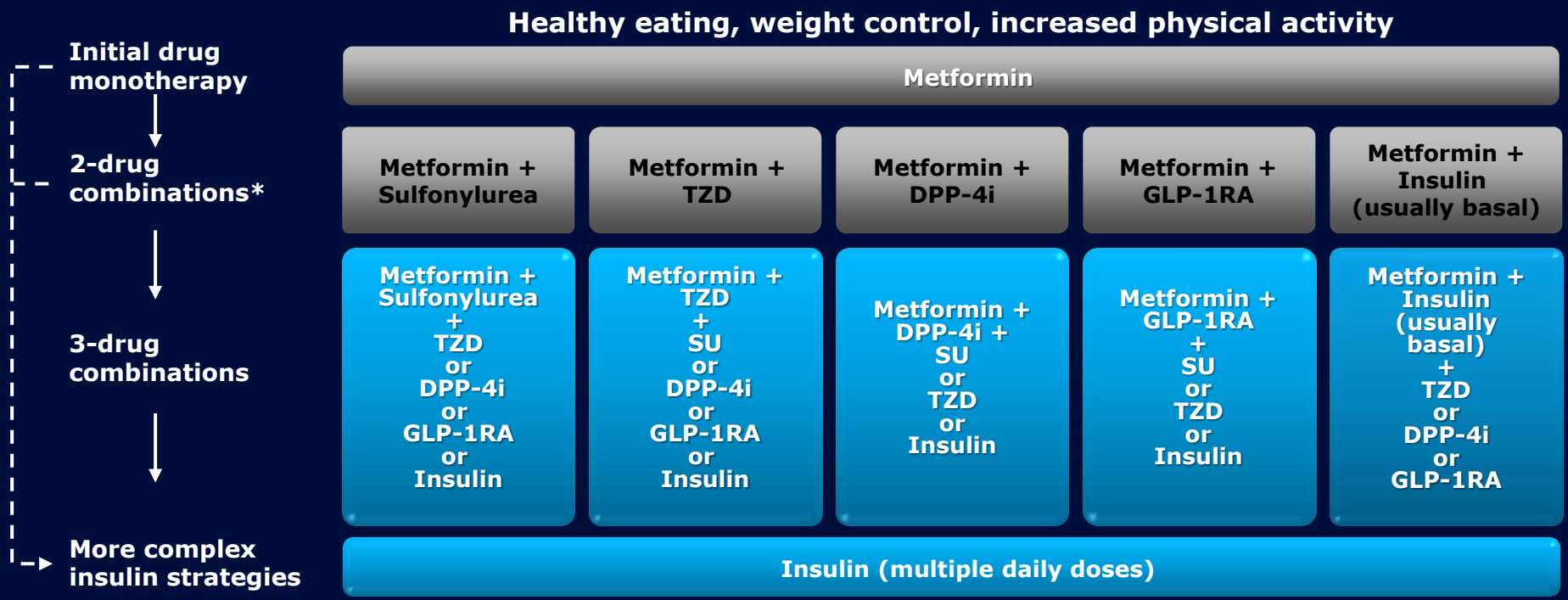
ADL=activities of daily living; BG=blood glucose; FPG=fasting plasma glucose.

* 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.

Kirkman MS et al. *Diabetes Care*. 2012;35(12):2650-2664.

Antihyperglycemic Therapy in Type 2 Diabetes: General Recommendations

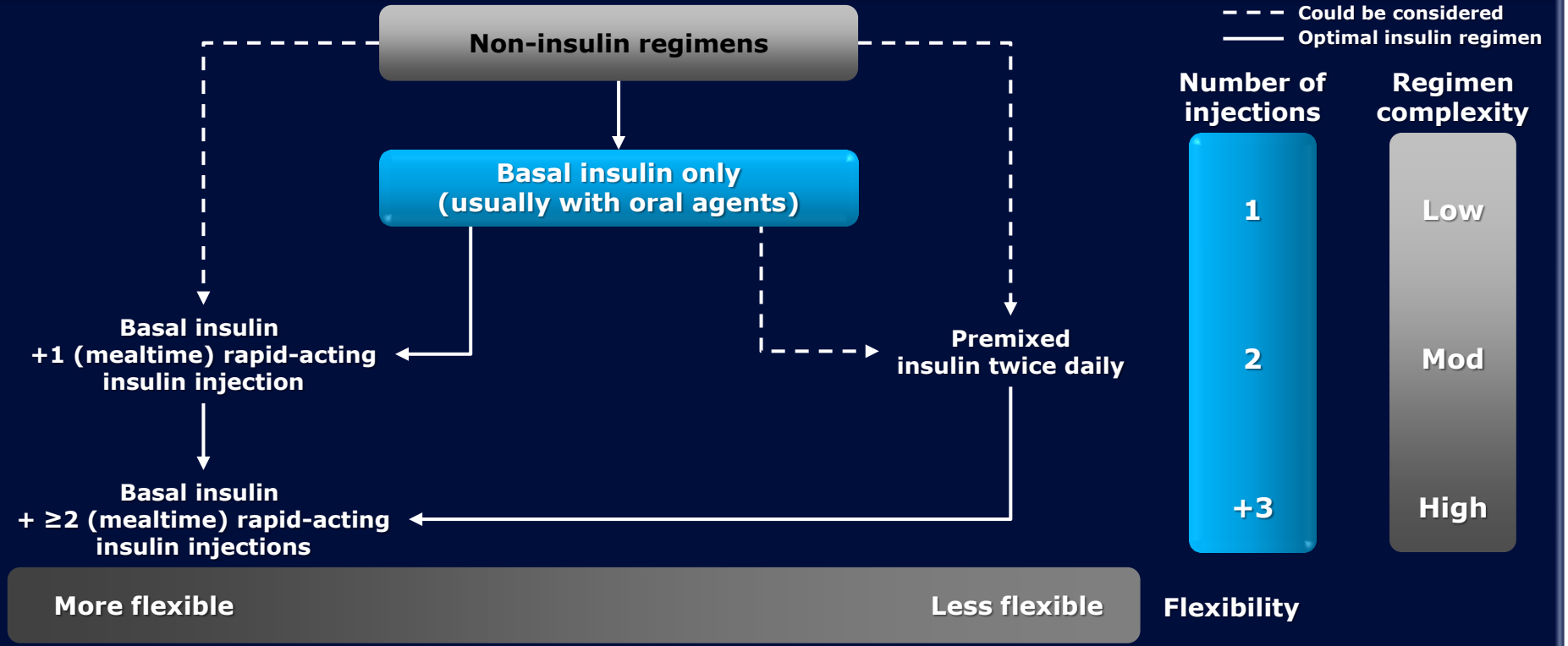


* Consider beginning at this stage in individuals with very high A1C (eg, ≥9.0%).

DPP-4i=dipeptidyl peptidase-4 inhibitor; GLP-1RA=glucagon-like peptide-1 receptor agonist; SU=sulfonylurea; TZD=thiazolidinedione.

Inzucchi SE et al. *Diabetes Care*. 2012;35(6):1364-1379.

Antihyperglycemic Therapy in Type 2 Diabetes: General Recommendations (cont'd)



Mod=moderate.

Inzucchi SE et al. *Diabetes Care*. 2012;35(6):1364-1379.

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]

1. Handelsman Y et al; AACE Task Force for Developing Diabetes Comprehensive Care Plan. *Endocr Pract*. 2011;17(suppl 2):1-53.
2. American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline.* Columbia, MD: American Medical Directors Association; 2010.

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

Clinical Situation	Suggested Insulin
Adding insulin to oral agents	• Basal insulin, predinner insulin mixture, or intermediate-acting insulin
Treating well-controlled individual who has consistent eating patterns	• Basal-bolus insulin regimen, twice-daily insulin mixture, or split-mixed intermediate- and short-acting insulin
Treating poor glycemic control	• Insulin regimen per physician's recommendation

American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline*. Columbia, MD: American Medical Directors Association; 2010.

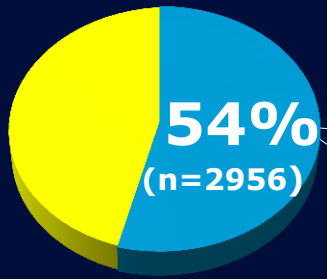
What Is Sliding Scale Insulin (SSI)?

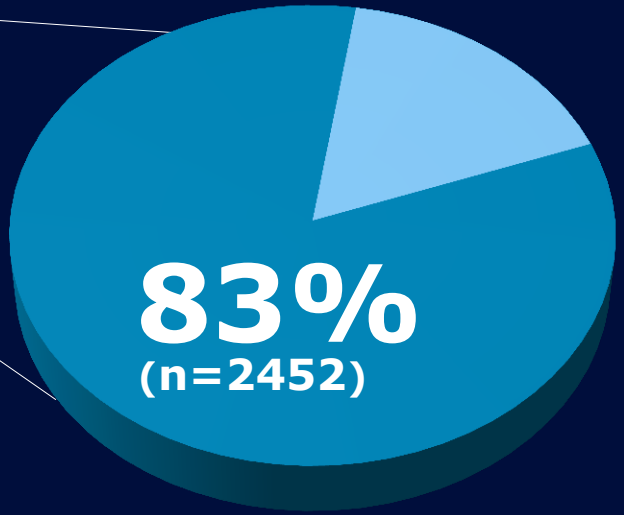
- SSI utilizes dosing of short-acting insulin based on current blood glucose measurements, without a basal insulin component in the individual's regimen[1,2]
- Although exclusive use of SSI is not recommended, it is still widely used in some hospitals as a treatment option[2-4]
- AMDA does not recommend 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

1. Guthrie DW et al. *J Fam Pract*. 2011;60(5):266-270. 2. Lilley SH, Levine GI. *Am Fam Physician*. 1998;57(5):1079-1088. 3. American Diabetes Association. *Diabetes Care.* 2013;36(suppl 1):S11-S66. 4. Handelsman Y et al; AACE Task Force for Developing Diabetes Comprehensive Care Plan. *Endocr Pract*. 2011;17(suppl 2):1-53. 5. American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline*. Columbia, MD: American Medical Directors Association; 2010.

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.

Pandya N et al. *J Am Med Dir Assoc*. 2008;9(9):663-669.

Hazards of Sliding Scale Insulin

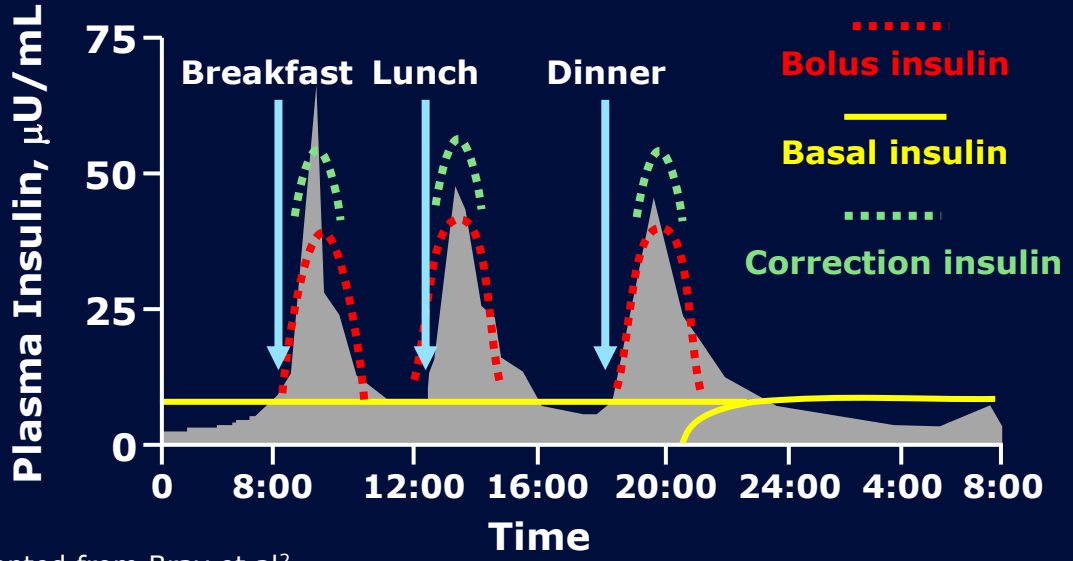
- Increases the risk of both hypoglycemia and hyperglycemia[1]
- Uses a reactive approach that can lead to rapid swings in blood glucose, resulting in hyperglycemia and hypoglycemia[2]
- Is likely to continue without appropriate modification when used as an admission regimen[2]

Hazards of sliding scale insulin use exceed the advantage of its convenience[3]

1. American Diabetes Association. *Diabetes Care.* 2013;36(suppl 1):S11-S66. 2. American Diabetes Association. *Diabetes Care.* 2006;29(suppl 1):S4-S42. 3. Hirsch IB. *JAMA*. 2009;301(2):213-214.

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]



Adapted from Bray et al[2]

Basal-bolus is more effective at glycemic control vs sliding scale therapy in medical and surgical patients[3,4]

1. Moghissi ES et al; American Association of Clinical Endocrinologists; American Diabetes Association. *Endocr Pract.* 2009;15(4):353-369. 2. Bray B. *Consult Pharm*. 2008;23(Suppl B):17-23. 3. Roberts G et al. *Med J Aust*. 2012;196(4):266-269. 4. Umpierrez GE et al. *Diabetes Care*. 2011;34(2):256-261.

Insulin Initiation Begins With an Estimation of the Total Daily Dose

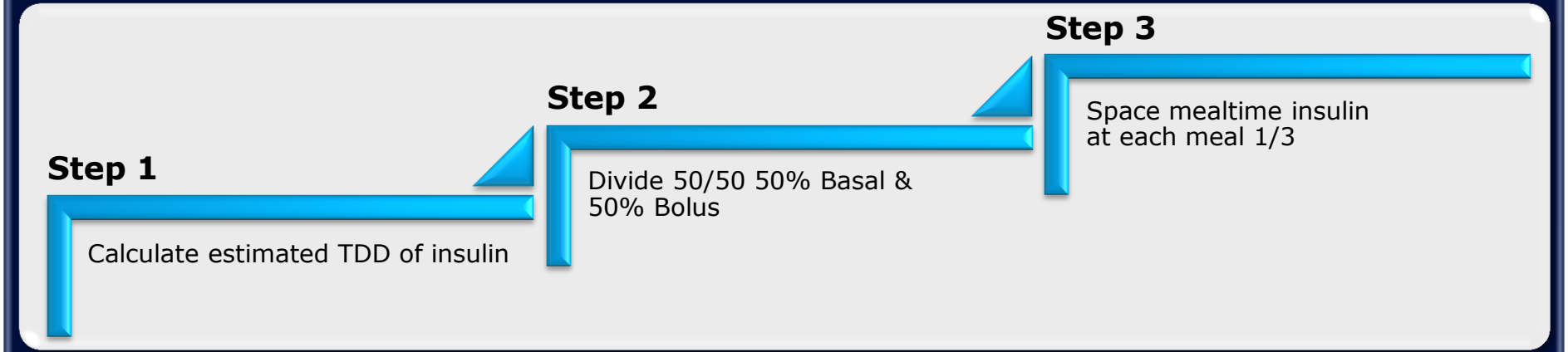
- Determine appropriate insulin regimen and insulin type based on individual needs
- Estimate the total daily dose (TDD) requirements based on:
  - Body weight
  - Level of physical activity
  - Comorbid conditions

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

American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline.* Columbia, MD: American Medical Directors Association; 2010.

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]

1. American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline.* Columbia, MD: American Medical Directors Association; 2010. 2. Umpierrez GE et al. *Diabetes Care*. 2007;30(9):2181-2186. 3. DeSantis AJ et al. *Endocr Pract*. 2006;12(5):491-505. 4. Lansang MC, Umpierrez GE. *Diabetes Spectr*. 2008;21(4):248-255.

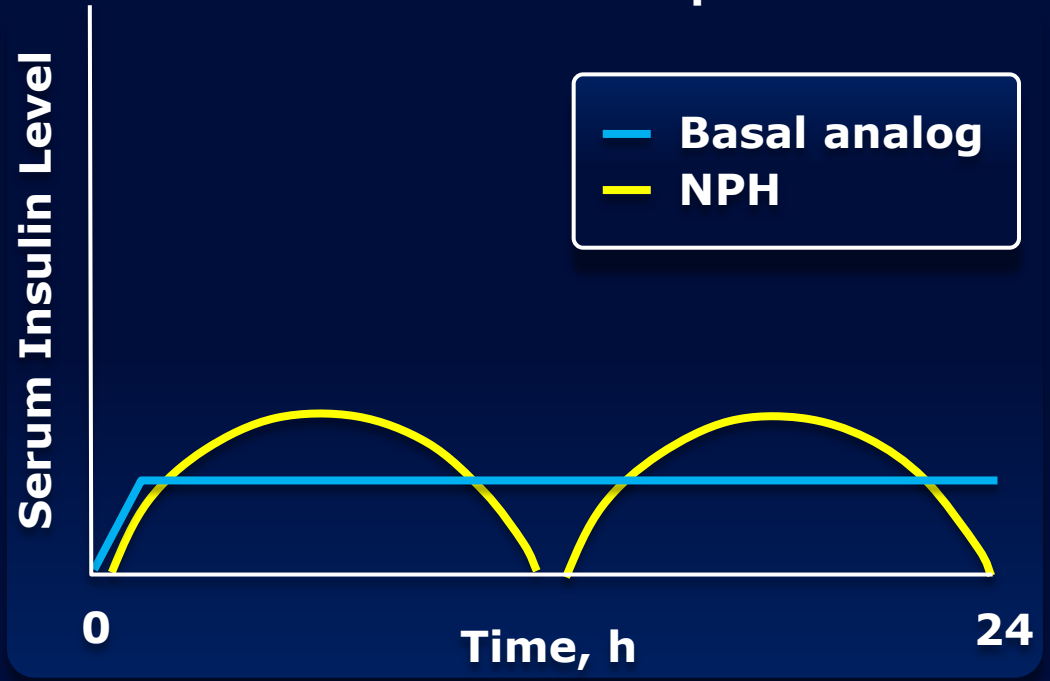
Benefits of Insulin Analogs vs Human Insulin

- 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

Brange J, Vølund A. *Adv Drug Deliv Rev*. 1999;35(2-3):307-335.

Basal Analogs Offer Advantages for Individuals on Basal Therapy in LTC

Theoretical insulin profile[1]



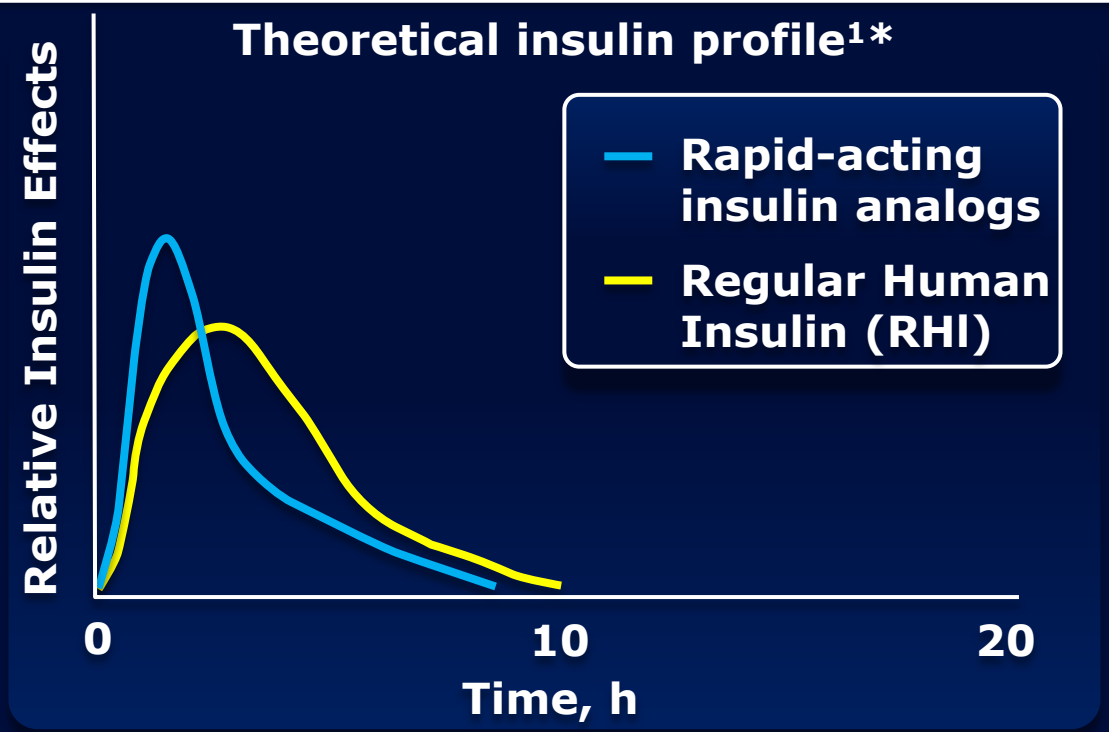
Compared to NPH, basal insulin analogs provide[2]:

- Reduced rate of hypoglycemia
- Once-daily dosing in T2DM
- Similar reduction in FPG

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

1. Brunton S et al. *J Fam Pract*. 2005;54(5):445-452. 2. Tanwani LK. *Am J Geriatr Pharmacother*. 2011;9(11):24-36.

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]

1. Freeman JS. *J Am Osteopath Assoc*. 2009;109(1):26-36. 2. Tanwani LK. *Am J Geriatr Pharmacother*. 2011;9(11):24-36.
3. Handelsman Y et al; AACE Task Force for Developing Diabetes Comprehensive Care Plan. *Endocr Pract*. 2011;17(suppl 2):1-53.

Avoidance of Hypoglycemia Is Essential for Individuals With Diabetes in LTC

Risk Factors for Hypoglycemia

Patient Characteristics

- Older age[1]
- Female gender[1]
- African American ethnicity[1]
- Longer duration of diabetes[1]
- Neuropathy[1]
- Renal impairment[1]
- Previous hypoglycemia[2]

Behavioral and Treatment Factors

- Missed meals[2]
- Elevated A1C[1]
- Insulin or sulfonylurea therapy[1]

1. Miller ME et al; ACCORD Investigators. *BMJ*. 2010;340:b5444. 2. Briscoe VJ, Davis SN. *Clin Diabetes*. 2006;24(3):115-121.

Relative Rates of Severe Hypoglycemia With Insulin

Increasing rates of hypoglycemia		
Most frequent	Prandial and premix	Human insulin Analog insulins Premix insulins
More frequent	Basal +	Basal plus 2-3 prandial Basal plus 1 prandial
Less frequent	Basal only	NPH Basal analogs

NPH=neutral protamine Hagedorn.

Moghissi E et al. *Endocr Pract*. 2013;19(3):526-535.

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 (eg, 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 (eg, 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.

American Medical Directors Association. *Diabetes Management in the Long-Term Care Setting: Clinical Practice Guideline*. Columbia, MD: American Medical Directors Association; 2010.

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?

Thank you!