

FLUID THERAPY

Anne Arundel Veterinary Emergency Clinic

Dehydration

a harmful reduction in the amount of water in the body.





OTHER INDICATIONS FOR FLUIDS

Hypovolemia

Renal Failure

Vomiting & Diarrhea

Toxin Decontamination



What is Skin Turgor?

Skin turgor refers to the elasticity of your skin. When you pinch the skin on your arm, for example, it should spring back into place with a second or two.

Having poor skin turgor means it takes longer for your skin to return to its usual position.



IF ALL 3 ARE HIGH, WE DRY

- PACKED CELL VOLUME (PCV)
Tells us how the percentage of blood versus plasma
- TOTAL SOLIDS (TS or TP)
Tells us the concentration of plasma
- URINE SPECIFIC GRAVITY
Tells us the concentration of urine



FLUID COMPARTMENTS

Intracellular

Located within a cell

(For example: Inside RBC)

Extracellular

Located outside of a cell

- Intravascular
(Within Blood Vessels)
- Interstitial
(Within Organs/Tissues)



FRIENDS VS BEST FRIENDS

CRYSTALLOIDS (Friends)

- Small Molecules
- Can enter all body fluid compartments
- After 1 hr, $\frac{2}{3}$ redistributes into interstitial and $\frac{1}{3}$ stays intravascular
- Iso, Hypo, and Hypertonic solutions

COLLOIDS (Best Friends)

- Larger Molecules
- After 1 hr, $\frac{2}{3}$ stay in intravascular space and $\frac{1}{3}$ into interstitial space
- Can last a few hours - few days
- Hetastarch and Blood Products

(Friends tend to stay at the party for a little while and then leave, but your best friends stay longer and are there in times of need. "Call On Your Colloids!")

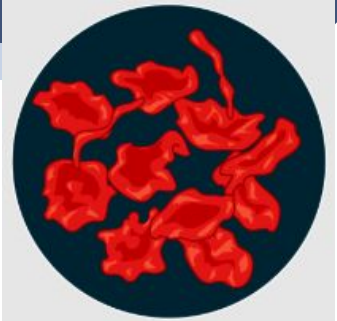


SIPPIN' ON SOME TONIC

TONICITY

Simply put, for our purposes this reflects Na (Sodium) concentration within a solvent (Water)

It affects water balance between intracellular and extracellular fluid.



HYPERTONIC

More salt outside of RBC than water. Water leaves RBC and shrinks the cells.

ISOTONIC

Equal balance of salt and water in and outside of the RBC. Meant to replace fluids lost with no change on size/shape of RBC



HYPOTONIC

More water outside of RBC than inside. Water enters the RBC and causes it to swell. Good for cellular hydration.





FLUID TYPES WE KEEP ON DECK

0.9% NaCl

Isotonic solution

- Flushes
- CRI Dilutions
- Fluid Replacement

Normosol - R

Isotonic Solution

- Primary Fluid Choice For maintenance
- Fluid Resuscitation

3 - 5% NaCl

Hypertonic Solution

- Hyponatremia
- Volume Resuscitation
- Brain Injury

Lactated Ringers

Isotonic Solution

- Not Kept in Our Hospital
- Fluid Resuscitation

0.45% NaCl

Hypotonic Solution

- Hypovolemia
- Cellular Hydration

Dextrose 2.5% - 5%

Hypotonic Solution

- Fluid Replacement
- Hypoglycemia
- Insulin Shock



ROUTES TO GIVE FLUIDS

ORAL

- By Mouth
- Slower
- Less Invasive
- Not great for GI dysfunction

SUBCUTANEOUS

- Under Skin
- Inexpensive
- Takes 6-12 hours
- Great for at home treatments
- NEVER DEXTROSE
- NO PRESSURE BAG

INTRAVENOUS

- In the vein
- Faster
- Need Catheter maintenance
- Not great for giving dextrose over 5% for long periods of time

INTRAOSSEOUS

- In the Bone
- Younger and smaller patients
- Exotics
- Concerns with patient discomfort and maintenance



BASIC EQUIPMENT NEEDED TO START

1. Isotonic Fluid Bag
 2. Primary Administration Set
 3. Extension Set (If on bottom cage or going to surgery)
- Always prime or bleed the line so we don't have any air bubbles.
 - All bags get patient fluid labels printed and stickered.



WHAT IS A BUREtrol?

A type of infusion device that holds limited quantities of IV fluids or medications. Primarily used in smaller patients that are running on slower rates per hour.

This will replace your primary administration set. Always add extension set.





OTHER PRACTICAL USES FOR FLUIDS

- Surgical Maintenance = 10mL/kg/hr if critical/dehydrated otherwise 3-5mL/kg/hr.
- CPR - Because the heart is only functioning at 20% normal we won't give fluids for fear of overload
- To Increase Blood Pressure: Hetastarch Bolus= 5mL/kg
- Hetastarch Maintenance = $20\text{mL} \times \text{kg} \div 24 \text{ hr}$



WATER, WATER, EVERYWHERE!

ABDOMINOCENTESIS

- Removing fluid from the abdomen
- Using a needle
- Extension set
- 3 Way Stopcock
- 30 mL Syringe
- Bowl
- Wear Gloves

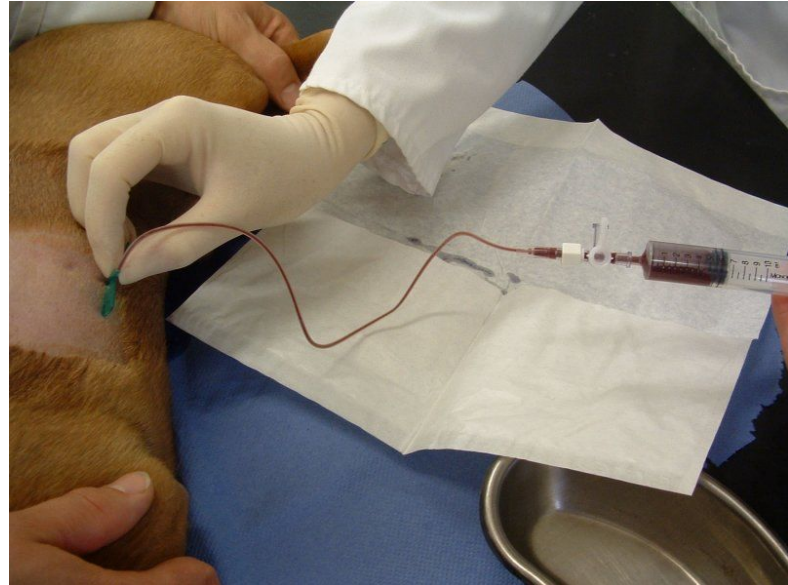




WATER, WATER, EVERYWHERE!

THORACOCENTESIS

- Removing fluid or air from the chest
- Using a needle
- Extension set
- 3 Way Stopcock
- 30 mL Syringe
- Chest Tap Bowl
- Wear Gloves

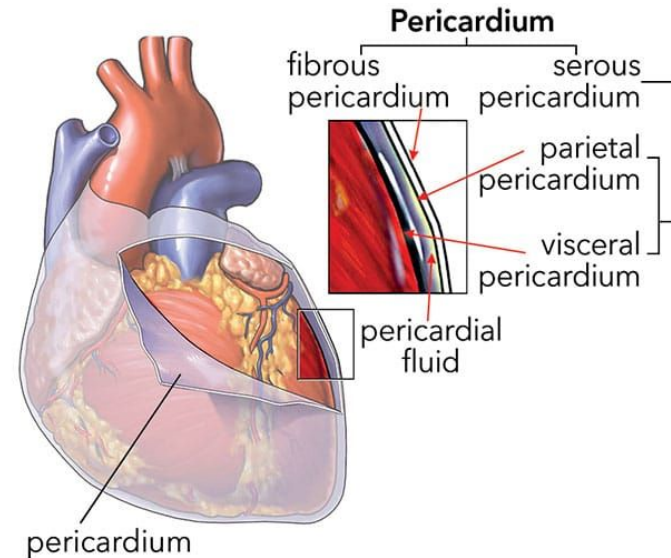




WATER, WATER, EVERYWHERE!

PERICARDIOCENTESIS

- Removing fluid from the pericardium (sac around the heart)
- Using a needle
- Extension set
- 3 Way Stopcock
- 30 mL Syringe
- Chest Tap Bowl
- Wear Gloves





EDEMA VERSUS EFFUSION

EDEMA

Swelling caused by excess fluid trapped in the body's tissues.

You cannot remove fluid by centesis only diuretics

(Think of a sponge full of water)

EFFUSION

An escape of fluid into the body cavity.

You can remove fluid by centesis.

(Think of a bowl of water)



Pumps Only Good for Fluids



Jorvet Infusion

- IV Warmer
- Rate 0.1 - 1200 ml/hr
- LED Screen
- Lights up with Alarms
- Line Runs Top to Bottom



Pumps Only Good for Fluids



Baxter Fluid Pump

- IV Warmer
- Rate 1 - 999 ml/hr
- Has a primary & secondary rate
- Line Runs Top to Bottom



Pumps Only Good for Fluids



Medfusion Syringe Pump

- Syringe sizes 1ml - 60ml
- Can set rate or over set time.



Pumps Only Good for Fluids



Heska Syringe Pumps

- Syringe sizes 1ml - 60ml
- Can set rate or over set time.



Blood Transfusion Pumps



NAMSA Hemolysis Test Report

States that after testing in 2013, they found that vet pro jorvet pumps did not cause hemolysis of packed red blood cells during transfusion.



Let's Do Maintenance Math

Formula : $30 \times \text{Weight in Pounds} \div 24 \text{ hrs} = \text{Maintenance}$

Another way to say "Maintenance" is saying "1XM"

Example: $30 \times 11 \text{ lbs} \div 24 \text{ hrs} = 13.75$ (Round to 14 mls/hr)



Now Let's Adjust the Rate

The doctor asks you to change your maintenance rate to 0.5XM, 1.5XM, 2XM or 3XM.

First you find maintenance and then multiply it by the number the doctor asked to change it to.

Example: If 1XM is 14 mls/hr then

$$0.5 \times 14 = 7 \text{ mls/hr}$$

$$1.5 \times 14 = 21 \text{ mls/hr}$$

$$2 \times 14 = 28 \text{ mls/hr}$$

$$3 \times 14 = 42 \text{ mls/hr}$$



WE NEED IT FAST - SO BOLUS

The doctor might ask you to give a bolus of fluids. This means giving it faster than over an hour. This could be 10, 15, 20 or 30 minutes. The doctor will tell you a set amount to give (this is your volume to be infused - VTBI) and then they will say how many minutes to do it over. This number helps you determine your rate.

Example: Give 200 mls over 20 minutes.

60 minutes ÷ 20 minutes = 3

3 X 200 mls = 600 mls/hr (This is your rate for the bolus)



WE NEED IT FAST - SO BOLUS

BOLUS CHEAT SHEET

Over 10 Minutes = Multiply the VTBI by **6**

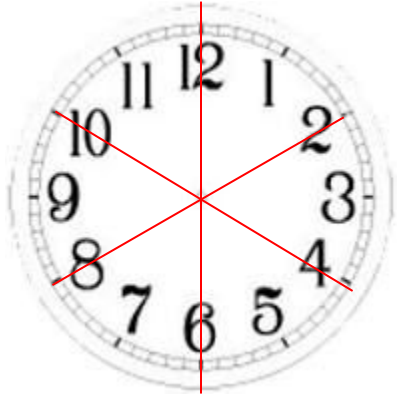
Over 15 Minutes = Multiply the VTBI by **4**

Over 20 Minutes = Multiply the VTBI by **3**

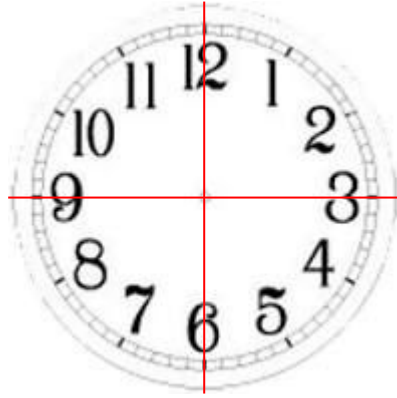
Over 30 Minutes = Multiply the VTBI by **2**



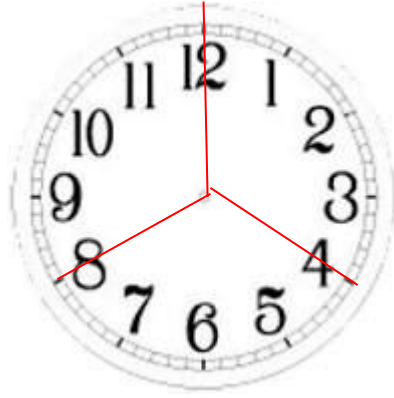
WE NEED IT FAST - SO BOLUS



**Over 10 Mins
Multiply by 6**



**Over 15 Mins
Multiply by 4**



**Over 20 Mins
Multiply by 3**



**Over 30 Mins
Multiply by 2**



PREGUNTAS?

Any questions?

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