OBSTETRICS AND GYNAECOLOGY
CLINICAL PRACTICE GUIDELINE

Acute deterioration (adult): Resuscitation and life support

Scope (Staff):	WNHS Obstetrics and Gynaecology Directorate staff
Scope (Area):	Obstetrics and Gynaecology Directorate clinical areas at KEMH, OPH and home visiting (e.g. Visiting Midwifery Services, Community Midwifery)

This document should be read in conjunction with this Disclaimer

Contents

Aim

To provide guidance for staff at WNHS on basic life support, advanced life support and resuscitation of the pregnant woman.

Introduction

Responding to acute deterioration

The management of adult basic and advanced life support in this document follows the guidelines of the Australian Resuscitation Council (ARC).

Refer to WNHS Policy: Recognising and Responding to Acute Clinical Deterioration (Physiological and Mental) for information on recognising and responding to acute deterioration.

Code blue calling criteria

- **Adult, neonate and fetal**- refer to WNHS Policy: Recognising and Responding to Acute Clinical Deterioration (Physiological and Mental): Appendix- Code Blue Calling Criteria
- **Observations**: Observations that fall within the purple category of the relevant Observation and Response Chart (ORC)

Assessment of the deteriorating patient

The airway, breathing, circulation, disability, exposure (ABCDE) approach is a systematic process that can be applied to the immediate assessment of a patient who **HAS** signs of life, but requires urgent medical team review, or Code Blue call.

- Follow Appendix 1: ABCDE Assessment

Basic life support – Adult

Background information

Adult resuscitation steps should be followed according to the Basic Life Support (BLS) Algorithm developed by the ARC (see flowchart on next page).

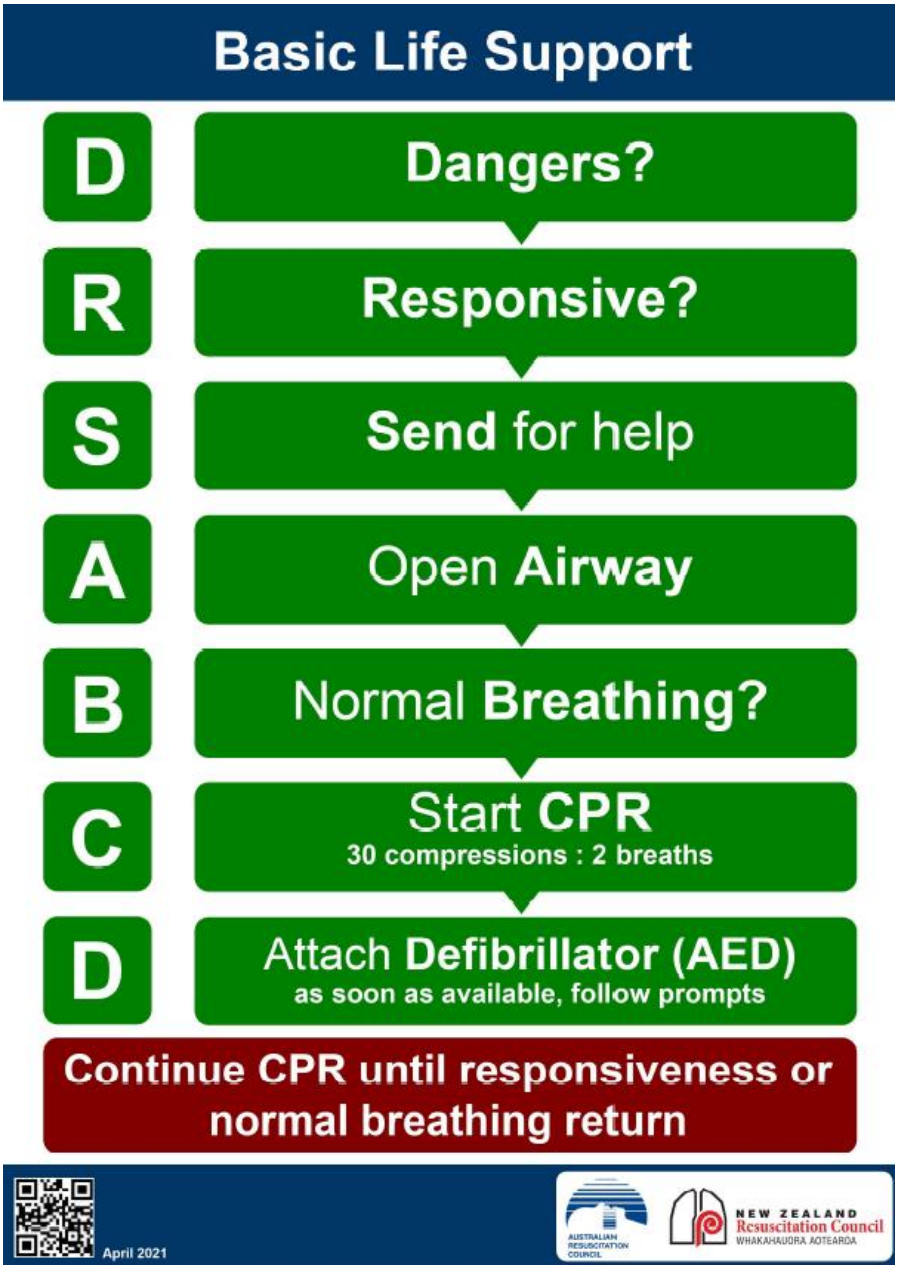
Survival from cardiac arrest is optimised by a sequence of interventions referred to as the “Chain of survival”. The concept includes:

1. Early recognition and calling for help to prevent arrest – up to 80% of patients have been shown to show signs of physiological deterioration prior to cardiac arrest.
2. Early cardiopulmonary resuscitation (CPR) – buys time to slow the rate of deterioration of the brain and heart.
3. Early defibrillation - Studies have repeatedly shown the importance of immediate bystander CPR plus defibrillation within 3–5 minutes of collapse to improve survival from sudden VF cardiac arrest.
4. Post resuscitation care – targets preserving function, particularly of the heart and brain, and restoring the patient’s quality of life.

Acknowledgement: European Resuscitation Council Guidelines: Introduction. 2005.

Principles of basic life support

The basic life support algorithm (DRSABCD) should be followed to preserve / restore life by establishing a clear airway, breathing and circulation in a collapsed patient.



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Applying the DRSABCD algorithm

D – Assess for danger

Assess the area for danger**.** Danger can include hazards such as electrical cables, furniture, equipment, water, body fluids, and sharps. Don appropriate PPE.

R – Check for response

Check the patient for a response. Squeeze the patient's shoulders firmly and call their name to elicit a response. If the patient is unresponsive, press the emergency bell to summon help.

S – Send for help

Send for help by pressing the emergency bell, if no bell in the immediate vicinity shout for help or dial 55 to initiate code blue medical. Once help arrives, ask your colleague to call a Code Blue Medical while you attend to the patient.

A – Airway

Ensure that the patient is lying on their back. Assess the airway by opening the patient's mouth to check for obstruction. Suction the airway with a yankeur suction device if required being careful to suction only within the mouth (under direct vision). Perform a head tilt and chin lift to open the airway. If there is a suspected spinal injury, use a jaw thrust to open the airway instead.

First responder: Rapidly proceed to breathing and compressions.

Second responder: If an oropharyngeal airway is available, consider inserting it at this point to maintain a patent airway. Ensure that the oropharyngeal airway is sized correctly by checking the length from the level of the incisor to the angle of the jaw.

B – Breathing

Look, listen, and feel for **normal** breathing. This should take < 10 seconds. Agonal gasps are not considered normal breathing. Do not check for a pulse, commence chest compressions if the patient is not breathing normally and is unresponsive. When there are more responders available, breathing should be provided using a bag and mask, with oxygen flow at 15L / minute. Breathing should be co-ordinated with CPR at a ratio of 30 compressions to 2 breaths. Compressions should be paused for breaths to allow for adequate air entry. Ideally, one person should hold the mask in place to obtain an adequate seal, while the other compresses the bag. Observe for rise and fall of the chest to ensure effective ventilations.

C- Circulation

Perform external cardiac compressions at a rate of 100 – 120 compressions / minute. If you are a single rescuer, continue CPR until the emergency team arrives. Do not perform mouth to mouth resuscitation or use a pocket mask in the hospital setting. Once help arrives, continue CPR at a ratio of 30 compressions to 2 breaths using a bag and mask. This should be connected to oxygen as soon as a gas source is available.

Hands should be positioned in the lower half of the sternum to deliver compressions. Use the heel of the hand to compress the chest, elbows should be

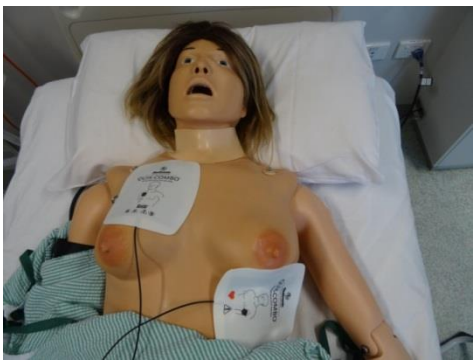
straight, and the CPR provider should have their shoulders positioned directly over their wrists. Compress the chest 5-6 cms or 1/3 of the chest width. Ensure that adequate time is allowed for the chest to recoil in between compressions. If adequate staff available, consider changing providers every 2 minutes, or more frequently if fatigued to ensure effective CPR is provided. Ensure there are minimal interruptions to chest compressions.

Pregnant women:

- Ensure that aorto-caval compression is relieved in pregnant patients. This may be achieved by manually displacing the uterus into a left lateral position. See section Resuscitation of the Pregnant Woman: Maternal Positioning.

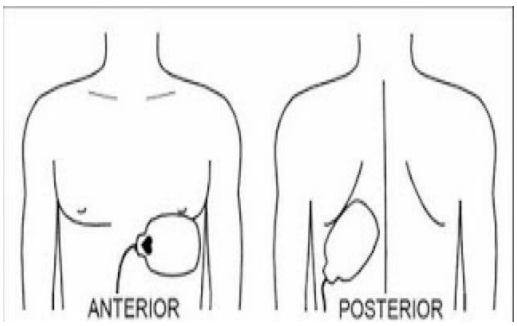
D – Defibrillation

Attach defibrillator pads to patient's chest as soon as possible. Take care to avoid the nipple, pacemakers, medication patches, ECG cables, dressings, CVC's, jewellery. Remove jewellery impacting pad placement if easy and quick to do so. Dry the patient's chest if wet or very sweaty before applying pads. Excessive hair can be removed by applying one set of pads and removing them quickly. Apply a clean set to the smooth skin. Ensure CPR continues while pads are being applied. "Roll" pads smoothly onto the skin, ensuring no air is trapped between the skin and the gel pad. See below diagrams for defibrillator pad placement. The cable for the gel pads can be plugged into any defibrillator machine at WNHS. There is no need to remove the pads if changing to a manual machine.



Antero-lateral pad placement

Position anterior pad underneath the right clavicle, along the sternal border. Position apex/lateral pad at 4th intercostal space, midaxillary line.



Anterior posterior pad placement

Position anterior pad as for apex pad in antero-lateral diagram. Position posterior pad underneath the scapula on the left side.

Lateral lateral pad placement

Position the middle of the pad at the 4th intercostal space, midaxillary line

Switch defibrillator on. Follow machine prompts. Ensure safety of resuscitation team by instructing staff to “stand clear” and checking for hazards by performing a “visual sweep” prior to delivering a shock. Oxygen should be kept at least 1m away from the patient during defibrillation. The patient should display a physical response such as a “jerking movement” during defibrillation which confirms a shock has been delivered. Once the shock has been delivered, immediately resume CPR as per ALS algorithm or until there are signs of life.

Defibrillator skills

WNHS uses automatic, semi-automatic and manual defibrillators. It is important to familiarise yourself with the type of defibrillator used in your clinical area. Basic life support involves the provision of defibrillation using an automatic external defibrillator (AED) or a semi-automatic external defibrillator (SAED) in automatic mode. Rhythm recognition, analysis and manual defibrillation fall within the advanced life support algorithm and are discussed there. All nurses, midwives and medical staff within the WNHS can defibrillate a patient using an AED, and for those trained adequately, a SAED. All nursing, midwifery and medical staff must demonstrate annual competency in basic life support. A record of competency is kept.

In this health service, only anaesthetists, and staff who are deemed competent, can perform manual defibrillation.

Defibrillation provides the best possible chance of survival in patients with pulseless ventricular tachycardia and ventricular fibrillation; therefore defibrillation should occur without delay.

Goals of Patient Care and Advance Health Directives

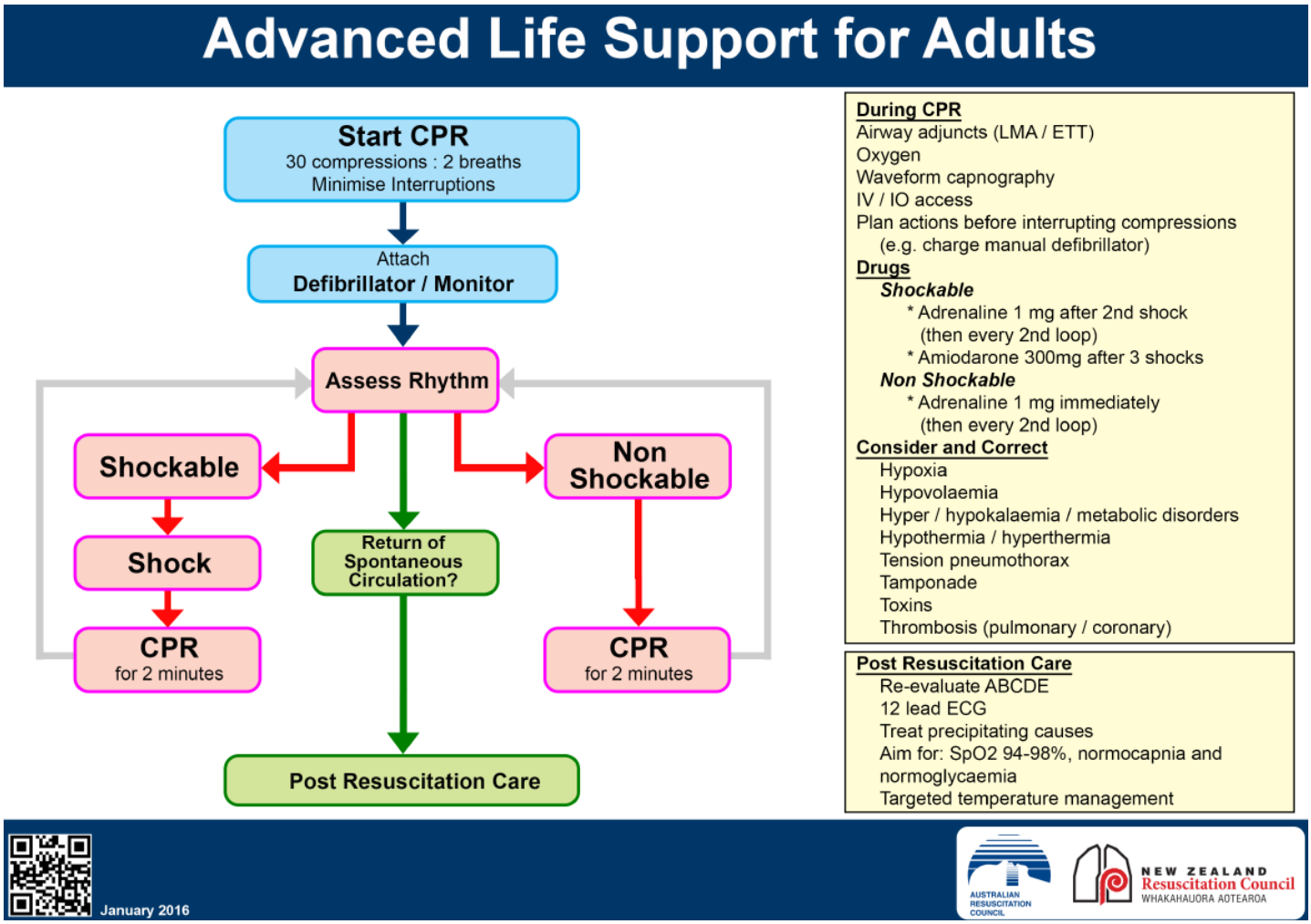
Identify if the patient has a valid Goals of Patient Care order and/or Advance Health Directive. Depending on the patient and clinician recommendations, this may include not commencing CPR in the case of cardiac arrest or other treatment limitations. Refer to:

- NMHS Goals of Patient Care Policy
- WNHS Advance Health Directive Policy
- WNHS HealthPoint hub page Goals of Patient Care (resources and links)

Advanced life support

Definition

The advanced life support algorithm is a systematic process designed to guide clinicians in the provision of care to the unconscious patient. It focuses on CPR, defibrillation, airway management, correcting reversible causes of cardiac arrest as well as post-resuscitation care. The algorithm is provided below.



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Key points

1. Single shocks should be provided to allow CPR to continue in between shocks. Effective CPR raises coronary perfusion pressure and increases the likelihood of successful defibrillation.
2. Chances of successful defibrillation diminish over time.
3. Default energy level for biphasic defibrillators in 200J.
4. Ensure reversible causes of cardiac arrest (4 Hs and 4Ts) are treated and addressed sufficiently during the resuscitation.
5. Document resuscitation on MR302 Medical Emergency Response Code Blue Report.

Defibrillation

Shockable rhythms – VF or pulseless VT

Defibrillation is the definitive treatment for VF and pulseless VT. If the patient is monitored in a fine ventricular fibrillation, then it may be advisable to continue CPR for another 2 minutes to improve coronary perfusion, increase the voltage of the rhythm to coarse VF and increase the likelihood of restoring sinus rhythm. Rhythm analysis should occur every 2 minutes throughout the resuscitation, prior to delivering the next shock if indicated. IV Adrenaline 1mg should be administered after the 2nd shock, and then every second cycle during the resuscitation. IV Amiodarone 300mg should be administered after the 3rd shock.

Non-shockable rhythms – asystole or pulseless electrical activity

Non-shockable rhythms include asystole and pulseless electrical activity (PEA). Defibrillation is not indicated for the management of these arrhythmias and CPR and other supportive measures should be continued. Rhythm should be checked every 2 minutes. IV Adrenaline 1mg should be given immediately when IV access is established Administer IV adrenaline 1mg every 2nd cycle subsequently.

Reversible causes of cardiac arrest

Physiological causes known to exacerbate or precipitate cardiac arrest should be addressed throughout the resuscitation. These are known as the 4H's and 4T's.

4 H's	4 T's
Hypoxia	Thrombosis
Hypovolemia	Tamponade
Hypo / hyperkalaemia / hypermagnesemia	Tension pneumothorax
Hypo / hyperthermia	Toxins

Hypoxia

Administer 15L/min of oxygen through the bag and mask. Consider airway adjuncts such as a Guedels, Laryngeal Mask Airway (LMA) or Endo tracheal tube (ETT). Once a definitive airway is secured, ventilate patient at a rate of 10 breaths per minute. Consider performing an arterial blood gas to determine oxygenation status.

Hypovolemia

Prepare and administer 1 L bag of normal saline or compound sodium lactate if hypovolemia is suspected. Ensure patient has 2 large bore cannulae sited. If unable to obtain IV access, consider the intraosseous route. An intraosseous gun is located on the theatre (and Emergency Centre) resuscitation trolley. Control the source of bleeding if haemorrhaging and administer uterotonics for obstetric patients as required.

Hypo / hyperkalaemia / hypermagnesemia

Potassium levels can be obtained through arterial blood gas sampling during resuscitation. If required send off a formal U&E to check electrolyte levels. Do not wait for results before treating suspected electrolyte disturbances. Both elevated potassium and magnesium levels may be reversed with intravenous calcium.

Hypothermia

Hypothermia is classified as core temperature < 35 degrees. Warm blankets and warm air blankets can assist in elevating temperature. Ensure women birthing in water have regular temperature checks.

Thrombosis

Hospitalised patients are at a higher risk of developing venous thromboembolism (VTE). Check medication chart for thromboprophylaxis and assess clinical history to determine if VTE is a potential cause of cardiac arrest. Pregnant patients with intact membranes are at risk of an AFE when the membranes rupture.

Tamponade

Tamponade is an unlikely cause of cardiac arrest outside the setting of trauma or cardiac surgery.

Tension pneumothorax

Tension pneumothorax is also unlikely cause of cardiac arrest outside setting of trauma.

Toxins

Toxins can include bites, stings, medications and illicit drugs. Clinical history may reveal a history of substance abuse. Administer reversal agents as appropriate. Do not administer naloxone to pregnant women unless absolutely necessary as this can be harmful to the fetus.

Medication and fluids

The ARC de-emphasises the role of drugs in a cardiac arrest. The medications that may be utilised are predominately adrenaline and amiodarone. See also Adult resuscitation drug protocols for administration and details.

Post resuscitation care

Post resuscitation care can commence on return of spontaneous circulation. . It is important to adopt a systematic assessment A-E approach to care and prepare the patient for transfer to a critical care area for ongoing management. Documentation should be reviewed to ensure it accurately reflects the resuscitation event.

Repeat the ABCDE approach in Appendix 1. Also consider:

- The patient should be transferred to a critical care area for ongoing management such as HDU, ICU or CCU. Liaise with the family as required and answer questions they may have.
- A formal debriefing should be provided for staff involved in resuscitation. It is useful for the resuscitation team to meet and discuss the events that occurred to resolve any unanswered questions that they may have.
- In the event of an unsuccessful resuscitation where the patient has died, refer to the Coroner as appropriate.

Resuscitation of a pregnant woman

Background

The physiological changes of pregnancy poses many challenges for clinicians who are resuscitating a pregnant woman. Maternal collapse requires the resuscitation of the mother first and foremost, but also necessitates consideration of the fetus, who may survive if delivered quickly by resuscitative hysterotomy.

The rise in maternal plasma volume and red blood cells increases total blood volume by 30-50% in pregnancy. Blood flow to the gravid uterus and placenta increase by 500mL / minute when compared to the non-pregnant uterus. For this reason, it is critical to remove the placental circulation during maternal collapse, so that cardiac output in the mother can be restored. This provides the mother with the best opportunity for survival.

Identifying and treating the 4H's and 4T's in pregnancy are the same as for the general adult population.

Resuscitative hysterotomy (perimortem caesarean)

A resuscitative hysterotomy (perimortem caesarean) involves the urgent delivery of the fetus at the site of maternal collapse while CPR is in progress. It is recommended for women who look visibly pregnant, which as a general rule is women over 20 weeks gestation. The predominant aim is to save the mother's life. Extraction of the fetus and placental circulation may improve maternal circulating blood volume, help relieve aorto-caval compression and improve respiratory mechanics. Continuous CPR must continue throughout the procedure.

Resuscitative hysterotomy (perimortem caesarean) needs to occur within 4-5 minute of cardiac arrest. Preparation should be undertaken 3 minutes into the resuscitation, with knife to skin at 4 minutes, and delivery of the fetus by 5 minutes. It is important to call a Code Blue Medical and also a Code Blue Paediatric when a pregnant woman collapses. The procedure will be bloodless while maternal cardiac output is low. Once spontaneous circulation is restored, she will start to bleed.

The resuscitative hysterotomy (perimortem caesarean) kit is located in the bottom drawer of the resuscitation trolley. Do not check fetal heart rate before or during the procedure. Neither maternal nor fetal management changes as a consequence of fetal heart rate.

Maternal positioning

Visibly pregnant women should be positioned supine for CPR while someone provides manual left uterine displacement. This can be performed by using both hands to lift the uterus to the mother's left and upwards towards the ceiling. If there are not enough personnel available to do this, then a 15-30 degree left, lateral tilt is sufficient.

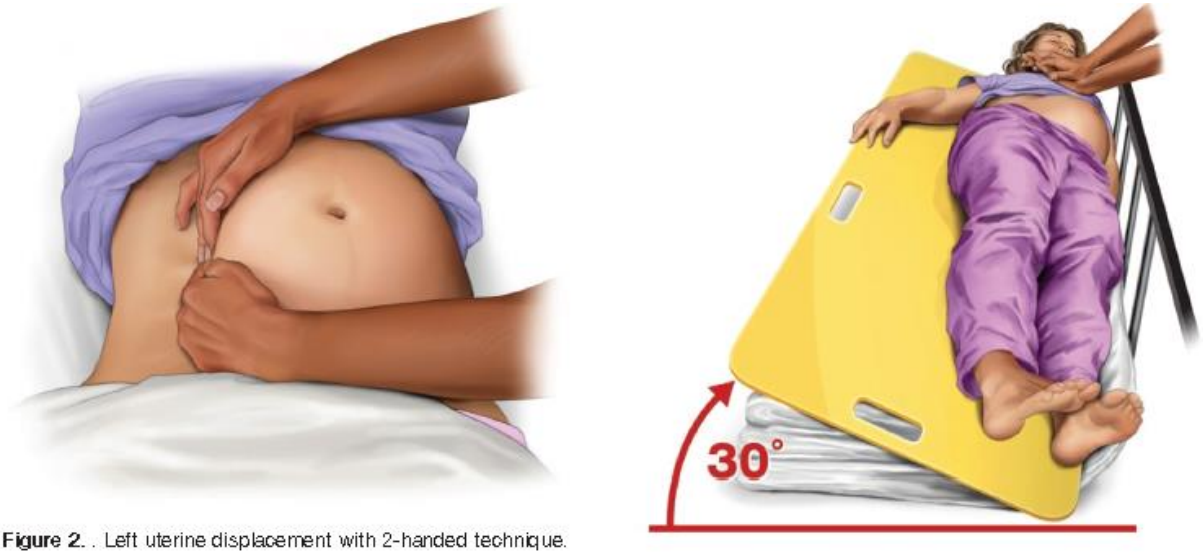

Figure 2. . Left uterine displacement with 2-handed technique.

A left lateral tilt can be achieved by placing a wedge under the woman's right hip and buttock. An excessive tilt can cause aorto-caval compression, so this must be avoided in pregnant patients. If the patient is on a soft surface, place a hard board behind their back to facilitate effective compressions. If the patient is on an air mattress, ensure the CPR tab is pulled to deflate it during CPR.

Maternal oxygenation

Pregnant women will rapidly desaturate in a cardiac arrest, therefore it is essential that airway and breathing are optimised. Administer oxygen at 15L/min using a bag and mask. Intubation of the pregnant patient is a difficult skill to master. Only a senior anaesthetist should attempt intubation during a cardiac arrest to avoid prolonged periods of apnoea. If intubation is not achieved quickly, abandon procedure and consider laryngeal mask airway.

References and resources

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Related legislation and policies

Legislation

- *Guardianship and Administration Act 1990* (external website)
- *Civil Liability Act 2002* (external website)

National

- Australian Commission on Safety and Quality in Health Care [ACSQHC]. National Safety and Quality Health Service (NSQHS) Standard: Recognising and Responding to Acute Deterioration

Department of Health WA policies

- Cardiotocography Monitoring Policy - MP - 0076/18 (2018)
- Consent to Treatment Policy- MP 0175/22
- Recognising and Responding to Acute Deterioration Policy (2023)
- Policy Framework: Clinical Governance, Safety and Quality

North Metropolitan Health Service (NMHS) policy: Recognising and Responding to Acute Deterioration (RRAD)

Related WNHS, CAHS and SCGH/OPH policies, procedures and guidelines

WNHS Policies: (WA Health employees access through HealthPoint)

- Clinical Handover at the Bedside
- Recognising and Responding to Acute Clinical Deterioration (Physiological and Mental)

WNHS Clinical Guidelines: (WA Health employees access through HealthPoint)

- Anaesthetics: Adult Resuscitation Drug Protocols
- Obstetrics and Gynaecology:
  - Clinical Handover
  - Hypertension in Pregnancy
  - Resuscitation Trolley Checking (Adult and Neonatal)
- Transfusion Medicine/ Haematology: Critical Bleeding Protocol

Child and Adolescent Health Service (CAHS): Neonatology: Resuscitation: Neonatal

Sir Charles Gairdner Osborne Park Health Care Group (SCGOPHCG) In-hospital Resuscitation (CPG010) guideline (WA Health employees access through HealthPoint)

Useful resources

Australian Resuscitation Council (ARC) Guidelines and Flowcharts (external website) including (see website for full list):

- ANZCOR Guideline 4 - Airway (2021)
- ANZCOR Guideline 5 - Breathing (2021)
- ANZCOR Guideline 6 - Compressions (2021)
- ANZCOR Guideline 7 - Automated External Defibrillation in Basic Life Support (2021)
- ANZCOR Guideline 8 - Cardiopulmonary Resuscitation (2021)
- Guideline 10.5 - Legal and Ethical Issues Related to Resuscitation
- Section 11: Adult Advanced Life Support:
  - Guideline 11.10 - Resuscitation in Special Circumstances: Pregnancy

Forms:

MR302 Medical Emergency Response Code Blue Report

Keywords:	clinical deterioration, acute deterioration, vital signs, assessment, code blue, basic life support, advanced life support, defibrillation, resuscitation, pregnant, maternal, basic life support, perimortem, caesarean section, BLS, ALS, adult resuscitation, DRS ABCD		
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NSQHS Standards (v2) applicable:	☒ 1: Clinical Governance ☐ 2: Partnering with Consumers ☐ 3: Preventing and Controlling Healthcare Associated Infection ☐ 4: Medication Safety	☒ 5: Comprehensive Care ☒ 6: Communicating for Safety ☐ 7: Blood Management ☒ 8: Recognising and Responding to Acute Deterioration	
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Version history

Version number	Date	Summary
1	May 2016	First version of amalgamation. Titled 'Recognising and Responding to Clinical Deterioration' (uploaded to A11.2). Contact OGD Guideline Coordinator for archived versions. **History**- Amalgamated content from four existing guidelines originating from Sept 2001. **Supersedes**: 1. (A1.13) Recognising and Responding to Clinical Deterioration (dated Dec 2014) 2. (A11.2) Basic Life Support- Adult (dated Jan 2015) 3. (A11.3) Advanced Life Support (dated Jan 2015) 4. (B11.1) Resuscitation in Late Pregnancy (dated Feb 2015)
2	Jan 2018	• Title changed to 'Clinical Deterioration: Recognising and Responding to' • RCA amendment- Table for adult added to page 5 – direct alignment with state-wide RRCD policy symbols '<' and '>'
3	Mar 2020	• Title changed to 'Acute Deterioration (Adult): Resuscitation and Life Support'

		• Formatting adjusted and duplication removed. Some content (e.g. frequency of observations and escalation processes) has been moved to the new WNHS policy- 'Recognising and Responding to Acute Physiological (Clinical) Deterioration' • Updated basic life support flowchart from ARC and updated statistics on maternal deaths from Australian Institute of Health and Welfare
4	Aug 2020	Amendment- Basic life support - Link added to first responder modifications for patients being treated for droplet precautions including COVID +ve (or suspected) patients
5	Dec 2023	• Condensed content, with some instructions (manual BP, automated readings, ECG, fetal code blue criteria, post-op obs) moved to WNHS acute deterioration policy. Now links to Adult Resuscitation Drug Protocols for medication content. • Link to Goals of Patient Care policy and resources added • Details about who may perform manual defibrillation amended- refer to defibrillation skills section • Preferred terminology change- 'perimortem caesarean' now also referred to as 'resuscitative hysterotomy' • Appendix 1 added to replace and summarise A-E assessment section in guideline • Updated AIHW maternal deaths statistics and moved to appendix 2

Appendix 1: ABCDE assessment- WNHS

Airway	**Assess**: • Is the patient talking? • Are there abnormal sounds e.g. stridor, gurgling	**Consider**: • Suctioning • Oxygen therapy • Airway manoeuvres and / or adjuncts as indicated
Breathing	**Assess**: • Respiratory rate • O_2 saturations • Chest movement and effort of breathing	**Consider**: • Auscultation and ordering a Chest X-ray • Oxygen therapy • Supplemental breaths using bag and mask
Circulation	**Assess**: • Pulse rate/rhythm, blood pressure • Patient colour / capillary refill time • Blood / fluid loss • Fetal heart rate	**Consider**: • IV access, fluids / medications as prescribed • Commencing cardiac monitoring and 12 lead ECG • Lateral uterine displacement
Disability	**Assess**: • Level of consciousness using AVPU scale • Drug chart and relevant documentation	**Consider**: • Monitoring blood glucose • Glasgow Coma Scale (GCS) • Pupillary response
Exposure	**Assess**: • Temperature • Head to toe examination	**Consider**: • Urine output • Checking peripheral pulses / wounds / drains etc. • Pain score

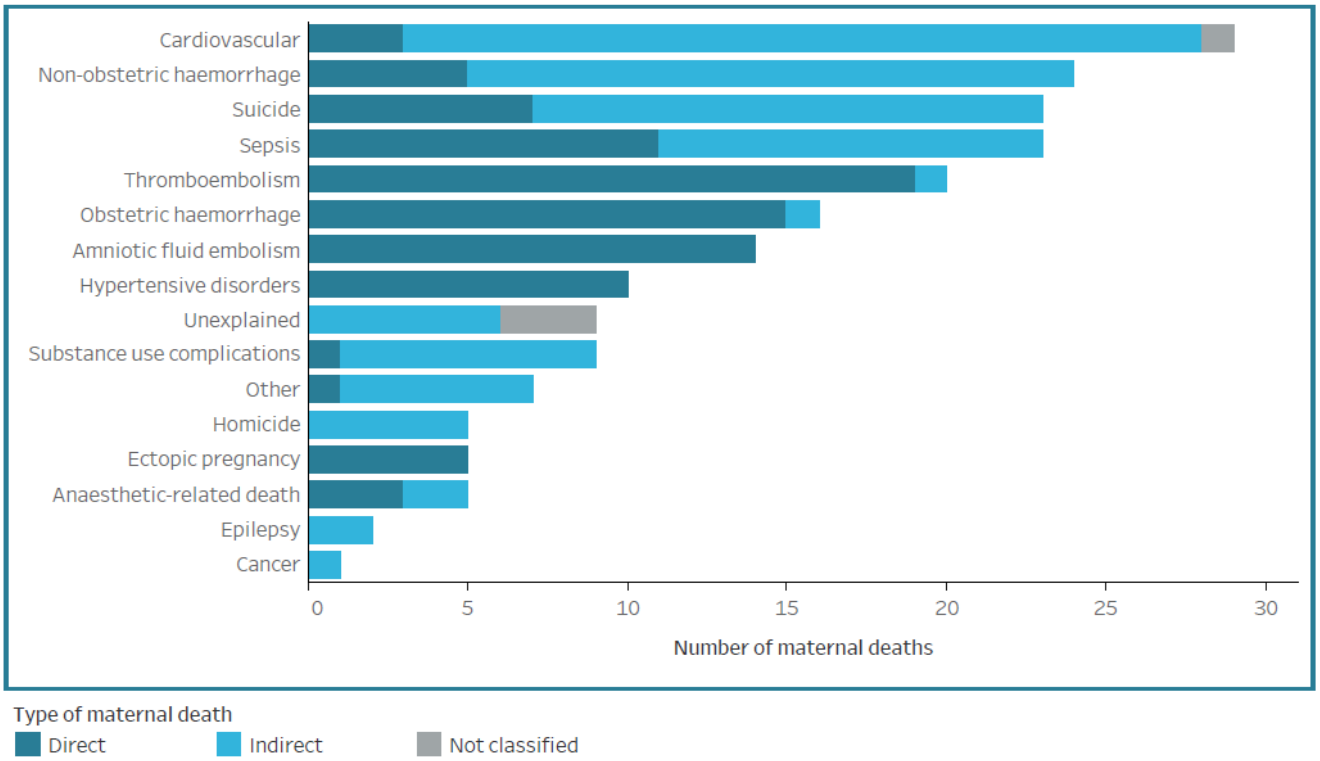
All findings are to be recorded on the relevant documents such as the ORC. Escalation of care must be activated according to local policy or if there are concerns about the patient.

Acknowledgment: Modified from SCGH/OPH ABCDE Assessment (2017) (adapted from the Alert™ Course and 'RPH M140527003 form' (2014)) to include obstetric circulation considerations.

Appendix 2: Maternal deaths in Australia

A table is shown below from the Maternal Deaths in Australia report (external website). There were 251 maternal deaths from 2009 – 2018.

Number of maternal deaths, by cause of death, 2009-2018



Source: Australian Institute of Health and Welfare. Maternal Deaths in Australia (Dec 2020). Image used with permission.

According to the AIHW, between 2009 and 2018 the most frequent causes of maternal death (direct, indirect and not further classified) were:

- Complications of pre-existing cardiovascular disease, non-obstetric haemorrhage, suicide and sepsis.

The most frequent **direct** causes of maternal death included:

- Thromboembolism, obstetric haemorrhage, amniotic fluid embolism and sepsis.