

Assessment of seriously ill patient

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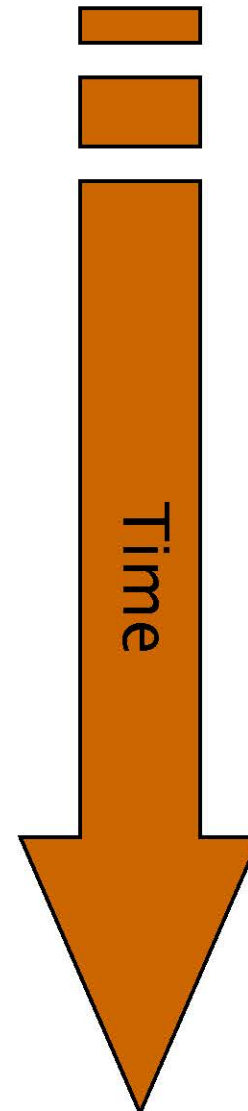
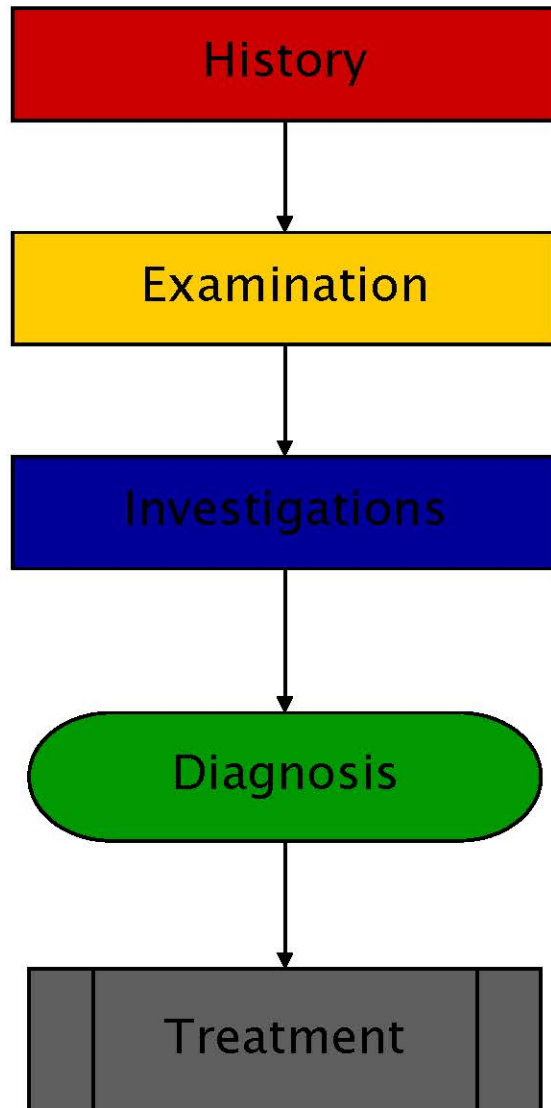
Consultant Anesthesia, ICU & Perioperative Medicine

Aim

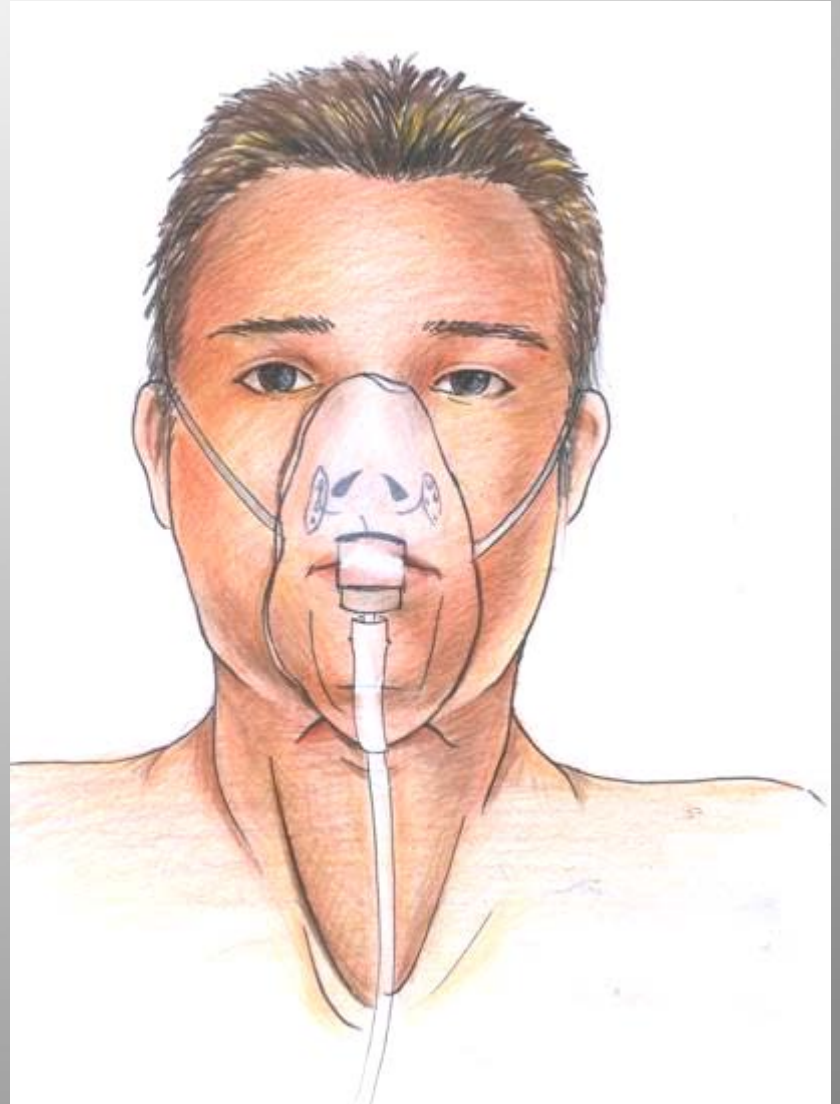
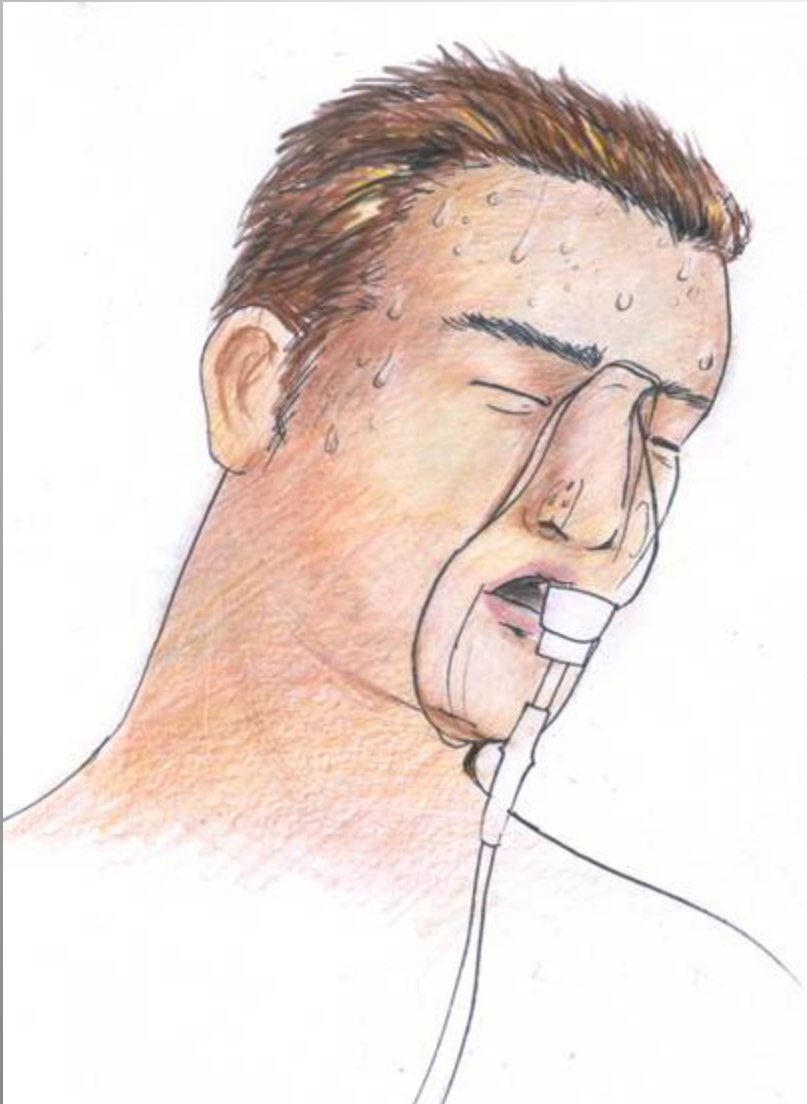
- Identify physiological abnormalities
- Identify most appropriate way to correct those abnormalities
- Diagnose underlying problem

Why

- Maximize likelihood of easier management with simpler interventions
- Prevent further deterioration
- Provide time for investigation & treatment



Time



History

Initial

- Main symptoms
- Coexisting illness
- Medications
- Major surgery or trauma
- Severe hemorrhage/transfusion

Subsequent

- Past history, chronic diseases
- Psychosocial issues
- Medications/allergies
- Family history
- Ethical/legal issues
- Systems review

Examination (Initial)

- Airway
- Breathing
- Circulation
- Consciousness



Examination (Subsequent)

- Respiratory
- Cardiovascular
- Abdomen &
genitourinary tract
- CNS
- Musculoskeletal
- Endocrine
- Hematologic systems

Airway/Respiratory System

- Observe mouth & chest
- Respiratory rate & pattern
 - *Tachypnea is the single most important indicator of critical illness*
- Use of accessory muscles
- Level of consciousness
- Oxyhemoglobin saturation



Circulation

- Blood pressure
- Evidence of decreased perfusion
- Abnormal heart sounds
- Central & peripheral pulses



Chart Review

- Vital signs
- Fluid balance
- Inspired oxygen concentration
- Medications
- Invasive parameters

Investigations

- Guided by history & examination
- Biochemistry, hematology, cultures, radiographs
- Arterial or venous blood gas
- Lactate level
 - *Metabolic acidosis is an important indicator of critical illness*

Features suggestive of severe illness

System	Feature
Cardiovascular	Tachycardia Hypotension Cold peripheries Skin mottling Bradycardia (<u>Pre-terminal state</u>)
Respiratory	Tachypnea Recessions Use of accessory muscles of respiration Low oxygen saturation Low respiratory rate (<u>Impending respiratory arrest</u>)

Features suggestive of severe illness

System	Feature
Splanchnic	Hematemesis Coffee ground vomitus in NGT Melena Jaundice
Renal	Oliguria
Nervous system	Decrease consciousness Confusion Agitation Aggressive behavior

Features suggestive of severe illness

System	Feature
Metabolic	Acidosis Severe electrolyte abnormalities (severe Hyperkalemia & severe Hyponatremia) Severe anemia Thrombocytopenia Coagulopathy Elevated lactate
Miscellaneous	Sweating

Warning signs of severe ill patient

Parameter	Values
BP	SBP < 90 or MAP < 70 mmHg
HR	> 150 or < 50 bpm
RR	> 30 or < 8 breaths/min
Conscious level	GCS < 12
Oliguria	< 0.5 ml/kg/h
Sodium	< 120 or > 150 mmol/l
Potassium	< 2.5 or > 6 mmol/l
pH	< 7.2
Bicarbonate	< 18 mmol/l
Worried nurse	Concerned experienced nurse

Recognition of patients at risk

- *Clinical indicators of deterioration before in-hospital cardiac arrest in 80% of patients*
 - Tachypnea
 - Tachycardia
 - Hypotension
 - Reduced conscious level

Recognizing sick patient & preventing cardiac arrest

- **Pathophysiology**

- Airway, Breathing & Circulation required for oxygen delivery
- Inadequate oxygen delivery leads to organ failure
- Vital organ failure can lead to cardio respiratory arrest

Causes of cardiorespiratory arrest

- Airway problems
- Breathing problems
 - ↓ Respiratory drive
 - ↓ Respiratory effort
 - Pulmonary disorders
- Cardiac problems
 - Primary
 - Secondary

Severe angina or myocardial infarction

- Chest Pain
- Action = “MONA”
 - Morphine
 - Oxygen
 - Nitroglycerine
 - Aspirin 300 mg
- If MI - consider reperfusion therapy

Peri-arrest rhythms

Peri-arrest arrhythmias

Principles of treatment

- What is the arrhythmia?
- How is the patient?

Arrhythmias

- **Excessive tachycardia**
 - Narrow complex >200 beats/min
 - Broad complex >150 beats/min
- **Excessive bradycardia**
 - <40 beats/min **or** <60 beats/min if poor cardiac reserve

Adverse signs

- Presence or absence of adverse signs or symptoms will dictate appropriate treatment for most arrhythmias

Adverse signs

1. Shock

- Pallor, sweating, cold, impaired consciousness & hypotension (SBP < 90 mmHg)

2. Syncope

- Loss of consciousness due to reduced cerebral blood flow

Adverse signs

3. Heart failure

- Arrhythmias compromise myocardial performance by reducing coronary artery blood flow

4. Myocardial ischemia

- Chest pain (angina)

Bradycardia Algorithm

- Assess using the ABCDE approach
- Give oxygen if appropriate and obtain IV access
- Monitor ECG, BP, SpO₂, record 12-lead ECG
- Identify and treat reversible causes (e.g. electrolyte abnormalities)

Assess for evidence of adverse signs

1. Shock
2. Syncope
3. Myocardial ischaemia
4. Heart failure

YES

Atropine
500 mcg IV

Satisfactory
response?

YES

NO

Risk of asystole?

- Recent asystole
- Mobitz II AV block
- Complete heart block with broad QRS
- Ventricular pause > 3s

YES

Interim measures:

- Atropine 0.5 mg IV repeat to maximum of 3 mg
 - Isoprenaline 5 mcg min⁻¹ IV
 - Adrenaline 2-10 mcg min⁻¹ IV
 - Alternative drugs*
- OR**
- Transcutaneous pacing



Seek expert help
Arrange transvenous pacing

NO

Observe

* Alternatives include:

- Aminophylline
- Dopamine
- Glucagon (if beta-blocker or calcium channel blocker overdose)
- Glycopyrrolate can be used instead of atropine



Möbitz Type I (Wenckebach) Block



Möbitz Type II Block



Tachycardia Algorithm (with pulse)

***Attempted cardioversion on conscious patients require anesthesia or sedation & analgesia**

- Assess using the ABCDE approach
- Give oxygen if appropriate and obtain IV access
- Monitor ECG, BP, SpO₂, record 12-lead ECG
- Identify and treat reversible causes (e.g. electrolyte abnormalities)

Assess for evidence of adverse signs

- Shock
- Syncope
- Myocardial ischaemia
- Heart failure

Synchronised DC Shock*
Up to 3 attempts

Unstable

Stable

- Amiodarone 300 mg IV over 10-20 min and repeat shock; followed by:
- Amiodarone 900 mg over 24 h

Is QRS narrow (< 0.12 sec)?

Broad

Narrow

Broad QRS
Is QRS regular?

Narrow QRS
Is rhythm regular?

Irregular

Regular

Regular

Irregular

Seek expert help



- Use vagal manoeuvres
- Adenosine 6 mg rapid IV bolus; if unsuccessful give 12 mg; if unsuccessful give further 12 mg.
- Monitor ECG continuously

Irregular Narrow Complex Tachycardia

Probable atrial fibrillation
Control rate with:

- β-Blocker or diltiazem
- Consider digoxin or amiodarone if evidence of heart failure
- Anticoagulate if duration > 48 h

Normal sinus rhythm restored?

NO

Seek expert help



YES

Probable re-entry PSVT:

- Record 12-lead ECG in sinus rhythm
- If recurs, give adenosine again & consider choice of anti-arrhythmic prophylaxis

Possible atrial flutter

- Control rate (e.g. β-Blocker)

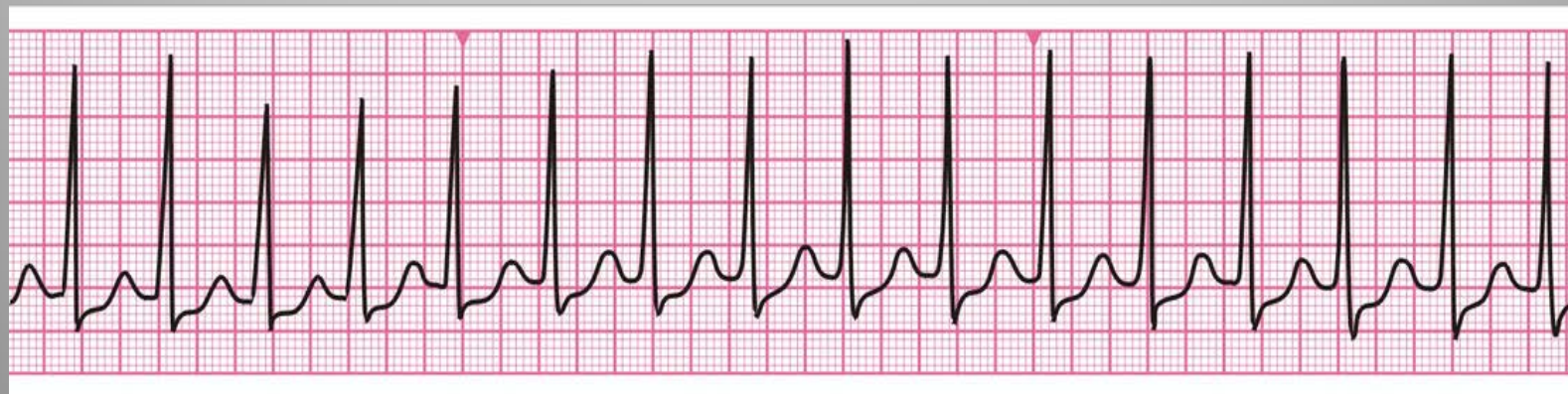
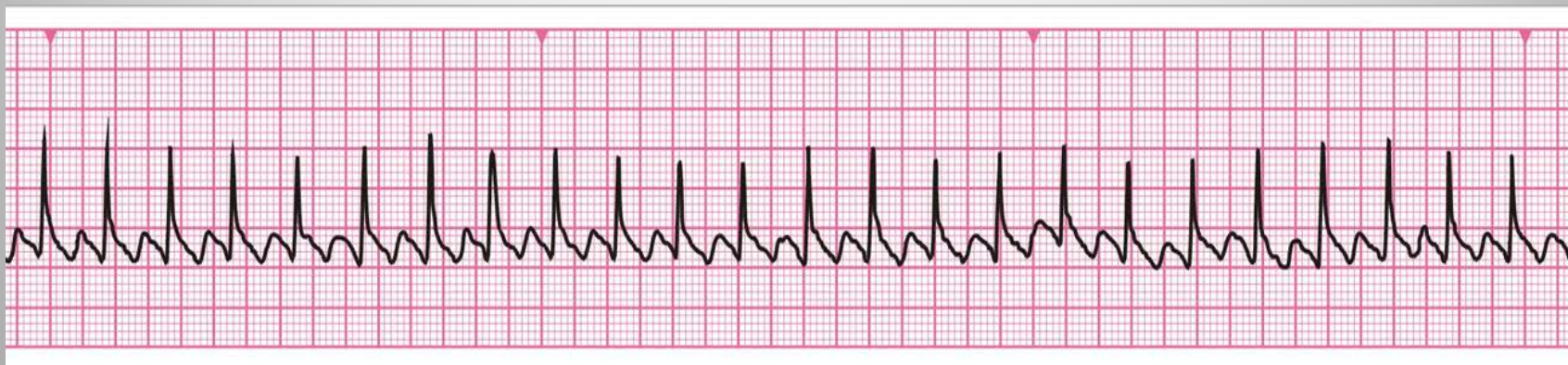
Possibilities include:

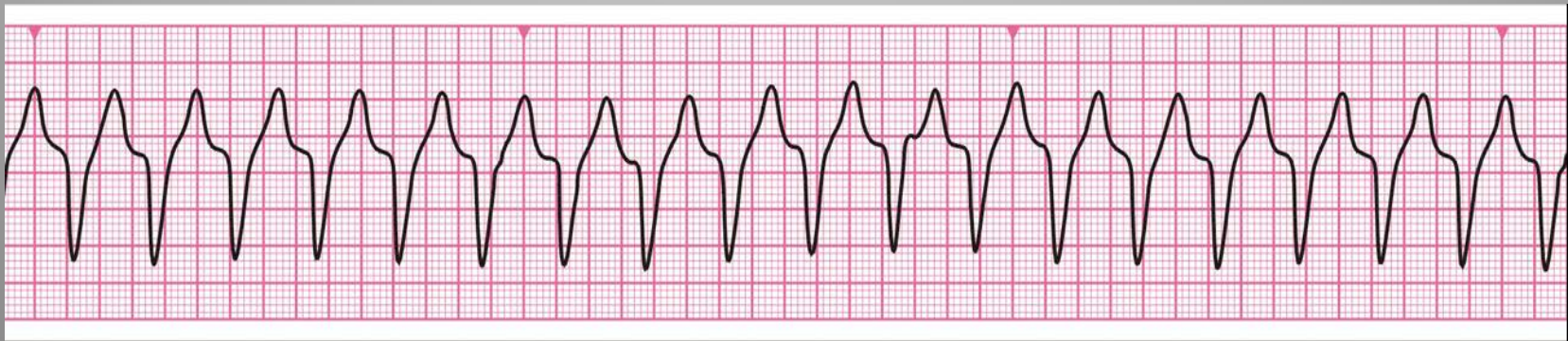
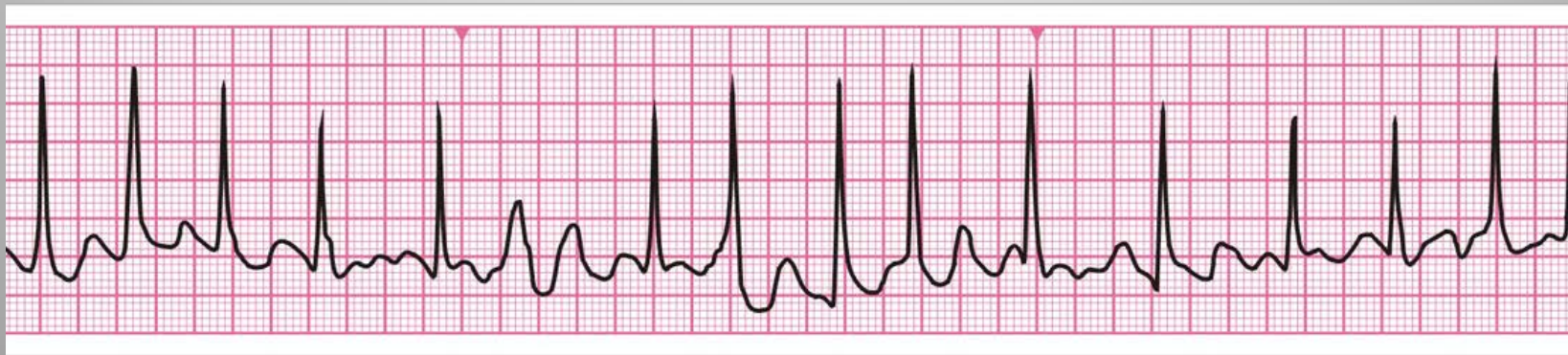
- AF with bundle branch block treat as for narrow complex
- Polymorphic VT (e.g. torsades de pointes – give magnesium 2 g over 10 min)

If Ventricular Tachycardia
(or uncertain rhythm):

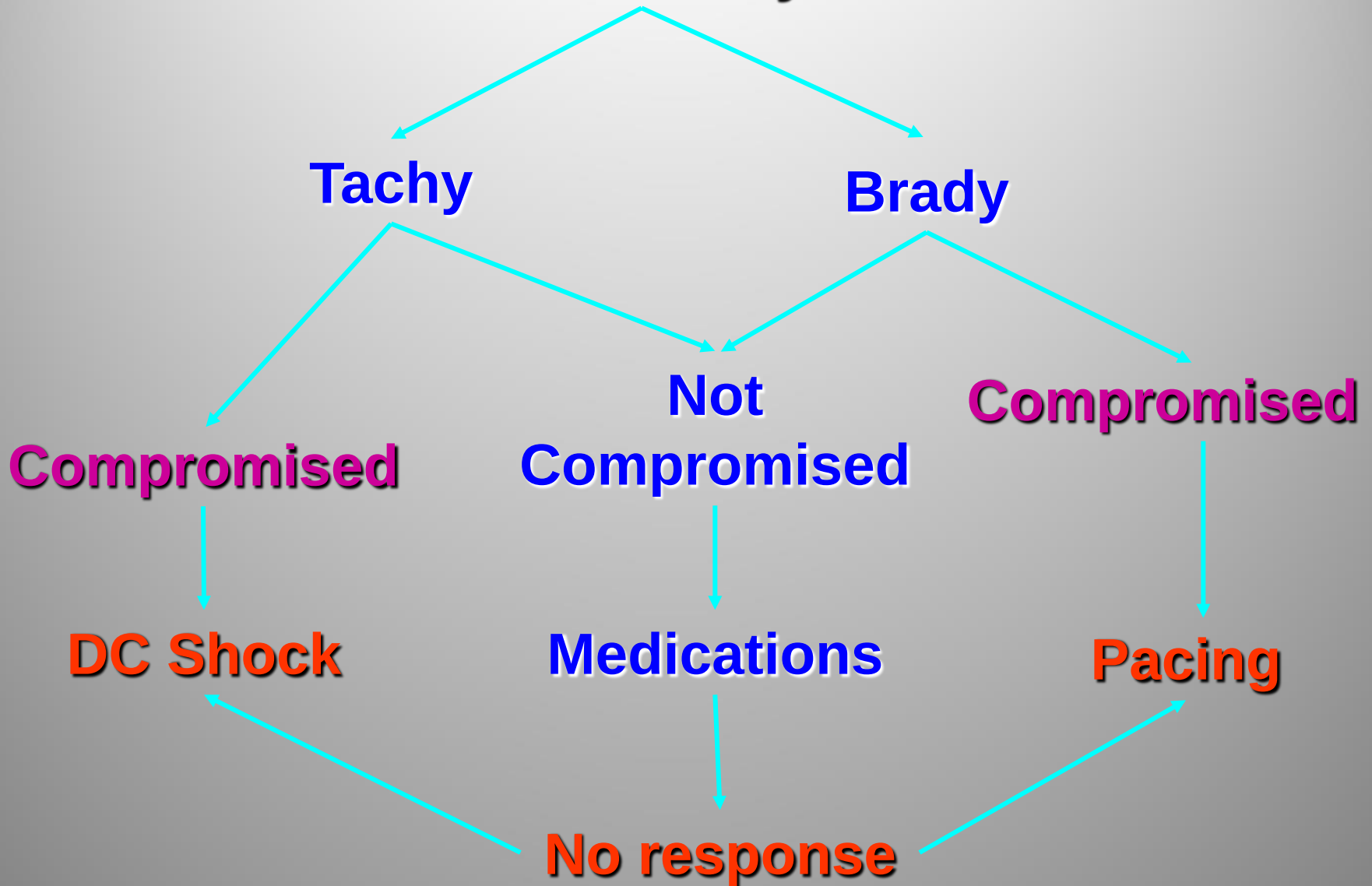
- Amiodarone 300 mg IV over 20-60 min; then 900 mg over 24 h

If previously confirmed SVT with bundle branch block:
Give adenosine as for regular narrow complex tachycardia





Peri-arrest Arrhythmia



Cardiac arrest rhythms

3-lead monitoring

- 3-lead system
- I, II, III
- Color coded
- Remove hair
- Apply over bone
- Lead setting (II)
- Gain



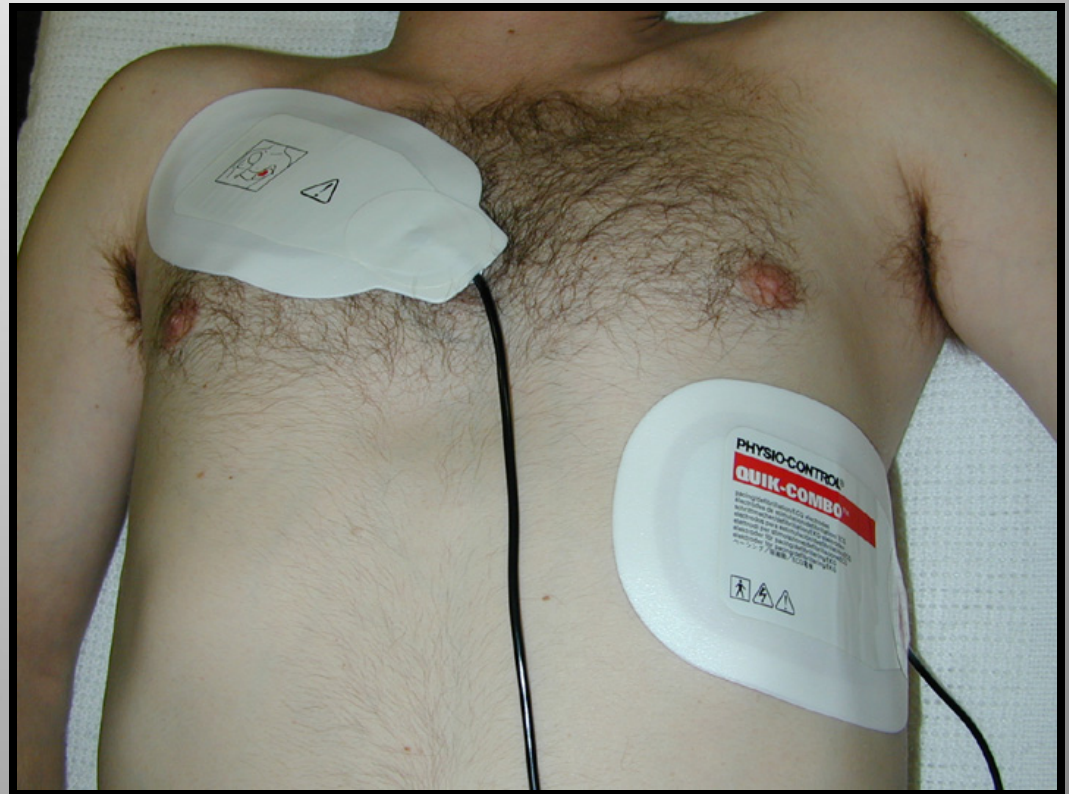
'Quick look' paddles

- Suitable for “quick-look”
- Movement artefact
- Risk of spurious asystole



Hands-free adhesive pads

- “Hands-free” monitoring & defibrillation



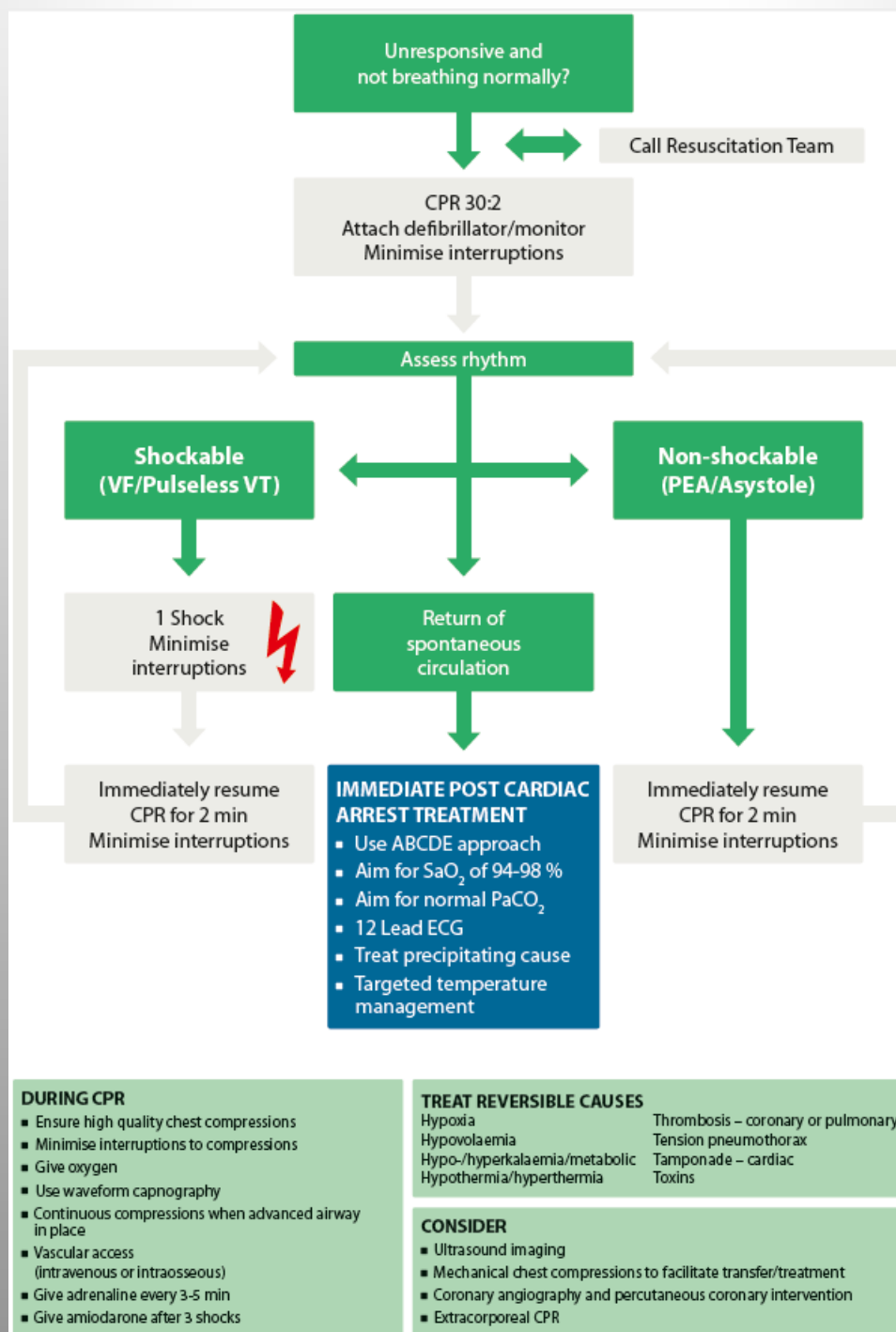
How to read rhythm strip

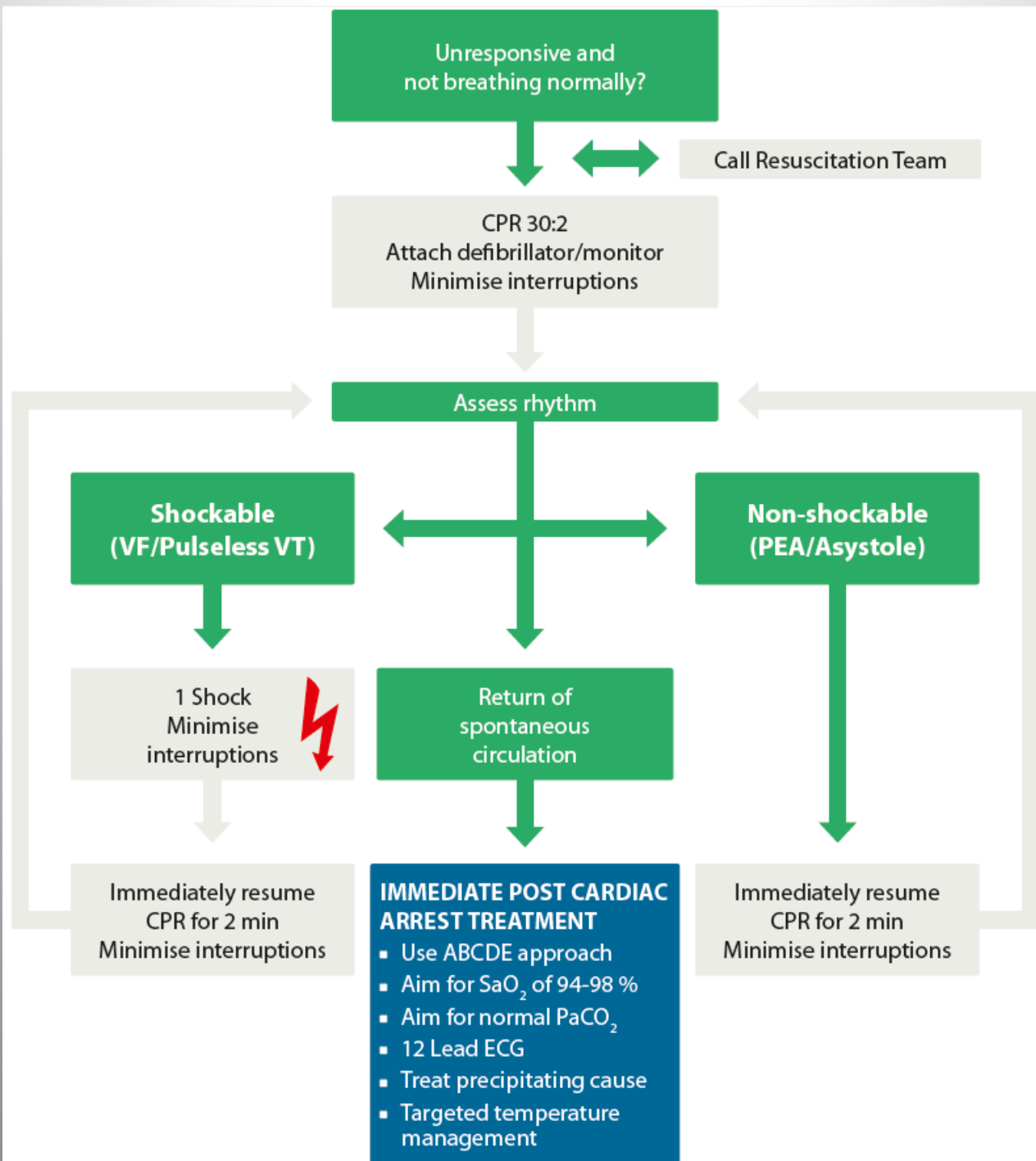


Cardiac arrest rhythms

- Ventricular fibrillation (VF)
- Pulseless ventricular tachycardia (VT)
- Asystole
- Pulseless Electrical Activity (PEA)

Advanced Life Support 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

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

... to confirm cardiac arrest

Open Airway
Look for signs
of life

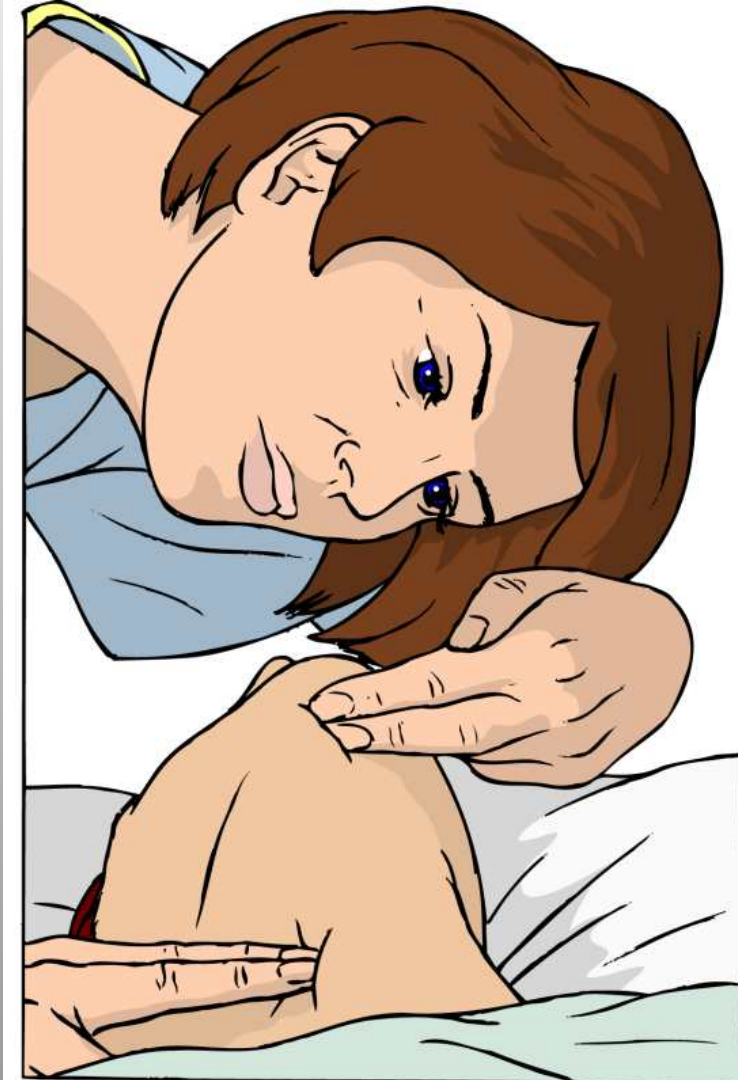
- Patient response
- Open airway
- Check for normal breathing
 - Caution agonal breathing
- Check for signs of life



.... to confirm cardiac arrest

Open Airway
Look for signs of life

- Pulse check if trained to do so
- Take no more than 10 seconds for assessment





Open Airway
Look for signs of life



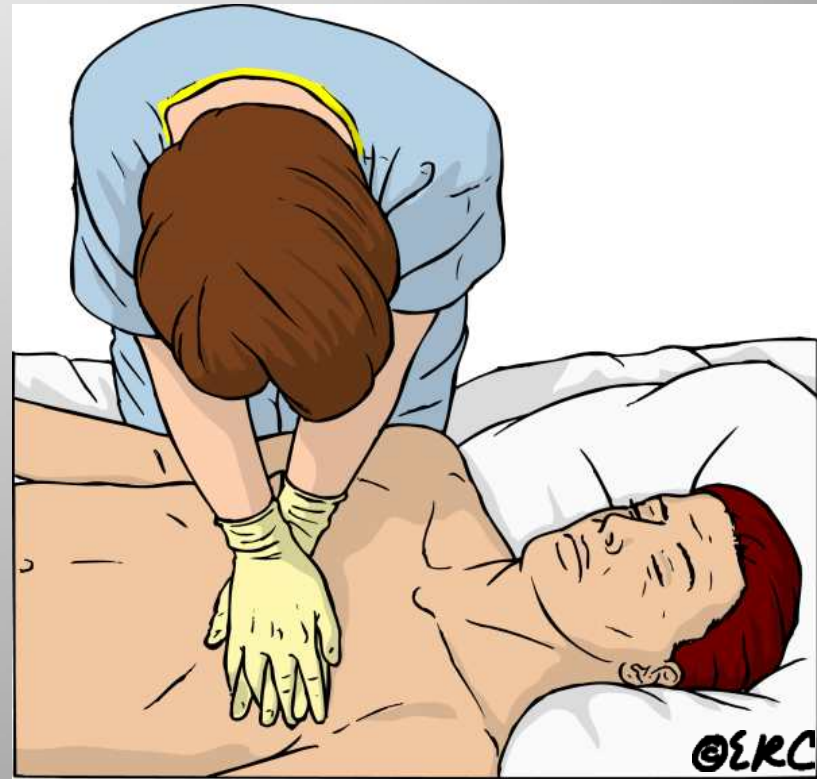
Cardiac arrest confirmed

Call
Resuscitation
Team

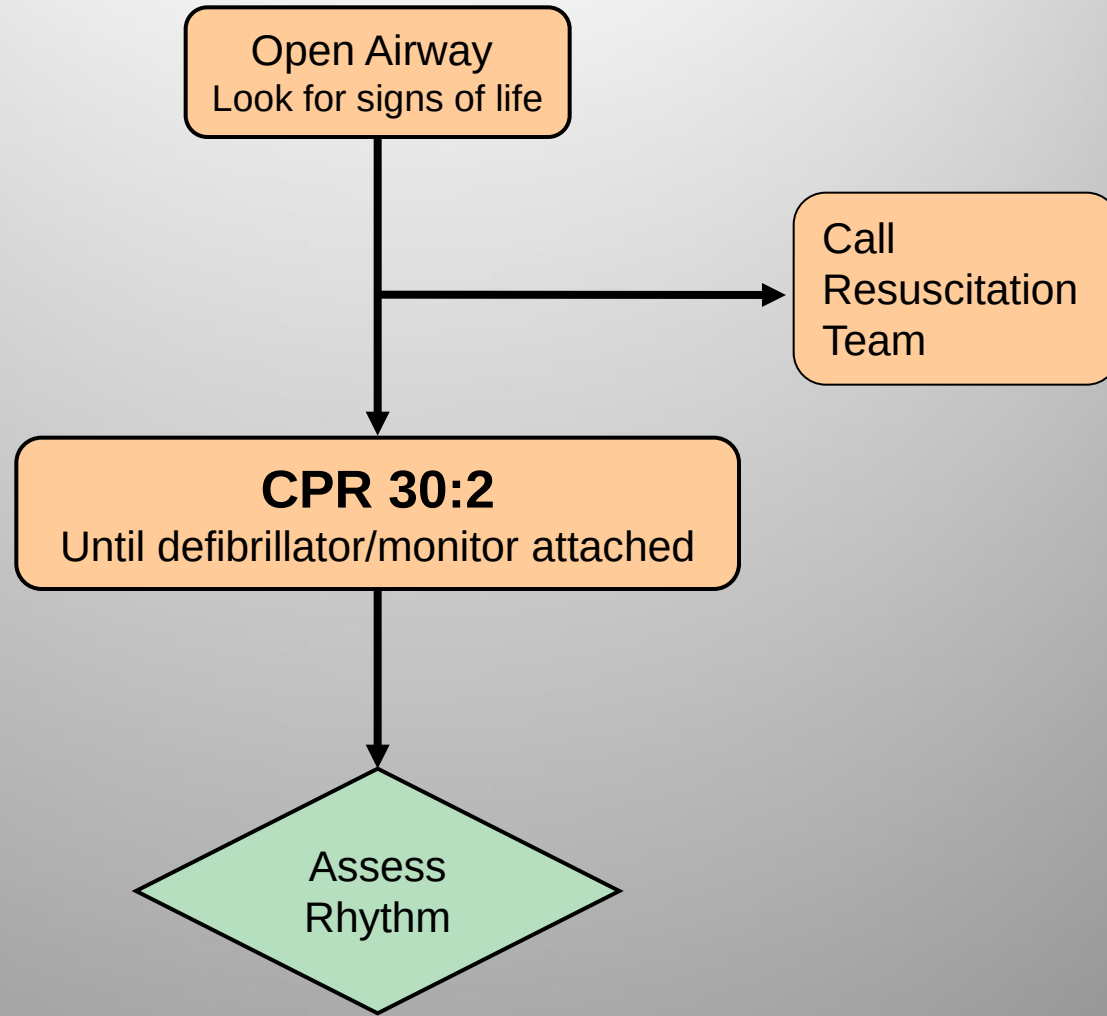
CPR 30:2
Until defibrillator /
monitor attached

Chest compression

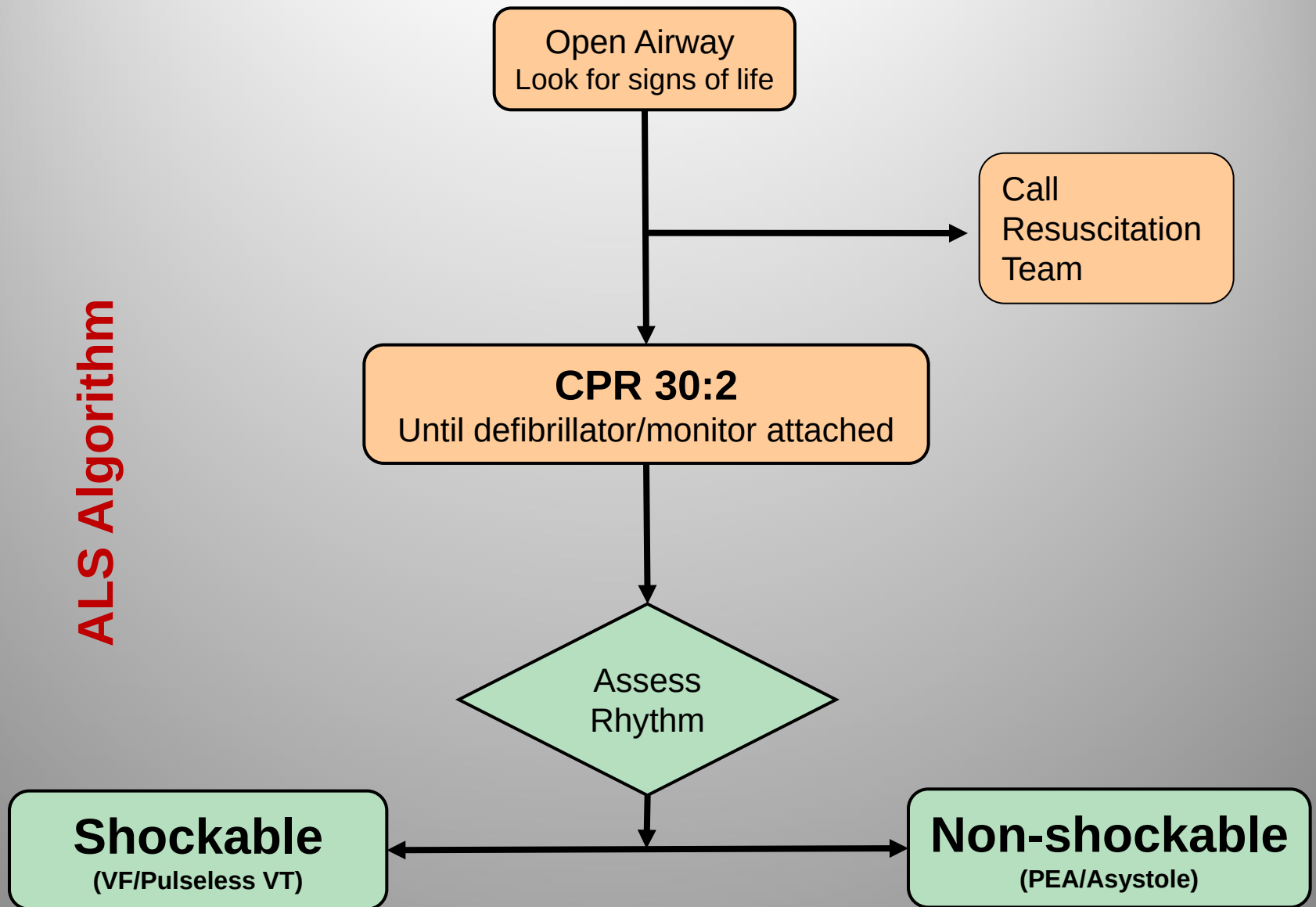
- 30:2
- Compressions
 - “Centre of chest”
 - 5-6 cm depth
 - 100-120 min⁻¹
- Uninterrupted compressions when airway secured
- Avoid
 - Provider fatigue
 - Interruptions



ALS Algorithm

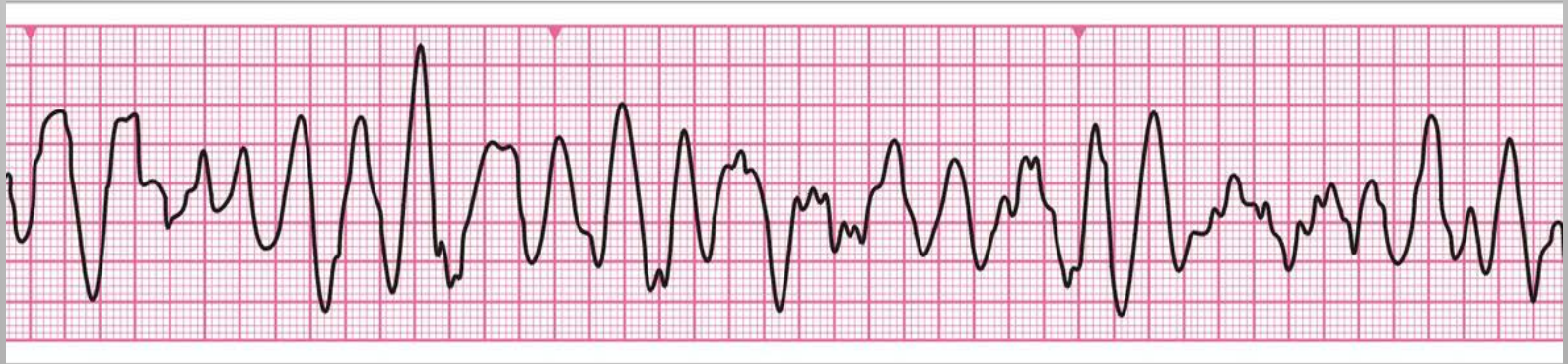


ALS Algorithm



Shockable

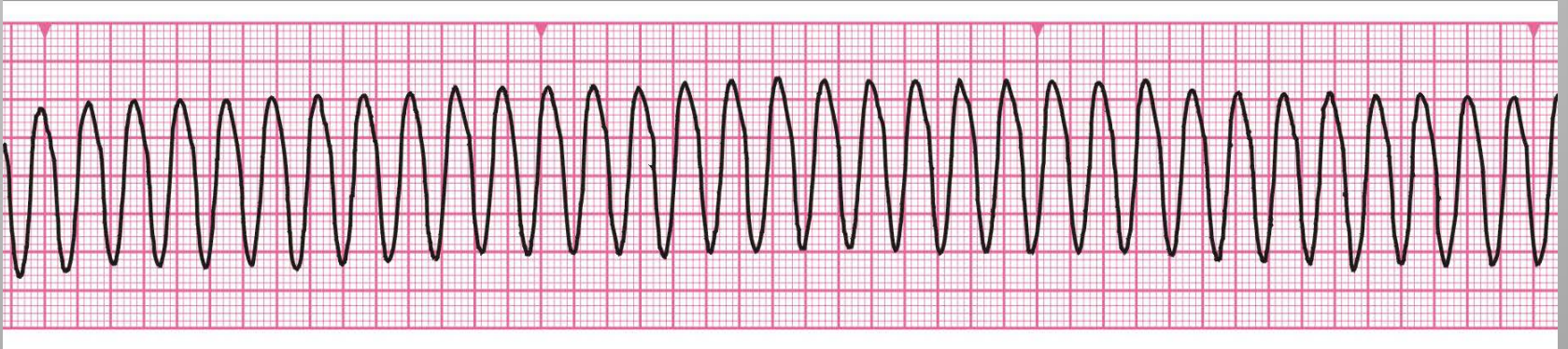
(VF)



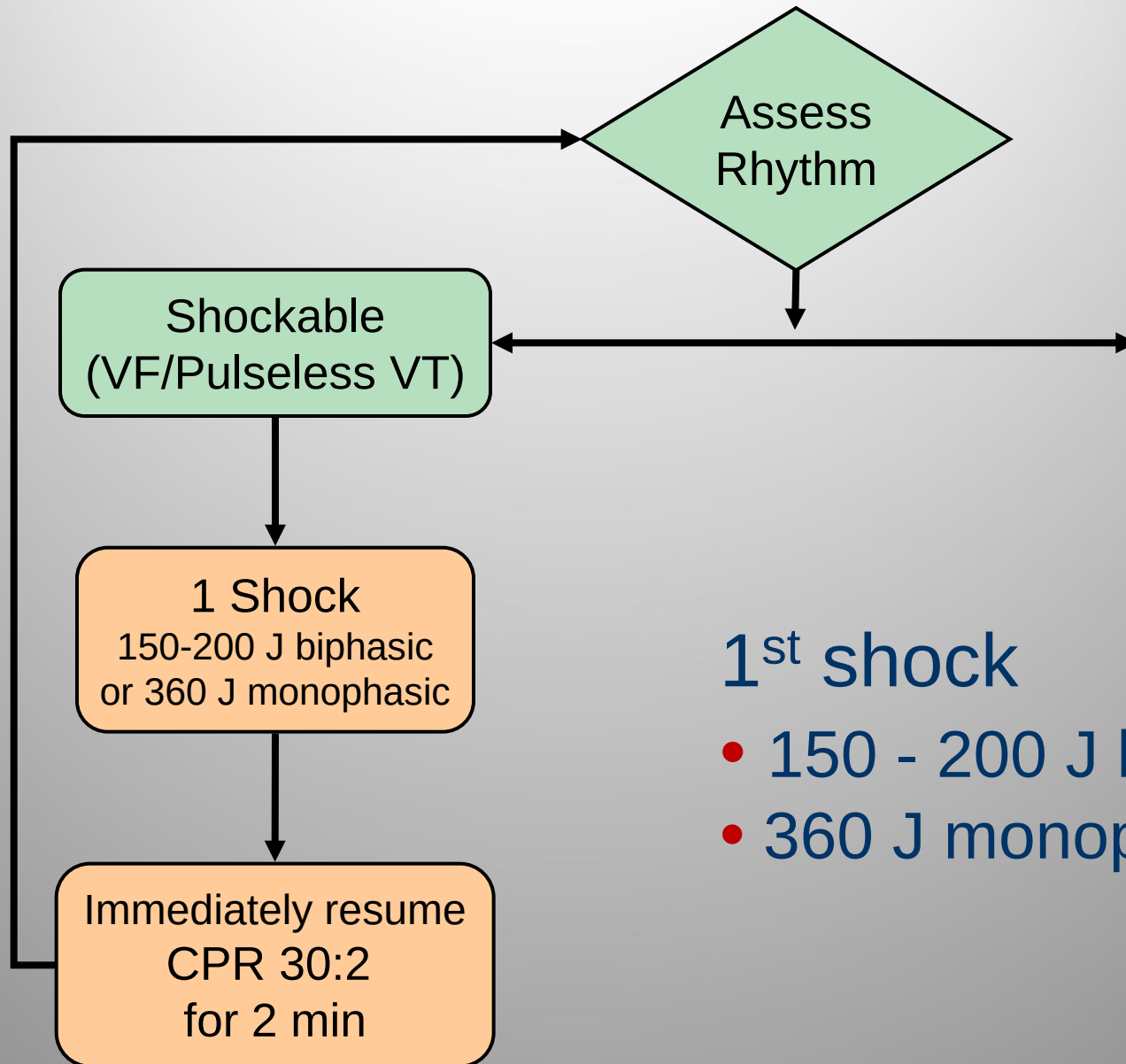
- Bizarre irregular waveform
- No recognizable QRS complexes
- Random frequency and amplitude
- Uncoordinated electrical activity
- Coarse / fine
- Exclude artifact
 - movement
 - electrical interference

Shockable

(VT)



- Monomorphic VT
 - broad complex rhythm
 - rapid rate
 - constant QRS morphology



1st shock

- 150 - 200 J biphasic
- 360 J monophasic

Defibrillation energies

- Vary with manufacturer
- Check local equipment
- If unsure, deliver maximum J (do not delay shock)

If VF/VT persists

Deliver 2nd shock



CPR for 2 min



Deliver 3rd shock



If VF/VT persists
Adrenaline 1mg IV

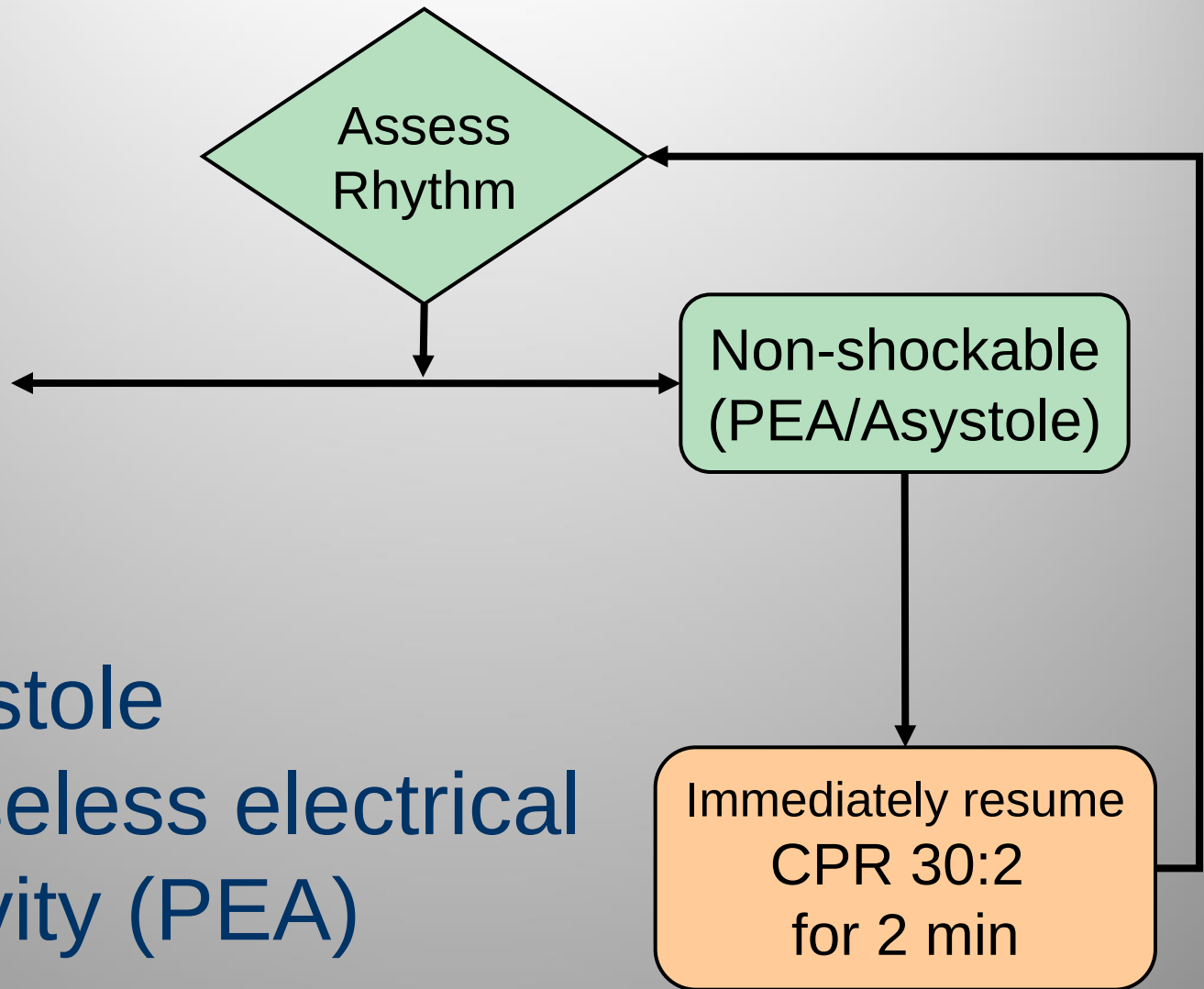
- 2nd and subsequent shocks
 - 150 - 200 J biphasic
 - 360 J monophasic
- Minimise delays between CPR and shocks (< 5 s)
- Do not delay shock to give adrenaline
- Give adrenaline & amiodarone before 4th shock

After delivery of shock

- Continue CPR for another 2 min
 - stop CPR only if patient shows signs of
life

After 2 min, assess rhythm

- If organised electrical activity, check for signs of life:
 - If present start post resuscitation care
 - If not present go to non-shockable algorithm
- If asystole, go to non-shockable algorithm



Asystole
Pulseless electrical
activity (PEA)

Non-shockable

Asystole

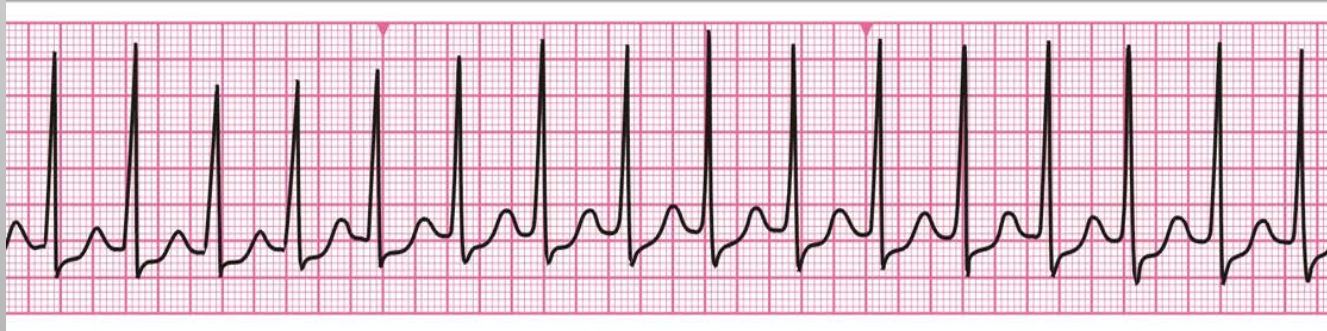


- Absent ventricular (QRS) activity
- Atrial activity (P waves) may persist
- Rarely a straight line trace

Asystole

- During CPR:
 - Check leads are attached
 - Adrenaline 1 mg IV every 3 – 5 min

Non-shockable (PEA)



- Clinical features of cardiac arrest
- ECG normally associated with an output

Pulseless electrical activity

- Exclude / treat reversible causes
- Adrenaline 1 mg IV every 3-5 min

DURING CPR

- Ensure high quality chest compressions
- Minimise interruptions to compressions
- Give oxygen
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THANKS