Adult Advanced Life Support Level 1 Manual

(Immediate Life Support)

CSK12364
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**Introduction**

This manual forms part of the requirements for the Adult Advanced Life Support (ALS) Level 1 course in SWSLHD. ALS Level 1 is also known as Immediate Life Support.

“Basic Life Support (BLS) is the preservation of life by the initial establishment of, and/or maintenance of, airway, breathing, circulation and related emergency care, including use of an AED. Advanced Life Support (ALS) is the provision of effective airway management, ventilation of the lungs and production of a circulation by means of techniques additional to those of Basic Life Support. These techniques may include, but not be limited to, manual defibrillation, advanced airway management, vascular access/ drug therapy and defibrillation” (ARC Glossary 2014).

The SWSCEDW, Adult ALS Level 1 course consists of:

- Completion of
  - Advanced Life Support Theory- Module A (Adult) (MHL - course code: 67644403)
  - Advanced Life Support Theory- Module B (Adult) (MHL – course code: 67644650)
  - Advanced Life Support Theory – Module C Quiz (MHL- course code 197482978).
- Reading this manual (SWSLHD Adult ALS Manual) and completing the questions at the end of the manual
- **When the five activities above are completed**, attendance at a SWSLHD Face-to-Face one day Adult ALS workshop CSK12364
- Practical assessment CSK12365 by an accredited Adult ALS assessor (either at the one day workshop, or at a later date in your facility).

The aim of this course is to enhance the knowledge and skills in ALS techniques for those responding to cardiac arrests within critical care areas. It is suitable for Registered Nurses (RN’s) who work in critical care areas and medical staff.

**Pre-requisites for attendance at the Adult ALS workshop CSK12364**

- Completion of Advanced Life Support Theory- Module A (Adult) (MHL - course code: 67644403), and Advanced Life Support Theory- Module B (Adult) (MHL - course code: 67644650) and Advanced Life Support Theory – Module C Quiz (MHL - course code: 197482978) within the last 6 months.
- Basic Life Support Accreditation within the last 12 months
- For RN’s; currently working in a critical care area
- Working knowledge of the defibrillator and arrest/resuscitation trolley in their workplace
- Reading this manual (SWSLHD Adult ALS Manual) and completing the questions at the end of the manual
- It is also expected that participants have completed Between the Flags - Tier 2 DETECT OR Between the Flags - Tier 2 DETECT workshop (Mixed – Face-to-Face) – Nursing and Medical – Half day.

In order to simplify treatment regimes, the Australian and New Zealand Committee on Resuscitation (ANZCOR) has produced standardised treatment guidelines based on the recommendations of the International Liaison Committee on Resuscitation (ILCOR). These can be found on the ANZCOR website, at www.resus.org.au. This course is based on these guidelines.

At the end of this course the participant are able to:

- Discuss and demonstrate airway management with Bag-Valve Resuscitator (BV)
- Identify shockable and non-shockable rhythms and demonstrate appropriate management
- Demonstrate knowledge of first-line pharmacological treatment in a cardiac arrest.
Participants are encouraged to seek opportunities to practice their ALS skills and reinforce the knowledge and skills they have learnt through the ALS course process. This should be taking place before and after the workshop date.

You will need to maintain your BLS and ALS accreditation annually. Reaccreditation consists of:

- Practical accreditation in *BLS with AED* (Basic Life Support (Adult) Practical Assessment)
- Completion of
  - Advanced Life Support Theory- Module A (Adult) (MHL - course code: 67644403)
  - Advanced Life Support Theory- Module B (Adult) (MHL – course code: 67644650)
  - Advanced Life Support Theory – Module C Quiz (MHL- course code 197482978).
- Practical accreditation by an accredited Adult ALS assessor.

ALS accreditation and reaccreditation must be recorded in MHL, which enables a standardised and accessible means of recording and reporting on courses, skills and competencies. For further information on accreditation for ALS, contact your Clinical Nurse Educator (CNE) or the SWSCEWD Nurse Educator (NE) below:

Amanda Hooton: amanda.hooton@sswahs.nsw.gov.au 8738 6089

**Abbreviations used within this manual**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AED</td>
<td>Automated External Defibrillator *</td>
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<tr>
<td>AF</td>
<td>Atrial Fibrillation</td>
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<tr>
<td>ALS</td>
<td>Advanced Life Support *</td>
</tr>
<tr>
<td>ANZCOR</td>
<td>Australian and New Zealand Committee on Resuscitation*</td>
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<tr>
<td>AP</td>
<td>Antero Posterior</td>
</tr>
<tr>
<td>ARC</td>
<td>Australian Resuscitation Council*</td>
</tr>
<tr>
<td>AV</td>
<td>AtrioVentricular* (official AV = audiovisual)</td>
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<tr>
<td>BLS</td>
<td>Basic Life Support*</td>
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<tr>
<td>BV</td>
<td>Bag Valve resuscitator</td>
</tr>
<tr>
<td>BTF</td>
<td>Between The Flags*</td>
</tr>
<tr>
<td>CEC</td>
<td>Clinical Excellence Commission</td>
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<tr>
<td>CERS</td>
<td>Clinical Emergency Response System</td>
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<tr>
<td>CPR</td>
<td>Cardiac Pulmonary Resuscitation</td>
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<tr>
<td>CVAD</td>
<td>Central Venous Access Device*</td>
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<tr>
<td>DBD</td>
<td>Donation after Brain Death*</td>
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<tr>
<td>DCD</td>
<td>Donation of tissue / organs after cardiac arrest</td>
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<tr>
<td>DETECT</td>
<td>Detecting Deterioration, Evaluation, Treatment, Escalation and Communicating in Teams*</td>
</tr>
<tr>
<td>DNR</td>
<td>Do Not Resuscitate</td>
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<tr>
<td>DO</td>
<td>Designated Officer* (official DO = Day Only)</td>
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<tr>
<td>DSN</td>
<td>Donation Specialist Nurse</td>
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<tr>
<td>EMD</td>
<td>Electro Mechanical Dissociation*</td>
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<tr>
<td>ETT</td>
<td>Endotracheal tube</td>
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<tr>
<td>FBAO</td>
<td>Foreign Body Airway Obstruction*</td>
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<tr>
<td>ICD</td>
<td>Implantable Cardioverter Defibrillator*</td>
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<tr>
<td>ICU</td>
<td>Intensive Care Unit</td>
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<tr>
<td>ILCOR</td>
<td>International Liaison Committee on Resuscitation*</td>
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<tr>
<td>ILS</td>
<td>Immediate Life Support*</td>
</tr>
<tr>
<td>IO</td>
<td>Intra Osseous* (official IO = inferior oblique)</td>
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<tr>
<td>IV</td>
<td>Intravenous</td>
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<tr>
<td>LMA</td>
<td>Laryngeal Mask Airway* (official LMA = Left Mento Anterior)</td>
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<td>LMS</td>
<td>Learning Management System*</td>
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<tr>
<td>MHL</td>
<td>My Health Learning</td>
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<td>NFR</td>
<td>Not For Resuscitation</td>
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<td>NSW</td>
<td>New South Wales</td>
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<td>OTDS</td>
<td>Organ Tissue Donation Service*</td>
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<td>PEA</td>
<td>Pulseless Electrical Activity*</td>
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<tr>
<td>PPM</td>
<td>Permanent Pacemaker</td>
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<tr>
<td>RCUK</td>
<td>Resuscitation Council United Kingdom*</td>
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<td>RMS</td>
<td>Roads &amp; Maritime Services*</td>
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<tr>
<td>RN</td>
<td>Registered Nurse</td>
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<tr>
<td>ROSC</td>
<td>Return of Spontaneous Circulation*</td>
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<tr>
<td>SaNOK</td>
<td>Senior available Next Of Kin*</td>
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<tr>
<td>SVT</td>
<td>Supra Ventricular Tachycardia</td>
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<tr>
<td>SWSLHD</td>
<td>South Western Sydney Local Health District</td>
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<td>SWSCEWD</td>
<td>South Western Sydney Centre for Education and Workforce Development*</td>
</tr>
<tr>
<td>TdP</td>
<td>Torsades de Pointes*</td>
</tr>
<tr>
<td>VT</td>
<td>Ventricular Tachycardia</td>
</tr>
<tr>
<td>VF</td>
<td>Ventricular Fibrillation</td>
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Abbreviations with an * are not listed in Approved List of Abbreviations Liverpool Hospital (2018)
Chapter 1: Recognising the deteriorating patient

Patients who require ALS often have poor outcomes. ‘Most in-hospital cardiac arrests are not sudden or unpredictable events. In approximately 80% of cases clinical signs deteriorate over the few hours before arrest’ (ARC & RCUK 2011, p.7).

Early recognition, appropriate escalation of care, and effective treatment of the patient who is clinically deteriorating may prevent cardiac arrest, death or an unplanned Intensive Care Unit (ICU) admission.

Early recognition of the deteriorating patient is vital. You should be familiar with the simple assessment and management algorithm: ‘A to G assessment, give oxygen, position your patient, call for help’ (CEC, 2014).

All public health organisations in New South Wales (NSW) are required to provide a Clinical Emergency Response System (CERS). It includes the use of NSW Standard Observation charts with standard calling criteria, an early warning system and rapid response/medical emergency team, for prompt review and treatment of patients who are clinically deteriorating, with referral to higher levels of care (escalation) when necessary. The aim is to reduce cardiac and respiratory arrests and hospital mortality. Although ALS knowledge and skills as taught in this course are vital, it is always better to prevent an arrest where possible.

As a result of Australian and International studies, reports and case reviews, the Between the Flags (BTF) and Detecting Deterioration, Evaluation, Treatment, Escalation and Communicating in Teams (DETECT) programs were implemented in NSW Health in 2010 (CEC, 2014). All facilities have policies which outline clinical review and rapid review criteria so that signs and symptoms of clinical deterioration are recognised and appropriately managed.

The A to G assessment is a structured approach to physical assessment. It is quick to use and aims to assist in finding the cause for deterioration rather than just a diagnosis. Using the A to G should also help to improve communication of changes in a patient’s condition.

A  Airway
B  Breathing
C  Circulation
D  Disability
E  Exposure
F  Fluids
G  Glucose

All clinical staff should be familiar with assessing the patient and recording vital signs, recognising the calling criteria and flagging those patients who need further help. If a patient is deteriorating then there should be an escalation and management plan appropriate for the facility and the patient.
The chain of survival (American Heart Association, 2014) is a series of actions that link to each other. Increasing the strength of each link can improve the chances of survival and recovery for victims of heart attack, stroke and other emergencies. These principles of early access, early Cardiopulmonary Resuscitation (CPR), early defibrillation and early advanced care are the foundation of ALS.


**Early access:** Early recognition of the deteriorating patient, immediate recognition of cardiac arrest, and activation of the emergency response system

**Early CPR with an emphasis on chest compressions:** Chest compressions and ventilations will ensure there is some blood circulated to the patient's brain, heart and lungs. This helps to reduce further deterioration. DO NOT DELAY CPR in attempts to defibrillate, and minimise interruptions to CPR.

**Early defibrillation:** Aim to deliver the first defibrillation attempt within three (3) minutes of cardiac arrest onset. If manual defibrillation is not available, seek out an Automated External Defibrillator (AED).

**Early advanced care:** ALS by well-trained staff includes good CPR, appropriate and effective defibrillation, adequate ventilation, administration of relevant IV medications and early recognition of reversible causes. Integrated post resuscitation care is vital after Return of Spontaneous Circulation (ROSC). Interventions in the post resuscitation period can significantly improve patient outcomes.

For further information, refer to your local policies on the deteriorating patient.

**Chapter 2: Algorithms**

On the following pages are the BLS and Adult ALS algorithms from the ANZCOR http://www.resus.org.au/. The purpose of these algorithms is to provide a logical, step-by-step procedure for the assessments and actions required for the person who has collapsed.

**As an ALS provider, you must know both algorithms thoroughly.**
Basic Life Support

D：Dangers?
R：Responsive?
S：Send for help
A：Open Airway
B：Normal Breathing?
C：Start CPR
   30 compressions : 2 breaths
D：Attach Defibrillator (AED)
   as soon as available, follow prompts

Continue CPR until responsiveness or normal breathing return

(ANZCOR, 2016a, p.5)
BLS is the preservation or restoration of life by the initial establishment and/or maintenance of airway, breathing and circulation, and related emergency care. Accreditation in BLS, including the AED, is required before attending the ALS face-to-face workshop. If you are not competent in BLS, then you cannot continue on to ALS.

In SWSLHD, the process for BLS accreditation is as follows:
- Update yourself on the theory of BLS. The MHL e-learning module, Basic Life Support -Adult is required every 5 years, but can be repeated more often if desired.
- Practical accreditation in BLS on an adult manikin and with an AED. This is then recorded in MHL as Basic Life Support (Adult) Practical Assessment. The SWSLHD BLS assessment chart is Appendix 1 of this manual.

Each facility has a policy on BLS which is guided by the ANZCOR’s recommendations.

**During ALS, good chest compressions are vital**

‘The quality of chest compressions during in-hospital CPR is frequently sub-optimal. The importance of uninterrupted chest compressions cannot be over-emphasized. Even short interruptions to chest compressions are disastrous for outcome and every effort must be made to ensure that continuous, effective chest compression is maintained throughout the resuscitation attempt. The person providing chest compressions should be changed every 2 minutes, but without causing long pauses in chest compressions’ (Soar & Davies, 2012, p.56).

**Good chest compressions for adults** (ANZCOR, 2016d):

- **Hand position**: two hands on the lower half of the sternum;
- **Rate**: approx. 100-120 compressions per minute;
- **Depth**: at least 5 cms (approx. 1/3 of the antero-posterior [AP] chest diameter);
- **Allow complete recoil of the chest after each compression, but keep the hand in contact with the chest**;
- **Duty cycle of 50% (ratio between compression and release)**;
- **Minimise interruptions to chest compressions**;
- **Alternate compressor duties frequently (i.e. every 2 minutes)**.

**CPR for the pregnant woman**: From third trimester, hand position for chest compressions may need to be slightly higher on the sternum. From about 20 weeks pregnant: Manually displace the uterus to the left, to relieve compression on the inferior vena cava. Add left lateral tilt, between 15 and 30 degrees if this is feasible (ERC 2015). This can be achieved by placing a pillow, a wedge or using rescuer’s knees (the human wedge), under the woman’s right side (Morris & Stacey, 2003). The angle of tilt used needs to enable high-
quality chest compressions and if needed, allow Caesarean delivery of the fetus’ (ERC 2015, p.185). Urgent caesarean section may need to be performed, and CPR must be continued throughout this procedure (Morris & Stacey, 2003).

The ALS algorithm (shown on the following page) was developed to simplify resuscitation and recommend a specific sequence. The priority is to minimise “hands off time”. There are two treatment arms for the ALS algorithm, SHOCKABLE and NON-SHOCKABLE.

More detail on the ALS for Adults algorithm is below.

- **1st responder:** Determine whether the patient is in cardiac arrest: Danger, Response, Send for help, Airway, Breathing
- No response and no breathing, commence CPR whilst awaiting defibrillator
- 1st responder continues with CPR at a ratio of **30 compressions: 2 breaths**
- 2nd responder attaches a manual defibrillator as soon as it arrives and prepares for a rhythm check and shock.

**DO NOT STOP CPR while defibrillator is charging**

Attach and charge the defibrillator without stopping for a rhythm check, so interruptions to CPR are avoided. Once the defibrillator is charged, CPR stops and **rhythm assessed.** The rhythm cannot be accurately assessed while chest compressions are performed.

To ensure that a shock is ready to go as soon as it is needed, the defibrillator is charged whilst compressions continue, and compressions stop once the defibrillator is fully charged.

When should the rhythm be checked?

- As soon as the defibrillator is available and has been fully charged, and everyone is prepared for a rhythm check
- After every 2 minutes of CPR, when the defibrillator has been fully charged and everyone is prepared for a rhythm check
- At any other time if the victim becomes responsive and normal breathing is apparent
- If the patient is already monitored and the rhythm can be easily seen, the rhythm should be checked as soon as the patient arrests, in the process of checking DRSABCD.

**Shockable rhythm** – Go to shockable arm of the algorithm. Ensure safety; deliver **shock,** straight to **CPR for 2 minutes.**

**Non-shockable rhythm** – Go to non-shockable arm of the algorithm. ‘Dump’ the charge and continue with **CPR for 2 minutes.** The defibrillator should be charged during CPR as the end of the 2 minute loop of CPR approaches, to minimise interruptions to CPR and increase the likelihood of shock success.
Advanced Life Support for Adults

Start CPR
30 compressions : 2 breaths
Minimise Interruptions

Attach Defibrillator / Monitor

Assess Rhythm

Shockable

Shock

CPR for 2 minutes

Non Shockable

Return of Spontaneous Circulation?

CPR for 2 minutes

Post Resuscitation Care

During CPR
Airway adjuncts (LMA / ETT)
Oxygen
Waveform capnography
IV / IO access
Plan actions before interrupting compressions (e.g. charge manual defibrillator)

Drugs
- Shockable
  * Adrenaline 1 mg after 2nd shock (then every 2nd loop)
  * Amiodarone 300mg after 3 shocks
- Non Shockable
  * Adrenaline 1 mg immediately (then every 2nd loop)

Consider and Correct
- Hypoxia
- Hypovolaemia
- Hyper / hypokalaemia / metabolic disorders
- Hyperthermia / hyperthermia
- Tension pneumothorax
- Tamponade
- Toxins
- Thrombosis (pulmonary / coronary)

Post Resuscitation Care
- Re-evaluate ABCDE
- 12 lead ECG
- Treat precipitating causes
- Aim for: SpO2 94-98%, normocapnia and normoglycaemia
- Targeted temperature management

ANZCOR 2018, p.8
Shockable arm of the algorithm:

Pulseless VT/VF: CPR in progress
When manual biphasic defibrillator available
Clearly perform defibrillation script as follows:

- Compressions continue
- Oxygen away
- All else clear
- Charging
- Hands off/I’m safe
- Evaluate rhythm
- Deliver one (1) shock of 200 joules

Cycle continues: Continue compressions and ventilation (30:2) for 2 minutes
Clearly perform defibrillation script
Adrenaline administration every 2nd loop (around every 4 minutes)
Correct reversible causes
Consider anti-arrhythmics: Amiodarone 300mg after 3rd failed shock
Non-shockable arm of the algorithm:

PEA / Asystole: CPR in progress
When manual biphasic defibrillator available
Clearly perform defibrillation script as follows:

- Compressions continue
- Oxygen away
- All else clear
- Charging
- Hands off/I'm safe
- Evaluate rhythm
- Disarm & dump charge

Cycle continues: Continue compressions and ventilation (30:2) for 2 minutes
Adrenaline 1mg administered immediately after 1st shock is dumped and then
every 2nd loop (around every 4 mins)
Correct reversible causes

During CPR, also consider
- IV/IO access
- Airway adjuncts
- Oxygen requirements
- Waveform capnography
- Plan actions before interrupting compressions

Potentially reversible causes
Consider and correct: The 4H’s and 4T’s

<table>
<thead>
<tr>
<th>4 H’s</th>
<th>4 T’s</th>
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<tbody>
<tr>
<td>Hypo / Hyperkalaemia / metabolic disorders</td>
<td>Thrombosis (pulmonary and coronary)</td>
</tr>
<tr>
<td>Hypo / hyperthermia</td>
<td>Tension pneumothorax</td>
</tr>
<tr>
<td>Hypovolaemia</td>
<td>Tamponade</td>
</tr>
<tr>
<td>Hypoxia</td>
<td>Toxins / tablets</td>
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</tbody>
</table>

For further information on reversible causes, refer to the ANZCOR Guidelines:

11.2 Protocols for Adult ALS

11.7 Post resuscitation therapy in adult ALS
Chapter 3: Airway Management and Ventilation

Airway Management

Airway management is necessary to provide an open airway in the following circumstances:

- If the patient is unconscious
- If the patient has an obstructed airway
- If the patient needs rescue breathing.

Unconscious patients should be moved gently, avoiding twisting and bending of the neck. Patients should only be rolled onto their side if the airway is obstructed with fluid, such as; submersion injuries. In these cases the patient may be rolled onto their side to clear the airway with the mouth open and turned slightly downwards to allow the fluid to drain. Well-fitting dentures should be left in place, however loose fitting ones should be removed.

**Head tilt / chin lift**

For the purposes of ALS the chin lift is used in combination with a head tilt. The chin is supported by the rescuers fingers to open the mouth and lift the tongue and soft tissues away from the back of the mouth and throat.

![Head tilt / chin lift](image)

Placing one hand on the patient’s forehead while the other hand provides the chin lift. The head is tilted back (this is the head tilt). A **head tilt is NOT suitable for patients with traumatic injuries** where c-spine injuries are suspected.

**Jaw thrust**

Clasp the jaw with both hands and hold the mouth open with the thumbs. Pressure is applied with the fingers behind the angles of the jaw gently pushing the jaw upwards and away from the chest. This manoeuvre shifts the tongue away from the back of the throat. Jaw thrust is the preferred method of opening the airway where c-spine injuries are suspected.
Obstruction

Airway obstruction may be partial or complete, may have a gradual or sudden onset, and may be present in a conscious or unconscious patient. All obstructions are life threatening, regardless of the cause. It is essential to assess and manage all airways.

Causes of airway obstruction can include:

- relaxation of airway muscles due to unconsciousness,
- inhaled foreign body,
- anaphylaxis,
- airway trauma or burns.

A conscious patient with airway obstruction may have extreme anxiety, agitation, gasping sounds, cough, stridor, loss of voice and may clutch at their throat. In partial airway obstruction breathing is laboured, may be noisy and some air can be felt escaping from the nose or mouth.

In a complete airway obstruction there may be some effort made to breathe, but no sounds of breathing or escape of air can be felt at the nose or mouth. In an unconscious, non-breathing patient airway obstruction may not be obvious until a rescue breath is attempted.

Management of Foreign Body Airway Obstruction (FBAO)

Foreign body airway obstruction can be life threatening. When a foreign body irritates the vocal cords, this can cause laryngeal spasm; a protective mechanism to prevent the material from entering the lungs. This can lead to a partial or complete airway obstruction at the entrance of the trachea.

First assess the severity of the obstruction.

**Effective cough (Mild Airway Obstruction)**

Patients with an effective cough should be re-assured and encouraged to cough until the obstruction is cleared.

**Ineffective cough (Severe Airway Obstruction)**

Give 5 sharp back blows with the heel of one hand, in the middle of the back between the shoulder blades. Rescuers should check after each back blow to see if the airway obstruction is relieved, rather than administering all 5.
If back blows are unsuccessful, 5 chest thrusts should be performed. To deliver chest thrusts the rescuer should locate the position on the chest where compressions for CPR are given and then deliver 5 chest thrusts. These are similar to chest compressions, but sharper and at a slower rate. Rescuers should check after each chest thrust to see if the obstruction is relieved, rather than administering all 5.

**Unconscious patients**

Suction the airway, and if the obstruction is visible remove the material and commence CPR.

Regurgitation and inhalation of stomach contents is often unrecognised in an unconscious patient. Regurgitation is a passive process and is managed by suctioning and/or rolling the patient on their side.

**Flow chart for management of Foreign Body Airway Obstruction**

(ANZCOR 2016, p.7)
**Oropharyngeal airways (Guedels airway)**

Oropharyngeal airways should be the appropriate size and reserved for unconscious patients, as vomiting and laryngeal spasm may occur in patients who have a gag reflex.


The correctly sized oropharyngeal airway will measure from the incisors to the angle of the jaw.

http://www.haworth21.karoo.net/BASIC%20AIRWAY%20MANAGEMENT.htm

Insert the oral airway upside down until the soft palate is reached, then rotate the device 180 degrees and slip the airway into place over the tongue.

http://www.haworth21.karoo.net/BASIC%20AIRWAY%20MANAGEMENT.htm
Nasopharyngeal airways

To size the nasopharyngeal airway; measure from the tip of the nose to the tragus. To insert the nasopharyngeal airway check there are no obstructions in the nasal passage. Lubricate the nasopharyngeal airway, insert the tip of the airway into the nostril and guide it towards the ear with a slight rotating motion until the flange sits against the nostril.

If difficulty is experienced when advancing the nasopharyngeal airway, stop and try the other nostril.

In patients with suspected basal skull fractures oral airways are preferred.

Laryngeal Mask Airway (LMA)

The LMA is a supraglottic airway device used during resuscitation. In the resuscitation situation these airways are generally used when attempts of inserting an endotracheal tube have been unsuccessful or when suitably skilled clinicians are not available. LMAs do not protect the airway from aspiration. Sizes of LMAs used in adults are 3, 4 & 5.

LMA insertion is a skill that may be practiced as part of the ALS face-to-face day; however there is no formal accreditation of this skill throughout the course.

http://www.brandianesthesia.it/english/genanesth.html
Advanced airway management such as insertion of endotracheal tubes and surgical airways are beyond the scope of this course and therefore not covered in this manual.

**Breathing / Ventilation**

Ineffective or absent breathing may be due to:
- Direct depression of, or damage to, the breathing control centre of the brain
- Upper airway obstruction
- Paralysis or impairment of nerves/muscles of breathing
- Problems affecting the lungs
- Drowning
- Suffocation
- Cardiac arrest

**Breathing assessment**

LOOK – for movement of the chest or upper abdomen
LISTEN – for escape of air from the nose and/or mouth
FEEL – for movement of the chest and upper abdomen and escape of air from the nose and/or mouth.

**Rescue breathing**

If the patient is still unresponsive and not breathing normally after the airway has been opened and cleared, the rescuer must immediately commence chest compressions and then rescue breathing at a ratio of 30:2 (30 compressions : 2 breaths).

**Bag-Valve-Mask (BVM) ventilation**

BVM ventilation is a skill which assists in oxygenating and ventilating a patient until a more definitive airway can be obtained. The adult BVM device holds 1500-1600mls. Proper positioning of the patient with either head tilt/chin lift or jaw thrust is essential when performing BVM ventilation. After selecting the appropriate size mask to fit the patient's face, ensure the BVM device is connected to 15 L/min of oxygen.

BVM ventilation can be performed by one or two clinicians.

In the single person BVM ventilation technique, the thumb and index finger of the clinician holds the mask over the nose and chin of the patient, while the other three fingers hold the mandible in a jaw thrust position.

In the two person technique the first person applies the mask to the patient’s face while performing a jaw-thrust manoeuvre and maintaining a tight seal with both hands. The second person squeezes the bag with both hands to ventilate the patient.

Ventilation should be assessed by observing rise and fall of the patient’s chest while gently squeezing the bag. Complications of BVM ventilation include; gastric distention, aspiration and risk of barotrauma.

**Special considerations**

Unless specified, the following section is adapted from “Bag-Valve (BV) Resuscitator including oropharyngeal and nasopharyngeal airways” (LH_GL2018_P01.44).

**Patients with a tracheostomy**

A tracheostomy is an artificial opening into the trachea (NSW Agency for Clinical Innovation, 2013). The tracheostomy is usually located on the “midline anterior aspect of the neck” (Liverpool Hospital, 2018, p. 7).

If a patient with a tracheostomy needs Bag-Valve ventilation, try the tracheostomy site first:

- Follow the BLS algorithm and suction if necessary
- If a fenestrated tube is in place, replace the inner cannula with a non-fenestrated inner cannula
- If a cuffed tube is in situ, inflate the cuff
- Fenestrated tubes are normally cuffless, therefore, if ventilation is inadequate (due to air escaping) the tube may need to be replaced
- Apply the Bag-Valve resuscitator directly to the tracheostomy tube and ventilate at a rate of 10 breaths per minute

If unable to ventilate adequately, prepare to either; remove the tracheostomy tube and set up for either a new tracheostomy tube or an endotracheal tube.

Patients with a laryngectomy

A laryngectomy is a permanent opening into the trachea, where the larynx has been removed and a stoma formed, meaning there is no connection between the upper airway and trachea (NSW Agency for Clinical Innovation, 2013 & Marcovitch, 2010). The “laryngectomy stoma is located on the midline anterior aspect of the neck, above the suprasternal notch” (Liverpool Hospital, 2018, p. 7).

All ventilation must involve the neck stoma, not the mouth and nose.

- Follow the BLS algorithm
- Expose the stoma and place a rolled towel between the patient’s shoulder blades
- Suction and remove dried secretions with forceps as necessary
- Connect the Bag-Valve resuscitator to the laryngectomy tube or use the mask over the stoma in an inverted position
Chapter 4: Shockable and non-shockable rhythms

Patients who require ALS commonly have underlying problems, which may include heart disease, respiratory disease, drug overdose, trauma, electrolyte imbalances, and a history of arrhythmias.

Patients who arrest are defined by the criteria of not breathing and not responsive, and it is vital that the ALS provider performs rhythm checks. Rhythm checks in ALS must be accurate and fast, and the algorithm defines the basic management into shockable and non-shockable rhythms.

In cardiac arrest, shockable rhythms are Ventricular Tachycardia (VT) and Ventricular Fibrillation (VF). In cardiac arrest, non-shockable rhythms are Asystole and Pulseless Electrical Activity (PEA), which is also sometimes known as Electromechanical Dissociation (EMD). The term PEA will be used in this manual.

The chance of successful defibrillation decreases with time. Therefore the performance of good CPR and decreasing the time to defibrillation are the highest priorities in resuscitation from sudden cardiac arrest (ANZCOR, 2018).

Electrocardiograph (ECG) monitoring may be via a standard hardwire ECG monitoring system utilising 3 to 5 electrodes on the chest, or via the defibrillator pads. Whatever the method used, ensure reliable tracings are obtained and that all those assessing the patient are all looking at the right patient & the same rhythm.

A quick look at what is 'normal', so that abnormal is easily determined.

Normal Sinus rhythm is defined by the criteria of

Regular rhythm (equal RR intervals)

Normal P wave, Normal PR interval (less than 0.2 seconds, 1 large square)

Normal QRS for that patient   Ventricular rate between 60 and 100 beats per minute.
Consistent and regular P waves followed by consistent and regular QRS complexes, with a consistent PR interval.

A patient in sinus rhythm should also have a detectable pulse with each QRS complex.

In the critically ill / arrested patient, pulse checks should only be via central pulses i.e. carotid, femoral and apex.

**Should you check a pulse?**

In BLS, the combination of unresponsiveness and absent or abnormal breathing is used to identify cardiac arrest. Pulse checks have limitations, but an ALS provider can check for a central pulse for up to 10 seconds in the initial assessment of the collapsed patient.

*If trained and experienced in assessment of circulation in collapsed patients: check for breathing and a central pulse at the same time. If there is any question over the presence or absence of a pulse it must be treated as if it were absent* (ANZCOR 2017, p.6).

During ALS, once the defibrillator is fully charged, the rhythm should be checked. ‘If a rhythm compatible with spontaneous circulation is observed, the defibrillator should be disarmed and the pulse checked’ (ANZCOR, 2018, p.2). If the patient is unconscious, has no breathing and is in a shockable rhythm (VF or VT), no pulse check is required.

**Shockable rhythms**

**Ventricular tachycardia (VT)**

VT is a rapid rhythm which originates in the ventricles. It is defined by:

- Regular, Rapid rate (more than 100 beats per minute, and most commonly more than 160)
- Wide QRS complex

As the ventricles are stimulated rapidly and abnormally, VT may produce a loss of cardiac output. If there is no cardiac output the patient will have no pulse and be in cardiac arrest. Patients in VT who are still conscious (have a pulse), are still in mortal danger and may proceed to full cardiac arrest at any time. For patients who are in cardiac arrest, VT is the rhythm generally associated with more favourable outcomes.

There are two basic types of QRS morphology (shape) associated with VT:
Monomorphic is the most common, with a regular, (mono) wide QRS. ‘Monomorphic VT is a form of VT in which the QRS complex configuration is uniform from beat to beat in all the surface ECG leads’ (Badhwar 2017). Here are two examples of monomorphic VT:

![Rhythm Strip 1](image1.png)

![Rhythm Strip 2](image2.png)

Polymorphic VT is less common, with a slightly irregular appearance and a beat-to-beat variation in the QRS complexes, as shown in the rhythm strips below.

![Rhythm Strip 3](image3.png)

Torsades de Pointes (TdP) is a type of polymorphic VT which is French for ‘twisting around the points’, as shown below. It is usually associated with long QT intervals / drug overdose or toxicity / electrolyte imbalances. A short-long-short sequence between the R-R interval occurs before the trigger response. It is a shockable rhythm.

Sustained and rapid Polymorphic VT can quickly degenerate into VF.

![Rhythm Strip 4](image4.png)

Badhwar 2017, Figure 13-13
Diagnosis between polymorphic VT and Monomorphic VT and even VF can be difficult with a single ECG lead (Badhwar 2017).

A: Monomorphic VT   B: Polymorphic VT

Badhwar 2017, Figure 13-4 (Reproduced, with permission, from Akhtar M. Circulation. 1990; 82:1561.)

Patients who have polymorphic VT may have a history of monomorphic VT which is being treated with antiarrhythmic medications. In these cases, the antiarrhythmic medication may be contributing to a long QT interval and can be a cause of polymorphic VT. In cardiac arrest, treatment should include appropriate defibrillation plus withdrawal of the offending agent and replacement of electrolytes; IV magnesium may be useful (Badhwar 2017).

**Ventricular fibrillation (VF)**

‘VF is in many situations the primary rhythm in sudden cardiac arrest. The vast majority of survivors come from this group’ (ANZCOR, 2018, p.2). VF is an irregular, chaotic rhythm. There is electrical activity in the heart but it is not effective. The ventricles do not pump, but quiver like jelly, and produce no cardiac output. All patients in VF will have no pulse and blood pressure and will not be conscious. ‘The amplitude and waveform of VF deteriorate as high energy phosphate stores in the myocardium decrease. This rate of decrease can be slowed, or even reversed by effective BLS’ (ANZCOR, 2018, p.2). It is not reversible without a shock from a defibrillator.

Coarse VF has taller complexes, and is allied with better outcomes compared to fine VF.
If not reverted by a shock, or if good CPR is not maintained, VF complexes will become fine quite quickly, and will proceed to asystole.

**Non-shockable rhythms**

**Asystole**

Asystole is also known as ‘flat line’. There is no atrial or ventricular activity, no electrical activity in the heart. The patient will have no pulse, no normal respirations and will not be conscious. Outcomes for patients in asystole are poor.

Asystole can closely resemble very fine VF. If it is hard to tell whether it is fine VF or asystole, then the ECG amplitude on the monitor can be increased to confirm the diagnosis. However, very fine VF should be treated as asystole (if you can’t tell whether there is electrical activity then a shock will not be useful to convert it). Pacing and atropine are **NOT** recommended treatments for asystole.

Note that asystole has a slight undulating baseline, and is not completely flat, as you would see when a patient’s ECG leads have been removed.

If there are still regular P waves, but no QRS complexes, the terms ventricular standstill or P wave asystole are used. It is a non-shockable rhythm. External pacing may sometimes be utilised.

**Pulseless Electrical Activity (PEA)**

PEA is a term which refers to any rhythm which is not VT or VF, and there is no detectable cardiac output. There is a range of potential rhythms, and it generally has a very poor prognosis unless the cause is quickly found and treated.

As patients with PEA do not have a shockable rhythm, defibrillation is not an option. Patients with PEA are treated as asystole, with good CPR and adrenaline, whilst seeking a reversible cause.
Below: rhythms which could be PEA, if the patient does not have a cardiac output / pulse.

Cardiac compressions can mimic activity on the monitor screen.

When performing a rhythm check, ensure compressions have ceased before confirming the rhythm.

Chapter 5: Defibrillation

‘Following the onset of VF or Pulseless VT, cardiac output ceases and cerebral hypoxic injury starts within 3 minutes. For complete neurological recovery, early successful defibrillation with a Return Of Spontaneous Circulation (ROSC) is essential. The shorter the interval between the onset of VF/VT and delivery of the shock, the greater the chance of successful defibrillation and survival’ (ARC & RCUK 2011, p.49).

A defibrillation shock when applied through the chest produces simultaneous depolarisation of a mass of myocardial cells and may enable resumption of organised electrical activity. For a patient to then return to a ‘normal’ rhythm, the heart and conduction system must have the capability to do so.

A defibrillation shock is indicated for treating VF and pulseless VT.

Cardioversion has the same mechanism and technique as defibrillation and uses a defibrillator. The difference is that the delivery of the energy is synchronised with the R wave. Cardioversion is employed when the patient has an R wave, and the shock will be timed (synchronised) so that the shock does not occur on the T wave. The defibrillator must be changed to synchronous defibrillation. Cardioversion is most commonly employed for patients in Atrial Fibrillation (AF) or Supra Ventricular Tachycardia (SVT) and is a more controlled procedure than emergency defibrillation. For patients in cardiac arrest, in VF or Pulseless VT, the shock is Asynchronous. Asynchronous is the default mode for manual defibrillators.
Defibrillation is more likely to be successful if:

- It occurs within 3 minutes of cardiac arrest
- Interruptions to cardiac compressions are minimised. Start cardiac compressions immediately, and then apply the defibrillator as soon as it is available
- Adhesive pads are placed in the best possible positions as per manufacturer’s instructions
- Biphasic defibrillators are used, with an energy level of 200 joules. Biphasic defibrillators are more effective at terminating shockable rhythms and more likely to do so on the first shock.

**Pad placement**

Defibrillator paddles are rarely used as they have been largely replaced by disposable self-adhesive pads. Pads are safer, do not require firm pressure on the chest, and most pads can be used for external pacing as well as defibrillation. Regardless of whether pads or paddles are used, the positions are the same.

The chest must be exposed; the patient cannot be defibrillated safely with clothes on their chest. This includes removing bras. When applied the pads or paddles must not be in contact with each other.

During ALS, the usual position for paddles or pads in the anterior-lateral position, as shown.

- Patient’s upper right chest just under the right clavicle. Also known as the right parasternal area over the 2nd intercostal space.
- Patient’s lower left lateral part of the chest. Also known as midaxillary line over the 6th left intercostal space.

**Alternative pad/paddle placement**

Placement of pads should not delay defibrillation: for e.g., the anterior-posterior and apex-posterior placements are not recommended in the emergency situation as it can take longer to place the pads, as the patient is often required to be turned over.

Large-breasted individuals: Left pad lateral to or underneath the left breast, avoiding breast tissue and enabling better adhesive contact with the skin.

Excessively hairy individuals: If the hair is so thick that the electrodes do not lie flat on the surface of the chest, then hair should be removed. A gap between the paddle/pad and chest wall is a spark hazard. If the pads do not have good adhesion to the skin, then the current will be less effective, as the current may spread across the patient’s chest rather than internally. Hair needs to be removed rapidly to decrease delays in shock delivery.

Patients with Internal CardioDefibrillator (ICD) or pacemakers: Most pacemakers and ICDs are implanted into the patient’s left upper chest and so the normal pad/paddle placement can be used. If they are implanted on the patient’s right upper chest, then the defibrillator
pad/paddle should be at least 8 cm from the generator position. The Anterior-posterior or apex-posterior placement can also be used.

Obese individuals: The usual pad placement and energy levels applies. Transthoracic impedance is the measure of opposition to current flow between the two pads on the thorax. Modern biphasic defibrillators are impedance-compensated and adjust their output according to the patient’s impedance, so the usual defibrillation protocols should be followed (ERC 2015, p.37). Even the super obese are unlikely to have transthoracic impedances that preclude successful defibrillation (McFarlane 2012).

During open-heart surgery spoon-like paddles are used to defibrillate the patient.

Self-adhesive pads should be used for defibrillation, but if the only available option is paddles:

- Apply firm pressure
- Use conductive gel pads for maximum electrical contact
- Charge the paddles on the patient’s chest
- Don’t wave charged paddles around in the air, this is dangerous.

**Defibrillation procedure in ALS**

Clear and confident instructions are required to ensure that defibrillation is a safe activity. When you are the person who is performing defibrillation, use the procedure outlined below including these recommended phrases to convey what you are doing to all involved.
It is recommended that a single shock strategy be used for patients in cardiac arrest requiring defibrillation for VF or Pulseless VT.
A sequence of up to three (3) stacked shocks can be considered in critical care areas when:
- a monitored and witnessed cardiac arrest occurs in a well oxygenated patient
- the defibrillator is immediately available, AND
- first shock can be delivered within 20 seconds AND
- The time required for rhythm recognition and for recharging the defibrillator is short (i.e. less than 10 seconds)
- After cardiac surgery: At any time in the immediate post-operative period, to minimise the potential harm of chest compressions, and only if the defibrillator is immediately available (within 20 seconds of arrest).  

(ANZCOR 2017, ARC 2011)

**Know your defibrillator!**
Each manufacturer has recommendations for pad size, position and energy levels, and these should be followed.

Monophasic Defibrillators: Most facilities use Defibrillators that use Biphasic waveforms, which recommend 200 joules. If you are using an older, monophasic defibrillator, then higher energy levels of 360 joules are required. Higher energy levels can cause more myocardial damage and skin burns.

It is not recommended to defibrillate patients in Asystole or PEA, as defibrillation will not change their rhythm. Other management is required.

If the shock is not delivered when expected, consider:
- Defibrillator is in ‘synchronise’ mode
- Flat battery
- Charge dumped automatically, as decision to deliver shock took too long
- Lead fracture

**Safety precautions when defibrillating**
- Be aware of electrical hazards in the presence of water, metal fixtures (e.g. bed rails), oxygen and flammable substances.
- Avoid charging paddles unless they are on the patient’s chest
- Minimise sparking by ensuring the pad/paddles are correctly placed.
- Avoid placing defibrillator paddles/pads over ECG electrodes, ECG leads, medication patches, piercings, implanted devices (e.g. pacemaker, portacath), and CVAD insertion sites.
- High-flow oxygen (e.g.; BV resuscitator attached to oxygen) should be removed, so that the flow of oxygen is not directed across the chest during defibrillation.
- Minimise interruptions to CPR while defibrillating.
- Disarm or ‘dump’ the shock if it is not required.
- Manual chest compressions should not continue during shock delivery.
- Don’t defibrillate a patient if they, the operator or close bystanders are situated in an explosive / flammable environment.
- Never shock a patient in VT until they are unconscious.
Chapter 6: Pharmacology

While the listed drugs have theoretical benefits in selected situations, no medication has been shown to improve long-term survival in humans after cardiac arrest. Priorities are: Defibrillation, Oxygenation and Ventilation together with External cardiac compression’ (ANZCOR, 2016c, p2).

The two main drugs used in cardiac arrest are Adrenaline and Amiodarone. Further information on other drugs can be found in ANZCOR Guideline 11.5 Medications in Adult ALS (2016c).

Adrenaline (Epinephrine)

**Action:** Sympathomimetic.

Alpha adrenergic effects → systemic vasoconstriction, increases coronary & cerebral perfusion.

Beta adrenergic effects → may increase cerebral and coronary blood flow.

**Dose in cardiac arrest** 1mg IV or IO (10ml 1:10,000 or 1ml 1:1,000)

**Indications in cardiac arrest**

<table>
<thead>
<tr>
<th>Shockable rhythm (VT/VF)</th>
<th>Non-shockable rhythm (PEA/Asystole)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given after the 2nd shock once compressions have been resumed</td>
<td>Given as soon as circulatory access is obtained</td>
</tr>
<tr>
<td>Repeated every alternate 2 minute loop (around every 4 minutes)</td>
<td>Repeated every alternate 2 minute loop (around every 4 minutes)</td>
</tr>
<tr>
<td>Give without interrupting chest compressions</td>
<td>Give without interrupting chest compressions</td>
</tr>
<tr>
<td>Flush with 0.9% sodium chloride, minimum 20mls</td>
<td>Flush with 0.9% sodium chloride, minimum 20mls</td>
</tr>
</tbody>
</table>

**Contraindications**

Nil. Usual contraindications become relative in cardiac arrest.

**Side effects**

- Increases myocardial oxygen consumption (increases workload of the heart).
- Induces ectopic ventricular arrhythmias, particularly in the presence of acidaemia.
- Transient hypoxaemia due to pulmonary arteriovenous shunting.
- Impaired microcirculation.
- Increased post-cardiac arrest myocardial dysfunction.

Amiodarone

**Action**

Membrane stabilising anti-arrhythmic drug (Class III antiarrhythmic).

Increases the duration of the action potential and refractory period in atrial & ventricular myocardium.

AV conduction is slowed.

Peripheral vasodilatation.
Dose in cardiac arrest

300mg (6mls) IV or IO. Made up to a total of 20mls 5% dextrose and give as a bolus over 1 to 2 minutes (SWSLHD GL2016_021). An additional dose of 150mg could be considered. An infusion may be ordered after bolus dose(s), e.g. 15mg/kg over 24 hours (ANZCOR, 2016c, p.6).

Flush with 5% dextrose or 0.9% sodium chloride, minimum of 20mls. IV Amiodarone comes in glass vials of 150mg in 3mls (50mg / ml) and is oily; shaking will cause bubbles and make it hard to draw up. It should be mixed with 5% dextrose to prevent precipitation.
IV Amiodarone should be given via a large vein, preferably central access.

Indications in cardiac arrest

<table>
<thead>
<tr>
<th>Shockable rhythm (VT/VF)</th>
<th>Non-shockable rhythm (PEA/Asystole)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given after the 3rd failed shock once compressions have been resumed</td>
<td>Not indicated for PEA or asystole</td>
</tr>
<tr>
<td>Further dose of 150mg if VF/VT persists, at least 15 minutes after 1st dose (MIMS Online).</td>
<td></td>
</tr>
<tr>
<td>May be followed by an infusion (15mg/kg over 24 hrs or as per hospital protocol)</td>
<td></td>
</tr>
<tr>
<td>Give without interrupting chest compressions</td>
<td></td>
</tr>
</tbody>
</table>

May also be considered for prophylaxis of recurrent VF / VT
Further information on Intraosseous devices can be found in the ANZCOR Guideline 11.5 p2.

Contraindications

Relative in cardiac arrest. Includes bradycardias & conduction blocks; torsades de pointes inducing drugs including other antiarrhythmics; known hypersensitivity; thyroid dysfunction; hypotension. Do not mix with other drugs as interacts with a wide range of drugs.

Side effects

Hypotension, usually related to the rate of delivery
Bradycardia
AV blocks

Other drugs that may be used during a cardiac arrest include:
- Magnesium
- Potassium
- Lignocaine
- Calcium
- Sodium bicarbonate

Fluids: 0.9% Sodium Chloride or Hartmann’s solution is preferred for fluid resuscitation. Avoid IV dextrose which is redistributed away from the intravascular space rapidly and
causes hyperglycaemia, which may worsen neurological outcome after cardiac arrest (ARC & RCUK, 2011).

Chapter 7: Post Resuscitation

A to G

Resuscitation does not stop after ROSC. It is important that clinicians continue to assess and maintain airway, breathing and circulation of the patient. “Hypoxic brain injury, myocardial injury or subsequent organ failure are the predominant causes of morbidity and mortality after cardiac arrest” (ANZCOR, 2016e, p. 6).

The aims of post resuscitation care are to:

- Continue respiratory support
- Maintain cerebral perfusion
- Treat and prevent cardiac arrhythmias
- Determine and treat the cause of the arrest (including reversible causes – 4H’s & 4T’s).

A full A-G assessment should occur immediately after ROSC.

Airway & Breathing

After ROSC clinicians must ensure the airway is clear and the patient is adequately oxygenated and ventilated. After a brief period of cardiac arrest where the patient responded immediately to treatment, the patient may immediately return to normal cerebral function. In these cases the patient does not require tracheal intubation and ventilation, but should be given oxygen to maintain normal oxygenation.

In other cases hypoxia and hypercapnia increase the risk of further cardiac arrest and secondary brain injury. In these circumstances tracheal intubation, sedation and ventilation should be considered. After ROSC, in the post-arrest period, hyper/hypoxia should be avoided and inspired oxygen should be titrated to target oxygen saturations between 94-98%. Arterial blood gas measurements should be used to assess ventilation in the post-arrest period (instead of end tidal carbon dioxide levels) with clinicians aiming to maintain normocarbia (PaCO2 35 – 40mmHg).

Assess the patient’s chest for symmetrical movement; listen for quality of chest sounds and equal rise and fall of chest. Frequently monitor respiratory rate, SaO2 and where appropriate, end tidal carbon dioxide level.

Circulation

After a cardiac arrest the cardiac rhythm and circulatory function may be unstable. For this reason the patient should have continuous cardiac monitoring along with regular pulse, 12 lead ECG and blood pressure checks. The patient’s peripheral circulation should also be assessed by checking for warmth and rapid capillary refill.
Disability & Exposure

Neurological function should be rapidly assessed by using a Glasgow Coma Scale and recording the score in the patient’s clinical notes. To examine the patient properly the patient should also be exposed.

Fluids

Assess input and output. Are IV fluids in progress? If not, do they need to be commenced? If so, are they an appropriate fluid choice, check rate and amount?

Blood glucose control

Post cardiac arrest clinicians should monitor and treat hyperglycaemia (>10mmol/l) with insulin, but should also avoid hypoglycaemia.

Temperature control

Targeted temperature management is recommended by ANZCOR (2016e) for the management of adult patients who remain unresponsive post cardiac arrest (after ROSC).

Organ & Tissue Donation

When a resuscitation attempt progresses to death organ and tissue donation should be considered. Donation of organs and tissues is an act of altruism that potentially benefits those in medical need, and society as a whole. Although end of life care should routinely include the opportunity to donate organs and tissue, the duty of care toward the dying patients and their families remains the dominant priority of NSW Health staff. The decision of people who choose not to donate must always be respected and the family shown understanding for the decision.

Organs and tissues must be obtained for transplantation in accordance with the NSW Human Tissue Act 1983. Organs and tissues for transplantation must be obtained in ways that:

- Demonstrate respect for all aspects of human dignity, including the worth, welfare, rights, beliefs, perceptions, customs and cultural heritage of all involved;
- Respect the wishes, where known, of the deceased;
- Give precedent to the needs of the potential donor and the family over the interest of organ procurement;
- Organs and tissues must be allocated according to just and transparent processes;
- Protect, as far as possible, recipients from harm; and,
- Recognise the needs of the health professionals involved.

Before the request for Organ and Tissue Donation

- Organ and tissue donation should be considered in every end of life decision.
- In Donation after Brain Death (DBD), ensure that the family is informed of the patient’s death and that brain death is explained and understood by the family.
- In Donation after Circulatory Death (DCD), ensure that the family and medical staff have reached a consensual decision to withdraw futile life sustaining treatment.
The family discussions on withdrawal of treatment, brain death and or imminent death are led by a Staff Specialist and should always include the bedside RN, a social worker, and the Donation Specialist Nurse (DSN). Inclusion of attendees is at the discretion of the Treating Staff Specialist. A pastoral care worker may be involved at the discretion of the family.

The family donation conversation must (to the extent possible) be separate from and follow the discussion and decision related to withdrawal of cardiorespiratory support. Separating the discussion of withdrawal of cardiorespiratory support from organ donation is important for bereaved families and helps minimise any potential perception of conflict of interest on the part of any persons involved in the care of the patient or by the patient’s family.

The opportunity for donation should be discussed with families of potential organ donors by skilled communicators, knowledgeable about donation, and who have received specific training in this area (Designated Requestor).

Family Donation conversations should be a collaborative approach, led by a Designated Requestor (DR) (if the DR is also the treating Staff Specialist, a separate DR must lead the conversation) and include the treating Staff Specialist, bedside RN, social worker and the Donation Specialist Nurse (whom can also be the DR).

Ideally all family donation conversations should include and/or be led by a Donation Specialist Nurse (DSN).

The on-call DSN should be contacted regarding a potential organ donor via the on-call roster via hospital switchboard.

Alternately, you may contact a Donate Life Donation Specialist Coordinator (DSC) on (02) 9963 2801, which is a paging service. The DSC can access the Australian Organ Donor Register (AODR) to ascertain consent or refusal of the potential donor. The AODR MUST be checked in all potential donations to ascertain consent, intention or refusal.

The RMS organ donor register, was decommissioned as of the 20th November 2017 and is no longer accessed to ascertain consent, intention or refusal.

All patients at end of life should be referred to the DSN or the DonateLife DSC to assess for medical suitability for potential organ donation.

Involve on-call social work support.

Ascertain if religious support is required.

Consent

Consent needs to be obtained from the senior available next of kin (SaNOK), a Designated Officer (DO) within your facility and if it is a Coroner’s Case, consent must be obtained from the Forensic Pathologist and Coroner as well. A Designated Officer cannot provide consent for organ and tissue donation in a Coroner’s Case without prior consent from the Coroner.

Process of Organ and Tissue Donation

A Donation Specialist Nurse (DSN) is present throughout the donation process, if the patient is not already admitted to an ICU they will be transferred there as soon as a bed is available. The family is informed of the donation process, duration / length of the procedure and that organ retrieval surgery is performed with considerable respect for the donor. They ensure social work involvement in all cases and ascertain if religious support is required.

Coroner’s Cases: A family member must identify the donor with the police before or after an organ donation and additional support may be required at this time.

The DSN will work closely with the Critical Care staff to ensure that the necessary tests & assessments are carried out and to give advice and guidance on the management of the potential organ donor. The DSN will also liaise with Operating Theatre staff to make arrangements for retrieval surgery. They will also provide and organize for bereavement aftercare and counseling for the family, as well as follow up and feedback for all of the hospital staff involved.

Tissue –only donation

All deaths (including Coroner’s cases) occurring within or declared on arrival to hospital are to be notified to the Lions NSW Eye Bank Coordinators through the Sydney Eye Hospital 24 hours a day on: 9382 7288.

Coroners Cases

In many cases a resuscitation attempt that progresses to death needs to be referred to the Coroner. Examples of situations that should be referred to the Coroner include, but are not limited to the following:

- A violent or unnatural death
- A sudden death where the cause is unknown
- Where a patient’s death was suspicious or unusual
- Where the patient had not been seen by a medical practitioner for the 6 month period prior to their death
- A patient died while in a mental health facility (NSW Health, 2010)

When a patient is to be referred to the Coroner nothing should be done to the body. “All intra-venous cannula, needles, endotracheal and intragastic tubes, all drains and airways should be left in situ. Attached drip bags, bottles and feed lines must accompany the body. All sharps or items of equipment left in situ should be firmly taped or secured to the body in such a way that the risk of sharps injury or leakage is minimised” (NSW Health, 2010, p.7). The body should not be washed as this may remove evidence that will be useful for the forensic pathologist to examine. The body should be placed in a plastic body bag. When a post mortem is to occur, the pathologist or medical officer performing the examination must have access to the medical records. The release of these records should be managed by the Medical Records department or designated responsible officer of the facility.

For further information in relation to Coroner’s Cases please refer to (NSW Health, 2010).
Chapter 8: Legal and ethical considerations

Following is a summary of ANZCOR 2015, Guideline 10.5, Legal and ethical issues related to resuscitation.

Duty to Rescue

‘Good Samaritans’ or volunteers are required to act in good faith and without recklessness, maintaining a standard of care that is appropriate to their training, or lack of training.

The person, who has a duty of care to respond, such as a nurse or doctor trained in ALS, is expected to have a higher duty of care and standard of care, than that of a volunteer or Good Samaritan. If the nurse or doctor is trained in the skills of Advanced Life Support then they must perform tasks to a standard expected of a reasonably competent person with their training and experience.

Consent for treatment

Consent for treatment is normally required. However, if the person is unable to give consent (e.g. they are in cardiac arrest) then the legal requirement to obtain consent before assistance or treatment could be waived. If the situation is considered to be an emergency, ‘a doctor (and possibly other healthcare workers), may treat a patient if the doctor acts reasonably and honestly believes on reasonable grounds that the treatment is necessary to prevent a serious threat to the victim’s life or health’ (ANZCOR, 2015, p.5).

Refusal and discontinuation of treatment

‘Competent adults are legally entitled to refuse any treatment even if life-sustaining or their own best interest’ (ANZCOR 2015, p. 9). In NSW, a person who has been given ‘enduring guardianship’ for another person under the 1987 Guardian Act (NSW) can refuse treatment on their behalf.

Do not attempt resuscitation orders and termination of resuscitation attempts

Not For Resuscitation (NFR) or Do Not Attempt Resuscitation (DNAR) orders must be documented in the patient’s notes and signed by a doctor. The Resuscitation Plan as outlined in the NSW Health PD2014_030 should be implemented after consultation with relevant members of the healthcare team, the patient or legal guardian, and the family / carer. It is a legally enforceable medical order and remains active during admission unless cancelled ‘The legal status of such orders within institutions is not clear and probably void between institutions and out-of-hospital unless signed by the victim when competent or by a substitute decision-maker’ (ANZCOR 2015, p.13). Nurses and doctors should be aware of local laws, regulations and policies concerning DNAR forms and advanced directives. Some of the relevant policies are listed below:

NSW Health Guidelines GL2005_057 End-of-Life Care and Decision-Making Guidelines
SWSLHD_PD2013_035 Initiation and management of Advance Care Planning processes
Bowral Hospital BDH_PD2016_C01.08 Care Plan for the Dying Adult Patient
The decision to terminate resuscitation may be difficult, and in the acute hospital setting, this will be made by a medical practitioner. There are many factors to take into account, including duration of cardiac arrest, if the arrest was witnessed, the patient’s known wishes, the patient’s co-morbidities and whether immediate CPR was provided. The ‘BLS termination of resuscitation rule’ (no shockable rhythm, unwitnessed by emergency services and no return of spontaneous circulation) can be used to guide termination or pre-hospital CPR in adults (ANZCOR 2015).

**Care for families and significant others**

Family members and significant others of patients who are undergoing resuscitation should be given the option to be present at the resuscitation, this may assist the family to cope and provide more positive emotional outcomes. Care of the family members/significant others should include assigning an appropriate staff member to act as a support person (ANZCOR 2016f).
Chapter 9: Communication and Teamwork

A successful team is well organised with clearly defined roles and responsibilities, skilled team members, effective leadership and team interactions.

The team leader is responsible for role allocation, gathering and distributing information, coordinating the team and leading decision making and task prioritisation. A team leader can only be effective if they are working with team members who take responsibility for their role, pass on information to the team leader, perform allocated tasks and express concerns when necessary.

An essential component of all successful teams is effective communication. Some features of effective communication include:

- Use people’s names
- Confirm when you hear information
- Share information amongst the team and team leader
- Be specific and succinct
- Clarify team goals and acknowledge effort
- Remain calm and avoid conflict.

In ALS circumstances ISBAR is a useful tool to enhance the hand over process. This process can be used when the Medical Emergency Team (MET) arrives at the bedside and provides clinicians with a structure to clearly and concisely deliver relevant information to other clinicians. Communicating effectively with the team will be incorporated as part of the ALS face-to-face workshop in discussions and simulated scenarios.

<table>
<thead>
<tr>
<th>I</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>State your name, role/position</td>
</tr>
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<td></td>
<td>Identify the patient</td>
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<table>
<thead>
<tr>
<th>S</th>
<th>Situation</th>
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<tbody>
<tr>
<td></td>
<td>State the patient’s current problem or diagnosis</td>
</tr>
<tr>
<td></td>
<td>Why did you call for help?</td>
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<table>
<thead>
<tr>
<th>B</th>
<th>Background</th>
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<tbody>
<tr>
<td></td>
<td>State the relevant clinical background and medical history of the patient</td>
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<td></td>
<td>What treatment have you initiated and has this worked?</td>
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</table>

<table>
<thead>
<tr>
<th>A</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>State the patient current observation or lack of spontaneous circulation</td>
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<td></td>
<td>Any test or procedures you have done and what are the results?</td>
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<td></td>
<td>What do you think the problem is?</td>
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</tbody>
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<table>
<thead>
<tr>
<th>R</th>
<th>Recommendation</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Clearly express what you would like to happen. What do you want the other clinician to do?</td>
</tr>
</tbody>
</table>

CEC, In Safe Hands
Chapter 10: Questions for completion prior to workshop attendance

1. Indicate the shockable rhythms in ALS:
   a) 
   b) 
   c) 
   d) 

2. What is the recommended compression to ventilation ratio?
   a) 30:2
   b) 30:1
   c) 15:1
   d) 5:1

3. Which of the following are first line cardiac arrest drugs?
   a) Atropine and amiodarone
   b) Amiodarone and adrenaline
   c) Potassium and magnesium
   d) Adrenaline and adenosine

4. In the event of an arrest a patient's dentures should always be removed:
   True
   False
5. Indicate the non-shockable rhythms in ALS:

![Waveform](image)

- a)
- b)
- c)
- d)

6. What does ISBAR stand for:

   (a) Investigate, Symptoms, Background, Assessment, Recognise
   
   (b) Introduction, Situation, Background, Assessment, Recommendation
   
   (c) Investigate, SAGO, Basic observations, Alert, Refer
   
   (d) Introduction, Symptoms, Background, Assessment, Refer.

7. Opening the airway is necessary in which of the following circumstances:

   a) If the patient is unconscious
   
   b) If the patient has an obstructed airway
   
   c) If the patient needs rescue breathing
   
   d) a and c
   
   d) (a), (b) and (c)

8. At what rate should the cardiac compressions be delivered in an adult?

   a) 80 per minute
   
   b) 140 per minute
   
   c) 90 per minute
   
   d) 100-120 per minute
9. Indicate the correct pad placement for defibrillation

![Pad Placement Diagram]

10. Mr X is monitoring in the rhythm below.

![ECG Waveform]

What is this rhythm?

(a) Ventricular tachycardia
(b) Supraventricular cardiac
(c) Sinus tachycardia
(d) Ventricular fibrillation

11. Mr X is not responding and is not breathing, and continues to monitor in the above rhythm. CPR is in progress. The resuscitation trolley has arrived. What is your next action?

(a) Administer Adrenaline 1mg immediately
(b) Continue compressions for 2 minutes and then administer Adrenaline 1mg
(c) Continue compressions for 2 minutes then defibrillate 200 joules
(d) Defibrillate with 200 joules immediately

12. Amiodarone 300mg bolus is administered if a patient is in:

(a) VT/VF
(b) Asystole
(c) 2nd degree AV Block
(d) Atrial fibrillation
13. Mrs K is in cardiac arrest. At the first rhythm check, the rhythm below is displayed. What is your immediate action?

![ECG rhythm]

(a) Defibrillate at 200 joules
(b) Dump the charge, check for a central pulse
(c) Continue CPR
(d) Administer Amiodarone 300mg

14. What is the correct dose for Adrenaline in the ALS algorithm?

(a) 2mg
(b) 500mcg
(c) 10mg
(d) 1mg

15. What is the correct dose for Amiodarone in the ALS algorithm?

(a) 150mg
(b) 300mg
(c) 1mg/kg
(d) 1.5mg/kg

16. Which manoeuvre/s should be used for patients with a suspected c-spine injury:

(a) Head tilt
(b) Chin lift
(c) Jaw thrust
(d) Head tilt / chin lift
17. Which of the following is the best action for clinicians caring for a conscious patient with an effective cough and FBAO:

(a) Give 5 chest thrusts
(b) Call for help and start CPR
(c) Reassure the patient and encourage coughing
(d) Give a total of 5 back blows, reassessing after each.

18. Treatment of the following rhythm is

(a) CPR, adrenaline immediately and then every 4 minutes
(b) CPR, defibrillate at 200 joules, adrenaline every 4 minutes
(c) External pacing at 80 per minute and intubate immediately
(d) Oxygen away, defibrillate immediately and continue compressions

19. What are the 4 H’s in the ALS algorithm?

1)
2)
3)
4)

20. What are the 4 T’s in the ALS algorithm?

1)
2)
3)
4)
Reference / Bibliography


Bowral Hospital (2016) Care Plan for the Dying Adult Patient (BDH_PD2016_C01.08)


European Resuscitation Council (ERC) 2015, Guidelines for Resuscitation Section 4: Cardiac arrest in special circumstances, Retrieved 24 July 2019 from https://cprguidelines.eu/sites/573c777156e1585a053d7b95/573c7815e61585a053d7bce/files/S0300-9572_15_00329-9_main.pdf?Institute of Trauma and Injury Management (2012), Australian Trauma Team Training Course: Participant Manual. Institute of Trauma and Injury Management.


Resus4Kids (2016) COACHED algorithm. Resus4Kids Instructor resources


South Western Sydney Local Health District (2013). _ Initiation and management of Advance Care Planning processes (PD2013_035)


## Appendix 1

**SWSLHD CEWD Life Support Assessment Tool, March 2016**

### Life Support Assessment Tool (Basic Life Support, BLS)

Participants must demonstrate basic life support techniques for adult, child and infant victims. Demonstration is required ANNUALLY, on an adult manikin. If child and infant manikins are unavailable, participants must state the differences in BLS for these age groups.

For a 30 minute update on BLS theory, go to HETi online e-learning 'Basic Life Support (adult)'

For further information: Australia New Zealand Council of Resuscitation

www.resus.org.au

<table>
<thead>
<tr>
<th>Activity</th>
<th>adult</th>
<th>child</th>
<th>infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger</td>
<td>Check area for Danger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response</td>
<td>Ascertain Response by appropriate verbal &amp; tactile stimuli (Never shake a child or infant)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seek for help</td>
<td>Sends for help and AED (if available)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notes time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airway</td>
<td>Open Airway head lift, chin lift (child &amp; adult), jaw thrust if suspected spinal injuries neutral position (infant)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clears airway; suction / remove visible objects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal Breathing?</td>
<td>Assess breathing for no more than 10 seconds; Look, listen &amp; feel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If breathing normally, place in recovery position</td>
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<tr>
<td>Cardiopulmonary Resuscitation</td>
<td>Victim unconscious &amp; not breathing normally; start Compressions</td>
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<tr>
<td></td>
<td>Locate correct compression point – lower half of sternum, centre of chest</td>
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<tr>
<td></td>
<td>Depress 1/3rd depth of chest with each compression</td>
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<td></td>
<td>Perform chest compressions at a rate of 100 - 120 / minute</td>
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<td></td>
<td>After 30 initial compressions, give 2 effective rescue breaths</td>
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<td></td>
<td>Defines when to use pocket mask rather than mouth-to-mouth</td>
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<td></td>
<td>Maintain CPR ratio of 30:2 (compression:ventilation)</td>
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<tr>
<td>Defibrillation</td>
<td>Turn AED to &quot;ON&quot;</td>
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</tr>
<tr>
<td></td>
<td>Correctly attach and position defibrillation pads</td>
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<td></td>
<td>Ensure pads are connected to AED</td>
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<td></td>
<td>Chest compressions continue until AED alerts you to stop compressions</td>
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<td></td>
<td>Follow verbal prompts from the AED – allow AED to ‘analyse’</td>
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<tr>
<td></td>
<td>If shock advised; ensure all staff are clear by loudly stating STAND CLEAR and ensure safety of self &amp; others</td>
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</tr>
<tr>
<td></td>
<td>Safely administer shock when advised</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Follow verbal prompts until help arrives</td>
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<td></td>
</tr>
</tbody>
</table>

### Assessor’s Initials

<table>
<thead>
<tr>
<th>Comments</th>
<th>Employee Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Name</td>
<td>Designation</td>
</tr>
<tr>
<td>Participants Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>

Assessment Decision: Competent [ ] Not Yet Competent [ ]

Plan of Action if Not Yet Competent:

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**SWSLHD Life Support Assessment Tool: V.0 March 2016**
Appendix 2

**Adult Advanced Life Support - Level 1 - Assessment Checklist**

This assessment relates to Standard 8: Recognizing & responding to acute deterioration.

For RN's, currently working in a critical care area OR Medical Staff

Prior to the assessment the participant must have:

- Completed Between the Flags - Tier 2 DETECT OR Between the Flags- Tier 2 DETECT workshop (Mixed – Face-to-Face) – Nursing and Medical – Half day
- Basic Life Support Accreditation completed within the last 12 months
- Completion of *Advanced Life Support Theory- Module A(Adult)* (MHL - course code: 67644403)
- *Advanced Life Support Theory- Module B (Adult)* (MHL - course code: 67644650)
- *Advanced Life Support Theory – Module C Quiz* (MHL - course code 197482978).
- Has previously attended the SWSLHD Face-to-Face Adult Advanced Life Support (Level 1) workshop or equivalent

Assessors Signature: __________________________

Assessors Name: _____________________________

Designation: _________________________________

☐ Accreditation entered into MHL

**Plan of action if deemed not yet competent**
# Adult Advanced Life Support - Level 1 - Assessment

**Instructions to Assessors:** Each activity must be demonstrated correctly by participants. Mark each statement with: ✓ = Observed OR ✗ = Not Observed

<table>
<thead>
<tr>
<th>Activity</th>
<th>Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger:</td>
<td>Check for Danger &lt;br&gt;Maintains WHS procedures throughout scenario</td>
</tr>
<tr>
<td>Response:</td>
<td>Ascertain Response by appropriate verbal and tactile stimuli &lt;br&gt;Communicates clearly with all staff involved in the scenario</td>
</tr>
<tr>
<td>Send for help:</td>
<td>Sends for help &lt;br&gt;Notes Time</td>
</tr>
<tr>
<td>Airway:</td>
<td>Open Airway (Head tilt/Chin lift, Jaw thrust) &lt;br&gt;Clears airway (suction/remove visible objects) &lt;br&gt;Inserts airway adjuncts (without delaying compressions)</td>
</tr>
<tr>
<td>Breathing:</td>
<td>Assesses for normal breathing for no more than 10 seconds (look, listen, feel)</td>
</tr>
<tr>
<td>CPR:</td>
<td>Immediately commence chest compressions &lt;br&gt;• Correct hand position &lt;br&gt;• Depth 1/3 chest &gt;5 cm &lt;br&gt;• 100-120 per/min &lt;br&gt;• Ratio 30:2 &lt;br&gt;Delivers breaths using BVM resuscitator</td>
</tr>
<tr>
<td>Defibrillation:</td>
<td>Attaches manual defibrillator with minimal interruption to compressions &lt;br&gt;Immediately performs 1st rhythm check in the following sequence: &lt;br&gt;• Compressions continue &lt;br&gt;• Oxygen away &lt;br&gt;• All else clear &lt;br&gt;• Charging (at 200J) &lt;br&gt;• Hands off / I'm safe &lt;br&gt;• Evaluate rhythm &lt;br&gt;• Defibrillation or disarm &amp; dump</td>
</tr>
<tr>
<td>Asystole/PEA:</td>
<td>States IV access obtained &amp; bloods taken &lt;br&gt;Administers IV Adrenaline 1 mg with 20ml flush immediately &amp; on alternate loops</td>
</tr>
<tr>
<td>VF/VT:</td>
<td>States IV access obtained &amp; bloods taken &lt;br&gt;Administers IV Adrenaline 1 mg with 20ml flush after 2nd shock &amp; on alternate loops &lt;br&gt;Administers IV Amiodarone 300 mg with 20 ml flush after 3rd shock</td>
</tr>
<tr>
<td>Reversible causes:</td>
<td>Verbalises and identifies potential reversible cause/s &lt;br&gt;• Hypovolaemia &lt;br&gt;• Hypoxia &lt;br&gt;• Hyper/hypothermia &lt;br&gt;• Hyper/hypokalaemia / metabolic disorders</td>
</tr>
<tr>
<td>Post resuscitation:</td>
<td>Assesses pt using ABCDEFG &lt;br&gt;Discusses post resuscitation care</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
</tr>
<tr>
<td>Assessment Decision:</td>
<td>☐ Competent ☐ Not yet Competent</td>
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</tbody>
</table>

**Participant Name:** [Participant Name]  
**Participant Signature:** [Participant Signature]  
**Employee No:** [Employee No]  
**Ward/Department:** [Ward/Department]  
**Designation:** [Designation]  
**Assessors Name:** [Assessors Name]  
**Assessors Signature:** [Assessors Signature]