Impact and Management of Hypoglycemia in LTC Residents

Speakers

Naushira Pandya M.D., CMD, FACP,
Professor and Chair, Department of Geriatrics
Nova Southeastern University College of Osteopathic Medicine, FT. Lauderdale, FL

Debbie Afasano BSN, CDONA, HCRM, CIC
VP of Clinical Operations
Avante Group

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• N. Pandya has no financial disclosures
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Objectives

1. Definition of hypoglycemia
2. Causes of hypoglycemia; diabetes and non-diabetes related
3. Recognition and treatment of hypoglycemia
4. Clinical impact of hypoglycemia
5. Evaluation of patients with recurrent hypoglycemia
6. Interprofessional approach to the patient with hypoglycemia in the PA/LTC setting

Definition

• Patients with diabetes
  – all episodes of an abnormally low plasma glucose concentration (with or without symptoms) that expose the individual to harm
  – concerned about the possibility of hypoglycemia at a self-monitored blood glucose (SMBG) level ≤70 mg/dL (3.9 mmol/L)

Definition.....

• Patients without diabetes
  – presence of a hypoglycemic disorder cannot be diagnosed with confidence solely on the basis of a low plasma glucose concentration
  – symptoms may be highly suggestive of hypoglycemia, they cannot be ascribed to hypoglycemia with confidence unless the plasma glucose concentration is low at the same time, and the symptoms are relieved when it is raised (Whipple’s Triad)
  – However, severely depressed plasma glucose concentrations (<40 mg/dL [2.2 mmol/L]) in the absence of symptoms should not be ignored.
**Whipple's triad (1938)**

- Recognize that the patient’s symptoms could be caused by hypoglycemia
- Document that the patient’s plasma glucose concentration is low when the symptoms are present
- Demonstrate that the symptoms are relieved by correction of the hypoglycemia by administration of glucose or glucagon

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**Prevalence of Hypoglycemia in PA/LTC**

- Serious hypoglycemic episodes requiring hospitalization occurred in only 1% of studied residents in US facilities. (Feldman et al. JAMDA 0:5 (2009))
- 2 of 47 frail patients in a 1988 study. (Mooradian et al. JAGS 36:5, 1988)
- Italian DIMORA study. (Abbatecola et al. JAMDA April 2015, 16:4)
  - 2258 patients with type 2 diabetes, mean age 82 (dementia = 1138, no dementia = 1120)
  - Severe hypoglycemia was more prevalent in patients with dementia (18%) compared with patients without dementia (8%)
  - Long-acting insulin analogs associated with reduced hypoglycemia, vs sulfonylureas/metformin combination

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**Causes of hypoglycemia in adults**

- Ill or medicated individual
- Seemingly well individual
Ill or medicated individual

1. Drugs
   - Insulin or insulin secretagogue
   - Alcohol
   - Others

2. Critical illnesses
   - Hepatic, renal, or cardiac failure
   - Sepsis (including malaria)
   - Inanition

3. Hormone deficiency
   - Cortisol
   - Glucagon and epinephrine (in insulin-deficient diabetes mellitus)

4. Nonislet cell tumor


Seemingly well individual

5. Endogenous hyperinsulinism
   - Insulinoma
   - Functional beta cell disorders (nesidioblastosis)
   - Noninsulinoma pancreatogenous hypoglycemia
   - Post gastric bypass hypoglycemia
   - Insulin autoimmune hypoglycemia
   - Antibody to insulin
   - Antibody to insulin receptor
   - Insulin secretagogue

6. Accidental, surreptitious, or malicious hypoglycemia


Other Risk Factors For Severe Hypoglycemia in the Elderly

- 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
- Unusual increase in exercise
- Loss of normal counter-regulation

Chelliah. Drugs aging 2004:21
Drugs other than antihyperglycemic agents and alcohol reported to cause hypoglycemia

- **Moderate quality of evidence**
  - Gatifloxacin
  - Pentamidine
  - Quinine
  - Indomethacin
  - Glucagon (during endoscopy)

- **Low quality of evidence**
  - IGF-I
  - Lithium
  - Propoxyphene/dextropropoxyphene


Risk Factors for Insulin-Induced Hypoglycemia in Patients with Diabetes

**Decreased glucose intake**
- Missed or partially consumed meals
- Fasting
- Gastroparesis with delayed carbohydrate absorption

**Delayed insulin clearance, erratic insulin absorption**
- Insulin injection in hypertrophic sites (no site rotation)
- Renal insufficiency or renal failure

**Increased insulin sensitivity**
- Intensive insulin therapy (e.g., basal-prandial + SSI)
- Increased level of physical activity
- Weight loss

Chelliah. Drugs aging 2004:21

Risk Factors for Insulin-Induced Hypoglycemia in Patients with Diabetes

**Insulin administration problems**
- Frequent use of sliding-scale insulin
- Improper timing of insulin relative to timing of food intake
- Inappropriately tight blood glucose control
- Injection of wrong type of insulin (e.g., rapid acting instead of long acting)
- Unawareness of hypoglycemia (resulting from failure of sympatgo-adrenal activation)

Chelliah. Drugs aging 2004:21
Possible Symptoms and Signs of Hypoglycemia in Frail Elderly Patients

- **Neuroglycopenia**
  - Altered behavior and mentation
  - Altered level of consciousness
  - Confusion or disorientation
  - Generalized weakness
  - Poor concentration and coordination (Falls)
  - Seizures
  - Stroke

- **Autonomic**
  - Hunger
  - Increased or prolonged sweating
  - Irritability/nervousness
  - Tachycardia/palpitations
  - Pallor
  - Parasthesias

Diabetes Management in the Post-Acute and Long-Term Care Setting: AMDA 2015

Impact of Hypoglycemia in the Elderly

- Hypoglycemia can worsen neuropathic pain
- Likelihood of falls can increase
- Cognitive impairment increases the likelihood of hypoglycemia
- But hypoglycemia can worsen cognitive impairment

Proportion of patients with clinical outcomes during follow-up according to cognitive function status at baseline

ADVANCE De Galan et al. Diabetologia Nov 2009 52(11)
Hypoglycemic Episodes and Risk of Dementia in Older Patients With Type 2 Diabetes Mellitus

<table>
<thead>
<tr>
<th>No. of Hypoglycemic Episodes</th>
<th>No. of Dementia Cases</th>
<th>Hazard Ratio (95% Confidence Interval)</th>
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<tbody>
<tr>
<td>1 or more</td>
<td>250</td>
<td>1.6 (1.2 – 2.0)</td>
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<tr>
<td>2</td>
<td>57</td>
<td>1.4 (1.1 – 1.8)</td>
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<tr>
<td>3 or more</td>
<td>43</td>
<td>1.2 (0.9 – 1.5)</td>
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<td>Education, Diabetes Treatment</td>
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<tr>
<td>Additional Adjusted for 7</td>
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<td></td>
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<tr>
<td>Years of Insulin Use,</td>
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</tr>
</tbody>
</table>

Conclusions: Hypoglycemic episodes are common in older adults with poor glycemic control. Raising HbA1C goals may not be adequate to prevent hypoglycemia in this population.

Munshi et al. Arch Intern Med. 2011;171(4)
**Evaluation of Hypoglycemia**

- History and physical may reveal the cause (especially if ill)
- Medication review
- Clinical evidence for adrenal insufficiency or non-islet cell tumor should be considered
- If the symptoms occur primarily in the fasting state, that evaluation should be performed during a fast
- If compelling history of postprandial symptoms (5h post meal), it is reasonable to seek Whipple's triad with frequent timed plasma glucose measurements and recording of any symptoms after a mixed meal.

**Patients fortuitously observed during an episode of symptomatic hypoglycemia,**

Should have the following blood tests

- Glucose
- Insulin
- C-peptide
- Beta-hydroxybutyrate (BHOB)
- Proinsulin
- Sulfonylurea and meglitinide screen
The Role of Staff and Facility Processes of Care

Nutritional Assessment

- Promote Choice:
- "Real Food" alternatives with nutritional value in a person centered culture.
- Acknowledge Lifelong habits
- Replace supplements with preferences
- Seasoning and Food Preparation
- Central Dining Room Experience
- Address Mobility issues/access
- Dentition and oral health
- AGS, AMDA and the American Society of Dietetics and Nutrition recommend regular diet for elders in institutions

Shared Vision:

1. Therapeutic diets are a frequent causes of weight loss in the LTC setting
2. They are not palatable and are poorly accepted.
3. The use of therapeutic diets, including low-salt, low-fat, and sugar-restricted diets, should be minimized
New Dining Practice Standards

Oral Care and Assessment
- Oral health problems can lower the resident's quality of life.
- Good oral hygiene and blood sugar control can reduce these risks.
- Teach nursing assistants to provide daily mouth care and why!
- Report: Thrush/white or red patches that can turn into sores or ulcers, pain, swelling, redness and sensitivity to hot, cold or sweets, bad breath; Inform of who is on antibiotics
- Dry mouth may be caused by high blood pressure, medication side effects,
- Poor oral health can reduce intake and increase (if gingival infection or inflammation) or decrease BG!

Keep Staff Engaged
- Monitor food intake daily.
- Report inadequate intake or change in the usual intake
  - Check intake and output more closely with blood sugars fluctuation or if medicines are modified.
  - Carbohydrate replacement if resident is not eating as usual.
  - Monitor for weight changes monthly or more frequently with changes in resident’s condition.
  - Weight changes can = problems with blood sugar control. BG can be too low or too high
  - Report evidence of unintended weight loss.
  - Consider swallowing problems for observed symptoms with eating/drinking and poor intake
Teach Staff to Be Aware and Beware!

- With a long history of diabetes and intense insulin regimens, less intense hypoglycemic symptoms may occur (hypoglycemic unawareness).
- Some residents may be unable to perceive or communicate symptoms.
- Hypoglycemia can occur without symptoms, so it is important to have a process to check blood glucose levels.
- Review/adjust insulin or other hypoglycemic agent doses if weight loss is present.

Stop and Watch
Early Warning Tool

If you have identified a change while caring for or observing a resident, please **diagnose** the change and notify a nurse. Either give the nurse a copy of this tool or review it with her/him as soon as you can.

- Seeks different than usual
- Talks or communicates less
- Overall needs more help
- Pain – new or worsening: Participated less in activities
- Atle less
- No bowel movement in 3 days; or diarrhea
- Drank less
- Weight change
- Agitated or nervous more than usual
- Tired, weak, confused, or drowsy
- Change in skin color or condition
- Help with walking, transferring, toileting more than usual

Influencing Care

- Reporting systems: 24 hour report and Stop and watch
- SBAR and Physician Notification
- Managing physician orders, Labs and Medication Management
- Quality Measures and 5 STAR analysis
- Assessment and Care planning QIS Interviews and Tools for QAA
- Managing the Environment of Care (Resident Rooms, Dining Room Observation, Environmental Observation, Infection Control, Kitchen, etc.)
Promote Clinical Consistency

- Safe Transitions of Care
- Across shifts (Rounding and reporting tools)
- 7 days a week
- Across team roles and responsibilities: C.N.A. > L.P.N. > R.N.> MD/Extender
- Standardized reporting expectations
- Resources: Lippincott, AMDA/FMDA, (Know Before You Call) INTERACT: SBAR, Stop and Watch,

Hand Off Appropriately

Managers create the master sheet in am and give to each nurse
The sheet could be prepared as preprinted table with names, diagnoses.
This could be the work sheet for the day after the morning meeting for the managers
The same sheet could be passes on from shift to shift till the next morning
Check off completed tasks
Prepared by N. Pandya MD, CMD, FACP.

Whiteboard Targets

- Newly admitted residents
- Admissions Scrub and Initial Care Plan
- Unplanned re hospitalizations (PCC, Interact QI RCA; )
- ERMA/Incidents –care plan updated; documentation every shift for 72 hours.
- Acute Changes in Condition: 24 hour report, VS report
- Advanced Care Planning Needs
- List of RADAR Residents (top ten); update every Monday. Include in QOC Review
- Appointments – Date/ Time, RP notification, Transport
- Referrals e.g. Hospice, therapy, other
Prior to the morning meeting the DON/designee and team will round on each unit.

The focus is facility and resident safety, daily priorities, staffing, and supplies and equipment.

Determine who will be seen on post meeting focused rounds (such as post falls, acute changes in status, new admissions.)

Target: Who needs more than a drive by!

Use White Board Targets, Rounds, and Documentation Tool

Schedule QOC reviews daily (advance schedule by DON)
Process Check For:

- Emergency Cart
- Lab Tracking
- Diabetic Log
- Physician Call Back Log
- Pending Medication Log/EDK
- Supplies/Equipment Needs
- Staff Posting/Needs
- Shift Report/Rounds report
- Other?

Quality Checks: Preparation of Equipment

- When using a blood glucose monitor, calibrate it and run a quality-control test following the manufacturer's instructions to ensure accurate test results.
- Most healthcare facility–based glucose monitors undergo quality-control testing every 24 hours.
- Ensure annual competency, quality control in place per QAA

Ensure that the code strip number on the test strip matches the code number on the monitor.

Process Check For Glucose Testing From Lippincott

- If you obtain an extremely high or low blood glucose level on the glucose monitor, retest the resident.
- If the result is the same, obtain a serum blood glucose level immediately to confirm the result according to facility protocol
- If the resident exhibits signs of hypoglycemia, or extreme hyperglycemia, treat immediately
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
  - 1 tablespoon sugar or honey
  - 3 glucose tablets, 3 marshmallows
  - 1 mini candy bar
- 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
- Snack with protein if long-acting medication has caused hypoglycemia or next meal is >1 h away

Treatment in an Obtunded or Unconscious Patient

- Glucagon 1mg or 1 Unit im or sc (peak effect in 25-30 min)
- 50% iv dextrose (25-50 ml depending on severity of hypoglycemia)
- Give oral carbohydrates when pt is alert
- ER transfer may be prevented
  - CAUTION: glucagon may be less effective in pts with chronic or recurrent hypoglycemia, or chronic liver disease

Resources

- Guidelines for Improving Care of the older person with diabetes AM J Geriatric Soc 51(2003): S265-S280
- Diabetic Management in LTC Facilities, 6th Edition; ltcdiabetesguide.org
- Oral Health Care for Older Adults www.nohic.nidcr.nih.gov
- Working with Your Older Patient, a clinician's handbook www.nia.nih.gov
- Interact
Discussion