Objectives

To understand:

- What is meant by defibrillation
- The indications for defibrillation
- How to deliver a shock safely using:
  - a manual defibrillator
  - an automated external defibrillator (AED)
Mechanism of defibrillation

• Definition
  “The termination of fibrillation or absence of VF/VT at 5 seconds after shock delivery”
• Critical mass of myocardium depolarised
• Natural pacemaker tissue resumes control
Defibrillation

Success depends on delivery of current to the myocardium

Current flow depends upon:

• Electrode position
• Transthoracic impedance
• Energy delivered
• Body size
Transthoracic Impedance

Dependent upon:

• Electrode size
• Electrode/skin interface
• Contact pressure
• Phase of respiration
• Sequential shocks
Defibrillators

• Design
  – Power source
  – Capacitor
  – Electrodes

• Types
  – Manual
  – Automated
  – Monophasic or Biphasic waveform
Defibrillator waveforms

Damped Monophasic

Truncated Biphasic
Biphasic Defibrillators

• Require less energy for defibrillation
  – smaller capacitors and batteries
  – lighter and more transportable

• Biphasic shocks have higher success rate for terminating VF/VT than monophasic shocks
Goals for in-hospital defibrillation

- “Healthcare providers with a duty to perform CPR should be trained, equipped, and authorised to perform defibrillation”
- “The goal should be a collapse-to-shock interval of less than 3 minutes in all areas of the hospital”
Automated external defibrillators

- Analyse cardiac rhythm
- Prepare for shock delivery
- Specificity for recognition of shockable rhythm close to 100%
Automated external defibrillators

Advantages:

• Less training required
  – no need for ECG interpretation

• Suitable for “first-responder” defibrillation

• Public access defibrillation (PAD) programs
Automated External Defibrillation

- Attach adhesive electrodes
- Follow audible and visual instructions
- Automated ECG analysis - stand clear
- Charges automatically if shockable rhythm
- +/- manual override
Assess Victim According to BLS guidelines

BLS
If AED not immediately available

Switch defibrillator ON
Attach electrodes
Follow spoken/visual directions

ANALYSE

Shock Indicated
After every shock CPR 2 minutes

No shock Indicated
If no circulation CPR 2 minutes
Manual Defibrillation

Relies upon:

• Operator recognition of ECG rhythm
• Operator charging machine and delivering shock
• Can be used for synchronised cardioversion
Defibrillator Safety

• Never hold both paddles in one hand
• Charge only with paddles on casualty’s chest
• Avoid direct or indirect contact
• Wipe any water from the patient’s chest
• Remove high-flow oxygen from zone of defibrillation
Shock Energy

- Shocks energy 200 J, if biphasic
- Shocks energy 360 J, if monophasic
Manual Defibrillation (1)

- Diagnose VF/VT from ECG and signs of cardiac arrest
- Select correct energy level
- Charge paddles on patient
- Shout “stand clear”
- Visual check of area
- Check monitor
- Deliver shock
Synchronised cardioversion

- Convert atrial or ventricular tachyarrhythmias
- Shock synchronised to occur with the R wave
- Short delay after pressing discharge buttons - keep defibrillator electrodes in place
- Conscious patients: sedation or anaesthesia
- Check mode if further shock/s required
Pulseless VT is treated with an unsynchronised shock using the VF protocol
Any Questions?
Summary

• Defibrillation is the only effective means of restoring cardiac output for the patient in VF or pulseless VT
• Defibrillation must be performed promptly, efficiently and safely
• New technology has improved machine performance and simplified use