VET 415 Fluid Therapy

How do we classify dehydration in a percentage?

Physical Exam
Skin Turgor: Decreased skin turgor = longer time to return to normal
Mucous Membrane Moisture: Tacky or dry mucous membranes
Body Weight
Eye Position: Sunken in eyes

Laboratory Data
Urine Specific Gravity: >1.030
Low Urine Output: < 1 mL/kg/hr
Elevated PCV and TP
+/- Hypernatremia

Typical Percentages
Mild = 6%
Moderate =9%
Severe = 12%

What factors are included in a fluid plan?

1. Deficit volume (dehydration)
2. Normal ongoing losses (maintenance rate)
3. +/- Abnormal ongoing losses

Rate: Typically 4-6 hours if no cardiac disease present
The larger the deficit, the faster it should be corrected

Determining Deficit Volume

Formula: % dehydration X body weight in kilograms = L of deficit
*% dehydration should be a number between 0.05 and 0.12 (5-12% dehydrated)

Normal Ongoing Losses

Formulas vairy by species
Dogs: 80 X (body weight in kilograms)$^{3/4}$
Cats: 70 X (body weight in kilograms)$^{3/4}$
2-4 mL/kg/hr *most mammalian species **neonates have increased needs

Abnormal Ongoing Losses

*Vomiting, Diarrhea, Polyuria, or Cavitary Effusions
~This number is estimated based on the patient and the presentation
~Some like to estimate it at about half of the normal ongoing losses rate

Calculation Example

Determined dehydration as 10% → 0.1 for a 30kg dog

Deficit: $0.1 (30) = 3L$ or $3000ml$

We want to replace this over 6 hours
*could have also chosen 4

$3000ml / 6hr = 500 ml/hr$

Normal ongoing losses

$80 (30)^{.75} = 1,025.48 ml/day$

$\frac{1,025.48 ml}{1 day} \times \frac{1 day}{24 hr} = 42.73 ml/hr$

Abnormal ongoing losses

Estimated @ 25 ml/hr

Total fluid rate for 6 hours = 567 ml/hr

After the first 6 hours are done you can reassess and then calculate a maintenance rate while still accounting for the abnormal ongoing losses if they are present

6 hours later ~~ reassess

Now we just have to account for the normal ongoing losses and abnormal ongoing losses

Normal losses: $80(30)^{.75} = 42 ml/hr$

Abnormal losses: $25 ml/hr$

Total: 67 ml/hr

Adding Potassium

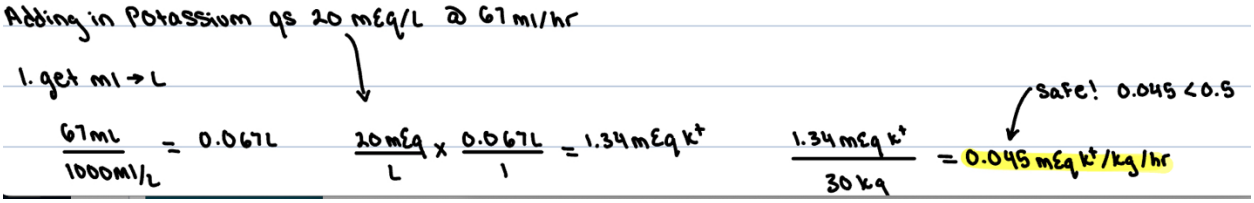
NEVER BOLUS FLUIDS WITH ADDED POTASSIUM!!!!

Maximum safe amount of 0.5mEq/kg/hr

Typically added based on serum K+ levels:

Serum K^+ (mEq/L)	eEq/L KCl of Fluid	mEq/kg/hr @1x maint rate
3.5-5.5	20	0.027
3.0-3.5	30	0.041
2.5-2.9	40	0.054
<2.5	50	0.068

Example of calculating the potassium level using the data from our previous example



Anesthesia Fluids

Traditional Intraoperative Fluid Plan
10mL/kg/hr isotonic crystalloids

*There is a problem with this blanket approach…
- Rates are likely excessive for many patients
- Interstitial edema, impaired O2 exchange and delivery, as well as increased morbidity can be caused by fluid retention
- Not just about the fluid rate, fluid needs are likely to vary during the procedure so timing matters

Should you give a fluid bolus when there is anesthesia-induced hypotension?
*It depends….

Balanced isotonic crystalloids are poor volume expanders and their efficacy as a treatment for anesthesia-induced hypotension is variable. We have to consider the distribution of this fluid and understand that hypovolemia is ONE of many possible causes of hypotension in anesthetized patients

Colloids
- Artificial colloids can maintain (or increase) colloid oncotic pressure so they are a more effective treatment for anesthesia-induced hypotension than crystalloids

Systolic Pressure Variation

- Measured during mechanical ventilation
    - Positive pressure during inspiration
    - Decreased venus return and decreased preload
    - A decreased preload leads to a decreased stroke volume
    - The magnitude of this depends where the patient is at on the Frank-Starling curve
        - If there is undulation in the arterial BP tracing the patient would likely benefit from an increase in fluids

Recap/Current and Future Trends in Fluid Therapy

- Rates lower than in the past (3-5 mL/kg/hr)
- More individualized plans to match the patient's needs in the moment
- Volume AND timing of fluid administration is important