

CRITICAL CARE EMERGENCIES 101: HIGH STAKES HIGH ANXIETY

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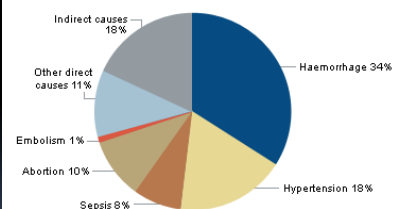
Objectives

- To examine common complications of pregnancy that may require critical care admission
- To review a critical case
- To describe collaborative possibilities with outreach

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Most maternal deaths are from causes that can be prevented or treated

Global distribution of causes of maternal death, 1997–2007



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Critical Care in Obstetrics

- Maternal transfer and morbidity related to:
 - Hypertension
 - Postpartum hemorrhage

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Admissions

- 2.7/1000 births
 - Postpartum (majority)
- Hypertension (30%)
- Hemorrhage (25%)
- Sepsis
- Cardiac disease
- Other pre-existing conditions

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Critical Care Outreach

- History: UK (1999)
- Multidisciplinary team
- Unstable physiology prior to cardiac arrest
- Respiratory cause

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Incidence of Hypertension in Pregnancy

- Chronic hypertension: 3%
- Hypertension in pregnancy: 10%
- Preeclampsia: 5%
- Increasing rates based on:
 - Increased BMI
 - Increased maternal age
 - Nutrition and lifestyle factors

Classification

- Pre-existing hypertension
 - With co-morbid conditions
 - With preeclampsia (after 20 weeks gestation) defined as resistant hypertension or new or worsening proteinuria or one or more adverse conditions
- Gestational hypertension
 - With co-morbid conditions
 - With preeclampsia (after 20 weeks) defined as new proteinuria or one/more co-morbid conditions

Risk factors

- First pregnancy
- Extremes of maternal age (<18 and > 35)
- Obesity
- Personal or family history of preeclampsia
- Diabetes, renal disease, vascular disease
- Paternal antigen exposure

Prevention

- Calcium supplementation
- Aspirin
- Rest
- Regular exercise
- Vitamin C & E
- Diuretics
- Garlic

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Etiology

- Abnormal placental implantation
- Angiogenic factors
- Cardiovascular maladaptation and vasoconstriction
- Genetic predisposition
- Immunologic intolerance
- Platelet activation
- Vascular endothelial damage/dysfunction

Tests/Investigations

- CBC, group and reserve
- INR, PT, PTT
- AST, ALT, LDH
- Urinalysis, Proteinuria (dip or 24 hour collection), creatinine ratio
- Albumin, Bilirubin

Investigations to Classify HDP

Fetal investigations:

- FMC
- NST
- BPP
- Deepest amniotic fluid pocket
- US assessment of fetal growth
- Umbilical artery Doppler

Pharmacological Intervention

- Goal of treatment is to lower the BP to less than 160 mmHg systolic and less than 110 mmHg diastolic
- Initial treatment is recommended: labetalol, or hydralazine
- Magnesium sulfate is not an antihypertensive agent

Labetolol

- A non-selective beta-blocker with vascular-receptor blocking capabilities
- Associated with fetal growth restriction over time and in higher doses with neonatal hypoglycemia
- Side effects include fatigue, lethargy, peripheral vasoconstriction, sleep disturbance
- Oral dose (as ordered) can be from 200 – 1200 mg/d in 2-3 divided doses or up to 10-20 mg IV (with appropriate monitoring guidelines)

Hydralazine

- Selectively relaxes arteriolar smooth muscle causing vasodilation
- Urgent control of severe hypertension
- Side effects include headache, nausea, flushing, palpitations, hypotension/fetal bradycardia (IV doses)
- 50 – 300 mg/d in 2 – 4 doses (as ordered)
- IV doses 5 mg IV (with appropriate guidelines)

Magnesium Sulfate

- Initial dose is 4 grams in 20 minutes with an ongoing dose of 2 grams/hour (IV)
- “High risk medication”
- Prevents eclampsia as well as recurrent seizures
- Priority agent for perinatal seizures (pre or up to 6 weeks post partum); benzos not first line agent in pregnancy induced seizure

M.P.

- M.P. presented to ER with a worsening headache at home (Day 4 following birth) 2 days post discharge from hospital
- No medications, no allergies
- On arrival:
 - BP 180/124, P 98, RR 22
 - Hyperreflexia noted (3+)
 - Bloodwork drawn for LFT's and CBC
- During assessment, M.P. had a seizure

Case study (cont'd)

- Diazepam 10 mg. IV given
- Hydralazine 10 mg. IM stat
- Patient still c/o headache, blurred vision, and "not well"
- BP 170/110, P92, RR 24
- Consult to OB

Triaging Postpartum patients

- Assessment includes:
 - Knowledge of normal postpartum physiology
 - Medical and pregnancy complications
 - Potentially different response to medications

Lab Results

	2 hours	1 hour	ER	Normal
Hgb	120	113	109	115-160
Platelets	104	85	65	150 -400 X10/L
Albumin	28	22	21	35-50 g/L
AST	164	249	375	10 - 42 U/L
ALT	177	222	415	10 - 40 U/L
Bilirubin	11	17	22	3 - 17 umol/L

Case study (cont'd)

- Consult to OB—Mg SO4 started
- CT scan ordered
- Admitted to CCTC for 24 hours
- No further seizures
- Transferred to postpartum for an additional 24 hours. Baby rooming-in with her.

ACLS in Pregnancy

Emergency Response for the Critically Ill Obstetrical Patient
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A separate Code OB - University Hospital is under development and will be based on site specific resources. The process for obstetrical response is currently in the process of review and is subject to change. To ensure the most up-to-date information, always obtain the guidelines and checklists from the CCTC website; the last date of review is identified on the bottom of the page. The link is located under "P" for Pregnancy on the Protocols page.
<http://www.lhs.ca/health/protocolsandcctcprotocols/index.html>

Maternal Cardiac Arrest:

In maternal cardiac arrest where there is a "viable gravid uterus" that is large enough to potentially cause vena caval compression with viable or non-viable, emergency cesarean section should be performed within 4 minutes if there is no return of circulation. The primary purpose is to facilitate effective maternal CPR/ventilation.

CPR should be performed with hands positioned mid sternal (more cephalic than conventional CPR), with uterine displacement position (wedge under right hip, tilted toward left). If the patient is receiving progesterone suppositories at the time of cardiac arrest, the suppository should be stopped and 10 ml of calcium chloride 10% or 20 ml calcium gluconate 10% administered.

Causes for the cardiac arrest should be sought for and treated, using the BEALS/CHOPS mnemonic: (Bleeding, Embolism (contraindicated/anticoagulation), Anesthetic complications, Uterine atony, Cardiac disease (Hypertension/pulmonary hypertension), Hypertension/renal/vascular/obstruction, Other - differential diagnosis per standard ACLS guidelines, Placenta abruption/retention, or Septic.

Emergency responses are divided into 3 situations below:

1. Code OB: when both maternal and neonatal resuscitation/emergency response is needed.
2. Emergency obstetrical response where neonatal resuscitation is not a consideration.
3. Massive Transfusion Pathway (may require activation in either situation 1 or 2 above).

1. CODE OB:

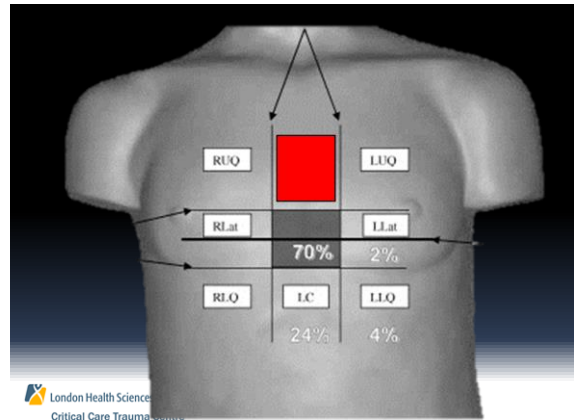
Code OB is indicated when a multidisciplinary team is needed urgently, to respond to a life-threatening maternal event with high likelihood of risk to, or imminent delivery of a potentially viable fetus. Code OB should not be used if neonatal resuscitation is not desired (see #2).

Indications: Maternal Cardiac Arrest, or if there is IMMINENT or unplanned birth of a viable fetus.

ACLS Modifications

- Hand position
- Uterine displacement
- Removal of fetal monitoring
- Consider calcium salts
- Perimortem C section at 4 minutes if no ROSC (to perform effective CPR)
- BEAU CHOPS
- Primary goal is saving mother

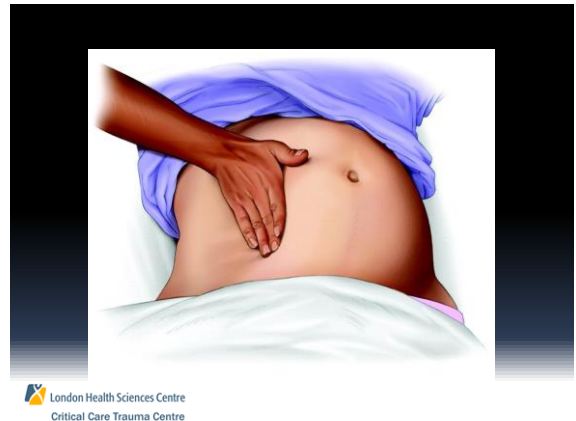
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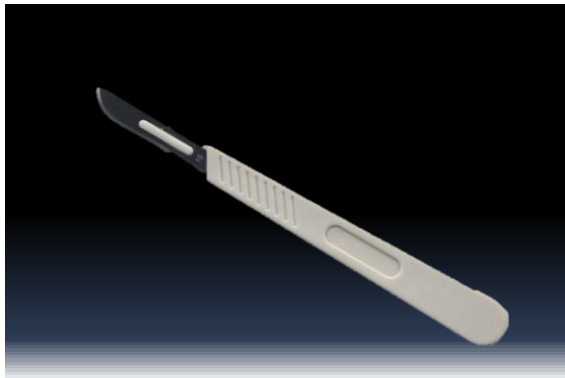
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Maternal ACLS

http://www.lhsc.on.ca/Health_Professionals/CCTC/protocols/emergency_sept_22_2011.pdf

http://circ.ahajournals.org/content/122/18_suppl_3/S829.full

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Rule out and Treat

- B** Bleeding/DIC
- E** Embolism cardiac/pulmonary/amniotic fluid
- A** Anaesthetic complications
- U** Uterine atrophy
- C** Cardiac disease: MI/ischemia/aortic dissection/cardiomyopathy
- H** Hypertension/preeclampsia/eclampsia
- O** Review standard ACLS guidelines (Hs and Ts)
- P** Placental abruption, previa
- S** Sepsis

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Neonatal Resuscitation

- Warm
- Position airway (sniff)
- Suction (80-100 mmHg)
 - Mouth before Nose
- Dry and stimulate
- Don't dry if < 28 weeks, place neonate wet into food grade plastic bag to maintain thermal regulation
- Bag/mask ventilation
- Keep baby below unclamped placenta

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Bleeding in Our Case

- Post cesarean
- Post tPA
- Post CPR
- Deep sedation
- Hypothermia
- Boggy, compliant abdomen
- Fibrinogen deficit (12:4 red cell:plasma)
- Fibrinogen deficit of pregnancy

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Post Partum Hemorrhage: The Five T's

- Tone
- Tissue
- Trauma
- Thrombin
- Therapeutic anticoagulation

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Recognition of PPH (SOGC, 2008)

Blood Loss	SBP	Signs/ Symptoms	Shock
500-1000ml (10-15%)	Normal	↑ HR, palpitations Dizziness	Compensated
1000-1500ml (15-25%)	Slight ↓	Diaphoresis ↑ cap refill Cool extremities Anxiety	Mild
1500-2000ml (25-35%)	70-80 mmHg	↑ RR Postural Hypotension Oliguria	Moderate
2000-3000ml (35-45%)	50-70 mmHg	Hypotension Altered LOC	Severe

Assessment

- Fundus and flow q15 minutes in 1st hour *
Most Important Finding*
- CBC, INR/PTT and fibrinogen
- Continuous BP and HR monitoring

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Lochia Assessment

- Small amount: less than 4 inch stain on peripad
- Moderate: less than 6 inch stain on peripad
- Heavy: pad saturated within 1 hour

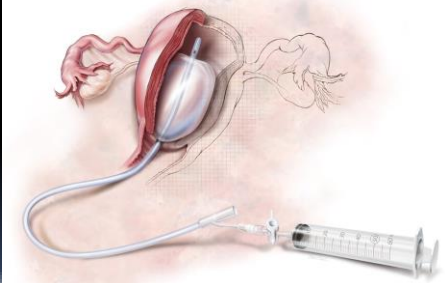
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PPH medications

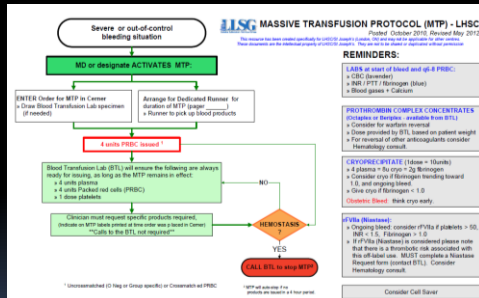
Medication	Dose	Contraindications	Actions
Oxytocin	10 IU IM 20 U in 1000 @ 125ml/hour	none	Contraction of upper segment of myometrium
Methylergonovine	.2 mg IM (q 2-4 hours)	Hypertension, toxemia, sepsis, hepatic or renal disease	Vasoconstriction
Carboprost (Hemabate)	0.25 mg .IM or IMM repeated q15 - 30 minutes for total of 2 mg.	Active pulmonary, renal, hepatic or cardiac disease	Improves uterine contractility
Misoprostil	200 - 600 ug p.o. or 200 - 1000 ug pr	Caution: cardiovascular disease	Smooth muscle contraction

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COOK Bakri MEDICAL POSTPARTUM BALLOON



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Benefits of Early Initiation of Breast Pumping/Feeding

- Promotes uterine contraction to decrease post partum bleeding
- Even small amount of colostrum may be critical to enteric health of neonate (may prevent necrotizing enterocolitis)
- Preserves mothers ability to breast feed following recovery
- All of the other benefits to mother and baby