

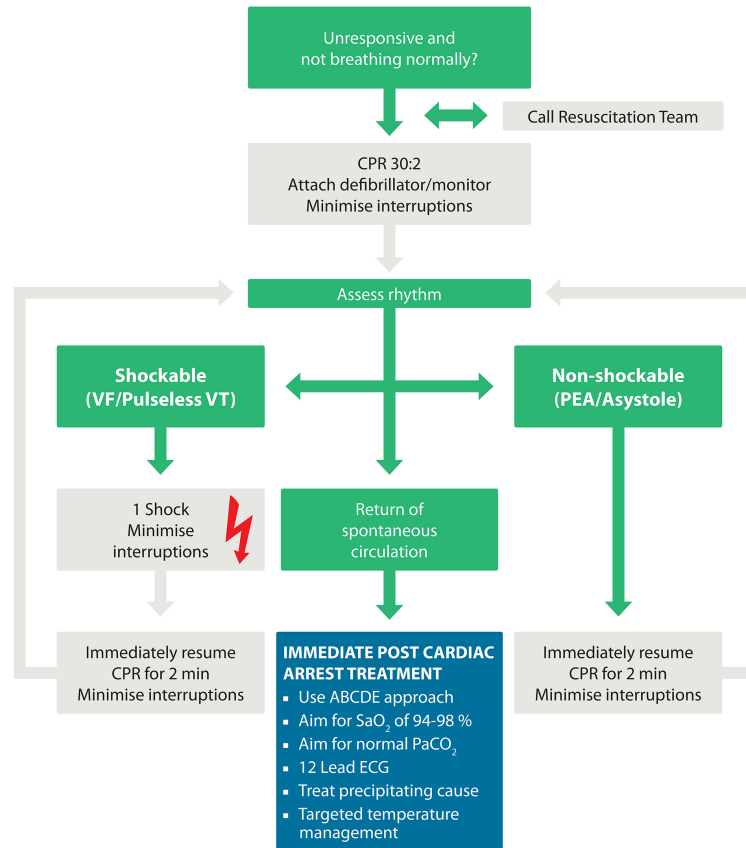
Lecture

ALS Algorithm

Learning outcomes

- The ALS algorithm
- Treatment of shockable and non-shockable rhythms
- Potentially reversible causes of cardiac arrest

Adult ALS Algorithm



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

CONSIDER

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

To confirm cardiac arrest...

Unresponsive?
Not breathing or only occasional gasps?

- Patient response
- Open airway
- Check for normal breathing
- Check circulation



To confirm cardiac arrest...

Unresponsive and
not breathing normally?



Call Resuscitation Team



Cardiac arrest confirmed

Unresponsive and
not breathing normally?

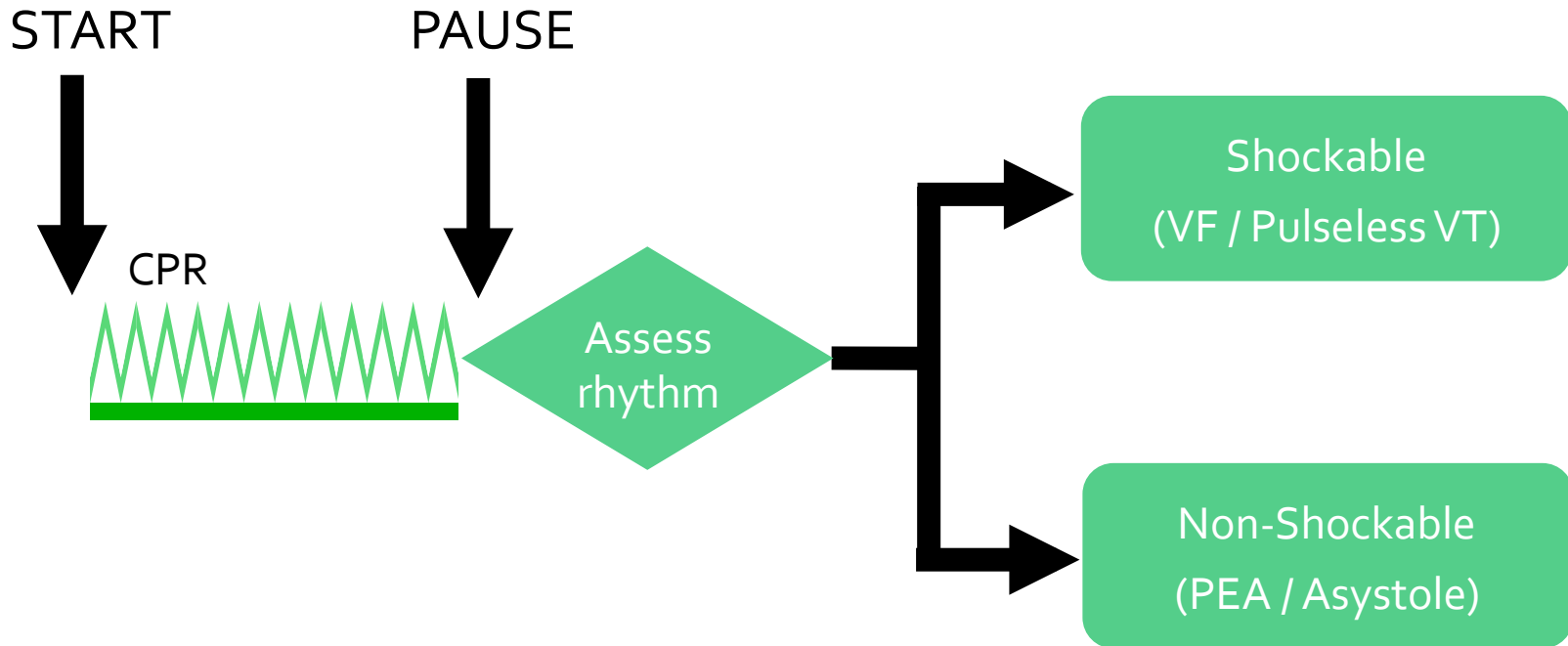


Call Resuscitation Team

CPR 30:2
Attach defibrillator/monitor
Minimise interruptions




Shockable and Non-Shockable



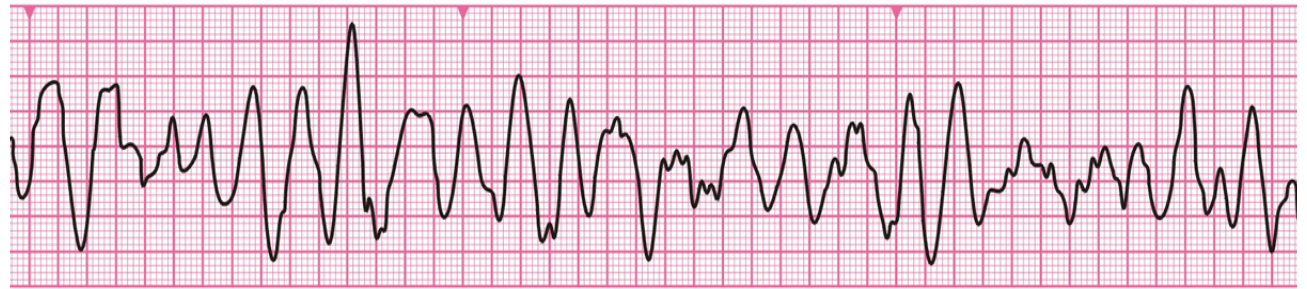
MINIMISE INTERRUPTIONS IN CHEST COMPRESSIONS

Shockable
(VF/Pulseless VT)

1 Shock
Minimise
interruptions 

Immediately resume
CPR for 2 min
Minimise interruptions

Shockable (VF)



- Bizarre irregular waveform
- No recognisable QRS complexes
- Random frequency and amplitude
- Uncoordinated electrical activity
- Coarse/fine
- Exclude artefact
 - Movement
 - Electrical interference

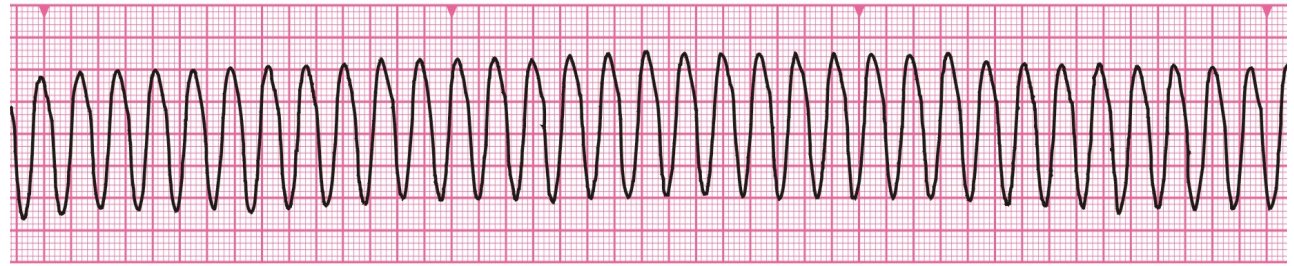
Shockable
(VF/Pulseless VT)

1 Shock
Minimise
interruptions



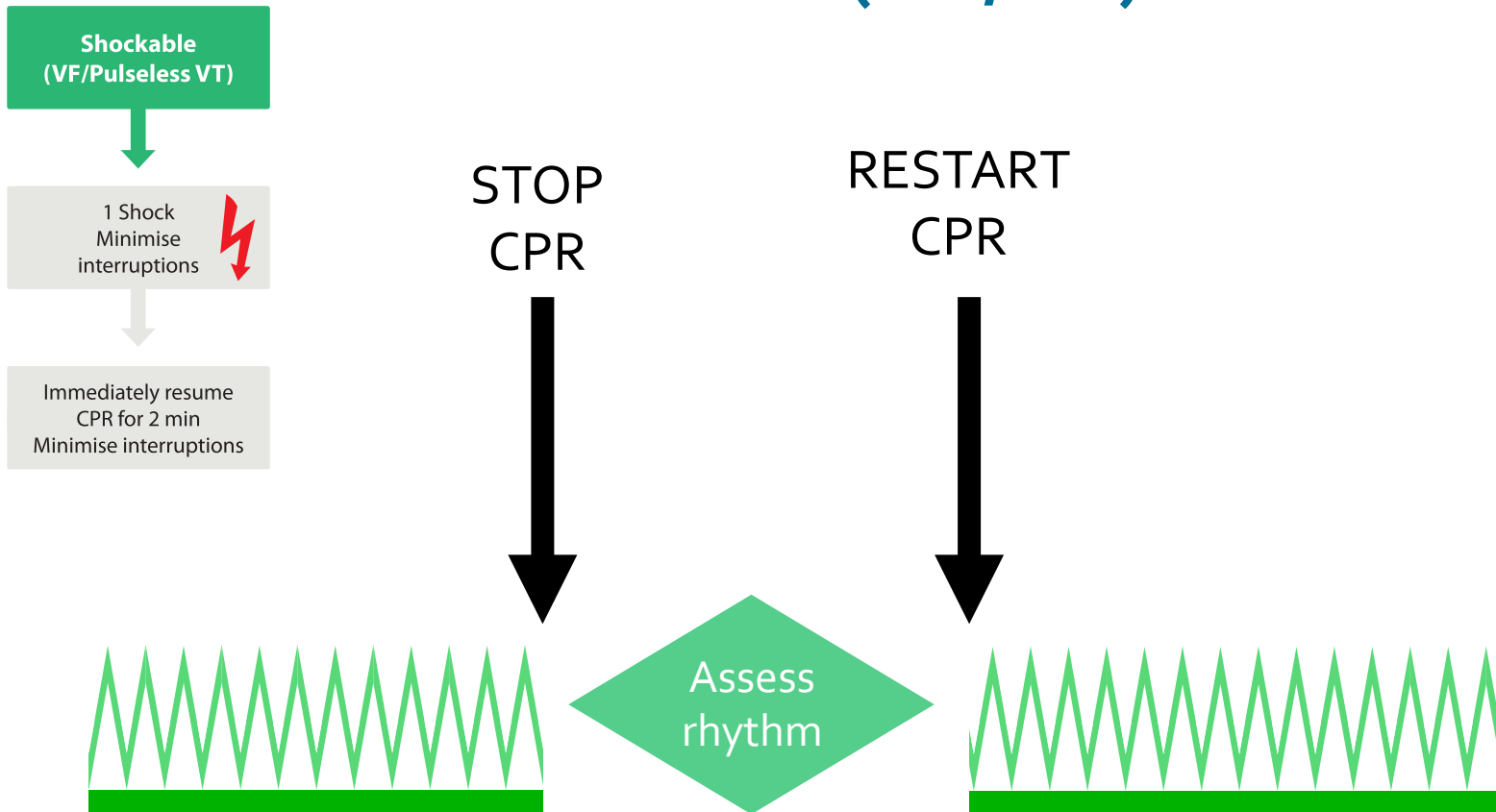
Immediately resume
CPR for 2 min
Minimise interruptions

Shockable (VT)



- Monomorphic VT
 - Broad complex rhythm
 - Rapid rate
 - Constant QRS morphology
- Polymorphic VT
 - Torsade de pointes


Shockable (VF / VT)



Shockable (VT)

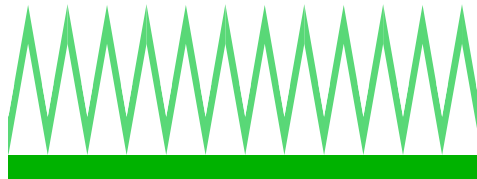
Shockable
(VF/Pulseless VT)



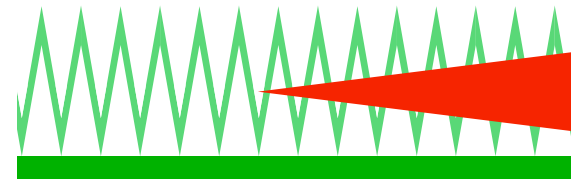
1 Shock
Minimise
interruptions 



Immediately resume
CPR for 2 min
Minimise interruptions



Assess
rhythm




CHARGE
DEFIBRILLATOR



Shockable (VF / VT)

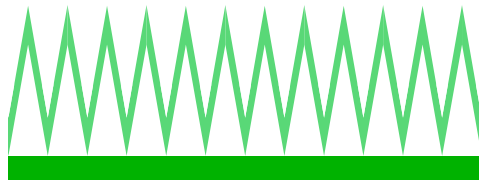
Shockable
(VF/Pulseless VT)



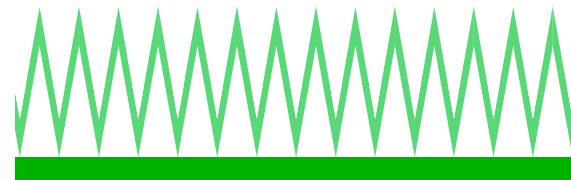
1 Shock
Minimise
interruptions 



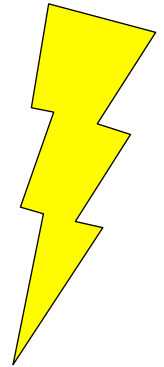
Immediately resume
CPR for 2 min
Minimise interruptions



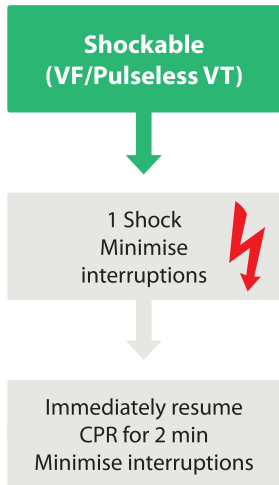
Assess
rhythm



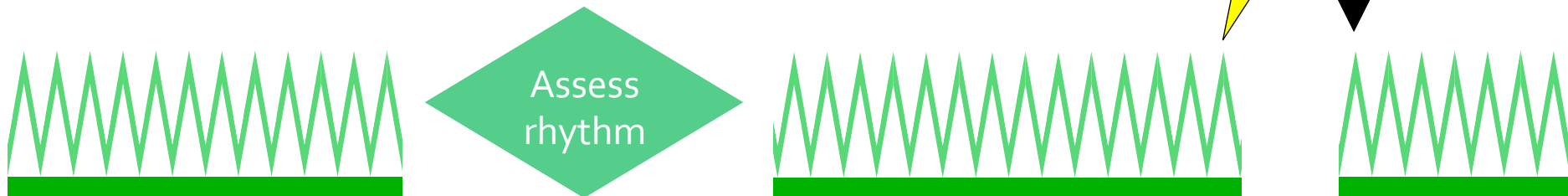
DELIVER
SHOCK



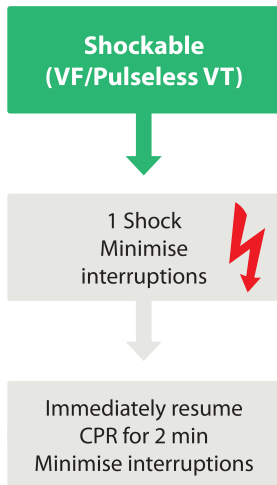
Shockable (VF / VT)



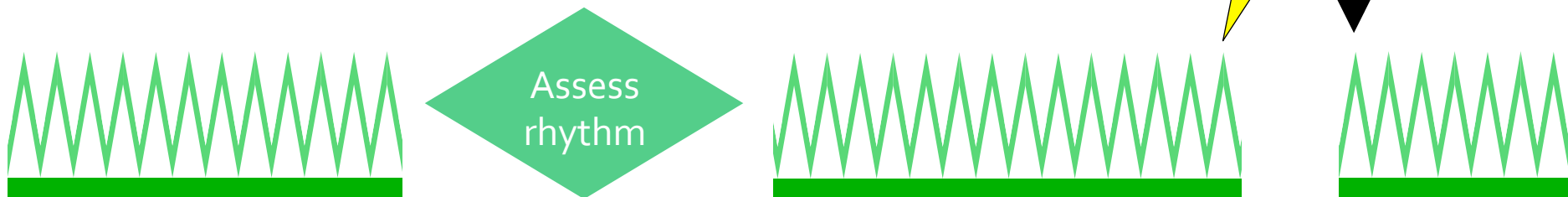
IMMEDIATELY
RESTART CPR



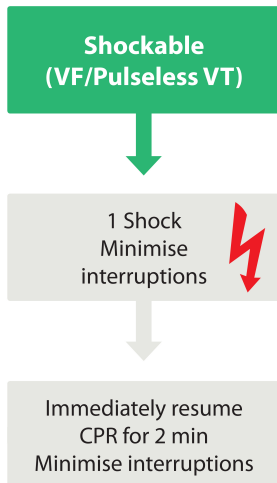
Shockable (VF / VT)



IMMEDIATELY
RESTART CPR



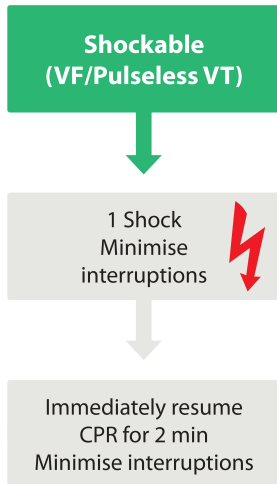
MINIMISE INTERRUPTIONS IN CHEST COMPRESSIONS



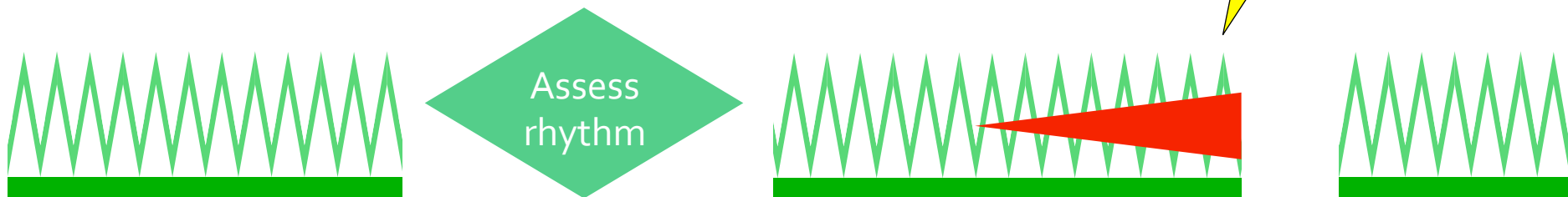
Defibrillation energies

- 150 J – 360 J biphasic (360 J monophasic)
- If unsure, deliver highest available energy
- DO NOT DELAY SHOCK

Persisting VF / VT (2nd shock)

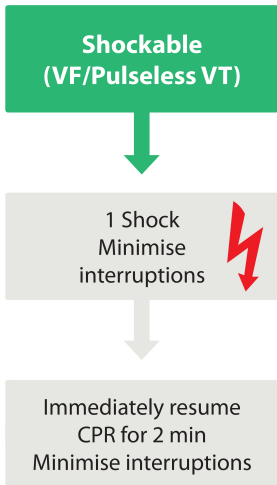


- 2nd and subsequent shocks
- 150 – 360 J biphasic
 - 360 J monophasic

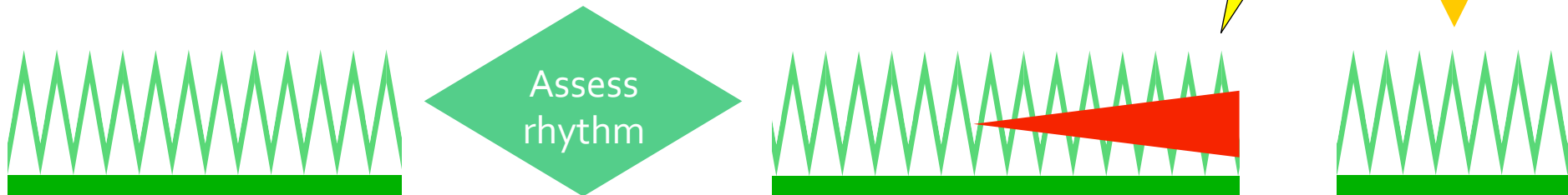


MINIMISE INTERRUPTIONS IN CHEST COMPRESSIONS

Persisting VF / VT (3rd shock)

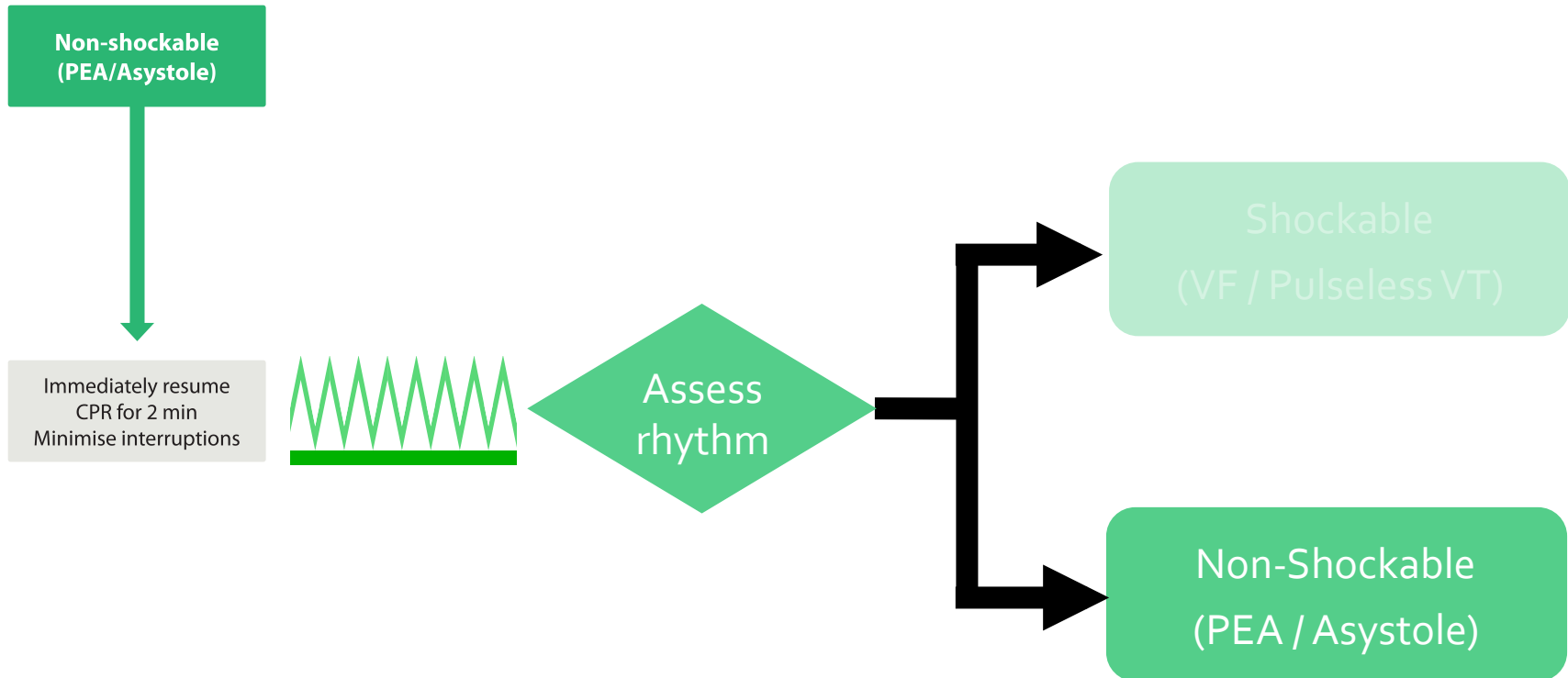


Give adrenaline and
Amiodarone after 3rd
shock during CPR



MINIMISE INTERRUPTIONS IN CHEST COMPRESSIONS

Non-Shockable



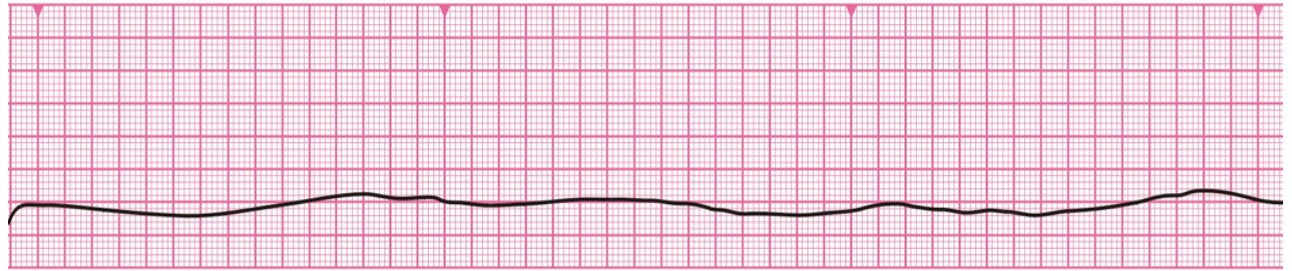
MINIMISE INTERRUPTIONS IN CHEST COMPRESSIONS

Non-shockable
(PEA/Asystole)



Immediately resume
CPR for 2 min
Minimise interruptions

Non-Shockable (Asystole)



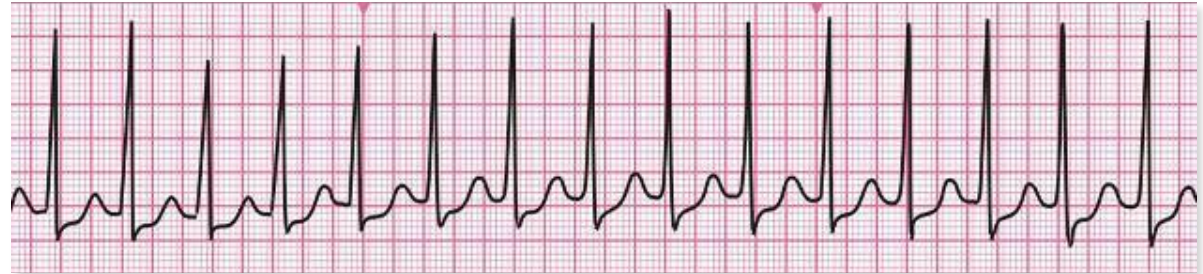
- Absent ventricular (QRS) activity
- Atrial activity (P waves) may persist
- Rarely a straight line trace
- Adrenaline 1 mg IV then every 3-5 min

Non-shockable
(PEA/Asystole)



Immediately resume
CPR for 2 min
Minimise interruptions

Non-shockable (Pulseless Electrical Activity)



- Clinical features of cardiac arrest
- ECG normally associated with an output
- Adrenaline 1 mg IV then every 3-5 min

During CPR

DURING CPR

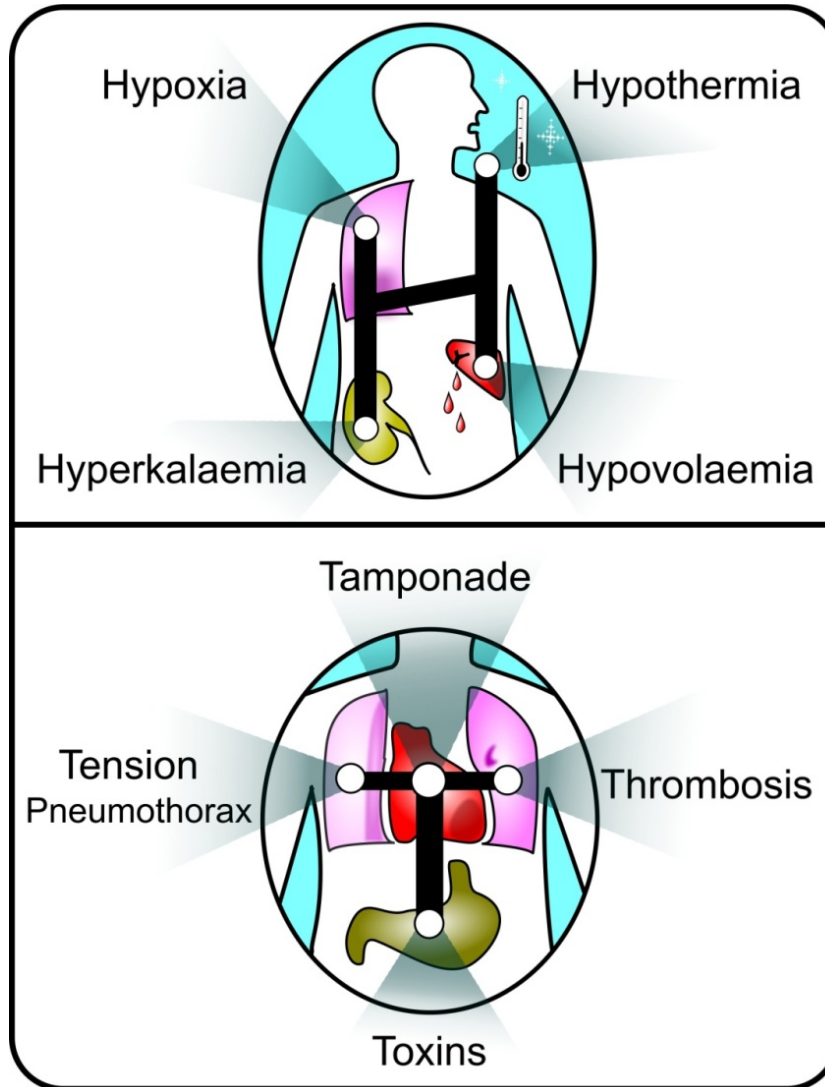
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- Minimise interruptions to compressions
- Give oxygen
- Use waveform capnography
- Continuous compressions when advanced airway in place
- Vascular access
(intravenous or intraosseous)
- Give adrenaline every 3-5 min
- Give amiodarone after 3 shocks

Resuscitation team

- Roles planned in advance
- Identify team leader
- Importance of non-technical skills
 - Task management
 - Team working
 - Situational awareness
 - Decision making
- Structured Communication



Reversible causes



Hypoxia

- Ensure patent airway
- Give high-flow supplemental oxygen
- Avoid hyperventilation



Hypovolaemia

- Seek evidence of hypovolaemia
 - History
 - Examination
 - Internal haemorrhage
 - External haemorrhage
 - Check surgical drains
- Control haemorrhage
- If hypovolaemia suspected give intravenous fluids



Hypo/hyperkalaemia and metabolic disorders

- Near patient testing for K^+ and glucose
- Check latest laboratory results
- Hyperkalaemia
 - Calcium chloride
 - Insulin/dextrose
- Hypokalaemia/
Hypomagnesaemia
 - Electrolyte supplementation



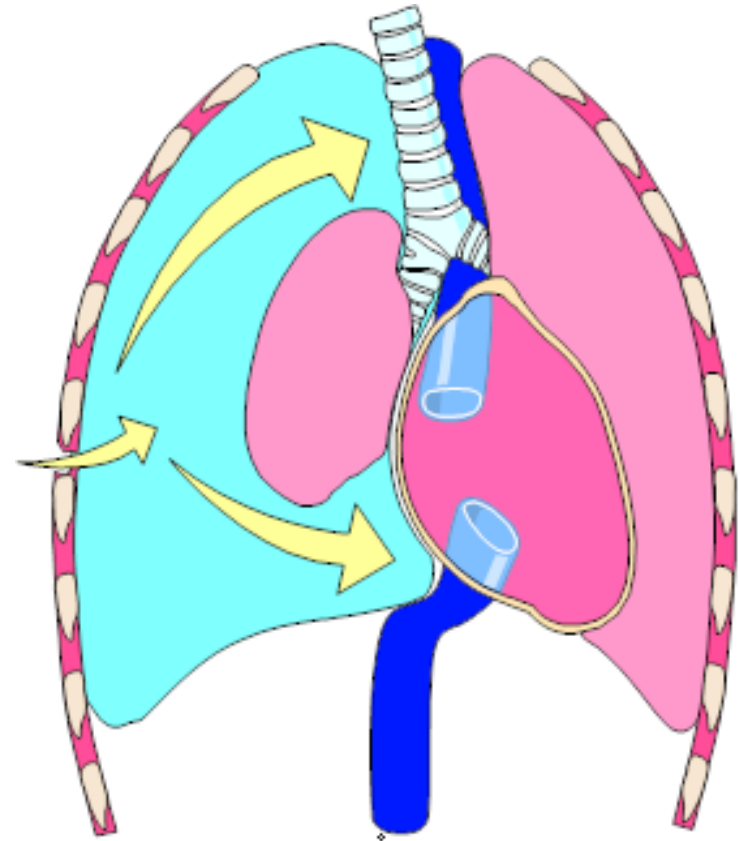
Hypothermia

- Rare if patient is an in-patient
- Use low reading thermometer
- Treat with active rewarming techniques
- Consider cardiopulmonary bypass



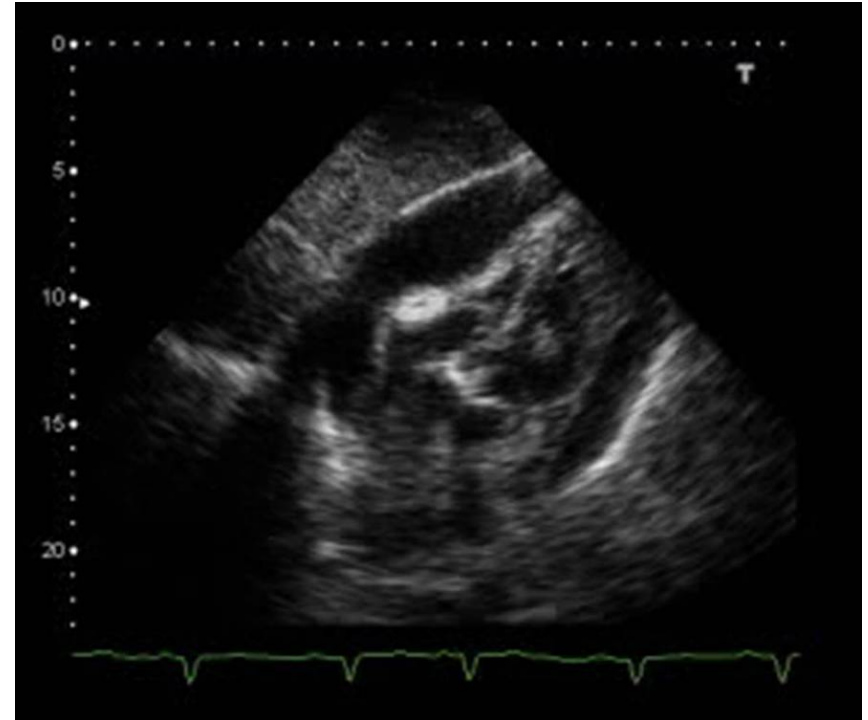
Tension pneumothorax

- Check tube position if intubated
- Clinical signs
 - Decreased breath sounds
 - Hyper-resonant percussion note
 - Tracheal deviation
- Initial treatment with needle decompression or thoracostomy



Tamponade, cardiac

- Difficult to diagnose without echocardiography
- Consider if penetrating chest trauma or after cardiac surgery
- Treat with needle pericardiocentesis or resuscitative thoracotomy



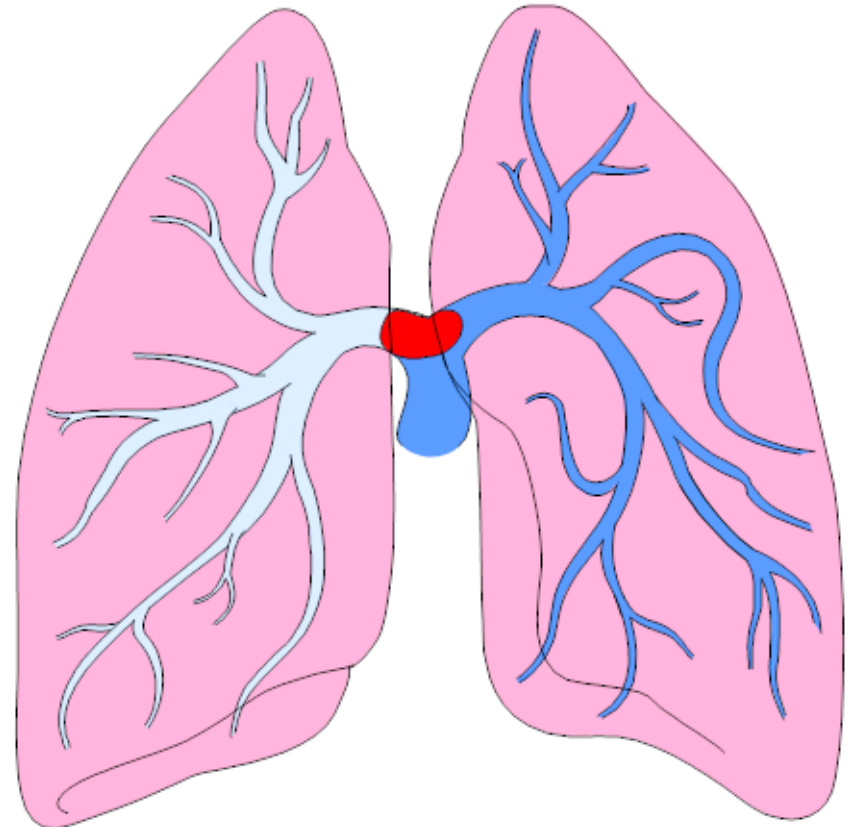
Toxins

- Rare unless evidence of deliberate overdose
- Review drug chart



Thrombosis

- If high clinical probability for PE consider fibrinolytic therapy
- If fibrinolytic therapy given continue CPR for up to 60-90 min before discontinuing resuscitation

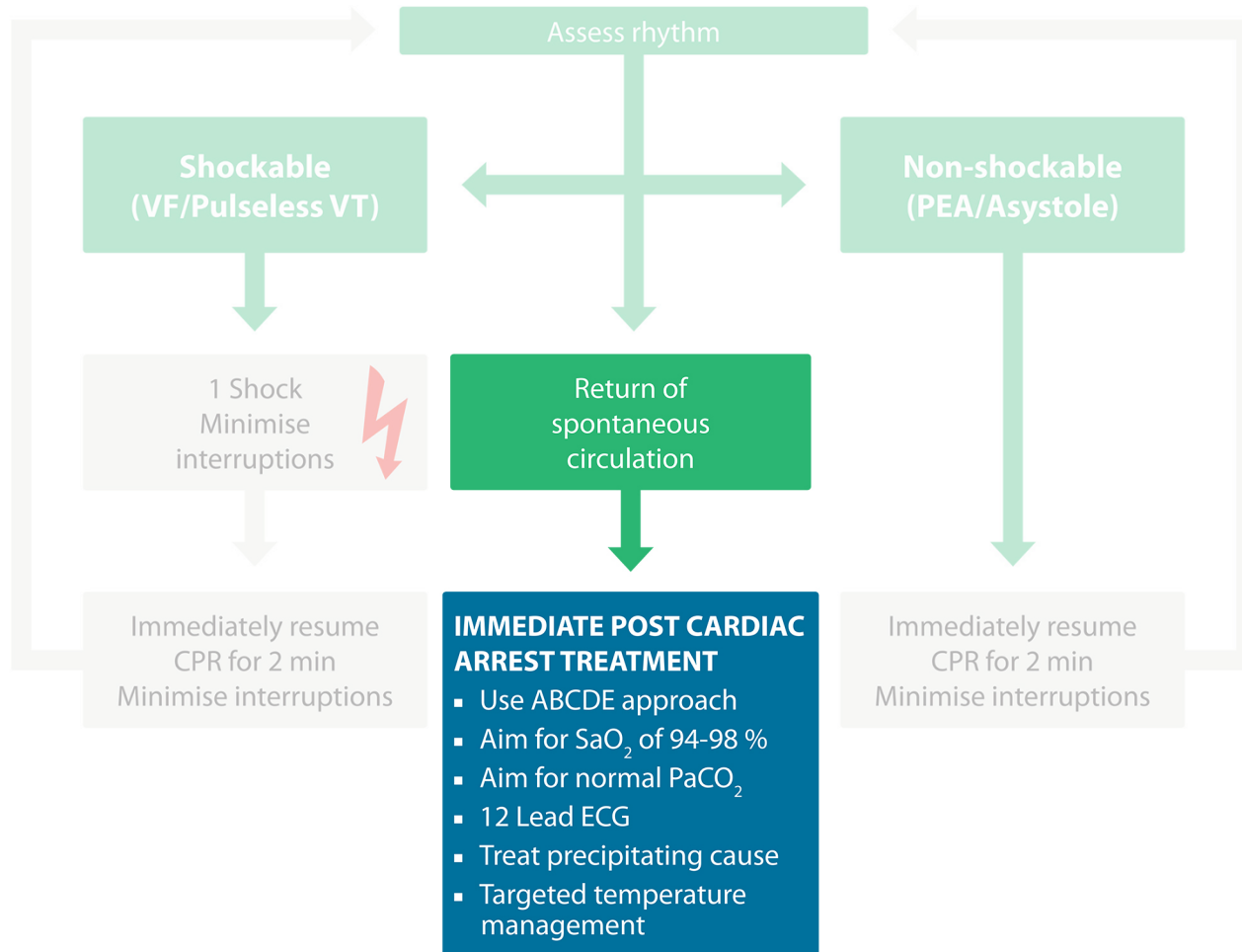


Ultrasound

- Do not interrupt CPR
- Obtain images during rhythm checks
- In skilled hands may identify reversible causes



Immediate post-cardiac arrest treatment



Any questions?

Summary

- The ALS algorithm
- Treatment of shockable and non-shockable rhythms
- Potentially reversible causes of cardiac arrest