Advanced Life Support

Unresponsive and not breathing normally?

Call Resuscitation Team

CPR 30:2

Attach defibrillator/monitor

Minimise interruptions

Assess rhythm

Shockable (VF/Pulseless VT)

1 Shock

Minimise interruptions

Immediately resume CPR for 2 min

Minimise interruptions

Non-shockable (PEA/Asystole)

Return of spontaneous circulation

IMMEDIATE POST CARDIAC ARREST TREATMENT

- Use ABCDE approach
- Aim for SaO₂ of 94-98%
- Aim for normal PaCO₂
- 12 Lead ECG
- Treat precipitating cause
- Targeted temperature management

DURING CPR

- Ensure high quality chest compressions
- Minimise interruptions to compressions
- Give oxygen
- Use waveform capnography
- Continuous compressions when advanced airway in place
- Vascular access (intravenous or intraosseous)
- Give adrenaline every 3-5 min
- Give amiodarone after 3 shocks

TREAT REVERSIBLE CAUSES

- Hypoxia
- Hypovolaemia
- Hypo-/hyperkalaemia/metabolic
- Hypothermia/hyperthermia
- Thrombosis – coronary or pulmonary
- Tension pneumothorax
- Tamponade – cardiac
- Toxins

CONSIDER

- Ultrasound imaging
- Mechanical chest compressions to facilitate transfer/treatment
- Coronary angiography and percutaneous coronary intervention
- Extracorporeal CPR
Collapsed / sick patient

Shout for HELP & assess patient

Signs of life?

No

Call resuscitation team

CPR 30:2
with oxygen and
airway adjuncts

Apply pads/monitor
Attempt defibrillation
if appropriate

Advanced Life Support
when resuscitation team arrives

Yes

Assess ABCDE
Recognise & treat
Oxygen, monitoring, IV access

Call resuscitation team
if appropriate

Handover to resuscitation team
(Antenatal counselling)
Team briefing and equipment check

Birth

Dry the baby
Maintain normal temperature
Start the clock or note the time

Assess (tone), breathing and heart rate

If gasping or not breathing:
Open the airway
Give 5 inflation breaths
Consider SpO₂ ± ECG monitoring

Re-assess
If no increase in heart rate
look for chest movement

If chest not moving:
Recheck head position
Consider 2-person airway control
and other airway manoeuvres
Repeat inflation breaths
SpO₂ monitoring ± ECG monitoring
Look for a response

Acceptable pre-ductal SpO₂:
2 min 60 %
3 min 70 %
4 min 80 %
5 min 85 %
10 min 90 %

When the chest is moving:
If heart rate is not detectable
or very slow (< 60 min⁻¹)
Start chest compressions
Coordinate compressions with PPV (3:1)

Reassess heart rate every 30 seconds
If heart rate is not detectable
or very slow (< 60 min⁻¹)
consider venous access and drugs

Discuss with parents and debrief team

At All Times
Ask:
Do You Need Help?

Increase oxygen
(Guided by oximetry if available)

Maintain Temperature

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Unresponsive and not breathing normally

Call Emergency Services

Give 30 chest compressions

Give 2 rescue breaths

Continue CPR 30:2

As soon as AED arrives - switch it on and follow instructions
Basic Life Support with the use of an Automated External Defibrillator (AED)

Check response
- Shake gently
- Ask loudly: “Are you all right?”

If unresponsive
- Open airway & check for breathing

If unresponsive and not breathing normally
- Call 112, send someone to get an AED

Start chest compressions immediately
- Place your hands in the centre of the chest
- Deliver 30 chest compressions:
  - Press firmly at least 5 cm but no more than 6 cm deep
  - Press at a rate of at least 100/min but no more than 120/min
- If trained and able combine chest compressions with ventilations otherwise continue with compression only CPR
  - Seal your lips around the mouth
  - Blow steadily until the chest rises
  - Give next breath when the chest falls
- Continue CPR 30 compressions to 2 ventilations

As soon as AED arrives
Switch on the AED & attach pads
- Follow the spoken/visual directions
- Attach one pad below the left armpit
- Attach the other pad below the right collar bone, next to the breastbone
- If more than one rescuer: do not interrupt CPR

If shock is indicated
- Stand clear and deliver shock
- Continue CPR

Follow AED instructions

Continue CPR unless you are certain the victim has recovered and starts to breathe normally.
Unresponsive?

Shout for help

Open airway

Not breathing normally?

5 rescue breaths

No signs of life?

15 chest compressions

2 rescue breaths
15 compressions

Call cardiac arrest team
or Paediatric ALS team
after 1 minute of CPR
Paediatric Advanced Life Support

Unresponsive? 
Not breathing or only occasional gasps

CPR (5 initial breaths then 15:2) 
Attach defibrillator/monitor 
Minimise interruptions

Call Resuscitation Team 
(1 min CPR first, if alone)

Assess rhythm

Shockable 
(VF/Pulseless VT)

Non-shockable 
(PEA/Asystole)

1 Shock 4 J/Kg

Return of spontaneous circulation

IMMEDIATE POST CARDIAC ARREST TREATMENT
- Use ABCDE approach
- Controlled oxygenation and ventilation
- Investigations
- Treat precipitating cause
- Temperature control

Immediately resume: 
CPR for 2 min 
Minimise interruptions 
At 3rd cycle and 5th cycle consider amiodarone in shock-resistant VF/pVT

REVERSIBLE CAUSES
- Hypoxia
- Hypovolaemia
- Hyper/hypokalaemia, metabolic
- Hypothermia
- Thrombosis (coronary or pulmonary)
- Tension pneumothorax
- Tamponade (cardiac)
- Toxic/therapeutic disturbances

DURING CPR
- Ensure high-quality CPR: rate, depth, recoil
- Plan actions before interrupting CPR
- Give oxygen
- Vascular access (intravenous, intraosseous)
- Give adrenaline every 3-5 min
- Consider advanced airway and capnography
- Continuous chest compressions when advanced airway in place
- Correct reversible causes

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Anaphylactic reaction?

Assess using ABCDE approach

Diagnosis - look for:
- Acute onset of illness
- Life-threatening Airway and/or Breathing and/or Circulation problems
- And usually skin changes

Call for help
- Lie patient flat with raised legs (if breathing allows)

Adrenaline

IM doses of 1:1000 adrenaline (repeat after 5 min if no better)
- Adult 500 mcg IM (0.5 mL)
- Child more than 12 years 500 mcg IM (0.5 mL)
- Child 6-12 years 300 mcg IM (0.3 mL)
- Child less than 6 years 150 mcg IM (0.15 mL)

Adrenaline IV to be given only by experienced specialists
Titrated: Adults 50 mcg; Children 1 mcg kg⁻¹

When skills and equipment available:
- Establish airway
- High flow oxygen
- IV fluid challenge
- Chlorphenamine
- Hydrocortisone

Monitor:
- Pulse oximetry
- ECG
- Blood pressure

Adrenaline (give IM unless experienced with IV adrenaline) IM doses of 1:1000 adrenaline (repeat after 5 min if no better)
- Adult 500 mcg IM (0.5 mL)
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- Child less than 6 years 150 mcg IM (0.15 mL)

Adrenaline IV to be given only by experienced specialists
Titrated: Adults 50 mcg; Children 1 mcg kg⁻¹

IV fluid challenge (crystalloid):
- Adult 500 - 1000 mL
- Child 20 mL kg⁻¹

Stop IV colloid if this might be the cause of anaphylaxis

1 Life-threatening problems:
Airway: swelling, hoarseness, stridor
Breathing: rapid breathing, wheeze, fatigue, cyanosis, SpO₂ < 92%, confusion
Circulation: pale, clammy, low blood pressure, faintness, drowsy/coma

2 Adrenaline:

3 IV fluid challenge:

4 Chlorphenamine (IM or slow IV)
- Adult 10 mg
- Child 6 - 12 years 5 mg
- Child 6 months to 6 years 2.5 mg
- Child less than 6 months 250 mcg kg⁻¹

5 Hydrocortisone (IM or slow IV)
- Adult 200 mg
- Child 100 mg
- Child 50 mg
- Child less than 6 months 25 mg

6 Hydrocortisone
Assess patient at extrication

Lethal injuries or whole body frozen

NO

Duration of burial (core temperature)\(^1\)

\(\leq 60\) min (\(\geq 30\)°C)

Universal ALS algorithm\(^2\)

\(> 60\) min (\(< 30\)°C)

Signs of life?\(^3\)

NO

Start CPR\(^5\)

Monitor ECG

Asystole

YES

Consider serum potassium\(^6\)

Hospital with ECLS

NO

Consider termination of CPR

YES

Minimally invasive rewarming\(^4\)

\(\geq 8\) mmol L\(^{-1}\)

\(\leq 60\) min (\(\geq 30\)°C) Core temperature may substitute if duration of burial is unknown

\(\geq 60\) min (\(< 30\)°C) Universal ALS algorithm

Transport patients with injuries or potential complications (e.g. pulmonary oedema) to the most appropriate hospital

Check for spontaneous breathing and pulse for up to 1 min

Transport patients with cardiovascular instability or core temperature < 28°C to a hospital with ECLS (extracorporeal life support)

Withhold CPR if risk to the rescue team is unacceptably high

Crush injuries and depolarising neuromuscular blocking drugs may elevate serum potassium

VF/pVT/PEA Consider termination of CPR

Hospital with ECLS

\(^1\) Core temperature may substitute if duration of burial is unknown

\(^2\) Transport patients with injuries or potential complications (e.g. pulmonary oedema) to the most appropriate hospital

\(^3\) Check for spontaneous breathing and pulse for up to 1 min

\(^4\) Transport patients with cardiovascular instability or core temperature < 28°C to a hospital with ECLS (extracorporeal life support)

\(^5\) Withhold CPR if risk to the rescue team is unacceptably high

\(^6\) Crush injuries and depolarising neuromuscular blocking drugs may elevate serum potassium
Unresponsive and not breathing normally?

Shout for help and call emergency services

Open airway

Give 5 rescue breaths / ventilations supplemented with oxygen if possible

Signs of life?

Start CPR 30:2

Attach AED and follow instructions
Hyperkalaemia

- Assess using ABCDE approach
- 12-lead ECG and monitor cardiac rhythm if serum potassium (K+) ≥ 6.5 mmol L⁻¹
- Exclude pseudohyperkalaemia
- Give empirical treatment for arrhythmia if hyperkalaemia suspected

**MILD**
K⁺ 5.5 - 5.9 mmol L⁻¹
Consider cause and need for treatment

**MODERATE**
K⁺ 6.0 - 6.4 mmol L⁻¹
Treatment guided by clinical scenario, ECG and rate of rise

**SEVERE**
K⁺ ≥ 6.5 mmol L⁻¹
Emergency treatment indicated

**ECG changes?**
- Peaked T waves
- Flat / absent P waves
- Broad QRS
- Sine wave
- Bradycardia
- VT

**IV calcium**
10 mL 10% calcium chloride IV OR 30 mL 10% calcium gluconate IV
- Use large IV access and give over 5-10 min
- Repeat ECG
- Consider further dose after 5 min if ECG changes persist

**Insulin–glucose IV infusion**
Glucose (25 g) with 10 units soluble insulin over 15 min IV
25 g glucose = 50 mL 50% glucose OR 125 mL 20% glucose

**Risk of hypoglycaemia**

**Salbutamol 10-20 mg nebulised**

**Consider calcium resonium**
15 g x 4/day oral or 30 g x 2/day per rectum

**Consider dialysis**
Seek expert help

**Monitor serum potassium and blood glucose**
K⁺ ≥ 6.5 mmol L⁻¹ despite medical therapy

**Prevention**

- Peaked T waves
- Flat / absent P waves
- Broad QRS
- Sine wave
- Bradycardia
- VT

**Monitor K⁺ and blood glucose**

- Protect the heart
- Shift K⁺ into cells
- Remove K⁺ from body
- Consider cause of hyperkalaemia and prevent recurrence
Traumatic Cardiac Arrest

Trauma patient

Cardiac arrest / Periarrest situation?

Consider non-traumatic cause

Likely

Universal ALS algorithm

UNLIKELY

Simultaneously address reversible causes

1. Control catastrophic haemorrhage
2. Control airway and maximise oxygenation
3. Bilateral chest decompression
4. Relieve cardiac tamponade
5. Surgery for haemorrhage control or proximal aortic compression?
6. Massive transfusion protocol and fluids

Start / Continue ALS

Elapsed time < 10 min since arrest?
Expertise?
Equipment?
Environment?

Consider immediate resuscitative thoracotomy

Return of spontaneous circulation?

YES

Consider termination of CPR

NO

Pre-hospital:
- Perform only life-saving interventions
- Immediate transport to appropriate hospital

In-hospital:
- Damage control resuscitation
- Definitive haemorrhage control