



## EMERGENCY PROCEDURES

### RESUSCITATION IN LATE PREGNANCY

**Keywords:**

#### **PURPOSE**

- The successful resuscitation of a woman in late pregnancy.

#### **BACKGROUND**

Maternal collapse is a unique situation where Advanced Life Support (ALS) measures can be employed to save the lives of two patients – mother and baby. Fortunately, cardiac arrest in pregnancy is rare with an estimated incidence of 1/30,000 pregnancies. More frequently encountered is the period of decline prior to an arrest, where the application of ALS principles can avoid further deterioration. Risk factors for cardiac arrest include pre-existing cardiac disease, obesity, diabetes and advanced maternal age – all more likely in the patient population serviced by King Edward Memorial Hospital.

Staff should be familiar with the ALS guidelines for [Adults](#) produced by the Australian Resuscitation Council. Separate ALS guidelines exist for the [Child](#) and [Neonate](#) to recognize that successful resuscitation must take into account the different aetiology of collapse in these groups and institute a different management algorithm. Similarly, staff responding to maternal resuscitation must recognize the different causes of collapse during pregnancy and how its successful management will differ from that of standard (non-pregnant) adult ALS.

#### **PREGNANCY SPECIFIC ISSUES IN RESUSCITATION:**

##### ***Airway difficulty***

Should be anticipated due to anatomical changes in pregnancy and an increased risk of aspiration. Early intubation is desirable if experienced staff and equipment are at hand. Alternatively, ventilation should be instituted with a self-inflating bag and mask or a Supreme laryngeal mask airway (LMA). Cricoid pressure is not recommended to reduce aspiration as there is no evidence for its use in obstetrics and it may impede laryngoscopy<sup>1</sup>.

***Learning point: get experienced staff to manage the airway***

##### ***Breathing mechanics***

Are less favourable in pregnancy due to reduced respiratory compliance and a reduced functional residual capacity with increased risk of atelectasis. This is exacerbated by the increased oxygen and ventilatory requirements in pregnancy. This means that apnoea is poorly tolerated and desaturation will occur unless ventilation is instituted quickly. With a secure airway, moderate hyperventilation may be employed to achieve a PaCO<sub>2</sub> 30-32.

***Learning point: provide supplemental oxygen and assist ventilation if required***

##### ***Chest compressions***

Performed on a non-pregnant adult may only achieve 20-30% of the pre-arrest cardiac output. This value is reduced even further in maternal cardiac arrest<sup>2</sup>. Deeper chest compressions and higher positioning of the hands on the sternum are recommended to compensate for changes in chest shape and the upward displacement of the diaphragm by the gravid uterus.

***Learning point: use deeper, higher chest compressions***

##### ***Displacement of the uterus***

This should be performed to improve venous return by relieving aortocaval compression. This becomes more significant in pregnancies beyond 20 weeks gestation but may be relevant at earlier gestations if the size of the gravid uterus is enlarged (eg. twin pregnancy, polyhydramnios, fetal macrosomia). This can be achieved with 15-30° of pelvic tilt but increasing evidence suggests that manual uterine displacement (MUD) is more effective at relieving aortocaval compression<sup>1,3,4</sup>. MUD is best implemented by a rescuer positioned on the patient's left side and by using two hands to lift the uterus leftwards and upwards (toward the ceiling).

**Learning point: relieve aortocaval compression**

### **Defibrillation**

This remains a priority for shockable rhythms (VF/pulseless VT). It is recommended that self-adhesive pads be used as breast hypertrophy in pregnancy increases the risk of skin contact with a rescuer if defibrillating paddles are used. Removal of fetal and uterine monitoring should occur to reduce the risk of arcing during defibrillation. Chest wall impedance is unchanged in pregnancy and the energy setting for (biphasic) defibrillation remains at 200J as per the guidelines for Adult ALS.

**Learning point: use self-adhesive pads for defibrillation**

### **Intravenous (IV) access**

IV access should be readily obtained and any drugs administered should be followed by a 20-30ml flush with 0.9% saline. If IV access proves difficult then proceed to intraosseous (IO) access without delay – a Bone Injection Gun (BIG) is available on the theatre resuscitation trolley which will be brought to all code blue medicals. Ideally IV/IO access should be above the diaphragm (e.g. humeral intraosseous access) as aortocaval compression can delay the effect of drugs administered from femoral or lower limb sites.

**Learning Point: any drugs given IV/IO should be followed by a saline flush**

### **Perimortem caesarean section (PCS)**

This involves delivery of the fetus in order to relieve aortocaval compression and aid resuscitation of the mother by improving respiratory mechanics, venous return and oxygen demand. Preparation for this should begin on commencing life support in order to achieve skin incision by 4 minutes into the arrest with delivery of the fetus by 5 minutes- this will require activation of a 'code blue paediatric' call at the same time a 'Code Blue Medical' is called. The greatest benefit is likely to occur in women beyond 24 weeks gestation but it should be considered at earlier gestations if there is concern about aortocaval compression from the gravid uterus. Chest compressions should be continued throughout the procedure and surgeons must use the fastest technique they are familiar with – perimortem surgical packs are located on the resuscitation trolleys in obstetric areas. PCS is not indicated if the cause of collapse can be managed more safely by an alternative method (e.g. eclamptic seizures or a high spinal block).

**Learning point: preparation for perimortem caesarean section should start immediately**

### **Fetal monitoring**

is not recommended during maternal resuscitation as focussing on the mother's cardio respiratory status is the best way to ensure the wellbeing of the fetus. Once the resuscitation has been successful, fetal monitoring can be applied if at a viable gestation.

**Learning point: fetal monitoring can distract from the maternal resuscitation**

## REVERSIBLE CAUSES OF COLLAPSE IN PREGNANCY – HS AND TS

Hypoxia	- aspiration - respiratory weakness (e.g. secondary to a high spinal)
Hypovolaemia/hypotension	- obstetric haemorrhage - high spinal/epidural block
Hyper/hypokalaemia (metabolic disorders)	- renal impairment from severe pre-eclampsia - hypoglycaemia
Hypo/hyperthermia	- consider if trauma or out of hospital collapse - sepsis
Hypertension	- intracerebral haemorrhage - eclamptic seizure
Toxicity	- hypermagnesaemia - local anaesthetic toxicity
Thromboembolism	- venous thromboembolism - amniotic fluid embolism - venous air embolism
Tamponade	- cardiac tamponade secondary to aortic dissection - consider in trauma
Tension pneumothorax	- consider in trauma

## ADDITIONAL ADVICE

- Stop any epidural infusions during the resuscitation.
- Leg elevation can improve venous return and hypotension.
- Avoid oxytocin boluses in hypotensive patients.
- Check electrolytes quickly with an arterial or venous blood gas.
- Avoid hypothermia as it can cause a coagulopathy.
- Use 20% intralipid therapy in suspected local anaesthetic toxicity.
- Use 10ml of 10% calcium chloride to treat hypermagnesaemia.

## POST-RESUSCITATION CARE

The patient will need ongoing monitoring in the Adult Special Care Unit (ASCU) or referral to an intensive care for organ support. Continue to review correctable factors – order FBP, U&E, LFT, Coagulation studies, Rotem, ABG, ECG, and CXR. If a perimortem caesarean section was performed, then transfer to theatre for wound closure. There is limited evidence for the use of therapeutic hypothermia following maternal collapse but in some patient circumstances, it may be appropriate to institute this in an intensive care environment.

Documentation of the resuscitation should include a list of people in attendance, a temporal record of drugs and interventions administered as well as completion of the Code Blue Emergency Evaluation Form.

A family meeting should provide a factual account of events and include senior staff representatives from obstetrics, midwifery and anaesthesia.

A formal debrief should occur for all staff involved in the resuscitation.

## REFERENCES / STANDARDS

1. Lipman S et al. [The Society for Obstetric Anesthesia and Perinatology consensus statement on the management of cardiac arrest in pregnancy](#). *Anaesth Analg* 2014; 118 (5):1003-16.
2. McDonnell NJ. Preventing maternal morbidity and mortality: Management of the collapsed obstetric patient. [Australasian Anaesthesia](#). Melbourne: ANZCA, 2009.
3. Jeejeebhoy FM et al. [Management of cardiac arrest in pregnancy: A systematic review](#). *Resuscitation* 2011; 82:801-809.
4. Zelop CM. [Cardiopulmonary arrest in pregnancy](#). *UpToDate* (April 2014)

National Standards – 1 Clinical Practice is Guided by Current Best Practice  
9 Recognising and Responding to Clinical Deterioration.

Legislation - Nil

Related Guidelines – [Australian Resuscitation Council Guidelines](#)

Other related documents – KEMH Clinical Guidelines:

- Obstetrics & Gynaecology:
  - Death: [Sudden & Unexplained- Including Maternal Death](#); [Deceased Adult Patient- Non Coronial: Care of](#)
  - Emergency Procedures: [Basic Life Support - Adult](#)
- Obstetrics & Midwifery: [Pregnancy Complications: Eclampsia: Management](#)
- Restricted Area Guidelines (*Intranet Only*): [Primary Post-Partum Haemorrhage](#)
- Anaesthetics (E) [Epidural Complications \(4.9\)](#); [Anaphylaxis \(5.1\)](#); [Adult Resus Drug Protocols](#)
- Transfusion Medicine Protocols: [Urgent Transfusion Requests and Emergency Uncrossmatched Blood](#); [KEMH Massive Transfusion Guideline](#)

## RESPONSIBILITY

<b>Policy Sponsor</b>	HoD Anaesthetics
<b>Initial Endorsement</b>	September 2001
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