

Fluid resuscitation

Index: [Intravenous fluid therapy](#)

Original article by: [Michael Tam](#)

There is only "one" rule for both adults and children:

Normal saline :: 10-20 mL/kg bolus :: fast as you can

If someone is shocked and **requires** emergency fluid resuscitation, your fluid of choice is **0.9% NaCl** or "normal saline". Don't fluff around with colloids or Hartmann's solution - choose bog standard saline.

For your average adult, round to the litre - so that would be giving either one or two bags of saline **stat**. And "stat" means as *fast as you can through a large bore IV cannula* (by gravity or by hand pump). The infusion machines ("Baxters") only go as fast as 1L per **hour**. You don't have an hour. You should be able to get a litre in over a handful of minutes (should definitely be less than 10 minutes).

For children, you would probably aim more for a 20 mL/kg bolus rather than 10 mL/kg and you wouldn't round off. An 8 kg child should get a 160 mL bolus of saline. For the smaller volumes in children, it is often possible to push it in directly with a few large (e.g., 50 mL) syringes by hand.

After **two** 20 mL/kg fluid boluses in children, or **2 litres** of fluid in adults, if there is no or poor response, you need to start transfusing blood / infusing inotropes, etc.

Why crystalloids over colloids?

Although there always seems to be a compelling "biologically logical" reason for using colloidal fluids in preference to crystalloids, this has not been borne out in study evidence. The Australian and New Zealand Saline versus Albumin Fluid Evaluation (SAFE) study compared outcomes at 28 days after either intravenous saline or 4% human albumin in the critical care setting. There was no overall clinically significant benefit (1).

The [Cochrane Database of Systematic Review](#) has a meta-analysis on the usage of saline versus human albumin. Its finding is that there is no significant difference between the two in critically ill patients. However, in a subgroup of those with burns, those treated with 4% human albumin appeared to have excess mortality when compared to saline (2).

The excess mortality was not detected in a meta-analysis of randomised controlled trials in the Annals of Internal Medicine, however, suggesting that any difference between the two would likely to be small (3).

In conclusion, there is no evidence that colloidal fluids are any better than saline in resuscitation and in some situations, there is some evidence that human albumin may be harmful. For other colloidal fluids like succinylated gelatin (Gelofusine) or polygeline (Haemacel), they contain foreign proteins and there is a small risk of anaphylaxis (while there is essentially none from saline). Saline obviously costs less than colloids as well.

References

- (1) Finfer S, Bellomo R, Boyce N, French J, Myburgh J, Norton R. SAFE Study Investigators. A comparison of albumin and saline for fluid resuscitation in the intensive care unit. *New England Journal of Medicine*. 350(22):2247-56, 2004 May 27. [download [PDF](#) :: 665 kb]
- (2) The Albumin Reviewers (Alderson P, Bunn F, LiWan Po A, Li L, Roberts I, Schierhout G). Human albumin solution for resuscitation and volume expansion in critically ill patients. *The Cochrane Database of Systematic Reviews* 2004, Issue 4. [download [PDF](#) :: 235 kb]
- (3) Wilkes MM, Navickis RJ. Patient survival after human albumin administration: a meta-analysis of randomized, controlled trials. *Ann Intern Med* 2001; 135: 149-64. [download [PDF](#) :: 562 kb]

Updated: Michael Tam (19 June 2006)

[Please read the disclaimer](#)