Fluid Balance

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Body water

- Average 70kg man: 42 litres water
  - 2/3 Extracellular: 28 litres
  - 1/3 intracellular: 14 litres
    - Plasma – 3 litres
    - Extra-vascular – 11 litres
  - Osmolality = 280-295mosmol/kg

Normal biochemistry

Sodium	
Potassium	
Calcium	
Magnesium	
Chloride	

Electrolyte balance

- Sodium
  - 1-2 mmol/kg
- Potassium
  - ~ 1 mmol/kg

Fluid replacement

Crystalloid	Colloid
0.9% Saline	Gelatin
5% Dextrose	Starches
0.45% Saline 5% Dextrose	Albumin
Hartmanns	Blood

Crystalloid

	0.9% Saline	5% Dextrose	Hartmanns
Na			
Cl			
K			
Lactate			
Calcium			
Glucose			

Colloid

- Gelatins / Starches
  - Anaphylaxis risk
  - Can worsen intra-vascular hypovolaemia
- Human Albumin Solution: 4.5% and 20%
  - Liver disease
  - Blood product risks
- Blood
  - Incompatability/TRALI/Infection risks

Fluid prescription

- Maintenance fluid and electrolyte requirements

AND

- Replacement requirements

Maintenance requirements

Water Input		Water Output	
Avenue	Quantity (mL day^{-1})	Avenue	Quantity (mL day^{-1})
Water in fluids	1,250	Lungs, skin	900
Water in solid food	1,000	Sweat	100
Water produced by metabolism	350	Feces	100
		Minimal urinary output	500
		Excess urinary output	1,000
Total input	**2,600**	**Total output**	**2,600**

Replacement

- NG aspirates
- Diuresis
- Bleeding
- Vomit
- Diarrhoea
- Stoma output
- Drain output
- Increased insensible losses e.g. febrile
- Dehydration

ALWAYS CHECK THE FLUID BALANCE CHART

Maintenance fluids

- ORAL PREFERRED
- Typically:
  - 1 litre 0.9% Normal saline + 20mmol KCl
  - 2 litres 5% Dextrose + 20mmol KCl
- What do you think?

GIFTASUP guidance 2008

- Recommendation 1
  - Because of the risk of inducing hyperchloraemic acidosis in routine practice, when crystalloid resuscitation or replacement is indicated, balanced salt solutions (e.g. Ringer's lactate/acetate or Hartmann's solution) should replace 0.9% saline, except in cases of hypochloraemia

GIFTASUP guidance 2008

- Recommendation 3
  - To meet maintenance requirements, adult patients should receive sodium 50-100 mmol/day, potassium 40-80 mmol/day in 1.5-2.5 litres of water by the oral, enteral or parenteral route (or a combination of routes).
  - Additional amounts should only be given to correct deficit or continuing losses. Careful monitoring should be undertaken using clinical examination, fluid balance charts, and regular weighing when possible

GIFTASUP guidance 2008

- Recommendation 8
  - Excessive losses from gastric aspiration or vomiting should be treated with an appropriate crystalloid solution which includes an appropriate potassium supplement.
  - Losses from diarrhoea, ileostomy, small bowel fistula, ileus or obstruction should be replaced volume for volume with Hartmann’s or Ringer-Lactate/acetate type solutions

Suggested maintenance fluid

- Enteral if possible

- 1 litre Hartmanns
- 1 litre 5% dextrose with 40mmol KCL

➔ Achieves fluid and electrolyte requirements

Suggested maintenance fluid

- It is important, and your responsibility to check electrolytes before prescribing fluids
  - Particularly sodium and potassium
  - Also magnesium and phosphate

- Don’t just re-prescribe previous days fluids

Special situations

- Vomit/NG aspirates
  - 0.9% Saline with 40 mmol KCL
- Cirrhosis
  - Even though hyponatraemic have high total body sodium
  - Give Albumin solutions

Special situations

- Cardiac failure/Elderly
  - Use fluids with care.
  - Reassess frequently for signs of failure, e.g. pulmonary oedema.
  - Avoid just re-writing previous days regime
- Chronic renal failure
  - May be unable to handle fluid
  - 20ml plus previous hours urine output.
  - Avoid potassium unless hypokalaemic