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All feedback and suggestions are welcome. Please forward to: Clinical.Guidelines@ambulance.qld.gov.au

Disclaimer

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Defibrillation is the definitive treatment for life-threatening cardiac dysrhythmias, VF and pulseless VT, and is undertaken in parallel with advanced cardiac life support procedures.[1]

A direct current countershock, when applied through the chest produces simultaneous depolarisation of a mass of myocardial cells that may enable resumption of organised electrical activity.[2]

Depending on the type of defibrillator, shocks may be performed using:
- manual mode
- semi-automatic mode

Six types of defibrillator are utilised by the QAS:
- corpuls³
- LIFEPAK® 12
- LIFEPAK® CR2 AED
- Propaq® MD
  (QAS Flight Paramedics working with LifeFlight Physicians)
- HeartStart FRx AED
  (QAS First Responders)
- SCHILLER FRED easyport AED
  (QAS Bike Response Paramedics)
Indications

- VF
- Pulseless VT

Contraindications

- Non-shockable rhythms:
  - asystole
  - pulseless electrical activity
  - perfusing rhythms
- Patients presenting with signs of life

Complications

- Patient injury including burns:
  - Arcing between electrodes may occur if pads are incorrectly placed.\[^{1}\]
  - Foreign bodies (including cardiac leads) between the pads and patient
  - Pads with insufficient or degraded conductant\[^{1}\]
- Explosion:
  - Discharge of the shock could initiate an explosion if there is a combustible gas or fluid in the vicinity.\[^{2}\]
- Transmitted shock to the operator or bystanders\[^{3}\]

Procedures – Defibrillation

1. Prepare the patient and skin for electrode placement (refer to additional information)
   - Ensure non-conductive environment
   - Ensure non-explosive environment
   - Ensure no-contact environment
   - Expose chest: shave, clean, dry area to ensure good skin contact between defibrillation pads and the skin
   - Remove monitoring electrodes if they are obstructing defibrillation pads.
2. Position defibrillation electrodes in the anterior-lateral position (all patient ages). Anterior-posterior electrode placement may be considered if defibrillation electrodes are at risk of overlapping (paediatric patients).

  * In females defibrillation pad placement over the breast may increase impedance and decrease defibrillation efficacy. The positive defibrillation pad should be placed lateral to, or underneath the breast tissue in large breasted women.

**NOTE:** Authority to defibrillate in an aircraft must be obtained from the pilot prior to commencing defibrillation.
**Procedure – Defibrillation**

**Automatic external defibrillation (AED) mode**

1. To start the AED mode, press the AED key. To change to AED mode when the defibrillator is in manual mode, press the AED key.
2. Attach corPatcheasy defibrillation electrodes to the patient.
3. Press the Analyse key to initiate analysis. Do not touch or move the patient.
4. After analysis of the ECG the defibrillator will advise either DELIVER SHOCK or SHOCK NOT RECOMMENDED.
5. If a shockable rhythm is detected, you will see DELIVER SHOCK and the defibrillator will begin charging to 200j.
6. Once charged, hold the key to deliver the shock to the patient.
7. Confirm that defibrillation has occurred by SHOCK PERFORMED being displayed on the screen.

**Manual external defibrillation mode**

1. To start in manual mode, press the Manual key. To change to manual mode when the defibrillator is in AED mode, press the Manual key.
2. Select the required energy level with the flashing jog dial or via the soft keys, confirm the joule setting by pressing the jog dial.
3. Press the Charge key to charge the defibrillator.
4. Once charged, hold the key to deliver the shock to the patient.
5. Confirm that defibrillation has occurred by Shock performed being displayed on the screen.

**corpuls³**: For comprehensive instruction refer to the corpuls³ operating instructions.

**NOTE**: If clinicians are unclear regarding the presenting cardiac rhythm the corpuls³ Analyse function should be immediately used.
Procedure – Defibrillation

**LIFEPAK® 12: For comprehensive instruction refer to the LIFEPAK® 12 operating instructions.**

**Semi-automatic external defibrillation (SAED) mode**

1. When turned on the LIFEPAK® 12 will be in semi-automatic mode and the ADVISORY LED is illuminated.

2. The CONNECT ELECTRODES message and voice prompts occur until the pads are connected to the therapy cable.

3. Press ANALYZE to initiate analysis. Stop CPR.

4. After analysis of the ECG the defibrillator will advise either SHOCK ADVISED or NO SHOCK ADVISED.

5. If a shockable rhythm is detected, you will see and hear SHOCK ADVISED and the defibrillator will begin charging to 200 J. A rising tone indicates that the defibrillator is charging.

6. Once charged, press SHOCK to deliver the shock to the patient.

7. If the SAED detects a non-shockable rhythm you will see and hear NO SHOCK ADVISED.

8. After a shock is delivered or no shock advised a 2 minute CPR continue timer displays on the screen.

9. After 2 minutes, user is prompted to Push ANALYZE.
**LIFEPAK® 12 (cont.)**

**Manual external defibrillation mode**

1. To change to manual mode when the defibrillator is in SAED mode, press the Advisory button.
2. Press Energy Select and dial the appropriate energy setting.
3. Press Charge to charge the defibrillator – a rising tone indicates that the defibrillator is charging.
4. Press the Shock button to deliver the shock to the patient.

**NOTE:** If clinicians are unclear regarding the presenting cardiac rhythm the LIFEPAK® 12 ANALYSE function should be immediately used.

**Propaq® MD:**

*For comprehensive instructions refer to the Propaq® MD operating instructions.*

![Propaq® MD diagram]
**Procedure – Defibrillation**

**Manual external defibrillation mode**

1. Press the green power button to turn the unit on.
2. If defibrillation electrodes are not making good contact with the patient’s skin and the pad selection is ECG lead, the unit issues the message **Check Therapy Electrodes**.
3. Press the **Select Energy** arrows up or down to desired level (refer to CareFlight Physician for joule settings).
4. Press **Charge** to charge the defibrillator – a charging message displays at the bottom of the screen, and a distinctive charging tone sounds indicating that the unit is charging.
5. Press and hold the red shock button to deliver the shock.

**NOTE:** If clinicians are unclear regarding the presenting cardiac rhythm the Propaq® MD ANALYSE function should be immediately used.
HeartStart FRx AED:

For comprehensive instruction refer to the HeartStart FRx AED operating instructions.

1. Press the green on/off button.
2. Follow the voice and visual instructions to position the pads.
3. As soon as the HeartStart FRx detects the pads are attached to the patient, it begins analysing the rhythm.
4. If a shock is advised the orange SHOCK button flashes and the HeartStart FRx instructs you to press the flashing orange button.
5. If a shock is not advised, the blue i-button comes on solid, to show that it is safe to touch the patient and the HeartStart FRx instructs you to perform CPR.
6. Once a shock is delivered the HeartStart will instruct you it is safe to touch the patient and to begin CPR.
**SCHILLER FRED easyport AED:**

*For comprehensive instruction refer to the SCHILLER FRED easyport AED operating instructions.*

1. Press the green on/off button.
2. Follow the voice and visual instructions to position the defibrillation electrodes on the patient’s chest.
3. Connect the electrode cable to the device. The yellow electrode indicator LED will go out as soon as the device is able to identify an acceptable electrode resistance.
4. Follow the prompts to start analysis by pressing the blue button.
5. If a shock is advised, the orange shock button will flash and the SCHILLER FRED easyport will instruct you to press the shock button.
6. If a shock is not advised, the SCHILLER FRED easyport will instruct you to perform CPR.
7. Once a shock has been delivered, the SCHILLER FRED easyport will instruct you to recommence CPR.
LIFEPAK® CR2 AED:

The use of this AED is not restricted to trained personnel as voice prompts guide the operator. Allowing the use of AEDs by individuals without prior formal training can be beneficial and may be lifesaving, however training is recommended.

This AED is designed to be used on adult or child patients, and should only be applied to patients who are unresponsive and not breathing normally.

For comprehensive instructions refer to the LIFEPAK® CR2 operating instructions.

1. Open the lid to turn on the defibrillator. The defibrillator guides the operator through the appropriate steps with voice prompts.

   **Note:** If the defibrillator does not turn on within approximately 5 seconds or if the lid is missing, simply press the on/off button.

2. Remove clothing (including undergarments) from the patient’s chest. Quickly shave chest hair in the area where the defibrillation pads will be placed. If the chest is dirty or wet, wipe the chest clean and dry. Remove any medicine patches from the patient's chest.

3. If the patient is a child less than 8 years old or who weighs less than 25 kg, press the CHILD MODE button to enter child mode. To switch back to adult mode, press the CHILD MODE button again. If there is any doubt about age or weight, it is acceptable to use the device in adult mode. The same defibrillation pads are used for either adult and child patients.
Procedure – Defibrillation

4. Pull the **red handle** to reveal the defibrillation pads.
5. Pull the loops on the defibrillation pads to peel the pads from the tray.
6. Apply the defibrillation pads to the patient’s bare chest exactly as shown in the pictures on the pads. It is essential to press the defibrillation pads firmly so that the pads completely adhere to the patient’s chest.

**Note:**
Avoid placing defibrillation pads over an implanted device. An indication of an implanted device is a protrusion in the chest skin. If there is any doubt, place the defibrillation pads as instructed and continue as prompted by the AED.

7. Ensure the defibrillation pads are placed at least 2.5 cm apart. If the patient’s chest is too small, place the pads on the patient's chest and back (anterior/posterior placement) as shown in the child pictures on the pads.
8. Listen to the voice prompts and do not touch the patient unless instructed to do so.
9. If the AED ECG analysis determines that a shock is indicated, the voice prompts will instruct “Everyone CLEAR”, “PRESS FLASHING BUTTON”. Press the flashing shock button to deliver a defibrillation shock.
10. Do not touch the patient while a shock is being delivered, then continue to follow the voice prompts.
11. The defibrillator will instruct the operator to begin chest compressions, and voice prompts guide hand placement and a metronome guides compression rate and ventilations. If, for whatever reason, the operator is unable or reluctant to provide ventilations (either mouth to mouth resuscitation or with appropriate ventilation equipment), the operator can focus on performing good quality chest compressions until assistance or airway equipment is available.
12. Continue to follow the voice prompts and provide chest compressions or defibrillation shocks as instructed.

Information for recommissioning the AED after use are provided in the Operating Instructions.
**Additional information**

- In cases where a patient has been defibrillated several times (i.e. 3 cycles) and if the patient remains in a shockable rhythm, clinicians should consider quickly replacing the defibrillation pads with fresh defibrillation pads. When replacing the defibrillation pads, if appropriate, consider placing the defibrillation in the anterior/posterior orientation if the initial orientation was anterior/lateral (or vice versa).

- The use of self-adhesive defibrillation pads is associated with a significantly improved rate of ROSC and hospital admission when compared with hand-held paddles.[2]

- After completion of a risk/benefit analysis, the QAS authorises the use of adult LIFEPAK®12 defibrillation pads in the anterior/posterior placement for paediatric patients, despite manufacturer’s recommendation. The QAS does **not** stock paediatric LIFEPAK®12 defibrillation pads.

- LIFEPAK®12 joule settings for adults and children > 8 years:
  - Shock 1 200 J
  - Shock 2 300 J
  - Shock 3 360 J

- Manual corpsuls3 joule settings for adults and children ≥ 6 years is 200 J (all shocks).

- Manual joule settings for children < 6 years:
  - All shocks at 4 J/kg
  - Round up the energy required to the next highest setting on the defibrillator.

**Safety**

**Ensure a non-conductive environment:**

- Remove conductive items in the vicinity of the patient AND/OR the defibrillator
- Wipe the chest dry of water, sweat, blood, excess gel, vomit etc.

**Ensure a non-explosive environment:**

- Do not defibrillate in the vicinity of petrol, LPG, or other such flammable materials.

**Ensure no contact:**

- No person is to be in contact with the patient at time of defibrillation.
- Have only one clinician responsible for defibrillation. They are to check no contact and shout loudly ‘All clear!’ prior to defibrillation.
- Ensure there is no contact between the patient and the ambulance vehicle prior to defibrillation. (Place blankets over side arms of stretcher and pillows under the feet if necessary.)

**Ensure no movement:**

- Rhythm analysis may be improved by stopping the ambulance where appropriate.
- Minimise patient movement.

**NOTE:** Authority to defibrillate in an aircraft must be obtained from the pilot prior to commencing defibrillation.
Defibrillation pad removal

- If removal of the defibrillation pads is required, the following procedure is to be employed:
  - Each individual defibrillation pad should be removed with two hands.
  - Loosen one side of the defibrillation pad by gently separating the pad’s contact with the patient’s skin.
  - Peel the defibrillation pad back over itself at 180 degrees, using the other hand to support the skin where required.
  - Defibrillation pads should be removed in the direction of hair growth where possible.
  - Gentle handling of the patient’s skin is required in the very young, older patients and in patients where skin integrity is questionable.