Expert peer review on application for colloid solutions for the treatment of pediatric trauma or burn patients

The objective of this review is to examine the available scientific evidence for use of Colloids in children to enable informed decision whether colloids should be included in the Essential Medicine List for Children (EMLc) and if yes, which one should be. The review focuses primarily on trauma and burns as indications for the use of colloids in children. The most commonly used colloids are albumin, and nonprotein colloids like hydroxyethyl starches (HES), dextrans and gelatins.

1. Assessment of efficacy
   a. Have all relevant studies on efficacy been included
      Yes X No (if no, please provide reference and information)

   b. Summarize the data on efficacy, in comparison to what is listed in EML where applicable (limit to 2 to 3 sentences)

   Fourteen articles were included in the review. They consisted of reviews, guidelines and expert opinion based on evidence. No randomized controlled trials were identified.

   No high-level evidence studies could be identified for the use of colloids in children with traumatic injuries or burns. A Cochrane review did not find evidence to prove superiority of any one colloid solution over others in terms of effectiveness and safety. All articles reviewed indicated that there is very little evidence available currently for or against the use of colloids in children. Especially randomized controlled trials are not available to support any evidence for use of colloids in children. Some authors therefore additionally referred to the available evidence for adults stating that this is scarce too. Overall only three of the fourteen included articles recommended the use of a colloid solution.

   c. Please provide any additional relevant information with reference

2. Assessment of safety
   a. Have all relevant studies on safety been included
      Yes X No (if no, please provide reference and information)

   b. Summarize the data on safety, in comparison to what is listed in EML where applicable (limit to 2 to 3 sentences)

   For crystalloids like Ringer-lactate and Normal saline 0,9% no side effects are described when used in accordance with guidelines. Possible side effects of all colloids are hypersensitivity and anaphylactic reactions up to anaphylactic shock and affection of coagulation. This applies especially to HES and dextran. HES may also cause pruritus which is often refractory to treatment

   c. Please provide any additional relevant information with reference

3. Assessment of cost and availability
   a. Have all relevant data on safety provided
      Yes X No (if no, please provide reference and information)
b. Summarize the data on cost and cost effectiveness, in comparison to what is listed in EML where applicable (limit to 2 to 3 sentences)

Colloid solutions are much more expensive than crystalloid fluids. Volume replacement with colloids is considerably more expensive than with crystalloids. The International Drug Price Indicator Guide shows that the supplier median price for Dextran 70 (0.0106 US$ /ml) is almost 12 times higher than the one for normal saline (0.0009 US$ /ml).

c. Please provide any additional relevant information with reference

d. Is the product available in several low and middle income countries?

Information not available.

4. Assessment of public health need

a. Please provide the public health need for this product (1-2 sentences)

Injury and violence are responsible for over 900 000 deaths in children and young people under the age of 18 years each year. In 2004 38.8 per 100.000 children worldwide died from unintentional injuries and nearly 96.000 children globally died from burns. Road traffic injury is the second leading cause of death in children between 1 and 14 years and the leading cause of death in the age group between 15 and 18. Non-fatal falls are the most common reason for children to be taken to an emergency room.

Approximately 30–40% of trauma mortality can be attributed to haemorrhage. The main reasons for early deaths in hospital are continued haemorrhage, coagulopathy and incomplete resuscitation.

Fluid therapy plays an important role in the treatment of trauma patients with substantial blood loss as well as in patients with burn injuries and remains the cornerstone in resuscitation. But there is an ongoing controversy concerning the kind of fluid to be used in treatment of hypovolemic patients. Main available options for fluid resuscitation are either crystalloid or colloid solutions. If more than 40% of blood volume is lost blood transfusion is recommended additionally because these fluids are helpful to maintain tissue oxygenation.

b. Do guidelines (especially WHO guidelines) recommend this product? If yes, which ones? List 1 or 2 international preferable

No WHO Guidelines.

Care of Burns in Scotland network (COBIS) recommended in their guideline for treatment of children with burn injuries to use crystalloid solutions for the first 8 hours and albumin for the following 16 hours.

German Society for Paediatric Surgery - consensus-based guideline on the treatment of children with burn injuries. In these guidelines the use of crystalloid solutions was recommended for the first 24 hours, colloids should be used in prolonged shock and under strict indications only.

Advanced Trauma Life Support (ATLS) protocol of the American College of Surgeons and the Paediatric Trauma Care Guidelines of the University of Kentucky recommend bolus of 20 ml/kg normal saline which
may be repeated once. In case of persistent signs of shock administration of 10 ml/kg packed red blood cells was recommended. (No evidence named in these publications)

5. Are there special requirements for use or training needed for safe/effective use?
If yes, please provide details in 1-2 sentences

No

6. Is the proposed product registered by a stringent regulatory authority?
   Yes X  No

7. Any other comments

8. What is your recommendation to the committee (please provide the rationale)

There is very little evidence to support the use of colloids in children with traumatic injury or burns. Much of the available evidence is not specifically for children and not derived from randomized, placebo-controlled trials.

From the evidence identified, however, it appears that colloids do not have a proven benefit compared to crystalloids. This view is also supported by a recent Cochrane review addressing the question, for all indications and all types of colloids in adults. Colloids are more expensive and are more likely to cause adverse effects.

My recommendation is not to include them in the EML for the treatment of children with traumatic injury or burns.