A Pragmatic Approach to Diabetic Care for Nursing Home Residents

Charles Crecelius MD PhD CMD FACP

Question:

• Why Do We Treat Diabetes?
  o To get to a goal blood sugar
  o To achieve a certain score on a Quality Measure
  o To prevent diabetic complications
  o To extend the person’s life expectancy
  o To meet clinical practice guideline
  o To meet the individual needs of the patient
The problems of treating diabetes in LTC residents

- Diets difficult to control
- Goals unclear
- Nursing time issues
- Clinical practice guidelines often not elderly oriented
- Medication usage different from younger patients

The State of Diabetes Management in Long Term Care

JAMDA 2009 Study of Nursing Home
- 15% had policy for use of treatment algorithm
- 8% had quality improvement tool re: Diabetes
- 7% had policy for Hgb A1C measurement
- 31% had policy for blood sugar monitoring
- Only 1% of residents had a goal HgbA1C stated

Issues Affecting Management Decision

- Macrovascular complications not significantly affected within the last 5 years of life
- Falls associated more with hypo- than hyper-glycemia
- Tight control associated with worsened mortality in the elderly
  - ACCORD trial: Increased hypoglycemia = increased mortality
  - ADVANCE trial: increased risk falls and cognitive impairment
  - VACSDM: Hgb A1C 6.9% = increased risk hypoglycemia, trend of increased CV events

Evidence for HgbA1C Goals

- ACCORD
  - Mean age 62 (40-79), weight 206 lb, initial A1C 8.3
  - Intensive vs Regular Group (Hgb A1C 6.4 vs. 7-7.9)
  - Intensive: up to 3 orals + insulin
  - At 3.5 years: Intensive group had increase in:
    - all cause mortality (NNH 95)
    - hypoglycemia (NNH 14)
    - Weight gain greater 10 kg (NNH 7)
    - Fluid retention (NNH 30)
  - At 5 years (intensive treatment stopped): original intensive: still had increased all cause mortality
Evidence for HgbA1C Goals

- ADVANCE
  - mean age 66 (>55), weight 172 lb, initial A1C 7.5
  - Intensive vs Standard Group (A1C 6.5 vs 7.3)
  - Intensive up to 3 orals + insulin, most on 2 orals
  - At 5 year, Intensive group had:
    - No effect on all cause mortality (including CV)
    - Decreased nephropathy (NNT 91)
    - Increased severe hypoglycemia (NNH 83)
    - Increased hospitalizations – any cause (NNH 42)

Prognosticating Death and Diabetic Goals

- Favorable effects of diabetic care require at least 5 years remaining life to be attainable
- Effects are especially evident if other co-morbid diseases are treatable (hypertension, cholesterol)
- Prognosticating life expectancy is a reasonable guide to help make decisions
- Several tools are available
  - www.eprognosis.org
  - PACE Prognostic Index
PACE Prognostic Index
8 Predictors of Mortality in Index

- Male 2 points
- Age 75-79 2 points
- 80-84 2 points
- ≥85 3 points
- Dependence in toileting 1 point
- Dressing dependency
  - partially 1 point
  - fully 3 points
- Malignant neoplasm 2 points
- CHF 3 points
- COPD 1 point
- Renal insufficiency or failure 3 points
- Once >5 points, life expectancy <3 years

Carey EC et al. JAGS 56; 2008
Medication Utility Changes With Time

Examples

• Sulfonylureas cheap but risk of hypoglycemia increases with age
• Basal-bolus insulin great for mimicking physiology but cumbersome, uncertain applicability to elders
• Biguanides cheap and effective but renal function highly limits use
• DDP-4 drugs sound ideal but expense, limited data in frail elders
• Ultimately what is the purpose of the medication—is it just to make a number pretty or to improve QoL?

Medication Utility Can Change With Time

“Take the green pill to feel hunky, the yellow pill to feel dory.”
Four Step Model of Appropriate Medications

Summary of Evidence

• In younger populations, lowering blood glucose to near-normal HbA1c levels reduces the risk of microvascular complications such as retinopathy and nephropathy. The NNT for older adults increases significantly.

• The impact of tight glucose control on the risk of macrovascular complications (MI, stroke) or mortality is dubious in older adults, and in fact probably increases (unfavorable NNH).

• Aiming for HbA1c levels near or below 7% soon after the diagnosis of diabetes may reduce the risk of macrovascular disease in younger persons.
Summary continued

• Tighter glycemic control may play a more important role before macrovascular disease is well advanced

• While important to treat elevated HbA1c, the greatest clinical benefit of good glycemic control may occur early in the course of the disease

• Any cardiovascular benefit of glucose lowering is probably modest compared with the benefits from treating other CV risk factors such as hypertension and hyperlipidemia

Summary continued

• There is a ceiling effect to treating diabetes – at least 5 years is needed to have an impact on microvascular disease, even longer for macrovascular disease

• Have an idea of resident prognosis

• HgbA1C goals should be individualized in selected patients such as the frail elderly

• Don't be lazy, but don't be crazy in treating A1C
Hgb A1C Goals

<table>
<thead>
<tr>
<th>Organization</th>
<th>Goal Hgb A1C</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Diabetic Assoc.</td>
<td>&lt;7</td>
<td>Re-evaluate if reduced life expectancy, co-morbidities, CAD, silent hypoglycemia</td>
</tr>
<tr>
<td>American Geriatric Soc.</td>
<td>&lt;8</td>
<td>For frail, life expectancy &lt; 5 years, risk of treatment complications</td>
</tr>
<tr>
<td>Department of Veteran Affairs</td>
<td>&lt;7</td>
<td>Only for life expectancy &gt; 10 years, no major co-morbidities</td>
</tr>
<tr>
<td></td>
<td>&lt;8</td>
<td>Life expectancy 5-10 years, only mild co-morbidities</td>
</tr>
<tr>
<td></td>
<td>&lt;9</td>
<td>Life expectancy &lt; 5 years, major co-morbidities</td>
</tr>
</tbody>
</table>

So How Do I Get Started on Improving Diabetic Care in My Facility?

- Need a diabetic champion
- Need a structured approach
  - Need to see where you are
  - Need to gather a team
  - Need to plan a direction
  - Need to do it
  - Need to re-evaluate and re-plan as needed
- Basically need a quality improvement project
  - Must plan carefully to get the desired results or....
Bad Planning equals Bad Results

Quality Improvement Project Benefits: Improving Diabetic Management

- Providing the Best Care
- Patient:
  - Generally less restricted diet, less accuchecks, better knowledge of their disease, less hypoglycemia, lower morbidity
- Nursing:
  - Better understanding of person specific goals, less accuchecks, less complex medication regiments
Benefits continued

- Administration
  - Provision of best clinical and person-centered care, lower costs, lower medico legal risk
- Physician
  - Best value based medicine, provision of best medical care, lower medico legal risk
- Survey Process
  - Reduces chance of med error
  - Prepares for new surveyor guidance F329

Why Undertake This Project?

1) Improves quality of life by not restricting diets, which has been shown to have minimal if any impact on medical management. Patients will not complain that they don’t get certain foods; helps discourage “cheating” out of frustration, and improves the dining experience.

2) Families learn that restricted diets are unnecessary and decrease quality of life

3) Reduces stress (and potentially expense) on dietary staff. Do not have to worry about the wrong patient getting the wrong diet, makes meal preparation easier, causes less staff stress explaining to persons why they can’t have certain food.
Why Undertake This Project?

4) Reduces nursing staff time measuring accuchecks and adjusting sliding scale insulin, which is not physiologic nor designed for chronic administration (time expense example: 5 min per patient, 4x/day, 12 person on SSI = 4 hours/day nursing time!)

5) Reduces medication error in administration of insulin by having set amounts of insulin for each resident every day (not having to adjust amounts given).

6) Reduces risk of hypoglycemia and associated morbidity and mortality, by setting realistic control goals which are geriatric-evidence based.

7) Can reduce polypharmacy by setting realistic goals and avoiding excessive medication.

8) Reduces need for accuchecks by improving overall diabetic control and setting realistic goals, which saves nursing time and patient expense

- Net Result: Better Resident Quality of Life, Better Medical Care, Less Errors, Better Surveys, Reduced Nursing / Dietary Time and Cost
Diabetic QI Project......

STEP ONE
- Measure performance parameters
  - Use of Medications:
    - **Orals**: Sulfonylureas, Meglitinides, Biguanides, Thiazolidinediones, Alpha-glucosidase inhibitors, DPP-4 Inhibitors
    - **Insulins**: Short-Acting, Long-Acting, Fixed Combinations, Sliding Scale
    - **Other Injectables**: Pramlintide, Exenatide
  - Frequency of HgbA1C measurements
    - Exclusions: formal palliative care and hospice
  - Stated HgbA1C goal / adherence to goal
  - Accucheks per day per patient
  - Individual physician performance

STEP TWO
- Educate !!
  - Families
    - Diet myth and facts, concept of patient specific goals
  - Administration
    - Above + QI project goals, benefits to facility
  - Nursing
    - Above + medication basics, QI project goals
  - Physicians
    - Above + planned interventions
Diabetic QI......

STEP THREE
• Do It !!
  o Introduce educational material
    • Letters to families and physicians, in-service to nursing
  o Publish baseline parameters, set goals
    • Medication usage, hypoglycemic events, accuchecks, nursing and family satisfaction, physician performance
  o Re-educate at 2 and 5 months
    • Nursing and physicians
  o Re-measure at three and 6 months
    • Publish progress

Patient / Family Letter

• Introduces project
• Sent by medical director and administration
• Emphasizes utility of unrestricted diet
  o Lack of benefit on control
  o Problems with weight loss
  o Diet already balanced
• Deflates fears
**Doctor Letter**

- Introduces project
- Sent by medical director
- Sets goals
  - Get rid of diabetic diets
  - Decrease accuchecks on controlled patients
  - Get rid of eternal sliding scale insulin
  - Set Goal HgbA1C
  - Avoid hypoglycemia

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**Nurse Education**

- Use of the Why We Are Doing this Project Letter
- In-service on diabetic protocols
- In-service on diabetic basics
- Help to discontinue diabetic diet
- Help to identify resident candidates for medication and accucheck review
Pharmacist Involvement

• Critical to success
• Provide data on all patients on insulin
• Provide pharmacist reviews (in conjunction with medical director) on suggested changes
  o Reduction of accuchecks
  o Transition of sliding scale insulin to scheduled insulin
  o Helping to set a goal HgbA1C

Diabetic Drugs – Other Drug Interactions & Side-Effects

• Many medications interact with diabetic Rx
• Can increase or decrease blood sugars
• These symptoms can be mistaken for other problem or side-effects
• Frailty, dementia can make discerning all this very difficult
Diabetic Rx, Adverse Effects and the Elderly

"Side effects? In your condition you won't notice."

Commonly Used Drugs Which Can Cause Hyperglycemia

- Glucocorticoids
- Antipsychotic Rx
- Beta-adrenergic agonist
- Calcium channel blockers
- Estrogens
- Levodopa
- Megesterol
- Nicotinic acid
- Opioids
- Phenytoin
- Diuretic
- Thyroid hormones
Signs and Symptoms of Hyperglycemia

- Blurred vision
- New / increasing confusion
- Lethargy
- Weight loss
- New / worsening incontinence
- Fruity Breath odor

Drugs that can Cause Hypoglycemia

- Aspirin / Salicylates
- Alcohol
- Antibiotics (sulfa, quinolones, pentamidine, streptozocin)
- Antifungals
- Antipsychotics
- Beta-blockers
- Calcium channel blockers
- Diabetic medication
- Diuretics
- Fluoxetine
- Interferon
- Theophylline
- Quinidine
- Varenicline (Chantix)
Signs and Symptoms of Hypoglycemia

- Altered behavior / mental function
- Altered level of consciousness
- Falls
- Weakness
- Hallucinations
- Irritability
- Seizures
- Stroke
- Sweating

Diabetic Protocols

- Important to have protocols for managing diabetes
  - Consistent treatment
  - Staff awareness of best practices
  - Allows immediate treatment of urgent conditions
  - Medico legal protection
  - Improved diabetic care

Critical to in-service staff, ideally test their knowledge
When to Call the Practitioner Protocol

• Important to have consistent protocols
  o All clinical staff aware
  o Can be modified or individual patient needs
  o Consider having in patient chart

• Call Immediately:
  o Blood sugar less than 70 mg/dl AND unresponsive
  o Blood sugar less than 60 AND responsive
  o Two consecutive blood sugars less than 70 mg/dl
    • "back to back" or same time of day

When to Call the Practitioner Protocol

• Call as soon as possible / fax
  o Two blood sugar values greater 250 mg/dl IF
    • New medical problem
    • Change in condition / functional status
    • Treatment not already initiated / modified
  o Blood sugars greater 300 during most of 2 consecutive days (unless orders to manage exist)
  o Patient has not eaten well ≥ 2 days and has any additional symptoms (e.g. confusion, fever)
Hypoglycemic Protocol part 1

- Protocol included
- Used for blood sugars less than 60 mg/dl
  - Whether on insulin or orals
  - Two component – able or unable to swallow
- Blood sugar less 60 + ABLE to swallow
  - 15 gm. glucose gel, repeat bs 20 min / document
  - Notify practitioner, be able to discuss recent bs, meds, VS, condition status
  - Repeat q 20 min until >60 / per practitioner order

Hypoglycemic Protocol part 2

- Blood sugar less 60 + UNABLE to swallow
  - Give 1 mg glucagon sq
    - Turn resident side – glucagon can cause emesis
    - Record VS / pulse ox – notify MD
  - Repeat blood sugar in 20 min
    - Still unable to swallow – repeat glucagon
      - Recheck bs 10 min – still less 60 – call 911
    - Able to swallow
      - give 15 gm. oral glucose tube
      - Repeat q 20 min until bs >60 / practitioner order
Hypoglycemic Protocol  part 3

• Must have 1:1 contact until bs greater than 60  for two consecutive readings, 20 min apart
• After hypoglycemic event + unable swallow
  o Must monitor VS q shift for 24 hours
  o Accucheck QID x 48 hours
• After hypoglycemic event + able swallow
  o Must request physician orders for further blood sugar reading
• Must document all in nursing notes

Alternatives to Glucose gel

• Appropriate only if absolutely certain patient swallows well
  o The 15 gram of carbohydrate rule
    • ½ cup juice
    • ½ cup apple sauce
    • 3 glucose tablets
  o Carbohydrate + protein (can sustain sugar levels)
    • 1 cup milk
    • ½ cup pudding / ice cream
  o Use thick foods e.g. peanut butter cautiously. Good for follow-up meal, but dangerous for acute use
Monitoring Blood Sugars Four Times A Day

What Do Residents Think

Suggested Blood Sugar Monitoring

• Oral agents
  o Twice daily, at least 2-3 times a week, rotate times

• Simple insulin regimen (1-2 shots a day)
  o Twice daily, at least 3-4 times a week, rotate times, consider checking post-prandials

• Complex insulin regiments (3 or more shots a day)
  o Four times a day initially
  o Consider decreasing if stable for several weeks
Blood Sugar Monitoring Advise

- Check 3am blood sugar if morning sugars are usually low - less 80. (Check for hypoglycemia)
- Consider “fingerstick holiday”
- Consider individualizing high blood sugar practitioner notification depending on patient goals (e.g. palliative care)
- Consider extra medication order for special meals / scheduled snacks (e.g. weekly ice cream)

“Best” Medicines

- No one best medication for diabetes
- Clinical evidence for frail elders highly lacking
- Effect on heart attack, stroke and amputation poorly demonstrated / known
- Effect on eyes, kidney function may exist
- “Best medication” is that which avoids low and high sugars for a particular patient
Pros and Cons of Diabetic Medication

• Sulfonylureas, Meglitinides
  o Cheap, lower sugars well
  o Higher risk of hypoglycemia

• Alpha-glucosidase inhibitors
  o Relatively inexpensive, low risk hypoglycemia
  o Gas, bloating, relatively weak drugs

• Biguanides
  o Cheap, very effective, low risk hypoglycemia
  o Require good renal function, weight loss

Pros and Cons of Diabetic Medication

• Thiazolidinediones
  o Effective, low risk of hypoglycemia
  o Expense, cardiovascular risk

• DPP-4 Inhibitors
  o Effective, low risk of hypoglycemia
  o Most expensive, newest class

• Insulins
  o Moderate expense, effective
  o Invasive, require more monitoring, many forms
Diabetes and the Old Beers List

- The Beers List
  - Utilized in F329 Unnecessary Drugs (Medications of Particular Interest)
  - Originated by Dr. Mark Beers; medications potentially dangerous in older adults
  - A guideline, exceptions allowed with explanation
- Old Beers List
  - Chlorpropamide (prolonged half life, SIADH)
  - Glyburide (prolonged half life)

Diabetes and the New Beers List

- New 2012 Beers List
  - Updated by AGS this year
  - CMS expected to update Surveyor guidance by next year
- Sliding Scale Insulin added
  - “Higher risk of hypoglycemia without improvement in hyperglycemia management regardless of care setting”
  - Strong recommendation

Why Is Sliding Scale Insulin Undesirable

- NOT physiologic
  - The body secretes insulin in response to a meal
  - Sliding scale tries to retroactively “fix” past meal
    - Can actually worsen control
    - Designed only for medically unstable patients
  - Scheduled insulin anticipates the meal
    - More physiologic
    - Gives insulin based on intake at meal
    - Less likely to cause hypoglycemia

More Reasons Not to Use Sliding Scale Insulin

- Demands 3 or 4 injections a day
  - BID 70/30 or oral / long acting insulin often works as well
- Require 3 or 4 accuchecks a day
  - Other regiments allow BID or less
  - Accuchek = resident discomfort, increased nursing time, increased expense (12 patients a day on SSI = 4 hours nursing time a day)
Resistance to Changing Sliding Scale Insulin

- “We’ve always done it this way”
  - No medication is forever
- My patient is too unstable
  - Studies show better control, less sugars out of line
  - I have successfully changed 15 patients this year with better control, less calls, less low sugars
- It takes too much time and effort
  - More time up front, less on the back end
  - Better patient care
  - Better valued based medication

Transitioning Sliding Scale to Scheduled Insulin is Possible
Transitioning Sliding Scale Insulin to Scheduled Insulin

• Several methods, none superior
• My method – low dose vs high dose algorithm
• All require QID accucheck initially, at least weekly review initially, then readjustment
• Call for blood sugar less 80, more then 350
• Usually can get the “correct dose” within 1 to 3 cycles, then decrease accucheck
• CMS will pay for a higher level of visit given complexity of interaction

Transitioning Involves:

• Close monitoring during the phase in period
• Communication
• Pharmacy support
• Person centered approach
• Protocols
• Clinical acumen
• Occasionally just old fashion experience
Transitioning Low Dose SSI

• Low Dose = Less than 20-25 units total a day
  o Since insulin requirements low, can often convert to long acting insulin + orals OR 70/30 insulin BID

• Initial conversion
  o >50% converted to long acting insulin; rest dropped and oral agents maximized
  o OR divide total SSI into 70/30 BID – 2/3 am, 1/3 pm

• Subsequent actions
  o Maximize long acting insulin + short acting orals timed to peaks
  o OR adjust 70/30 as needed

Conversion Example for Lower Dose Sliding Scale Insulin

• Resident average insulin usage past week
  o Am 10 units, lunch 6 units, dinner 6 units

• Start
  o lantus/levimir - 12 units q hs
  o Metformin +/- sulfonylurea if no low mealtime bs
  o Meglitinides +/- AGI if bs “spikes”
  OR
  o 70/30 insulin - 14 units q am, 7 units Q pm
Transitioning High Dose Sliding Scale to Scheduled Insulin

- High Dose = More than 20-25 units total a day
- Continue long acting insulin
- Needed mealtime dose is a combination of that used in previous and current meal.
- Initial: \((\text{average previous} + \text{lowest current meal}) / 2\)
- Subsequent: adjust each meal by 2-3 units using subsequent meal accucheck value
- Can check occasional 1.5 hour post prandial if difficulty finding right dose

Conversion Example for Higher Dose Sliding Scale Insulin

<table>
<thead>
<tr>
<th>Insulin</th>
<th>Morning</th>
<th>Noon</th>
<th>Dinner</th>
<th>HS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>22</td>
<td>12</td>
<td>10</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Lowest</td>
<td>12</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>New Dose</td>
<td>14</td>
<td>15</td>
<td>8</td>
<td>0</td>
<td>37</td>
</tr>
</tbody>
</table>
Conversion Higher Dose Characteristics

- Tends to correct later day values first
  - Risk of hypoglycemia greatest when awake, lowest when asleep / in am
- Subsequent dose changes usually requires additional insulin in am, less so at lunch or dinner
- Usually does not require hs dosing unless large hs snack
- Works well with / without long acting insulin

What about those residents who eat sometimes and not other?

- Use oral agents that are not as likely to cause hypoglycemia when intake is variable
  - Alpha Glucosidase inhibitors, biguanides, DPP-4 inhibitors, thiazolidinediones
- Use in short-acting insulin that can be given after meal, and dose based on intake
  - Insulin glulisine = apidra. Can be dosed <15 min before or <20 min after meals
  - Example: 10 units if >50% intake, 5 units if 50-25%, 0 units if less than 25% (no accucheck needed)
  - Meets surveyor guidance for dose timing
What About Hospice Patients?

• Goal:
  o First, avoid hypoglycemia
  o Second, avoid symptomatic / sustained hyperglycemia - usually about 350
  o Third, liberalize the diet
  o Fourth, re-think treatment of other disease states such as hypertension, hyperlipidemia, smoking

• Example:
Summary

• Know your resident – set person centered goals
• Request a goal Hgb A1C for every resident
• Re-evaluate your diets
• Have protocols that all understand
• Consider a quality improvement project to improve diabetic care – involve all stakeholders
• Get rid of sliding scale insulin for chronic care residents
• Get rid of unneeded accuchecks
• Review regularly

What about this patient? #1

• 90 year old female, has CHF, CRF, moderate dementia, DM with Hgb A1C 6.5, on glyburide and sliding scale insulin (averages 20 units a day), has had 3 episodes of hypoglycemia last month.
  o What is her life expectancy?
  o What should the goal HgbA1C be?
  o Does she need insulin?
  o Are sulfonylureas a good choice?
  o What other agents could she take?
  o How often are accuchecks needed?
What about this patient? #2

- 71 year old male recuperating from 1st stroke, making good progress to being independent at home. Has history of:
  - HTN (BP 150/88) on HCTZ
  - hyperlipidemia (LDL 140, HDL 42) on no Rx
  - newly diagnosed DM with HgbA1C 7.5
- What is his longevity projected to be?
- What should the goal HgbA1C be?
- What diabetic medications are reasonable?
- How often should accuchecks be done?
- What else needs attention?

How about this patient? #3

- 80 year old female with mild dementia, HTN, and DM with HgbA1C 7.2, sliding scale insulin (total 52 units a day), eats great in the morning, little at dinner, hypoglycemia 2xmonth at hs
  - What is her longevity?
  - What should her goal HgbA1C be?
  - What other regiments could be good for her?
  - How many accuchecks a day does she need?
What about this patient? #4

- 82 year old female with end stage dementia, dysphagia, pureed diet / thickened liquids only, episodic pneumonia, family refuses hospice but accepts a OHDNR status, wants DM treated. Current HgbA1C 8, on sliding scale insulin due to highly variable intake (average 18 units a day, ranges 6 to 30 units a day)
  - Longevity?
  - Goal HgbA1C
  - Alternatives to current sliding scale insulin?
  - Number if accuchecks a day
  - Anything else?