Fluid Management Quick Reference:

Crystalloids: Are salty water. To replace volume loss, improve end organ function, replace water and electrolyte deficiencies. Do not forget to consider Oral Rehydration Solution if giving high volumes and they can drink. Does nothing to replace oxygen carrying capacity.

Normal Saline- Unbalanced cations/anions (charge), high volume infusions associated with hyperchloremic acidosis. 0.9% NaCL is good as it has little medication incompatibilities and one liter is safe in most people without predisposing medical conditions.

Hypertonic Saline (HTS)- Unbalanced cations/anions, but hypertonicity good for TBI. Must carefully monitor blood pressure as can rise quickly.

Lactate Ringers-pH neutral (buffered), has medication incompatibilities (avoid with citrate), slightly hypotonic so less ideal with TBI. Since "buffered" more ideal for higher volumes than normal saline.

Plasma-Lyte A- pH neutral (buffered) but slightly alkaline so can increase ph. Isotonic so higher volumes generally OK. Compatible with blood transfusions, but costly and less available. Does nothing to replace oxygen carrying capacity.

Colloids: Expand the circulating blood volume: Does not replace oxygen carrying capacity.

Natural: **Plasma and Freeze-dried plasma** (FDP) is ok for TBI.
Albumin also natural, but **not** ok for TBI.

Synthetic~~: Hydroxyethyl starches (HES) and Hetastarch~~ (**AVOID** these in critical casualties), accumulates in kidneys, causes coagulopathy, associated with worsened patient outcomes.

Whole Blood: This is what you give if someone has lost a lot of blood, increases oxygen carrying capacity. Do not delay evacuation. Requires protocols followed stringently. Warm the blood prior to giving. Use goal directed resuscitation (see below). Minimize risks of whole blood transfusion with attention to detail and avoid mismatch in ABO compatibility. Confirmed Low Titer Type O- is first choice. Assure donor blood has been screened for transmittable diseases beforehand. Don't over fill the bag. Don't forget to give **Calcium** and **TXA** to the casualty while waiting for blood.

- Fresh Blood =up to 6 hours at room temperature after collection before storage
- Warm whole blood = 22 degrees Celsius use within **24 hours**
- For storage purposes keep at 2-6 degrees Celsius after collection.

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Fluid Management Quick Reference:

Goal oriented fluid administration should be your goal.

Monitor urine output: Document urine output every hour. Avoid fluid overload associated with compartment syndrome, acute respiratory distress syndrome and dilutional coagulopathy.

Urine output should be **0.5ml/kg/hr.** (1ml/kg/hr for Rhabdomyolysis)

For hemorrhagic shock BP for Crystalloids and Colloids at **MAP of 55-65** and a BP of 100 for whole blood (110 for TBI).

Hypotensive shock other than hemorrhagic shock: MAP at 40-60 and improving mental status.

REMINDER: MAP = [(2xdiastolic) +systolic] / 3

Maintenance Fluids:

- **1.2L/Day** (50ml/hr)
- If decreased urine output (UOP) > 2 hours **bolus 250ml-500ml** of crystalloid
- **Increase hourly maintenance by 25%**

Children maintenance: To determine initial hourly rate based on patient's body weight (4-2-1 rule).

ml/hr = (4x first 10kg) + (2 x second 10kg) + (1 x every kg after)

Burns:

- <15% Total Burn Surface Area (TBSA) = Nonaggressive fluids
- 15%-40% TBSA = Diligent fluid management
- >40% TBSA = Major resuscitation, ominous prognosis

Rule of Tens for burns:

(use ORS and Lactate Ringers augmentation if possible secondary to high volume needed**)**

- 10ml/hr x ____ % TBSA of 2nd & 3rd Degree Burns
- For every 10 kg above 80 kg, increase the rate by 100 mL/hr

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