Interactive Diabetes and Endocrinology Emergencies Cases

1. A 75-year-old male with a past medical history of diabetes mellitus and chronic kidney disease (CKD) presents overnight with altered mental status and acute kidney injury. Upon arrival, his blood sugar is 200. His home insulin dose of 15 units “70/30” Novolin BID is ordered with a “now” dose. The patient receives 15 units upon arrival. Two hours later, his AM dose is due, and he receives another 15 units plus sliding scale insulin per protocol for a blood sugar of 179. Two hours later a rapid response is called as patient is found unresponsive and with a blood sugar of 35.
    a. What factors contributed to this patient’s hypoglycemic event?
    b. What is the complication from using pre-mixed insulins on admission to the hospital?
    c. The patient’s admission weight is 75 kg. Calculate the appropriate admission insulin regimen keeping in mind the patient’s co-morbidities.
    d. The patient is NPO given his altered mental status. What should you do now with his insulin regimen?
2. A 19-year-old female presents with DKA. She is appropriately placed on IV insulin infusion with intravenous fluids. Twelve hours later, her anion gap has closed, and her blood sugars are ranging between 150 and 200 mg/dl. She is ready for conversion to subcutaneous insulin.
    a. The average hourly rate is 2 units/hour over the last 8 hours and the patient has been eating. Calculate the 24-hour insulin requirement. Calculate the appropriate basal-bolus insulin dosing.
    b. How soon after giving long-acting insulin should the insulin gtt be turned off?
3. A 65-year-old morbidly obese female with type II diabetes mellitus, COPD, systolic heart failure and CKD stage 3a presents with an acute COPD exacerbation. She takes U-500 insulin as an outpatient but is not always compliant. Her last A1C was 10.5%. Her blood glucose on admission is 325 mg/dl. She received 125 mg IV solu-medrol in the Emergency Department. Her labs are within normal limits except for her blood glucose.
    a. Should her U-500 insulin be held on admission?
    b. Calculate her basal-bolus insulin dosing regimen based on an admission weight of 112 kg keeping in mind her medical co-morbidities.
    c. Two days into the patient’s hospital admission, her blood glucose levels have been consistently > 200 mg/dL. Re-calculate her insulin dosing.
    d. She is improved and ready for discharge home. What additional medications would be indicated? What else should be in place prior to discharge?
4. A 47-year-old diabetic male presents with fever, nausea, vomiting and right leg pain. He is found to have right lower extremity cellulitis and is admitted to the hospital. Admission labs are as follows: blood glucose 200,

1. https://www.endocrine.org/clinical-practice-guidelines/glucocorticoid-induced-adrenal-insufficiency. Accessed 24 July 2024.
2. Pokhrel B, Aiman W, Bhusal K. Thyroid Storm. [Updated 2022 Oct 6]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK448095/
3. Society of Hospital Medicine, Stepwise Approach to Managing Inpatient Hyperglycemia. https://www.hospitalmedicine.org/globalassets/clinical-topics/clinical-pdf/gcmi-guide-m4.pdf. Accessed 24 July 2024.

sodium 134, bicarbonate 15, chloride 95, K 3.5, albumin 3.5, UA shows ketones. He is on 20 units of Lantus QHS and Jardiance was recently started about 1 month ago.

a. What is this patient's anion gap? What additional testing might you want to order? What is the most likely diagnosis?
b. How do you treat the above condition?

5. A 50 year old female with history of rheumatoid arthritis amidst a flare presents with cough, dyspnea, dizziness, joint and muscle aches, and nausea/vomiting/abdominal pain. Her BP is 75/45 and her temperature is 101.1 F upon presentation. Labs are significant for Na 129, K 5.2, and glucose of 68. COVID-19 testing is positive. She is started on appropriate treatment for COVID. She is given intravenous fluids, however, her BP only improves to 84/52. She has not been able to keep down any medications.
    a. What is the emergent treatment for her current condition?
    b. What dose of steroids and for how long is considered at risk for the above condition?
    c. What precautions should be given upon discharge?
6. A 32-year-old female with no medical history presents to the emergency department with fever of 104 degrees. She is delirious and no further history can be obtained from the patient, however, her family states that she has been complaining of a tremor and profuse sweating over the past few days. They've also noticed a change in her eyes over the last few months, which now "bug out". She gave birth 2 weeks ago. Vital signs are significant for heart rate of 140 BPM, BP of 91/43. Physical exam is significant for exophthalmos, jaundice, and pedal edema. On lung exam, you auscultate rales bilaterally. Labs with AST of 493 and ALT of 390, total bilirubin of 3.5. EKG shows atrial fibrillation. CXR shows pulmonary edema.
    a. What is the most likely diagnosis?
    b. What lab tests should you order?
    c. What are the best treatments in the appropriate order?

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Answers:

Question 1:

- 1a. Novolin 70/30 has an onset of approximately 30-60 minutes and peaks in 2 to 10 hours. His insulin dosing has "stacked" leaving him hypoglycemic 2 hours after his second dose of 70/30. He has AKI on CKD, altering insulin metabolism.
- 1b. 75 kg x 0.2 units/kg = 15 units TDD; 15 / 2 = 7.5 basal and 7.5 mealtime. 7.5 / 3 = 2.5 units short-acting per meal. Use sliding scale with lowest correction factor.
- 1c. Hold mealtime insulin. Still give 7.5 units basal insulin and SSI.

Question 2:

- 2a. 2 units/hr x 24 hours = 48 units. 48 x 0.6-0.8 = 28- 38 units of insulin. Can be used as TDD vs. Basal.
- 2b. Insulin gtt can be turned off 1 hour after rapid-acting or regular insulin and 2-3 hours after intermediate or long-acting.

Question 3:

- 3a. Yes, unless you consult Endocrinology at admission.
- 3b. 112 kg x 0.6 units/kg = 67.2 units TDD; 67.2 / 2 = 33.6 units basal and 33.6 units mealtime; 33.6 / 3 = 11.2 units for meals
- 3c. Increase dosing by 10-20%. 74 units is increase by 10% of TDD. 74 / 2 = 37 units basal and 37 units mealtime; 37 / 3 = 12
- 3d. Adding an SGLT2 inhibitor would be indicated (CKD, HF). Ensuring she has DM provider identified, all her insulin supplies, sick day management plans, DM education, nutrition consult. Initiate oral anti-diabetics 1-2 days prior to discharge.

Question 4:

- 4a. AG = 25 when corrected for albumin. ABG to check pH. Diagnosis = Euglycemic DKA.
- 4b. Hold Jardiance. Fluids + dextrose, electrolyte replacement, insulin gtt until gap closes.

Question 5:

- 5a. Adrenal crisis; 100 mg IV hydrocortisone x 1, then 200 mg hydrocortisone/24 h continuous infusion, intravenous fluids in 5% dextrose; follow electrolytes frequently
- 5b. Duration: 3-4 weeks or greater; dose: hydrocortisone 15-25 mg equivalent (4-6 mg prednisone)

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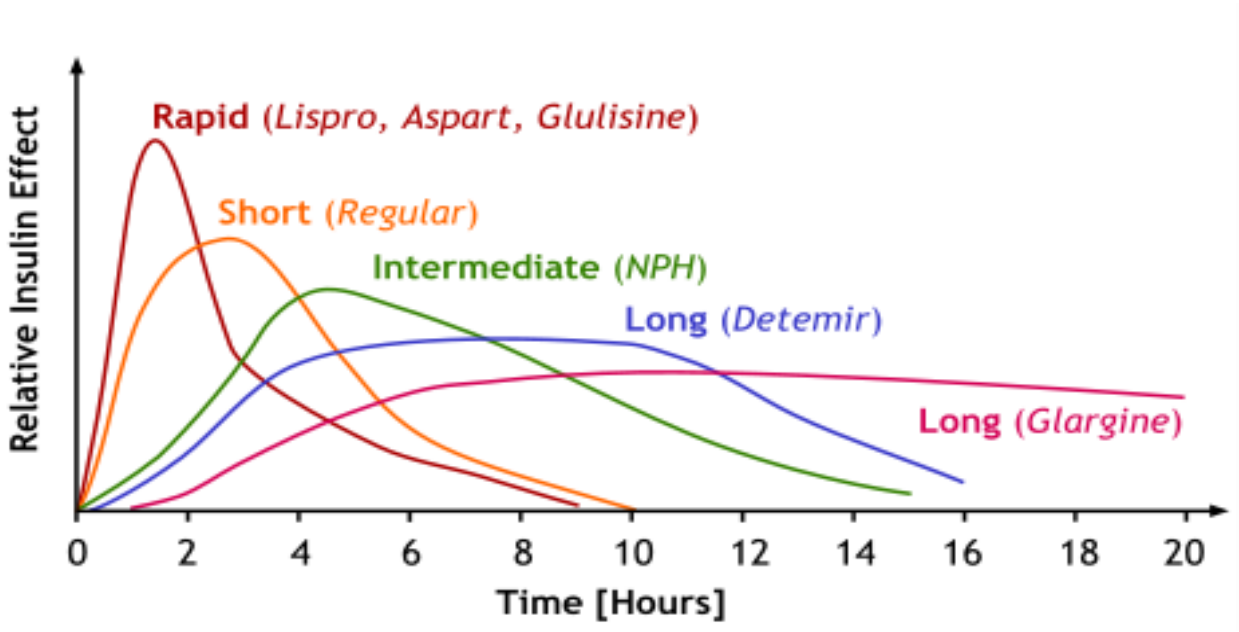
- 5c. Sick day precautions.

Question 6:

- 6a. Thyroid storm/thyrotoxicosis
- 6b. TSH, total T3, free T4
- 6c. Propranolol 40 to 80 mg q6h, Propylthiouracil (PTU) 500 to 1000 mg followed by 250 mg q4h or Methimazole 20 mg every 4 to 6 hours (MMI for long-term), SSKI, hydrocortisone 100 mg IV q8h, consideration to RAI, thyroidectomy, ATD's.

How to estimate total daily dose (TDD) insulin based on medical co-morbidities:

- Malnourished, elderly, CKD, ESRD, ESLD – 0.2-0.3 units/kg
- Normal-weight patients, incl. Type I DM – 0.4 units/kg
- Overweight – 0.5 units/kg
- Obese, high-dose steroids, insulin resistance – 0.6 units/kg



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