IMOET National Meeting
Tuesday 30th September 2014
Dublin Castle

Standardisation of multidisciplinary obstetric emergency training nationally.

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

IMOET
Irish Multidisciplinary
Obstetric Emergency Training

Maternal Collapse

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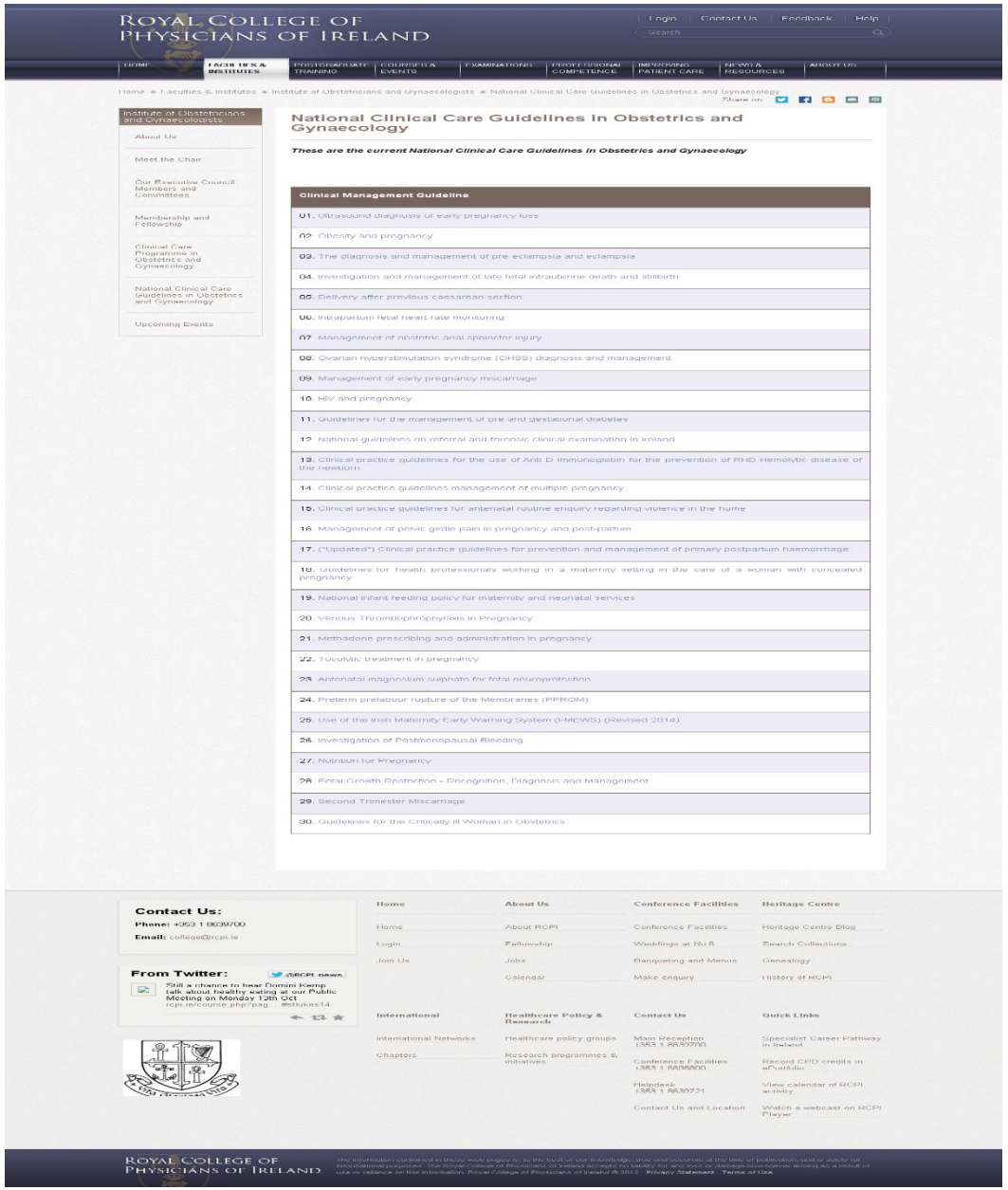

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National Clinical Care Guidelines in Obstetrics and Gynaecology

These are the current National Clinical Care Guidelines in Obstetrics and Gynaecology

Clinical Management Guideline
01. Ultrasound diagnosis of early pregnancy loss
02. Obesity and pregnancy
03. The diagnosis and management of pre-eclampsia and eclampsia
04. Investigation and management of late fetal intrauterine death and stillbirth
05. Delivery after previous caesarean section
06. Intrapartum fetal heart rate monitoring
07. Management of obstetric anal sphincter injury
08. Ovarian hyperstimulation syndrome (OHSS) diagnosis and management
09. Management of early pregnancy miscarriage
10. HIV and pregnancy
11. Guidelines for the management of pre and gestational diabetes
12. National guidelines on referral and forensic clinical examination in Ireland
13. Clinical practice guidelines for the use of Anti D immunoglobin for the prevention of RhD Hemolytic disease of the newborn
14. Clinical practice guidelines management of multiple pregnancy
15. Clinical practice guidelines for antenatal routine enquiry regarding violence in the home
16. Management of pelvic girdle pain in pregnancy and post-partum
17. (*Updated*) Clinical practice guidelines for prevention and management of primary postpartum haemorrhage
18. Guidelines for health professionals working in a maternity setting in the care of a woman with concealed pregnancy
19. National infant feeding policy for maternity and neonatal services
20. Venous Thromboprophylaxis in Pregnancy
21. Methadone prescribing and administration in pregnancy
22. Tocolytic treatment in pregnancy
23. Antenatal magnesium sulphate for fetal neuroprotection
24. Preterm prelabour rupture of the Membranes (PPROM)
25. Use of the Irish Maternity Early Warning System (I-MEWS) (Revised 2014)
26. Investigation of Postmenopausal Bleeding
27. Nutrition for Pregnancy
28. Fetal Growth Restriction – Recognition, Diagnosis and Management
29. Second Trimester Miscarriage
30. Guidelines for the Critically Ill Woman in Obstetrics

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Still a chance to hear Domini Kemp talk about healthy eating at our Public Meeting on Monday 13th Oct rcpi.ie/course.php?pag... #ettukes14

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Outline

- Purpose of the guideline, scope & methods
- Physiological changes of pregnancy
- Maternal cardiac arrest
  - Causes
  - Management
- Areas of implementation & governance

Purpose & scope

- To provide evidence based guidance to healthcare professionals involved in the management of the pregnant woman who has developed a cardiac arrest

Methods

- Review of other published guidelines
- Literature review
- Input from & peer review by interested stakeholders
  - Anaesthesia, midwifery, obstetrics & resuscitation officers.

Maternal Collapse

- Defined as an acute event involving the cardiorespiratory and cerebrovascular systems, resulting in reduced or absent conscious levels at any stage in pregnancy and up to six weeks after delivery.
- Could be sub-divided into:
  - Collapsed but responsive
  - Collapsed but unresponsive
    - With or without a pulse

Incidence of Maternal Cardiac Arrest

- Rare event so true incidence difficult to determine
- UK Confidential Enquiries (2003-2011)
  - 1 in 20-30,000 pregnancies.
- United States (1998-2011) Anesthesiology 2014 Apr;120(4):810-8
  - 4843 cases in 56,900,512 (or 1 in 12,000) hospitalisations for delivery.
  - Database designed to capture a representative sample of approximately 20% of all U.S. hospital admissions.
  - 58.9% survived to discharge.

Physiology of Pregnancy

- Changes to meet needs of growing fetus & placenta.
- Cardiovascular
  - Increase Blood & Red Cell volume +35%
  - Larger increase Plasma volume +45% -dilutional anaemia
  - Increase Stroke volume +30%
  - Increase Heart rate +15 to 30%
  - Increase Cardiac output +40%
  - Decrease SVResistance –15%
    - BP remains at pre-pregnant levels

Physiology of Pregnancy

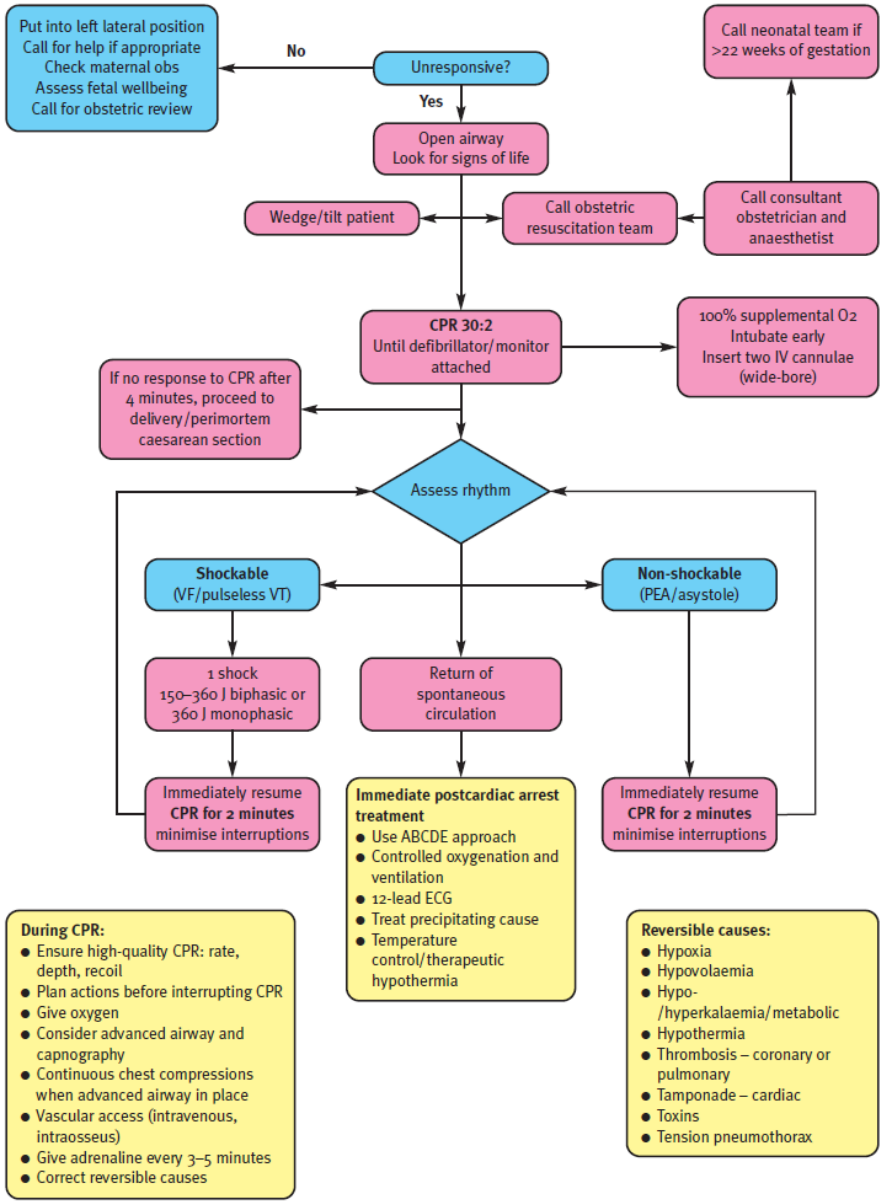
- Respiratory
  - Increase O2 consumption +20 to 50%
  - Increase MV +50%
  - Increase TV +40%
  - Increase RR +15%
- Increased O2 demand with decreased O2 reserve (FRC)
  - Desaturate very quickly

Causes of Maternal Arrest

- **BEAU-CHOPS**
- **B**leeding/ DIC
- **E**mbolism: pulmonary/coronary/amniotic fluid embolism
- **A**naesthetic complications
- **U**terine atony
- **C**ardiac disease: myocardial ischaemia / infarction, aortic dissection, cardiomyopathy
- **H**ypertension, preeclampsia, eclampsia
- **O**ther: standard differential diagnosis of 6 Hs & Ts
  - Hypoxia, Hyper/Hypokalaemia, Hypo/Hyperthermia, Hydrogen ions (acidosis), Hypoglycaemia, and Tension pneumothorax, Tamponade, Toxins, Trauma.
- **P**lacental abruption/praevia.
- **S**epsis.

Management of Maternal Collapse

APPENDIX 2 Maternal collapse algorithm



KEY
ABCDE = airway, breathing, circulation, disability, exposure; CPR = cardiopulmonary resuscitation;
RCG = electrocardiogram; PEA = pulseless electrical activity; VF = ventricular fibrillation; VT = ventricular tachycardia

Table 1. Checklist of Key Tasks During the First Minutes of In-House Maternal Cardiac Arrest

Call for help!	☐ Call "OB Code"
Start CPR	☐ Call neonatal team
	☐ AED/defibrillator
	☐ IMMEDIATE BLS
	☐ Adult code cart
	☐ Adult airway equipment
	☐ Backboard
	☐ Scalpel/Cesarean pack
	☐ Assign timer/documenter
C Circulation	☐ Left uterine displacement (manual)
Chest compressions	☐ Hands mid-sternum
	☐ 100 compressions/min
	☐ PUSH HARD! PUSH FAST!
	☐ Change compressors every 2 min
	☐ Obtain IV access above diaphragm
A Airway	☐ Chin lift/jaw thrust
	☐ 100% O_2 at 10–15 L/min
	☐ Use self-inflating bag mask
	☐ Oral airway or
	☐ Experienced personnel: Intubation with 6–7.0 ETT or
	☐ Supraglottic airway (e.g., LMA)
	☐ Do not interrupt chest compressions!
B Breathing	☐ If not intubated: 30 compressions to 2 breaths
	☐ If intubated: 10 breaths per min (500–700 mL per breath)
	☐ Administer each breath over 1 s
D Defibrillate	☐ Pads front and back
	☐ Use AED or Analyze/defibrillate every 2 min
	☐ Immediately resume CPR for 2 min
	☐ Prepare for delivery
E Extract FETUS	☐ Aim for incision by 4 min
	☐ Aim for fetal delivery by 5 min

Collapsed & unresponsive

- Pulse present?
  - Yes
    - Place in left lateral position & measure BP.
  - No pulse
    - Activate the emergency response team
    - Commence Basic Life Support
      - **C**ompressions **A**irway **B**reathing

Resuscitation Team

- Should comprise
  - The locally agreed adult medical emergency team
  - An obstetrician capable of performing Caesarean Delivery.
  - Neonatal team should be called early if delivery is planned.
- Stand alone maternity hospital
- General hospital
  - May require creation of specific code for maternal cardiac arrest so that appropriate personnel arrive.

Chest Compressions

- 100/minute to depth of 5-6 cm
  - 2-3cm higher on sternum in 3rd trimester.
- No interruptions if airway secured with endotrachial tube
- 30 compressions to 2 breaths
  - If trachea not intubated.
- Person doing compressions changes every 2 mins
- ACLS recommends monitoring exhaled CO2 as an indicator of compression effectiveness.

Left Uterine Displacement (LUD)

- Gravid uterus may cause aortocaval compression
  - If uterus palpable at umbilicus
  - > 20/40 gestation
  - Polyhydramnios, multiple pregnancies etc
- Compressions most effective
  - Patient supine on hard surface
  - Manual displacement of uterus to the left.
  - Wedges, pillows etc – compressions not as effective

Manual LUD

Defibrillation

- Treatment of Ventricular fibrillation
- Standard Defibrillator or Automatic External Defibrillators (AEDs)
  - AEDs useful where people may not have rhythm recognition skills.
  - Be familiar with what's in your own unit.
- Only interrupt compressions to assess rhythm
- 150 joules shock for adult

Airway Management

- Head-tilt, chin-lift, jaw-thrust to open airway
- Oropharyngeal (Guedel) airway
- Bag mask ventilation to visible chest rise
- Laryngoscopy & intubation by experienced personnel
- Supraglottic airways e.g. LMA may be used.
- Focus is on oxygenation & ventilation by whatever means
- Pregnant at risk of gastric aspiration
  - Cricoid pressure may reduce risk
  - May also obstruct ventilation

Peri-mortem Caesarean Delivery (PMCD)

- Guidelines support rapid delivery of fetus in setting of aortocaval compression
  - Emptying gravid uterus improves venous return
- No response to advanced life support measures incl adequate LUD
- Aim to deliver fetus at 5 mins
  - Maternal & neonatal survival reported with longer intervals of arrest.
- Perform PMCD at site of maternal arrest
- Resus trolley should have surgical pack for CD

PMCD

Einav S, Kaufman N, Sela HY. Maternal cardiac arrest and perimortem caesarean delivery: Evidence or expert-based? Resuscitation 2012

- Review of 94 published cases
  - Where data was deemed adequate
- 54% survived to hospital discharge
- PMCD beneficial in 32%
- Condition not worsened in any
- Only 4 of 94 delivered within 5 mins

Intravenous Access

- Equipment for rapid delivery of large, warmed fluid volume should be available
  - Give fluids above the diaphragm if possible.
  - Massive haemorrhage protocol
  - Rapid infusors
  - Ultra sound for central venous access
  - Intra-osseous needle on resus trolley

Resuscitation Drugs

- Same drugs & doses used as for non-pregnant patients
- Lipid emulsion on all resus trolleys
  - Treatment of local anaesthetic toxicity

Post Resuscitation

- Treatment for specific causes
  - e.g. pulmonary embolus
- There should be a defined pathway for transfer of a successfully resuscitated patient to the Intensive Care Unit (ICU)
  - Recently published HSE guideline in conjunction with National Clinical Programs in Anaes, Crit Care & Obs.
- Post- resuscitation measures
  - e.g. therapeutic hypothermia

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Clinical Strategy and Programmes Division

Guidelines for the Critically Ill Woman in Obstetrics

Obstetric & Gynaecology, Anaesthetic and Critical Programmes

Clinical Strategy & Programmes Division

Health Service Executive

Guidelines for the Critically Ill Woman in Obstetrics
Version 1
Published 28th March 2014

Quality Improvement

- Designated lead for resuscitation in each unit
- All clinical staff should have adequate & up to date resuscitation skills
- All cases of maternal collapse should be reviewed through a clinical governance process
- Periodic emergency drills within a hospital
  - Anaesthesia, obstetrics, neonatal, midwifery

How to deliver standard multidisciplinary training?

- BLS locally
- ? UK PROMPT (Practical Obstetrical Multi-Professional Training) style courses
- ? Multidisciplinary simulation laboratory sessions
  - College of Anaesthetists & anaesthetic department of some hospitals
  - “Pregnant” mannequins available to simulate
    - Contractions,
    - CTG monitoring,
    - Breech, instrumental delivery,
    - Shoulder dystocia,
    - Haemorrhage etc

Key Performance Indicators

- Evaluate the multitude of contributing factors and interventions relevant to the scenario.
- Cardiac arrest KPIs
  - early defibrillation, effective chest compressions, and adequate oxygenation.
- Utstein reporting templates
  - Recommended by AHA & European Resus Council etc
  - Collect a multitude of data but most important:
    - Collapse time to 1st CPR attempt
    - Collapse time to 1st defib shock.
    - Collapse time to PMCD (where appropriate)

Take Home Message

- Each obstetric unit should have a designated lead person for resuscitation.
- All healthcare providers within the unit should have adequate & up to date resuscitation skills.
- Standard adult resuscitation protocols (with the addition of left uterine displacement) are applicable to the pregnant woman.
- PMCD in setting of aortocaval compression should be performed as soon as possible (ideally within 5 minutes) if there is no response to adequate resuscitation manoeuvers including LUD.

Thank you

- Guidelines reviewed
  - The American Heart Association 2010 ACLS guidelines for cardiopulmonary resuscitation in special situations (pregnancy).
  - The Society for Obstetric Anaesthesia and Perinatology 2014 consensus statement on the management of cardiac arrest in pregnancy.
  - The Royal College of Obstetrics and Gynaecology 2011 maternal collapse in pregnancy and the puerperium guideline.
  - The European Resuscitation Council 2010 guidelines on cardiac arrest in special circumstances (pregnancy).