

Episode 2 - Burns in Children

Depth

Skin is 0.5 mm to 5 mm thick. Epidermis is 0.05 to 1.5 mm thick, whilst dermis is 1 to 4 mm thick (1/5th superficial dermis, 4/5th deep dermis). With regards to depth of burn use descriptive terms. Remember that areas of burn will be of mixed depths and poorly demarcated initially. Their full extent can only be properly evaluated with serial assessment over days and weeks.

Epidermal		Red, dry, painful
Dermal	Superficial	Red, blistering, painful
	Deep	Waxy/leathery, no blisters, less painful
Subdermal (full thickness)		Charred, subcutaneous tissues, painless.

Body surface area (approximations)

Age (weight kg)	Body Surface Area (m ²)	Area of a 1% burn
1 year (10 kg)	0.5	50 cm ² (5 cm x 10 cm)
10 years (30 kg)	1.0	100 cm ² (10 cm x 10 cm)
15 years (50 kg)	1.5	150 cm ² (15 cm x 10 cm)

Fluid resuscitation (Brooke formula)

Children (< 12 years old)	3 ml x kg x %
Adolescents (> 12 years old)	2 ml x kg x %

Note: resuscitation fluids are given over 24 hours (half during the first 8 hours and half over the next 16 hours). Maintenance fluid runs alongside these resuscitation fluids.

Intraoperative fluid loss

Replacement with Ringer's acetate or Plasmalyte (both are compatible with blood products). As a rule of thumb losses can be replaced with 10 ml/kg/hr. Fluid boluses can be provided if there are signs of cardiovascular instability or a fluid deficit. Enteral feed is not counted in the fluid balance. Nasojejunal feeds should be continued intraoperatively. Nasogastric feeds should be continued if the patient is to remain intubated postoperatively.

Intraoperative blood loss

Blood loss from debridements, excisions and graft sites is roughly 1% of blood volume for every 1% body surface area of burn tissue excised (cf. adult estimates: 50 ml per 1% BSA). It can be two or three times as great as this however.

Age	1% of circulating volume	Excision of a 10% burn (blood loss)
1 year old (10 kg)	7 ml	75 ml
6 year old (20 kg)	14 ml	150 ml
12 year old (40 kg)	30 ml	300 ml

Note: replace blood with blood, i.e. red cells and plasma, and platelets where necessary. Take blood samples for blood gasses, TEG, formal FBC and coagulation studies. 500 ml of blood loss has approximately the same total volume as 1 unit of red cells plus 1 unit of plasma.

Procedural sedation (dressing changes)

Drug	Dose	Notes
Paracetamol	15 mg/kg po	
Morphine	0.5 mg/kg po	0.2 mg/kg if under 1 year
Midazolam	0.5 mg/kg po	
Dexmedetomidine	2 mcg/kg intranasal	
Fentanyl	1 mcg/kg intranasal (x 3)	Over 1 year of age
Ketamine	5 mg/kg po	Over 1 year of age
Nitrous oxide		

Note: for sedation provided by the anaesthetic team, alternatives are Ketamine 1 - 5 mcg/kg/min (intravenous) and Dexmedetomidine 1 mcg/kg/hr (intravenous). Dexmedetomidine provides sedation but does not provide pain relief. Intranasal Fentanyl can be administered at 10 minute intervals up to three times. If Propofol or intravenous Fentanyl are used it should be in an area where general anaesthesia can be safely provided.