

# Paediatric



# Pages

## ABCDE – HOW TO RECOGNISE AND TREAT THE SERIOUSLY ILL CHILD

	Possible Problems	Management Options
<b>A</b>	<p>Airway obstruction</p> <ul style="list-style-type: none"> <li>• Partial or complete</li> <li>• Foreign body</li> <li>• Secretions/blood/vomit</li> <li>• Infection</li> <li>• Swelling e.g. anaphylaxis</li> <li>• trauma</li> </ul> <p>Loss of airway reflexes due to decreased LOC</p>	<p><b>OXYGEN</b></p> <p><b>Airway positioning</b></p> <ul style="list-style-type: none"> <li>• Neutral position in infant</li> <li>• Sniffing position in children</li> </ul> <p><b>Clearance of secretions / FB</b> e.g. suctioning</p> <p><b>Airway adjuncts</b></p> <ul style="list-style-type: none"> <li>• oropharyngeal, nasopharyngeal, Advanced airway e.g. intubation</li> </ul> <p>In awake child, let them adopt their own position of comfort</p>
<b>B</b>	<p>Respiratory failure</p> <ul style="list-style-type: none"> <li>• Inadequate oxygenation</li> <li>• Inadequate ventilation</li> </ul> <p>Look for increased work of breathing, signs of respiratory failure (decreased LOC, hypotonia, cyanosis, bradycardia)</p>	<p><b>OXYGEN</b></p> <p>Treatment of underlying condition e.g. infection, asthma, pneumothorax</p> <p>Manual ventilation if poor effort e.g. BVM</p>
<b>C</b>	<p>Shock</p> <ul style="list-style-type: none"> <li>• Hypovolaemia e.g. haemorrhage</li> <li>• Distributive e.g. sepsis</li> <li>• Cardiogenic e.g. myocarditis</li> <li>• Obstructive e.g. tension PTX</li> <li>• Dissociative e.g. CO poisoning</li> </ul> <p>Remember ↓BP is a late sign</p>	<p><b>OXYGEN</b></p> <p><b>IV/IO access</b></p> <p><b>Fluid bolus of 0.9% NS</b></p> <ul style="list-style-type: none"> <li>• 10mls/kg in trauma / DKA</li> <li>• 20mls/kg in other medical conditions</li> </ul>
<b>D</b>	<p>Decreased LOC</p> <ul style="list-style-type: none"> <li>• check AVPU</li> <li>• check pupils for size + reactivity</li> <li>• posture</li> </ul> <p>Localising signs e.g. complex seizure, meningitis</p>	<p><b>OXYGEN</b></p> <p><b>CHECK BM</b></p> <p>Protect airway and breathing</p> <p>Consider recovery position</p> <p>Treat underlying condition</p> <p>Consider CT Brain</p>
<b>E</b>	<p>Assess for other signs of illness e.g. rash</p> <p>Assess for other signs of injury e.g. long bone fractures</p>	<p><b>KEEP WARM</b></p> <p>Preserve dignity</p>

Notes:

1. Get senior EM doctor and paediatric team early
2. Children are more likely to have a primary respiratory arrest than a primary cardiac arrest. The cause is often **HYPOXIA – GIVE OXYGEN**

**Contacting Paediatric team in an emergency**

1. Fast bleep 6000 and ask for **PAEDIATRIC TEAM** if urgent help needed
2. Bleep 6666 and ask for **PAEDIATRIC ARREST TEAM** if cardiac arrest

**TRAFFIC LIGHT SYSTEM**

The Traffic light system should be used to assess serious illness (NICE).

**Table 1 Traffic light system for identifying likelihood of serious illness**

	Green – low risk	Amber – intermediate risk	Red – high risk
Colour	<ul style="list-style-type: none"> <li>• Normal colour of skin, lips and tongue</li> </ul>	<ul style="list-style-type: none"> <li>• Pallor reported by parent/carer</li> </ul>	<ul style="list-style-type: none"> <li>• Pale/mottled/ashen/blue</li> </ul>
Activity	<ul style="list-style-type: none"> <li>• Responds normally to social cues</li> <li>• Content/smiles</li> <li>• Stays awake or awakens quickly</li> <li>• Strong normal cry/ not crying</li> </ul>	<ul style="list-style-type: none"> <li>• Not responding normally to social cues</li> <li>• Wakes only with prolonged stimulation</li> <li>• Decreased activity</li> <li>• No smile</li> </ul>	<ul style="list-style-type: none"> <li>• No response to social cues</li> <li>• Appears ill to a healthcare professional</li> <li>• Unable to rouse or if roused does not stay awake</li> <li>• Weak, high-pitched or continuous cry</li> </ul>
Respiratory		<ul style="list-style-type: none"> <li>• Nasal flaring</li> <li>• Tachypnoea:                             <ul style="list-style-type: none"> <li>– RR &gt; 50 breaths/minute age 6–12 months</li> <li>– RR &gt; 40 breaths/minute age &gt; 12 months</li> </ul> </li> <li>• Oxygen saturation ≤ 95% in air</li> <li>• Crackles</li> </ul>	<ul style="list-style-type: none"> <li>• Grunting</li> <li>• Tachypnoea:                             <ul style="list-style-type: none"> <li>– RR &gt; 60 breaths/minute</li> </ul> </li> <li>• Moderate or severe chest indrawing</li> </ul>
Hydration	<ul style="list-style-type: none"> <li>• Normal skin and eyes</li> <li>• Moist mucous membranes</li> </ul>	<ul style="list-style-type: none"> <li>• Dry mucous membrane</li> <li>• Poor feeding in infants</li> <li>• CRT ≥ 3 seconds</li> <li>• Reduced urine output</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced skin turgor</li> </ul>
Other	<ul style="list-style-type: none"> <li>• None of the amber or red symptoms or signs</li> </ul>	<ul style="list-style-type: none"> <li>• Fever for ≥ 5 days</li> <li>• Swelling of a limb or joint</li> <li>• Non-weight bearing/ not using an extremity</li> <li>• A new lump &gt; 2 cm</li> </ul>	<ul style="list-style-type: none"> <li>• Age 0–3 months, temperature ≥ 38°C</li> <li>• Age 3–6 months, temperature ≥ 39°C</li> <li>• Non-blanching rash</li> <li>• Bulging fontanelle</li> <li>• Neck stiffness</li> <li>• Status epilepticus</li> <li>• Focal neurological signs</li> <li>• Focal seizures</li> <li>• Bile-stained vomiting</li> </ul>

CRT: capillary refill time  
RR: respiratory rate

## SUMMARY OF BASIC LIFE SUPPORT

	Infant (<1 year)	Child (1 year to puberty)
<b>Airway</b>		
Head-tilt position	Neutral	Sniffing
<b>Breathing</b>		
Initial slow breaths	Five	Five
<b>Circulation</b>		
Pulse check	Brachial or femoral	Carotid
Landmark	Lower half of sternum	Lower half of sternum
Technique	Two fingers or two thumbs	One or two hands
CPR ratio	15:2	15:2



Figure 4.3 Head tilt and chin lift in infants



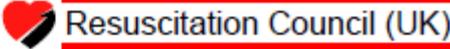
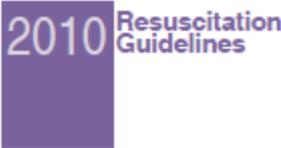
Figure 4.4 Head tilt and chin lift in children



### Vital Signs: Normal Ranges

Age (years)	Respiratory rate (breaths/min)	Systolic BP (mmHg) 5th centile	Systolic BP (mmHg) 50th centile	Pulse (beats/min)
<1	30–40	65–75	80–90	110–160
1–2	25–35	70–75	85–95	100–150
2–5	25–30	70–80	85–100	95–140
5–12	20–25	80–90	90–110	80–120
>12	15–20	90–105	100–120	60–100

# PAEDIATRIC LIFE SUPPORT: CHOKING CHILD



## Paediatric Choking Treatment Algorithm

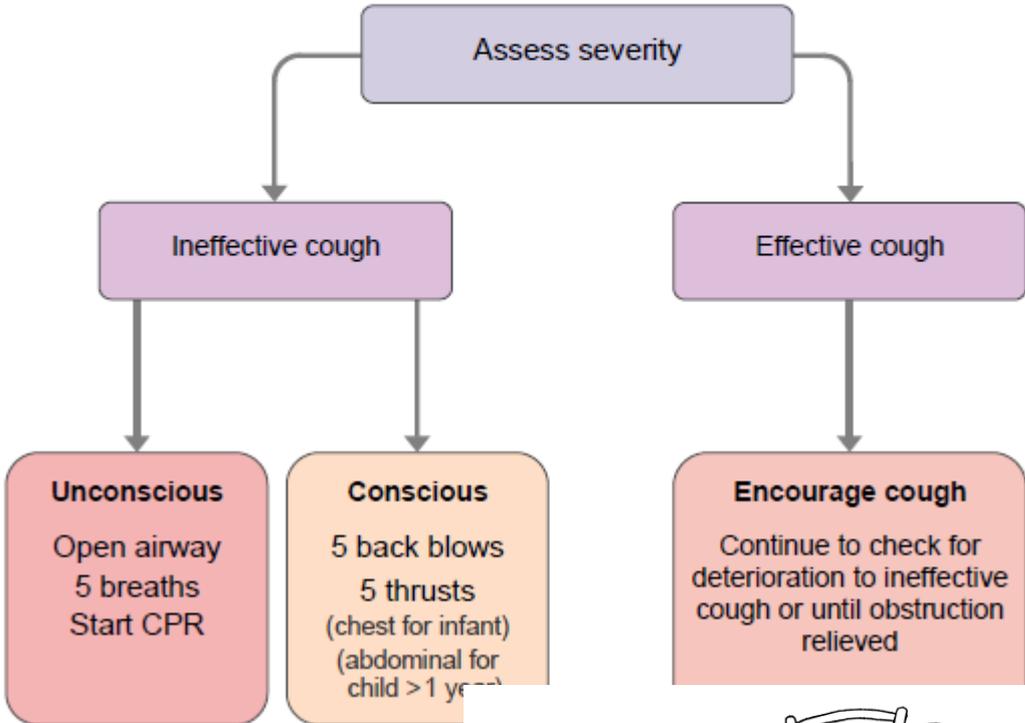


Figure 4.13 Back blows in an infant

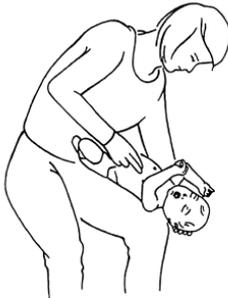


Figure 4.14 Chest thrusts in an infant



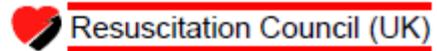
Figure 4.15 Back blows in a small child



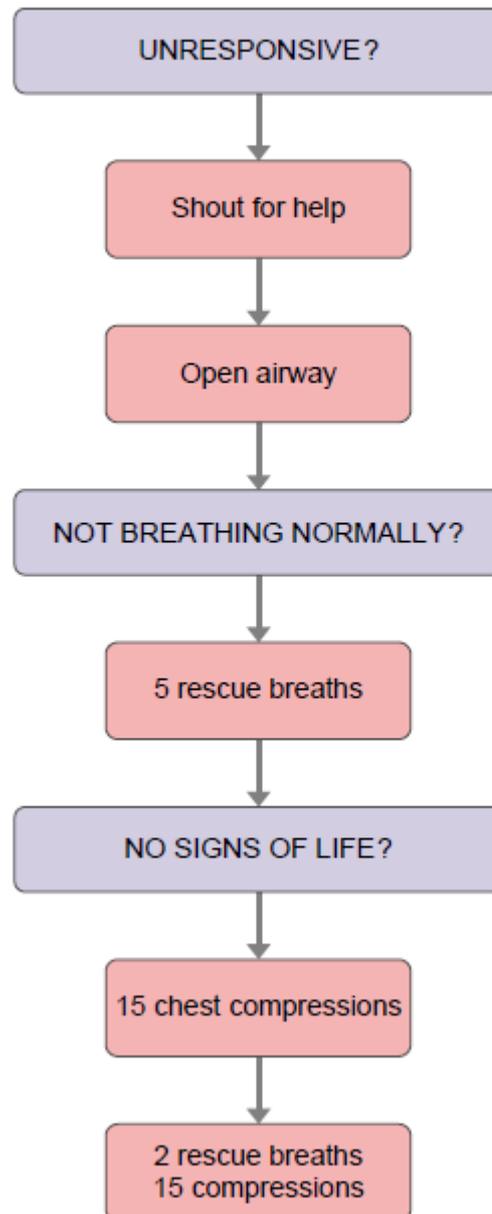
Figure 4.16 Heimlich manoeuvre in a standing child

# PAEDIATRIC BASIC LIFE SUPPORT

2010 Resuscitation  
Guidelines

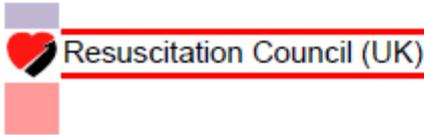


## Paediatric Basic Life Support (Healthcare professionals with a duty to respond)

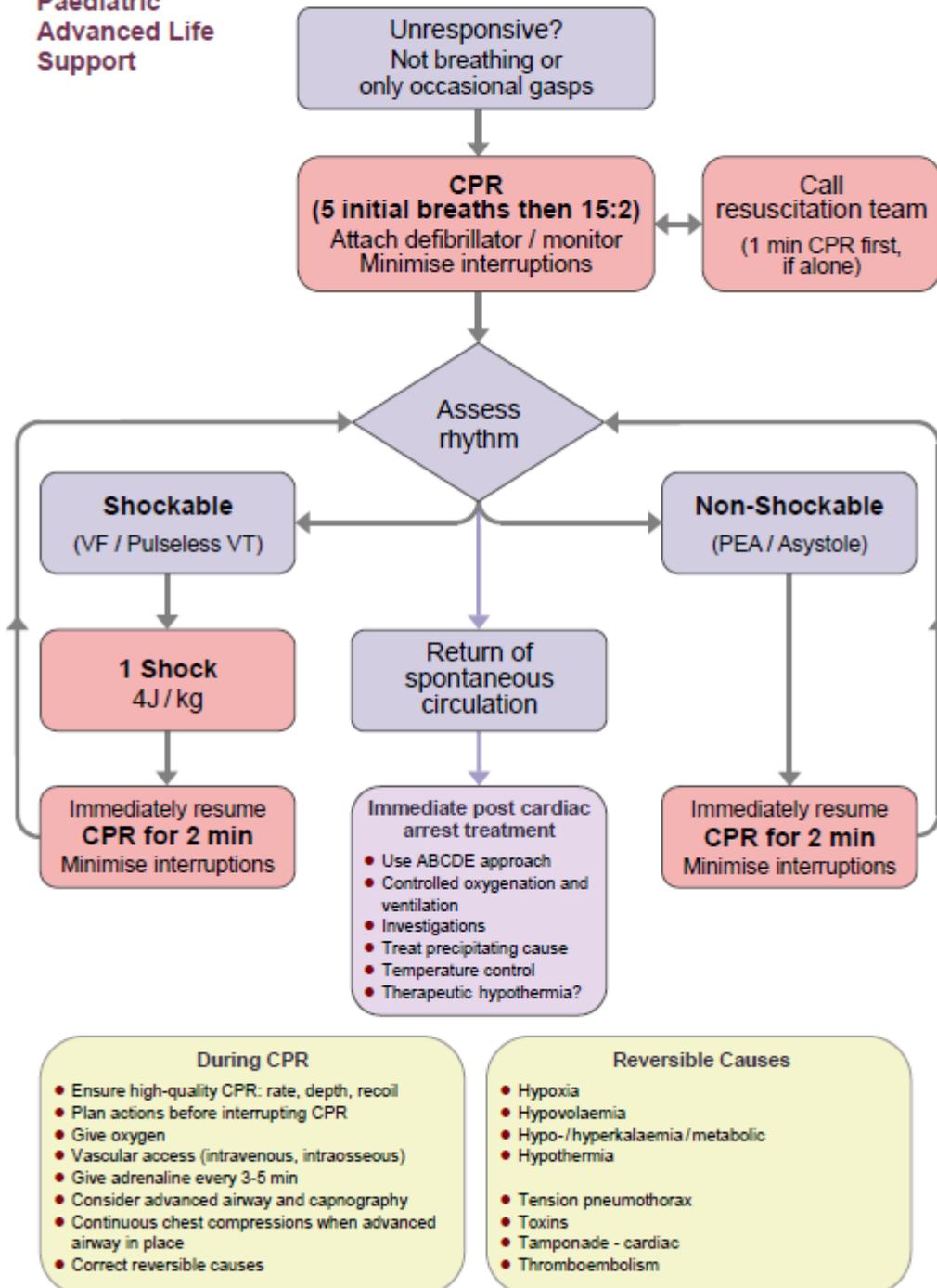


**Call resuscitation team**

# ADVANCED PAEDIATRIC LIFE SUPPORT: CARDIAC ARREST



Paediatric  
Advanced Life  
Support

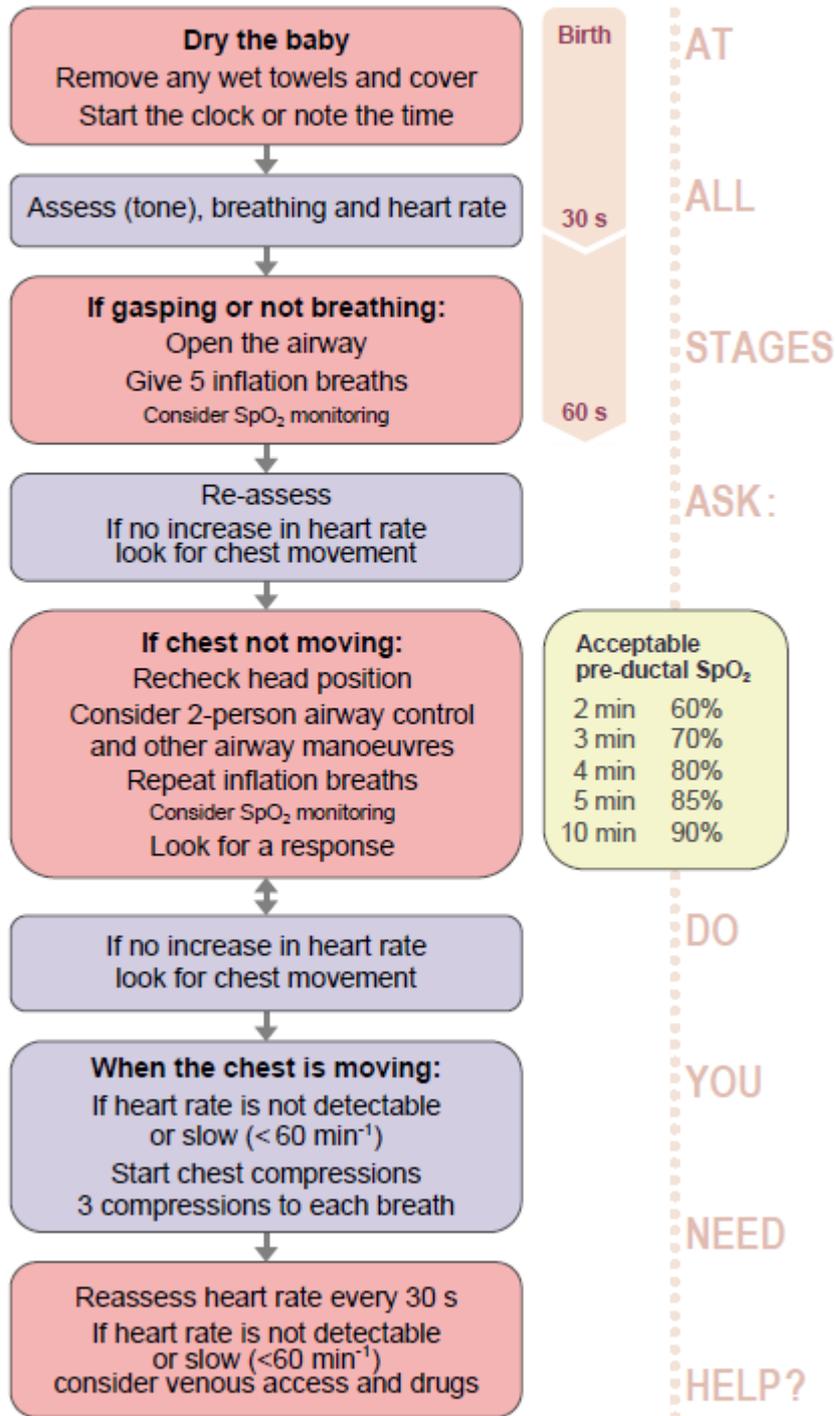


# ADVANCED PAEDIATRIC LIFE SUPPORT: NEWBORN LIFE SUPPORT

2010 Resuscitation Guidelines

Resuscitation Council (UK)

## Newborn Life Support



# ADVANCED PAEDIATRIC LIFE SUPPORT: BRADYCARDIA

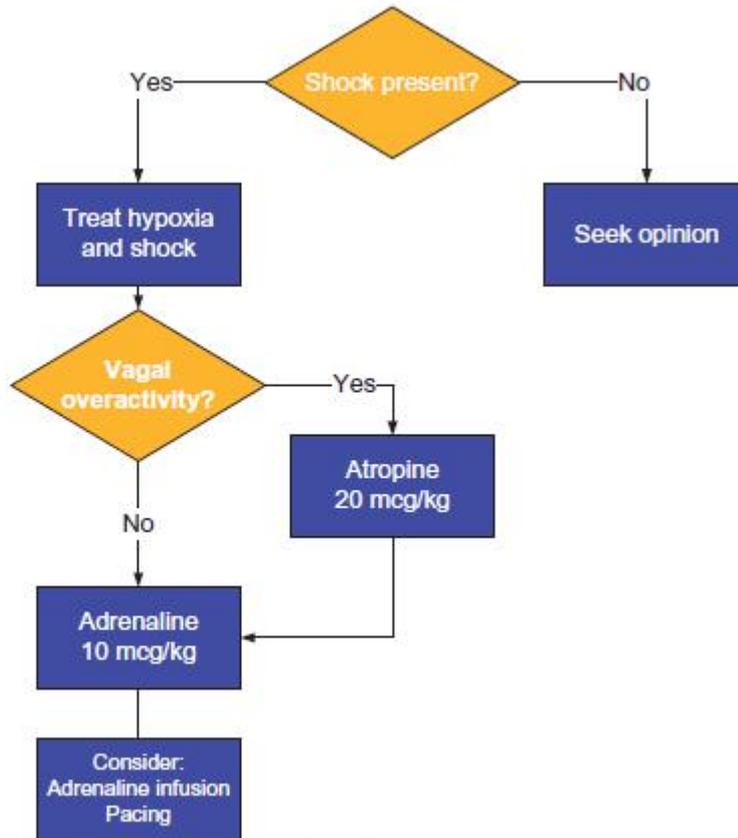


Figure 10.1 Algorithm for the management of bradycardia

# ADVANCED PAEDIATRIC LIFE SUPPORT: SUPRAVENTRICULAR TACHYCARDIA

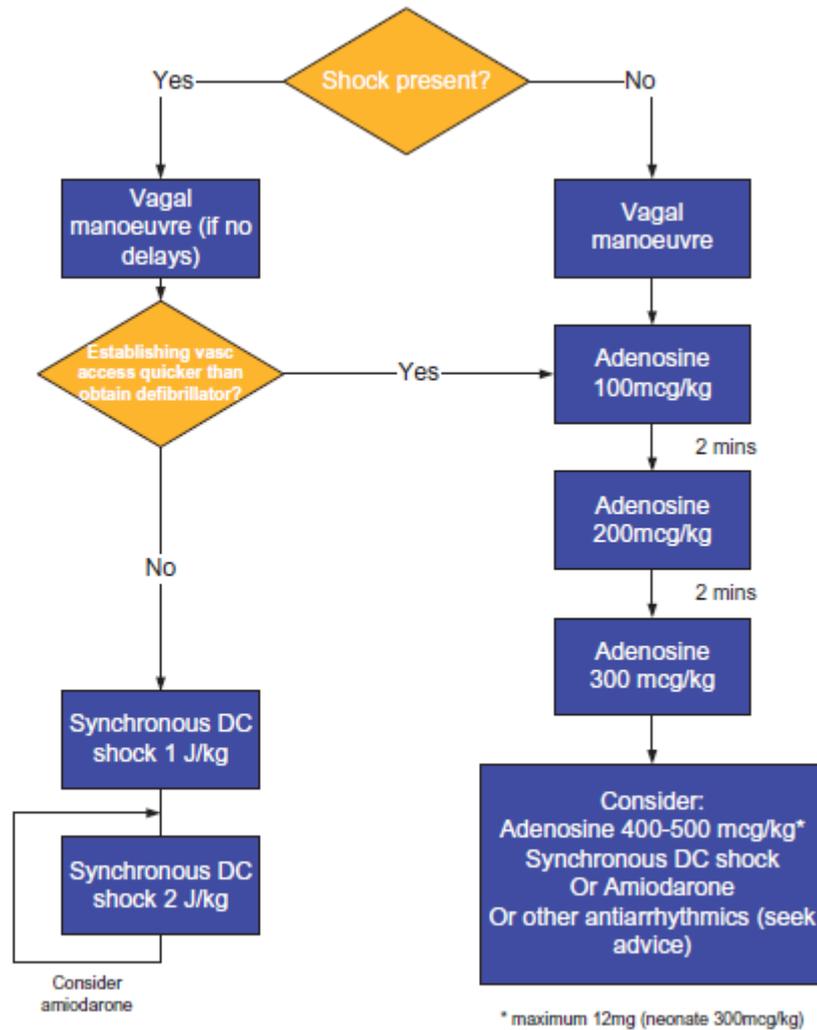


Figure 10.4 Algorithm for the management of supraventricular tachycardia

# ADVANCED PAEDIATRIC LIFE SUPPORT: VENTRICULAR TACHYCARDIA

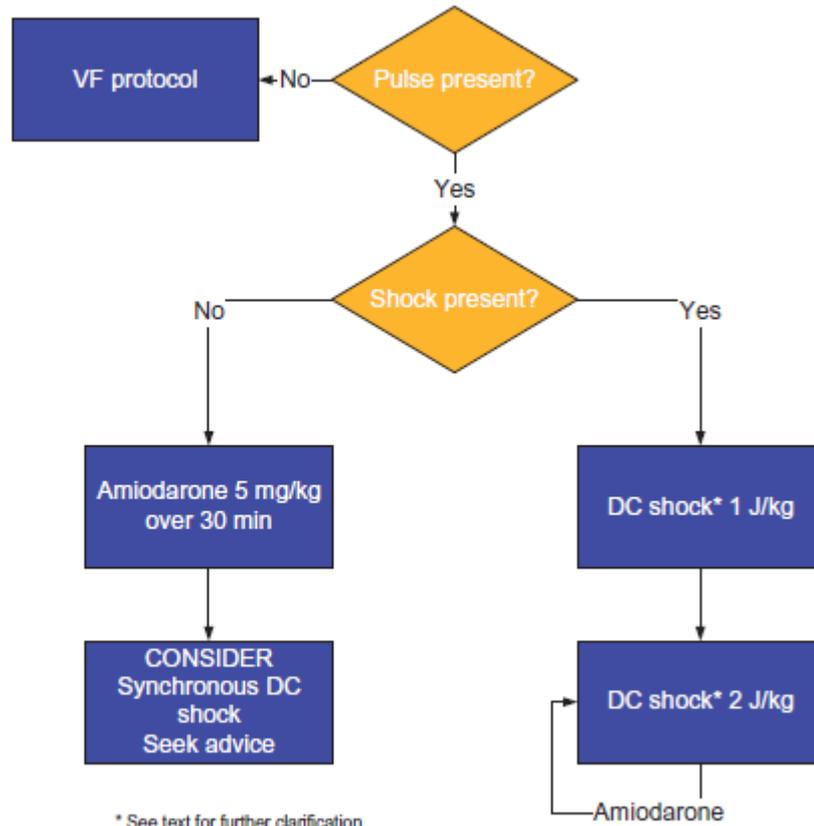


Figure 10.5 Algorithm for the management of ventricular tachycardia

# ADVANCED PAEDIATRIC LIFE SUPPORT: FITTING CHILD

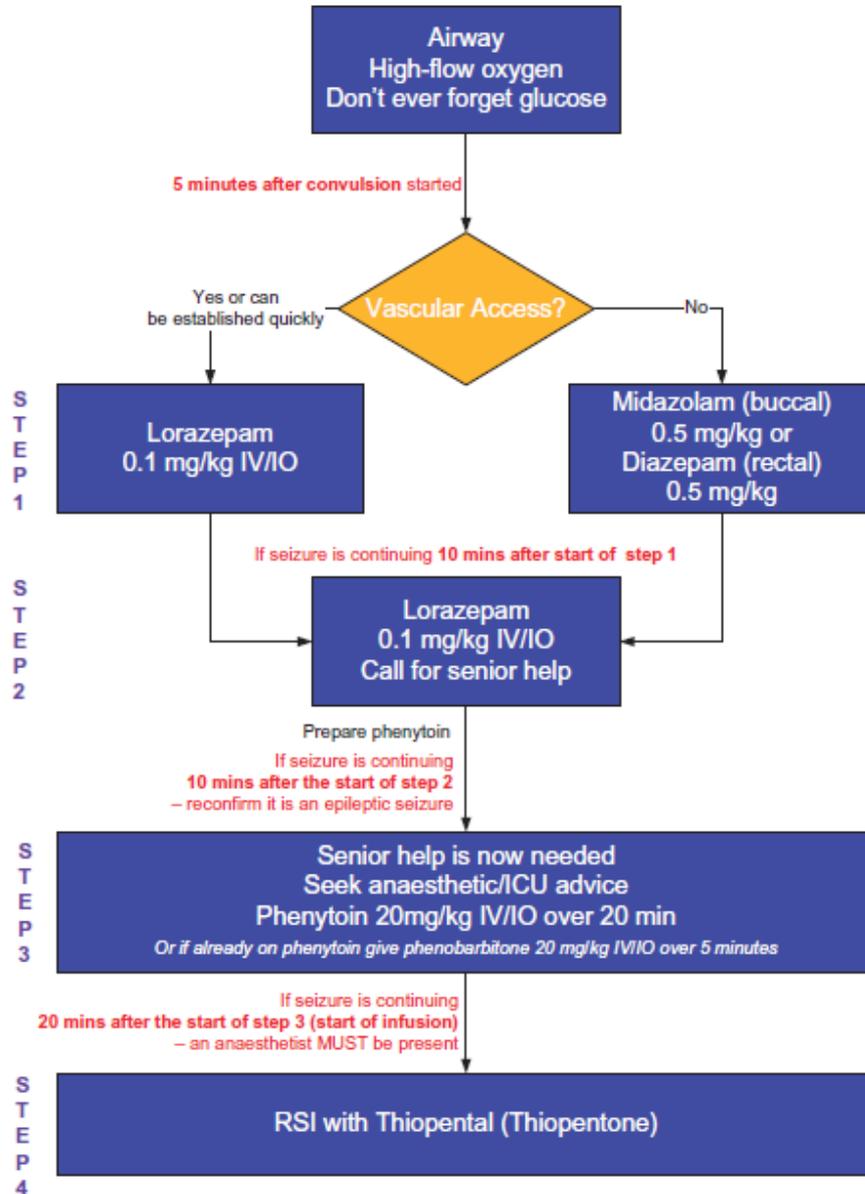


Figure 12.1 Status epilepticus algorithm. ICU, intensive care unit; RSI, rapid sequence induction

# THE UNCONSCIOUS CHILD

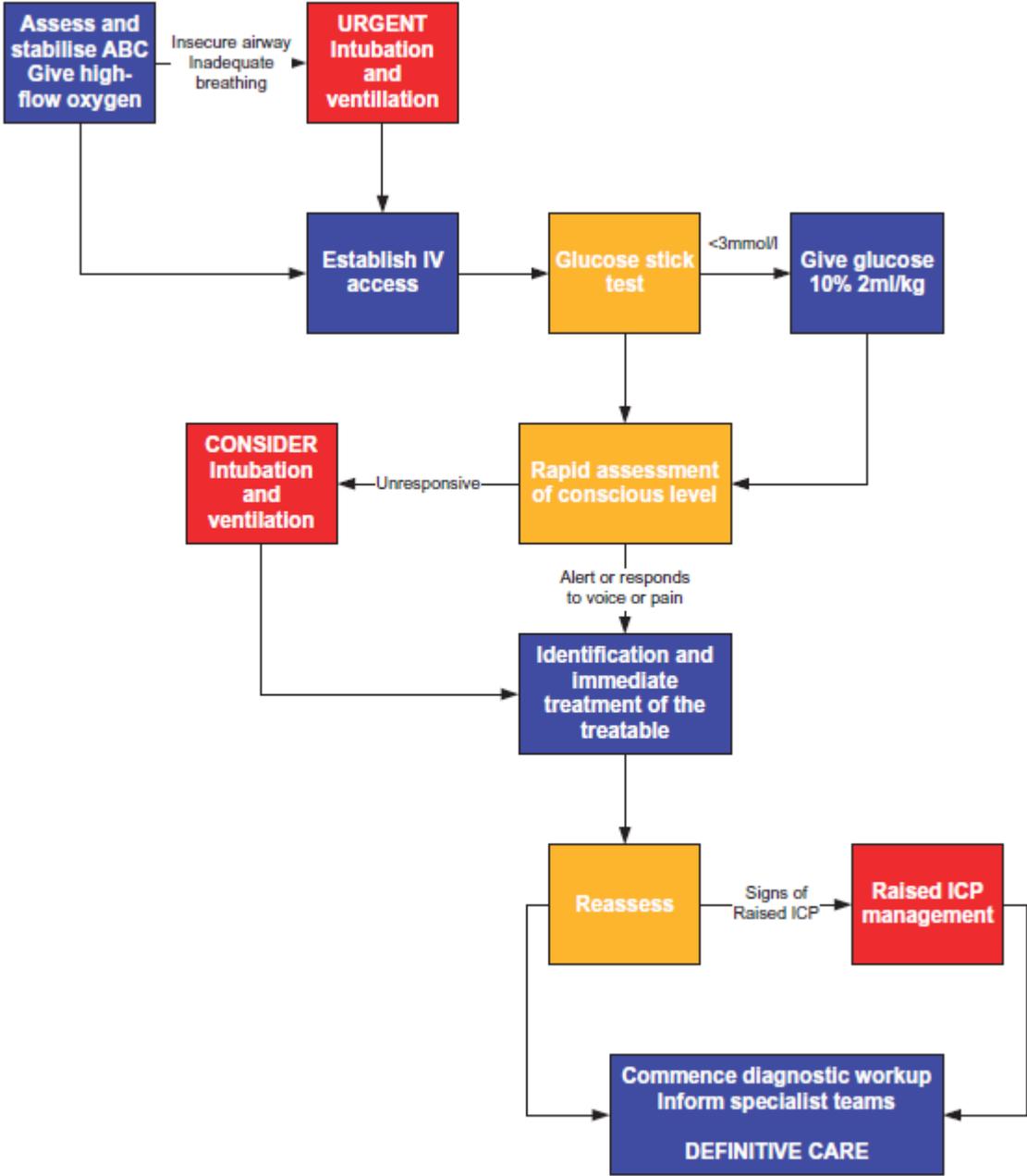
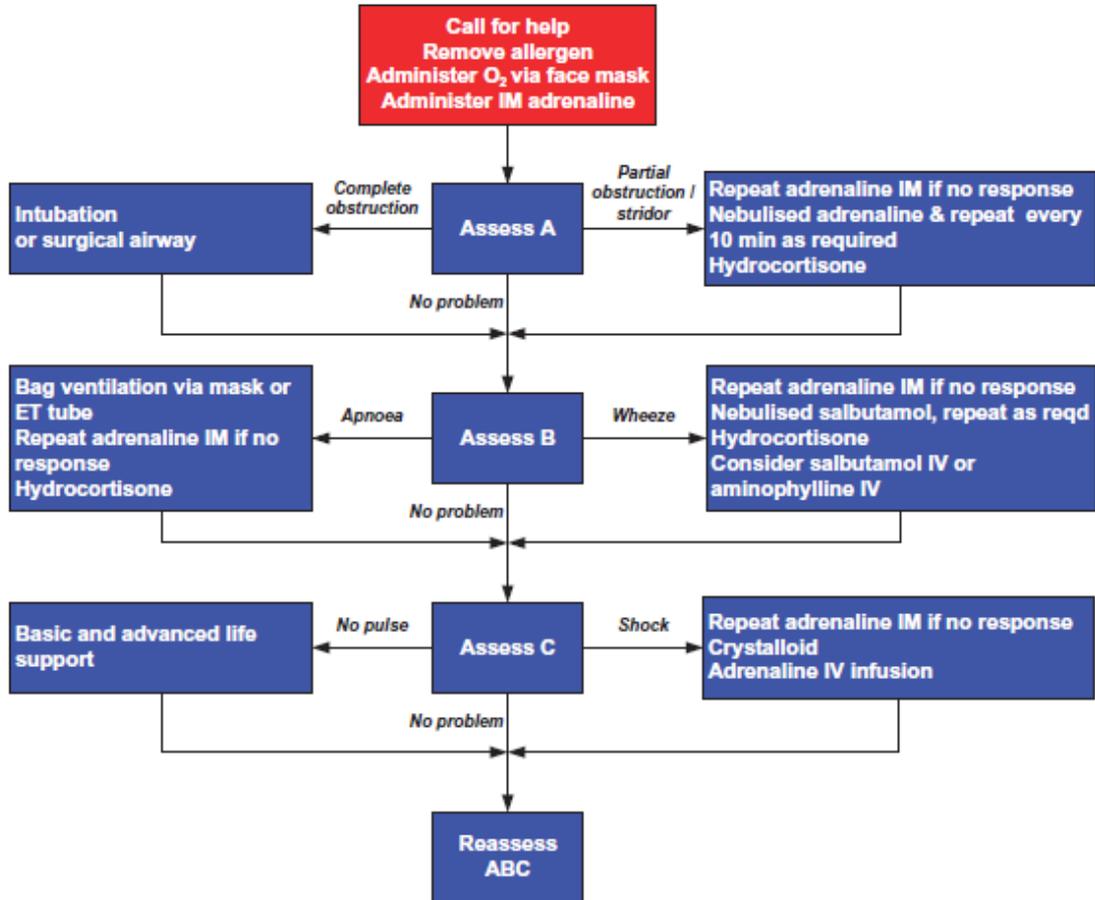


Figure 11.2 Algorithm of the initial management of coma. ICP, intracranial pressure

**The Paediatric Glasgow Coma Scale**

Glasgow Coma Scale (4–15 years)		Children's Glasgow Coma Scale (<4 years)	
Response	Score	Response	Score
<i>Eye opening</i>		<i>Eye opening</i>	
Spontaneously	4	Spontaneously	4
To verbal stimuli	3	To verbal stimuli	3
To pain	2	To pain	2
No response to pain	1	No response to pain	1
<i>Best motor response</i>		<i>Best motor response</i>	
Obeys verbal command	6	Spontaneous or obeys verbal command	6
Localises to pain	5	Localises to pain or withdraws to touch	5
Withdraws from pain	4	Withdraws from pain	4
Abnormal flexion to pain (decorticate)	3	Abnormal flexion to pain (decorticate)	3
Abnormal extension to pain (decerebrate)	2	Abnormal extension to pain (decerebrate)	2
No response to pain	1	No response to pain	1
<i>Best verbal response</i>		<i>Best verbal response</i>	
Orientated and converses	5	Alert; babbles, coos words to usual ability	5
Disorientated and converses	4	Less than usual words, spontaneous irritable cry	4
Inappropriate words	3	Cries only to pain	3
Incomprehensible sounds	2	Moans to pain	2
No response to pain	1	No response to pain	1

# ADVANCED PAEDIATRIC LIFE SUPPORT: ANAPHYLAXIS



Drugs in anaphylaxis	Dosage by age			
	Less than 6 months	6 months to 6 years	6 – 12 years	More than 12 years
Adrenaline IM – pre-hospital practitioners	150 micrograms (0.15 ml of 1:1000)		300 micrograms (0.3 ml of 1:1000)	500 micrograms (0.5 ml of 1:1000)
Adrenaline IM – in-hospital practitioners	10 micrograms/kg 0.1ml/kg of 1:10,000 (infants and young children) OR 0.01ml/kg of 1:1000 (older children) <sup>1</sup>			
Adrenaline IV	Titrate 1 microgram/kg*			
Crystalloid	20 ml/kg			
Hydrocortisone (IM or slow IV)	25 mg	50 mg	100 mg	200 mg

\* 1 microgram/kg given over 1 minute (range 30 seconds to 10 minutes), e.g. 0.5 ml/kg of 1:10,000 adrenaline made up to 50 ml saline 0.9% and run at 1ml/min is 1 microgram/kg/min

<sup>1</sup> The strength of IM adrenaline is not intended to be prescriptive, 1:1000 or 1:10,000 could be used depending on what is practicable. The problem with sticking solely to 1:1000 is that when used in infants and small children, you are then drawing up very small volumes

Figure 9.1 Emergency treatment of anaphylaxis

## SUDDEN UNEXPLAINED DEATH IN INFANCY (SUDI)

- *This will present to you as cardio-respiratory arrest in an infant. Commence CRP as per APLS algorithm unless the baby has rigor mortis or stasis skin changes*
- *You must get senior EM (get a nurse to phone the on-call consultant) and get Paediatric help immediately in this situation –bleep 6666 and ask for paediatric arrest team*

### **The patient**

The paediatric registrar will follow the agreed protocol for the investigation of SUDI. This is in the SUDI pack which the registrar will have. The pack is kept on A2.

### **The parents**

- The child should be dressed and a photograph taken in case the parents should ask for this now or at a later date. The parents should be allowed to hold their child for as long as they wish
- They should be told that their baby was dead on arrival +/- it was not possible to resuscitate him/her
- If they ask questions about the cause etc tell them that you do not have the answers yet – it's too soon
- When they are ready for more information tell them that the Coroner must be notified and that the police will be coming to co-ordinate this

### **The Coroner**

A message must be left on the Coroner's answer phone including the name and personal contact number of the doctor who pronounced life extinct. This is usually a senior member of the paediatric team.

### **Other people who need contacted**

GP, Social worker, Health Visitor

### **You**

The death of a child is always difficult for the staff involved, even if expected. Take time to collect your thoughts after the death. It is often helpful to talk it over with senior nursing or medical members of the team, they often have experience of similar situations and will be able to offer you support. Remember that you can talk to your mentor or one of the consultants at any time if you have questions or difficulties with any the treatment of any patient.

## MENINGOCOCCAL SEPTICAEMIA

- *Refer to the [www.meningitis.org](http://www.meningitis.org) management pathway*

### **Presentation**

Features include fever, myalgia, rigors and confusion. By contrast with neurological features seen in meningitis, those with septicaemia usually have a clear sensorium. Early on clinical features are fever, toxic appearance and tachycardia. With progression, features alter to circulatory failure and shock with poor peripheral perfusion and the gap between core and peripheral temperature increases. Oliguria/anuria may develop and lethargy and confusion leading to coma may result as cerebral perfusion diminishes.

***Please note that hypotension is not a feature of shock in children until a pre-terminal stage is reached, even in the face of significant reduction in circulating volume.***

This is a most fulminant infection. Some children may be symptomatic for several days, others die in <12 hours from the onset of first symptom. Pharyngitis may precede onset in some but others simply get ill and hot. Early recognition is the key to success with requires careful examination of febrile children in a good light, looking for evidence of a purpuric rash in those who are more ill. About 10% of patients develop an initial maculopapular rash (blanches on pressure) prior to the onset of purpura (will not blanch on pressure); in others no rash is present, however, look at the conjunctivae since one purpuric spot in an ill, febrile child is enough to begin therapy.

### **Management**

Suspicion goes more than 50% of the way towards actual diagnosis.

- *Assess ABC and treat. Get senior help early*
- *Administer IV ceftriaxone 80mg/kg– (max 2-4g, over 2-4min). Add in ampicillin /amoxicillin 100mg/kg IV in the under 6 months to cover Neisseria.*

The meningococcal packs are in the paediatric resus area, please complete before antibiotics if it will not unduly delay administration of the antibiotic.

## RASHES

- *Children with non-blanching rash and sick septic children with non-specific rashes should be treated for meningococcal disease.*
- *Discharge plans for children with rashes must include Glass Test Advice*

Colour textbooks are invaluable: see shared resource  
AAHEDDocuments\$(\\a248fps01) (K; hugo resources

### Key Facts are given in the table below

Condition	Organism	Clinical Presentation	Treatment
<b>Impetigo</b>	Group A Strep	Vesicles becoming unroofed Honey crust	Polyfax Fucidin Ointment (Oral Flucloxacillin)
<b>Mild Cellulitis</b>	Strep or Staph	Warm, red, swelling	Co-Amoxiclav
<b>Severe cellulitis</b>	Strep or Staph	Above + Systemic illness or periorbital involvement	ADMIT FOR IV TREATMENT OR IV NURSES
<b>Erythema Multiforme</b>		Target lesions incl. Palms & sole	Supportive
<b>Stevens Johnson Syndrome</b>		Above + mucous membrane	ADMIT
<b>Urticaria</b>	Allergic Reaction	“Hives” or nettle rash	1% HC cream
<b>Drug Eruption</b>		Any rash + drug Hx	
<b>Scabies</b>	Scarcoptes scabiei	Papules or nodules esp. flexor creases Burrows between fingers	Malathion or Permethrin +Advice sheet from CI Derm III.
<b>Fifth Disease</b>	Parvovirus	Slapped Cheek	
<b>Kawasaki Syndrome</b>		Erythema, sick, conjunctivitis, mucositis, peeling from fingers or toes	ADMIT
<b>Toxic Shock Syndrome</b>	Staph	Erythema, watery diarrhoea, shock	Flucloxacillin

Condition	Organism	Clinical Presentation	Treatment
Scarlet fever	Group A Strep	Erythema, strawberry tongue	Penicillin
Viral Exanthem		Pin prick rash or pimples. URTI or vague illness.	
Chickenpox	Varicella Zoster	Vesicles on trunk	Risk to pregnant mums- refer to GP for serology/ immunisation
Primary Herpes Stomatitis	H. Simplex	Extensive oral ulcers	Acyclovir Mouthwash
Post-primary HSV	H. Simplex	Cold sores, lip ulcers	Acyclovir Mouthwash
NAI		Bizarre marks, burns	Child protection guidelines
Meningococcal		Non-blanching rash <i>May be extremely subtle at first</i>	IMMEDIATE TREATMENT OR SENIOR OPINION FOR ALL NON-BLANCHING RASHES

## ASSESSING PYREXIA IN CHILDREN (SEE ABC SERIOUSLY ILL CHILD, TRIAGE, VOMITING AND DIARRHOEA)

- *“Time and observations sometimes help the art of medicine..”*
- *Unwell pyrexial children must be taken to resus immediately – the paediatric registrar must be contacted and you should follow the septic child protocol.*

High temperatures are very common in childhood and you are going to see lots of cases while working in the Emergency Department. The parental concern is always meningitis – this should be your main concern as well! Although all children should be seen very promptly there is no rush if your initial assessment excludes serious illness. It is a good idea to keep the child in the department for an hour or two if discharge is a possibility but you are not sure. You can tell the child’s parents that you are going to keep him/her in the Emergency Department for a period of observation.

### **Initial Action**

- The child should have been given an antipyretic by the triage nurse. Make sure that their clothes are removed and that they are cooling down.
- Consider Ametop in all pyrexial/unwell children at triage in case venepuncture is required. Especially all infants under 90 days with temps
- Talk to the child’s parents and listen to what they tell you.
- Carry out a full top-to-toe examination including assessment of general appearance, cardiorespiratory exam, abdominal exam, rashes and ENT examination.
- If no obvious cause for the fever is found urinalysis must be carried out and a specimen sent to the lab for direct microscopy. Chest X-ray should be considered and is mandatory if there is any abnormality of respiratory rate or SaO<sub>2</sub>.

### **Admitting or discharging**

- Less than 28 days old – *admission is always mandatory.*
- 28 days to 90 days – discuss with ED consultant or paediatric reg
- Older than 90 days – assessment becomes more reliable so children older than three months may be discharged by the Emergency Department doctors if well. A senior ED doctor must sign off all pyrexial children under 1 year old.

## VOMITING AND DIARRHOEA – THE DEHYDRATED CHILD (SEE SERIOUSLY ILL CHILD, TRIAGE, ASSESSING PYREXIA)

- *Very ill children should be taken to resuscitation immediately and paediatric registrar contacted.*
- *The main aim with diarrhoea and vomiting in children is to determine the child's hydration status and stabilise. The underlying cause should then be sought.*

The most common cause is acute gastro-enteritis (which is usually viral) but systemic bacterial infection may also be present in this way. In very young children, vomiting is due to faulty feeding, over feeding, regurgitation (GOR) or an obstructive lesion (pyloric stenosis, malrotation). Don't forget that intussusception causes colic, pale/screaming attacks and diarrhoea/blood PR – an abdominal X-ray should be taken if this is suspected.

### **Action**

- Give dioralyte 5mls every 5 mins, get parents to chart amount taken (this will hopefully have been started by the triage nurse)
- Take a good history, in particular, the number of wet nappies, tears, timing of vomiting, contents of vomiting and type of vomiting (projectile) and number of dirty nappies. Listen to parents (unfortunately this may mean looking at a dirty nappy that has been specially saved for you!).
- On examination note mental status, mucous membrane, tears and capillary refill.
- Carry out a good examination, as you would for a pyrexia child, remembering urine test.
- Following your history and examination, decide if dehydration is
  - mild (3%), moderate (5%) severe (8%).
- For mild dehydration try a small bottle of dioralyte (if not already tried). Child can be discharged home if tolerating this and remains well after a period of observation.
- Moderate to severe dehydration will need admission for parenteral fluids. Contact the Paediatric team who will calculate fluid replacement.
- Admit all children who are not feeding / tolerating oral fluids

### **Advise parents**

- Clear fluids only – regularly and small amounts.
- Dioralyte.
- Advance to simple foods as tolerated.
- Do not give milk (cow) or fruit juices.
- Give simple advice about preventing faecal-oral spread of infection.

- To come again SOS if:
  - diarrhoea and vomiting continues after 24 hours
  - blood in stool or vomit signs of dehydration develop.

### **Assessment of Dehydration Levels in Infants**

Signs	Severity		
	Mild	Moderate	Severe
General condition	Thirsty, restless, agitated	Thirsty, restless, irritable	Withdrawn, somnolent, or comatose; rapid deep breathing
Pulse	Normal	Rapid, weak	Rapid, weak
Anterior fontanelle	Normal	Sunken	Very sunken
Eyes	Normal	Sunken	Very sunken
Tears	Present	Absent	Absent
Mucous membranes	Slightly dry	Dry	Dry
Skin turgor	Normal	Decreased	Decreased with tenting
Urine	Normal	Reduced, concentrated	None for several hours
Weight loss	4%-5%	6%-9%	>10%

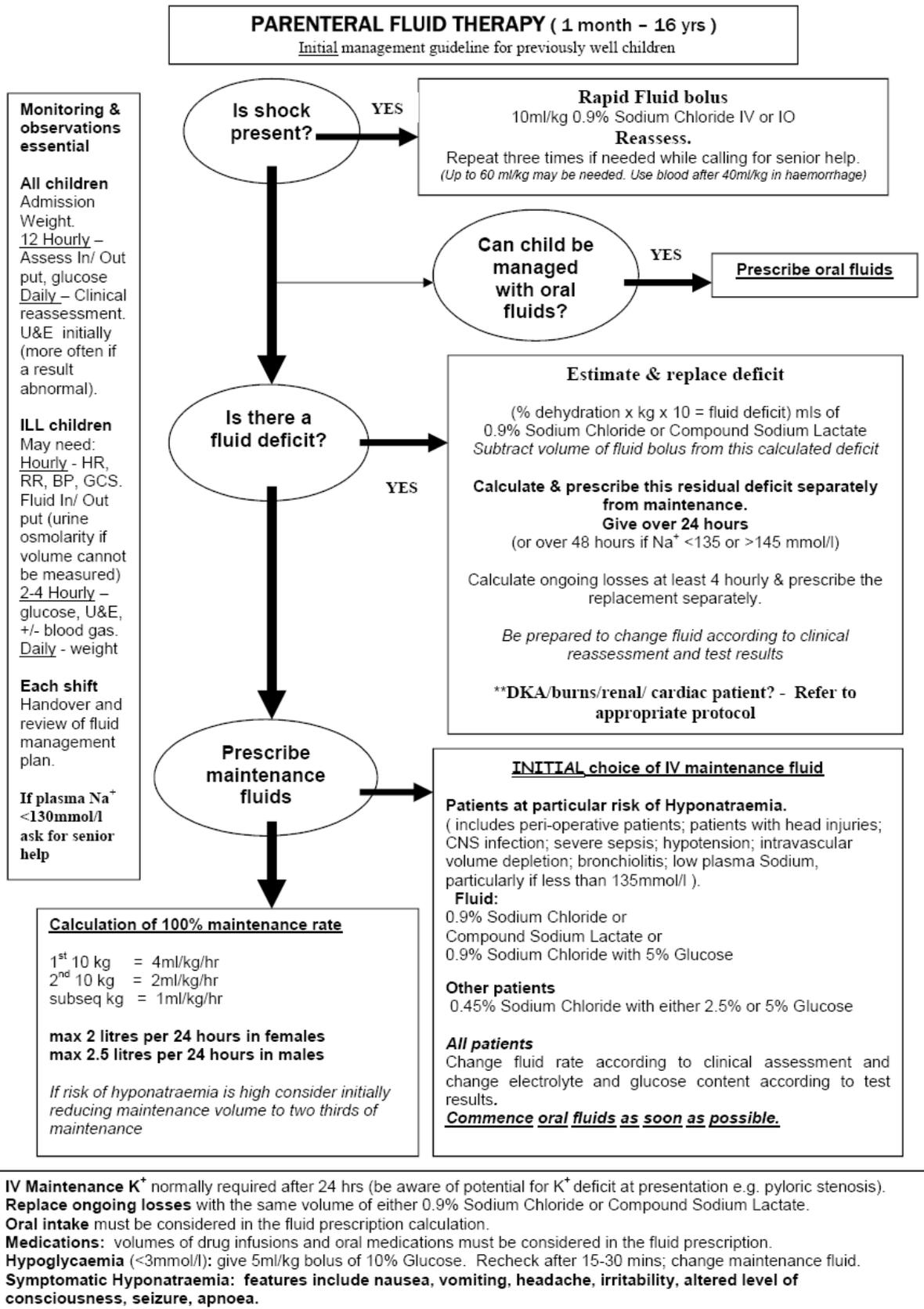
### **Intravenous fluids**

IV Fluids must be prescribed on a Paediatric Fluid Balance Chart

ED medical staff should only prescribe and administer fluid boluses for shocked children and dextrose for hypoglycaemic children.

Fluids or maintenance and on-going losses must only be prescribed by the inpatient paediatric medical team.

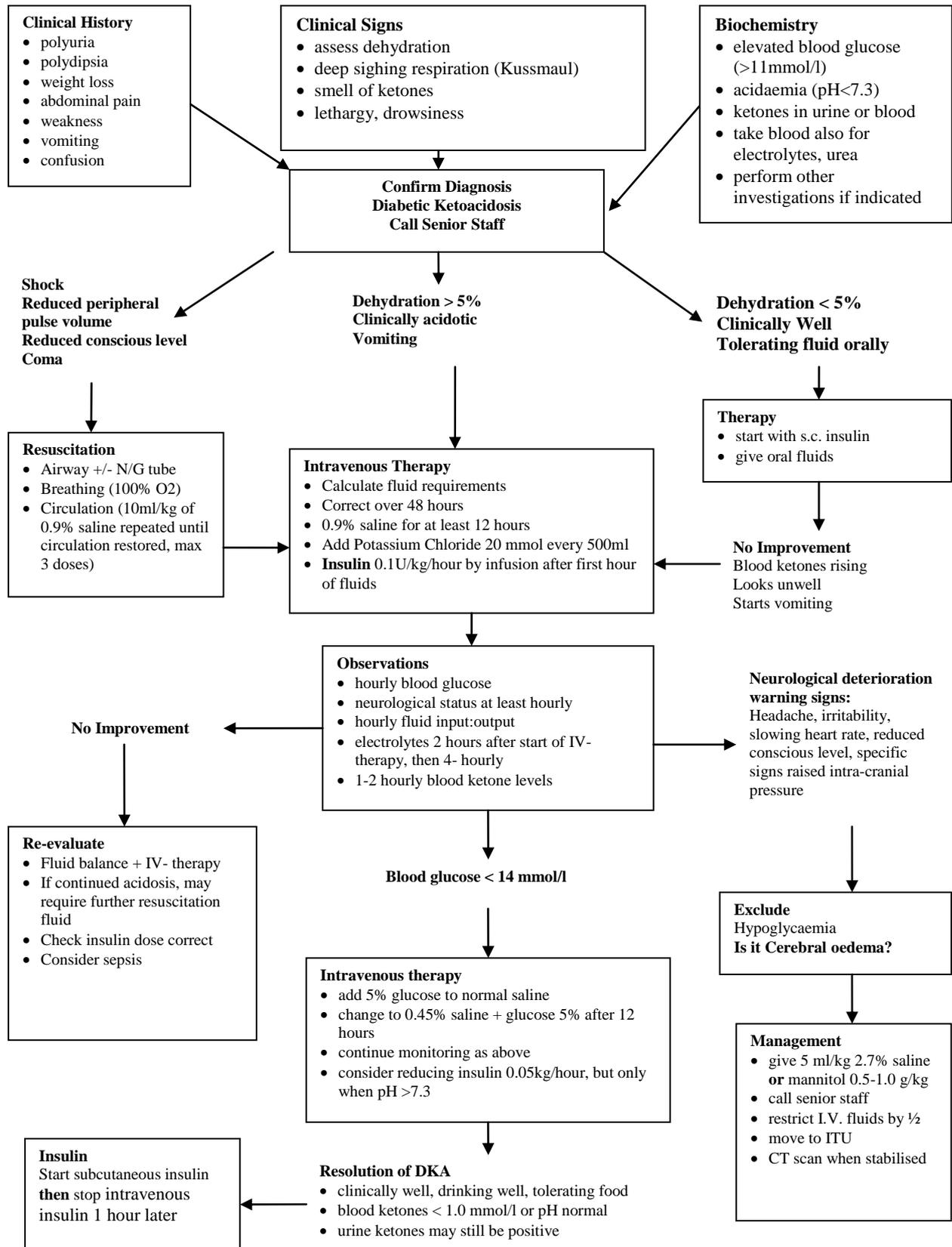
See next page for further guidance.



# PAEDIATRIC DKA

## Algorithm for the Management of Diabetic Ketoacidosis in Children & Young People up to 18 Years

1. The paediatric registrar should *always* be contacted for advice
2. IV fluids are calculated by weight.
3. All cases must be discussed with a senior doctor

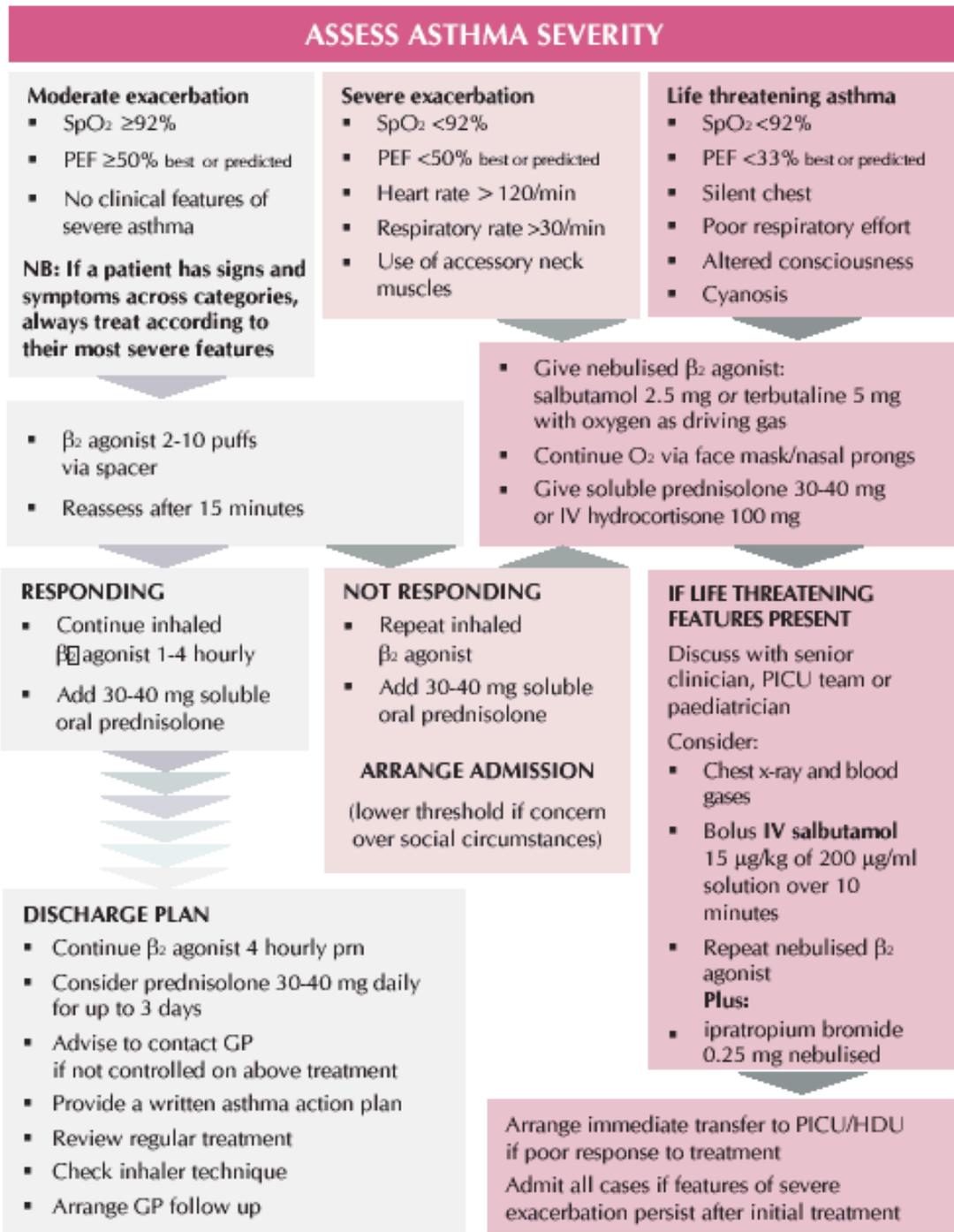


# ASTHMA

## Age 2-5 years



Age > 5 years



# BRONCHIOLITIS

## Bronchiolitis Guideline

### Bronchiolitis Clinical Guideline 2010

**Admission Criteria**

- Oxygen saturations persistently less than 92% in room air
- Risk of severe disease
  - Premature birth and/or bronchopulmonary dysplasia
  - Congenital heart disease
  - Immune deficiency
- Marked respiratory distress
- Apnoeic spells
- Need for frequent nasopharyngeal suction
- Failed trial of feeding or feeding less than 50% normal
- Beware: Young infants early in course of illness (neaks dav. 3-4)*

**Investigations**

- CXR and blood investigations are not indicated in clinically diagnosed, uncomplicated bronchiolitis
- Nasopharyngeal secretions for RSV status can help cohort patients and may decrease the use of antibiotics

**Management**

**Supportive therapy**

- Keep O2 saturations above 92% in the acute phase
- Suction of nasopharyngeal secretions

**Fluid management**

- Trial of oral or nasogastric feeds using small frequent boluses
  - Mild to moderate cases
  - Consider aspiration risk; may need to restrict to 2/3 maintenance
- IV fluids
  - More severe cases
  - Failed trial of enteral feeding
  - Imminent intubation
  - Restrict 2/3 maintenance and follow fluid management guidance

**Nebulised Therapy**

**Hypertonic Saline (Severity score > 6)**

**4ml 3% Saline given 8-hourly**

**Adrenaline (Severity score > 8)**  
*Document severity score before and after use, and continue use only if there is a proven effect. Prove it works, or don't use it.*

1.5 ml Adrenaline 1/1000 added to 4 ml hypertonic saline (8-hourly)

Adrenaline can be added to doses of hypertonic saline

1.5 ml Adrenaline 1/1000 mixed 1:1 with 0.9% Saline

Additional doses of nebulised adrenaline may be given where necessary

**Discharge**

- Feeding ideally 75% normal
- Some symptoms will persist for 2 weeks (40%) and in some cases 4 weeks (10%) after onset
- Illness peaks at day 3-4, so symptoms may worsen before improving and child may need to be reassessed
- In the recovery phase, some infants may be clinically well but have oxygen saturations of 90 – 94%, and may be considered for discharge.

Score	0	1	2	3
Respiratory Rate <6 months	<40	40-55	56-70	>70
RR. > 6 months	<30	30-45	46-60	>60
Wheezing	None	End-expiratory	Inspiratory and expiratory with stethoscope	Audible wheeze
Retractions	0	+	++	+++
Supplemental O2	None	21-28% Nasal prongs 100% O2: < 2L	29-35% Nasal prongs 100% O2: (2-4 L)	>35% Nasal prongs: >4L

## MAJOR TRAUMA IN CHILDREN (SEE SERIOUSLY ILL CHILD, UNCONSCIOUS CHILD AND HEAD INJURY)

- *Dial 6666. Follow the trauma and paediatric triage protocols. You Can Follow The Sequence for 'Seriously Ill Child' With Modifications*

A: Airway manoeuvres / adjuncts as necessary. Anaesthetics / paediatrics if needs intubated

### **Cervical spine stabilisation:** ref. Serious injury update APLS Instructors Information 2015

In-line with the new FPHC consensus guideline<sup>1</sup> the approach to spinal immobilisation is a stepwise approach following the current algorithm (see Figure 13.5 in APLS manual). The method of stabilisation should be considered carefully:

- Manual in-line stabilisation (MILS)
- Blocks where necessary if suggested by mechanism of injury (see NIHCE guidance)
- There is no evidence of the benefit of using collars in children and in many cases they are contraindicated e.g. penetrating trauma and, therefore, their use will no longer be routinely taught on APLS, APLS recertification and PLS courses
- Spinal board used only for extrication with rapid transfer to a scoop stretcher for transportation and early removal from scoop stretcher in ED
- Minimal handling with 20° tilt is recommended (rather than log roll) as described in the FPHC consensus guidelines<sup>1</sup>
- **THIS MEANS THE TRAUMA TEAM LEADER (usually EM Consultant / SpR MAY WELL INSTRUCT REMOVAL OF COLLAR ON ARRIVAL**

B: Breathing assessment including RR and oxygen sats

High flow oxygen

Ventilate if poor respiratory effort or tachypnoea

C: Venous access – IV if easily obtained otherwise IO using IO gun kept in paed resus bay

Haemorrhage identify potential source and control

Fluid resuscitation 0.9% normal saline 10mls/kg, repeated if not responding, after 20mls / kg needs senior surgical team involvement, after 40ml / kg needs resuscitation by blood transfusion

D: AVPU, eyes, posture

Check glucose

Log roll (PR rarely indicated and should only be performed by experienced surgeon)

E: Exposure to complete assessment but cover quickly to avoid heat loss

## AMPLE History

Allergies

Medications

Past medical history

Last meal

Events leading

Continue to reassess ABCDE

Imaging as indicated

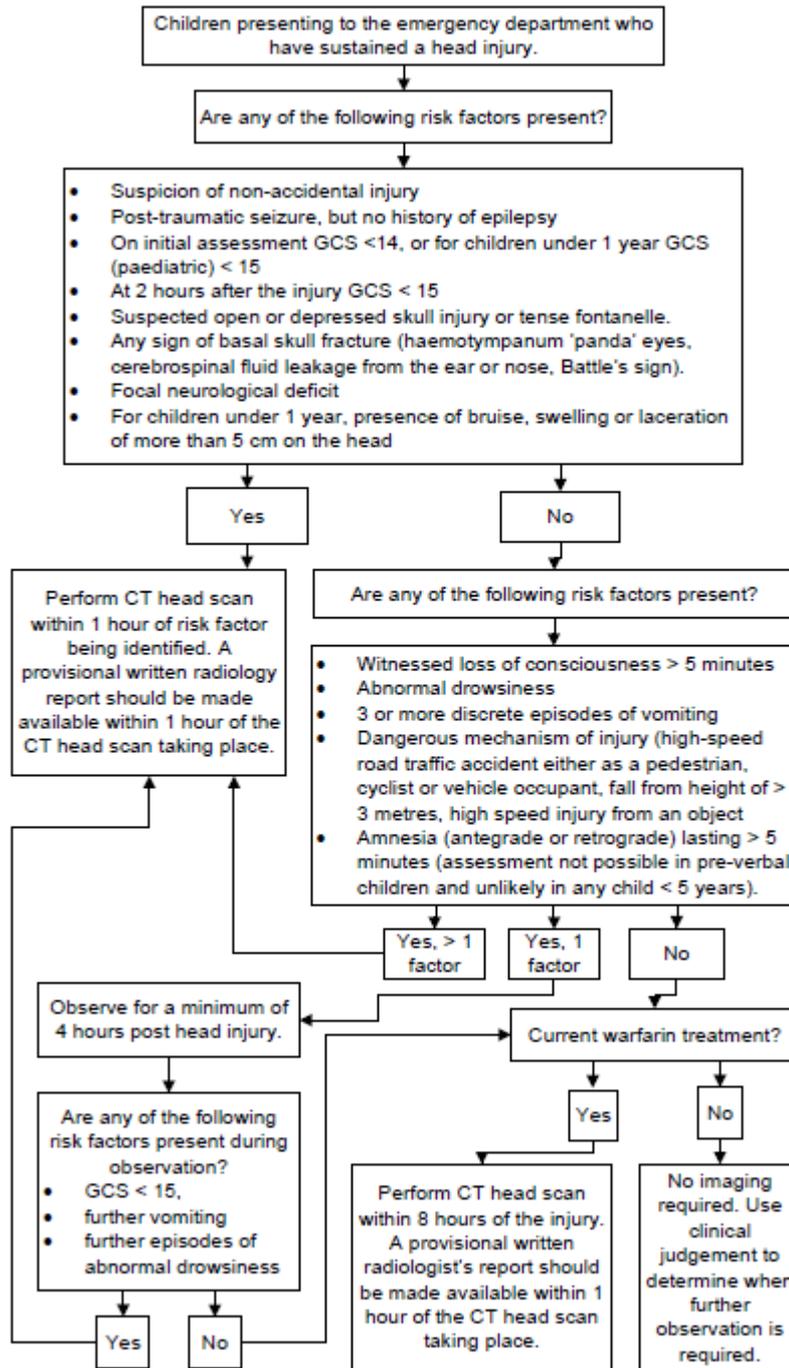
Secondary survey

**Signs Indicating Blood Loss Requiring Urgent Treatment**

Sign	Indicator
Heart rate	Marked or increasing tachycardia or relative bradycardia
Systolic BP	Falling
Capillary refill time (normal <2s)	Increased to >4–5s
Respiratory rate	Tachypnoea unrelated to thoracic problem
Mental state	Altered conscious level unrelated to head injury

# HEAD INJURY – NICE 2014

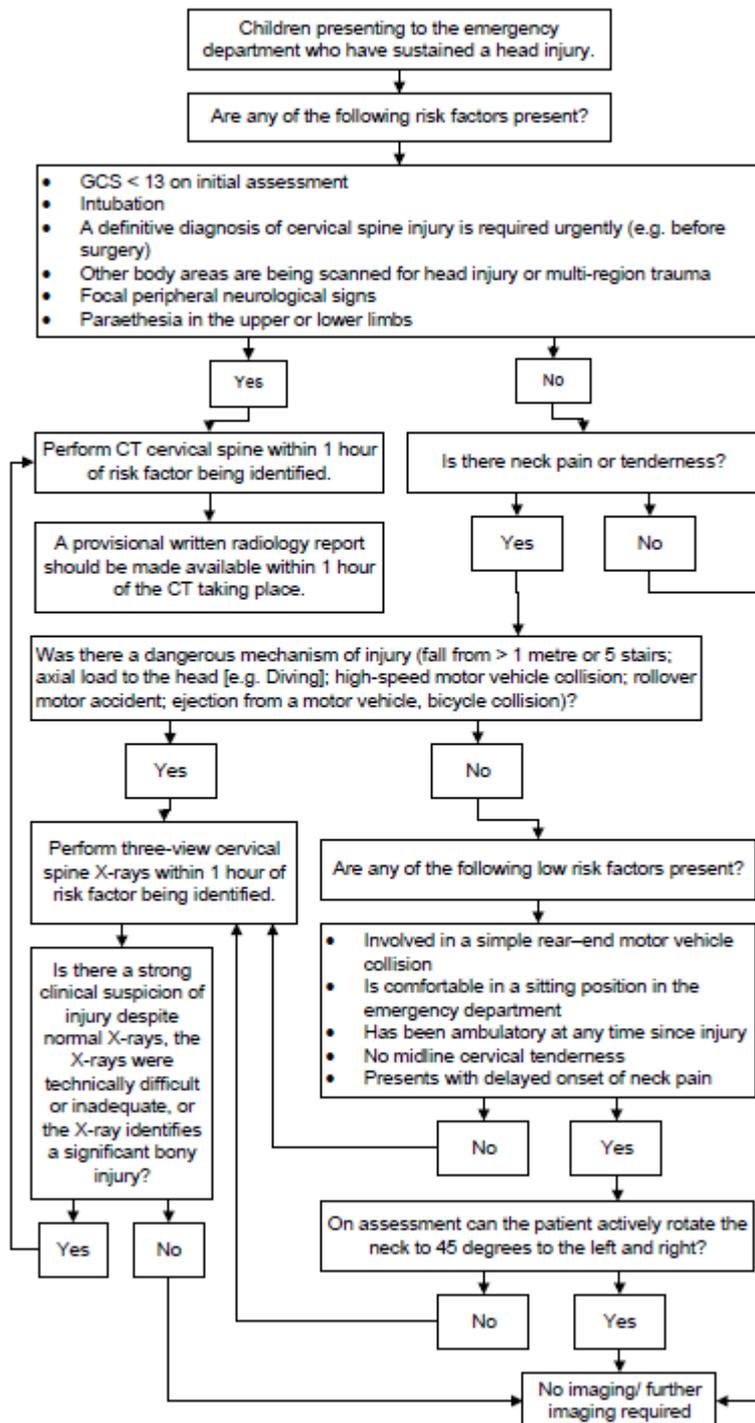
**Algorithm 2: Selection of children for CT head scan**



# CERVICAL SPINE INJURY – NICE 2014

## Please read PAGE 233

**Algorithm 4: Selection of children for imaging of the cervical spine**



## THE LIMPING CHILD

### **Initial Management**

Full history and examination after adequate analgesia

Examination must include back and abdomen in all and genitalia in boys

Check temperature

### **Differential Diagnoses**

1. Any site: Fracture – specifically exclude toddler’s fracture and femoral shaft  
Soft tissue injury  
Septic arthritis – systemically unwell, pyrexial, decreased ROM of joint  
Osteomyelitis – may not be systemically unwell  
Neoplasia – e.g. leukaemia  
Rheumatological conditions
2. Knee: Remember pain in the knee can be referred from the hip
3. Hips: Irritable hip – transient synovitis with effusion that causes painful hip, systemically well, may have had recent viral illness  
Perthe’s disease – an osteochondritis of the upper femoral epiphysis affecting typically 3-10 years  
SUFE – slipped upper femoral epiphysis, typically 8-15 years  
Congenital problem – eg missed developmental dysplasia of the hip
4. Back: e.g. Discitis
5. Abdomen: e.g. Peritonitis, hernias
6. Genitalia: e.g. Testicular torsion

### **Red Flags**

Non-accidental injury

Malignancy

Sickle cell disease

Sepsis

Rheumatology – leg length discrepancy, multiple joint involvement

General – systemically unwell, non-weight bearing, limping > 4 weeks

### **Management**

X-ray all injuries. Also x-ray tibias of toddlers to exclude Toddler’s fracture  
X-rays of hips if systemically well and no history of injury (need frog leg in over 8). Refer to Ortho in RBHSC if abnormal

If x-rays normal prescribe regular analgesia and arrange review in the ED injury review clinic in 48-72 hours

If systemically unwell or red flag symptoms seek senior ED opinion – may need bloods etc.

## FRACTURES

Paediatric bony injuries tend to be different from adults due to the weakness of a child's bone (the ligaments are far stronger than bone) and the presence of growth plates.

The epiphyseal plates mean 2 things:

1. x-rays are harder to look at (especially elbows)
2. fractures tend to occur around these areas.

### **1. Elbow injuries**

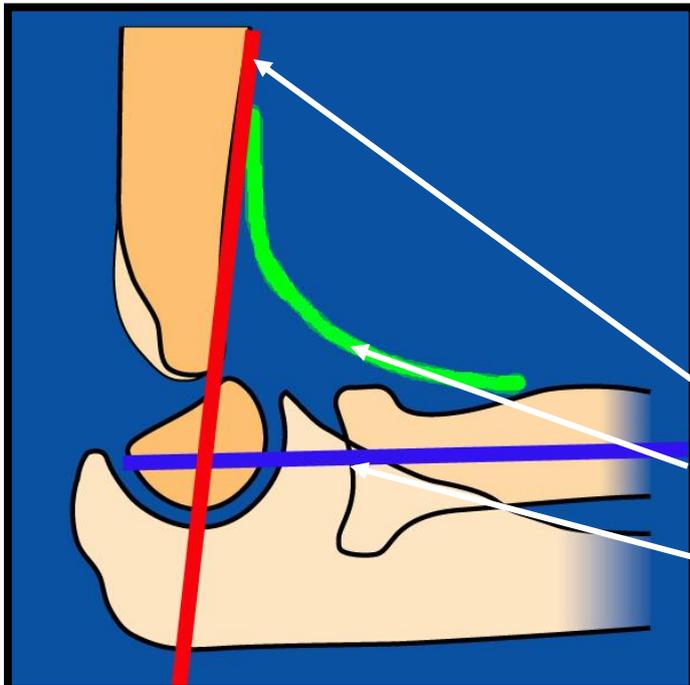
These are very common in children.

Familiarise yourself with a normal lateral x-ray of the elbow.

- Anterior humeral line: important for supracondylar fractures
  - Drawn tangential to anterior humeral cortex on a true lateral view,
  - Normally passes through the middle or posterior third of the ossified capitellum.
  - Note this line is not helpful when the capitellum is small (child < 2 years)
- Radio-capitellar line:
  - drawn bisecting the radial shaft, normally passes through the capitellum on all views;
  - if it does not, suspect radial head or complete elbow joint dislocation
- Fat pads: there are 2 (anterior and posterior)
  - Fat pad displacement is a response to distension of the joint capsule from an effusion or blood – it implies a fracture or serious soft tissue injury

### **Management**

1. Long arm backslab if obvious fracture on x-ray, fat pads or child unable to straighten arm after elbow injury.
2. Refer all fractures to fracture clinic – supracondylar fractures require discussion with fractures that day
3. Review all other elbow injuries in the ED clinics in 10 days



Normal elbow demonstrating radiographic lines:

- anterior humeral line,**
- coronoid line,**
- radio-capitellar line.**

## 2. Salter Harris Fractures

These are very common fractures in children.

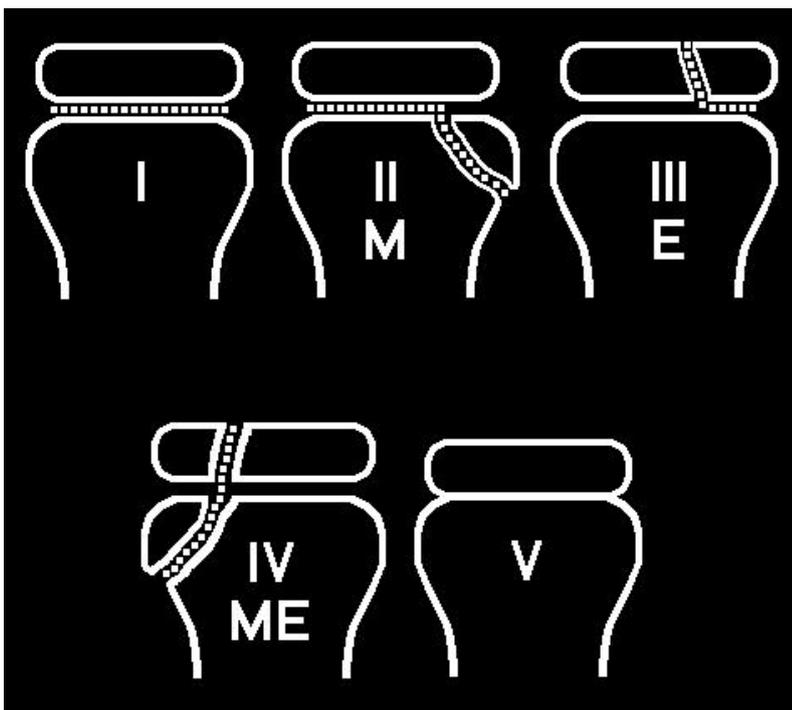
They tend to be missed in the fingers and metacarpals and around ankles.

Type II are the most common.

In children with sore fingers localise pain & request an x-ray of specific part.

Missed fractures occur because x-rays of hands are taken as opposed to an x-ray of the painful finger or metacarpal.

**Salter Harris classification:**



## ZIP ENTRAPMENT IN CHILDREN

Little boys and big boys occasionally zip up too quickly and manage to entrap their foreskins within the zip. Discuss with the child and explain to the parents what is happening.

If a child is very distressed consider immediate ENTONOX OR oral sedation.

15% entrap by the teeth of the zip.

Management: *Cut the zip at its base and it will open releasing the foreskin.*

85% entrap by the zip fastener itself.

Management: *Use topical anaesthetic gel. Try to gently remove zip. If obviously badly trapped may need a GA. Give intranasal diamorphine for the pain (not with midazolam!).*

Alternatively, Entonox and a local anaesthetic injection into the entrapment site or penile block. Then remove the zip.

## NON-ACCIDENTAL INJURY

- *ALL THESE SITUATIONS REQUIRE URGENT CONSULTATION WITH A SENIOR DOCTOR IN SENIOR EMERGENCY DEPARTMENT/PAEDIATRICS.*

Emergency Department SHOs are not expected to diagnose NAI or to confront parents but they are expected to be alert to the possibility and to report any suspicions to a doctor experienced in dealing with such cases.

If you suspect NAI, speak to a senior member of the ED staff or contact the Paediatric Registrar immediately. Make a meticulous record of the history and physical findings and tell the parents that you feel that you need a second opinion on their child.

### **Reasons for suspecting NAI\* include -**

- Abnormal patterns of injury e.g. slap marks, cigarette burns, bite marks
- History inconsistent with type of injury e.g. # long bones in an infant unable to walk
- Unexplained injuries e.g. old bruises
- Delay in presentation
- Child brought to the Emergency Department by someone other than parent
- Abnormal behaviour in child e.g. withdrawn, poor rapport with parent
- Signs of physical neglect
- Frequent attendances

\*Don't forget that there is often an innocent explanation for suspicious situations and diseases (e.g. bleeding disorders) can mimic NAI.

**METICULOUS NOTE KEEPING IS MANDATORY – DO NOT WRITE NAI/?NAI IN THE NOTES. PLEASE RECORD YOUR CONCERNS**  
eg “*I need an experienced opinion to confirm that the history given is consistent with the physical findings*” etc.

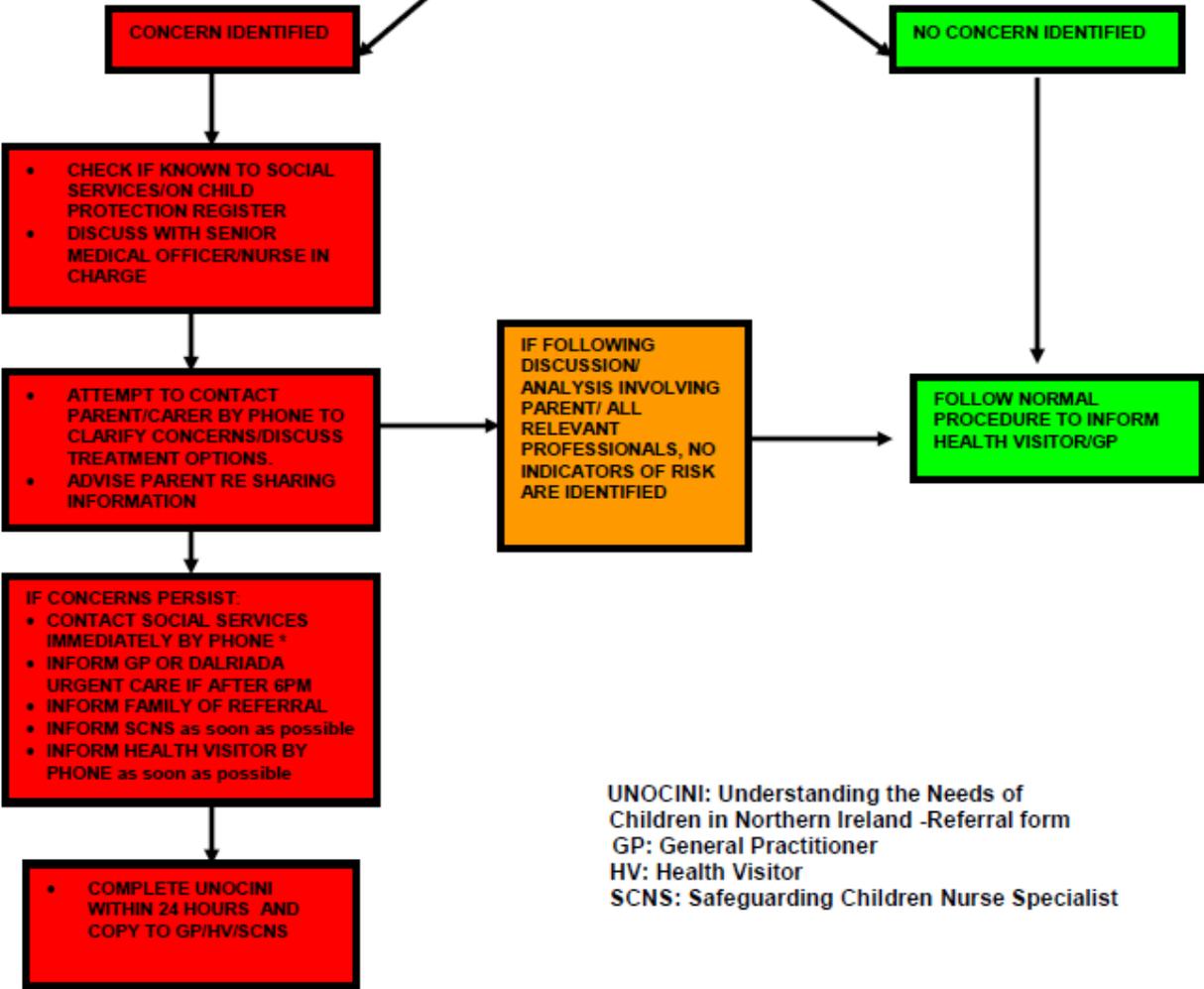
### **Reasons for Suspecting Sexual Abuse include:**

Disclosure or other member of the family  
 Underage pregnancy  
 Genital injury  
 Sexually transmitted disease  
 Precocious sexual behaviour  
 Deliberate self-harm / behaviour problems

# GUIDELINE FOR ED STAFF WHEN A CHILD LEAVES WITHOUT BEING ASSESSED OR TREATED

THE FOLLOWING FLOWCHART IS TO BE USED IN CONJUNCTION WITH ACPC REGIONAL POLICY & PROCEDURES (2005) AND MUST NOT BE USED IN ISOLATION. WHERE THERE IS CONCERN FOR THE WELFARE OF A CHILD ALL STAFF HAVE A DUTY TO REPORT TO SOCIAL SERVICES

A RISK ASSESSMENT MUST BE MADE BASED ON INFORMATION AVAILABLE FROM REGISTRATION AT ED, PLUS ANY OTHER AVAILABLE INFORMATION



UNOCINI: Understanding the Needs of Children in Northern Ireland -Referral form  
 GP: General Practitioner  
 HV: Health Visitor  
 SCNS: Safeguarding Children Nurse Specialist

## PAIN RELIEF

- *Weigh all children to and prescribe analgesia based on weight. Always check the BNF.*

**Paracetamol:** 15mg/kg orally QID

**Ibuprofen:** 5-10mg/kg orally TID

**Morphine:** 0.1mg/kg IV

**Diamorph:** Intranasal use. Use the following guide (also in resus). Add the appropriate amount of water to the diamorphine. The dose to be delivered is 0.2ml of the solution. Draw up extra so that you can prime the atomiser with the solution first.

AGE	EST WGT	MLS to add to 5MG of Diamorphine	MG in 0.2ml of solution
1	10	1.0	1mg
2	12	0.84	1.2mg
3	14	0.72	1.4mg
4	16	0.62	1.6mg
5	18	0.56	1.8mg
6	20	0.50	2mg
7	22	0.46	2.2mg
8	24	0.42	2.4mg
9	26	0.38	2.6mg
19	28	0.36	2.8mg
11	30	0.34	3.0mg
12	32	0.32	3.2mg
13	34	0.30	3.4mg

## **General Approach to the Distressed Child**

*A doctor's rapid but composed response to pain or distress will greatly improve parents' confidence and this will be passed on to their child.*

Many children find hospitals terrifying. In addition they need to cope with the stress and pain of injury or illness. Parents are often as distressed as their child – this can start a vicious cycle. In this situation management of the whole family is required! Reassure parents that you are going to help and comfort their child and appear calm and reassuring. Children cry because of pain and fear but they will also cry with exhaustion, hunger and frustration! Nursing staff are experienced in helping you with this situation.

Non-Pharmacological techniques are an important part of caring for ill and injured children. These include:

- Simple comforting
- Distraction
- Relaxation
- Imagery

Pain must be adequately relieved as soon as possible –this may involve analgesia, splinting, topical treatment etc. Prior to undertaking a potentially distressing procedure such as suturing or changing dressings, sedation(anxiolysis) may be required. Guidelines are overleaf.

Remember that ENTONOX (N<sub>2</sub>O/O<sub>2</sub> 50/50) VIA BLUE&WHITE SHOULDERED CYLINDER is invaluable & can be given to babies and children of any age by self-administration or continuously-supervised parental administration as soon as a distressed child arrives. It wears on & off quickly and safely but is contra-indicated in head injury, systemic illness or pneumothorax/ respiratory illness (remove if any sign of drowsiness to prevent excessive sedation).

## **Femoral Nerve Block**

Use levo-bupivocaine (Plain) 0.5%:

AGE	DOSE (MLS)
<5	1ml per year of life
5-12	5mls
>12	10mls

## SEDATION

- *All children requiring sedation **MUST** be discussed with the Consultant.*

Children who are very distressed may benefit from sedation prior to suturing, etc, under local anaesthetic. It is vital that informed consent is obtained from the child's parent prior to giving sedation – some parents will opt to simply comfort their child during the procedure and this is a perfectly acceptable option.

**Remember to ensure there is adequate staff in the department to safely sedate.**

All children will require observation in the Emergency Department for at least 90 minutes after the administration of the sedation and will require close parental supervision for a further two and a half hours at home. After sedation children require careful continuous monitoring of vital signs and SaO<sub>2</sub> by an experienced nurse.

### **Oral Midazolam**

Oral Midazolam syrup can be used to provide anxiolysis without excessive sedation. Dose is 0.5mg/kg.

### **Ketamine**

This should only be performed in the presence of Consultant Staff. The following is the CEM guidelines (due to be revised this year so may change).

#### **Introduction**

Ketamine is a unique dissociative drug introduced into clinical practice in 1970. It has anxiolytic, analgesic, amnesic and dissociative properties with a wide safety margin. It is most commonly used to facilitate short painful procedures, such as suturing under local anaesthetic, removal of a foreign body or brief orthopaedic manipulations.

Before ketamine is used all other options should be fully considered, including analgesia, reassurance, distraction, entonox, intranasal diamorphine, etc.

The doses advised for analgesic sedation are designed to leave the patient capable of protecting their airway. There is a significant risk of a failure of sedation if the procedure is prolonged, and the clinician must recognise that the option of general anaesthesia may be preferred in these circumstances.

Ketamine should be only used by clinicians experienced in its use and capable of managing any complications, particularly airway obstruction, apnoea and laryngospasm. There should be a documentation and audit system in place within a system of clinical governance.

**Indications:** (Evidence Levels 2-3)

Ketamine can be used to induce analgesic sedation in children who will need a painful or frightening procedure during the course of their emergency care. It can be used instead of general anaesthesia for minor and moderate procedures in combination with local anaesthetic techniques.

It avoids the need to physically restrain a child.

Trials suggest over 90% efficacy for parenteral Ketamine.

There is no evidence of improved emergence phenomena if midazolam is used as a supplement. (Evidence level 2)

There is no evidence of reduced airway problems if atropine is used as a supplement with low dose ketamine. (Evidence level 3)

**Contraindications:** (Evidence levels 4 and 5)

- Age less than 12 months due to an increased risk of laryngospasm and airway complications. Children aged between 12 and 24 months should only receive ketamine sedation from expert staff (usually a consultant)
- A high risk of laryngospasm (active respiratory infection, active asthma)
- Unstable or abnormal airway. Tracheal surgery or stenosis.
- Active upper or lower respiratory tract infection
- Proposed procedure within the mouth or pharynx
- Patients with severe psychological problems such as cognitive or motor delay or severe behavioural problems.
- Significant cardiac disease (angina, heart failure, malignant hypertension)
- Recent significant head injury or reduced level of consciousness
- Intracranial hypertension with CSF obstruction.
- Intra-ocular pathology (glaucoma, penetrating injury)
- Previous psychotic illness
- Uncontrolled epilepsy
- Hyperthyroidism or Thyroid medication
- Porphyrin
- Prior adverse reaction to Ketamine

**Procedure:**

1. Discuss the proposed procedure and use of ketamine with parent or guardian and obtain written consent. The known risks are: mild agitation (20%), moderate/severe agitation (1-5%), rash (10%), vomiting (7%), transient clonic movements (5%), airway problems (1%). It is important to emphasise to the consenting adult that nystagmus, purposeless movements and some degree of dissociation are normal during ketamine sedation, so that these are expected.

2. The child should be managed in a high dependency or resuscitation area with immediate access to full resuscitation facilities. Monitoring should include ECG, blood pressure, respiration and pulse oximetry. Supplemental oxygen should be given and suction must be available.

3. At least three staff are required: a doctor to manage the sedation and airway, a

clinician to perform the procedure and an experienced nurse to monitor and support the patient, family and clinical staff. Observations should be regularly taken and recorded.

4. The doctor managing the ketamine sedation and airway should be suitably trained and experienced in ketamine use, with a full range of advanced airway skills.

5. There is no evidence that complications are reduced if the child is fasted, however traditional anaesthetic practice favours a period of fasting prior to any sedative procedure. The fasting state of the child should be considered in relation to the urgency of the procedure, but recent food intake should not be considered as an absolute contraindication to ketamine use.

6. Where time permits, topical anaesthesia (EMLA, Amytop, etc.) should be used to reduce the pain of intravenous cannulation or intramuscular injection.

7. The dose of ketamine is 1.0 mg/kg by slow intravenous injection over at least one minute or 2.5mg/kg IM as a single injection in the lateral aspect of the thigh. The dose should be based on the child's actual weight, not age. Caution and careful checking are required in drawing up the correct dose since there are three different formulations of ketamine available (10mg/l, 50mg/ml and 100mg/ml). A dose chart showing the correct dose and volume to be given according to the child's weight is valuable in preventing errors (see Appendix Two for an example of such a chart).  
Ketamine Sedation of Children in EDs September 2009 - 4 -

8. Encourage the child to child and parents to talk (dream) about happy topics. This helps minimise unpleasant emergency phenomena

9. Adequate sedation is usually indicated by loss of response to verbal stimuli and nystagmus: heart rate, blood pressure and respiration rate may all increase slightly. Lacrimation or salivation may be observed. The effects of the drug are usually apparent 1-2 minutes after an IV dose, and 5 minutes after an IM dose.

10. Supplemental doses of 0.5mg/kg by slow IV injection or 1mg/kg IM may be given if required.

11. Local anaesthetic should be used where indicated.

12. After the procedure the child should recover in a quiet, observed and monitored area under the continuous observation of a trained member of staff. Recovery should be complete between 60 and 120 minutes, depending on the dose and route used.

13. The child can be safely discharged once they are able to ambulate and Vocalise / converse at pre-sedation levels. An advice sheet should be given to the parent or guardian advising rest and quiet, supervised activity for the remainder of that day. The child should not eat or drink for two hours after discharge because of the risk of nausea and vomiting.

14. The medical record and local audit documentation should be completed.

15. At the end of the procedure ensure that any remaining ketamine is discarded, and that this is witnessed. The empty bottle can then be placed in a sharps bin.

**Potential Complications:** (evidence level 2, 3, 4)

## Airway:

- Noisy breathing is usually due to airway mal-position and occurs at an incidence of <1%. This can normally be corrected by routine airway position management.

- In rare cases laryngospasm may occur (0.3%). The reported incidence of intubation for laryngospasm is 0.02%. A recent meta-analysis showed that low IM doses of ketamine (<3.0

mg/kg) exhibited significantly less overall airway and respiratory adverse events. There were

no. occurrences of either laryngospasm or apnoea in the 682 children receiving lower IM doses. (Green et al, 2008)

Vomiting: 5 - 10% incidence. This usually occurs during the recovery phase.

Lacrimation and salivation: 10% incidence

Transient rash: 10% incidence

Transient clonic movements: <5%