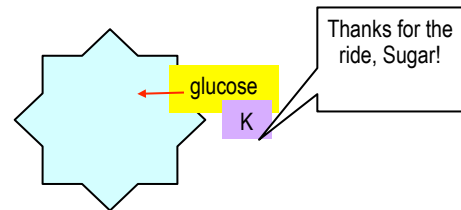


IV Therapy - Office Hours 4/27/09

Random facts

- If you bring the serum Na up too quickly, the Na will act as an osmotic agent to draw water out of the cell. This will DEHYDRATE your patient. A rate of 50ml/hr is “pretty slow”, so this would be OK. A rate of 200ml/hr is “really fast.”
- If your pt is NPO, look at how long they have been NPO and what type of IV fluid she's been receiving. Most healthy pts can go up to 5 days or so NPO with no big problems.
- Glucose/18 (the glucose level divided by 18) will equal the serum tonicity telling you what the osmolarity of the serum is.
- Na goes down when sugar goes up. The sugar in the blood stream acts as an osmotic agent and will pull water into the cell. The hypothalamus senses dehydration and makes the pt VERY thirsty so they'll drink a lot of water and secrete ADH. This will cause the serum Na to drop!
- Every 100 increase in glucose cause the Na to drop by 2. The reverse is also true, so if you start with a BS of 1000 and a sodium of 130, by the time the BS is at 200, the Na will be at 146...so you wouldn't want to give this pt Na...by treating the sugar problem you will correct the Na problem.
- For hyponatremia, the pt will be symptomatic at around Na of 120.
- When you are considering your IV therapy think about three things...the salt, the sugar and the rate.
- When glucose goes into the cell, K enters also!



Q: A pt is admitted with DKA. The first priority is to:

A: Give NS

Rtnle: The high BS involved with DKA is pulling the water out of the cells so the pt is extremely dehydrated. Remember that the kidneys can “handle” any BS up to about 250, so a PT in DKA is going to have glucose spilling over into the urine. The urine is now highly osmolar and is also going to pull water with it contributing to the dehydration. When a pt is this dehydrated your first priority is to replace fluid with NA. But wait, why wouldn't you want to give a hypotonic solution? When BS is really high, it's not always the case that the blood is hypertonic b/c the hypothalamus will sense the sugar levels and trigger the thirst center and the release of ADH...this means that a pt with DKA will have low Na. You do not want to give a hypotonic solution b/c this would not be enough Na!

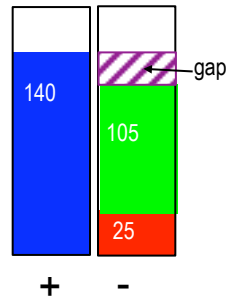
Q: Six hours into treatment of a pt with DKA by continuous IV insulin infusion the following labs are returned: Na 131 (135-145), K 3.7 (3.5-5), Cl 102 (95-108), HCO₃ 22 (22-26), glucose 170. The nurse should...

A: Give SubQ insulin and d/c the insulin drip.

Rtnle: Look at the anion gap...this will essentially tell you if the body is producing ketones. The body produces ketones when it has no sugar available for energy and has to burn fat instead. When the anion gap is “closed”, it means that the ketone issue is resolved and that the body is now able to use sugar (so the sugar is getting into the cell where it is needed.)

Here's how to calculate the anion gap:

Let's say you have a Na level of 140, a Chloride level of 105 and a HCO₃ level of 25.



A normal value for this gap is <10 . This gap is 20 so it is too big! Ketones are negatively charged (as are Cl and HCO_3). If there is an anion gap, then we know there is “something” negatively charged (anion) that we’re not testing with the lab panel. This negatively charged “something” is usually ketones in a diabetic pt, but can also be lactic acid in other situations.

In the pt in question, the anion gap is 7, so it is considered “closed” and the ketone issue is resolved, meaning the DKA has been successfully treated. The next step is to convert the pt to the normal routine for diabetes management, which is SubQ insulin... we will give the SubQ insulin and leave the drip running while it takes affect. We will then d/c the insulin drip.

- Q: A malnourished pt is admitted with a serum calcium of 7.5 (8.5-10.5). Which is the priority?
 A: Check serum albumin
 Ratnle: When you measure calcium you are getting the value for ALL the calcium in the blood. However, not all Ca is created equal. Most of the serum calcium is bound to proteins and some of it is free. We care more about the free/unbound Ca. Calcium is the most abundant mineral in the body, accounting for approx 40% of all body minerals. Most is located in the bone, and 1% is in the plasma and cells. The plasma calcium is found in three forms: free (ionized), protein-bound (bound to albumin) and complexed with phosphate, citrate or carbonate. In the plasma, half is bound to plasma proteins, 10% is complexed with another electrolyte and approximately 40% is free/ionized. The ionized form is the biologically active form that performs major physiologic fns.

When a pt has a high Ca level and a low albumin, a correction factor is used to calculate the true calcium value, but I don’t think we’re getting into that in this class...maybe next semester.

The fact that Ca is bound to proteins is important to consider when caring for a patient who has low albumin, because less calcium will be protein bound, which causes a false low reading. With hypoalbumenia the serum Ca may be low, but this does not necessarily indicate a decrease in biologically available calcium...rather, it reflects that there is less protein available to bind with Ca. The lab serum Ca measures both bound and unbound/free/ionized.

Now, you may be asking yourself, “Self, how long can a pt be NPO before they start to get into trouble?” Well, it depends. If the pt is healthy then they can go about 5 days without any ill effects. However, if the pt is sickly, they will need nutrition sooner. If the gut does not work, you will want to consider TPN which is a hypertonic sln. Because it is hypertonic it can’t go in a peripheral vein (the tonicity would dehydrate the surrounding cells, causing them to become “sticky” and the platelets would aggregate there leading to thrombophlebitis). You will put a PICC or central line in for TPN.

- Q: Following a thyroidectomy, the nurse assesses for complications related to damage or removal of the parathyroid gland. Which should the nurse assess for?
 A: Numbness around mouth
 Ratnle: The parathyroid is likely to be damaged when the thyroid is removed due to its location right next door to the thyroid. Note that the parathyroid has something to do with calcium in the body. Even if that’s all you know, you can probably figure out this question. If the parathyroid is damaged, you would look for signs of hypocalcemia. From N-16 you learned that you could flick someone in the cheek to check for hypocalcemia, so maybe that applies here. Yes, it does! A sign that the parathyroid has been damaged is numbness around the mouth...see how clever you are!

Q: On POD#1, a s/p knee arthroscopy pt has LR running at 125 ml/hr. Morning labs include: Hct 30% (down from 38% preop.), Na 141 (135-145), K 5.3 (3.5-5). The pt has pain 3/10 and is nauseated. The nurse should:

A: Change IV to D5½NS at 125 ml/hr.

Rtnle: The pt's K is high, but not "freak out" high. Your options are to give kayexalate, but that takes 24 hours to work...your other option is to give sugar with a hypotonic sln of NS (his Na is fine). The sugar will take the K into the cell where it belongs...what does Pat (Potassium) say to Glenn Close (Glucose)? "Thanks for the ride, Sugar!" ...ok, that might be a stretch 😊