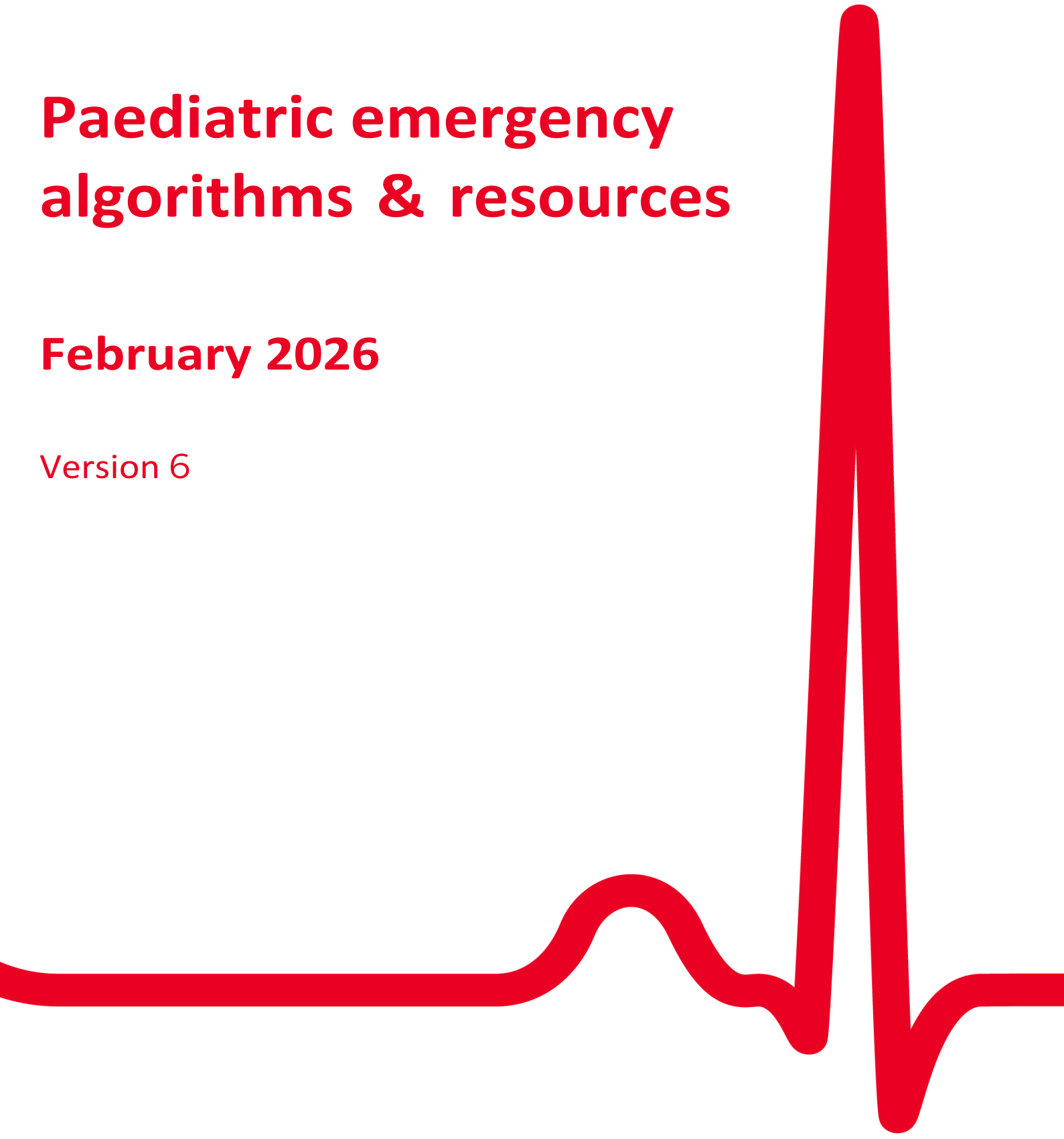
Resuscitation Council UK

GUIDELINES 2025

Paediatric emergency algorithms & resources

February 2026

Version 6



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GUIDELINES 2025

Paediatric emergency algorithms & resource folder

Contents

- **Document updated to reflect 2025 guidelines**
- **Anaphylaxis to be reviewed in 2026**

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Paediatric emergency drug chart

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		Adrenaline	Fluid bolus	Glucose	Tracheal tube		Defibrillation*
					Uncuffed	Cuffed	
Strength		**1:10,000 (1 mg in 10 mL (100 mcg mL^{-1}))**	**Balanced isotonic crystalloid OR, 0.9% saline**	**10%**			
Dose		**10 mcg kg^{-1}**	**10 mL kg^{-1}**	**2 mL kg^{-1}**			**4 joules kg^{-1}**
Route		**IV, IO**	**IV, IO**	**IV, IO**			**Transthoracic**
Notes			**Consider warmed fluids**	**For known hypoglycaemia** Recheck glucose 5–10 min after dose and repeat as required		**Monitor cuff pressure**	**Monophasic or biphasic**
Age	**Weight kg**	**mL**	**mL**	**mL**	**ID mm**	**ID mm**	**Manual**
< 1 month	3.5	0.35	35	7	3.0	N/A	20
1 month	4	0.4	40	8	3.0–3.5	3.0	20
3 months	5	0.5	50	10	3.5	3.0	20
6 months	7	0.7	70	14	3.5	3.0	30
1 year	10	1.0	100	20	4.0	3.5	40
2 years	12	1.2	120	24	4.5	4.0	50
3 years	14	1.4	140	28	4.5–5.0	4.0–4.5	60
4 years	16	1.6	160	32	5.0	4.5	70
5 years	18	1.8	180	36	5.0–5.5	4.5–5.0	80
6 years	20	2.0	200	40	5.5	5.0	80
7 years	23	2.3	230	46	5.5–6.0	5.0–5.5	100
8 years	26	2.6	260	**50**	–	6.0–6.5	110
10 years	30	3.0	300	**50**	–	7.0	120
12 years	38	3.8	380	**50**	–	7–7.5	150
14 years	**50**	**5.0**	**500**	**50**	**–**	**7–8**	**150**
Adolescent	**50**	**5.0**	**500**	**50**	**–**	**7–8**	**150**
Adult	**70**	**10.0**	**500**	**50**	**–**	**7–8**	**150**

Cardioversion	Synchronised shock, 1.0 joules kg^{-1}, doubling the energy with each subsequent attempt up to a maximum of 4 J kg^{-1} if unsuccessful.			
Amiodarone	5 mg kg^{-1} IV/IO bolus (max 300 mg) in cardiac arrest after 3rd and 5th shocks. Flush with 0.9% saline or 5% glucose (over 60 min if child is NOT in cardiac arrest).			
Atropine	20 mcg kg^{-1} IV (max 600 mcg).			
Calcium gluconate 10%	Unstable arrhythmia due to hyperkalaemia 0.5 mL kg^{-1} IV over 5–10 min (max 30 mL), repeat after 5–10 min if ECG changes persist.			
Lorazepam	100 mcg kg^{-1} IV/IO (max 4 mg) for treatment of seizures. Can be repeated after 10 min.			
Adenosine	IV/IO for treatment of SVT. Requires a large saline flush and ECG monitoring.	**Neonate:** 150 mcg kg^{-1}, increase dose in steps of 50–100 mcg kg^{-1} every 1–2 min for repeat doses (max 300 mcg kg^{-1}).	**Infants > 1 month & children up to 17 years:** 0.1–0.2 mg kg^{-1} (100-200 mcg kg^{-1}). If SVT persists, give a 0.3 mg kg^{-1} (300 mcg kg^{-1}) (max. 12–18 mg) after at least 1 min.	
Anaphylaxis	Adrenaline 1:1000 IM. Can be repeated after 5 min. After 2 IM injections, treat as refractory anaphylaxis and start low-dose adrenaline infusion IV.	**< 6 months:** 100–150 mcg (0.1–0.15 mL)	**> 6 months–6 years:** 150 mcg (0.15 mL)	**> 6–12 years:** 300 mcg (0.3 mL)	**> 12 years:** 500 mcg (0.5 mL)

Weights averaged on lean body mass from 50th centile weights for males and females.

Drug doses based on Resuscitation Council UK Guidelines 2025 recommendations.

Recommendations for tracheal tubes are based on full-term neonates.

For newborns, glucose at 2 mL kg^{-1} is recommended.

*Defibrillation: Refractory VF/pVT post 5th shock Infant/child: Increase energy stepwise, up to a maximum of 8 J kg^{-1} (max 360 J). Adolescents: Increase energy to 360 J.

Updated Feb 2026

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Paediatric basic life support

Maintain personal safety

Unresponsive

Call for help/activate 2222

Open airway

Breathing normally, signs of life?

NO or any doubt

5 rescue breaths

- Competent providers should use bag-mask ventilation with oxygen
- If unable/unsafe to ventilate perform continuous chest compressions, ventilate as soon as possible

If no signs of life observed during rescue breaths, immediately commence chest compressions

- 15 chest compressions : 2 breaths
- Attach defibrillator when available

Follow PAEDIATRIC ADVANCED LIFE SUPPORT ALGORITHM on arrival of in-hospital resuscitation team

YES

Assess ABCDE
O_2 monitoring, vascular access

Call further assistance as appropriate

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Paediatric out-of-hospital basic life support

Maintain personal safety

Unresponsive

Shout for help

→ **Second rescuer** or single rescuer suspecting a primary cardiac arrest
- Call 999 and ask for ambulance service
- Collect AED

Open airway

Breathing normally?

→ **YES**

Observe and re-assess as necessary

NO or any doubt

5 rescue breaths

Infant: mouth-to-nose/mouth

Child: mouth-to-mouth

If unable/unsafe to ventilate, perform continuous chest compressions

Add rescue breaths as soon as possible

→ **Single rescuer**
- Call ambulance service if phone available, using speaker function
- If no phone available continue with CPR for 1 min before calling ambulance service

If no signs of life observed during rescue breaths

30 chest compressions followed by 2 rescue breaths

Continue CPR 30:2

As soon as AED arrives
switch it on and follow instructions

Continue CPR until the ambulance service arrives

*Chest compression : Ventilation ratio can be 30:2 or 15:2 depending on what the bystander is familiar with/ or is directed to do by the emergency dispatcher.

Those trained only in 'adult' BLS (may include healthcare providers and lay rescuers) who have no specific knowledge of paediatric resuscitation, should use the adult sequence they are familiar with, including paediatric modifications.

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Paediatric advanced life support

Maintain personal safety

Identify and treat reversible causes early

Recognise cardiorespiratory arrest
No signs of life or bradycardia < 60 min^{-1} with poor perfusion.

↓

Call resuscitation team/ambulance service

↓

Commence/continue BLS
CPR 15 : 2
Attach defibrillator and minimise interruptions

↓

Assess rhythm

SHOCKABLE
VF/Pulseless VT

1st shock 4 J kg^{-1}
from 5th shock escalate stepwise to 8 J kg^{-1} (max 360 J) for refractory VF/pVT

Immediately resume CPR for 2 min
Minimise interruptions

After 3 shocks give:
Adrenaline IV/IO 10 mcg kg^{-1} (and then every 3–5 min)
AND
Amiodarone IV/IO 5 mg kg^{-1} (and repeat 5 mg kg^{-1} once more only after 5th shock)

Return of spontaneous circulation (ROSC)

NON-SHOCKABLE
PEA/asystole/brady < 60 min^{-1}

Immediately resume CPR for 2 min
Minimise interruptions

Give adrenaline IV/IO 10 mcg kg^{-1}
as soon as possible and then every 3–5 min

High-quality chest compressions and:

- Ensure correct rate, depth and full recoil
- Provide BMV with 100% oxygen (2 person approach)
- Continuous compressions if tracheal tube or SGA inserted
- Use waveform capnography and ventilate at a rate (breaths minute^{-1}) of:

Infants	1–8 years	8–12 years	> 12 years
25	20	15	10

- Vascular access IV/IO
- Once started, give adrenaline every 3–5 min
- Maximum single dose adrenaline 1 mg
- Maximum single dose amiodarone 300 mg after the 3rd shock and 150 mg after the 5th shock

Reversible causes:

- Hypoxia
- Hypovolaemia
- Hyper-hypokalaemia, -calcaemia, -magnesaemia, hypoglycaemia (metabolic)
- Hypo-hyperthermia
- Thrombosis (coronary/ pulmonary)
- Tension pneumothorax
- Tamponade (cardiac)
- Toxins

Immediately after ROSC:

- Use an ABCDE assessment
- Aim for SpO_2 of 94–98% and normal $PaCO_2$
- Maintain SBP and mean > 10th percentile
- Avoid/manage hypothermia
- Glucose control
- Treat precipitating cause

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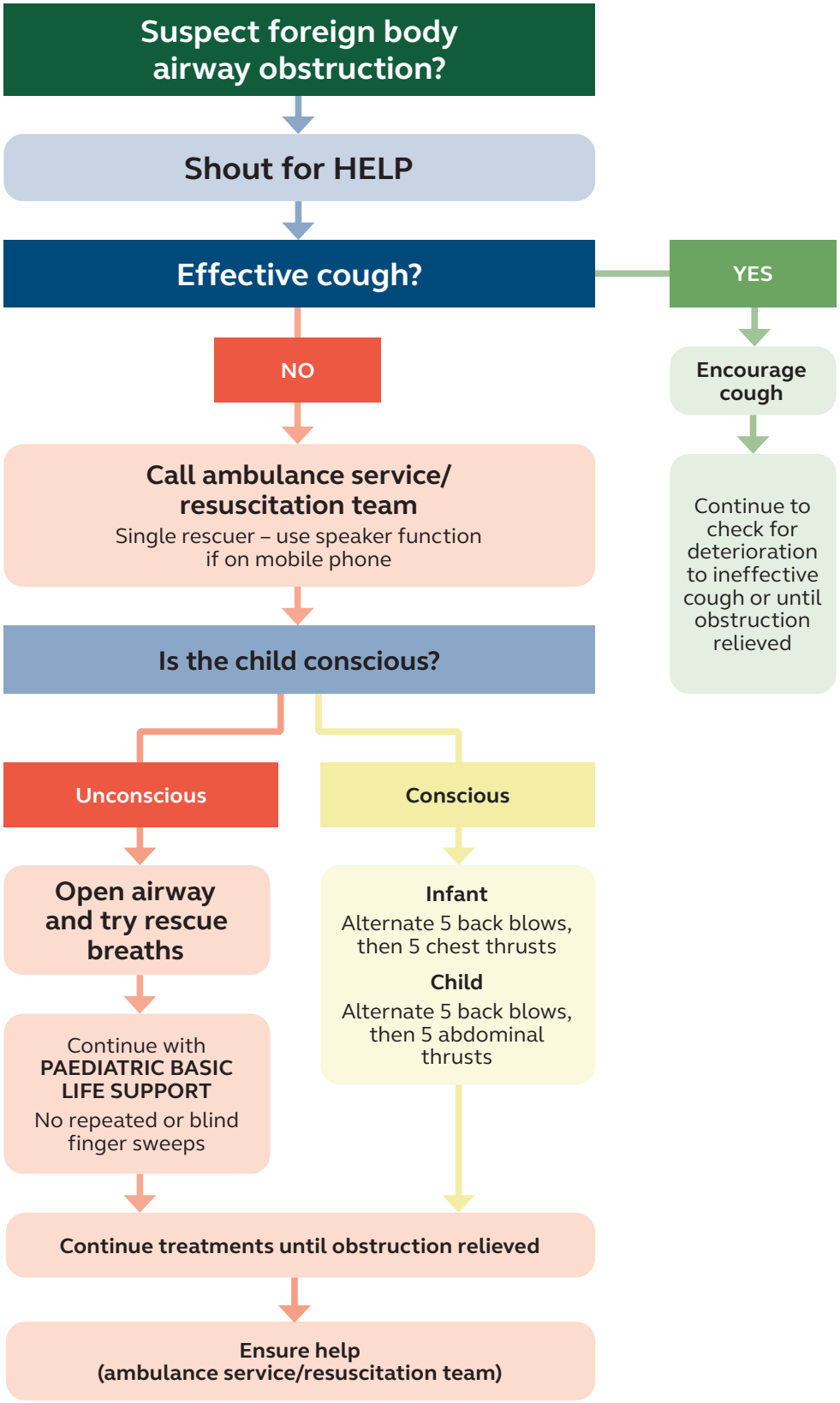
Paediatric choking



Anaphylaxis

Anaphylaxis?

A = Airway **B** = Breathing **C** = Circulation **D** = Disability **E** = Exposure

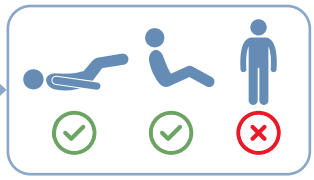
Diagnosis – look for:

- Sudden onset of Airway and/or Breathing and/or Circulation problems[1]
- And usually skin changes (e.g. itchy rash)

Call for HELP

Call resuscitation team or ambulance

- Remove trigger if possible (e.g. stop any infusion)
- Lie patient flat (with or without legs elevated)
  - A sitting position may make breathing easier
  - If pregnant, lie on left side



Give intramuscular (IM) adrenaline[2]

Inject at **anterolateral aspect** – middle third of the thigh

- Establish airway
- Give high flow oxygen
- Apply monitoring: pulse oximetry, ECG, blood pressure

If no response:

- Repeat IM adrenaline after 5 minutes
- IV fluid bolus[3]

If no improvement in Breathing or Circulation problems[1] despite TWO doses of IM adrenaline:

- Confirm resuscitation team or ambulance has been called
- Follow REFRACTORY ANAPHYLAXIS ALGORITHM

1. Life-threatening problems

Airway
Hoarse voice, stridor

Breathing
↑work of breathing, wheeze, fatigue, cyanosis, SpO_2 < 94%

Circulation
Low blood pressure, signs of shock, confusion, reduced consciousness

2. Intramuscular (IM) adrenaline

Use adrenaline at 1 mg/mL (1:1000) concentration

Adult and child > 12 years:	500 micrograms IM (0.5 mL)
Child 6–12 years:	300 micrograms IM (0.3 mL)
Child 6 months to 6 years:	150 micrograms IM (0.15 mL)
Child < 6 months:	100–150 micrograms IM (0.1–0.15 mL)

The above doses are for IM injection **only**.
Intravenous adrenaline for anaphylaxis to be given **only by experienced specialists** in an appropriate setting.

3. IV fluid challenge

Use crystalloid

Adults:	500–1000 mL
Children:	10 mL/kg

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Refractory anaphylaxis

No improvement in respiratory or cardiovascular symptoms despite 2 appropriate doses of intramuscular adrenaline

Establish dedicated peripheral IV or IO access

Seek expert[1] help early
Critical care support is essential

Give rapid IV fluid bolus
e.g. 0.9% sodium chloride

&

Start adrenaline infusion
Adrenaline is essential for treating all aspects of anaphylaxis

Give IM* adrenaline every 5 minutes until adrenaline infusion has been started
*IV boluses of adrenaline are not recommended, but may be appropriate in some specialist settings (e.g. peri-operative) while an infusion is set up

Give high flow oxygen
Titrate to SpO_2 94–98%

Monitor HR, BP, pulse oximetry and ECG for cardiac arrhythmia
Take blood sample for mast cell tryptase

Follow local protocol
OR

Peripheral low-dose IV adrenaline infusion:
- 1 mg (1 mL of 1 mg/mL [1:1000]) adrenaline in 100 mL of 0.9% sodium chloride
- Prime and connect with an infusion pump via a dedicated line

DO NOT 'piggy back' on to another infusion line

DO NOT infuse on the same side as a BP cuff as this will interfere with the infusion and risk extravasation

- In both adults and children, start at 0.5–1.0 mL/kg/hour, and **titrate according to clinical response**
- Continuous monitoring and observation is mandatory
- ↑↑ BP is likely to indicate adrenaline overdose

Continue adrenaline infusion and treat ABC symptoms
Titrate according to clinical response

[1]Intravenous adrenaline for anaphylaxis to be given only by experienced specialists in an appropriate setting.

A = Airway

Partial upper airway obstruction/stridor:
Nebulised adrenaline (5 mL of 1 mg/mL)

Total upper airway obstruction:
Expert help needed, follow difficult airway algorithm

B = Breathing

Oxygenation is more important than intubation

If apnoeic:
- Bag mask ventilation
- Consider tracheal intubation

Severe/persistent bronchospasm:
- Nebulised salbutamol and ipratropium with oxygen
- Consider IV bolus and/or infusion of salbutamol or aminophylline
- Inhalational anaesthesia

C = Circulation

Give further fluid boluses and titrate to response:
Child 10 mL/kg per bolus
Adult 500–1000 mL per bolus
- Use glucose-free crystalloid (e.g. Hartmann's Solution, Plasma-Lyte®)

Large volumes may be required (e.g. 3–5 L in adults)

Place arterial cannula for continuous BP monitoring

Establish central venous access

IF REFRACTORY TO ADRENALINE INFUSION
Consider adding a second vasopressor **in addition** to adrenaline infusion:
- Noradrenaline, vasopressin or metaraminol
- In patients on beta-blockers, consider glucagon

Consider extracorporeal life support

Cardiac arrest – follow ALS ALGORITHM

- Start chest compressions early
- Use IV or IO adrenaline bolus (cardiac arrest protocol)
- Aggressive fluid resuscitation
- Consider prolonged resuscitation/extracorporeal CPR

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Paediatric cardiac arrhythmias

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Assess with ABCDE approach – recognise and treat reversible causes
Oxygen if SpO_2 < 94%, respiratory rate, heart rate, CRT, cardiac monitoring, blood pressure, vascular access, AVPU

Signs of circulation?

NO → Follow **ADVANCED LIFE SUPPORT ALGORITHM**

YES

Decompensated – seek expert help

Signs of vital organ perfusion compromise:
Reduced conscious level, tachypnoea, bradycardia / tachycardia, BP < 5th centile*, CRT > 2 secs, weak or impalpable peripheral pulses

Compensated

Normal conscious level, +/- respiratory distress and signs of circulatory compromise, BP > 5th centile*

Monitor for clinical deterioration and seek expert help

Treat the cause:
- If bradycardia, consider oxygenation and vagal tone
- If SVT, consider vagal manoeuvres
- Reassess
- Consider adenosine

Bradycardia

< 1 year < 80 min^{-1}
> 1 year < 60 min^{-1}

- **Optimal oxygenation** with positive pressure ventilation if required
- **If unconscious and HR < 60 min^{-1} despite oxygenation, start chest compressions**
- **No response to oxygenation:**
  - If vagal stimulation possible cause – atropine
  - If no response to oxygenation or atropine consider adrenaline
- **Pacing – very rarely required and guided by aetiology**

Tachycardia

Narrow complex

Sinus tachycardia

Infant typically 180–220 min^{-1}
Child typically 160–180 min^{-1}
Gradual onset

- **Treat the cause:**

Physiological response:
- Crying
- Exercise
- Anxiety/fear
- Pain

- **Identify precipitant**

Compensatory mechanism:
- Respiratory/circulatory failure
- Hypovolaemia
- Sepsis
- Anaemia

SVT

Infant > 220 min^{-1}
Child > 180 min^{-1}
Abrupt onset

- Synchronised cardioversion with appropriate sedation + analgesia (e.g. IM/intranasal ketamine if delay in IV access)
- Chemical cardioversion may be 1st choice if suitable IV access is in place and delay in synchronised cardioversion
- Adenosine
- Consider amiodarone before 3rd shock

Broad complex

VT

Could be VT or SVT, if unsure treat as VT

- **If conscious:**
  - Synchronised cardioversion with appropriate sedation + analgesia (e.g. IM/intranasal ketamine if delay in IV access, **do not delay cardioversion)**
- **If unconscious:**
  - Immediate synchronised cardioversion
  - Consider amiodarone before 3rd shock

Drug	Atropine	Adrenaline	Adenosine	Amiodarone	Synchronised cardioversion	Magnesium
Treatment	**Up to 11 years:** 20 mcg kg^{-1} (max. 0.5 mg) **12–17 years:** 300–600 mcg, larger doses may be used in emergency	**For bradycardia:** 1–2 mcg kg^{-1} or continuous infusion	**Infants > 1 month & children up to 17 years**: 0.1–0.2 mg kg^{-1} (100-200 mcg kg^{-1}) **If the SVT persists:** give a 0.3 mg kg^{-1} (300 mcg kg^{-1}) (max. 12–18 mg) after at least 1 min.	5 mg kg^{-1} – by SLOW IV infusion (> 20 min) before 3rd cardioversion in discussion with paediatric cardiologist/expert	With appropriate sedation + analgesia (e.g. IM/intranasal Ketamine if delay in IV access + airway management) – IV access attempts must not delay cardioversion **1st shock:** 1 J kg^{-1} **Subsequent shocks:** doubling the energy with each subsequent attempt up to a max of 4 J kg^{-1}	25–50 mg kg^{-1} (max. 2 g) to be given over 10–15 min, may be repeated once if necessary, in Torsades de pointes VT

Age	*Systolic BP 5th centile mmHg
1 month	50
1 year	70
5 years	75
10 years	80

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Acute asthma in children

Acute asthma in children aged 2–12 years

These clinical features increase the probability of a diagnosis of asthma:

- More than one of the following: wheeze, cough, difficulty breathing and chest tightness. The risk is increased if these symptoms are recurrent, worse at night or in the early morning, occur during or after exercise or trigger dependent (e.g. with exposure to pets, cold, humidity, heightened emotions or occurring independent of upper respiratory tract infections).
- Personal history of atopic disorder.
- Family history of atopic disorder and/or asthma.
- Widespread wheeze heard on auscultation.
- History of improvement in symptoms or lung function in response to adequate therapy.

Acute asthma in children under 2 years

The assessment of acute asthma in early childhood can be difficult.

- Intermittent wheezing attacks are usually due to viral infection and the response to asthma medication is inconsistent.
- Prematurity and low birth weight are risk factors for recurrent wheezing.
- The differential diagnosis of symptoms includes: aspiration pneumonitis, pneumonia, bronchiolitis, tracheomalacia, complications of underlying conditions such as congenital anomalies and cystic fibrosis.

Classification of severity of acute presentation

Moderate asthma
Normal mental state.
Ability to talk in sentences or vocalise as normal.
Some accessory muscle use.
PEF ≥ 50% of best or predicted.
O_2 saturations > 92% in air.
Moderate tachycardia.
HR ≤ 125 min^{-1} (> 5 years)
HR ≤ 140 min^{-1} (2–5 years)
RR ≤ 30 min^{-1} (> 5 years)
RR ≤ 40 min^{-1} (2–5 years)
Management
Continuous O_2 saturation monitoring.
High-flow O_2 via face mask titrated to achieve O_2 saturations 94–98%.
ß2 agonist 2–10 puffs via pMDI + spacer
+/-face mask, repeat dose every 20 min reviewing effect; no improvement in 1 h treat as acute severe.
Ipratropium bromide given early via pMDI.
+ spacer +/- face mask, particularly if poorly responsive to ß2 agonist.
Oral steroids: prednisolone 20 mg for children aged 2 to 5 years; 30 to 40 mg for children > 5 years.

Acute severe asthma
Agitated, distressed.
Cannot complete sentences in one breath, or too breathless to talk or feed.
Moderate to marked accessory muscle use.
PEF 33–50% of best or predicted.
O_2 saturations < 92% in air
HR > 125 min^{-1} (> 5 years)
HR > 140 min^{-1} (2–5 years)
RR > 30 min^{-1} (> 5 years)
RR > 40 min^{-1} (2–5 years)
Management
Continuous O_2 saturation monitoring.
High-flow O_2 via face mask titrated to achieve O_2 saturations 94–98%.
ß2 agonist nebulised (salbutamol 2.5–5 mg) every 20 min with Ipratropium bromide (250 mcg) for first 2 h; review frequently.
Consider adding **magnesium sulfate** to each nebulised **salbutamol** and **ipratropium bromide** in the first hour.
Oral steroids: 20 mg prednisolone for children aged 2 to 5 years; 30 to 40 mg for children > 5 year.
Consider intravenous **magnesium** and **aminophylline** if the child is unresponsive to maximal doses of bronchodilators and steroids.
Consider ABG if poor response to early treatment .
Refer to PICU.

Life-threatening asthma
SpO_2 < 92%, plus any one of the following in a child with severe asthma:
- Silent chest
- Cyanosis
- Poor respiratory effort
- Hypotension
- Exhaustion
- Confusion
- PEF < 33% best or predicted
Management
Continuous O_2 saturation monitoring.
High-flow O_2 via face mask titrated to achieve O_2 saturations 94–98%.
Refer to PICU.
ß2 agonist nebulised (salbutamol 2.5–5 mg) every 20 min with **Ipratropium bromide** (250 mcg) for first 2 h; review frequently.
Oral steroids: 20 mg prednisolone (2–5 years); 30 to 40 mg (> 5 years). Repeat dose if vomiting or consider intravenous steroids (hydrocortisone 4 mg kg^{-1} every 4 h)
Give bolus of **intravenous magnesium.**
Consider early single bolus dose of IV salbutamol where child has responded poorly to inhaled therapy followed by an infusion
Consider **aminophylline** if child unresponsive to maximal doses of bronchodilators and steroids
Consider ABG if poor response to early treatment.

pMDI – pressurised metered-dose inhalers

Note: Evidence is unclear which of intravenous salbutamol, aminophylline or magnesium should be the first line in severe asthma.

Early management of asthma. Based on the British Thoracic Society, Scottish Intercollegiate Guidelines Network, British guideline on the management of asthma, revised November 2024

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Treating convulsive status epilepticus in children

SEIZURE STARTS

Management

- Confirm clinically.
- Check ABC, high-flow O_2, attach monitoring, IV/IO access.
- Check blood glucose, treat < 2 mmol L^{-1}
- Treat underlying cause: infection, intoxication, intracranial hypertension, electrolyte disorder, channelopathies.

5 MIN

1st line agents

- Consider pre-hospital treatment already given: 2 doses of benzodiazepines max.
  - **midazolam 0.3 mg kg^{-1}** buccal or intranasal 0.2 mg kg^{-1} IM (max 10 mg) (see BNFc for exact age related dose).
  - **diazepam 0.5 mg kg^{-1}** rectal (max 20 mg).

IF IV/IO access: OR **lorazepam** 0.1 mg kg^{-1} IV/IO (max 4 mg).
OR **midazolam** 0.15 mg kg^{-1} IV/IO (max 10 mg).

10 MIN

- Reassess, give 2nd dose.
  - **Lorazepam** 0.1 mg kg^{-1} IV/IO (max 4 mg)

OR **Midazolam** 0.15 mg kg^{-1} IV/IO (max 10 mg).

Reconfirm epileptic seizure and prepare 2nd line agent of choice for next step.

15–20 MIN

2nd line agents

- **Levetiracetam** 40–60 mg kg^{-1} IV over 5 min, (max 4.5 g)

If Levetiracetam is **not** available use:

- **phenytoin*** 20 mg kg^{-1} IV over 20 min (max 1.5 g with ECG monitoring)

OR **phenobarbital** 20 mg kg^{-1} IV max 1 mg kg^{-1} min^{-1} (max 1 g)

OR **valproid acid**** 40 mg kg^{-1} IV over 15 min (max 3 g)

Call anaesthetist and PICU

30–40 MIN

3rd line agents

- If preparation for deeper anaethesia with I+V complete, proceed to next step.

OR Administer further alternative second-line drug (levetiracetam, phenytoin, phenobarbitol).

No later than 40 MIN

Emergency anaesthesia using either:
- ketamine
- thiopental
- propofol
- midazolam

With single dose rocuronium if using NMB

- Consult paediatric neurologist
  - EEG monitoring.
  - Consider brain imaging.
  - Monitor for complications, e.g. respiratory and haemodynamic instability, renal dysfunction, metabolic disturbances, and adverse drug effects.

- Definition of convulsive status epilepticus (CSE) is a seizure that continues for greater than 5 min, so treatment usually starts once seizure has lasted > 5 min.
- After 5 min seizures are unlikely to spontaneously terminate.
- The risk of a seizure becoming refractory increases with increasing seizure duration.
- Children who frequently have seizures or CSE usually have an individually tailored guideline.
- Do not give phenytoin too rapidly as it will cause bradycardia and/or asystole.
- In sepsis consider measuring calcium and magnesium levels as they are sometimes low.
- Monitor glucose aim for 4-8 mmol L^{-1}.
- Measure serum sodium and treat if < 125 mmol L^{-1} (3 mL kg^{-1} 3% sodium chloride).
- Consider temperature control measures if hyperthermic.
- Consider meningitis, encephalitis and Raised ICP.
- Consider CNS haemorrhage if signs of trauma.
- There is no evidence for the ideal third line agent: thiopentone, propofol, ketamine and midazolam may all be used.

https://www.nice.org.uk/guidance/ng217 Epilepsies in children, young people and adults. NICE guidelines NG217 (updated Apr 2022)

* **Phenytoin:** monitor ECG and BP, caution with cardiopathies, arrhythmias and AV blocks.

** **Valproic** acid should be avoided in pregnant teenagers, suspected liver failure or metabolic disease.

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Early management of diabetic ketoacidosis (DKA) in children

adapted from NICE NG18 (updated 2023) and BSPED Guideline for the Management of Children and Young People under the age of 18 years with Diabetic Ketoacidosis (2024)

Recognition

History of polyuria, polydipsia and weight loss.
May have confusion, abdominal pain and hyperventilation.

- Blood glucose > 11 mmol L^{-1}
- pH < 7.3
- Blood bicarbonate < 15 mmol L^{-1}
- Ketones: blood beta-hydroxybutyrate > 3 mmol L^{-1} or urine ketonuria ++ and above

Note: Usually not vomiting, acidotic or drowsy unless more than 5% dehydrated.

Severity of DKA and degree of dehydration	
Mild: 5% dehydration	Venous pH below 7.3 or serum Bicarbonate < 15 mmol L^{-1}
Moderate: 5% dehydration	Venous pH below 7.2 or Bicarbonate < 10 mmol L^{-1}
Severe: 10% dehydration	Venous pH < 7.1 or Bicarbonate < 5 mmol L^{-1}

Management

Resuscitation

A Ensure airway patency, insert NG tube if reduced conscious level or vomiting to decrease gastric distension.

B High flow oxygen via a face mask with reservoir bag + titrate to oxygen saturations 94-98% (for children with shock); avoid intubation unless respiratory arrest or respiratory failure when anaesthetic assistance is urgently required.

C Establish IV access, take venous bloods (pH, $PaCO_2$, bicarbonate, sodium, potassium, urea, creatinine, beta-hydroxybutyrate levels, glucose), monitor ECG, identify shock.

- **Dehydrated but not in shock:** Give a fluid bolus 10 mL kg^{-1} of balanced isotonic crystalloid or 0.9% sodium chloride over 30 min (discuss with senior paediatrician before giving a second bolus)
- **In shock:** Give a fluid bolus 10 mL kg^{-1} of balanced isotonic crystalloid or 0.9% sodium chloride over 5-10 min and re-assess; repeat to a maximum of 40 mL kg^{-1}; inform PICU if shock persists and consider inotropes.

D Seek and identify signs and symptoms of raised intracranial pressure – headache, confusion, irritability, posturing, falling GCS, rising BP with bradycardia. Treat with 3% sodium chloride, seek PICU advice and call an anaesthetist. Consider CT brain to determine the cause.

E Consider sepsis if fever, hypothermia, hypotension, lactic acidosis, refractory acidosis.

IV fluids and insulin

For children with dehydration, nausea and vomiting: Calculate fluid requirements (FR) for each child.

Aim: to correct fluid deficit over 48 h.

FR = Maintenance fluids for 48 h + fluid deficit.

Subtract 10 mL kg^{-1} from fluid requirement for children who did not present with shock.

Do not subtract resuscitation fluid volumes from fluid requirements for children who presented in shock.

Isotonic balanced crystalloids or 0.9% sodium chloride initial fluid of choice – add potassium once passing urine and serum potassium is in normal range (usually < 5.5 mmol L^{-1}); add 5% dextrose to fluid when glucose less than 14 mmol L^{-1}.

1–2 h after intravenous fluids commenced, start insulin infusion at 0.05–0.1 units kg^{-1} h^{-1} (0.05 units kg^{-1} h^{-1} for children < 5 years old recommended).

Monitor serum potassium and treat hypokalaemia.

Do not give intravenous bicarbonate to correct acidosis.

Maintenance fluids calculation	
First 10 kg of body weight	4 mL kg^{-1} h^{-1}
For second 10 kg of body weight (11–20 kg)	2 mL kg^{-1} h^{-1}
For each kg of body weight above 20 kg (up to max of 75 kg)	1 mL kg^{-1} h^{-1}

Observations

Strict fluid balance.

Hourly capillary blood gas and blood glucose measurements.

Capillary blood ketone levels 1–2 h (ideally point of care testing).

Initially two-hourly U+E's.

Hourly BP, HR, RR, temperature, continuous ECG monitoring.

Hourly assessment of level of consciousness.

Half hourly neuro observations including level of consciousness in children with severe DKA and children < 2 years old.

Urgently escalate symptoms of headache, bradycardia, changes in level of consciousness or changes in ECG (ST and T wave changes may indicate hypokalaemia).

Fluid deficit (mL) = % dehydration x weight (kg) x 10

Fluid requirement (FR) over 48 h for a 10 kg child = maintenance requirement for 48 h + (fluid deficit – initial fluid given) (if no signs of shock)

Note: max FR allowance for 5% dehydration = 3750 mL, 10% dehydration = 7500 mL.

Example: 5% dehydrated, no shock at presentation, given 10 mL kg^{-1} 0.9% saline

= (4 x 10 x 48) + (5 x 10 x 10) – (10 x 10)
= 1920 + 500 – 100
= 2320 mL over 48 h
= 48 mL h^{-1}

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GUIDELINES 2025

Septic and sepsis-associated organ dysfunction in children

RECOGNITION 0 MIN

Assess with ABCDE approach

A, B assessment

- Airway, RR, work of breathing, oxygen saturations, breath sounds, recognition respiratory distress/failure.
- Open airway and start high-flow oxygen 15 L min^{-1} or BMV as appropriate.

C assessment

- HR, CRT, BP, peripheral and central perfusion, rhythm recognition; recognition circulatory failure/shock.
- Establish IV/IO access (take blood cultures, full blood count, blood glucose, urea and electrolytes, lactate*, blood gas and other bloods as indicated**) and give fluid resuscitation as below.

D assessment

- AVPU score; recognition of altered mental status secondary to poor perfusion.

E assessment

- Rash, temperature (high or low).

Sepsis is suspected if there is evidence of infection as cause of the acute illness (suspected or proven) and consider other signs and symptoms such as: core temperature < 36°C or > 38.5°C; white cell count elevated or depressed for age; inappropriate tachycardia; altered mental state; reduced peripheral perfusion, hypotension, new or increasing oxygen requirement or respiratory support, coagulation abnormalities.

10–15 MIN

Initial resuscitation

- If no signs fluid overload (hepatomegaly, crackles at lung bases) then give 10 mL kg^{-1} balanced crystalloids*** IV bolus over 5–10 min and re-assess after each bolus up to 40–60 mL kg^{-1} or until perfusion improved.
- Therapeutic end points: CRT < 2 s; normal BP for age; UO > 1 mL kg^{-1} h^{-1}, normal pulses, normal mental state.
- Watch for signs of fluid overload; if present stop bolus therapy and start inotropic support.
- Correct hypoglycaemia and hypocalcaemia.
- Start broad-spectrum antibiotics; seek and aggressively control any infection source.
- Call for more senior help and an anaesthetist urgently; call PICU for bed +/- PICU transfer team.
- If mechanical ventilation is required, then cardiovascular instability during intubation is less likely after appropriate cardiovascular resuscitation.

15–60 MIN

Fluid refractory shock?

- Start IV/IO vasoactive infusion; central IV (preferable) or peripheral IV (clinical signs unreliable at differentiating 'warm' and 'cold' shock in children).

– **Adrenaline** 0.05–0.3 mcg kg^{-1} min^{-1} (use more dilute infusion if peripheral)

AND/OR **Noradrenaline** starting infusion rate 0.05 mcg kg^{-1} min^{-1} via central IV or IO.

- Titrate vasoactives upwards according to clinical response and haemodynamic effects using haemodynamic monitoring (where possible)****

Use ketamine IV/IO/IM to gain central access and airway if needed.

Fluid and catecholamine-resistant shock?

- Consider hydrocortisone IV 1–2 mg kg^{-1} if the child is not responding to fluids and vasoactive support, and in children with specific pathologies (e.g. adrenal insufficiency) or who are receiving specific medications.
- Further management as per paediatric intensive care/retrieval service advice.

Call PICU

Warm shock
– high cardiac output with low systemic vascular resistance.

Cold shock
– low cardiac output with high systemic vascular resistance.

Fluid in mL kg^{-1} should be dosed for ideal body weight (max bolus 500 mL)

* lactate measurements are useful if available as they have prognostic ability if measured serially.

** Other bloods that may be indicated: coagulation studies, liver function tests, magnesium levels or any others indicated by the child's clinical picture.

*** Balanced (buffered) fluids are used in preference to 0.9% sodium chloride, but if not available, 0.9% sodium chloride should be used.

**** These are starting dose ranges for these vasoactives, and increases may be necessary but should be guided by PICU retrieval team/senior clinicians. Choice of vasoactive is dictated by clinician preference, response to treatment and monitored parameters, and again decisions should be made in conjunction with PICU teams.

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GUIDELINES 2025

Emergency Paediatric Tracheostomy Management

Basic Response

SAFETY - STIMULATE - SHOUT FOR HELP - OXYGEN

SAFE:	Check Safe area, Stimulate, and Shout for help
AIRWAY:	Open child's airway: head tilt / chin lift / pillow or towel under shoulders may help
OXYGEN:	Ensure high flow oxygen to the tracheostomy AND the face as soon as oxygen available
CAPNOGRAPHY:	Exhaled carbon dioxide waveform may indicate a patent airway (advanced response)

SUCTION TO ASSESS TRACHEOSTOMY PATENCY

Remove attachments: humidifier (HME), speaking valve
Change inner tube (if present)
Inner tubes may need re-inserting to connect to breathing circuits

Can you pass a SUCTION catheter?

Yes → The tracheostomy tube is patent
Perform tracheal suction
Consider partial obstruction

CONTINUE ASSESSMENT (ABCDE)

No

EMERGENCY TRACHEOSTOMY TUBE CHANGE

Deflate cuff (if present). Reassess patency after any tube change
1st change – same size tube
2nd change – one-half size smaller tube
3rd change - over suction catheter to guide

IF UNSUCCESSFUL – REMOVE THE TUBE

IS THE PATIENT BREATHING? - Look, listen and feel at the mouth and tracheostomy/stoma

Yes → Continue oxygen
Stabilize
Reassess
Review

Plan for definitive airway if tube change failure

No

CALL FOR HELP: 2222 in hospital, 999 in community

5 RESCUE BREATHS

Patent Upper Airway – use the nose/mouth
Obstructed Upper Airway – use the tracheostomy/stoma

NO SIGNS OF LIFE? START CPR

15 compressions : 2 rescue breaths
Ensure help or resuscitation team called

Advanced Response

Primary emergency oxygenation

Standard ORAL airway manoeuvres
Cover the stoma (swabs / hand).
Use:
- Bag-valve-face mask
- Oral or nasal airway adjuncts
- Supraglottic Airway (SGA)
- e.g. Laryngeal Mask Airway (LMA)

Tracheostomy STOMA ventilation
- Paediatric face mask applied to stoma
- SGA applied to stoma

Secondary emergency oxygenation

ORAL intubation with endotracheal tube
Uncut tube, advanced beyond stoma
One half-size smaller than tracheostomy tube
'Difficult Airway' Expert and Equipment*

Attempt intubation of STOMA
3.0 ID tracheostomy or endotracheal tube
'Difficult Airway' Expert and Equipment*

***EQUIPMENT: Fibreoptic scope, bougie, airway exchange catheter, Airway trolley**