WORKSTATION - IV FLUIDS

AIMS

The participant should be familiar with the common solutions available for use in resuscitation.

GOALS OF RESUSCITATION

Goals of resuscitation are to achieve haemodynamic stability, correct metabolic disturbances, return tissue perfusion to normal.

REQUIREMENTS

You will be working with:

0.9% normal saline
Hartman's solution
5% Dextrose
Albumen
Haemaccel 500mls
Blood - 1 bag of O+
Hypertonic saline and Dextran
Cannulas - 24, 22, 18, 16, 14G
Intraosseous needle
Rapid infusion device
Pressure bags
Different IV tubings

IV FLUID ADMINISTRATION

At the start of the workstation, the instructor having previously set-up three bags of normal saline connected to standard tubing connected to a 22, 14 and 7 French rapid infusion device, will open up the fluid allowing it to drain into a large bowl. At the end of the basic instruction about IV cannulas and tubing and fluids, the instructor may return and demonstrate the flow rates in the different bags. In addition, the utility of a pressure bag on a 14G cannula will be shown. An explanation of Poiseuille's Law should be given by the instructor to the participants showing that flow is inversely proportioned to the length of the IV cannula and tubing and directly proportional to the diameter. The most effective method of increasing flow during resuscitation is the use of 14G cannula rather than a 16G cannula as this results in a 50% increase in the volume administered. Using a 300mm pressure bag with automatic adjustable pressure regulator, this in turn will double the flow again. The combination of a pressure bag and 14G cannula will triple your overall flow rate to nearly 600mls/minute. Manual compression of a drip chamber despite producing peak pressures of more than 70mmHg is an inefficient method of improving flow compared to external pressure bag.

STANDARD IV CATHETERS

GAUGE	LENGTH	FLOW RATE*
24	¾" (19mm)	24
22	1" (25mm)	36
20	1¼" (32mm)	64
20	2" (50mm)	55
18	1¼" (32mm)	108
18	2" (50mm)	95
16	1¼" (32mm)	215
16	2" (50mm)	196
14	2" (50mm)	321
* Water at 39" head height measured in ml/min		

CRYSTALLOID vs COLLOID

This has been a longstanding debate in the medical literature and disagreement has stemmed from the potential effects exerted by repletion of the vascular space with acellular fluid on the content of the body's other communicating fluid spaces. Components of colloid resuscitation traditionally held that haemorrhage depletes the vascular space so repletion with fluid should be designed to remain in that space. Colloid remains in the intravascular space for much longer than crystalloid. It was argued that crystalloid decreases intravascular colloid osmotic pressure and thus increases the risk of developing pulmonary cerebral and intrastitial oedema. Crystalloid supportors conversely argue that fluid and electrolyte depletion in traumatic injury occurs from all spaces haemostatically so that replacement of volume across these spaces is at least partly beneficial. Meta analysis has been performed in 1989 at 17 major clinical studies and it suggests that crystalloid is as efficacious as colloid.

Interest in hypertonic saline solutions began in the 1960's and recently 7.5% normal saline and 6% Dextran 70 (hypertonic saline dextrose has been used and shown to have a slight improved survival especially in those with head injury).

Currently the ideal resuscitation in remote areas would be saline because of its availability. Ideally IV fluids should only be administered up to a point of 2-3 litres otherwise significant haemodilution will occur.

Haemoccel offers polygeline based colloid solution having a longer intravascular half life and therefore theoretically requiring less fluid to resuscitate to normal values. The disadvantages of Hartman's and saline is that they tend to be a little bit acidotic and Hartman's solution can increase the lactate levels.

Dextrose 5% is metabolised and does not remain in the intravascular space and therefore is not a good fluid for resuscitation.