Strategies to Manage Poorly Controlled Diabetes

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Dr. Pandya has no financial disclosures
Objectives

- To understand a patient-centered approach to the management of diabetes with respect to involvement, therapeutic choices, and goals of glycemic control
- To explore advancement of therapy with additional agents in three typical cases in whom glycemic control was suboptimal
- To be familiar with current guidelines and recommendations for managing diabetes in frail older adults
- To be able to select therapeutic appropriate options in patients who have significant comorbidities
Differences in Persons with Diabetes

• Heterogeneous population
  – Clinically
  – Functionally
  – Cognition
  – Socio-economically
  – Site of care (community, AL, SNF)

• Multiple comorbidities

• Goals of treatment
  – Reduce complications
  – Life expectancy (in elderly)
  – Patient values and preferences
  – Risk of disease and complications vs. risk of treatment
Age-Adjusted Percentage with A1c < 7%, or A1c < 8%, or A1c < 9% Among Adults with Diagnosed Diabetes, United States, 1988–1994 to 1999–2006
Patient And Disease

- Greater potential for adverse effects and drug interactions
- Increased risk of hypoglycemia
- Importance of weight loss vs. glycemic control
- Health-related quality of life outcomes (HR-QoL)
- Irregular meal consumption
- Cognitive dysfunction and depression
- Poor support systems
- Psychological insulin resistance
- Impaired vision and manual dexterity
Medication Management

- Multiple and changing treatment approaches
- Reliance on sliding scale insulin protocols in inpatient and institutional settings
- Inappropriate dosing or timing of insulin
- Hypoglycemia management (delayed recognition or overcorrection)
- Lack of comfort with newer insulins and injectable agents, and delivery systems
- Cost of multiple therapies
ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

Patient-Centered Approach

*Diabetes Care, Diabetologia.* 19 April 2012

- Gauge patient’s preferred level of involvement.
- Explore, where possible, therapeutic choices.
- Utilize decision aids.
- **Shared decision making** – final decisions re: lifestyle choices ultimately lies with the patient.
Approach to management of hyperglycemia:

- More stringent: highly motivated, adherent, excellent self-care capacities
- Less stringent: less motivated, non-adherent, poor self-care capacities

| Patient attitude and expected treatment efforts | |
| Risks potentially associated with hypoglycemia, other adverse events | |
| Disease duration | |
| Life expectancy | |
| Important comorbidities | |
| Established vascular complications | |
| Resources, support system | |

Diabetes Care, Diabetologia. 19 April 2012 [Epub ahead of print]

OTHER CONSIDERATIONS

- Age
- Weight
- Sex / racial / ethnic / genetic differences
- Comorbidities
  - Coronary artery disease
  - Heart Failure
  - Chronic kidney disease
  - Liver dysfunction
  - Hypoglycemia
Case 1: RV

- 38 yr old African American woman with a 5 yr history of T2 DM
- Graduate student with caregiver responsibilities for grandfather with dementia
- DOES NOT HAVE HEALTH INSURANCE
- Sedentary lifestyle and poor diet with lack of fresh foods
- PMH: HTN, hyperlipidemia, asthma
- Medications: metformin 1000mg BID, glipizide 10 mg QD, ventolin MDI PRN
- Exam: Obese. BMI 35.9 kg/m2. 132/80. Acanthosis nigricans. No thyromegaly. Unkempt feet, no neuropathy
- Labs: A1C 8.5% Trig 180 md/dL, LDL 90 mg/dL, UMA/cr 9
# Treatment Options for RV

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add GLP-1 receptor agonist</td>
<td>Weight loss</td>
<td>High cost</td>
</tr>
<tr>
<td></td>
<td>No hypoglycemia</td>
<td></td>
</tr>
<tr>
<td>Add SGLT2 inhibitor</td>
<td>Weight loss</td>
<td>UTI, genital fungal infection Diuretic effect</td>
</tr>
<tr>
<td>Continue sulphonyurea?</td>
<td>Low cost</td>
<td>Weight gain Hypoglycemia Low durability?</td>
</tr>
<tr>
<td>Add basal insulin</td>
<td>Universally effective Unlimited efficacy</td>
<td>Variable cost Weight gain Hypoglycemia</td>
</tr>
</tbody>
</table>
Case 1: RV Follow-up

- Once daily liraglutide was given (1.8mg/d)
- A1C after 6 mth was 7.6%
- Glipizide was discontinued after a couple of episodes of hypoglycemia
- Over the next 12 mth, follow-up was erratic
- A1C after 18 mth rose to 8.2% on metformin and liraglutide
- Basal insulin (glargine) was started and liraglutide discontinued
- Current dose of basal insulin has been increased to 38 U/d and follow-up remains poor
OTHER CONSIDERATIONS

• Weight (not usually pertinent in LTC)
  - Majority of T2DM patients overweight / obese
  - Lifestyle program
  - Metformin
  - GLP-1 receptor agonists
  - ? Bariatric surgery
  - Consider LADA in lean patients
What’s in a number?
Interpretation of A1C

### A1c may be increased by
- Hypothyroidism
- Splenectomy
- Aplastic anemia
- Iron deficiency (≥5.5% but not over 6.5%)
- Race
- Chronic alcohol consumption
- Chronic opioid use
- Severe hypertriglyceridemia

### A1c may be decreased by
- Anemia
- Blood loss, transfusions
- Abnormal Hb (spurious)
- Hemodialysis and Hct <30%
- Liver disease

Accurate glycemic control may be estimated as
- $\text{HbA}_{1\text{c}} \times 1.14$ if Hct ≥ 30%
- $\text{HbA}_{1\text{c}} \times 1.19$ if Hct < 30% and treated with low dosages of EPO
- $\text{HbA}_{1\text{c}} \times 1.38$ if Hct < 30% and treated with high dosages of EPO.

C. Kim et al. Diabetes Care April 2010 vol. 33
Case 2: NK

- 75 y old male of Caribbean-Indian descent with a 10 y history of T2 DM
- Retired owner of a construction company, active and walks daily, diet rich in sweets
- OFTEN HOLDS BASAL INSULIN
- **PMH:** CABG 2 y ago, mild neuropathy, hyperlipidemia, HTN, erectile dysfunction
- **Medications:** Metformin 2000 mg/d, insulin glargine 26 U/d, atorvastatin 80 mg/d, ASA 81 mg/d, lisinopril 20 mg/d,
- **Exam:** Thin, BMI 23 kg/m2, poor dentition, no thyromegaly, NSR, no signs of HF, normal pulses, dermatophytosis
- **Labs:** A1C 9% (EAG 212), GFR 50 mL/min/1.73m², UMA/Cr 20, LDL 92 mg/dl, trig 225 mg/dl
- **FBG log:** 98-140
Case 2: Glucose Log for NK

<table>
<thead>
<tr>
<th>Day</th>
<th>FBG</th>
<th>2h post LUNCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>109</td>
<td>223</td>
</tr>
<tr>
<td>Tuesday</td>
<td>121</td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td>98</td>
<td>278</td>
</tr>
<tr>
<td>Thursday</td>
<td>132</td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td>116</td>
<td>307</td>
</tr>
<tr>
<td>Sunday</td>
<td>125</td>
<td></td>
</tr>
</tbody>
</table>
# Treatment Options for NK

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
</table>
| Increase basal insulin?                          | • Remains on one daily injection                                          | • Inter-meal hypoglycemia  
• Will not treat post-prandial hyperglycemia |
| Add TZD?                                         | • No hypoglycemia  
• Durability  
• ↓ TGs, ↑ HDL-C  
• ? ↓ CVD (pio) | • Edema, HF?  
• High cost  
• ? Bladder ca (smoker) |
| Add DPP4 inhibitor?                              | • No hypoglycemia  
• Well tolerated                                                            | • Modest ↓ A1c  
• ? Pancreatitis  
• High cost |
| Add prandial insulin (initially with lunch)      | • Targets meal//s causing PP hyperglycemia  
• Other prandial doses can be given as needed                              | • 2+ injections daily  
• Hypoglycemia                                                             |
Case 2: NK Follow-up

- Insulin aspart started initially 6U before lunch (increased to 8U)
- Dramatic decrease in PPG after lunch (140-165)
- After 2 mth, ac and HS BG revealed high values at HS (250+)
- Aspart started with dinner as well as lunch
- After 4 mth, POC A1C in the office was 8%, with one episode of mild hypoglycemia
Sequential Insulin Strategies in T2DM

Diabetes Care, Diabetologia. 19 April 2012
Approach To Starting and Adjusting Insulin in Type 2 Diabetes

ADA. 7. Approaches to Glycemic Treatment. Diabetes Care 2015;38(suppl 1):S46. Figure 7.2; adapted with permission from Inzucchi SE, et al. Diabetes Care, 2015;38:140-149
# Suggestions for Adjusting Insulin Therapy Based on Glucose Patterns

<table>
<thead>
<tr>
<th>Average Blood Glucose</th>
<th>Basal</th>
<th>Rapid# Breakfast</th>
<th>Lunch</th>
<th>Supper</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fasting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOW</td>
<td>🔽</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH*</td>
<td>🔽</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Before Lunch</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOW</td>
<td>🔽</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH</td>
<td>🔽</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Before Supper</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOW</td>
<td>🔽</td>
<td></td>
<td>🔽</td>
<td></td>
</tr>
<tr>
<td>HIGH**</td>
<td></td>
<td></td>
<td>🔽</td>
<td></td>
</tr>
<tr>
<td><strong>Bedtime</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOW</td>
<td>🔽</td>
<td></td>
<td>🔽</td>
<td></td>
</tr>
<tr>
<td>HIGH</td>
<td>🔽</td>
<td></td>
<td>🔽</td>
<td></td>
</tr>
</tbody>
</table>

Basal insulin with rapid-acting insulin at each meal AMDA CPG 2010
ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

OTHER CONSIDERATIONS

• Age: Older adults
  - Reduced life expectancy
  - Higher CVD burden
  - Reduced GFR
  - At risk for adverse events from polypharmacy
  - More likely to be compromised from hypoglycemia

☐ Less ambitious targets
☐ HbA1c <7.5–8.0% if tighter targets not easily achieved
☐ Focus on drug safety

*Diabetes Care, Diabetologia. 19 April 2012 [Epub ahead of print]*
ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

OTHER CONSIDERATIONS

- **Comorbidities**
  - **Coronary Disease**
  - Heart Failure
  - Renal disease
  - Liver dysfunction
  - Hypoglycemia

- Metformin: CVD benefit (UKPDS)
- Avoid hypoglycemia
- ? SUs & ischemic preconditioning
- ? Pioglitazone & ↓ CVD events
- ? Effects of incretin-based therapies

*Diabetes Care, Diabetologia. 19 April 2012 [Epub ahead of print]*
Case 3: Mrs. AB

- 81 year-old woman admitted to the rehabilitation unit of the SNF following her third vascular surgery to the left leg for severe PAD complicated by rest pain
- 1 week later, she developed increased fatigue, weakness, and 2-3+ leg edema
- **Comorbidities:** T2 DM for 25 years, requiring insulin >20 yrs, heart failure (HF), Stage III CKD, HTN, hyperlipidemia, weight loss, and chronic anemia
- **Functional status:** ambulates with walker, continent, needs help with bathing, and IADLs
Case 3: Mrs. AB
Medications

- Novolin 70/30, 26 U BID
- Sliding scale insulin using Regular insulin
- Pioglitazone 30 mg q.d.
- Simvastatin 40 mg q.d.
- Furosemide 60 mg q.d.
- KCL 20 meq BID
- Digoxin 0.125 mg q.d.
- Clopidogrel 75 mg q.d.

LABS: Na 132 meq/L, K 3.4 meq/L, BUN 45 mg/dL, Creat 1.7 md/dL
- GFR 40 mL/min
- A1C 9 %, EAG 212 mg/dL
## Glucose log for past week (ac and hs)

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
<th>Bedtime</th>
</tr>
</thead>
<tbody>
<tr>
<td>289</td>
<td>138</td>
<td>249</td>
<td>148</td>
</tr>
<tr>
<td>320</td>
<td>168</td>
<td>334</td>
<td>139</td>
</tr>
<tr>
<td>245</td>
<td>147</td>
<td>287</td>
<td>156</td>
</tr>
<tr>
<td>269</td>
<td>129</td>
<td>180 (refused insulin)</td>
<td>326</td>
</tr>
<tr>
<td>418</td>
<td>212</td>
<td>317</td>
<td>176</td>
</tr>
<tr>
<td>234</td>
<td>156</td>
<td>298</td>
<td>(refused CBG)</td>
</tr>
<tr>
<td>357</td>
<td>162</td>
<td>257</td>
<td>128</td>
</tr>
</tbody>
</table>
Problematic Issues for Patient AB

- Optimization of HF pharmacotherapy
- Improvement of diabetes management
- ATTEMPT TO AVOID HOSPITAL TRANSFER!
Specific Considerations Regarding Diabetes Management in Mrs. AB

- Long duration with complications
- Life expectancy likely < 5y (given age, co-morbid conditions, functional impairment) Huang et al. Ann Int Med 2008;149
- Goal for glycemic control
- Use of sliding scale insulin
- Use of thiazolidinediones in HF
ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

OTHER CONSIDERATIONS

• **Comorbidities**
  - Coronary Disease
  - Heart Failure
  - Renal disease
  - Liver dysfunction
  - Hypoglycemia

- Metformin: May use unless condition is unstable or severe
- Avoid TZDs
- ? Effects of incretin-based therapies

*Diabetes Care, Diabetologia. 19 April 2012 [Epub ahead of print]*
Thiazolidinedione use in Patients with Diabetes and Established Heart Failure

- TZDs improve insulin sensitivity, endothelial dysfunction, inhibit cardiac hypertrophy; but increase Na reabsorption
- 111 diabetic patients with chronic systolic HF, treated with TZD were examined retrospectively
- Fluid retention reversed after drug withdrawal (peripheral NOT pulmonary edema)
- More female patients and insulin users developed TZD-related fluid retention
- However, no differences in the baseline NYHA functional class or echocardiographic severity of cardiac dysfunction
- **Recommendation to use with caution in mild HF and avoid in moderate or severe HF**

P.S. Chaggar et al. Diab and Vasc DisRes July 2009 6: 146-152,
OTHER CONSIDERATIONS

- **Comorbidities**
  - Coronary Disease
  - Heart Failure
  - Renal disease---
  - Liver dysfunction
  - Hypoglycemia

- Increased risk of hypoglycemia
- Metformin & lactic acidosis
  - US: stop @SCr ≥ 1.5 (1.4 women)
  - UK: ↓ dose @GFR <45 & stop @GFR <30
- Caution with SUs (esp. glyburide)
- DPP-4-i’s – dose adjust for most
- Avoid exenatide if GFR <30

*Diabetes Care, Diabetologia. 19 April 2012*
WHAT SHOULD GOALS OF CONTROL BE IN LTC?

DEPENDS ON THE DIABETES BURDEN OR
Diabetes Mellitus In Older People: Position Statement of the IAGG and the EDWPOP

Influence of co-morbidities

- Regular Comprehensive Geriatric Assessment is used to identify functional loss and impact of disability
- A nutritional screening assessment tool should be used routinely
- In patients with HTN a BP threshold for treatment is 140/80 mmHg, and 150/90 mmHg in those > 75 yrs
  - Lower systolic BP may be appropriate if GFR <60
- In functionally dependent patients with DM a BP target < 150/90 mmHg is acceptable
- Screening for renal impairment in newly diagnosed DM
  - Annual testing for GFR

Diabetes Mellitus In Older People: Position Statement of the IAGG and the EDWPOP

**Therapy (pharmacological)**

- Avoid restrictive diets if >70 yrs, or malnutrition
- Metformin first-line therapy, and as adjunct to insulin if combination therapy is used
- Avoid sulfonylureas if higher risk of hypoglycemia
- In selected patients, a basal regimen may be safer than basal/bolus or premixed insulin therapy
- In selected patients not at target and with poor tolerance to other agents, a DPP4 inhibitor may be second line therapy
- In obese patients (BMI>35), with poor response to other therapies, a GLP1 agonist can be second or third-line therapy
- Pioglitazone may be used as second-line therapy after metformin *IF* not high risk of CHF, no bone loss, prior dx of osteoporosis, or h/o bladder cancer

Fig. 1

Pragmatic Diabetes Management in Nursing Homes: Individual Care Plan

CiteAthanasia Benetos, Jean-Luc Novella, Bruno Guerci, Jean-Frederic Blickle, Jean-Marc Boivin, Pierre Cuny, Brigitte Delemer, Thierry Gabreau, and others


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Factors to Be Considered When Assessing and Treating Frail Patients With Diabetes in Nursing Homes

- Life expectancy, quality of life, independence
- Risk of hypoglycemia and falls
- Potential consequences of hyperglycemia
- Nutritional status
- Comprehensive geriatric assessment
- Comorbidities
- Cardiovascular disease, history, and risk
- Kidney disease and impaired renal function
- Liver disease and impaired hepatic function
- Complications of diabetes (eyes, feet, neuropathy)

Benetos et al. JAMDA Oct 2013
A Framework for Considering Treatment Goals for Glycemia in Older Adults with Diabetes

<table>
<thead>
<tr>
<th>Pt characteristics/health status</th>
<th>Rationale</th>
<th>Reasonable A1C goal</th>
<th>Fasting or pre-prandial glucose mg/dL</th>
<th>Bedtime glucose mg/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy *</td>
<td>Longer remaining life expectancy</td>
<td>&lt; 7.5 %</td>
<td>90-130</td>
<td>90-150</td>
</tr>
<tr>
<td>Complex/intermediate **</td>
<td>Intermediate remaining life expectancy High treatment burden, hypoglycemia, falls</td>
<td>&lt;8.0 %</td>
<td>90-150</td>
<td>100-180</td>
</tr>
<tr>
<td>Very complex/poor health ***</td>
<td>Limited remaining life expectancy makes benefit uncertain</td>
<td>&lt;8.5 %</td>
<td>100-180</td>
<td>110-120</td>
</tr>
</tbody>
</table>

* Few coexisting chronic illnesses, intact cognitive and functional status
** Multiple coexisting chronic illnesses, or 2+ IADL impairments, mild to mod cognitive impairment
*** LTC or end-stage chronic illnesses, mod to severe cognitive impairments, 2+ ADL dependencies
Excessive Reliance on Sliding Scale Insulin

- Often the sole mode of control
- Tendency to use “one size fits all” regimens
- Use of SSI is now on the Beers list 2012
- AMDA recommends that any patient on SSI be re-evaluated within 1 week and converted to fixed daily insulin doses that minimize the need for correction doses (1)
- Preliminary data from a retrospective study reveals that about 70% of BG results done by finger stick have no action taken in individuals on SSI
- *Clinical judgment and ongoing clinical assessment* are important for making day-to-day decisions regarding the treatment of hyperglycemia1,2

1. AMDA. Diabetes Management in the Long-Term Care Setting Clinical Practice Guideline. Columbia, MD: AMDA; 2010.
Increased Glucose Excursions with sliding Scale Insulin
## 2012 Beers Criteria
### Endocrine

<table>
<thead>
<tr>
<th>Therapeutic category</th>
<th>Rationale</th>
<th>Recommendation</th>
<th>Quality of evidence</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin, sliding scale</td>
<td>Higher risk of hypoglycemia without improvement in hyperglycemia management regardless of care setting</td>
<td>Avoid</td>
<td>Moderate</td>
<td>Strong</td>
</tr>
</tbody>
</table>

C. Campanelli et al. JAGS Feb 2012
SSI has been replaced by a Correction Factor

- **1500 Rule (1700 or 1800 rule may be safer)**
- **Using rapid acting insulin**
  - $\frac{1500}{\text{TDD}} =$ # of mg/dl BG will drop when given 1 unit of insulin
  - Example: 8u AM, 7u Noon, 10u PM, 25u Bed : TDD=50 u
  - $\frac{1500}{50} = 30$ points/unit insulin
  - If blood glucose levels are out of target.....
  - Adding or subtracting 1 unit of rapid insulin will allow BG levels to increase or decrease by $\sim 30\text{mg/dl}$

If a correction dose is routinely being added to the patient’s usual rapid insulin dose at meals due to hyperglycemia, the average correction dose used for any particular meal can be used as the number of units to increase the preceding rapid acting insulin dose.

*L Fredrickson, Adopted from Insulin pump therapy AMDA. Managing Diabetes in the Long-Term Care Setting: Clinical Practice Guideline. Columbia, Md: American Medical Directors Association; 2015.*
Strategies to move on from SSI

If on SSI +/- oral agent, calculate average TDD of insulin used over past 3 days

Give 70-80% of TDD as basal insulin (fixed time of day)

Increase or decrease the basal dose by 2-4 units until the fasting goal is reached (Fix the Fasting First!)

Use **Correction Scale** before meals

*Take average correction at lunch and add to breakfast dose*
*Take average correction at dinner and add to lunch dose.*
*Take average correction at HS and add to dinner dose.*
Strategies to move to basal-prandial insulin from SSI with Regular, NPH or pre-mix

1. Calculate average TDD of all insulin from the requirements of the past 3 days.
2. Start basal insulin at 50% of the calculated daily dose.
3. Divide the other 50% insulin requirement into 3 equal meal time bolus doses of rapid acting insulin (if possible).

Reasonable to stop sulfonylureas
OTHER CONSIDERATIONS

• Comorbidities
  - Coronary Disease
  - Heart Failure
  - Renal disease
  - Liver dysfunction
  - Hypoglycemia

- Most drugs not tested in advanced liver disease
- Pioglitazone may help steatosis
- Insulin best option if disease severe

Diabetes Care, Diabetologia. 19 April 2012 [Epub ahead of print]
ADA-EASD Position Statement: Management of Hyperglycemia in T2DM

OTHER CONSIDERATIONS

- **Comorbidities**
  - Coronary Disease
  - Heart Failure
  - Renal disease
  - Liver dysfunction
  - Hypoglycemia

- Emerging concerns regarding association with increased mortality and dementia
- Proper drug selection in the hypoglycemia prone
What About Hypoglycemia?

- 3.46 episodes per 100 pt yrs
- Costs highest for ER to inpatient hypoglycemia events ($10,326/event)
- Lowest for outpatient events ($285/event)

Curkendall et al. JCOM journal Oct 2011
Risk Factors For Severe Hypoglycemia

- Age
- Unawareness of, or previous severe hypoglycemia
- High doses of insulin or sulfonylureas
- Recent hospitalization or intercurrent illness
- Polypharmacy (>5 prescribed meds)
- “Tight control” of diabetes
- Poor nutrition or fasting
- Chronic liver, renal or cardiovascular disease
- Vigorous sustained exercise
- Endocrine deficiency (thyroid, adrenal, or pituitary)
- Alcohol use
- Loss of normal counter-regulation

Chelliah. Drugs aging 2004:21
Treatment of Hypoglycemia—Rule of 15

- Give **15 g** of glucose or carbohydrate, equivalent to
  - ½ cup juice, or soda
  - ½ cup apple sauce
  - 1 cup milk
  - 1 tube glucose gel
  - 3 glucose tablets, 3 marshmallows
- Wait **15 minutes**
- Recheck blood glucose. If still below the target, give another 15 g of glucose or carbohydrate
- Assess for possible cause of hypoglycemia and document

SC = subcutaneous; IM = intramuscular.

American Medical Directors Association. *Diabetes Management in the Long Term Care Setting: Clinical Practice Guideline*. Columbia, MD: AMDA 2010
Role of Glucose Monitoring in Type 2 Diabetes

- Allows assessment of response to therapy
- May prevent hypoglycemia
- Can help in adjusting medications
- Patients on insulin need to monitor glucose more frequently if readings are used to guide mealtime insulin doses

- So “AC and HS accuchecks” should not be standard orders!

Institute of Clinical Systems Improvement Diabetes guideline Apr 2012 (www.icsi.org)
Suggested Monitoring of Blood Glucose by Type of Diabetes Therapy

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Frequency and Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-pharmacologic or oral agent</td>
<td>Twice per day for 1–2 weeks after admission, then once or twice per week; postprandial may be helpful</td>
</tr>
<tr>
<td>Simple insulin regimens (1 or 2 daily injections)</td>
<td>Twice daily, at least 3 to 4 days per week; postprandial may be helpful</td>
</tr>
<tr>
<td>Complex insulin regimens (3 or more daily injections)</td>
<td>Three or more times every day; postprandial may be helpful</td>
</tr>
</tbody>
</table>

**NOTE:** More-frequent monitoring may be necessary during acute illness or whenever the patient’s therapeutic regimen changes.
Take Home Points

- People with diabetes are a heterogeneous group with unique needs which we as practitioners need to understand and accept.
- Individualized and frequent step-wise adjustments to therapy along with review of glucose trends is necessary to improve glycemic control.
- People with diabetes should not be blamed, but helped to understand that they have a progressive disease which can be managed in partnership with the inter-professional care team.
QUESTIONS?

THANK YOU!

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