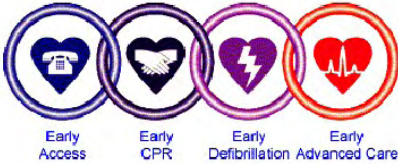




Queensland Government
Queensland Health

Royal Brisbane and Women's Hospital Health Service District



Code Blue Manual

February 2007

Introduction

Foreword

Royal Brisbane and Women's Hospital Health Service District's (RBWH HSD) clinical staff need to be competent in providing Basic Life Support in order to respond to Code Blue Emergencies. Clinical staff working in Critical Care areas and any staff who form part of the Code Blue Response Team should be trained and skilled in providing Advanced Life Support.

The Code Blue Manual approved by the RBWH HSD Emergency Response Committee is founded upon relevant recommendations of the International Liaison Committee on Resuscitation (ILCOR) and Australian Resuscitation Council (ARC) guidelines contained within this document. Royal Brisbane and Women's Hospital and Health Service District staff have prepared this resuscitation manual that aligns with the Australian Council of Health Care Standards (ACHS), Criteria 3.2.4: *Emergency and disaster management supports safe practice and a safe environment.*

The manual is intended to identify relevant standards, procedures and protocols that will enable an efficient and coordinated approach to Code Blue emergencies with the potential to improve patient outcomes.

All staff are expected to be familiar with their roles and responsibilities as outlined within the manual.

Authorised by:

Dr Judy Graves
Acting Executive Director Medical Services
Royal Brisbane & Women's Hospital Health Service District

. / / 07

Version Control

Version	Date	Position	Comments
V1	March 2003		
V2	2005		
V3	2006	Clinical Emergency Response Coordinator	
V4	2007	Clinical Emergency Response Coordinator	Final Review

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Glossary of Terms

Acronyms and abbreviations that may be used in the context of a resuscitation event

Advanced Life Support

The provision of effective airway management, ventilation of the lungs and production of circulation by means of techniques additional to basic life support e.g. advanced airway management, intravenous access and drug therapy .

Airway

The passage from the nose and mouth through which air passes to the lungs.

Angle of the Jaw

The sharp bends in the lower jaw just below the ear.

Back Blow

Blows between the shoulder blades with the heel of the hand in an effort to clear a foreign body from the airway of a victim with complete airway obstruction.

Basic Life Support

The preservation of life by the initial establishment of and / or maintenance of airway, breathing, circulation and related emergency care.

Breathing

The spontaneous movement of air in and out of the lungs.

Cardiac Arrest

Cessation of the heart action.

Cardiopulmonary Resuscitation

The technique of rescue breathing combined with chest compressions. The purpose of cardiopulmonary resuscitation is to temporarily maintain a circulation sufficient to preserve brain function until advanced life support treatment is available.

Carotid Pulse

Pulse felt in one of the two main arteries of the neck located on either side of the trachea.

Child

Young child is defined as 1 to 8 years of age. Older child is defined as 9 to 14 years inclusive.

Choking

Life-threatening acute obstruction of the upper airway.

Circulation

Blood flow through the heart and blood vessels to provide oxygen and nutrients to the body's organs and tissues.

Collapse

A state of prostration resulting from a severe injury or medical condition in which the patient may be either unconscious or semiconscious.

Cyanosis

A bluish discolouration seen in the skin, finger / toe nails and mouth. When observed in the lips and tongue and the lining of the mouth it is associated with severe lack of oxygen in the body.

Defibrillation

The application of a controlled electric shock to the victim's chest in order to terminate a life threatening cardiac rhythm (ventricular fibrillation or pulseless ventricular tachycardia).

Defibrillator

A device which stores electric energy which can be discharged when required for the purpose of achieving the passage of an electric current through the heart in an attempt to achieve defibrillation.

Diaphragm

The major muscle of breathing which separates the chest and abdominal cavities.

DRABC

The priority steps in the management of a collapsed person are:

Danger, **R**esponse, **A**irway, **B**reathing, and **C**irculation.

Early Defibrillation

The provision of defibrillation within a short time after cardiac arrest.

External Cardiac Compression

Rhythmic pressure exerted at regular intervals on the victim's sternum (breastbone) in an attempt to create an artificial circulation.

Finger Sweep

Use of staff members fingers to try to dislodge a foreign body from a patient's throat.

First Aid

First aid is the initial care given by someone to a person who is injured or has become ill.

Head Tilt

Backward tilting of the head on the neck to achieve a clear airway.

Health Care Professional

A person, who is a registered medical practitioner, registered nurse, allied health or qualified ambulance officer.

Infant

An infant is defined as younger than one year.

Inflation

The movement of air from the environment into the victim's lungs by a staff members expired air or with the aid of special ventilation equipment.

Jaw Support

Supporting the jaw at the point of the chin in such a way that there is no pressure on the soft tissue of the neck.

Jaw Thrust

The forward pressure applied behind the angle of the jaw to thrust the jaw forward and open the airway.

Laryngeal Spasm

Contraction of the muscles of the larynx resulting in partial or complete closure of the vocal cords resulting in partial or complete blockage to the entrance of the windpipe.

Lateral Chest Thrust

Intermittent pressure applied by the hands over the ribs close to the armpits in an attempt to expel a foreign body that is completely obstructing the airway.

Lateral Position

A position in which an unconscious patient lies on one side with the weight supported by the under shoulder, hip and the upper knee which is at right angles to the hip. The face is turned slightly downwards to allow the tongue to fall forwards so that saliva or vomit will drain out.

Left Lateral Tilt Position

The pregnant patient is positioned on her back with her shoulders flat and sufficient padding under her right buttock to give an obvious pelvic tilt to the left.

Neonate

A neonate is defined as one month of age or under.

Precordial Thump

A sharp, quick single blow over the midpoint of the sternum delivered with the fist from about 20-30cm over the chest.

Pulse

The wave of distension felt through the walls of the arteries as blood is pumped out of the heart.

Rescue Breathing

If the unconscious patient is not breathing after the airway has been opened and cleared, the staff member must immediately commence Rescue Breathing.

Resuscitation

The preservation or restoration of life by the establishment and / or maintenance of airway, breathing and circulation and related emergency care.

Semi Automated External Defibrillator

An external defibrillator which analyses the electrical rhythm of the heart and charges automatically if a shockable rhythm. It provides the operator with audible and / or visual prompts on actions required for safe delivery of an electrical shock.

Stridor

A high-pitched crowing noise heard during breathing and due to partial airway obstruction.

Unconsciousness

The condition in which a victim fails to respond to "verbal or tactile stimuli".

Ventilation

The movement of air between the environment and the lungs.

Xiphoid Process

The pointed process of cartilage, supported by a core of bone, connected with the end of the body of the sternum.

Abbreviations

ABC	Airway, Breathing, Circulation
AF	Atrial Fibrillation
ALS	Advance Life Support
AMI	Acute Myocardial Infarction
ARC	Australian Resuscitation Council
BLS	Basic Life Support
bpm	Beats per Minute
BSL	Blood Sugar Level
BVM	Bag Valve Mask
CCU	Coronary Care Unit
CRT	Capillary Refill Time
CNS	Central Nervous System
COPD	Chronic Obstructive Pulmonary Disease
CPR	Cardiopulmonary Resuscitation
CVA	Cerebral Vascular Accident
DC	Direct Current
DEM	Department of Emergency Medicine
EAR	Expired Air Resuscitation
ECC	External Cardiac Compression
ECG	Electrocardiograph
ETT	Endotracheal Tube
EMD	Electromechanical Dissociation
GIT	Gastrointestinal Tract
ICP	Intracranial Pressure
ICU	Intensive Care Unit
IHD	Ischaemic Heart Disease
ILCOR	International Liaison Committee on Resuscitation
IPPV	Intermittent Positive Pressure Ventilation
IV	Intravenous
J	Joules
JVP	Jugular Venous Pressure
NIBP	Non-invasive Blood Pressure
PE	Pulmonary Embolism
PEA	Pulseless Electrical Activity
ROSC	Return of Spontaneous Circulation
SAED	Semi-automated External Defibrillator
SVT	Supraventricular Tachycardia
TCAD	Tricyclic Antidepressant
VF	Ventricular Fibrillation
VT	Ventricular Tachycardia
WPW	Wolf Parkinson White

Chapter 1 Hospital Standards

Code Blue

Code Blue is one of the [Emergency Procedure](#) codes for Medical Emergencies and Arrests (including non-patient care areas) on the Herston Campus. A single telephone number '**333**' is used for all Code Blue events at the Herston Campus. The call will automatically be directed to the Department of Emergency Medicine (DEM) who will dispatch a Code Blue Response Team.

Note: Areas of the RBWH HSD that are situated **off** the Herston Campus are to ensure that staff are familiar with their local processes and arrangements to enable an efficient coordinated approach when responding to a Code Blue emergency in their area.

Code Blue process for the Herston Campus:

In the event of a CODE BLUE event occurring staff are to advise DEM of the following:

- Medical Emergency or Cardiac Arrest;
- Exact location (Ward / Area / Building and Bed Number); and
- Treating Team.

Any attempt at resuscitation is better than no attempt.



Policies

88402/ALL: [Cardiopulmonary Resuscitation and Medical Emergency](#)

88495/PPP: [Cardiopulmonary Resuscitation Guidelines for Withholding - Adult](#)

Code Blue Response Team

The Royal Brisbane and Women's Hospital Health Service District has implemented the '**Code Blue Response Team**' to respond to both Medical Emergencies and Arrests. The foundations of this team are based on the 'Medical Emergency Team' concept. As the hospital comprises of clinical and non-clinical areas, the nominated Code Blue Response Team will respond to all areas.

The Code Blue Response Team comprises of the following :

- Intensive Care Registrar
- Medical Registrar
- Treating Team
- Critical Care Nurse

Note: In the event of a Medical Emergency outside an acute clinical area, staff from DEM will undertake the role of the Code Blue Response Team. Refer to policy 88402/ALL: Cardiopulmonary Resuscitation and Medical Emergency

Priorities in an Emergency

In all emergency situations, staff must:

- Assess the situation quickly;
- Ensure safety for staff, patient and bystanders;
- Initiate a response from the patient;
- Call for help - **Code Blue Emergency** - Ring '**333**'; and
- Commence appropriate treatment following the Basic Life Support flowchart.

General Principles

After ensuring the safety of the patient, staff and bystanders, the management of the collapsed patient involves:

- Prevention of further injury;
- Checking response to verbal and tactile stimuli;
- Care of airway, breathing and circulation;
- Calling for help;
- Control of bleeding;
- Protection from the environment;
- Maintenance of normal body temperature;
- Protection of skin and nerves by protection of bony prominences from hard objects; and
- Reassurance and continued observation of the collapsed patient.

Cardiac / Respiratory Arrest & Medical Emergency

Chain of Survival Concept

The highest potential survival rate from a cardiac arrest can be achieved only when the following sequence of events occurs as rapidly as possible:

- Recognition of early warning signs;
- Activation of the appropriate response system;
- Basic CPR;
- Defibrillation;
- Management of the airway and ventilation; and
- Intravenous administration of medications.



These links are indispensable and have been associated with links in a chain. Weakness in any link, and loss of connection between the links lessens the chance of survival for the patient.

Cardiac or Respiratory Arrest

This process applies when the person is unresponsive and has no signs of life i.e. does not respond to verbal or tactile stimuli and is not breathing. Therefore basic life support is required immediately and advanced life support within 3 - 5 minutes.

Notification Criteria - Adult

Recognition	<ul style="list-style-type: none"> • Cardiac or Respiratory Arrest
Response & Activation	<ul style="list-style-type: none"> • Assess environment for danger. • Initiate response. • Call for help, ring '333'. • Commence Basic Life Support. • Take Standard Resuscitation Trolley and SAED to the patient. • Apply SAED electrodes to patient and follow prompts. • Continue BLS until the Code Blue Team arrives.

Medical Emergency

This process applies to situations where staff believe that the patient, visitor or staff member requires urgent medical attention within 10 – 15 minutes.

Early recognition of a deterioration in a patients condition, and prompt action by staff can achieve a dramatic improvement in patient outcomes.

Notification Criteria - Adult

Airway	Threatened
Breathing	<ul style="list-style-type: none"> • Unexpected change in Respiratory Rate. • Under 5 breaths/min or over 36 breaths/min.
Circulation	<ul style="list-style-type: none"> • Unexpected change in Heart Rate. • Under 40 bpm or over 140 bpm.
Nervous System	<ul style="list-style-type: none"> • Sudden loss of consciousness. • Prolonged or repeated seizure
Obstetric	Any Obstetric Emergency.
Other	<ul style="list-style-type: none"> • Aggression. • Any patient who you are seriously concerned about.

Resuscitation Management

Each member of the multidisciplinary team is to know and understand the skills and roles of each person involved in the Code Blue response. During a Code Blue response the multidisciplinary team recognizes the resuscitation team leader for possessing broad skills of organisation and performance related to the Code Blue response. All active members should be performing as a well-constructed team, polished by practice and experience. This will assist in preventing a disorganised and frantic code scene.

The team should comply with airway, breathing and circulation principles and keep the resuscitation room / area composed so all personnel can hear without repetitious commands. Team members should:

- State the vital signs of the patient every 5 minutes, or with any change in the monitored parameters if the patient is monitored;
- State when procedures and medications are complete;
- Request clarification of any orders when they are unclear; and
- Provide primary and secondary assessment information as requested.

Evaluation of airway, breathing and circulation should guide the efforts whenever:

- the vital signs are unstable;
- when treatment appears to be failing;
- before procedures; and
- for periodic clinical updates.

Code Critique and Debriefing

Following a resuscitation attempt, team members should assess if anything could be improved in relation to the response provided to the patient. The team leader is to assume responsibility for gathering as many team members as possible for (at least) a pause to reflect on the event. This provides feedback for staff involved, gives a venue to express grieving and provides an opportunity for lessons learnt and staff education.

Documentation

Accurate data from all medical emergencies and arrest attempts must be kept for audit, training and medico-legal purposes. To evaluate the outcome of resuscitation attempts, it is important to compare like with like. The 'Clinical Emergency Record' gives guidance on a standardised way to record in-hospital resuscitation, promotes integration of record keeping, enhances communication regarding patient care across disciplines and assists with providing continuity of care. This form can be utilised for reviewing, reporting and conducting research on in-hospital resuscitation. The driving force behind the development of the reporting mechanism was the fact that we do not know the true effectiveness of in-hospital resuscitation. The tool contains hospital, patient, arrest, medical emergency and outcome variable categories.

The Nursing Team Leader, or delegate, of the ward initiating the Code Blue event is responsible for ensuring the form is accurately completed. The original copy is to be filed in the progress notes of the Patient's Record. The yellow duplicate copy is to be forwarded to the Quality Improvement Unit for auditing.

Refer to policy [74100/ CPP Documentation - Medical Record](#) with links to the '[Documentation Information Package for HealthCare Professionals](#)'.

Royal Brisbane & Women's Hospital Health Service District						Name: _____																																																																	
Medical Emergency / Arrest Observation Record						Address: _____																																																																	
Date: ____/____/____ Ward/Area: _____						UR Number: _____ Complete or ARs Patient ID Label on Original and Duplicate																																																																	
Pt Found: _____ hrs By Whom: _____ Witnessed Arrest: <input type="checkbox"/> Yes <input type="checkbox"/> No BLS Commenced: _____ hrs 333 Call: _____ hrs Team Arrived: _____ hrs			Withholding CPR Order: <input type="checkbox"/> Yes <input type="checkbox"/> No Advanced Health Directive: <input type="checkbox"/> Yes <input type="checkbox"/> No			Call Criteria for '333' call: Airway Threatened Cardiac Arrest Respiratory Arrest Pulse Rate < 40 Respiratory Rate < 5 Pulse Rate > 140 Respiratory Rate > 35 Prolonged Seizure Decrease in GCS < 8 Aggression Other (specify): _____																																																																	
RESPONSE (Primary Survey)																																																																							
Airway: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Guedel <input type="checkbox"/> ETT Size: _____ <input type="checkbox"/> Suction <input type="checkbox"/> Other (specify): _____				Breathing Rhythm: <input type="checkbox"/> Regular <input type="checkbox"/> Irregular <input type="checkbox"/> RR Arrest <input type="checkbox"/> O ₂ Mask _____ ltr <input type="checkbox"/> Laerdal Bag EAR Commenced: _____ hrs				Circulation Rhythm: <input type="checkbox"/> Regular <input type="checkbox"/> Irregular <input type="checkbox"/> No Pulse <input type="checkbox"/> IV line peripheral <input type="checkbox"/> Central Line CPR Commenced: _____ hrs																																																															
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ECC - External Cardiac Compression - Indicate Yes or No A = Apgar, V = Respiration, Vent = Vent, P = Pupils, Perf = Perfusion, GCS = Glasgow																																																																							
MEDICATIONS / FLUIDS																																																																							
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OUTCOME																																																																							
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Names and Designation of staff members Involved																																																																							
Medical Team Leader: _____ Nursing Team Leader: _____																																																																							
Person Completing this Form																																																																							
Signature: _____ Designation: _____ Print Name: _____																																																																							

CLINICAL EMERGENCY RECORD

Integrated Risk Management

Integrated Risk Management (IRM) brings together all the internal and external risks that the organisation faces when delivering health-care services.

Risk Management for staff in emergency situations requires a pro-active, ongoing process of identifying and assessing risk. The objective is to improve care delivery through the minimisation of all types of risk. By identifying the risk that patients, staff and the organisation are exposed to, staff can plan and develop strategies to manage and reduce adverse outcomes.

It is paramount to learn retrospectively from previous emergency events and consider if the system failed, why it failed and how to improve the processes to minimise the risk of failure in the future. Staff members are responsible for reporting all risks to the Line Manager or the Risk Management Facilitator in your Division. For further information on IRM please refer to [Policy 91000/ALL: Integrated Risk Management](#).

Infection Control

Health professionals involved in Code Blue resuscitation procedures must take steps to minimise the risk of infection to themselves or others by micro-organisms. Standard Precautions should be applied to all patient contact. As a resuscitation situation commonly involves exposure to body fluids (saliva, respiratory secretions, blood etc) all team members are to routinely wear gloves and protective eyewear throughout the resuscitation attempt to protect themselves from unexpected exposures.

Although the risk of cross infection is almost negligible through direct mouth to mouth resuscitation, mouth to mask resuscitation is a safe and effective alternative. Pocket facemasks are available in all clinical areas and regular training programs are to be conducted for staff annually.



Pocket face mask with one-way valve.

Disposable gloves are available for use by persons with cuts or abrasions on their hands. Surfaces of the body exposed to blood, saliva, urine or faeces should be washed thoroughly with soap and water at the earliest opportunity. Australian Resuscitation Council Guideline 9.6.2 (2002).

For more information on infection control aspects refer to the Royal Brisbane and Women's Hospital and Health Service District [Infection Control Manual](#) available via the Policy Web Site on the Herston Intranet

Chapter 2: Basic Life Support - Adult

Introduction

Basic Life Support (BLS) is the preservation or restoration of life by the establishment of and / or maintenance of airway, breathing, circulation, and related emergency care.

Basic Life Support is only a temporary measure to maintain ventilation and circulation. The purpose of BLS is to help maintain myocardial and cerebral oxygenation until Advanced Life Support (ALS) personnel and equipment are available.

Basic Life Support therefore covers the first three components of the "chain of survival" i.e. early access, early cardiopulmonary resuscitation (CPR) and early defibrillation. Early defibrillation is facilitated by the use of Semi Automated External Defibrillators (SAED's) that are available across the RBWH HSD.

Most adults with sudden non-traumatic cardiac arrest are found to be in ventricular fibrillation (VF). For these patients, the time from collapse to defibrillation is the single greatest determinant of survival.

Indications

Respiratory Arrest

When primary respiratory arrest occurs, the heart and lungs can continue to oxygenate the blood for several minutes where oxygen will continue to circulate to the brain and other vital organs. Such patients demonstrate signs of circulation (e.g. pulse present) in the absence of breathing. When respiratory arrest occurs or spontaneous respirations are inadequate, establishment of a patent airway and rescue breathing can be lifesaving as it can maintain oxygenation and may prevent cardiac arrest.

Cardiac Arrest

In cardiac arrest, circulation is absent and vital organs are deprived of oxygen. Cardiac arrest can be accompanied by the following cardiac rhythms:

- Ventricular fibrillation (VF);
- Pulseless ventricular tachycardia (VT);
- Asystole; or
- rhythms associated with Electromechanical Dissociation (EMD).

Cardiopulmonary Resuscitation

CPR is the technique of inflation of the lungs and compression of the heart, used in an attempt to revive a patient who has suffered a cardiac arrest.

CPR can restart normal heart action after cardiac arrest or maintain artificial circulation to preserve brain function until further treatment is available e.g. defibrillation.

Defibrillation – SAED

Defibrillation is the therapeutic use / delivery of an unsynchronised electrical current to the myocardium. A defibrillation shock when applied through the chest produces simultaneous depolarisation (i.e. a short period of electrical asystole) of a mass of myocardial cells. This may enable resumption of organised cardiac electrical activity.

Defibrillation is indicated for:

- VF and Pulseless V T; &
- Fine or isoelectric VF masquerading as asystole.

Basic Life Support

Danger

In all emergency situations, the staff member must assess the situation to ensure safety for other staff, patient and bystanders. Electricity, smoke, gases, slippery surfaces, firearms, other weapons, poisonous creatures and implements for drug taking can cause a collapse and remain dangerous.

Before approaching the collapsed patient staff are to scan the area around the patient for signs of these and any other potential dangers e.g. blood, urine, water etc.

Response / Consciousness

Unconsciousness is when a patient fails to respond to “verbal or tactile stimuli” and can be caused by a variety of conditions. To assess a patient’s response to verbal and tactile stimuli, give a simple command such as:

- C Can you hear me?,
- O Open your eyes,
- W What’s your name?,
- S Squeeze my hand.

Then grasp and squeeze the shoulders firmly to elicit a motor response, ensuring that injury is not caused or aggravated by this. Under **NO** circumstances should you shake a patient to illicit their conscious condition A person who fails to respond to these stimuli should be managed as an unconscious patient.

Airway Management - Adult

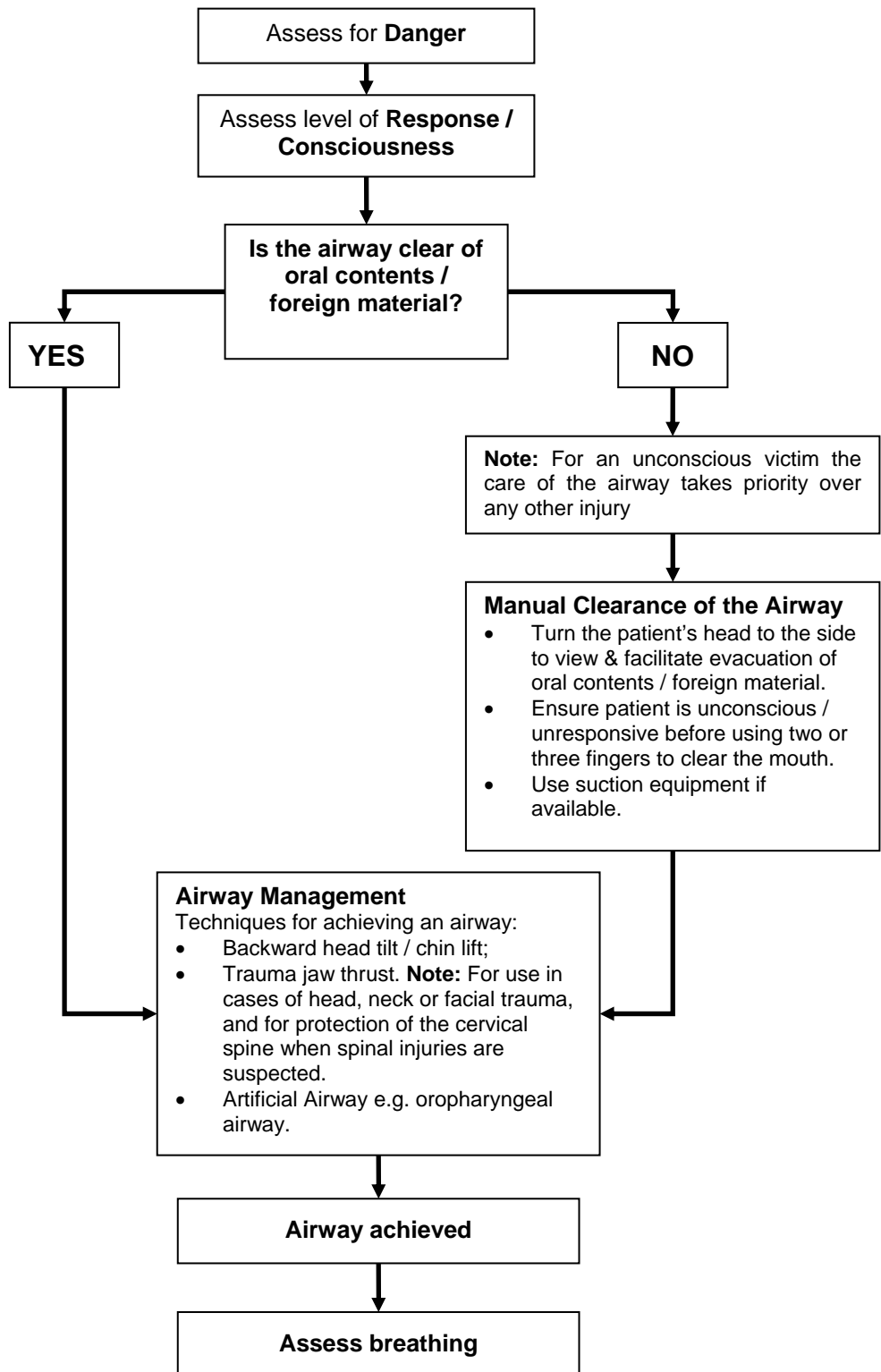
When a patient is unconscious and left lying on their back, the tongue is able to fall against the back wall of the mouth and block air entering the lungs. The obstruction to the airway by the soft tissues may be overcome by performing a head tilt manoeuvre and / or supporting the jaw. With an unconscious victim **care of the airway takes priority over any other injury**, including the possibility of a spinal injury. All unconscious patients should be handled gently, with no undue twisting or forward movement of the head and neck, and should be recovered (if the patient has an open airway and is breathing normally) in the side lying (lateral / recovery) position.

Airway management is required to provide an open airway when the victim:

- Is unconscious;
- Has an obstructed airway; &
- Requires rescue breathing.

Flow Chart for Airway Management

Airway Management



Manual Clearance of the Airway

The unconscious patient's airway must be cleared quickly prior to assessment of breathing and circulation. Staff should first turn the patient's head to the side to view and facilitate evacuation of oral contents / foreign material. Note:- This does not mean the patient should be placed in a lateral / recovery position. The staff member should then ensure the patient is unconscious / unresponsive before using two or three fingers to clear the mouth.

When suction equipment is available airway management techniques, such as head tilt and chin lift, should be implemented in conjunction with suctioning to facilitate effective access and removal of oral contents.

Loose dentures should be removed, but firmly fitting dentures can be left insitu, as they create structure to the patient's face and facilitate a more effective seal with the mask for ventilation.

Techniques for achieving an Airway

Backward Head Tilt / Chin Lift

Backward Head Tilt and Chin Lift assists in opening the airway by lifting the tongue (which is attached to the lower jaw) away from the back of the throat / pharynx. Backward Head Tilt and Chin Lift are used:

- in the management of an unconscious and breathing patient on their side, or
- when the patient is on their back in conjunction with jaw support during rescue breathing.

Technique – Backward Head Tilt / Chin Lift

1. place one hand on the forehead or top of the head;
2. the chin is then lifted and supported using a Pistol Grip by the other hand. The Pistol Grip involves placing the point of the knuckle of the middle finger under the chin, lying the index finger along the line of the jaw and placing the thumb along the front of the lower jaw between the lower lip and the point of the patient's chin. This technique avoids pressure being placed on the soft tissues under the chin;
3. extend and tilt the head backwards (NOT the neck); &
4. avoid use of excessive force.



Backward Head Tilt with Chin Lift

Note:

- During rescue breathing, both jaw support and backward head tilt are employed together; &
- When neck injury is suspected, use the Trauma Jaw Thrust technique.

Trauma Jaw Thrust

The trauma jaw thrust is a modification of the conventional jaw thrust and is to be adopted for cases of suspected head, neck or facial trauma when the cervical spine is to be maintained in a neutral in-line position. The modification allows the operator to protect the cervical spine while opening the airway by removing the tongue from the posterior pharynx.

Technique

- Position yourself at the top of the patient's head;
- place the thumbs on each cheekbone / zygoma;
- place the index finger on the underside of the mandible; and
- lift the mandible diagonally upward (i.e. up & forward)



Demonstration of Trauma Jaw Thrust

Artificial Airways

An oropharyngeal airway may be required to assist in maintaining an open airway when using the mouth to mask, or bag valve mask ventilation techniques. Signs and symptoms that a patient may require the assistance of an artificial airway include, but is not limited to the following:

- upper airway “gurgling” in the respiratory cycle;
- grinding teeth;
- clenched teeth;
- increased oral secretions; and
- biting of oral tracheal / gastric tubes.

It is still necessary to use the head tilt and jaw support method for airway management.

Oropharyngeal (Guedel) Airway

An oropharyngeal airway is a minimally flexible curved piece of hard plastic and should be reserved for unconscious or obtunded patients. When inserted the airway extends from the exterior of the lips, over the tongue to the pharynx allowing air to pass around and through the tube and assists in removing potential obstruction of the tongue to the patient's airway.

To determine the correct size of oropharyngeal airway to insert into the patient, place the airway flange beside the patient's cheek, parallel to their front teeth. If the airway is the right size, the airway curve should reach the angle of the jaw.

Technique

While inserting the airway avoid pushing the tongue into the posterior pharynx. To insert the oropharyngeal airway:

- position the patient appropriately using backward head tilt;
- use the thumb and forefinger of your non-dominant hand to pry the patient's jaws and teeth apart;
- hold the oropharyngeal airway with the curve inverted (i.e. the curve toward the lower lip);
- insert the airway until the end of the airway nears the soft palate;
- then rotate the airway 180° to pass the posterior pharynx.
- continue to insert the airway following the natural curve of the tongue and oropharynx till the flange rests against the lips.

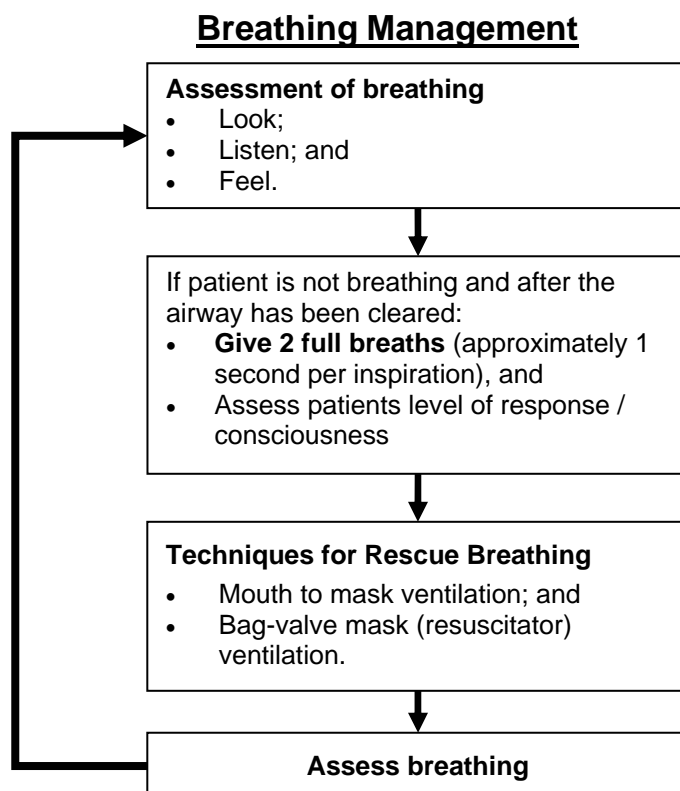
Note: Laryngospasm or vomiting with aspiration may occur in those patient's that still have a gag reflex present.

Breathing Management - Adult

Breathing may be absent or ineffective as a result of:

- Upper airway obstruction;
- Direct depression of / or damage to the breathing control centre of the brain;
- Problems affecting the lungs;
- Paralysis or impairment of the nerves and / or muscles of breathing;

Flow Chart for Breathing Management



Assessment

After the patient's airway is cleared, staff are to assess whether or not the patient is breathing effectively by using the following process:

- **LOOK** and **FEEL** for the movement of the upper abdomen or lower chest; and
- **LISTEN** and **FEEL** for the escape of air from the nose and / or mouth

Follow the sequence of: **LOOK, LISTEN, and FEEL**

Rescue Breathing

If the patient is not breathing after the airway has been cleared and opened, staff are to commence rescue breathing immediately.

Give two (2) initial breaths allowing approximately one (1) second per inspiration and then assess the patients level of response / consciousness as previously identified.

Summary Steps for performing Rescue Breathing.

- Clear the Airway;
- Tilt the head backwards using the Backward Head Tilt in combination with the Chin Lift technique;
- Blow for 1 second on inspiration; and
- Look, Listen and Feel for Exhalation.

Mouth to Mask Method

This method of resuscitation in rescue breathing avoids mouth to mouth contact by the use of a resuscitation mask. Note:- Resuscitation should not be delayed by attempts to obtain the mask.

Method

- Position yourself at the patient's side and in line with the patients head. Use both hands to maintain an open airway and to hold the mask in place.
- Maintain backward head tilt and jaw thrust.



Application of Mask



Demonstration of Mouth to Mask Method

- Place the narrow end of the mask on the bridge of the nose and apply the mask firmly to the face.
- Elevate the jaw into the mask to achieve an effective seal.
- Inflate the lungs by blowing adequately through the mouthpiece of the mask (approximately 1 second per inspiration).
- To allow for exhalation, remove your mouth from the mask.
- Turn your head to **look, listen** and **feel** for escape of air.
- Recheck head tilt, jaw thrust and mask seal if chest does not rise.

Mask and Resuscitator (Bag – Valve) Method

A hand held resuscitation bag is an inflatable device that is able to be attached to a face mask to allow for manual delivery of oxygen or room air to the lungs of a patient who is unable to breath for themselves.

Method

For a single staff member:

- Position yourself at the patient's head;
- Place the narrow end of the mask on the bridge of the nose and apply the mask firmly to the face;
- Attach the resuscitator to the mask and to the tubing leading from the oxygen source.
- Using your nondominant hand on the mask, exert downward pressure to seal the mask against the patient's face, while maintaining head tilt / chin lift for patent airway (as demonstrated in diagram A below);
- Ensure that the patient's mouth remains open underneath the mask by visually inspecting the mouth through the mask (if possible);

- Use your dominant hand to compress the resuscitator (approximately half the depth of the resuscitator); &

For two staff members:

- One staff member is to position themselves at the patient's head facing their feet (as demonstrated in diagram B below).
- Use both hands to maintain an open airway and to hold the mask in place.
- Maintain backward head tilt and jaw thrust.
- The second staff member provides ventilation using the resuscitator.
- Observe the patient's chest for rise and fall to ensure that effective ventilation is being achieved with each compression of the resuscitator.



Diagram A: Single person demonstration of Mask – Resuscitator technique.



Diagram B: Two person demonstration of Mask – Resuscitator Technique.

Circulation Management - Adult

Causes of Cardiac Arrest

Cardiac arrest may be primary or secondary in origin. Primary Arrest may be caused by but not be limited to:

- Ischaemic Heart Disease;
- Electric shock;
- Drug overdose / toxicity;
- Trauma;
- Electrolyte abnormalities; &
- Drowning.

Decreased oxygen or blood supply to the heart may be a cause of Secondary Arrest. Secondary arrest may be caused by but not be limited to:

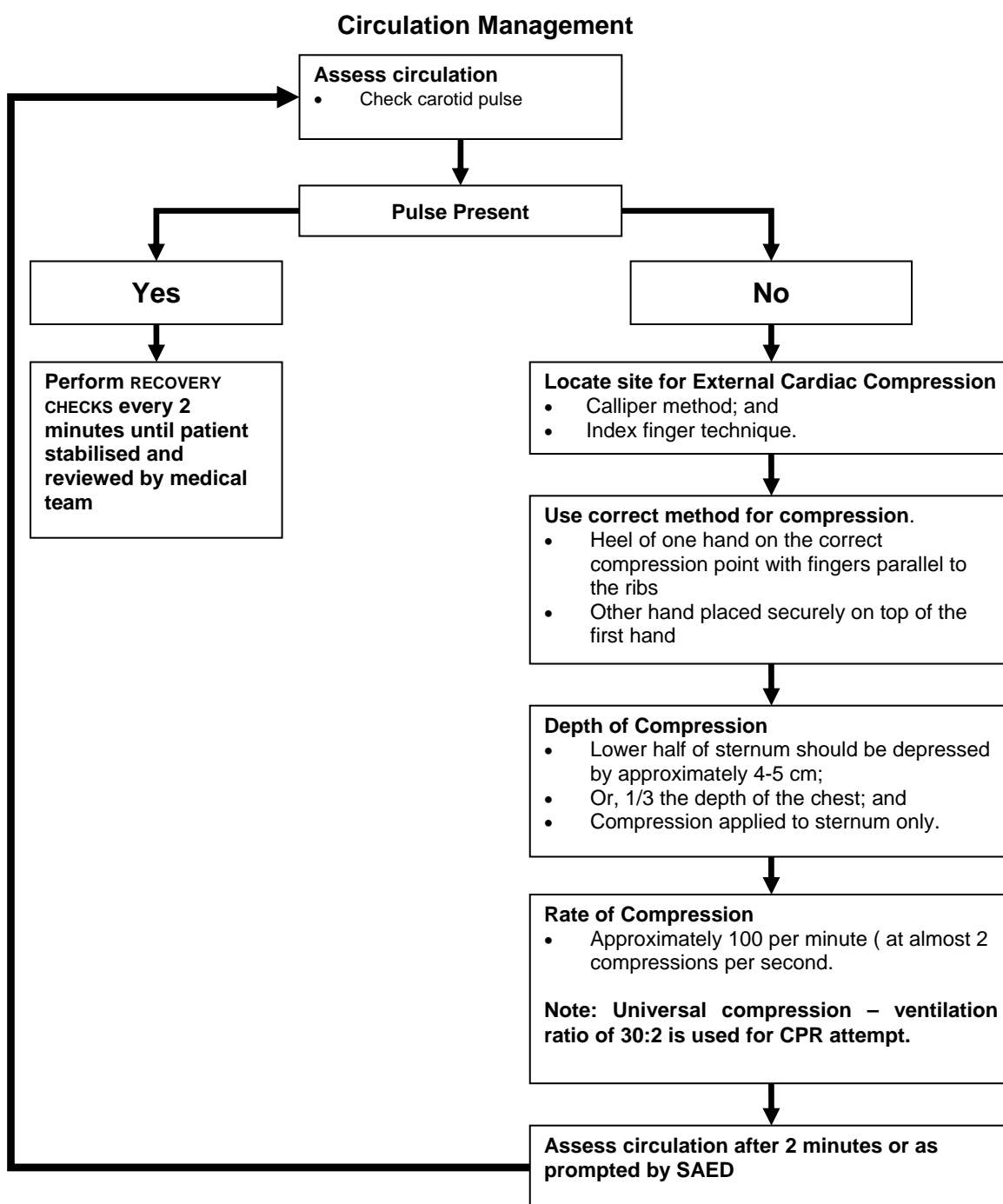
- Cessation of breathing;
- Airway obstruction; &
- Severe bleeding.

Recognition of Cardiac Arrest

A cardiac arrest has occurred if a collapsed patient is:

- Unconscious;
- Unresponsive;
- Not Moving;
- Not breathing normally; &
- Has no pulse present.

Flowchart for Circulation Management



Check for a Pulse

If a patient is found to be unconscious, unresponsive, not moving and is not breathing normally staff are to check for the presence of a pulse. If no pulse is present ***cardiopulmonary resuscitation should commence immediately.***

Method for Checking the Carotid Pulse

Maintain maximum head tilt (in patients suspected of neck injury, jaw thrust technique may be used), the hand supporting the patient's lower jaw should be moved to feel for the carotid pulse. Place two or three fingers gently over the patient's larynx. Slide them off to the curve between the large muscle of the neck and the larynx. Feel with the flat portion or pulps of the fingers, not the finger tips.



Checking the Carotid Pulse

Locating Site for External Cardiac Compression

The recommended compression point is the mid-line over the lower half of the sternum. There are two methods for identifying the correct compression site, the calliper method and index finger technique.

Calliper Method

Using the calliper method identify:

- upper end of the sternum(suprasternal notch);
- middle point of the sternum;
- and lower point of the sternum (xiphoid process).



Identifying landmarks of the chest.



Application of the Calliper Method.



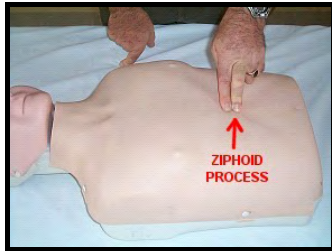
Demonstration of correct hand position for compression.

Keeping the thumb of the upper hand in position, place the heel of the lower hand on the lower half of the sternum, keeping it against the upper thumb as per the above diagram.

Index Finger Technique

- With the middle and index finger of one hand, identify the lower margin of the patient's rib cage;

- Move the fingers up the rib cage to the notch (xiphoid process) where the ribs meet the sternum in the centre of the lower part of the chest;
- With the middle finger in the notch, the index finger is then placed next to it on the lower end of the sternum;
- The heel of the other hand is placed on the lower half of the sternum against the index finger; &
- **Note** - Avoid compression beyond the lower half of the sternum, which may cause regurgitation and/or damage to the internal organs. Compression performed too high is considered to be ineffective.



Identifying Landmarks



Demonstration of correct hand placement

Method of Compression

Place the heel of one hand on the compression point with fingers parallel to the ribs and slightly raised to avoid direct pressure on the ribs.

The other hand should be placed securely on top of the first. The thumb of the top hand should be locked around the wrist of the bottom hand, or fingers of both hands may be interlocked (diagram A below).

All pressure is exerted through the heel of the bottom hand and the body weight of the staff member performing this role is the compressing force (diagram B below). The staff member's shoulder should be vertically over the sternum and the compressing arm kept straight (diagram C below).

Note - Avoid either rocking (backwards and forwards) or using thumps or quick jabs.

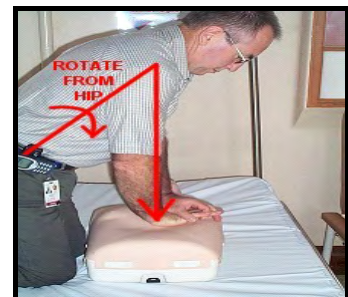
The staff member performing compression should allow full recoil of the chest after each compression.



Fingers Interlocked (A)



Wrist Grip Compression (B)



Correct posture (C)

Depth of Compression

The lower half of the sternum should be depressed by approximately 4-5 centimetres or up to one-third the depth of the chest with each compression.

Rate of Chest Compressions

Staff should perform chest compressions at a rate of approximately 100 compressions per minute (at almost 2 compressions/second).

Ratio of External Cardiac Compression to Inflations

A universal compression-ventilation ratio of **30:2** (30 compressions followed by 2 ventilations) is recommended regardless of the number of staff members present.

Note - Compressions must be paused to allow for ventilations.

If there are two staff members, it is recommended that initially, the more experienced staff should perform rescue breathing.



Demonstration of Compression and Ventilation positions during 2 Person CPR

Duration of CPR

Staff should continue CPR until:

- The return of spontaneous circulation (ROSC) (eg pulse is able to be palpated, increased conscious level). Rescue breathing should continue until spontaneous breathing has resumed;
- Code Blue Response Team arrive and continue to provide assistance with resuscitation;
- Senior medical staff pronounces life extinct; &
- Impossible to continue (eg exhaustion) if staff member is alone and in a non-clinical area.

Defibrillation – SAED

Defibrillation as soon as possible provides the best chance of survival for patients with VF or Pulseless VT.

Only staff that have undergone Semi-automated External Defibrillator (SAED) training, with demonstration of annual knowledge and skills assessment, will undertake the use of this equipment.

Basic Life Support must not be delayed by attempts to locate an SAED. SAED's available within the RBWH HSD will only be utilized to reverse the effects of Cardiac Arrest in the adult population.

All aspects of safety, as identified in the following section are to be adhered to throughout the procedure in order to maintain patient and staff safety.

The person operating the SAED or Manual Defibrillator is responsible for the safety of the patient and all members of the team while the Defibrillator or SAED is in use.

Introduction

The LIFEPAK 500 SAED is easy to use because it provides prompts for each step in the defibrillation process.

The LIFEPAK 500 analyses the heart rhythm and advises the staff member if a shockable rhythm is detected. The staff member must press the **SHOCK** button to deliver the shock. It is simple to use because it interprets the heart's Electrocardiogram (ECG) signal and advises the staff member what to do.



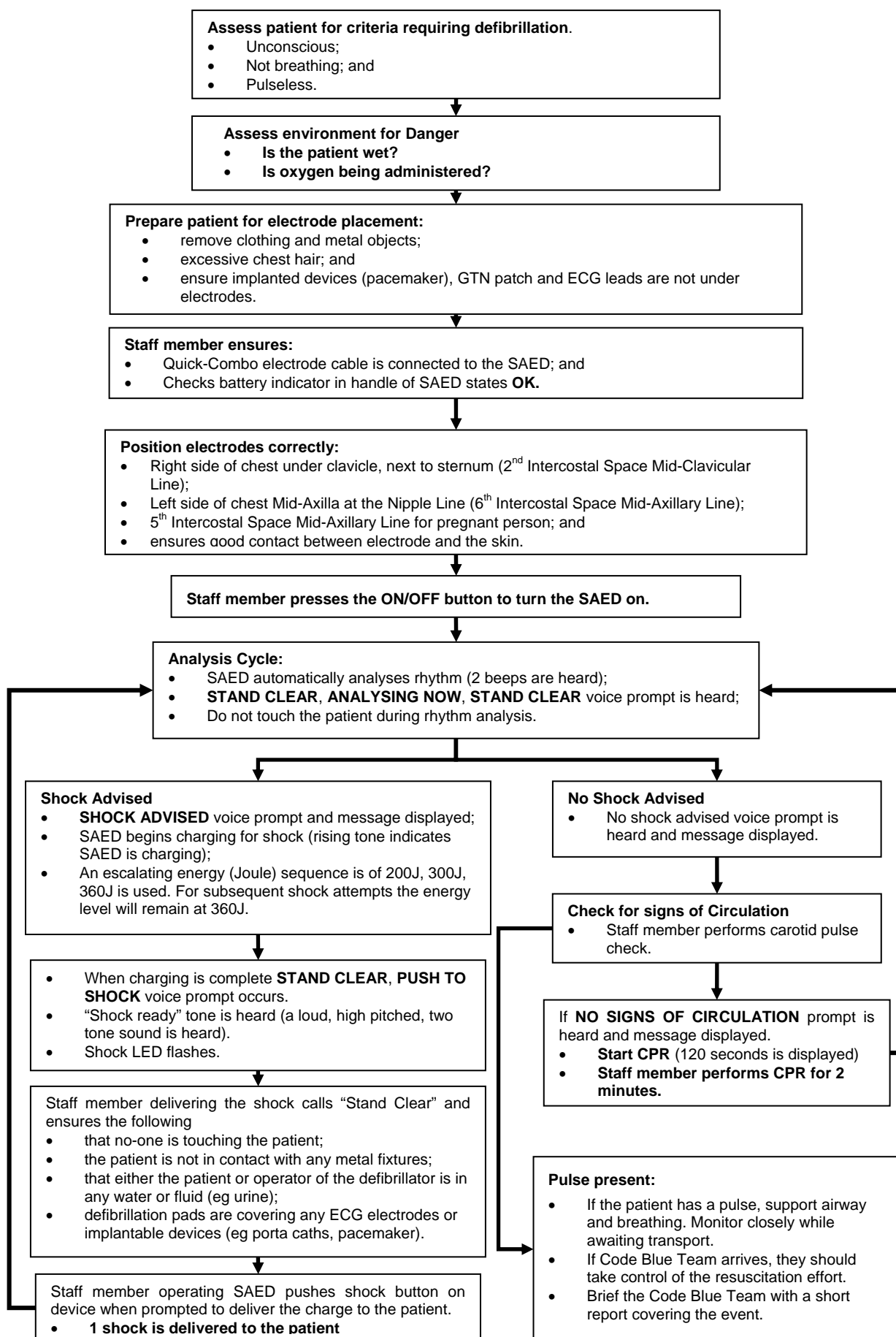
LIFEPAK 500 SAED

LIFEPAK 500 SAED Configuration

The LIFEPAK 500 SAED devices used within the RBWH HSD have been configured upon the recommendations of the Emergency Response Committee. These are as follows:

- A single shock strategy is recommended. After the delivery of a single shock staff are to perform 2 minutes of CPR between prompts provided by the SAED.
- An escalating energy (Joules) sequence is used for each single shock attempt. For each shock attempt the SAED will increase the energy delivered to the patient. The energy sequence consists of 200J, 300J and 360J. The energy will remain at 360J for subsequent shock attempts. **Note:** In the event that the SAED is turned off due to a fault, when the device is turned back on, the SAED recognizes this as a new event and will recommence the energy sequence at 200J and escalate the energy sequence as identified above.

Flowchart for Defibrillation Management



Precautions

Look for danger. Be aware of electrical hazards in the presence of water, metal fixtures, oxygen and flammable substances.

DO NOT:

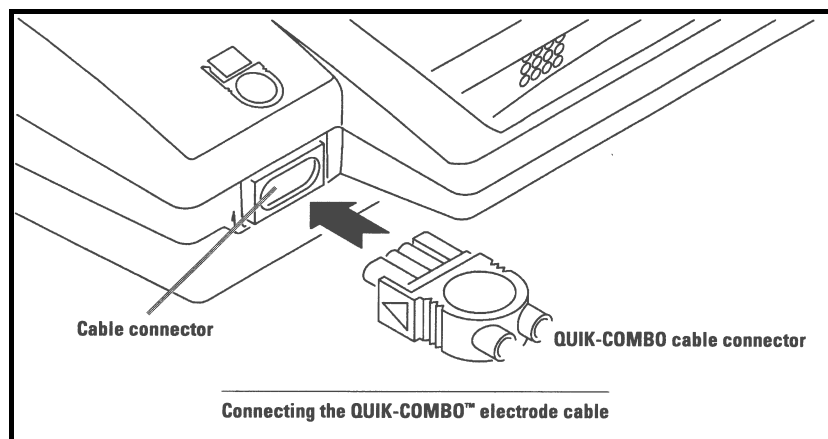
- Defibrillate over Electro Cardio Graphic (ECG) electrodes or Glyceryl Trinitrate (GTN) patches;
- Defibrillate over an implantable device (eg pacemaker box, porta cath);
- Have **ANY** contact indirectly or directly with the patient during defibrillation;
- Have the patient in contact with any metal fixtures;
- Have either the patient or operator of the defibrillator in any water or fluid (eg urine);
- Defibrillate while high concentration oxygen is being administered. Mask and oxygen should be moved away from the patient during defibrillation; &
- Use on children less than eight (8) years of age.

If a permanent pacemaker is insitu the defibrillator pad placement may need to be altered.

If a temporary pacing wire is insitu ensure that the transmitter has been turned off.

Method

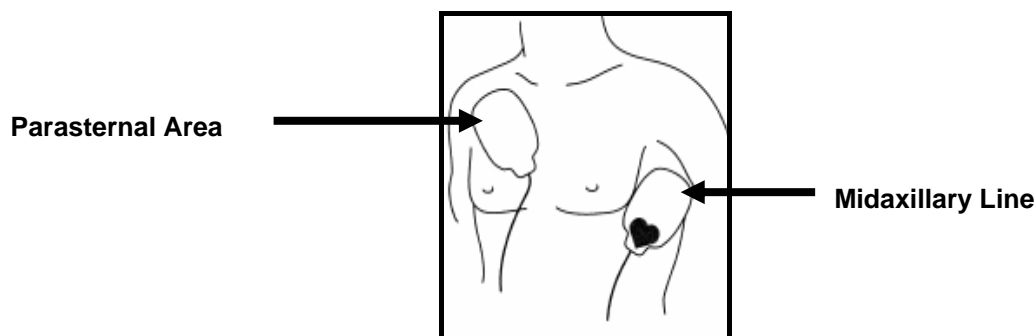
- Verify that the patient is in cardiac arrest and that they are unconscious, not breathing normally and pulseless;
- **CPR is to be initiated until defibrillation equipment is available;**
- Assess for danger – if the patient is wet or in a wet area, either dry or remove the patient from the area prior to defibrillation. Ensure that there is no explosive / flammable substances in the environment;
- Check battery indicator in handle of SAED states **OK**. If battery is flat another SAED is able to be obtained from the nearest patient care area (e.g. the ward next door) for emergent situations;
- To turn on the Lifepak 500 SAED press the **ON/OFF** switch. The green LED indicator illuminates when the device is ready to be used. Ensure that the electrode cable connector for the disposable defibrillation pads is connected to the LIFEPAK 500 as demonstrated in the following diagram below.



Demonstration of connecting Quick-Combo cable to LIFEPAK 500

- “**Connect Electrodes**” prompt will occur;
- Prepare patient for electrode placement i.e. shave the area if required to enhance contact of defibrillator pads;
- Apply electrodes to patients chest as described below.

One pad is placed firmly on the midaxillary line over the 6th left intercostal space and the other pad is placed firmly on the right parasternal area over the 2nd intercostal space. Note: The “Quick – Combo Pad” with the heart on it is to be placed as per diagram below.



Demonstrated use of Quick-Combo Pads

- Stop CPR and clear the area when prompted by the SAED. The SAED will voice prompt **ANALYSING NOW, STAND CLEAR**, this message will also appear on the screen. **Note:** Do not touch the patient during rhythm analysis as this may cause interference in monitoring.
- When the **SHOCK ADVISED** voice prompt and message occurs the SAED determines the rhythm identified is requiring defibrillation. The unit will begin charging.
 - Make sure no one is touching the patient.
 - **The staff member delivering the shock must call ‘STAND CLEAR’ and check the area before discharging the SAED;**
 - Push the SHOCK button when the unit gives the prompt. Note: the SAED will automatically analyse again after delivering the shock to see the results of the shock;
- Confirmation of shock delivery. Does the patient exhibit a motor response (i.e. body moves or ‘jumps’) when shock is delivered? If no motor response is observed, commence CPR immediately;
- When **NO SHOCK ADVISED** prompt occurs the SAED will prompt;
 - The staff member to perform CPR for 2 minutes. The SAED will also prompt the staff member to check the patient’s pulse.

If the patient recovers consciousness / ROSC and breathing, place the patient in the recovery position.

When the Code Blue Response Team arrives staff are to brief them with a short report, including documentation of the arrest covering the actions prior to their arrival.

For service and maintenance of the LIFEPAK 500 SAED please refer to the chapter in the manual related to Standard Resuscitation Trolley Equipment.

Resuscitation in Late Pregnancy

Modification of standard techniques is required when performing CPR in late pregnancy. Anatomical and physiological factors can cause increased risk of aspiration of stomach contents into the lungs. The pregnant uterus causes pressure on the major abdominal veins when the woman lies flat on her back, reducing venous return to the heart. This can be corrected by using left lateral tilt position using padding under the right buttock / hip.

Left Lateral Tilt Position

The woman is positioned on her back with shoulders flat and sufficient padding (e.g. rolled towel or wedge) is placed under the right buttock to provide a pelvic tilt to the left.

Airway

- Turn patient fully on her side (preferably the left);
- Clear the upper airway of foreign matter;
- Tilt the head and support the jaw; &
- Check for breathing.

Breathing

If breathing is absent, rescue breathing must be commenced.

Ventilation is more difficult because of the enlarged uterus restricting chest expansion. Maintain the woman in the left lateral tilt position.

Circulation

CPR is commenced as per other adult patients.

If the left lateral tilt cannot be achieved, staff can hold the uterus towards the patient's left side.

Defibrillation

The energy level used for defibrillation in adult patients are appropriate for use in the pregnant patient.

Recovery Checks

Staff members should minimise interruptions to **CPR at all times**.

Check for effective compression

- Staff member to check the carotid pulse every 2 minutes to assess if cardiac compression is effective.

If there is **no pulse** with compressions:

- Staff member performing External Cardiac Compression (ECC) must be advised that more effective compression is required.

If there is a **pulse** with compressions:

- Staff member performing ECC should be asked to stop the compressions and a carotid pulse check is made for up to 5 seconds.

Spontaneous Pulse present

- One staff member gives a full inflation and continues rescue breathing until effective spontaneous breathing returns. Other staff member monitors the radial pulse continually. If this cannot be felt, the carotid pulse should be checked immediately.

No Carotid Pulse

- One staff member gives 2 full inflations and CPR should continue.

Basic Life Support Flow Chart - Adult

D

Assess environment for **DANGER**.

- Staff member scans the area around the patient for signs of danger (e.g. electricity, smoke and slippery surfaces).

R

Is the patient **RESPONSIVE / Conscious?**

- Staff member assesses patients response to verbal and tactile stimulation (e.g. Open your eyes, grasp and squeeze the patient's shoulder firmly to elicit a motor response).

Note: If patient is non responsive / unconscious **CALL FOR HELP**.

- RBWH campus call **CODE BLUE 333**; and
- Services not on the Herston Campus are to call an ambulance on **000**.

A

Open **AIRWAY**.

- Staff member assesses patient's airway for oral contents / foreign material.
- Staff member performs manual clearance of the airway as required (e.g. turns the patient's head to the side to facilitate evacuation of oral contents).
- Staff member utilises technique of head tilt with chin lift or jaw thrust to open airway.

B

Assess **BREATHING**.

- Staff member assesses patient's breathing (LOOK, LISTEN and FEEL);
- If patient is not breathing, staff are to **give 2 full breaths each over 1 second**.
- Staff member checks rise and fall of patient's chest.

C

Assess **CIRCULATION**.

- Staff member palpates carotid pulse for up to 5 seconds.

If **NO PULSE** present.

Staff member gives 30 chest compressions. (Almost 2 compressions/sec). Followed by 2 breaths.

D

DEFIBRILLATION

Staff member to attach Semi-Automated External Defibrillator (SAED) to the patient as soon as possible, and follow the prompts of the device.

Continue CPR until Code Blue / Ambulance Team arrive, or signs of life return (e.g. Patient is conscious, breathing normally and able to move).

Assessment Tool - BLS



ADULT BASIC LIFE SUPPORT ANNUAL ASSESSMENT TOOL for ALL PERSONNEL

ROYAL BRISBANE AND WOMEN'S HOSPITAL
HEALTH SERVICE DISTRICT

Name: _____ Payroll Number: _____

Designation: _____ Ward / Unit / Department: _____

Areas shaded in grey are specific assessments for Clinical Staff and should ONLY be undertaken within scope of practice.

	ACTION	Achieved	Not Achieved
DANGER	Assesses environment for danger and discusses management of situation.	•	•
RESPONSE	Assesses level of consciousness - squeeze and shout.	•	•
	Demonstrates Left Lateral Tilt Position, if person is pregnant.	•	•
AIRWAY	Demonstrates effective airway management using <ul style="list-style-type: none"> • head tilt • chin lift (jaw support) • jaw thrust (suspected neck injury) 	• • •	• • •
	Demonstrates correct measurement and insertion of oropharyngeal (Guedels) airway.	•	•
	Demonstrates "Recovery Position"	•	•
BREATHING	Assesses breathing – <ul style="list-style-type: none"> • Look, Listen and Feel • Delivers 2 full breaths (each breath over 1 second) • Checks rise and fall of chest 	• • •	• • •
	Demonstrates the correct technique for mouth to mask ventilation.	•	•
	Demonstrates the correct technique for hand ventilating a patient using a bag-valve-mask.	•	•
	Discusses the clinical criteria used to evaluate effective hand ventilation using the bag-valve-mask apparatus: <ul style="list-style-type: none"> • skin colour • SaO₂ % • adequate symmetrical rise and fall of the chest • decreased airway resistance while ventilating the individual. 	• • • •	• • • •
CIRCULATION	States the criteria used to assess the presence of cardiac arrest: <ul style="list-style-type: none"> • Unconscious • Not breathing • Pulseless 	• • •	• • •
	Assesses circulation – <ul style="list-style-type: none"> • locates position for carotid pulse • palpates carotid pulse for up to 5 seconds 	• •	• •
	Locates hands in correct anatomical position (Calliper Method or Index Finger Method) <ul style="list-style-type: none"> • lower half of sternum • compression applied to sternum only (fingers clear of chest) <ul style="list-style-type: none"> • adult compression - depth 4 to 5 cm (approx. 1/3rd the depth of chest) 	• • •	• • •
	States the guidelines for Rescue Breathing and External Cardiac Compression (ECC) and demonstrates stated ratios and rates. CPR will be delivered in 2 minute block periods. <ul style="list-style-type: none"> • Ratio 30:2 one person or two person (6 cycles per 2 min) • Rate 100 bpm for adult and child (greater than 12 mths) in one minute 	• •	• •
	Evaluates cardiac output after two minute - palpates carotid pulse.	•	•

**Royal Brisbane & Women's Hospital Health Service District
Code Blue Manual**

	ACTION	Achieved	Not Achieved
ARREST PROCEDURE	Person finding the patient: <ul style="list-style-type: none"> • stays with the patient • summons help • assesses cardiopulmonary status • commences Rescue Breathing and External Cardiac Compression, as indicated 	• • • •	• • • •
	Other staff member(s): <ul style="list-style-type: none"> • dials 333 • states Code Blue – Cardiac Arrest and location of patient • brings arrest trolley and SAED (if available) to emergency site • prepares environment 	• • • •	• • • •
	Discusses the management of the patient and document requirements following the resuscitation process.	•	•
MEDICAL EMERGENCY *	Describes the MEDICAL EMERGENCY Call system. Explains the CALL CRITERIA <ul style="list-style-type: none"> • Airway • Breathing • Circulation • Nervous System • Obstetric • Other. 	• • • • • •	• • • • • •
	Ensures criteria for defibrillation are present (for Adults only): <ul style="list-style-type: none"> • Unconscious • Not breathing • Pulseless 	• • •	• • •
DEFIBRILLATION including SEMI AUTOMATED EXTERNAL DEFIBRILLATOR -(SAED)	Assesses environment in relation to specific dangers related to defibrillation (if patient is wet - dries patient / removes from wet area)	•	•
	Prepares site for electrode placement - removes clothing, and excessive chest hair. Ensures metal objects, GTN patches, leads and implanted devices are not under electrodes.	•	•
	SAED – Semi Automated External Defibrillator		
	Connects the electrode cable to the SAED	•	•
	Positions electrodes correctly: <ul style="list-style-type: none"> • Right side of chest under clavicle, next to sternum (2nd Intercostal Space Mid-Clavicular Line) • Left side of chest Mid-Axilla at the Nipple Line (6th Intercostal Space Mid-Axillary Line) • 5th Intercostal Space Mid-Axillary Line for pregnant person 	• •	• •
	Ensures good contact between electrodes and skin	•	•
	Turns SAED on and ensures treating team compliance with audible prompts: <ul style="list-style-type: none"> • no handling of patient during ANALYSE • no contact with patient or equipment following the prompt to SHOCK 	• •	• •
	Calls ' stand clear ' prior to pressing SHOCK button.	•	•
	Delivers a single shock followed by 2 minutes of CPR	•	•
	Discusses the escalating energy sequence for delivery of shocks (200J, 300J, 360J)	•	•
	Performs carotid pulse check when prompted.	•	•
	Recommences Basic Life Support when prompted if no pulse is present.	•	•
Min-I-jet [®] Assembly	Demonstrates correct assembly of Min-I-jet [®]	•	•

Date: _____ Assessment Ach () N/Ach ()

Assessee: _____ Assessor: _____

This requirement is in accordance with the ACHS Accreditation Guide 13th Edition, Standard 6, Criteria 6.3: 'Staff education programs provide for both clinical and non clinical staff, as determined by the facility, to be trained in basic life support procedures and recertified on a regular basis'.

This information is drawn from the Code Blue Manual, Royal Brisbane & Women's Hospital (2007)

Created: May 2002
Reviewed: January 2007

**Royal Brisbane & Women's Hospital Health Service District
Code Blue Manual**

**CARDIAC ARREST RESUSCITATION DRUGS
ANNUAL ASSESSMENT for REGISTERED NURSES**

ROYAL BRISBANE AND WOMEN'S HOSPITAL
HEALTH SERVICE DISTRICT

Name: _____ Payroll Number: _____

Ward / Unit / Department: _____ Date: _____

When you have completed this form please present it to your CPR Resource Person.

Please write the Indication Number from Table 2 and Preparation Number from Table 3 in Medication Table 1. For each drug, there may be more than one indication / preparation number.

Please nominate the most appropriate response.

TABLE 1 Medication
OXYGEN
Indications
Preparations
ADRENALINE
Indications
Preparations
LIGNOCAINE
Indications
Preparations
ATROPINE
Indications
Preparations

TABLE 2 Indications	
1	VF if defibrillation fails. Asystole. Pulseless electrical activity. EMD (Electro-mechanical Dissociation)
2	Ventricular fibrillation when defibrillation and adrenaline have failed, prophylaxis in recurrent VT of VF.
3	Cardiac Arrest. May be used at lower concentrations for Acute Chest Pain due to cardiac ischaemia and suspected hypoxemia.
4	Symptomatic sinus bradycardia, asystole resistant to other treatments.

TABLE 3 Preparations	
5	MIN-I-JET® 1:10,000 solution 1mg, 10 ml syringe; 1:1000, 1mg/ml (ampoule)
6	MIN-I-JET® 0.01%:1mg in 10 mls : 10ml syringe
7	MIN-I-JET® 2%:20mg per ml : 5 ml syringe
8	Delivered via mask or bag-valve-mask at a concentration of 100%

Assessment Ach () N/Ach () Assessee: _____ Assessor: _____

References for Chapter

- Australian Resuscitation Council (2006). Guideline 3.1. Unconsciousness. 1-2.
- Australian Resuscitation Council (2006). Guideline 3.3. Positioning an unconscious victim. 1-2.
- Australian Resuscitation Council (2006). Guideline 4. Airway. 1-6.
- Australian Resuscitation Council (2006). Guideline 5. Breathing. 1-3.
- Australian Resuscitation Council (2006). Guideline 6. Compressions. 1-3.
- Australian Resuscitation Council (2006). Guideline 7. Cardiopulmonary resuscitation. 1-5.
- 11.1. Introduction to advanced life support. 1-3.
- Australian Resuscitation Council (2006). Guideline 11.4. Cricoid pressure. 1-2.
- Australian Resuscitation Council (2006). Guideline 11.5. Electrical therapy for adult advanced life support. 1-8.
- Medtronic Physio – Control (2002). LIFEPAK 500 Automated external defibrillator operating instructions. Redmond, U.S.A.
- Resuscitation (2005). Part 2: Adult basic life support. . International Liaison Committee on Resuscitation. 67, 187 – 201.
- Resuscitation (2005). Part 3: Defibrillation. International Liaison Committee on Resuscitation. 67, 203 – 211.
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- Springhouse Corporation (1996). Nursing Procedures. 2nd Edition. Springhouse. Pennsylvania.

Chapter 3 Advanced Life Support

Introduction

Advanced Life Support (ALS) is basic life support with the addition of invasive techniques e.g. defibrillation, advanced airway management, intravenous access and drug therapy.

Basic Life Support is a temporary measure to maintain normal ventilation and circulation. Effective external cardiac compression provides a cardiac output of only 20-30% of the pre-arrest value, and rescue breathing provides ventilation with an inspired oxygen concentration of only 15-18%. Electrical defibrillation is the mainstay of treatment for Ventricular Fibrillation and Pulseless VT. The purpose of BLS is to help maintain myocardial and cerebral oxygenation until defibrillation, the Code Blue Response Team and equipment are available. Early defibrillation is facilitated by the use of SAED's that are now available across the RBWH HSD.

The best chance of long term neurological survival after cardiac arrest occurs if:

- The victim is witnessed to collapse.
- CPR is commenced immediately.
- The cardiac rhythm is ventricular fibrillation(VF) or Pulseless ventricular tachycardia (VT).
- Defibrillation is performed as soon as possible.

Australian Resuscitation Council Policy Statement February 2006, Guideline 11.1.

Indications

Airway obstruction, respiratory arrest and circulatory arrest are the conditions requiring BLS and ALS. Common underlying problems include:

- Ischaemic Heart Disease
- Acute severe asthma
- Drug Overdose / Toxicity
- Drowning
- Trauma
- Electrolyte abnormalities

Protocols

The Advanced Life Support Algorithm provides the sequence of actions to be performed once emergency equipment and drugs are available. The notes on the algorithm are recommendations from the Australian Resuscitation Council Guidelines, February 2006.

BLS Algorithm

BLS is commenced in most cases before entering the ALS algorithm. If defibrillation is immediately available then applying a Semi- Automated External Defibrillator (SAED) or Manual Defibrillator takes precedence.

Precordial Thump

A precordial thump is a sharp blow delivered by the staff members fist to the mid sternum of the patient's chest. A precordial thump should be considered within the first 15 seconds of ventricular fibrillation (VF) or pulseless ventricular tachycardia (VT) in a monitored arrest if a defibrillator is not immediately available.

General Principles

- Technique involves a clenched fist of the staff member being held approximately 25 to 30cm above the sternum of the patient and brought down sharply on the mid sternum of the patient's chest.
- This technique should be performed by those staff who are competent in advanced life support.

Apply Defibrillator

With a Manual External Defibrillator use paddles (if available) or self-adhesive Quick-Combo pads. With Semi-Automated External Defibrillator (SAED) use the self-adhesive Quick Combo pads.

Assess rhythm / pulse

An SAED separates rhythms into shockable (VF / VT) and non-shockable rhythms while a manual defibrillator requires the operator to diagnose the rhythm. After a period of CPR (approximately 2 minutes) the rhythm and pulse should be checked.

Shockable VF / Pulseless VT

- Ventricular fibrillation is an asynchronous, chaotic ventricular activity that produces no cardiac output.
- Pulseless ventricular tachycardia is a wide complex regular tachycardia associated with no clinically detectable cardiac output.
- A defibrillator shock must be administered according to the ALS algorithm.
- Administer a single shock and immediately resume CPR for 2 minutes after delivery of the shock. CPR should not be delayed to assess the rhythm.
- If the Shockable VF/ Pulseless VT has been witnessed in a monitored patient by a staff member then a stacked shock regimen of 200J, 300J and 360J can be administered.
- If further shocks are required then a single shock regime should be used followed by 2 minutes of CPR.

Immediate CPR

While defibrillation is of paramount importance for shockable VF/ pulseless VT, a period of well performed CPR can help maintain myocardial and cerebral viability, and may improve the likelihood of subsequent defibrillation shock success.

Non Shockable PEA/ Asystole

- Asystole is characterised by the absence of any cardiac electrical activity.
- Pulseless Electrical Activity (PEA) (also referred to as Electromechanical Dissociation EMD) is the presence of a coordinated rhythm without a detectable cardiac output.

- Prognosis of cardiac rhythms in this category or asystole is less favourable than with VT / VF.
- Reversible causes need to be addressed and implementation of advanced life support interventions during CPR.

During CPR

The interventions apply to all rhythms and are carried out continuously or during each loop of the algorithm.

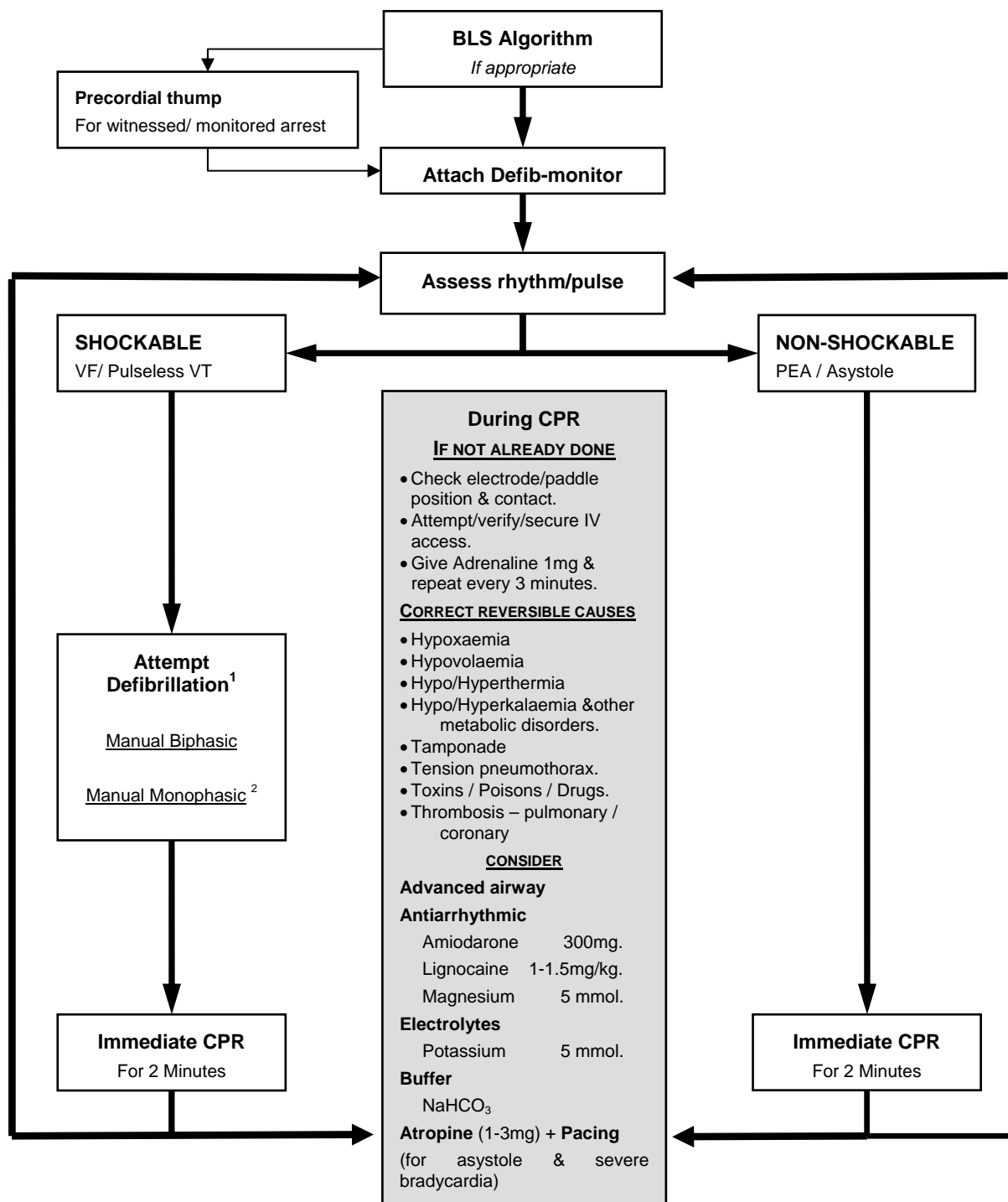
- Minimise interruption to CPR during ALS interventions.
- Attempts to secure the airway should not delay CPR for more than 20 seconds.
- Intravenous access should be obtained.
- Adrenaline should be administered every 3 minutes and;
- Other drugs / electrolytes should be considered depending on the individual circumstances.

Correct Reversible Causes

Studies have suggested that staff members can identify non-cardiac causes of some arrests. The patient history, background and previous events may enable the staff member to determine a non-cardiac cause of the cardiorespiratory arrest. The 4 H's and 4 T's are a reminder of conditions that may precipitate cardiac arrest or decrease the chances of successful resuscitation. These conditions should be considered as part of the patient assessment and if present corrected in every case.

Hypoxaemia	Tamponade
Hypovolaemia	Tension Pneumothorax
Hypo / hyperthermia	Toxins / poisons / drugs
Hypo / hyperkalaemia and metabolic disorders	Thrombosis - pulmonary / coronary

Advanced Life Support Algorithm



Note: 1. Single Shock Regime: 1st attempt 200J, 2nd attempt 300J, 3rd attempt 360J and for further attempts 360J is recommended.
Stacked Shock Regime: If a shockable rhythm is monitored and a multifunctional defibrillator is immediately available then a stacked shock regime of 200J, 300J and 360J can be administered.
2. Monophasic Shock Regime: The energy level for adults should be set at maximum (360J) for all shock attempts.

References: ARC Guideline 11.2, February 2006,

Medtronic Emergency Response Systems, 2006. (Manufacturer of LIFEPAK defibrillators)

Airway

The basic life support techniques for airway are discussed in chapter 2. This includes:

Airway manoeuvres

- Jaw thrust; and
- Head Tilt/Chin Lift.

Artificial airways

- Oropharyngeal airway as discussed in Chapter 2
- Nasopharyngeal airway
- Endotracheal intubation
- Laryngeal mask airway

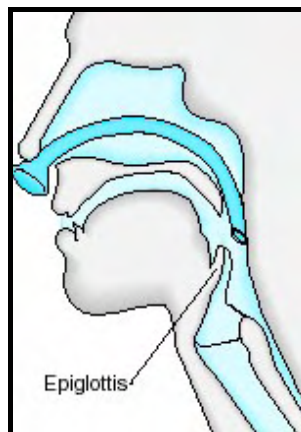
Nasopharyngeal Airway

The insertion of a nasopharyngeal airway allows for establishment or maintenance of a patent airway. A nasopharyngeal airway is a soft rubber or latex uncuffed catheter. This airway is recommended for patient's who have had recent oral surgery or facial trauma. This type of airway follows the curvature of the nasopharynx, passing through the nose and extending from the nostril to the posterior pharynx.

Technique

To insert a nasopharyngeal airway:

- Position patient appropriately using backward head tilt;
- Lubricate the airway with lubricant;
- Gently insert the airway into the patient's nostril; &
- Avoid pushing against resistance. This helps to prevent tissue trauma and airway obstructing.



Demonstration of Nasopharyngeal Airway

Endotracheal Intubation

Endotracheal intubation remains the gold standard for airway maintenance and airway protection in CPR. If the patient is unconscious with no gag reflex then a medical officer competent in this role should perform the procedure and ventilate with 100% oxygen. Intubation allows ventilation with 100% oxygen and suctioning of the airway. In addition endotracheal intubation provides possible access for the administration of some medications. Ongoing CPR must be maintained and

attempts at intubation should not interrupt cardiac compressions for more than 20 seconds.

Once an Endotracheal tube (ETT) has been passed:

- Inflate cuff with enough air to prevent a leak
- Confirm placement by assessing chest inflation, auscultation and direct observation
- To protect against unrecognised oesophageal intubation, secondary confirmation (such as end tidal carbon dioxide detector or an oesophageal detection device) is recommended)
- Firmly secure ETT.

Cricoid pressure

Aspiration of gastric contents into the lung is common during resuscitation and may have significant adverse effects on patient outcome. Cricoid pressure is the application of pressure by the thumb, index finger and middle fingers of the staff member on the cricoid cartilage. This compresses the upper oesophagus decreasing the likelihood of passive regurgitation of gastric contents into the pharynx in the unconscious patient.

General principles

- Apply pressure directly backwards with thumb, index and middle fingers on the cricoid cartilage. The pressure required to ensure oesophageal closure has been compared with the pressure against the bridge of the nose to cause discomfort, or the pressure against one's cricoid that prevents swallowing.
- It may be used when airway management and protection of the airway is needed.
- This manoeuvre requires staff that are competent in advanced life support.
- Pressure over the cricoid cartilage should be maintained until advised to release.

Electrical therapy

Defibrillation as soon as possible provides the best chance of survival for patients with VF or Pulseless VT. A defibrillation shock when applied through the chest produces simultaneous depolarisation of a mass of myocardial cells. This may enable resumption of organised electrical activity.

Defibrillation is indicated for:

- VF and Pulseless VT

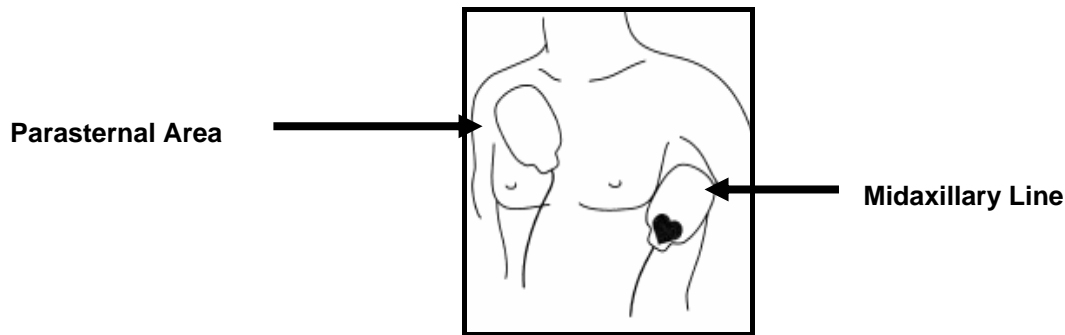
Timing of defibrillation

Interruptions to external cardiac compressions should be minimised for all interventions, for example rhythm assessment and pulse checks.

Effective CPR may increase the chance of defibrillation success. A 2 minute period of CPR is recommended before attempting defibrillation in adults with VF or pulseless VT when an emergency response has been initiated with a call to arrival interval of ≥ 4 to 5 minutes (Australian Resuscitation Statement February 2006, Guideline 11.5).

Positioning of electrodes

Place apex pad on the midaxillary line over the 6th left intercostal space and the sternal pad on the right parasternal area over the 2nd intercostal space.



Demonstrated use of Quick-Combo Pads

The self adhesive pads are safe and effective and are an acceptable alternative to standard defibrillation paddles (Australian Resuscitation Council February 2006, Guideline 11.5).

Recommended shock protocol

Single shock strategy should be used in patients in cardiac arrest requiring defibrillation for VF or pulseless VT. CPR should be resumed immediately following delivery of each shock and interruptions to external cardiac compressions minimised. A 3 stacked shock strategy is recommended in cases where the staff member witnesses the onset of a monitored cardiac arrest with VF or pulseless VT. Up to 3 shocks are delivered as required during the first defibrillation attempt. Interruptions to CPR should be minimised and resumed after the third shock as indicated. If further shocks are indicated a single shock strategy is recommended as outlined in the Advanced Life Support Algorithm (Australian Resuscitation Council, February 2006, Guideline 11.5).

Precautions

Be aware of electrical hazards in the presence of water, metal fixtures, oxygen and flammable substances. Warn of impending discharge by a "Stand Clear" command.

AVOID:

- charging paddles unless they are placed on the patient's chest;
- placing the defibrillator paddles / pads over ECG electrodes, monitoring leads, medication patches, an implanted device and central line insertion sites;
- allowing or having staff have any direct or indirect contact with the patient during defibrillation;
- having the patient in contact with metal fixtures eg bed rails;
- delivering the shock with a gap between the paddle / pad and chest wall;
- allowing oxygen to flow onto the patient's chest during the delivery of the shock; and
- defibrillating with the victim, operator and/or close bystander are situated in an explosive/ flammable (e.g. petrol) environment.

Confirmation of Shock Delivery

Check the patient has a motor response to the shock indicating delivery of the charge. If using a manual defibrillator, a spike should be observed on the screen. If this fails to happen check:

- the "Synchronise" mode of the defibrillator is turned off; and
- the defibrillator for a flat battery, lead fracture and charge dump.

Australian Resuscitation Council Policy Statement February 2006, Guideline 11.5.

Failure of defibrillation.

If the attempt at defibrillation is unsuccessful:

- Recommence CPR with oxygen.
- Check paddle and electrode position.
- Check that there is adequate skin contact.
- Consider changing the defibrillator pads.
- Consider anterior-posterior placement (one paddle is positioned anteriorly over the heart and the other paddle posterior to the heart) so that the maximum amount of current traverses the myocardium.

Australian Resuscitation Council Policy Statement February 2006, Guideline 11.5.

Defibrillators

The adult manual defibrillators used at the Royal Brisbane and Women's Hospital are predominately the LIFEPAK 12 (as shown) and the LIFEPAK 20 which are Biphasic Defibrillators. There are a small number of Monophasic Defibrillators such as LIFEPAK 9, LIFEPAK 9B and LIFEPAK 10 which exist in the organisation and will be phased out over time. **NOTE:** Manual monophasic defibrillators have a factory default energy setting of 200J. To administer the recommended energy protocol of 360J the energy setting will have to be manually altered prior to delivering the first shock attempt.



LIFEPAK 12

Post Resuscitation Therapy

Resuscitation does not stop after the return of a spontaneous circulation. Airway and breathing must be maintained and the blood pressure restored.

Hypoxic brain injury, myocardial injury or subsequent organ failure are the predominant causes of morbidity and mortality after cardiac arrests.

Aims of post resuscitation therapy

- Determine and treat the cause of arrest;
- Continue respiratory support;
- Maintain cerebral perfusion; &
- Treat and prevent cardiac arrhythmias.

A full history and examination will guide interventions.

It is important to ensure adequate blood pressure after the return of spontaneous circulation. This assists in the management and control of the following:

- arterial carbon dioxide levels;
- blood glucose levels;
- administration of prophylactic anti-arrhythmic's;
- induction of hypothermia post arrest;
- coagulation levels;
- maintenance of sedation and paralysis; and
- seizure management.

Prognosis

There is no reliable means to predicting accurate outcome in adults when neurologic recovery during or immediately after cardiac arrest. The likelihood of awakening decreases with each day of coma.

Assessment Tool ALS



ADULT ADVANCED LIFE SUPPORT ANNUAL ASSESSMENT TOOL

ROYAL BRISBANE AND WOMEN'S HOSPITAL
 HEALTH SERVICE DISTRICT

Name: _____

Payroll Number: _____

Designation: _____

Ward/Unit/Department: _____

ACTION		Achieved	Not Achieved
DANGER	Assesses environment for danger and discusses management of situation.		
RESPONSE	Assesses level of consciousness – response to verbal and tactile stimulation.		
	Demonstrates Left Lateral Tilt Position, if person is pregnant.		
AIRWAY	Demonstrates assessment of an airway		
	Demonstrates methods to clear an airway		
	Demonstrates effective airway management using <ul style="list-style-type: none"> • Head tilt • Chin lift (jaw support) • Jaw thrust (suspected neck injury) 		
	Discuss common causes of airway obstruction		
	Outline the indications and contraindications of the following: <ul style="list-style-type: none"> • Oropharyngeal airway • Endotracheal Tube • Nasopharyngeal airway • Laryngeal Mask Airway 		
	Demonstrates correct measurement and insertion of oropharyngeal (Guedels) airway.		
	Demonstrates "Recovery Position"		
	Demonstrates the intervention required while assisting with endotracheal intubation		
Demonstrates the correct application of cricoid pressure			
BREATHING	Assesses breathing – <ul style="list-style-type: none"> • Look, Listen and Feel • Delivers 2 full breaths (each breath over 1 second) • Checks rise and fall of chest 		
	Describe causes of absent or abnormal breathing		
	Describes rationale for rescue breathing		
	Demonstrates the correct technique for mouth to mask ventilation.		

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ACTION		Achieved	Not Achieved
	Demonstrates the correct process to assemble the bag-valve mask apparatus		
	Demonstrates the correct technique for hand ventilating a patient using a bag-valve-mask.		
	Discusses the clinical criteria used to evaluate effective hand ventilation using the bag valve mask apparatus: <ul style="list-style-type: none"> • Skin colour • SaO₂ % • Adequate symmetrical rise and fall of the chest • Decreased airway resistance while ventilating the individual. 		
	Discusses complications of manual ventilation		
CIRCULATION	Describes the criteria used to assess the presence of cardiac arrest: <ul style="list-style-type: none"> • Unconscious • Not breathing • Pulseless 		
	Discuss the physiological events that have occurred in cardiac arrest		
	Discuss the causes and treatment of cardiac arrest		
	Assesses circulation – <ul style="list-style-type: none"> • Locates position for carotid pulse • Palpates carotid pulse for no more than 10 seconds 		
	Locates hands in correct anatomical position (Calliper Method or Index Finger Method) <ul style="list-style-type: none"> • Lower half of sternum • Compression applied to sternum only (fingers clear of chest) <ul style="list-style-type: none"> • adult compression - depth 4 to 5 cm (approx. 1/3rd the depth of chest) 		
	States the guidelines for Rescue Breathing and External Cardiac Compression (ECC) and demonstrates stated ratios and rates for two (2) full minutes. <ul style="list-style-type: none"> • Ratio 30:2 one person or two person in one minute • Rate 100 bpm for adult and child (greater than 12 mths) in one minute 		
	Demonstrates the adequacy of chest compressions		
	Describes the aim of cardiopulmonary resuscitation		
	Evaluates cardiac output after two minutes - palpates carotid pulse.		
	Discusses the complications of chest compressions and ways to decrease the likelihood of these		
ARREST PROCEDURE	Describe the correct patient positioning to facilitate resuscitation in: <ul style="list-style-type: none"> • Suspected cervical spinal injury • Pregnant patient 		
	Person finding the patient: <ul style="list-style-type: none"> • Stays with the patient • Summons help • Assesses cardiopulmonary status • Commences Rescue Breathing and External Cardiac Compression, as indicated 		
	Other staff member(s): <ul style="list-style-type: none"> • Dials 333 • States Code Blue – Cardiac Arrest and location of patient • Brings arrest trolley and SAED (if available) to emergency site • Prepares environment 		
	Explain the cardiac arrest procedure for critical care areas		

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ACTION		Achieved	Not Achieved
	Discusses the management of the patient and document requirements following the resuscitation process.		
MEDICAL EMERGENCY	Describes the MEDICAL EMERGENCY Call system. Explains the CALL CRITERIA <ul style="list-style-type: none"> • Airway • Breathing • Circulation • Nervous System • Obstetric • Other. 		
	Ensures criteria for the use of SAED are present (for Adults only): <ul style="list-style-type: none"> • Unconscious • Not breathing • Pulseless 		
SEMI AUTOMATED EXTERNAL DEFIBRILLATOR (SAED)	Assesses environment in relation to specific dangers related to defibrillation (if patient is wet - dries patient / removes from wet area)		
	Prepares site for electrode placement - removes clothing, and excessive chest hair. Ensures metal objects, GTN patches, leads and implanted devices are not under electrodes.		
	SAED – Semi Automated External Defibrillator		
	Connects the electrode cable to the SAED		
	Positions electrodes correctly: <ul style="list-style-type: none"> • Right side of chest under clavicle, next to sternum (2nd Intercostal Space Mid-Clavicular Line) • Left side of chest Mid-Axilla at the Nipple Line (6th Intercostal Space Mid-Axillary Line) <ul style="list-style-type: none"> • 5th Intercostal Space Mid-Axillary Line for pregnant person 		
	Ensures good contact between electrodes and skin		
	Turns SAED on and ensures treating team compliance with audible prompts: <ul style="list-style-type: none"> • no handling of patient during ANALYSE • no contact with patient or equipment following the prompt to SHOCK 		
	Calls ' stand clear ' prior to pressing SHOCK button.		
	Delivers a single shock followed by 2 minutes of CPR		
	Discusses the escalating energy sequence for delivery of shocks (200J, 300J, 360J)		
	Performs carotid pulse check when prompted.		
	Recommences Basic Life Support when prompted if no pulse is present.		
DEFIBRILLATION	Discuss the physiological mechanism of defibrillation		
	State the definition and indications for defibrillation		1.
	Discuss the difference between monophasic and biphasic defibrillation		2.
	Describe patient preparation in relation to defibrillation and correct anatomical placement of defibrillator paddles		
	State the safety precautions to be considered when the defibrillator is in use		
	Discuss the factors that may influence the success of defibrillation		

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ACTION		Achieved	Not Achieved
	State the appropriate actions required if during defibrillation, the defibrillator did not discharge		
	Demonstrate a safe technique in the delivery of defibrillation <ul style="list-style-type: none"> • Identify rhythm correctly • Assess level of consciousness and central pulse • Identify need for synchronisation if applicable • Place conduction pads on chest in correct position • Select correct energy level • Charge defibrillator correctly • Recheck rhythm prior to discharge of volts • Call stand clear • Perform visual sweep of bed area • Apply adequate pressure to paddles onto chest (if required) • Perform defibrillation as required • Leave paddles on chest between the three sequential shocks • Adequately assess success of defibrillation <ul style="list-style-type: none"> ▪ Observe for musculoskeletal response ▪ Recheck monitor rhythm and central pulse 		
	Discuss the potential complications of defibrillation and strategies to minimise these		
	Discuss causes of failed shock delivery		
	Discuss the indication for and technique of delivering a precordial thump		
	Discuss the significance of synchronisation in cardioversion		
	Discuss the indications for cardioversion of a patient		
	Demonstrate the technique of synchronised cardioversion incorporating safety considerations, selection of joules, sequencing and timing of shocks.		
	Discuss the indications and principles for providing external pacing for a patient		
	Discuss the patient management required for external pacing <ul style="list-style-type: none"> • Placement of the pads • Identify successful capture • Patient preparation 		
MEDICATION	Outline the clinical indications, standard doses and adverse reactions of the following medications: <ul style="list-style-type: none"> • Adrenaline • Atropine • Amiodarone • Lignocaine • Calcium Chloride • Vasopressin • Adenosine • Potassium Chloride • Magnesium Sulphate • Sodium Bicarbonate • Oxygen 		
	Identify the medication suitable for administration via the endotracheal route		
	Discuss the correct technique for endotracheal administration of medications		

Royal Brisbane & Women's Hospital Health Service District
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ACTION		Achieved	Not Achieved
ARRHYTHMIAS	Identify the following rhythms and discuss the expected course of treatment in accordance with ARC guidelines functioning within a team. <ul style="list-style-type: none"> • Life threatening arrhythmias • Narrow complex tachycardia's • Broad complex tachycardia's • Bradyarrhythmia's 		
	Identifies correct arrhythmias		
	Describes the main characteristics and clinical presentation of the arrhythmias		
	Describes the signs of haemodynamic compromise		
	Discuss correct sequence according to the ARC guidelines for the management of the identified rhythm incorporating the following: <ul style="list-style-type: none"> • Drug therapy • Defibrillation energy levels for the arrhythmia as required • Any further interventions 		
POST-RESUSCITATIVE CARE	Discuss the post resuscitative, management and priorities of care for the patient		
	Discuss the care of significant others post cardiopulmonary arrest		
	Briefly discuss critical incident debriefing in the post cardiopulmonary arrest setting		
TEAM FUNCTIONING	Describes the various roles of team members in cardiac arrest		
	Demonstrates the ability to function as a team member in the provision of ALS		
	Demonstrates the use of appropriate PPE		
	Discusses the legal, ethical and professional responsibilities in ALS		

Date: _____

Assessment Ach () N/Ach ()

Assessee: _____

Assessor: _____

Chapter 4 Neonatal Resuscitation

Introduction

These guidelines have been prepared based on recommendations of the American Academy of Paediatrics (AAP) and the American Heart Association (AHA), contained in the Textbook of Neonatal Resuscitation, 5th edition, 2006.

It is estimated that 10% of all newborns will require some assistance to begin breathing at birth and that 1% of newborns require major resuscitative efforts to survive (Kattwinkel, 2000). Whether immediately after birth or later in the neonatal period, the process for neonatal resuscitation requires the same key skills and knowledge.

The need for resuscitation in the newborn mostly stems from problems with airway patency and breathing, rather than primary circulatory compromise.

Preparation

All neonatal resuscitation areas are required to meet the following standards.

All resuscitation equipment must be checked (present and functioning) each shift.

Neutral Thermal Environment

Radiant warmer plugged in and turned on.

Suction Equipment

- Suction pressure not greater than 100mmHg.
- Suction catheter connected to tubing and suction source (size Fg 12).

Oxygen

- Wall or oxygen cylinder ('C' size cylinder source to have minimum of 15000kPA) available.
- Oxygen tubing firmly attached to oxygen flow meter (NOT low flow meter) and oxygen source.

Resuscitation Devices

There are three types of devices available to ventilate newborns:

- self-inflating bag;
- flow inflating bag; and
- T-piece resuscitator device.

Flow-inflating bag - CPAP bag or anaesthetic circuit – inflates when a gas source enters the bag, and the opening of the bag attached to a mask, is sealed on a babies face. Peak inspiratory pressure is controlled by flow rate, and how hard the bag is squeezed. Only personnel experienced in its use should operate the flow-inflating bag.

- Bag assembled correctly (Non-disposable circuit).

Check bag and circuit integrity by inflating with oxygen, occluding elbow and inspecting for gas leakage.

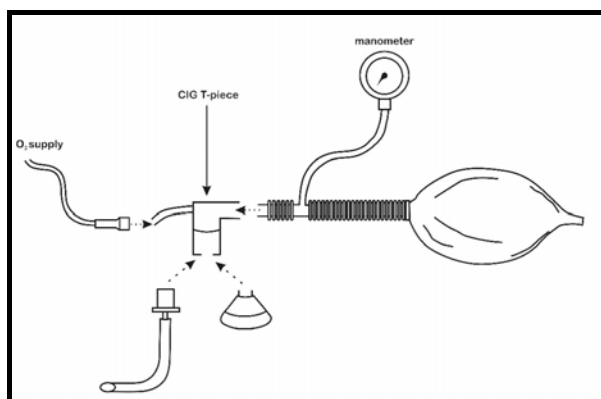
Self-inflating bag (Ambu or Laerdal™) - Re-inflates automatically after squeezing for each breath. Can be used without a flow of gas.

Bag assembled correctly

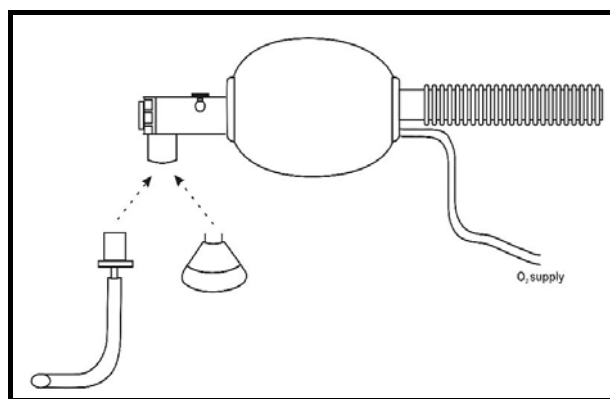
- **Valve assembly;**
- **Self-inflating bag;**
- **Oxygen inlet; and**
- **Oxygen Reservoir**

Check bag and circuit integrity by occluding patient outlet and squeezing bag to meet resistance.

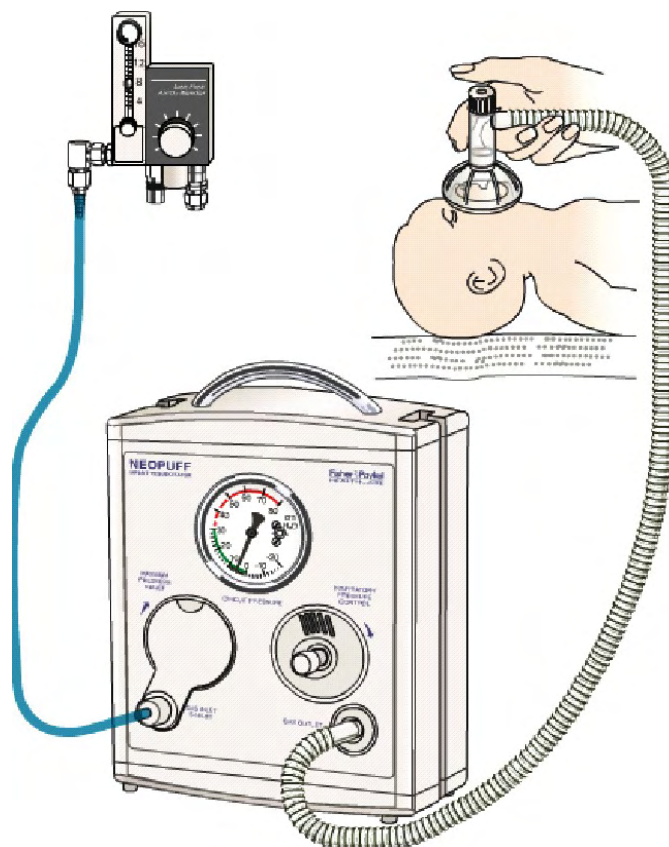
T- Piece Resuscitator Device (Neopuff™) has many similarities to the flow inflating bag, with the added safety of mechanically limiting airway pressures by a mechanical adjustment instead of by the amount of squeeze on the bag.



Flow Inflating



Self Inflating



T- Piece Resuscitator Device (Neopuff™)

CODE BLUE Manual**Masks**

- Round or anatomically shaped.
- Cushioned rim or silicone mask.

Additional Neonatal Emergency Supplies

RESUSCITATION TROLLEY REQUIREMENTS			
Intubation sets x 2			
<ul style="list-style-type: none"> • Sterile dressing towel x 1 • Sterile metal introducer x 1 • Scalpel blade size 22 x 1 or Sterile scissors • Comfeel™ • ½" Leucoplast • Spare T-piece 		<ul style="list-style-type: none"> • Tincture of Benzoin Compound • Pack of Cotton Bud Applicators • Laryngoscope & blades (Size 1 Mac) x 2 • Spare batteries x 2 (AA) • Spare bulb • Masks x 2 	
Laryngeal Mask Airway • size 1 x 1	Guedel airways • size 0, 00, 000	AlcOWipes x 6 Stethoscope	Needles • 19 & 25g x 5
Suction catheters • 5 & 6 Fg x 2 • 8 Fg x 2 • 12 Fg x 2	Syringes • 1ml, 2ml, 5ml x 5 • 10ml x 5 • 50ml x 1	Endotracheal tubes size • 2.5mm x 2 • 3.0mm x 2 • 3.5mm x 2 • 4.0mm x 2	Intravenous cannulas • 24 x 2 • 20 x 2 (for aspiration not IV fluids)
O negative blood pedi-pak (obtained from blood bank ext. 67188)	Pneumothorax aspiration set x 2 • 20ml syringe x 1 • 3 way tap x 1 • 23 gauge scalp vein needle x 1 • Alco wipe x 1	Butterfly scalp vein needles sizes • 21 x 2 • 23 x 2	Naso-gastric tubes • Fg 5 x 2 • Fg 8 x 2
Emergency Umbilical Vein Catheterisation • Argyle UA catheters: size Fg 3.5 x 1, Fg 5.0 x 1 • 3 way tap x 1 • Linen tie x 1 • Scalpel blade size 22 x 1 • Catgut suture 3.0 x 1 • Needle Holder		Emergency drugs and volume expanders • Adrenaline 1:10000 x 2 • Sodium bicarbonate 8.4% x 2 • Normal Saline 10ml x 5 • Naloxone 400µg in 1ml x 2	

Neonatal Emergency Response Procedure

The presence of neonatal cardiorespiratory compromise is assessed by using the following parameters:

- Alteration in **colour** eg. pallor, cyanosis, mottling;
- Altered **respiratory pattern** eg. grunting, gasping or absent respirations; and
- Altered **heart rate** i.e. less than 100bpm.

Other neonatal emergencies that require urgent medical assessment include but are not limited to the following:

- Seizures;
- Haemorrhage; and
- Alteration in tone and responsiveness.

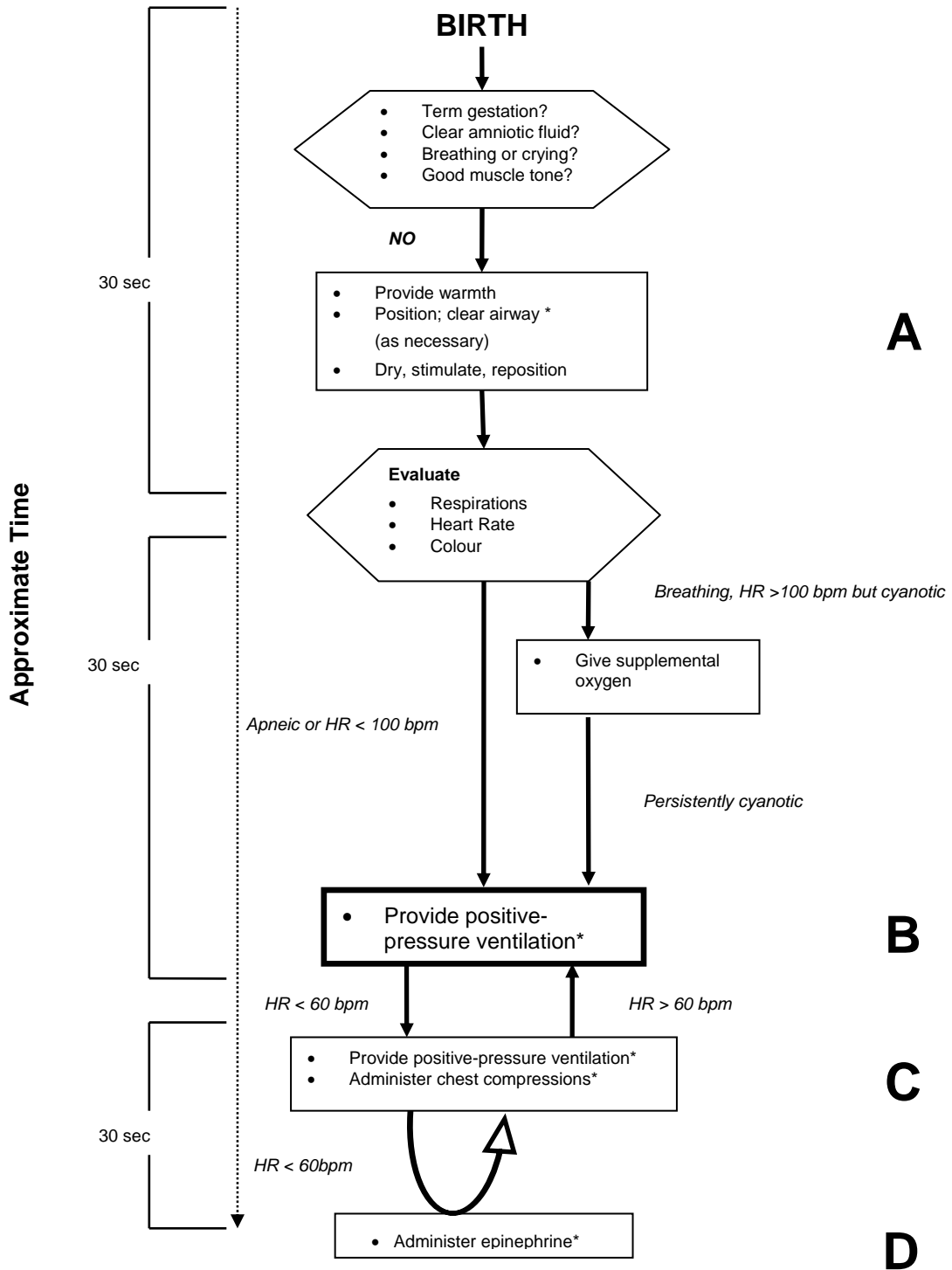
The following steps must be followed for a CODE BLUE event:

- The person finding the baby commences resuscitation.
- Call for assistance.
 - Assistant summons Neonatal Emergency Response Team.
- Birth Suite / Grantley Stable Neonatal Unit – press emergency call bell

- Post-natal / Peri-operative Suite/ DEM – dial **64333**
- State that the Neonatal Emergency Response Team is required
- State location of infant
- Briefly identify infant's problem

Continue with resuscitation according to steps identified in the Neonatal Resuscitation Algorithm.

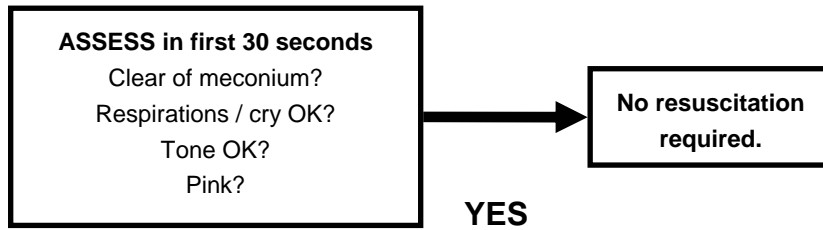
Neonatal Resuscitation Algorithm



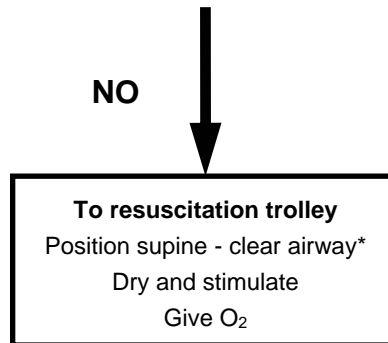
* Endotracheal intubation may be considered at several steps

American Heart Association (2006) Neonatal Resuscitation Textbook 5th Edition

Steps in Resuscitation



The above factors need to be assessed. Answering no to any of these factors is an indicator for the initiation of resuscitation in the following order:



Initial Steps

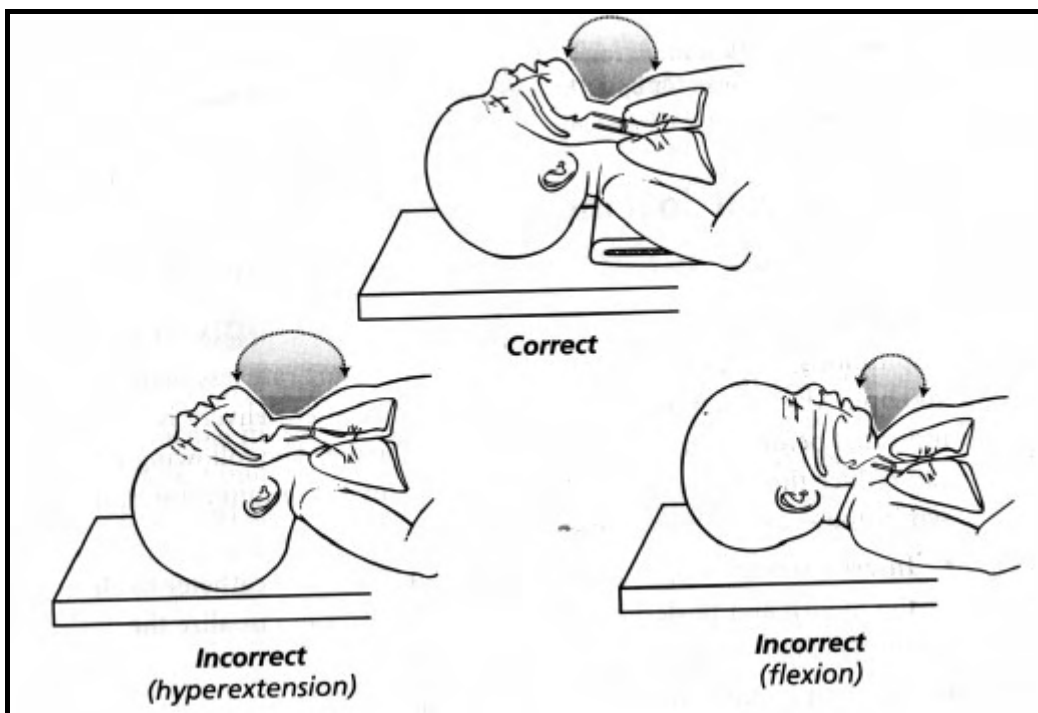
Promote neutral thermal environment

- Place under radiant warmer and dry baby;
- Remove wet linen; and
- DO NOT cover infant with blankets as this prevents heat reaching infant.

Airway Management

Position

- Flat supine in 'Sniffing position' – head slightly extended.
- Avoid hyperextension or flexion.



Suction infants oropharynx THEN nares

- Catheter insertion to maximum depth of 4-5cms (depending on size of infant).
- Suction pressure does not exceed 100mmHg.

Dry, stimulate, reposition

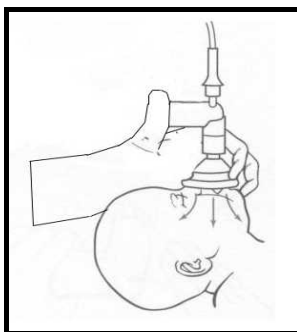
- After delivery, further drying provides stimulation.
- Other safe methods include rubbing the back, soles of feet.
- DO NOT persist with prolonged stimulation of an apnoeic infant – move to positive pressure ventilation.
- Reposition to maintain optimal airway.

Provide free flow oxygen

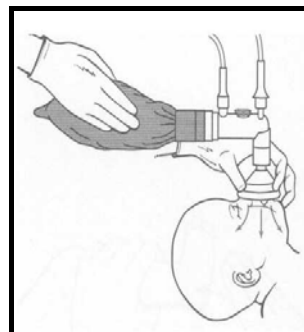
- Infant MUST be spontaneously breathing – if not move to positive pressure ventilation.
- Commence using 100% oxygen for neonatal resuscitation.
- Flow rate of 5L/min.
- Can be administered via:
 - (A) Oxygen tubing held in cupped hand over baby's face;
 - (B) Mask attached to CPAP bag elbow piece and oxygen tubing with end occluded;
 - (C) Mask attached to *flow inflating bag* held just above infant's face; and
 - (D) Mask attached to T – piece resuscitator device;
- **Note:** Do not attempt to administer oxygen via a self-inflating bag.



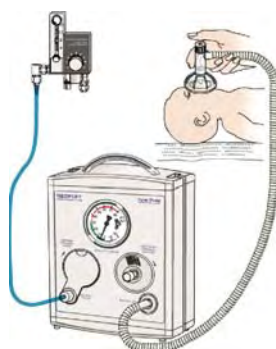
(A)Oxygen Tubing



(B) Mask attached to Elbow Piece

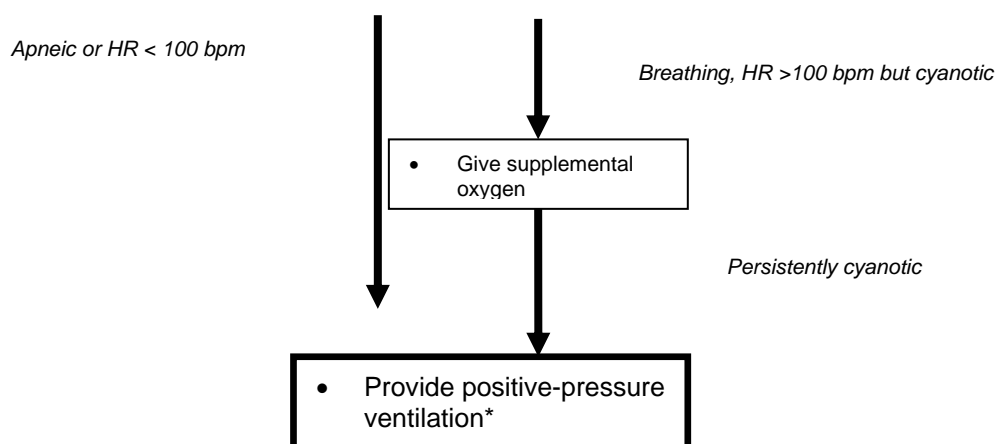


(C)Mask attached to flow inflating bag



T- Piece Resuscitator Device (Neopuff™)

Evaluate Heart Rate, Respiratory Rate and Colour



*Endotracheal intubation may become necessary if positive-pressure delivered by mask is not successful.

Positive Pressure Ventilation

Positive pressure ventilation can be given via an endotracheal tube or facemask, using either a flow-inflating, self-inflating bag or T piece resuscitator device.

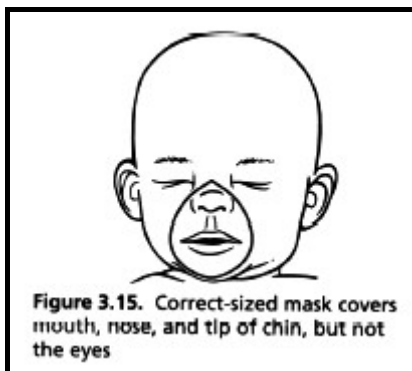
- A cushioned / silicone mask of appropriate size facilitates an effective seal and effective ventilation and reduces the risk of neonatal injury.

Using a face mask

- Mask must either have a cushioned rim or be made from silicone.
- Masks are either round or anatomically shaped.
- Anatomically shaped masks are fitted with the narrow end over the infant's nose.
- A mask that is too large will not seal well and may encroach on infant's eyes.
- A mask that is too small will not cover mouth and nose and may occlude the nose.

Obtaining a seal between mask and infant's face is critical in achieving adequate chest inflation.

- Mask covers the nose and mouth;
- Tip of the chin rests within the rim of the mask;
- Mask is held in position using thumb, index and middle finger, encircling mask rim;
- Chin is maintained in position with fourth and fifth fingers;
- Care should be taken to avoid 'jamming' the mask onto the face; and
- Avoid having hands or fingers resting on the baby's eyes.



Using a face mask

Gastric decompression for ventilation

Newborns that require positive pressure ventilation via a facemask for longer than a few minutes should have an oro-gastric tube inserted.

- The large amounts of gas forced into the stomach during resuscitation with a face mask can impede ventilation by exerting pressure on the diaphragm.
- The tube should be aspirated to remove air and possible gastric contents.
- There is also a risk of infants vomiting, and aspirating vomitus during resuscitation.

Core manual principles during resuscitation

- Reposition infant – flat supine, head slightly extended;
- Ventilate infant at between 40 –60 breaths per minute;
- Use sufficient pressure to cause the amount of chest wall rise and fall equal to normal quiet respiration;
- Poor chest wall movement reflects a low volume of gas entering lungs that may be insufficient for adequate gas exchange;
- Significant chest wall movement indicates over inflation of the lungs and increases the risk of pulmonary air leak;
- The first few breaths of life may require higher pressure and longer inflation times to establish the functional residual capacity; and
- Commence using 100% oxygen.

Selection of resuscitation bags / devices

The choice between self-inflating, flow-inflating bags and T-piece resuscitator device for positive pressure ventilation is based upon equipment availability and operator skill. Each type of equipment has advantages and disadvantages. Most importantly operators **MUST** develop competence with at least one type of bag or device.

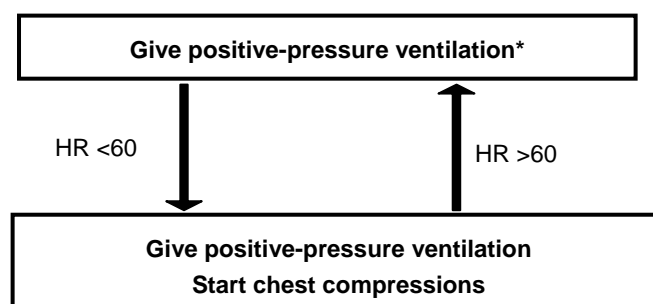
Device	Advantages	Disadvantages
Flow inflating bag	Delivers 100% oxygen Easy to determine when there is a seal on the infant's face Stiffness of lungs can be 'felt' when squeezing bag Can be used to deliver free flow oxygen	Requires a tight seal between the mask and patient to remain inflated Requires gas source to inflate Not fitted with a safety 'pop-off' valve
Self-inflating bag	Does not require compressed gas source If pressure-release valve is fitted, makes over inflation less likely	Will inflate even without a seal between mask and face (no operator feedback) Requires a reservoir attachment to deliver close to 100% oxygen Cannot be used to reliably deliver free-flow oxygen Cannot be used to deliver continuous positive airway pressure (CPAP)
T-piece resuscitator (eg, Neopuff device)	Added safety of mechanically limiting airway pressures Reliable control of peak inspiratory and positive end expiratory pressure Reliable delivery 100% oxygen Operator does not become fatigued	Requires gas source Compliance of lungs cannot be "felt" Requires pressures to be set prior to use Changing inflation pressure during resuscitation is more difficult

Continuing positive pressure ventilation after initial resuscitation and before transfer to Intensive Care Nursery

- Prolonged positive pressure ventilation using either flow inflating or self-inflating bags is not recommended due to the uneven ventilatory pressures generated and the increased risk of pulmonary air leaks.
- The use of a pressure-generating T-Piece Resuscitator (e.g. Neopuff TM) is recommended to allow for a predetermined peak and end pressure to be set, and the rate to be controlled manually which increases ventilatory control.

Assess effectiveness of Positive Pressure Ventilation

Evaluate Heart Rate, Respiratory Rate and Colour after 30 seconds of effective positive pressure ventilation



- Heart rate > 100bpm: Gradually withdraw positive pressure ventilation and provide facial oxygen to maintain colour + / - oxygen saturation.
- Heart rate > 60bpm and <100bpm: Continue positive pressure ventilation.
- Heart rate < 60bpm: Commence coordinated chest compression and ventilation with 100% oxygen.

Chest Compressions

Neonatal cardiopulmonary resuscitation is always a two-person technique.

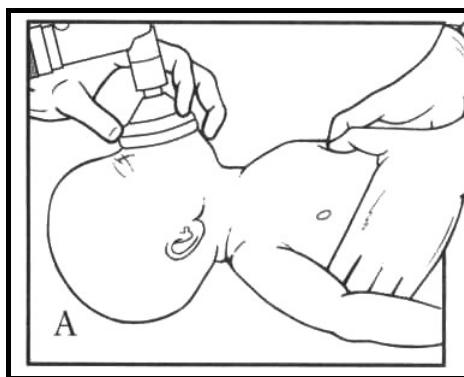
Operator who is providing positive pressure ventilation is positioned at the head of the infant.

Techniques for chest compression

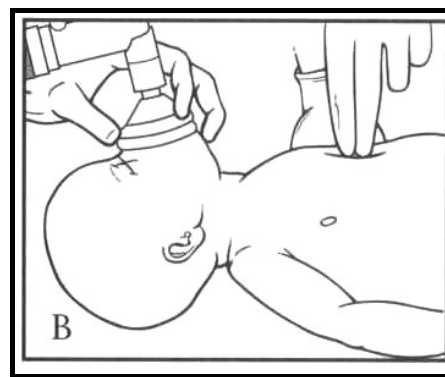
(A) Two thumbs depress the sternum, hands encircle thorax, and fingers provide spinal support.

- Larger babies: place thumbs side by side.
- Smaller babies: place one thumb over the other.

(B) Index and middle finger depress the sternum, slide other hand under infant's thorax to provide support.



(A) Two thumbs



(B) Index and middle finger

Fingers or thumbs are positioned on the lower one third of the sternum

- Correct location is attained by drawing a line between the nipples and placing fingers / thumbs centrally between this line and the xyphoid process or by running finger along the lower edge of ribs to xyphoid process. Area just above xyphoid is used for chest compression.
- Care should be taken to avoid applying pressure on the ribs or xyphoid process as this could lead to fractures, haemorrhage or pneumothorax.

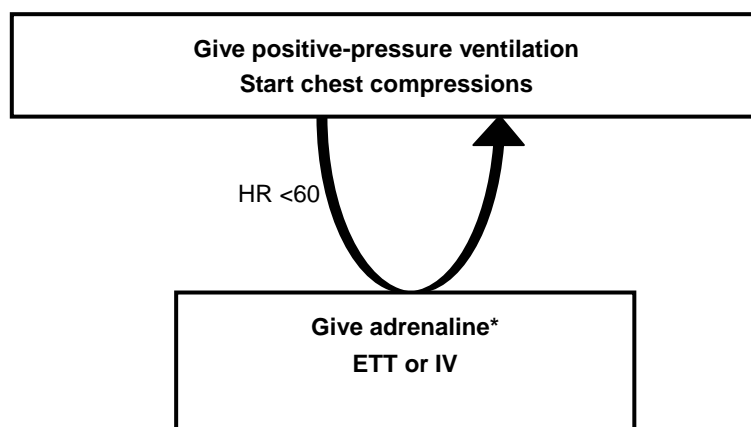
The sternum is depressed approximately one third the antero-posterior (A-P) diameter

- Release pressure to allow heart to refill with blood; and
- Maintain contact between fingers / thumbs and infant's chest.

Coordination of chest compressions with ventilation

- Chest compressions are always accompanied by ventilation.
- The ratio of compressions to ventilation is 3:1.
- There should be 90 compressions and 30 ventilation breaths in one minute (Total of 120 events).
- This is approximately 4 events every two seconds.
- Person performing the compressions facilitates coordination by counting out loud 'One-two-three-breathe'.

Evaluate Heart Rate, Respiratory Rate and Colour after 30 seconds of coordinated chest compressions and ventilation



Heart rate < 60bpm:

Give:

- ETT Adrenaline **0.3 - 1 mL/kg of 1:10,000.**
- Or
- IV Adrenaline, **0.1 - 0.3mL/kg 1:10,000** rapidly and continue chest compressions and ventilation.

Emergency Drugs

Adrenaline

Indications

- Asystole
- Heart rate less than 60 bpm

Actions

Increases the strength and rate of cardiac contractions and causes peripheral vasoconstriction.

Dosage

ETT Adrenaline **0.3 - 1 mL/kg of 1:10,000.** When using the ETT route, maximise drug dispersal by:

- Follow flush with several deep positive-pressure breaths
- Adrenaline may also be given using a feeding catheter attached to the syringe and inserted into ETT. This prevents the drug pooling in the ETT connector.

OR

- IV Adrenaline, **0.1 - 0.3mL/kg 1:10,000** rapidly and continue chest compressions and ventilation.

Note: Evaluate Heart Rate, Respiratory Rate and Colour 30 seconds after Adrenaline administration and continued coordinated chest compressions and ventilation

- Repeat Adrenaline dose every 3 – 5 minutes as indicated

Note: The endotracheal route is quicker, but may result in lower and unpredictable blood levels. Some clinicians choose to give a dose via the ETT while the umbilical venous line is placed.

Adverse effects

- Tachyarrhythmias
- Severe hypertension after resuscitation
- Tissue necrosis if extravasation occurs

Volume Expanders

Indications

Failure of the baby to respond to resuscitation attempts, combined with evidence suggestive of blood loss may indicate hypovolemia

Action

- Increase circulating blood volume
- Increase blood pressure

Dosage

- Administer volume expanders at 10ml/kg to correct hypovolemia.
 - Normal Saline; and
 - O Negative Blood
- Rate of Administration
 - Administer over 5 – 10 minutes
- Dose may be repeated if indicated.

Adverse Effects

- Sudden changes in cerebral blood flow may lead to rupture of the fragile capillaries in the germinal matrix in the brain of preterm infants
- Caution with the rate of volume administration is therefore required in preterm infants

Obtaining O negative blood in a neonatal emergency

- Ring blood bank on **67188** or **67365** and ask for an urgent pedi-pak of O-negative blood to replace blood volume
- Send a 'runner' with baby's name and UR number (or if available, Patient Identification Label) to Blood Bank to collect pedi-pak
- Blood bank is located on the fourth floor accessed from the middle stairs of the Ned Hanlon Building

Sodium Bicarbonate 8.4%

Infant's requiring prolonged resuscitation may develop a metabolic acidosis, as the body switches from aerobic to anaerobic metabolism. A by-product of anaerobic metabolism is lactic acid, which increases the body's acid load.

Indications

- Proven metabolic acidosis
- Suspected metabolic acidosis in prolonged resuscitation

Action

- Corrects metabolic acidosis as bicarbonate combines with hydrogen ions to produce carbonic acid and then carbon dioxide and water
- Effective ventilation must be established to support removal of the additional carbon dioxide

Dosage

- Administer IV Sodium Bicarbonate (NaHCO₃) 8.4% 1-2mL/kg
- Administer no faster than 1mmol/kg/min (i.e. 1ml/min)
- Sodium Bicarbonate can be diluted to a 4.2% solution by diluting in equal proportions with sterile water

Naloxone (Narcan) 400mcg/1ml

Maternal narcotic analgesia can cross the placenta and cause respiratory depression in the newborn. Repeat doses may be necessary

Indications

Naloxone is a narcotic antagonist

- Infants who fail to breathe spontaneously AFTER improvement with positive pressure ventilation and
- Whose mother received narcotic analgesia within four hours of delivery

Precautions

Action

Naloxone is a competitive antagonist at opiate receptor sites. Naloxone can reverse or prevent the effects of opioids on the body.

Precautions

- Naloxone should not be given before effective ventilation and improvement in condition has been established
- Naloxone should **NOT** be administered to infants of substance using (narcotics) women or those on methadone, as may precipitate the onset of severe seizures
- Duration of action of narcotics is longer than duration of action of Naloxone, therefore any infant who receives Narcan must be observed closely

Dosage

- 100mcg/ kg
- Preferred routes are ETT or IV for more rapid onset of action
- IM and SC are acceptable

Endotracheal Intubation

Endotracheal intubation can occur at any stage of the resuscitation algorithm.

Indications

- Improve ventilation
- Improve coordination between compressions and ventilation
- Suction meconium from trachea

- Provide a route for the administration of adrenaline and Naloxone

Endotracheal Tube Size

Selection of the correct size of ETT is critical. This is based on the size of the infant.

- A tube that is too small will inhibit effective ventilation
- Select the appropriate size tube by dividing the gestational age by 10
- Select the lower tube size for infants with gestations between sizes eg. 27 week infant requires a 2.5mm tube

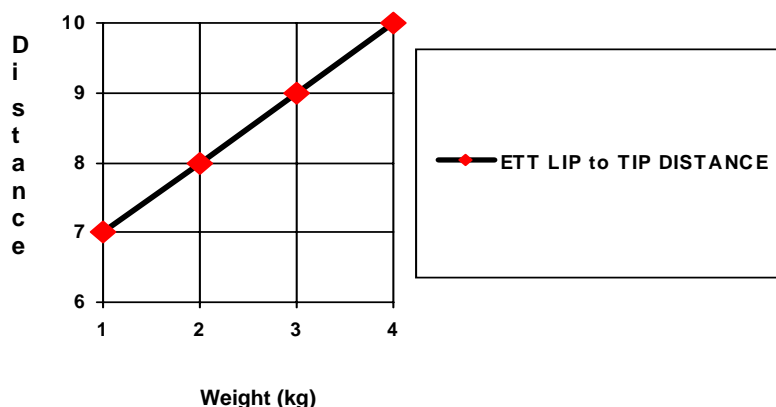
ETT Sizes (GA / 10)	
25 weeks	2.5mm
30 weeks	3.0mm
35 weeks	3.5mm
40 weeks	4.0mm

Endotracheal Tube Size Chart

Endotracheal tube length

A common problem with neonatal intubation is that the ETT is inserted too far, most commonly entering the right main bronchus. This leads to alveolar collapse in the non-ventilated areas and the risk of pneumothorax in the ventilated area.

- Avoid inserting the tube too far by using the 1,2,3 / 7,8,9 rule
- When a baby's estimated weight is 1kg insert the ETT to 7cm at the lip, when a baby's estimated weight is 2kg; insert the ETT to 8cm at the lip.



Shortening ETT prior to intubation

It is preferable, but not essential to cut the ETT prior to intubation

- Cut the tube at the estimated length for insertion to the lip + 3cm (use the cm markers on tube).
- Eg a tube for a 1kg baby would be cut at 10cm (7cm at the lip + 3cm).
- The tube is cut using a sterile scalpel blade or sterile scissors.

Using an introducer

- A sterile introducer is inserted into the ETT in preparation for intubation.
- Introducer increases tube rigidity.
- Introducer must not extend beyond the end of the ETT as it will cause tracheal trauma.

- Stabilise introducer position in the ETT by bending it over patient connector.

Laryngoscopy

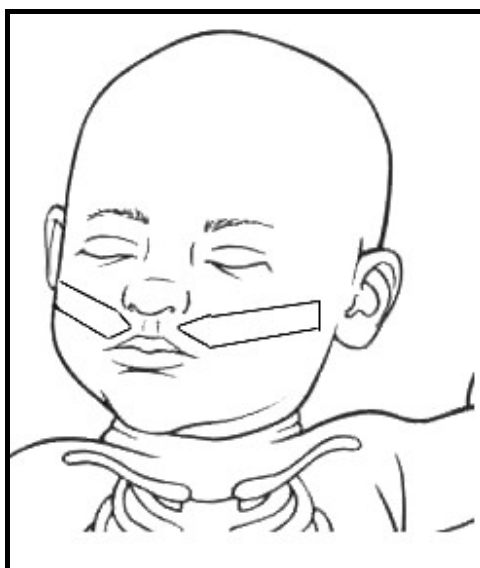
- Use a size 1 laryngoscope blade.
- Laryngoscope light must be bright and white – replace batteries if necessary.
- Position infant flat, supine with head slightly extended.
- Insert laryngoscope blade over the right side of the tongue, and sweep tongue to left side of mouth (All neonatal laryngoscope blades at this facility are for right handed people - i.e. laryngoscope must be held in the left hand).
- Advance blade until tip is positioned in the vallecula.
- Glottis visualisation may be assisted at this stage by:
 - Suctioning to remove pooled secretions; and
 - Applying cricoid pressure.
- ETT is inserted through the glottis to the desired distance (1,2,3 / 7,8,9 rule).
- Limit attempts to 20 seconds.

Assessing tube position before securing

- Look for chest wall rise and fall with each manual breath.
- Auscultate for bilateral and equal breath sounds.
- Observe for improvement in colour, heart rate.
- Observe for condensation in ETT.
- No gastric distension with ventilation.

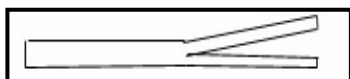
Securing an Endotracheal Tube

- If possible prepare skin protection strips (eg. Comfeel™) and securing tapes (as indicated) in advance. It is better cut tapes too long, than too short.



Securing Tapes

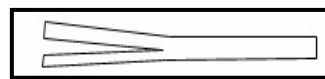
- Remove vernix, liquor etc by wiping infant's face with 'Comfeel™ wipes' (provides a protective film) or drapes.
- Using cotton tip, apply Tinc. Benz Co in a strip along infant's face from in front of ear, along the top lip and out to other ear.
- Apply shaped skin protection strips from the corners of the nose to in front of ears and reapply Tinc Benz Co.
- Apply base tape over skin protection strips and top lip.
- Secure ETT with 'Trouser Leg' tapes.
- Place V of tape over philtrum.
- Position ETT firmly into V of tape, pressing top trouser leg onto base tape.
- Wind lower trouser leg round and up the ETT.
- Repeat process from the opposite direction with second trouser leg tape.
- Recheck ETT position as above.
- A chest X-Ray will be required to confirm position, once the infant is in the Intensive Care Nursery.



Trouser Tape



Base Tape



Trouser Leg Tapes

Management of an Infant - Meconium Stained Liquor

Aspiration of meconium / meconium stained liquor into the neonatal lung can lead significant disease including Meconium Aspiration Syndrome + / - Persistent Pulmonary Hypertension of the Newborn.

Appropriate management at the time of birth may reduce the risk of Meconium Aspiration Syndrome.

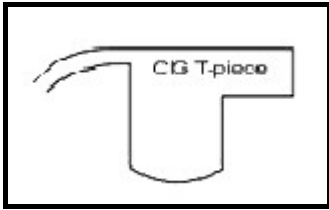
At the birth

Paediatric registrar / neonatologist to be present in birth or peri-operative suite.

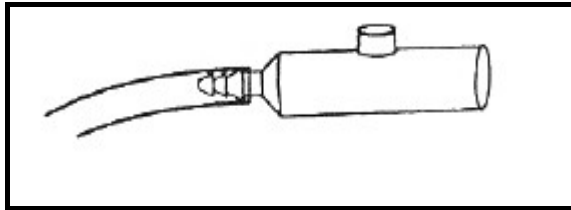
Immediately after birth

- Assess the vigorousness of the infant (tone, respiratory effort and heart rate).
- Do not attempt to intubate and suction meconium from a vigorous infant (good tone, heart rate > 100bpm, crying).
- Non-vigorous infants **MUST NOT** be stimulated, but taken immediately to resuscitaire.
- Meconium is suctioned from the trachea by intubating the infant, connecting a meconium aspirator (or CPAP T-piece) directly to patient connector and suction source and applying suction as ETT is gradually withdrawn.
- Repeat intubation and suction procedure until little additional meconium is recovered (2-3 times) or the heart rate indicates positive pressure ventilation is required.

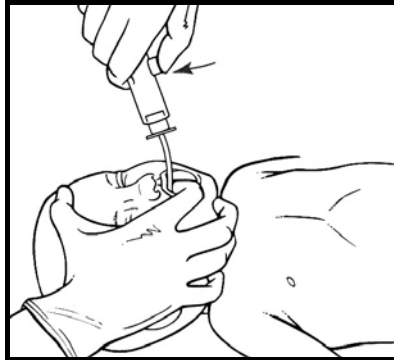
In the absence of a disposable meconium aspirator the metal elbow (diagram A below) can be utilized.



Metal Elbow (A)

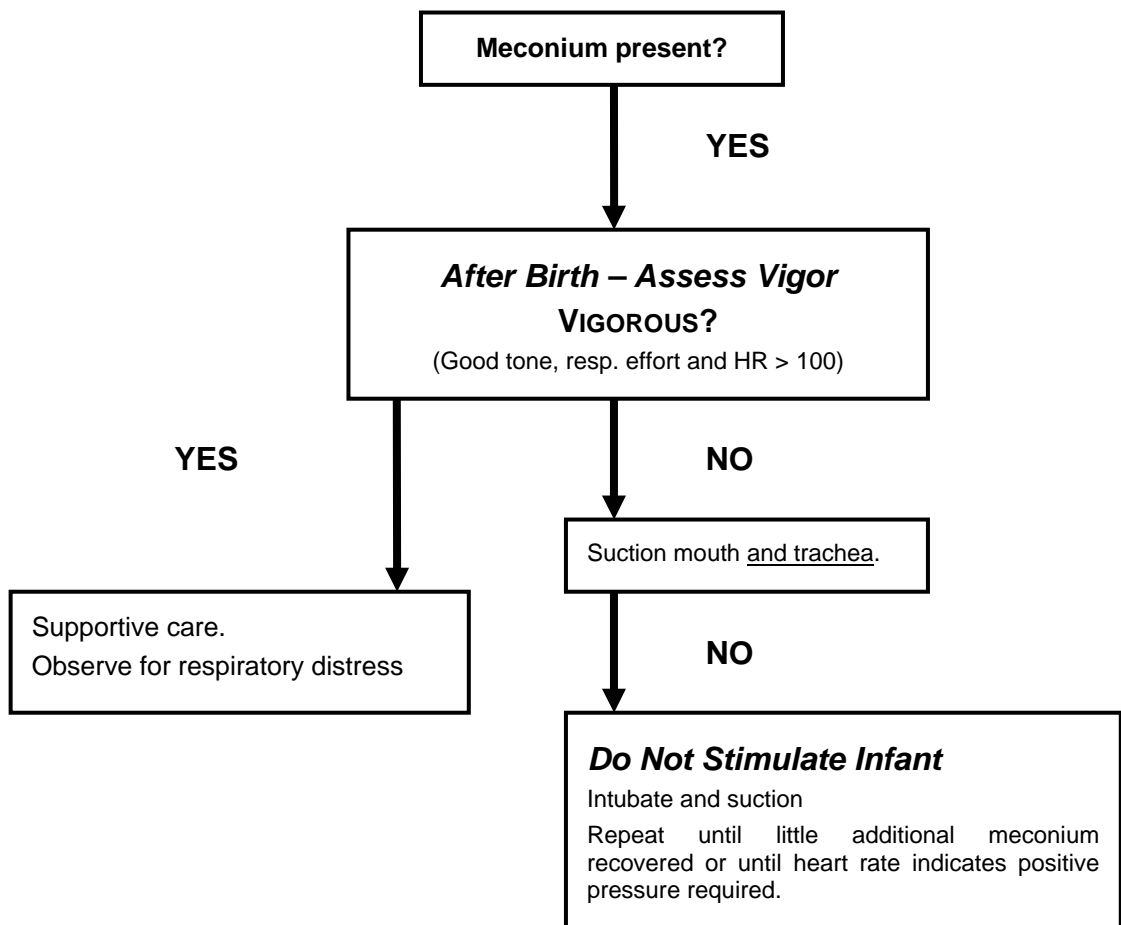


Meconium Aspirator (B)



Demonstration of using a meconium aspirator

Management of an Infant Born through Meconium Stained Liquor



* Vigorous is defined as strong respiratory efforts, good muscle tone, and a heart rate greater than 100 bpm.

Insertion of an Umbilical Venous Catheter (UVC)

A UVC may be required at resuscitation for the administration of volume or drugs.

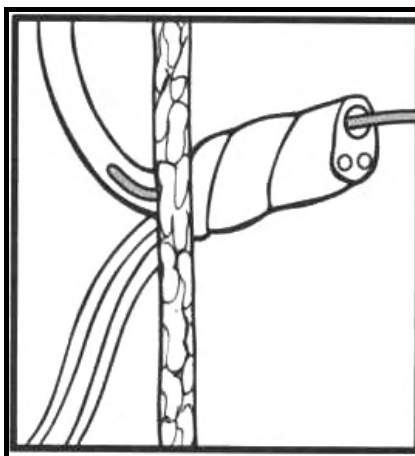
Preparation

- Don sterile gloves;
- Drape area;
- Cleanse skin and umbilical cord with alcoholic chlorhexidine, taking care to prevent pooling of chlorhexidine under infant;
- Apply a linen tie loosely around umbilical stump;
- Using a sterile scalpel (size 22), cut stump to approximately 2cm in length; and
- Prime umbilical vessel catheter and connect three way tap with normal saline.

Insertion

UV identified as the largest of the 3 vessels

- Insert umbilical vessel catheter (Fg 3.5 <2000g, Fg 5 > 2000g) into umbilical vein (UV).
- Insert catheter only a short distance (2cm –4cm and less for a preterm infant), until blood can be first aspirated.
- Do not advance catheter once sterile field has been breached.



Umbilical Venous Catheter

Securing a UVC

- UVC should be secured in place prior to transport to the Intensive Care Nursery.
- Tape umbilicus and catheter to abdominal wall with Micropore 2cm.

Pneumothorax

Infants requiring positive pressure ventilation as part of the resuscitation are at increased risk of developing a pneumothorax. Infants who do not respond or who deteriorate during the resuscitation should be assessed for the presence of a pneumothorax.

Assessment

- Observe for respiratory distress, cyanosis and bradycardia.
- Observe for chest wall symmetry.
- Abdominal distension may be a sign of a tension pneumothorax, particularly a right-sided one.
- Ensure ETT is not inserted too far.
- Auscultate: Breath sounds will be diminished on affected side.
- Transillumination may be appropriate for preterm infants in ICN.

Emergency evacuation of a Tension Pneumothorax

- Connect butterfly scalp vein needle (size 23g) to 20ml syringe via 3-way tap.
- Cleanse insertion site with alcoholic prep swab.
- Insert needle perpendicular to the skin, in the second intercostal space, mid-clavicular line.
- Withdraw air until syringe is filled.
- Turn 3-way tap to the 'off to patient' position and expel evacuated air from syringe.
- Turn 3-way tap to the 'on to patient' position and again attempt to withdraw air until patient's condition improves.
- A chest X-ray will be necessary once the infant is in ICN.

Communication

All neonatal resuscitation's must be clearly and contemporaneously documented in the patient record and communicated to relevant people.

Written Communication

- Document events and patient response/s to interventions in progress notes.
- Document drugs on the Single Dose Neonatal Medication Sheet.

Verbal Communication

- Notify consultant neonatologist / paediatrician.
- Notify and discuss with parents.

Reference for Chapter

Kattwinkel, J (ed) 2006 'Textbook of Neonatal Resuscitation', 5th ed, American Heart Association / American Academy of Paediatrics.

Assessment Tool Neonatal



NEONATAL RESUSCITATION ANNUAL ASSESSMENT TOOL

ROYAL BRISBANE AND WOMEN'S HOSPITAL
 HEALTH SERVICE DISTRICT

Name: _____

Payroll Number: _____

Designation: _____

Ward/Unit/Department: _____

To complete the following form please use the guide below:

1. Registered Nurses to complete full assessment
2. Enrolled Nurses to complete to airway in resuscitation

ACTION		Achieved	Not Achieved	
1. Preparation	Identifies required neonatal resuscitation equipment and checks functioning:			
	• Radiant warmer	•	•	
	• Suction equipment	•	•	
	• Oxygen supply equipment	•	•	
	• Bag and mask / T – Piece Device	•	•	
	• Intubation supplies	•	•	
	• Neonatal resuscitation drugs	•	•	
	• Emergency umbilical vessel catheterisation equipment	•	•	
	• Pneumothorax kit	•	•	
2. Neonatal Emergency Response Procedure	Assess presence of neonatal cardiopulmonary compromise			
	• Stay with baby	•	•	
	• Summon assistance	•	•	
	• Commence resuscitation procedure	•	•	
	Birth Suite			
	• Takes baby to nearest resuscitation area	•	•	
	• Summons neonatal emergency response team via emergency call bell (in neonatal resuscitation room BC/BS)	•	•	
	Post-natal / Perioperative Suite and all other areas			
	• Take baby to nearest resuscitation area	•	•	
	• Summon neonatal emergency response team by dialling 64333 and stating exact location and neonatal team required	•	•	
Grantley Stable Neonatal Unit				
	• Bring neonatal emergency box to cot-side	•	•	
3. Initial Steps in Resuscitation (approx 30 seconds)	Assess	• Clear meconium (see guidelines for Mx)	•	•
		• Breathing and crying	•	•
		• Good muscle tone	•	•
		• Pink Colour	•	•
		• Term or near term gestation	•	•
	Decision	• If answer is no to any of the above continue resuscitation	•	•
	Action	Provide		
		• Warmth	•	•
		• Airway management	•	•
		♦ Position baby	•	•
		♦ Suction airway	•	•
		• Continue drying, stimulate, reposition	•	•
		• Oxygen (as necessary)	•	•
		♦ States flow rate required	•	•
♦ Method/s of administration		•	•	
Evaluate	Respirations, Colour, Heart Rate	•	•	

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ACTION			Achieved	Not Achieved
4. Positive Pressure Ventilation (approx 30 seconds)	Action	Provide positive pressure ventilation		
		• Reposition infant	•	•
		• Identify safety precautions for use of	•	•
		♦ Self-inflating bag	•	•
		♦ Flow-inflating bag	•	•
		♦ T – Piece Resuscitator	•	•
		• Chooses appropriate mask	•	•
		♦ Size, shape, cushioning	•	•
		• Ensures adequate seal	•	•
		• Ventilates infant	•	•
		♦ appropriate rate	•	•
		♦ appropriate pressure	•	•
		♦ 100% oxygen	•	•
		• States criteria for assessing adequate chest wall movement	•	•
	• Identifies corrective action required for hypo/hyperinflation	•	•	
• Gastric decompression	•	•		
Evaluate / Decision	Respirations, Colour, Heart Rate			
	• States criteria for ongoing resuscitation	•	•	
5. Chest Compressions (approx 30 seconds)	Action	Coordinated positive pressure ventilation and chest compressions		
		• States and demonstrates correct ventilation / compression ratio and rate (2 person procedure)	•	•
		• Demonstrates correct ventilation / compression technique	•	•
		♦ Location of thumbs / fingers	•	•
		♦ Depth of compression	•	•
		♦ Maintains contact with the skin	•	•
		♦ Adequate release of sternal pressure	•	•
	Evaluate / Decision	Respirations, Colour, Heart Rate		
	• States criteria for ongoing resuscitation	•	•	
6. Emergency Drugs		States indications, dosage, rate / route of administration of:		
		• Adrenaline		
		• Sodium bicarbonate	•	•
		• Volume expanders	•	•
		• Naloxone	•	•
7. Assisting with intubation Ω (May be required at any stage of resuscitation continuum)	Action	Prepares:	•	•
		• Endotracheal tube	•	•
		♦ Appropriate size / length	•	•
		♦ Introducer	•	•
		• Laryngoscope	•	•
		♦ Blade size 1	•	•
		♦ Light source	•	•
		• Tapes / protective film	•	•
		• Suction equipment	•	•
		• Resuscitation bag attached to oxygen	•	•
• infant position	•	•		
	Assists as directed (eg. Suction, cricoid pressure, taping)	•	•	
8. Communication	Action	• Documents resuscitation	•	•
		• Ensures parents informed of infant condition	•	•
Date: _____			Assessment Ach () N/Ach ()	
Assessee: _____			Assessor: _____	

Chapter 5 Paediatric Resuscitation

Introduction

It is acknowledged that the RBWH HSD is a provider of adult health services. Paediatric patients from other health care facilities (i.e. The Royal Children's Hospital) may require the use of RBWH HSD resources for treatment. In the event that a paediatric patient is transferred to the RBWH HSD for treatment, appropriate support for the patient is to be provided by the referring agency. This support is to include, but not be limited to:

- appropriate clinician support to maintain the safety of the patient; and
- appropriate paediatric emergency equipment.

In the event that a **Code Blue** is called for a paediatric patient / visitor, the Code Blue Response Team from DEM will attend to stabilise the patient / visitor prior to transfer to an appropriate care facility.

The following information on paediatric resuscitation is focused on the provision of basic life support for those children who may require emergent care prior to the arrival of the Code Blue Response Team.

The Australian Resuscitation Council (ARC) (2006) defines a child as an individual who is one to eight years of age. This definition will apply to the following information.

Basic Life Support

Danger

In all emergency situations, the staff member must assess the situation to ensure safety for the patient, bystanders and themselves. Electricity, smoke and gases, slippery surfaces, firearms and other weapons, poisonous creatures and implements for drug taking can cause a collapse and remain dangerous.

Before approaching the collapsed patient scan the area for signs of these and any other dangers.

Response

Unconsciousness is when a patient fails to respond to "verbal or tactile stimuli" and can be caused by a variety of conditions. To assess a patient's response to verbal and tactile stimuli, give a simple command such as "open your eyes, squeeze my hand, let it go". Then grasp and squeeze the shoulders firmly to elicit a motor response, ensuring that injury is not caused or aggravated by this. A person who fails to respond these stimuli should be managed as an unconscious patient.

Airway Management - Children

Maintain an Open Airway

- children should be managed as per adults. Refer to Chapter 2 on Basic Life Support

Note : the lower jaw should be supported at the point of the chin with the mouth maintained in an open position. There must be no pressure on the soft tissues of the neck, as this may push the tongue upwards and backwards obstructing the passage off air.

Breathing Management - Children

Children should be managed as per adults i.e. give two (2) initial breaths allowing approximately one (1) second per inspiration and then check for signs of life (i.e. level of consciousness, responsiveness, movement and breathing). Refer to Chapter 2 of this manual.

Circulation Management – Children

Compression Point

Lower half of the sternum as for adults. The hands or fingers must not extend the lower extremity of the sternum to avoid pressure over the abdominal organs.

Method

- as per adults (calliper method and index finger technique).

Depth

Children of all ages: Approximately one-third the depth of the chest

Rate

Approximately 100 compressions per minute (at almost 2 compressions/ second).

Ratio

A universal compression-ventilation ratio of 30:2 (30 compressions followed by 2 ventilations) is recommended regardless of the numbers of staff members present.

Note - Compressions must be paused to allow for ventilations.

If there are two staff members, it is recommended that initially the more experienced staff member should perform rescue breathing.

Equipment

Clinical areas of the RBWH HSD that provide services to paediatric patients are recommended to have the following paediatric basic life support equipment available on the Standard Resuscitation Trolley in their area:

- oropharyngeal airways sizes 000, 00, 1, and 2;
- paediatric masks sizes 000, 00, 1, and 2; and
- paediatric resuscitator with inflating rescue bag.

Reference for Chapter

Australian Resuscitation Council (2006). Guideline 4. Airway. 1-6.

Australian Resuscitation Council (2006). Guideline 5. Breathing. 1-3.

Australian Resuscitation Council (2006). Guideline 6. Compressions. 1-3.

Australian Resuscitation Council (2006). Guideline 7. Cardiopulmonary resuscitation. 1-5.

Resuscitation (2005). Part 2: Adult basic life support. . International Liaison Committee on Resuscitation.67, 187 – 201.

Chapter 6 Specific Adult Emergencies

Introduction

The following Clinical Emergency Algorithms / Guidelines have been developed to provide practical advice for clinical staff when caring for patients prior to the arrival of the Code Blue Response Team.

These guidelines do not cover all clinical emergencies but are a general guide to assist practice. The information should be implemented subject to the clinician's judgment in each individual case and in accordance with the medical management plan provided by the senior medical officer. It is essential that clinicians are cognisant of their own capabilities as well as those of other health care streams.

The information provided in the algorithm are based on expert clinical expertise, opinion and the Australian Resuscitation Council Guideline Statements.

A Code Blue Response Team will treat any patient you are concerned about or experiencing any of the following conditions.

Medical Emergencies

- Upper Airway Obstruction - Choking;
- Recognition and Management of Lack of Oxygen;
- Bradypnea - Respiratory Rate < 5 breaths/minute;
- Tachypnoea - Respiratory Rate > 36 breaths/minute;
- Symptomatic Bradycardia - Heart Rate < 40 beats/minute;
- Tachycardia - Heart Rate > 140 beats/minute;
- Shock;
- Sudden Loss of Consciousness; and
- Repeated Prolonged Seizures.

Obstetric Emergencies

The following conditions listed are considered Obstetric Emergencies. Process for activating a Code Blue Response Team is as follows.

Condition	Process
Vasa Praevia (ruptured or intact) Severe post partum haemorrhage Uterine Rupture Acute Uterine Inversion Eclamptic Seizure Shoulder Dystocia Cord Presentation / Prolapse	Ring 333 Advise the need for an Obstetric Emergency Team . Provide the following information: <ul style="list-style-type: none"> • Location; • Treating Team; and • need for Obstetric Consultant / Registrar urgently.

To activate a **CODE BLUE MEDICAL EMERGENCY** call '**333**' and state:

- type of emergency;
- ward/location/building; and
- the patients treating team.

Upper Airway Obstruction - Choking

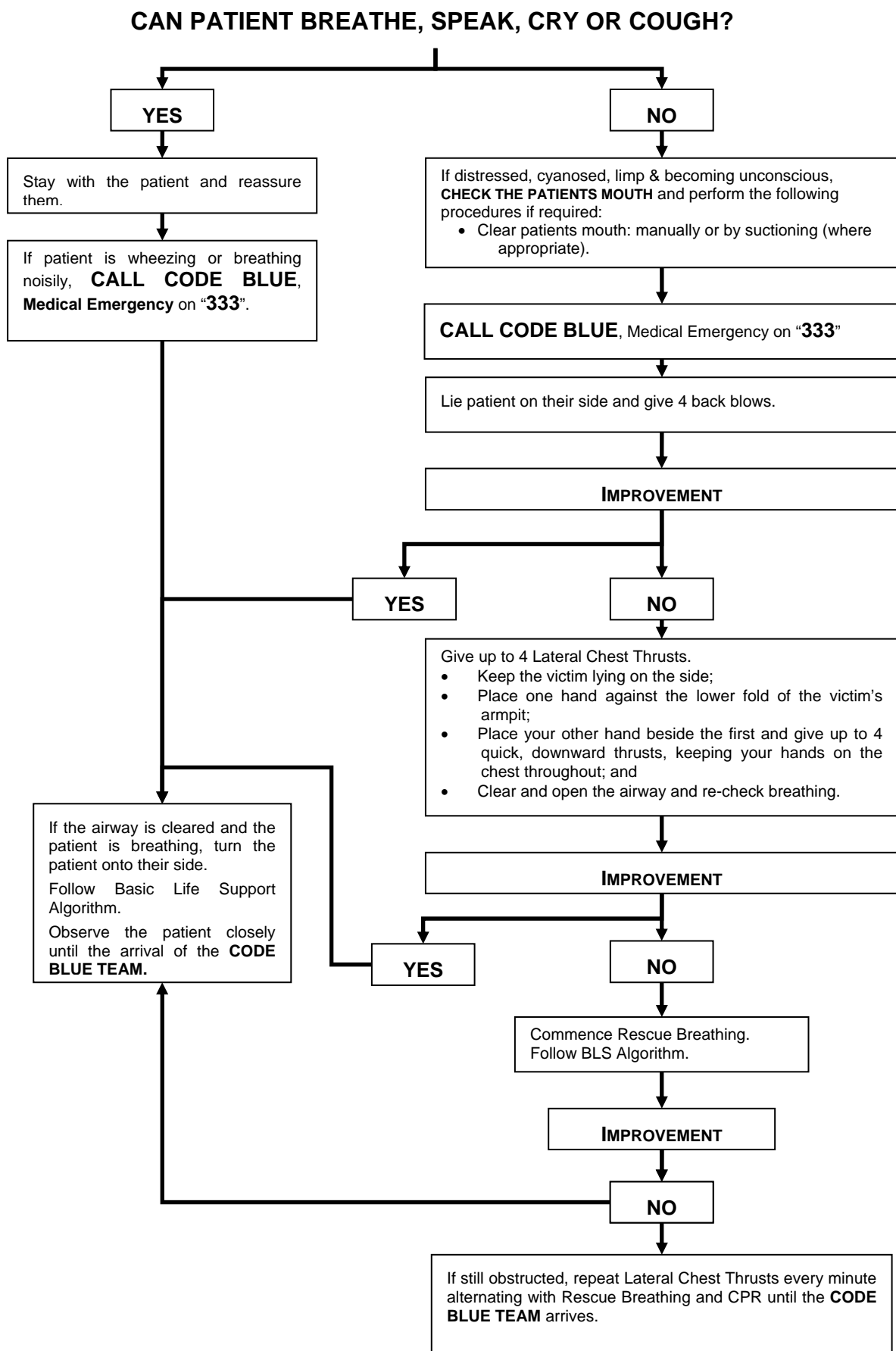
Obstruction of the upper airway may be identified as either partial or complete obstruction. Airway obstruction may be present in the conscious and unconscious patient. Airway obstruction can be short or gradual in onset and extend to complete obstruction within seconds. The signs and symptoms of the obstruction will be dependant on the cause of the obstruction. Signs and symptoms of obstruction may include, but not be limited to:

<i>Partial Obstruction</i>	<i>Total Obstruction</i>
Patient may experience: <ul style="list-style-type: none">• Wheezing• Stridor• Laboured breathing• Coughing spasms• Cyanosis	The patient will: <ul style="list-style-type: none">• Not be able to breathe, speak, cry or cough• Be agitated and may grip the throat• Have cyanosis of the face with bulging neck veins• Deteriorate rapidly and lose consciousness

Note: Airway obstruction in the non breathing, unconscious patient may not be apparent until rescue breathing is attempted.

For management of upper airway obstruction – choking of a patient refer to the following algorithm.

Management of Upper Airway Obstruction



Recognition and Management of Lack of Oxygen

Lack of oxygen (hypoxia) is a life threatening condition, if untreated hypoxia can result in cardiac arrest and / or brain injury. Refer to Policy 16230/ CPP Oxygen Therapy - Generic Principles and Approach (Adult).

Lack of oxygen can be recognised by:

- Restlessness and confusion, possibly with aggressiveness, progressing to lethargy and unconsciousness;
- Changes in breathing rate and pulse rate;
- Sweating; and
- Cyanosis.

Lack of oxygen should be suspected in situations where the airway, breathing or circulation may be compromised.

Management

- Address the underlying cause;
- Support breathing and ventilation;
- Provide supplemental oxygen in high concentrations;
- Call **Code Blue - Medical Emergency** on '333'; and
- Await Code Blue Response Team

Bradypnea Respiratory Rate < 5 breaths/ minute

Initial management for all patients experiencing Bradypnea

1. Perform primary survey.

AIRWAY	Assess / maintain airway
BREATHING	Assess and assist respiration if required GIVE HIGH FLOW OXYGEN TO ALL (Oxygen at 15L/min via Hudson Mask)
CIRCULATION	Assess circulation <ul style="list-style-type: none"> • Heart Rate; • Jugular Venous Pressure (JVP); and • Capillary Refill Time (CRT) / peripheral temperature; Secure IV access.
DISABILITY	Assess neurological disability

Establish monitoring:

- ECG;
- Pulse oximetry; and
- Non Invasive Blood Pressure (NIBP).

Liaise with the patients Treating Medical Officers.

Determine cause of Bradypnea and initiate appropriate treatment.

- If the patient has received narcotics in the previous 24 hours; consider administration of Naloxone.

Arrange critical care service review / consultation.

Prepare for transfer and definitive care if appropriate.

Causes of Bradypnea

Causes of Bradypnea can be classified into 2 groups:

- **Central CNS (loss of respiratory drive).** Causes of coma, cardiac arrest, shock, hypoxia, metabolic hypoglycaemia, hypocalcaemia, hyponatremia, uraemia, hepatic encephalopathy, drugs, seizure, CVA, neurotrauma, CNS infection, intracranial tumour, raised intracranial pressure, loss of hypoxic drive in COPD.
- **Peripheral (loss of ventilatory capacity),** myopathy, spinal paralysis, chest trauma, fatigue, drugs, COPD, asthma.

Definitive management is dependent on diagnosis.

Tachypnea Respiratory Rate > 36 breaths / minute

Initial management for all tachypnoea patients

1. Perform primary survey.

AIRWAY	Assess / maintain airway
BREATHING	Assess and assist respiration if required GIVE HIGH FLOW OXYGEN TO ALL (Oxygen at 15L/min via Hudson Mask)
CIRCULATION	Assess circulation: 2. Heart Rate; 3. Jugular Venous Pressure (JVP); and 4. Capillary Refill Time (CRT) / peripheral temperature; Secure IV access.
DISABILITY	Assess neurological disability

2. Establish monitoring:
 - ECG;
 - Pulse oximetry; and
 - NIBP.
3. Liaise with the patients Treating Medical Officers.
4. Determine cause of tachypnoea and initiate appropriate treatment.
5. Arrange critical care service review/consultation.
6. Prepare for transfer and definitive care if appropriate.

Causes of tachypnoea

Causes of tachypnoea can be classified into 2 groups:

- **Central CNS (increased respiratory drive).** Hypoxaemia, shock, metabolic acidosis, hyperthermia, sepsis, drugs, delirium, pain, seizures, CVA, neurotrauma, CNS infection, intracranial tumour, raised intracranial pressure.
- **Pulmonary/ventilatory insufficiency** aspiration, asthma, COPD, pneumonia, pulmonary oedema (cardiogenic/non cardiogenic), pulmonary embolus (PE), chest injury, pneumothorax, pulmonary collapse, pleural effusion.

Definitive management is dependent on diagnosis.

Symptomatic Bradycardia Heart Rate < 40 bpm

Initial management for all symptomatic bradycardia patients

1. Perform primary survey.

AIRWAY	Assess / maintain airway
BREATHING	Assess and assist respiration if required GIVE HIGH FLOW OXYGEN TO ALL (Oxygen at 15L/min via Hudson Mask)
CIRCULATION	Assess circulation: <ul style="list-style-type: none"> • Heart Rate; • Jugular Venous Pressure (JVP); and • Capillary Refill Time (CRT) / peripheral temperature; If evidence of acute physiological decompensation, i.e. circulatory arrest, initiate CPR. Secure IV access.
DISABILITY	Assess neurological disability

2. Establish monitoring:

- ECG;
- Pulse oximetry; and
- NIBP.

3. Liaise with the patients Treating Medical Officers.

4. Determine cause of bradycardia and initiate appropriate treatment.

5. Determine and arrange critical care service review/consultation.

6. Prepare for transfer and definitive care if appropriate.

Causes of Bradycardia.

- **Sinus bradycardia:** Acute myocardial infarction (AMI), (esp. acute inferior), sick sinus syndrome, myxoedema, obstructive jaundice, raised Intracranial Pressure (ICP), glaucoma, severe hypoxia.
- Drugs eg. Digoxin, Beta-blockers, Ca²⁺ channel blockers.
- Spinal shock, vagal syncope events.
- **Heart block.** AMI, idiopathic, drugs eg. Digoxin, Beta-blockers.
- **Nodal rhythm** AMI, vagal syncope events.

Indications for treatment

- Inadequate cardiac output leading to vital system dysfunction, including syncope, hypotension or cardiac failure.

Definitive management is dependent on diagnosis.

Emergency treatment for bradycardia leading to acute vital system dysfunction

Treatment options:

1. Atropine 0.3mg IV incremental bolus, max 3mg;
2. Adrenaline 20-50ug bolus or infusion titrated to effect;
3. Pacing external/internal (seek senior advise).

Tachycardia > 140 bpm

Initial management for all tachycardia patients

1. Perform primary survey.

AIRWAY	Assess / maintain airway
BREATHING	Assess and assist respiration if required GIVE HIGH FLOW OXYGEN TO ALL (Oxygen at 15L/min via Hudson Mask)
CIRCULATION	Assess circulation: <ul style="list-style-type: none"> • Heart Rate; • Jugular Venous Pressure (JVP); and • Capillary Refill Time (CRT) / peripheral temperature; If evidence of acute physiological decompensation, i.e. circulatory arrest, initiate CPR. Secure IV access.
DISABILITY	Assess neurological disability

2. Establish monitoring:

- ECG;
- Pulse oximetry; and
- NIBP.

3. Liaise with the patients Treating Teams Medical Officers.

4. Determine cause of tachycardia and initiate appropriate treatment.

5. Determine and arrange critical care service review/ consultation.

6. Prepare for transfer and definitive care if appropriate.

Types and causes of Tachycardia

- **Sinus tachycardia: SVT**, Acute myocardial infarction(AMI), Wolff-Parkinson-White syndrome (WPW), sick sinus syndrome, thyrotoxicosis, sepsis, shock, Pulmonary Embolus (PE), drugs (tricyclic antidepressants [TCAD] overdose), digoxin toxicity, Beta agonists.
- **Atrial fibrillation AF**. Ischemic Heart Disease (IHD), AMI, idiopathic, WPW syndrome, sick sinus syndrome, thyrotoxicosis, sepsis, shock, PE, drugs TCAD overdose drugs, chest injury, mitral valve disease, hypoxia.
- **Atrial flutter** IHD, AMI, cardiomyopathy, and valvular disease thyrotoxicosis.
- **Ventricular tachycardia**. IHD, AMI drugs TCAD overdose, digoxin toxicity.

Definitive management is dependent on diagnosis.

Emergency treatment for tachycardia leading to acute vital system dysfunction

Treatment options:

- In the event of evidence of acute physiological decompensation consider Direct Current (DC) cardioversion.

AF/Atrial flutter:

- Amiodarone, Digoxin,
- **SVT**, Adenosine, Beta-blocker.

Shock

Shock is a life-threatening pathophysiological state of inadequate perfusion leading to vital organ dysfunction.

Initial management for all shocked patients

1. Perform primary survey.

AIRWAY	Assess / maintain airway
BREATHING	Assess and assist respiration if required GIVE HIGH FLOW OXYGEN TO ALL (Oxygen at 15L/min via Hudson Mask)
CIRCULATION	Assess circulation: <ul style="list-style-type: none"> • Heart Rate; • Jugular Venous Pressure (JVP); and • Capillary Refill Time (CRT) / peripheral temperature; Secure IV access ideally 2 x 16G. If signs of peripheral blood loss (eg wound) apply local pressure
DISABILITY	Assess neurological disability

2. Establish monitoring:
 - ECG;
 - Pulse oximetry; and
 - NIBP.
3. Determine cause of shock and initiate appropriate treatment.
4. Arrange critical care service review/ consultation.
5. Prepare for transfer and definitive care if appropriate.

Types of Shock

Shock states can be classified into 3 types:

- **Low output:** Inadequate cardiac output leading to vital system dysfunction includes hypovolemia and cardiac dysfunction.
- **High output:** Inadequate systemic vascular resistance resulting in inadequate perfusion pressure, leading to vital system dysfunction; includes spinal, septic and anaphylactic.
- **Mixed:** features of cardiogenic and vasogenic shock.

Definitive management is dependent on diagnosis.

Low output shock

Clinical features:

- CRT > 2 seconds;
- Cold peripherals; and
- Narrowed pulse pressure.

Assess Jugular Venous Pressure

JVP ↑ diagnosis to consider:

- Pulmonary embolism
- AMI, cardiac dysrhythmia, cardiac tamponade tension pneumothorax.

JVP ↓ diagnosis to consider:

- Haemorrhage (trauma, GIT, retroperitoneal);
- Hypovolemia; and
- Dehydration.

High output shock

Clinical features

- CRT < 2 seconds;
- Warm peripherals; and
- Wide pulse pressure.

Diagnosis to consider:

- Sepsis;
- Spinal shock; and
- Anaphylaxis.

Mixed shock

Clinical features of both low output and high output shock. Sepsis is a common cause of mixed shock however this may arise as a preterminal stage in both shock states. Also note specific clinical scenarios, eg trauma (hypovolemia + spinal shock).

Sudden Loss of Consciousness

Initial management for all patients with reduced level of consciousness

1. Perform primary survey:

AIRWAY	Assess / maintain airway
BREATHING	Assess and assist respiration if required GIVE HIGH FLOW OXYGEN TO ALL (Oxygen at 15L/min via Hudson Mask)
CIRCULATION	Assess circulation: <ul style="list-style-type: none"> • Heart Rate; • Jugular Venous Pressure (JVP); and • Capillary Refill Time (CRT) / peripheral temperature; If evidence of acute physiological decompensation, i.e. circulatory arrest, initiate CPR. Secure IV access. Including Blood Sugar Level (BSL) testing.
DISABILITY	Assess neurological disability

2. Establish monitoring:

- ECG;
- Pulse oximetry; and
- NIBP.

3. Liaise with the patient's Treating Medical Officers.

4. Determine cause of reduced level of consciousness and initiate appropriate treatment.

5. Determine and arrange critical care service review/consultation.

6. Prepare for transfer and definitive care if appropriate.

Causes of reduced level of consciousness

Causes of reduced level of consciousness can be classified into 2 groups:

- **Primary CNS.** Epilepsy, Cerebral Vascular Accident (CVA), neurotrauma, Central Nervous System (CNS) infection, intracranial tumour
- **Secondary** Cardiac arrest, shock, hypoxia, hypercarbia, hypertension, metabolic hypoglycaemia, hyperglycaemia, hypernatraemia, hypercalcemia, uraemia, hepatic encephalopathy, drugs.

Definitive management is dependent on diagnosis.

Prolonged or Repeated Seizure

Initial management for all seizure patients

1. Perform primary survey.

AIRWAY	Assess / maintain airway
BREATHING	Assess and assist respiration if required GIVE HIGH FLOW OXYGEN TO ALL (Oxygen at 15L/min via Hudson Mask)
CIRCULATION	Assess circulation: <ul style="list-style-type: none"> • Heart Rate; • Jugular Venous Pressure (JVP); and • Capillary Refill Time (CRT) / peripheral temperature; Including Blood Sugar Level (BSL) testing. Secure IV access.
DISABILITY	Assess neurological disability

2. Establish monitoring:
 - ECG;
 - Pulse oximetry; and
 - NIBP.
3. Liaise with the patient's Treating Medical Officers.
4. Determine cause of seizures and initiate appropriate treatment.
5. Arrange critical care service review/consultation.
6. Prepare for transfer and definitive care if appropriate.

Causes of seizure

Seizure states can be classified into 2 groups:

- **Primary CNS.** Epilepsy, CVA, neurotrauma, CNS infection, intracranial tumour.
- **Secondary** Cardiac arrest, shock, hypoxia, hypertension, eclampsia, metabolic hypoglycaemia, hypocalcaemia, hyponatremia, uraemia, hepatic encephalopathy, drugs, drug withdrawal states.

Definitive management is dependent on diagnosis.

Emergency treatment for seizures leading to acute vital system dysfunction

Treatment options:

1. Midazolam
 - Adult repeat 1-5mg IV bolus to max 15 mg / Child 0.15mg/kg
2. Phenytoin 15mg/kg IV bolus
3. Clonazepam 1-2 mg IV bolus
4. Consider PR Valium 5mg if no IV access is available.

References for Chapter

Australian Resuscitation Council (2006). Guideline 4. Airway. 1-6.

Royal Brisbane and Women's Hospital Health Service District (2003). Resuscitation Manual.

Thomas, C.L ed.(1985) Taber's Cyclopedic Medical Dictionary. Philadelphia: F. A. Davis Company.

Chapter 7 Emergency Medications in Adult Cardiac Arrest

Priorities in cardiac arrests are defibrillation, oxygenation and ventilation together with external cardiac compression. No medication has been shown to improve long-term survival in humans after a cardiac arrest (Australian Resuscitation Council (2006) Guideline 11.6.).

Administration

Intravenous (IV) drug administration is the preferred method during cardiac arrest. Intravenous access can be achieved via a peripheral cannula inserted into a large peripheral vein. If IV access cannot be obtained in these veins, the external jugular vein may be considered. Lower limbs should be avoided due to impairment of venous return during a cardiac arrest.

Intravenous medications must be followed by a fluid flush of at least 20 – 30 mls and external cardiac compression.

If IV access cannot be obtained, some medications can be administered via endotracheal administration by following the recommended techniques:

- Suction the airway if possible;
- Insert a clean suction catheter beyond the tip of the Endotracheal tube and administer the medication;
- Administer endotracheal medication (endotracheal dose may be 3-10 times the IV dose) diluted to 10mls in water or normal saline; and
- Follow administration with at least two vigorous ventilation's to disperse the medication

Note: Adrenaline, lignocaine and atropine may be given via the endotracheal tube. Avoid all other drugs as they may cause mucosal and alveolar damage.

Emergency Drug Container

Adrenaline

Action

Adrenaline is a sympathomimetic agent and exerts an effect on alpha and beta-adrenoreceptors within the body. Adrenaline is a powerful cardiac stimulant which is able to produce an increase in heart rate, display vasopressor properties by increasing systolic blood pressure, it's action is rapid in onset and the effect of the drug is short in duration. Adrenaline may improve defibrillation attempts by increasing myocardial blood flow during CPR.

Indications

- Ventricular Fibrillation / Pulseless Ventricular Tachycardia after initial counter shocks have failed; and
- Asystole and electromechanical dissociation as initial treatment.

Dosage

1mg (1ml of 1:1000 or 10ml of 1:10 000) **repeated every 3 minutes.**

Adverse Effects

- Tachyarrhythmias;
- Severe hypertension after resuscitation; and

- Tissue necrosis if extravasation occurs.

Atropine

Action

Parasympathetic antagonist that blocks the action of the vagus nerve on the heart. Helps to prevent cholinergic cardiac effects such as cardiac arrhythmias, hypotension and bradycardia.

Indications

- Asystole; and
- Severe bradycardia.

Dosage

Adult dose is 0.4mg to 1mg which can be repeated at 5 minute intervals until desired heart rate is achieved. Total dose should not exceed 2 mg.

Adverse Effects

- Tachycardia and palpitations;
- Thirst and dryness of the mouth;
- Drowsiness, confusion and/or excitement; and
- Hyperthermia in large doses.

Calcium Chloride

Action

Calcium is essential for the functional integrity of the nervous and muscular systems. Calcium ions improve the force of myocardial contractions.

Indications

- Severe hyperkalaemia; and
- Hypocalcaemia.

Dosage

Adult dose is 500mg to 1g of 10% calcium chloride (10mls 10% calcium chloride = 6.8 mmols of Ca ions).

Adverse Effects

- Venous irritation may occur after IV injection;
- Tingling sensations;
- Chalky taste experienced by the patient; and
- Hot flushes.

Lignocaine

Action

Lignocaine is a Class I membrane stabilising antiarrhythmic. Lignocaine reduces automaticity by decreasing the rate of diastolic depolarisation and reduces the duration of the action potential through blockade of the sodium channel of the myocardial cell.

Indications

- Failure of defibrillation and adrenaline to revert VF / Pulseless VT; and
- Prophylaxis in the setting of recurrent VF or VT.

Dosage

- Initial bolus dose of 1mg/kg with a maximum dose of 200 to 300mg being administered within a 1 hour period;
- Additional bolus of 0.5mg/kg may be considered; and
- Lignocaine infusion not recommended until return of spontaneous circulation.

Adverse Effects

- Slurred speech, altered consciousness, muscle twitching and seizures; and
- Hypotension, bradycardia, heart block and asystole.

Magnesium

Action

Magnesium is an electrolyte essential for membrane stability. Hypomagnesaemia causes myocardial hyperexcitability particularly in the presence of hypokalaemia and digoxin.

Indications

- Torsades de pointes;
- Cardiac arrest associated with digoxin toxicity;
- Failure of defibrillation and adrenaline to revert VF/Pulseless VT; and
- Documented hypokalaemia and hypomagnesium.

Dosage

5-mmol bolus repeated once followed by an infusion of 20mmol over 4 hours. Intravenous dose should be diluted to a concentration of magnesium 20% or less.

Adverse Effects

- Excessive use may lead to muscle weakness and respiratory failure;
- Nausea;
- Hypotension;
- Flushing; and
- Central nervous system depression.

Sodium Bicarbonate

Action

Bicarbonate in the body acts as a buffer and Sodium Bicarbonate (NaHCO_3) is an alkalinising solution that combines with hydrogen ions to form a weak acid called carbonic acid. This acid breaks down to produce CO_2 and H_2O which assists in reversing clinical manifestations of metabolic acidosis. In most Cardiac Arrests early efficient CPR and adequate ventilation negate the need for NaHCO_3 .

Indications

- Hyperkalaemia;
- Documented metabolic acidosis;
- Overdose of tricyclic antidepressants; and
- Prolonged arrest (greater than 15 minutes).

Dosage

- 1mmol/kg given over 2-3 minutes then guided by arterial blood gases.
- Adequate ventilation and CPR must accompany administration.

Adverse Effects

- NaHCO₃ is no longer routine initial therapy because of the risk of alkalosis, hypernatraemia and hyperosmolality;
- Intra cellular acidosis may develop or worsen; and
- Blockage of IV line when mixed with adrenaline or calcium.

Sodium Chloride 0.9%

Action

Can be used as the vehicle with which many parenteral medications are diluted prior to intravenous administration and it can be used as an electrolyte replenisher for maintenance.

Oxygen

Oxygen is an essential component of cardiac resuscitation and the emergency care cycle. Any oxygen therapy delivery during resuscitation should be high concentration of 100% (FiO₂ = 1.00) in order to elevate the arterial oxygen tension, increasing arterial oxygen content and thus improving tissue oxygenation.

Oxygen should never be withheld because of the fear of adverse effects.

Oxygen should be administered at lower concentrations to all patients suffering with acute chest pain that may be due to cardiac ischaemia and suspected hypoxemia . Administration can be through several devices including masks and nasal cannulas for spontaneous breathing patients and via an endotracheal tube with positive pressure ventilation during resuscitation.

For more information refer to [Policy 16230/PPP: Oxygen Therapy Generic Principles and Approach \(Adult\)](#).

Supplementary Drugs (available on ward impress)

50% Dextrose

Action

Glucose is stored in the body as fat and in the muscles and liver as glycogen. Glucose provide energy for the body.

Indication

Glucose 50% injection is used to treat severe hypoglycaemia due to an excess of insulin.

Dosage

Glucose 50% solution is very hypertonic and must be administered by the intravenous route only. For acute hypoglycaemia 20 to 50 mls Glucose 50% solution can be administered by slow IV injection as the initial dose.

Adverse Effects

- May cause local phlebitis,

- Vein irritation and local pain at injection site; and
- Glycosuria.

Insulin (human soluble neutral)

Action

Insulin lowers blood glucose levels by binding to insulin receptors to increase glucose uptake.

Indication

- Hyperglycaemia.

Dosage

Dosage is individual and determined by the Medical Officer in accordance with the needs of the patient.

Adverse Effects

- Hypoglycaemia; and
- Local hypersensitivity reactions may occur.

Metoprolol

Action

Metoprolol is a cardioselective beta-adrenoreceptor and is suitable for the treatment of hypertension. Metoprolol acts on beta 1 receptors within the heart.

Indication

- Hypertension;
- Angina pectoris; and
- Disturbances in cardiac rhythm, especially supraventricular tachyarrhythmia's.

Dosage

Initial dose is up to 5 mg at a rate of 1 to 2mg/ minute. This dose may be repeated at 5 minute intervals until a satisfactory result is achieved. Note-parenteral administration should be conducted by experienced staff with monitoring and resuscitation equipment available.

Adverse Effects

- Bradycardia;
- Palpitations;
- Hypotension; and
- Fatigue.

Naloxone

Action

Naloxone is a competitive antagonist at opiate receptor sites. Naloxone can reverse or prevent the effects of opioids on the body.

Indication

Complete or partial reversal of narcotic depression. This includes respiratory depression induced by natural or synthetic opioids.

Dosage

Initial dose of Naloxone is 0.4 to 2mg IVI given at 2 to 3 minute intervals if required.

Adverse Effects

- Nausea;
- Vomiting;
- Tachycardia;
- Seizures; and
- cardiac arrest.

Phenytoin

Action

Phenytoin inhibits the spread of seizure activity in the motor cortex of the brain. Phenytoin aides in the normalisation of the influx of sodium and calcium to the Purkinje fibres of the heart. This assists in reducing ventricular automaticity and membrane responsiveness.

Indication

- control of status epilepticus; and
- cardiac arrhythmia's, particularly in patients who do not respond to conventional antiarrhythmics or cardioversion.

Dosage

For cardiac arrhythmias the recommended dosage is one IV injection 3-5mg/kg bodyweight initially and repeating if required. Phenytoin should be administered slowly at a rate not exceeding 50mg/ minute.

Adverse Effects

- cardiovascular collapse;
- central nervous system depression;
- ataxia;
- slurred speech; and
- mental confusion.

Advanced Life Support Medications

Amiodarone

Action

Class three (3) antiarrhythmic with complex pharmacokinetics and pharmacodynamics. It has effects on sodium, potassium and calcium channels as well as alpha and beta-adrenergic blocking properties.

Indications

- VF/ pulseless VT (usually administered when refractory of defibrillator shocks and adrenaline);
- Prophylaxis of recurrent VF/VT; and
- Supraventricular tachyarrhythmia's.

Dosage

Initial bolus dose is 300mg. An additional dose of 150mg could be administered. This may be followed by an infusion (eg 15mg/kg/ over 24 hours).

Adverse Effects

- Hypotension;
- Bradycardia; and
- Heart block.

Potassium Chloride

Action

Potassium is an essential body electrolyte found in intracellular fluid where it is the principal cation. It is involved in cell function, metabolism, transmission of nerve impulses, contraction of muscle and maintenance of renal function.

Indications

Prevention and treatment of potassium deficiency, digitalis intoxication and persistent VF due to documented or suspected hypokalaemia.

Dosage

A bolus dose of 5mmol of potassium chloride is given intravenously.

Adverse Effects

- Inappropriate or excessive use will produce hyperkalaemia with bradycardia, hypotension and possibly asystole.
- Extravasation may lead to tissue necrosis.

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Chapter 8 Resuscitation Equipment

A wide range of equipment is currently available for the provision of Basic and Advanced Life Support. The use of each item of equipment requires that staff are appropriately trained and competent in its use. The equipment found in clinical areas may exist as single items (masks for mouth to mask ventilation) or as a Standard Resuscitation Trolley, dependent on the needs of the patients and the scope of practice of the staff.

Any resuscitation equipment must be checked on a daily basis and it is recommended that trolleys are wiped free of dust weekly / fortnightly.

Standard Emergency Trolley

Contents

Top of Trolley			
Resuscitator x 1 (Sealed) Plastic face masks sizes 3/4 & 5 Resuscitator including bag & reservoir Oropharyngeal Airway Size 3 & 4 (disposable)		Pocket Face Mask with one-way valve	
		Emergency Drugs in sealed plastic containers	
Drawer 1 - Intubation Equipment			
Intubation Pack (Disposable - Single Use items) + Laryngoscope Handle – (Non-disposable)			
Laryngoscope handle x 1		Laryngoscope blades: No 3 & 4	
Introducer x 1		Magill's Forceps x 1	
Endotracheal tubes: Size 7.5, 8, 8.5 x 2 each		General Lubricant sachets x 2	
Yankauer disposable sucker x 1		Suction Catheters: 12g & 14g x 2 each	
Catheter mount x 1		Angle Connector x 1	
10ml syringe x 1		Artery Forceps x 1	
Micropore 25mm x 1 Tracheostomy tape ~ 1m		Scissors x 1	
Nasopharyngeal Airway Size 7			
Drawer 2 – IV Equipment			
IV Pack (Disposable – Single Use Items)			
Basic Dressing Packs x 2	Tourniquets x 2	Alcohol wipes x 12	Razor x 1
<u>IV Cannula</u> 16g x 4 18g x 4 20g x 4	<u>Syringes</u> 3ml, 5ml x 3 10ml x 4, 20ml x 1	<u>Needles</u> 19g x 6 21g x 6 25g x 2	<u>Blood Tubes:</u> FBC x 2 U&E x 2 (Li Heparin) Cross match x 1
Occlusive Dressing x 2	IV Giving Sets x 2		Normal Saline 10ml ampoules x 4
Additive labels x 2	Long Airways x 1	ABG syringes x 2	
Draw 3 or Bottom Shelf		Draw 4 or Bottom Shelf	
<u>IV Infusions:</u> Plasma Volume Expander (Haemaccel) 500ml Dextrose 5% in H ₂ O 1 litre Normal Saline 0.9% 1 litre		Protective equipment: masks goggles plastic aprons, disposable gloves	
<u>Attachments:</u> C size O ₂ cylinder with regulator, flow meter, O ₂ tubing & medium flow O ₂ mask attached Suction Tubing		Clinical Emergency Record Form, Clipboard, Pen Sharps Container	

The Semi Automated Defibrillator (SAED) should be situated on or near the Emergency Trolley. SAED Electrode packs x 2 and a disposable razor are to be stored inside the pocket of the SAED carry case. Electrode packs should not be opened until immediately prior to use.



Electrode Packs
(Expiry date on sticker
with bar code) and
Disposable Razor

LIFEPAK 500 SAED

SAED Service, Maintenance and Cleaning Information

Low Battery Detection

The battery symbol is displayed above the Liquid Crystal Display (LCD) on the top of the device. When the battery symbol is lit and the low battery message is displayed, the battery is **low** and should be replaced immediately. The lithium batteries that are in the SAED will provide approximately eleven more shocks.

When the battery symbol flashes on and off with the **REPLACE BATTERY** voice prompt and a message will be displayed, the battery is **very low** and should be replaced immediately.



Battery Symbol used for LIFEPAK 500

Service Indicator and Message

The service indicator is positioned above the LCD in the top left hand corner on the top panel of the device. When the service indicator is on (but not flashing), you can still use the SAED for electrical therapy. Contact Biomedical Technology Services (BTS) on **68397** to correct the problem as soon as possible.

When the SAED detects a problem that requires immediate service, the service indicator flashes and the **CALL SERVICE** message is displayed. Turn the SAED off, then on again. If the **CALL SERVICE** message is still displayed you will not be able to use the SAED until the problem is corrected. Contact BTS immediately and obtain a loan SAED from CELS.



Service Indicator Symbol for LIFEPAK 500

Replacement Electrodes / Batteries

To ensure that the SAED is always ready for use the replacement of electrode pads should occur as soon as possible after being used. Replacement electrode pads can be obtained by contacting CELS on Ext. **67486**. Cost transfer will occur to the requesting area. CELS normal operating hours are 0700-2100 hrs. For after hours replacement contact the After Hours Nurse Manager on pager No. 42081.

Batteries are automatically replaced by BTS on a 2nd yearly replacement schedule as part of their service line agreement. Replacement batteries are available through BTS.

A loan SAED is available for short term loan from CELS until the SAED sent for repairs is returned from BTS to the ward.

All defibrillators are routinely checked every 6 months by members of the BTS team as per their service line agreement.

Cleaning the SAED

Clean the SAED by wiping the casing and the cover surfaces with a lint free cloth slightly dampened with 1% Neutral Detergent and water. Allow drying before replacing cover.

Precautions for Cleaning

- Do not immerse or soak the SAED
- Do not use bleach, bleach dilution or phenolic compounds
- Do not steam or gas sterilise.

Booking SAED Trainer Machines

A SAED trainer is available for short term loan through CELS.

The SAED Trainer is the only equipment that can be booked from CELS. The SAED Trainer must be booked using GroupWise, which will automatically confirm or deny the booking. To do this:

1. Open *GroupWise*;
2. Click *Schedule new appointment*;
3. Click *Address*;
4. Select **CELS-SAED-Trainer-DTU01** from the list of addresses;
5. Select the *date*, *time* and *duration* of lending of the trainer; &
6. Click *Send*.

Alternatively you can use the web address of http://hi.bns.health.qld.gov.au/rbh/cels/booking_trainer.htm. GroupWise will automatically reply with either confirmation of the appointment or denying the booking and suggest other options.

There are SAED Trainers available through each Service Line as identified below.

SAED Trainer Locations

QH & Serial No.	No.	Service Line	Contact Person	Location	Extension	Pager
DTU 04	1	Mental Health Services	CPR Resource Person	G Floor MHB	Ext. 61136	
DTU 05	1	Cancer Care Services	Service Line Nurse Educator	6AS NHB	Ext. 65391	40449
DTU 06	1	Internal Medicine	Service Line Nurse Educator	7BS NHB	Ext. 68553	40335
DTU 08	1	Surgical and Perioperative Services	Service Line Nurse Educator	9AN NHB	Ext. 68562	42770
DTU 03	1	Surgical and Perioperative Services	Service Line Nurse Educator	L4 NHB	Ext. 68107	40338
DTU 07	1	Women's & Newborn Services	Service Line Nurse Educator	Rm 6907 L6, Pt Ed Area NHB	Ext. 62192	41526
DTU02	1	Allied Health	Physio CPR Resource Person	L2 NHB	Ext. 62592	
DTU01	1	Clinical Equipment Loan Service	CELS Staff	LG Floor NHB	Ext. 67486	42816
	3	Centre for Clinical Nursing	Catrina Booker	Ground Floor CCN	Ext. 68264	40219

Lifepak 12 SAED/ Manual Defibrillator Maintenance and Cleaning Information



LIFEPAK 12 Defibrillator/ Monitor

Regular maintenance and testing of the LIFEPAK 12 defibrillator / monitor and accessories are important to help prevent, and detect possible electrical and mechanical abnormalities. If an identified problem cannot be corrected, immediately remove the device from service and contact BTS regarding the

problem. BTS will coordinate with CELS for a temporary replacement of the LIFEPAK 12 while repairs are being carried out.

Each time that the LIFEPAK 12 is switched on it performs a self test of the defibrillator and monitor. If this internal test detects a fault, the Service LED will light.

It is recommended that the following inspections and checks occur on a daily basis. These include:

- General inspection of the defibrillator;
- Cleaning of the defibrillator;
- Checking that all necessary supplies and accessories are present. These may include fully charged battery, ECG electrodes, ECG paper, Quick-Combo defibrillation pads and a disposable razor.; &
- Conducting a user test.

Performing a User Test for the LIFEPAK 12

To perform the User Test:

- Disconnect the LIFEPAK 12 from the wall power supply allowing at least 2 seconds before powering the machine on This allows the defibrillator/monitor to switch to battery power. Press **ON** to switch the defibrillator/monitor on.
- Press **OPTIONS** to access **User Test**. When selected the User Test will automatically perform the following tasks:
 - Performs a self test;
 - Charges to 10 Joules and discharges internally; &
 - Prints a Pass/Fail report.

If the LIFEPAK 12 defibrillator/monitor detects a failure during the User Test the Service LED lights and the printed report indicates that the test has failed. If this occurs contact BTS immediately to correct the problem.

Cleaning the LIFEPAK 12

Clean the LIFEPAK 12 by wiping the casing and surfaces with a lint free cloth slightly dampened with 1% Neutral Detergent and water. Allow drying before use.

Precautions for Cleaning

- Do not immerse or soak the LIFEPAK 12
- Do not use bleach, bleach dilution or phenolic compounds
- Do not steam or gas sterilise.

Cleaning the LIFEPAK 12 is recommended between patients and on a daily basis.

Lifepak 20 SAED/ Manual Defibrillator Maintenance and Cleaning Information

Regular maintenance and testing is required for the LIFEPAK 20 (LP 20) as per the LP 12 mentioned previously. The LP 20 differs from the LPP 12 as it performs a Daily Auto Test at approximately 0300hrs daily. The LP 20 completes the following tasks during the auto test:

- It turns itself on;
- Performs self-test;

- Charges to approximately 10 Joules and then discharges through a test load;
- Tests the pacing circuitry (if non-invasive pacing installed);
- Stores the results in the test log;
- Prints the results if configured on; &
- Turns itself off.

If the defibrillator detects a problem during the auto test it will remain on, if it is connected to AC power. The Service LED will be on and a printed report will indicate a test failure. In the event that this occurs contact BTS immediately.

It is recommended to perform a User Test daily. To perform a User Test press **OPTIONS** to access the user test. When selected the user test will perform the following tasks;

- Turns itself on;
- Performs a self-test;
- Charges to approximately 10 Joules and then discharges through a test load;
- Tests the pacing circuitry (if non-invasive pacing installed);
- Stores the results in the test log;
- Prints the results if configured on; &
- Turns itself off.

If the LP 20 detects a problem during the user test the service LED lights up and the printed report will indicate that the test has failed. Turn off the defibrillator and repeat the user test. If the service LED remains on contact BTS immediately. **Note:** during the user test all front panel controls (except ON), and standard paddle controls are disabled. When performing the user test plug the device into AC power as this will conserve battery power of the LP 20.



LIFEPAK 20 Defibrillator/ Monitor

Intubation and IV Equipment Pack Information

Intubation and IV Equipment packs contain disposable (single use) items, except for the laryngoscope handle. If the pack integrity has been compromised (i.e. open) contact CELS/ AHNM immediately for a replacement pack. If a pack has been opened for a CODE BLUE event and has been potentially contaminated, discard the entire pack, ensuring that CELS Staff have been notified that the pack is contaminated.

If there are any concerns regarding the light source provided by the laryngoscope handle contact CELS/ AHNM immediately to replace the laryngoscope handle

D.E.M Resuscitation Trolley

Contents

The DEM Resuscitation Trolley (below) comprises of comparable equipment related to Airway, Breathing and Circulation to the Standard Resuscitation Trolley found in clinical areas. The benefit of the DEM trolley being available for arrest episodes include Advanced Life Support Measures related to:

- Ventilation Support Equipment;
- Cardiac Monitoring Equipment;
- Manual Defibrillation Equipment;
- Advanced Life Support Medications; &
- Intravenous Equipment and Infusions.



D.E.M Resuscitation Trolley

Emergency Drug Container

The [Pharmacy Department](#) provides emergency drugs in sealed plastic containers (2 containers). The drug containers are to be opened in the event of a CODE BLUE emergency.

The Pharmacy Department only accepts responsibility for the contents of the containers until the seal is broken, they will not accept responsibility for containers that have been opened and restocked by non-Pharmacy personnel.

Only drugs required for IMMEDIATE use are included in the containers. The drugs and quantities are standardised throughout the hospital in the following table:

CODE BLUE Manual**Emergency drug Container**

<i>Medication</i>	<i>Preparation</i>	<i>Amount</i>
Adrenaline	1:1000 1mg/ml	10 ampoules reduce
Adrenaline	1:10 000 1mg/10ml	5 Minijet syringes
Atropine	1mg/10ml	4 Minijet syringes
Calcium Chloride	10% 1G/10ml	1 Minijet syringe
Lignocaine	2% 20mg/ml	2 Minijet syringes
Magnesium Sulphate	49.3% 10mmol/5ml	2 Ampoules
Sodium Bicarbonate	8.4% 50mmol/50ml	2 Minijet syringes
Sodium Chloride	0.9% 5ml	5 Ampoules

Supplementary drugs (available on ward imprest)

<i>Medication</i>	<i>Preparation</i>
50% Dextrose	50ml vial
Insulin (Human soluble neutral)	10ml vial
Metoprolol 1mg/ml	5ml ampoule
Naloxone 0.4mg/ml	1ml ampoule
Phenytoin 100mg	2ml ampoule

Drugs Pack from the Department of Emergency Medicine

The team from the Department of Emergency Medicine who attends the cardiac or respiratory arrest will bring the following drugs:

<i>Medication</i>	<i>Preparation</i>
Midazolam 5mg/ml	1ml ampoule x 2
Suxamethonium 50mg/ml	2ml ampoule x 2
Vecuronium bromide 4mg	2ml ampoule x 4
Isoprenaline 1mg/5ml	5ml ampoule

Replacement of Emergency Drugs

Pharmacy Department will replace emergency drugs from the container following use. If replacement is required urgently, staff may collect replacement containers from Pharmacy. Alternatively, the used drug container may be given to the ward pharmacist who will arrange replacement. Emergency Drug containers can be obtained from Department of Emergency Medicine after hours. **At all times at least one emergency drug container must be present on the resuscitation trolley.**

Replacement of Emergency Equipment

ITEM	OFFICE HOURS	AFTER HOURS
SAED Electrodes	CELS 0700 - 2100hrs - 7days / wk Ext: 67486 or Pager 42816	2100 - 0700hrs through the AH NM
SAED Batteries	Biomedical Technology Services (BTS) for replacement battery Loan SAED through CELS	2100 - 0700hrs through AH NM (Loan SAED) SAED to BTS during Office Hours
Resuscitator	CELS 0700 - 2100hrs - 7days / wk Ext: 67486 or Pager 42816	2100 - 0700hrs through the AH NM
Emergency Drug Container	Pharmacy Department	DEM After Hours Drug Cupboard
Intubation Pack (Including Laryngoscope Handles)	CELS 0700 - 2100hrs - 7days / wk Ext: 67486 or Pager 42816	2100 - 0700hrs through the AH NM
IV Pack		
IV Infusions	Pharmacy Department	DEM After Hours Drug Cupboard
Other equipment	Supply / Ward stock	Supply / Ward stock
Oxygen Cylinder & Regulator	Contact Area PSO – O ₂ Cylinders Ward Stock (Regulators)	Contact Area PSO – O ₂ Cylinders Ward Stock (Regulators)

RBWH HSD Standard Resuscitation Trolley

Check Guidelines

Standard Resuscitation Trolleys are to be checked on a daily basis. This is undertaken to ensure the functioning and availability of all equipment, and that all consumables and drugs have not exceeded their expiry date.

Checks of the Standard Resuscitation Trolley need to include:

Lifepak 500 (SAED) / Lifepak 20 (Multifunctional Defibrillator):

- “OK” on the readiness display in the handle ;
- 2 SAED Quik-Combo Electrode Pads inside pocket of carry case;
- Electrode pack is unopened
(where the electrode lead extends from the sealed pack, connect to the SAED)
- Expiry dates of Defibrillator electrodes.

Resuscitator:

- Correct equipment contained in resuscitator as per equipment list;
- Integrity of ventilation bag and valves to ensure patency.

Emergency Drugs Packs:

- Pack integrity (assurance that pack is complete);.&
- Expiry date on Emergency Drug Container.

Laryngoscope handle light source functioning:

- Bright light visible when grey coloured plastic around light bulb is pressed.

Single Use Intubation and IV Equipment Pack:

- Pack integrity (assurance that pack is complete); &
- Expiry date on packs.

IV infusions:

- Correct IV infusions as per Standard Emergency Trolley Equipment list;
- Pack integrity; &
- Expiry date of IV Infusion fluids.

Oxygen Cylinder:

- Pressure gauge registers full;
- O₂ tubing & face mask attached; &
- Regulator has a current safety test tag.

Daily checklist to be signed and dated upon completion of checking.
Any issues identified and actions undertaken to be noted on checklist.

References for Chapter

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Chapter 9 CPR Education Resource

Basic and Advanced Life Support Training

Medical Staff

Medical Directors of departments are responsible for reviewing and overseeing Basic Life Support (BLS) training and assessment of all medical staff. Medical Officers should undergo skills assessment in BLS at the commencement of employment and then yearly assessments thereafter.

Nursing Staff

Nursing Directors of departments are responsible for reviewing and overseeing BLS training and assessment of all nursing staff. All nursing staff are required to complete yearly training and assessment competency in Basic Life Support to maintain their registration / enrolment. New nursing staff should complete competency assessment within 28 days of commencing work, in line with hospital policy (88400/ CPP: Cardiopulmonary Resuscitation & Medical Emergency). To maintain competence and confidence in BLS skills nurses are encouraged to actively participate in mock arrests / emergency situation role plays between assessment periods.

Advanced Life Support and Neonatal Resuscitation Training will be undertaken by staff working in specific clinical areas where the need is identified and negotiated. Yearly assessments are required to maintain competency.

Code Blue Response Team

Medical Officers and Nurses on the Code Blue Response Team will undergo skills assessment in Advanced Life Support (ALS) before the first day of duty on the Code Blue Response Team. After initial assessment, individuals on the Code Blue Response Team will undergo yearly assessment.

Allied Health

The Director of Allied Health is responsible for reviewing and overseeing Basic Life Support (BLS) training and assessment of allied health staff. Staff who provide direct patient care are to attend yearly training and assessment to maintain their competency and confidence in providing BLS.

Non – Clinical Staff

Line Managers of non – clinical staff are responsible for reviewing and overseeing BLS training and assessment of all non – clinical staff who are required to demonstrate BLS competency for work purposes. Due to the size of the organisation it is difficult to provide all employees within the district with BLS training and assessment. For non-clinical staff that are required to demonstrate BLS competency as outlined in their scope of practice, the current processes in place with regards to out sourcing of staff training and assessment will continue.

CPR Resource Person Training Program

A Cardiopulmonary Resuscitation (CPR) Resource Persons' Program is offered by the Centre for Clinical Nursing. This program utilises the skills and knowledge of the Queensland Health Preceptor Program. The CPR Resource Persons' Program addresses the required knowledge and skills to competently perform adult Basic Life Support (BLS), to assess the BLS learning needs of their

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colleagues and to develop effective educational strategies to address these needs. Neonatal and paediatric resuscitation are not covered within this program.

This program is open to Registered Nurses (for an Enrolled Nurse enrolment may be considered following negotiation with the CPR Resource Persons' Program Coordinator/s) who meet the prerequisite criteria. Within the RBWH HSD multi-disciplinary healthcare staff may be eligible to apply following negotiation with the CPR Resource Persons' Program Coordinator/s.

Participants for this workshop must have completed the Queensland Health Preceptor Program and / or a Certificate IV in Assessment and Workplace Training, or a program assessed and deemed equivalent by the CPR Resource Persons' Program Coordinator/s. To facilitate acquisition of necessary knowledge and skills during the program, it is expected that participants have also met the following prerequisite criteria prior to enrolment:

- possess a current (< 12 months) BLS competency:
 - demonstrated competence in cardiopulmonary resuscitation;
 - demonstrated competence in defibrillation using a SAED.
- demonstrated knowledge of the organisational emergency response policies and procedures.

****Participants are required to submit two (2) comprehensive session plans two weeks prior to the program, which will be utilised for a teaching session within the program. The session plans will be reviewed and feedback provided by the CPR Resource Persons' Program Coordinator/s.****

Session plan topics are:

- Basic Life Support (BLS) and Semi-Automated External Defibrillator (SAED) training session
- Mock arrest scenario. This session plan should include all aspects of the emergency processes from identification of emergency situation to completion of emergency team processes.

CPR Resource Person Refresher and Support sessions are conducted twice each semester. These sessions are intended to assist CPR Resource Persons to problem solve issues encountered in practice and assessment situations. Additionally, these sessions will provide opportunities to discuss changes in practice and alignment to policy and guidelines. CPR Resource Persons are responsible for maintaining current knowledge and skills in BLS and provide effective facilitation and assessment skills. Audit processes randomly reassess staff and CPR Resource Persons as a quality activity. Monthly meetings of CPR Resource Persons are also conducted. Other support mechanisms vary according to the work unit.

Details of CPR Resource Persons' Program and CPR Resource Person Refresher and Support sessions are included in the RBWH Professional Development Program Booklet. This is issued by the Centre for Clinical Nursing prior to the start of each semester.

