PALLIATIVE PEARLS
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Diabetes Management Case
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Patient Case

BG is a 70 y/o male admitted to hospice today with a primary diagnosis of prostate cancer metastatic to bone. Other diagnoses include anemia, seizures, and history of Type II diabetes. He has no known drug allergies. BG lives at home alone. His wife passed away 2 months ago unexpectedly.

Current medications include:

- MS Contin® 30mg PO BID for pain
- Hydromorphone 2mg PO Q4H as needed for pain
- Dexamethasone 4mg PO BID for bone pain
- Senna-S® 2 tablets PO BID for constipation
- Lorazepam 0.5mg PO Q6H as needed for anxiety
- Levetiracetam 500mg PO BID for seizures
- Tamsulosin 0.4mg PO Daily for the prostate
- Metformin 500mg PO BID for blood sugar
- Glipizide 5mg PO QAM for blood sugar
- Humalog® 10 units subcut AC & HS for blood sugar

BG remains active and requires minimal assistance with ADLs, however, he is concerned about checking his own blood glucose and administering Humalog injections 4 times a day. He states that his wife always took care of both tasks for him and although he is competent in his technique, he is having trouble keeping up and misses 1-2 injections each day. Upon review of BG's personal log prior to his wife's passing, his blood glucose levels averaged 160 mg/dL on his current Humalog and oral hypoglycemic regimen. He hasn't had breakfast yet this morning and when measured, his blood glucose is 370 mg/dL. The only symptom of hyperglycemia BG notes is increased thirst.

How does treating diabetes in hospice differ from non-hospice?[1-3]

Traditionally, diabetes therapy focuses on tight glycemic control in order to decrease the long-term risk of developing microvascular complications such as retinopathy, nephropathy, and neuropathy. It's important to note that the primary benefit of tight glycemic control is only observed after many years of treatment. In the short term, tight glycemic control increases the risk of hypoglycemia, especially in patients at end of life and is therefore not recommended. Patients enrolled in hospice will experience transitions that affect blood glucose such as medication changes, disease state progression, and oral

intake variability. In addition, patients may no longer show signs of hyperglycemia and glucose lowering medications may no longer be in line with their plan of care.

These changes and the risks that they present should be reviewed with patients and caregivers to explain why the goals of glycemic control change during hospice care. Educating on the signs and symptoms of both hyper- and hypoglycemia is important, especially when considering withdrawing or reducing diabetic medications:

- Hyperglycemia: Polyuria, polydipsia, blurry vision, numbness, tingling, recurrent infections, impaired wound healing[4]
- Hypoglycemia: Headache, confusion, dizziness, personality changes, fatigue, weakness, tiredness, sweating, shakiness, anxiety, high heart rate[5]

How does patient prognosis affect glycemic goals?[6,7]

Advanced disease and relatively stable - Several months to a year life expectancy: Medication regimens may not change at this point, however, dosing should reflect the goal of avoiding hypoglycemia and should be less intense and tailored based on oral intake. Hyperglycemia may not be a concern, but being familiar with the signs and symptoms will assist in maintaining a **target fasting glucose of ≤ 180 mg/dL.**

Impending death (i.e., organ failure or limited oral intake) - Several weeks or less life expectancy: Patients in this stage often have organ failure and limited oral food intake. Medication regimens should be adjusted accordingly since the primary goal is avoiding hypoglycemia. Decreasing or stopping insulin and sulfonylurea meds is recommended and the **target fasting glucose should be > 180 mg/dL.**

Actively dying (i.e., multiple organ system failures, end of life symptoms such as agonal respirations) - Life expectancy is usually hours to days: Primary focus is patient comfort and glycemic control is not a priority.

- Type I diabetes: **Target should be liberal (i.e., <360 mg/dL)** and insulin continued only if patient is prone to diabetic ketoacidosis (DKA)
- Type II diabetes: All insulin and oral hypoglycemics should be stopped

How should insulin be adapted for patients with advanced disease?

Avoiding hypoglycemia requires familiarity with the patient's daily oral intake and understanding of the insulin's onset of action, peak (when insulin is at its highest glucose lowering effect) and duration of effect. There are a variety of insulin products marketed:

Rapid-acting

- **Onset:** within 10 to 30 minutes; **Peak:** within 30 to 50 minutes; **Duration:** average 3 to 6 hours[7,9,10]
- Products: Humalog® (insulin lispro), NovoLog® (insulin aspart), Apidra® (insulin glulisine)
- Appropriate for patients with sporadic eating habits or those that miss meals due to nausea and/or vomiting or anorexia who have the capacity to administer frequent injections independently or with supportive caregivers in home. Sliding scales should be reserved for those able to measure blood glucose regularly throughout the day and are confident in adjusting doses independently. May be administered right before or during a meal.

Short-acting (i.e., Regular insulin)

- **Onset:** 30 minutes; **Peak:** 1 to 3 hours; **Duration:** average 8 hours[8-10]
- Products: Human insulin (rDNA origin) (Humulin® R, Novolin® R)
- Appropriate for patients with variable oral intake (or in whom oral intake is diminishing) and with capacity to administer frequent injections independently or with support presence in home. Sliding scales should be reserved for those who are able to measure blood glucose regularly throughout the day and are confident in adjusting doses independently.

Intermediate-acting (i.e., NPH)

- **Onset:** within 1 to 2 hours; **Peak:** 3 to 13 hours; **Duration:** average 16 to 24 hours[8-10]
- Products: Human (rDNA) isophane suspension (Humulin® N, Novolin® N)
- Appropriate for patients with a history of glucose control on rapid-acting or short-acting insulins that maintain capacity to administer 2 injections per day independently or with supportive presence in home. Oral intake should be stable in these patients.

Long-acting

- **Onset:** within 1 to 2 hours (Toujeo®: over 6 hours); **Peak:** No peak; **Duration:** 24 hours[8-10]
- Products: Lantus® (insulin glargine), Levemir® (insulin detemir), Toujeo® (insulin glargine)
- Long-acting insulin may cause less hypoglycemia as it has no significant peak effect. Appropriate for patients with a history of glucose control on rapid-, short- or intermediate-acting insulins that maintain the capacity to administer 1 injection per day independently or with support presence in home. Oral intake should be stable in these patients.

Ultra long-acting

- **Onset:** within 30 to 90 minutes; **Peak:** 12 hours; **Duration:** 42 hours[9,10]

- Products: Tresiba® (insulin degludec)
- Place in therapy for hospice patients has not been established.

Insulin mixtures

- **Onset:** within 30 minutes; **Peak:** mean 2 to 4 hours; **Duration:** up to 24 hours[9,10]
- Products: NovoLog Mix® 70/30, Humalog Mix® 75/25, Humalog Mix® 50/50, Humulin® 70/30, Novolin® 70/30
- Insulin mixtures are typically initiated in treatment-naïve patients. Patients on hospice may be maintained on these therapies while stable, however, it is a rare occurrence to convert other insulin therapies into an insulin mixture regimen.

Pharmacist Assessment:

BG is in stable condition, eating regular meals and continues to be capable of administering his own injections and testing his blood sugar, however, the 4-times-per-day Humalog regimen is becoming burdensome and adherence to the regimen is difficult. His blood glucose prior to his wife's passing was at target for his stage in hospice care. Missing 1-2 of his 4 Humalog injections per day over the past 2 months contributed to his high blood sugar this morning. Symptom of thirst indicates dehydration and/or polydipsia, which is a symptom of hyperglycemia. BG takes his current oral hypoglycemics, metformin and glipizide, with no issue.

BG is a candidate for switching to intermediate-acting or long-acting insulin therapy. Fewer injections each day can improve compliance. Long-acting insulin may be the better fit as it has no significant peak effect and thus places BG at less risk for hypoglycemia.

Recommended insulin conversion

Stepwise approach converting Humalog to NPH, then NPH to Lantus:[10-11]

1. Convert Humalog (rapid-acting) to Insulin, regular (short-acting)
    - Convert unit-per-unit: Humalog 10 units AC & HS = 40 units/day = 40 units of Insulin, regular/day
2. Convert Insulin, regular to Insulin, NPH (intermediate-acting)
    - Convert unit-per-unit: 40 units of Insulin, regular/day = 40 units insulin, NPH/day
    - Insulin, NPH 20 units in the morning and 20 units subcut 12 hours later
3. Trial regimen of Insulin, NPH and monitor for opportunities to adjust

4. When glucose at target, consider conversion from Insulin, NPH to Lantus (long-acting)

- The total daily dose of NPH insulin should be reduced by 20% and administered as single dose of Lantus once daily

For additional information on this topic, please review these references:

Enclara Pharmacia's On Demand Educational Webinar, "Type II Diabetes in Hospice: Focusing on the Patient not the Disease". Click here to log in.

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11. PL Detail-Document, How to Switch Insulin Products. Pharmacist's Letter/Prescriber's Letter. June 2014.

