Fluids Tutorial Summary

Module 1: Physiology

- In health we obtain fluid from food, drink and as a by-product of metabolism. Fluid is lost via urine and insensible losses (sweat, lungs and faeces).
- In health the body's fluid homeostatic mechanisms ensure a neutral fluid balance; outputs match inputs. In disease states however this is impaired due to disturbed normal mechanisms of water loss and gain as well as additional abnormal mechanisms in which water can be gained or lost.
- Approximately 60% of our body mass is made up of water. This body water is distributed into body compartments; two thirds makes up the intracellular fluid compartment and one third makes up the extracellular fluid compartment. The extracellular fluid compartment is further divided into the interstitial space and the plasma.
- In disease states there may be global losses or gains from these fluid compartments or an abnormal distribution. Sick patients can also develop third space losses.
- Electrolytes are lost and gained alongside fluid and therefore must also be replaced according to individual requirement. The average daily sodium requirement is 1-2mmol/kg/day and the potassium requirement is 1mmol/kg/day. In disease states these requirements may vary, thus it may be necessary to restrict electrolyte input or to supplement fluid more.

Module 2: Clinical Assessment

- In order to gauge a patient's fluid status, there are a variety of simple clinical assessments and tools which can be used to build this impression. This includes a focused patient history, observation of clinical signs, use of fluid balance charts, daily patient weighing and serum urea and electrolytes. In the case of critically ill patients and high risk patients intraoperatively, invasive monitoring of fluid status can be used.
- When taking a patient history it is necessary to ascertain fluid losses e.g. vomiting or diarrhoea as well as conditions which predispose to retaining fluid e.g. heart failure and renal failure.
- There are various clinical signs which alert to a status of fluid deficit or overload. They tend to lack sensitivity but in combination have greater weighting. Signs of fluid deficit may include postural hypotension, tachycardia, dry mucous membranes and oliguria. Signs of fluid overload may include hypertension, peripheral pitting odema and pulmonary oedema which causes bibasal crackles on auscultation.
- Fluid balance charts are often used in hospital patients to monitor fluid inputs and outputs. When interpreting these charts it is important to appreciate that there may be a level of

inaccuracy in the recordings and a rough estimate of insensible losses should be factored into the fluid balance calculation.

- For patients prone to retaining fluid, daily weighing can be a useful indicator of fluctuations in fluid, whereby 1kg of weight loss equates to 1kg of fluid loss.
- Serum biochemistry results can also be used to give an impression of fluid status. The most important results to look at are urea, creatinine, and sodium levels, all of which may rise in dehydration.

Module 3: Prescribing

- Prescribed fluids can be classified into two categories; colloid and crystalloids.
- Colloids may be used to replace blood components and to expand the intravascular volume by increasing intravascular colloid oncotic pressure. Commonly prescribed colloids include synthetic colloids and human protein solutions.
- Crystalloid fluids are commonly used for fluid maintenance and distribute freely from the intravascular compartment to the other compartments. Commonly prescribed crystalloids include glucose, saline and physiological solutions.
- When calculating a fluid regimen, it is necessary to see the patient yourself and assess their current hydration status. In addition it is necessary to assess a patient's fluid balance from the previous day, the current day and predicted future fluid losses and gains. Consider also in this calculation if there are likely to be radical losses or gains in electrolytes e.g. potassium rich GI losses.
- In situations of fluid resuscitation in the hypovolaemically shocked patient, there is less concern for the composition of infused fluid but rather the aim is to infuse large volumes fast to maintain blood pressure. However in some cases of massive fluid loss such as DKA, a large derangement in electrolytes can result and so it is necessary to pay careful attention to correcting this.
- Certain patient groups are at particular risk of fluid overload and thus exceptional care must be taken when prescribing fluids for them. Starting with a small fluid challenge is recommended. This includes patients with heart failure, liver failure and chronic renal failure.
- When IV fluids are being given it is important to review the patient regularly and never prescribe fluids for more than a 24hr period as fluid requirements are likely to change!

Module 4: Cases

- Fluid maintenance for otherwise well 'nill by mouth' patients undergoing elective surgery, may be a simple calculation of fluid and electrolyte requirement; calculating a rough requirement of sodium and potassium using the patient's weight.
- Sick patients are often far more complicated, with many more fluid and electrolyte losses and gains to consider. In this situation the patient may require large amounts of fluid with

extra electrolyte supplementation or restriction. Regular patient reassessment is required including regular blood test results in order to guide electrolyte replacement.

- It is paramount to recognise these sick patients and call for senior help early.

Module 5: OSCE video

The best summary for how to practically set up an IV infusion is the OSCE checklist included in module 5. This concisely covers the procedure in a step by step manor. To download this go to the following web address;

http://www.fluidstutorial.com/m5_3.html