Localisation Guide

Background

- I thought I'd put a few notes together to facilitate localisation of my crisis manual
- I believe localisation is vital to the usefulness & success of a crisis manual within an institution
- BUT in order for the manual to be useful for users who rotate around hospitals I would really like your changes to adhere to the design principles behind my manual (i did spend a lot of time and energy to conclude upon them after all)
- Hence the rules…

The Rules

- I ask that you do not change the overall design i.e. that each page must be laid out in the same way. This satisfies the design principle such that if a user is familiar with one page, they are then familiar with every page. Key points are:
  - The front and inner front pages remain the same (albeit changing the title of the book to your institutions name)
  - I remain credited as the original creator
  - Colours coding between index & pages remain
  - A tabbed system for quick access to pages remain
  - Red (emergency), Yellow (Thinking, diagnostics, extra information), Green boxes (dosing and equipment calculations) remain
  - Most important tasks are kept at the top with current design format
  - Key decision steps are highlighted
  - Where subtasks are written they are bracketed
  - All drugs are highlighted in green
  - Drug doses are presented pre-calculated for 70kg adults
  - Important tasks/words are bolded for emphasis
  - Links to other tabs keep the same design and colour coding

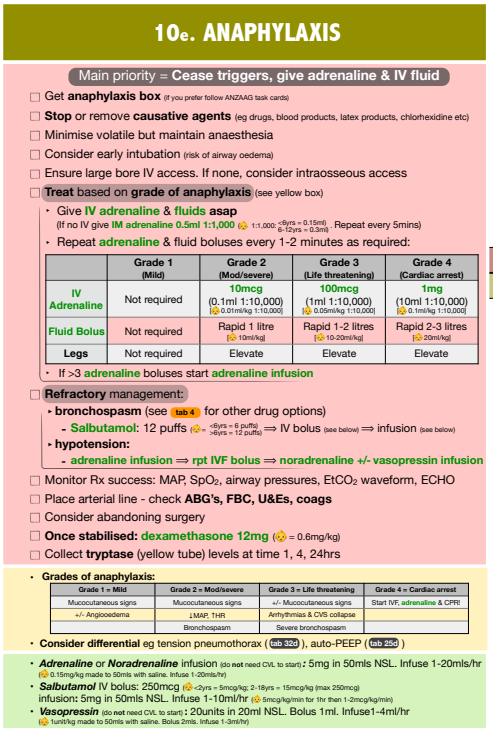
(goodness this became a long list - that wasn't the intention when i started it)

- Version 2 introduced the idea of the book as a topsy turvy book. You could use this by printing both books and then rotating them so flipping end over end gets you to the second book. Alternatively split the binding of the book into 2.
- Everything else is of course up for grabs.
- I would suspect this shouldn't change too much in the short term (given my content choices are based on published guidelines (as alluded to on the front page)). Below you'll find links to where i think obvious things will need to change.
- Obviously over time medicine (slowly) moves on. Hence the content of key treatment steps will have to change to fit in

[Clearly I've no way of enforcing such rules given I'm giving you the source .pages files for you to alter yourselves. But I'm hoping that you understand the design choices I've made & thus why it's important to keep them. And there's goodwill of course.]

Obvious Changes Required

- I have not included any links to where drug dosing protocols need to be changed. I'm very aware that different institutions will have different protocols to run drugs eg Magnesium in eclampsia. You'll have to search through the green boxes & formularies to change to your protocols if you want. Further check that you have stated drugs in your theatre. However, my dosings/protocols (any errors aside) are based on published work, & in a crisis they'll do the trick. I may have course missed small local prompts. Best look through the book carefully, contact me and i can help if i can.



10e. ANAPHYLAXIS

Main priority = **Cease triggers, give adrenaline & IV fluid**

- ☐ Get **anaphylaxis box** (if you prefer follow ANZAAG task cards)
- ☐ **Stop** or remove **causative agents** (eg drugs, blood products, latex products, chlorhexidine etc)
- ☐ Minimise volatile but maintain anaesthesia
- ☐ Consider early intubation (risk of airway oedema)
- ☐ Ensure large bore IV access. If none, consider intraosseous access
- ☐ **Treat** based on **grade of anaphylaxis** (see yellow box)
  - Give **IV adrenaline** & **fluids asap**
    (If no IV give **IM adrenaline 0.5ml 1:1,000** 1:1,000: <6yrs = 0.15ml, 6-12yrs = 0.3ml) Repeat every 5mins)
  - Repeat **adrenaline** & fluid boluses every 1-2 minutes as required:

	Grade 1 (Mild)	Grade 2 (Mod/severe)	Grade 3 (Life threatening)	Grade 4 (Cardiac arrest)
IV Adrenaline	Not required	10mcg (0.1ml 1:10,000) [0.01ml/kg 1:10,000]	100mcg (1ml 1:10,000) [0.05ml/kg 1:10,000]	1mg (10ml 1:10,000) [0.1ml/kg 1:10,000]
Fluid Bolus	Not required	Rapid 1 litre [10ml/kg]	Rapid 1-2 litres [10-20ml/kg]	Rapid 2-3 litres [20ml/kg]
Legs	Not required	Elevate	Elevate	Elevate

  - If >3 **adrenaline** boluses start **adrenaline infusion**
- ☐ **Refractory** management:
  - **bronchospasm** (see tab 4 for other drug options)
    - **Salbutamol**: 12 puffs (<6yrs = 6 puffs, >6yrs = 12 puffs) ⟹ IV bolus (see below) ⟹ infusion (see below)
  - **hypotension:**
    - **adrenaline infusion** ⟹ **rpt IVF bolus** ⟹ **noradrenaline +/- vasopressin infusion**
- ☐ Monitor Rx success: MAP, SpO_2, airway pressures, $EtCO_2$ waveform, ECHO
- ☐ Place arterial line - check **ABG's, FBC, U&Es, coags**
- ☐ Consider abandoning surgery
- ☐ **Once stabilised: dexamethasone 12mg** (= 0.6mg/kg)
- ☐ Collect **tryptase** (yellow tube) levels at time 1, 4, 24hrs

- **Grades of anaphylaxis:**

Grade 1 = Mild	Grade 2 = Mod/severe	Grade 3 = Life threatening	Grade 4 = Cardiac arrest
Mucocutaneous signs	Mucocutaneous signs	+/- Mucocutaneous signs	Start IVF, adrenaline & CPR!
+/- Angiooedema	↓MAP, ↑HR	Arrhythmias & CVS collapse	
	Bronchospasm	Severe bronchospasm	

- **Consider differential** eg tension pneumothorax (tab 32a), auto-PEEP (tab 25a)

- ***Adrenaline*** or ***Noradrenaline*** infusion (do **not** need CVL to start): 5mg in 50mls NSL. Infuse 1-20mls/hr (0.1mg/kg made to 50mls with saline. Infuse 1-20mls/hr)
- ***Salbutamol*** IV bolus: 250mcg (<2yrs = 5mcg/kg; 2-18yrs = 15mcg/kg (max 250mcg)
  infusion: 5mg in 50mls NSL. Infuse 1-10ml/hr (5mcg/kg/min for 1hr then 1-2mcg/kg/min)
- ***Vasopressin*** (do **not** need CVL to start): 20units in 20ml NSL. Bolus 1ml. Infuse1-4ml/hr (1unit/kg made to 50mls with saline. Bolus 2mls. Infuse 1-3ml/hr)

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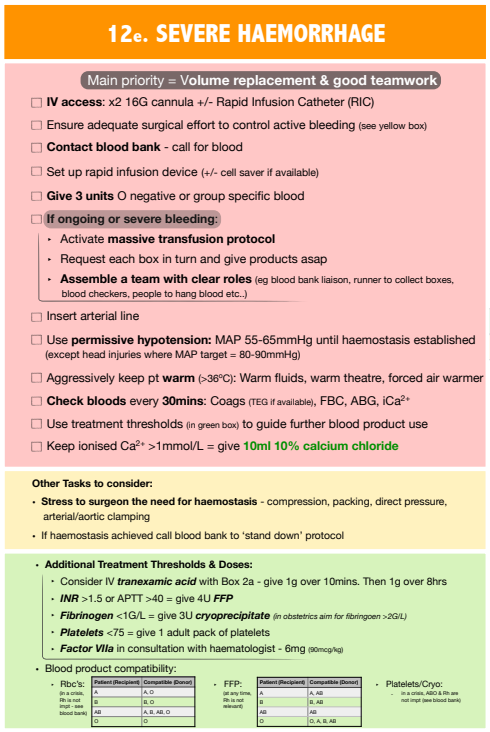
- Do you have an anaphylaxis box? Where is it? If you don't - now might the time

•Colour of tryptase tube & timings of samples



12e. SEVERE HAEMORRHAGE

Main priority = **Volume replacement & good teamwork**

- ☐ **IV access**: x2 16G cannula +/- Rapid Infusion Catheter (RIC)
- ☐ Ensure adequate surgical effort to control active bleeding (see yellow box)
- ☐ **Contact blood bank** - call for blood
- ☐ Set up rapid infusion device (+/- cell saver if available)
- ☐ **Give 3 units** O negative or group specific blood
- ☐ **If ongoing or severe bleeding:**
  - Activate **massive transfusion protocol**
  - Request each box in turn and give products asap
  - **Assemble a team with clear roles** (eg blood bank liaison, runner to collect boxes, blood checkers, people to hang blood etc..)
- ☐ Insert arterial line
- ☐ Use **permissive hypotension:** MAP 55-65mmHg until haemostasis established (except head injuries where MAP target = 80-90mmHg)
- ☐ Aggressively keep pt **warm** (>36°C): Warm fluids, warm theatre, forced air warmer
- ☐ **Check bloods** every **30mins**: Coags (TEG if available), FBC, ABG, iCa^{2+}
- ☐ Use treatment thresholds (in green box) to guide further blood product use
- ☐ Keep ionised Ca^{2+} >1mmol/L = give **10ml 10% calcium chloride**

Other Tasks to consider:

- **Stress to surgeon the need for haemostasis** - compression, packing, direct pressure, arterial/aortic clamping
- If haemostasis achieved call blood bank to 'stand down' protocol

- **Additional Treatment Thresholds & Doses:**
  - Consider IV ***tranexamic acid*** with Box 2a - give 1g over 10mins. Then 1g over 8hrs
  - ***INR*** >1.5 or APTT >40 = give 4U ***FFP***
  - ***Fibrinogen*** <1G/L = give 3U ***cryoprecipitate*** *(in obstetrics aim for fibrinogen >2G/L)*
  - ***Platelets*** <75 = give 1 adult pack of platelets
  - ***Factor VIIa*** in consultation with haematologist - 6mg (80mcg/kg)
- Blood product compatibility:
  - Rbc's: (in a crisis, Rh is not impt - see blood bank)

Patient (Recipient)	Compatible (Donor)
A	A, O
B	B, O
AB	A, B, AB, O
O	O

  - FFP: (at any time, Rh is not relevant)

Patient (Recipient)	Compatible (Donor)
A	A, AB
B	B, AB
AB	AB
O	O, A, B, AB

  - Platelets/Cryo: (in a crisis, ABO & Rh are not impt (see blood bank)

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12e

•Do you have a rapid infusion trolley
•Do you have RIC lines?
•Do you have a rapid transfuser?
•Do you have a cell saver
•Add blood banks phone number
•How much blood should be given before activating a MTP at your hospital?

•Do these treatment thresholds match your MTP?
•Do you have platelets on site?
•Do you have to contact haematologist before given VIIa? How do you contact them?

13e. AIR/GAS EMBOLISM

Main priority = **Restore cardio-respiratory stability**

- ☐ 100% oxygen
- ☐ **Stop nitrous oxide**
- ☐ **Stop source** of air/gas entry:
  - Surgical site - lower to below level of heart & flood with irrigation fluid
  - Entry point - search for e.g. open venous line
  - Neurosurgery case - consider intermittent jugular venous compression
- ☐ Place **patient in head down, left lateral** position
- ☐ **Remove pnuemoperitoneum** (if in use)
- ☐ If CVL in place - aspirate line
- ☐ Consider **chest compressions** 100/min (even if not in arrest - known to break up volumes of air)
- ☐ **Aim MAP >65mmHg** :
  - Assess fluid responsiveness - 500ml bolus crystalloid (= 20ml/kg)
  - Vasoactive medications eg **noradrenaline, adrenaline, dobutamine**
- ☐ Consider early TOE - (useful to r/o other causes of pulmonary embolism)
- ☐ Consider referral for hyperbaric oxygen therapy

- **Signs of air/gas embolism:**
  - **Respiratory**: ↓$EtCO_2$ (most sensitive), ↓SpO_2, pulmonary oedema, bronchospasm
  - **CVS**: shock, tachycardia, ↑PA pressures, cardiovascular collapse
- Use of **PEEP** is controversial. May ↑risk of paradoxical air embolism through PFO (note PFO is present in 10-30% of population)
- **Hyperbaric O_2** - treatment up to 6hrs post event may improve outcome in paradoxical air embolism

- ***Adrenaline:***
  - bolus = 10-100mcg (0.1-1ml of 1:10,000) - (0.01-0.05ml/kg of 1:10,000)
  - Infusion = 5mg in 50mls NSL. Infuse 0-20mls/hr (see tab 36e)
- ***Noradrenaline infusion:*** 5mg in 50mls NSL. Infuse 0-20mls/hr
- ***Dobutamine infusion:*** 250mg in 50ml NSL. Infuse 0-10ml/hr (can infuse peripherally)

1e. CICO - Supraglottic Rescue

Main priority = **Oxygenation with stable SpO_2 >90%**

- ☐ **Pre-oxygenate** all patients
- ☐ Consider **passive apnoeic oxygenation** with nasal cannula during RSI
- ☐ Remove cricoid early

If failure of first supraglottic airway plan:

- ☐ Get difficult intubation trolley
- ☐ An extra anaesthetic assistant to prepare equipment is very useful
- ☐ Use '*vortex*' approach -
  - **No more** than **3 attempts** at each **rescue technique. Move quickly,** in **any order**, between rescue techniques watching SpO_2/$EtCO_2$:

Bag/Mask	LMA	ETT
Dentures in	Change type	Dentures out
Optimise position	Change size	*Best*: person, position, blade eg video laryngoscope
2 hands + assistant	Cuff inflation/deflation	BURP
OPA/NPA	Place with laryngoscope	Bougie - only 1 blind attempt
+/- Muscle relaxation	+/- Muscle relaxation	+/- Muscle relaxation

- ☐ **If success with LMA:** consider converting to ETT with fibre optic scope
- ☐ Before giving muscle relaxation consider possibility of **waking patient**: **sugammadex 1.2g, naloxone 400mcg**
- ☐ As each rescue attempt **fails**, **escalate** & start to **prepare** for infraglottic **rescue**:
  - **Ready**: Get CICO kit from side of anaesthetic machine
  - **Set**: Open equipment packaging & palpate cricothyroid landmarks

If SpO_2 rapidly falling or persistently low (<90%) despite **3** different **techniques**:

- ☐ Call out loud - **'We are in a Can't Intubate, Can't Oxygenate Scenario'**
- ☐ **Do not delay,** start infraglottic rescue. See tab 2e

- ***sugammadex*** = immediately post roc/vec = 1.2g or 6 x 200mg vials (16mg/kg)
- ***naloxone*** = 400mcg bolus (10mcg/kg)

2e. CICO - Infraglottic Rescue

Main priority = **Oxygenation with stable SpO_2 >90%**

- ☐ **Dedicated team** continuing to attempt **oxygenation supraglottically**
- ☐ Pull patient up bed so head extends over pillow
- ☐ 3 options for infraglottic rescue (decide on your preferred 1st method):

1. Scalpel bougie *(palpable neck anatomy)*:

- ☐ = A **bloody, semi-blind** technique. Prepare gauze/swabs & suction
- ☐ Method (with 10 blade scalpel):
  - **Horizontal** stab incision through cricothyroid membrane
  - **Rotate scalpel** to vertical (blade caudad) and pass **bougie** alongside blade
  - Remove scalpel, railroad **size 6** ETT over bougie

2. Cannula Cricothyroidotomy *(palpable neck anatomy)*:

- ☐ **CICO Pack**: 14G cannula, 5ml syringe (with 2ml NSL), Rapid O_2 (insufflation device)
- ☐ Secure cricoid cartilage & aspirate as you advance the saline filled cannula
- ☐ Success = **free aspiration of air** - never let go of cannula
- ☐ Connect Rapid O_2 device to cannula & machine aux O_2 port (10L/min @ flowmeter):
  - **1st breath**: 6 secs (1000mls) - look for chest **rise & fall**
  - **Wait** 20 secs for SpO_2 rise **or** when SpO_2 starts to drop from peak response
  - **2nd breath**: 1.5 secs (250mls) & **repeat only** after waiting as previous step
  - If **no ↑SpO_2** after **2nd breath** or **any doubt** then **abandon** technique
- ☐ Convert to Melker size 5 airway using Seldinger technique

3. Scalpel, Finger, Cannula/Scalpel *(non-palpable anatomy)*:

- ☐ = A **very bloody, blind** technique. Prepare gauze/swabs & suction
- ☐ Method:
  - Vertical **midline 6cm** incision through skin & subcutaneous tissue
  - Use both hands to **blunt** dissect down to airway & **secure** cartilage
  - Insert cannula or scalpel through cricothyroid membrane
  - Follow step 1 or 2 as above to oxygenate patient

- Choice of 1st method is operator's personal preference. Decide on your preferred method & practise it - mentally or in a simulation
- If 1st method is unsuccessful move to alternative method immediately
- If no palpable anatomy: scalpel finger method is recommended

•Do you have a local hyperbaric unit?

•Oh dear this is difficult topic from top to bottom. You may have to change the whole thing from top to bottom here. However, the Vortex model has a lot of traction in Australasia & is simple and useful
•DO you have a difficult intubation trolley?

•Do you have a CICO kit on the side of your machines? (Again perhaps a good time to make one?)

•And now you know the contents of our CICO pack

•If your Anaesthetic machines goto 15L on the aux port you might want to recalculate the seconds taken to insufflate the same volumes
•Do you have Melker kits to convert to airway over a wire?

4e. BRONCHOSPASM

Main Priority: **SpO_2 >95% with Peak Airway Pressures <50cmH_2O**

- ☐ Inform surgeon. Minimise surgical stimulation
- ☐ **Check:**
  - Airway position
  - $EtCO_2$ trace
  - Airway pressures
- ☐ **Manually ventilate** - confirm high pressures and ensure adequate tidal volume
- ☐ **Deepen anaesthesia.** If using **desflurane**, switch to alternative
- ☐ **Emergency Drug** therapy:
  - Inhaled **salbutamol 12 puffs** via circuit (👶 <6yr = 6puffs; >6yr = 12puffs)
  - Inhaled **ipratropium bromide 6 puffs** via circuit (👶 4 puffs)
  - **IV salbutamol - 250mcg** slow bolus (👶 below). Repeat at 10mins if needed
  - **IV adrenaline - 0.1 - 0.5ml of 1:10,000** (👶 0.01-0.05ml/kg 1:10,000)
- ☐ **Optimise ventilator** settings: long expiratory phase, low PEEP, small tidal volumes, intermittent disconnection
- ☐ Other **bolus** drug **adjuncts** (listed in priority order): **hydrocortisone, magnesium, ketamine, aminophylline**
- ☐ If **no improvement** use **infusions** of **salbutamol, aminophylline, adrenaline**
- ☐ Place arterial line. Take serial ABG's

- Always **consider other causes** of high airway pressure other than primary bronchospasm see tab 25b. Most common include:
  - anaphylaxis
  - laryngospasm (on LMA)
  - tube position
  - chest wall rigidity
  - pneumothorax
  - LV failure
- **Permissive hypercapnia** may be required in order to ↓airway pressures
- Assess response by ↓airway pressures, ABG's, and improving $EtCO_2$ trace

- ***Salbutamol IV*** slow bolus: 👶: <2yrs = 5mcg/kg; 2-18yrs = 15mcg/kg (max 250mcg)
- ***Salbutamol Infusion:*** 5mg in 50ml NSL. Infuse 0-10ml/hr. (👶 50mls of neat salbutamol. Infuse 5-10mcg/kg/min for 1 hour, then reduced to 1-2mcg/kg/min)
- ***Adrenaline infusion:*** 5mg in 50mls NSL. Infuse 0-20mls/hr. (👶 not recommended)
- ***Hydrocortisone:*** 200mg IV (👶 4mg/Kg)
- ***Aminophylline:*** bolus load: 400mg over 15mins. Infuse: 50mg in 50ml at 35ml/hr. (👶 Load: 10mg/kg over 1hr diluted to 1mg/ml (max 500mg). Infusion varies by age: see tab 36e)
- ***Magnesium:*** 10mmol (5mls of 49.3%) over 20mins (👶 0.1ml/kg of 49.3% (max 5mls) over 20mins)
- ***Ketamine:*** 35-70mg IV. (👶 0.5-1mg/kg)

22e. POST PARTUM HAEMORRHAGE

Main Priority: **Prepare for Massive, Rapid Blood Loss**

- ☐ **x2 16G IV** cannula - consider intraosseous access if needed
- ☐ Encourage **surgical control** of uterine tone & bleeding (see yellow box)
- ☐ Rapidly infuse crystalloid to match blood loss
- ☐ If **ongoing severe blood loss**:
  - Call blood bank & rapidly transfuse up to **3 units of blood**
  - If required activate **massive transfusion protocol** (see tab 12e)
  - Note **obstetric specific MTP** actions:
    - If fibrinogen level <2 then give **3 units cryoprecipitate**
    - Consider giving **tranexamic acid** early: **1g over 10mins**
- ☐ If **out of theatre:** call **777** declare an "**obstetric emergency**"
- ☐ Use **vasopressors** to maintain a MAP >65mmHg
- ☐ Aggressively keep pt **warm** (>36ºC): Warm fluids, warm theatre, forced air warmer
- ☐ Use **oxytocics** to address uterine atony:
  - **Oxytocin IV 5 units slow push.** Follow with **infusion**
  - **Ergometrine 500mcg IM** (avoid if ↑MAP)
  - **Carboprost 250mcg IM/IU** (avoid if asthmatic). Repeat every 15mins (max 8 doses)
  - **Misprostol 400-1000mcg PR/vaginal**
- ☐ Perform **RSI** to enable surgical control (**spinal** only if haemodynamically **normal**). Consider:
  - Induction: **Ketamine 100mg** (1-2mg/kg), **suxamethonium 100mg**
  - Maintenance: **TIVA** or **volatile/nitrous**
- ☐ Place arterial line +/- CVL
- ☐ Review with surgeon every 10mins: diagnosis & plan (see yellow box)

- Major **causes of PPH**:
  - Tone (75%)
  - Tissue/Retained placenta (15%)
  - Trauma/Laceration (5-10%)
  - Thrombosis/Coagulopathy
- **Surgical control** of bleeding can include:
  - Pre-theatre: Uterine massage, bimanual compression, aortal compression
  - Intra-op: BAKRI balloon, B Lynch suture, aortal compression, artery ligation, hysterectomy

21e
22e

- ***Oxytocin*** infusion: 40units in 1litre NSL. Infuse at 250ml/hr
- Vasopressors: ***Metaraminol*** 1mg; ***phenylepherine*** 100mcg, ***Adrenaline***: 10-100mcg & titrate
- ***Adrenaline/Noradrenaline*** Infusion: 5mg in 50mls NSL. Infuse at 10-20ml/hr preferably via CVL

19e. MATERNAL COLLAPSE

Main Priority: **Good CPR, Diagnose Cause, Prepare for Delivery**

- ☐ Review all infusions/medications recently administered
- ☐ **Activate MTP** now. Start volume resuscitation asap (See tab 12e)
- ☐ If **no cardiac output:**
  - Call 777 & declare **'MET call + obstetric & neonatal emergency'**
  - Start **preparations** to deliver baby **now** (peri-mortem Caesarean or instrumental)
  - Remove all foetal monitoring
  - Start **CPR** > apply **defib** > check **rhythm** > see tab 6e or tab 7e
  - Ensure IV access, if none consider IO access (humerus preferable)
  - Consider reversible causes & **attempt diagnosis & treat asap** (see yellow box)
- ☐ Note '**maternal' specific tasks** during CPR:
  - **Lift uterus skyward** & **displace** to left
  - **Intubate early** & ventilate with $EtCO_2$ target of 30mmHg
  - Perform chest **compressions higher** on chest & push **deeper**
  - Patient >24 weeks: If **no rapid ROSC** then start **immediate** preparations to **deliver baby** within 5mins (peri-mortem Caesarean or instrumental)
- ☐ If **Peri or Post Arrest:**
  - Start standard peri-arrest care. Supporting **ABC's as appropriate** (intubate early)
  - Consider reversible causes & **attempt diagnosis & treat asap** (see yellow box)
  - Ensure ongoing **lifting of uterus** skyward & displaced to left (if baby not delivered)

19e
20e

- **Delivery of baby** is performed to **improve maternal prognosis, not babies**
- Consider the reversible causes of collapse in pregnancy (**Ts & Hs**):
  - **Hypoxia**: aspiration, high spinal
  - **Hypovolaemia/hypotension**: bleeding, high spinal
  - **Metabolic disorders**: AKI from severe pre-eclampsia, ↓BSL
  - **Hypertension**: intracranial haemorrhage, eclamptic seizure
  - **Toxicity**: Anaphylaxis, ↑Mg^{2+}, LA toxicity, eclampsia/ seizures
  - **Thromboembolism**: VTE/PE, amniotic fluid or air embolism
  - **Tamponade**: cardiac 2nd to aortic dissection, trauma
  - **Tension PTX**: trauma

- ***Magnesium*** *(49.3%)* [eclampsia]:
  - loading infusion: 8mls in 100ml NSL. Infuse at 300ml/hr to complete
  - For maintenance & rescue doses see tab 23e
- ***Calcium chloride 10%*** [$MgSO_4$ toxicity antidote]: 5mls slow push. (can repeat)
- ***20% Intralipid*** [LA toxicity]: (max total 12ml/kg)
  - bolus: 100mls (1.5ml/kg). Repeat (max twice) every 5 mins, if required
  - maintenance: 1000ml/hr (15ml/kg/hr). Double speed @5mins if no improvement
- ***Alteplase*** [Thrombosis]: 100mg in 20mls NSL. Infuse at 80ml/hr (be prepared for prolonged CPR - upto 60mins)
  [To reverse]: Stop infusion. Give ***1g tranexamic acid***. Discuss with haematologist (***cryo*** *+/-* ***platelets***)

- Some places have inhalers not in the trolleys. What about the circuit connectors?

- Number of blood bank
- If you have a cell saver - set it up?

- What are the numbers to call in order to get you to theatre asap

- What should you say to switchboard to mobilise the right people?
- Magnesium protocols can be very localised. Is yours different?

- How do you contact haematologist

20e. NEONATAL LIFE SUPPORT

Main Priority: **Dry baby, Oxygenate & Reassess every 30secs**

- ☐ Pre-setup **neopuff**: Gas supply @10L, PEEP 5, PIP 30cmH_2O. Heater & suction
- ☐ In 1st minute: **Vigorously dry** baby & apply warm, dry towels
- ☐ Then work in **30 sec cycles**. Perform intervention then reassess at end of cycle:
  - **Tone** - UL & LL
  - **HR** - use SpO_2 probe or stethoscope (tap beats out +/- count beats for 3secs, then x 20)
  - **RR** - Are they gasping or apnoeic?
- ☐ **If HR >100, good tone, regular RR:** give routine care
- ☐ **If baby well except ↑WOB:** give 5 cmH_2O CPAP with room air
- ☐ **If any** of **HR <100, poor tone, gasping/apnoeic:** start ventilating:
  - Fine tuning of neutral head position with jaw thrust is vital
  - Room air initially. ↑O_2 every 30 secs if no improvement: 40% then 100%
  - consider x5 inflation breaths of 2-3 sec: PIP 30cmH_2O
  - Once adequate **chest rise**: RR 40-60/min: PIP 15-20cmH_2O
- ☐ **If HR <60:**
  - 100% O_2. Consider LMA or intubation (if skilled)
  - Start chest compressions @ 90/min (2 thumb technique with 2nd person for airway is preferred)
  - Use ratio = **compressions 3 : 1 breath** (half second compression pause to deliver breath)
- ☐ **If Ongoing HR <60:**
  - Give **1:10,000 adrenaline** based on gestation
  - Umbilical **venous catheter** is preferred (1 vein, 2 arteries)

	23-26 Weeks	27-37 Weeks	38-43 Weeks
Umbilical Adrenaline	0.1 ml	0.25 ml	0.5 ml
ETT Adrenaline	1ml/kg (100mcg/kg) then 2ml normal saline flush		

  - Consider **umbilical saline bolus** 10ml/kg

19e 20e

- If **preterm** use lower inflation pressures: 28-32wks = 25/5; <28wks = 20/5
- Significant **meconium** delivery: Only suction a flat baby prior to oxygenating
- Place NG to **decompress stomach** if difficulty ventilating
- Assistant can place SpO_2 probe on right arm at any point. **Targets**:
  - 1min = 60-70%
  - 2min = 65-85%
  - 3min = 70-90%
  - 4min = 75-90%
  - 5min = 80-90%
  - 10min = 85-90%

Neonatal Drugs & Equipment (see tab 9e)

- ***Naloxone***: Full term = 200mcg IM (otherwise 10mcg/kg IM/IV)
- ETT: uncuffed size = [*term*] 3-3.5mm, [*preterm*] 2.5mm (have size above & below to hand); length 10cm

15e. LOCAL ANAESTHETIC TOXICITY

Main Priority: **Good Quality CPR & early Intralipid**

- ☐ **Stop** administration of **LA** and get **LA Toxicity Box**
- ☐ If **signs of cardiac output:**
  - Consider need for **intubation**
  - **Ventilate** if required - aim for $EtCO_2$ 30mmHg
  - Confirm IV access
  - Consider giving **IV 20% intralipid** early: bolus then infusion (see dosing below)
  - If **arrhythmia** use standard protocols - see tab 2de
    (Consider **amiodarone 300mg** slow IV push. Avoid **lignocaine**, caution with **Bblockers**)
  - Support **MAP** with fluids & **vasopressors**
  - Treat **seizures**:
    - **midazolam IV 2mg** bolus. Repeat every min (max 10mg) (👶 see green box)
    - If **refractory**: perform **RSI**
- ☐ If **cardiac arrest:**
  - Start **CPR** (see tab 6e or tab 7e) but note:
    - Use **reduced dose adrenaline** (70mcg/dose) (👶 1mcg/kg) **only** after **intralipid**
    - Be prepared to continue for 60 mins
  - Give **20% IV intralipid** (👶 see green box):
    - **Bolus**: 100mls. Can repeat every 5 mins, maximum twice (if required)
    - **Infusion**: 1000ml/hr neat intralipid. Double rate @ 5mins if no improvement
    - Do not exceed max dose of 840mls
  - Mobilise cardiopulmonary bypass/ECMO team (if available)
  - Send **ABG** - keep pH >7.25: Give **sodium bicarbonate 8.4% 50mls** (👶 1ml/kg)
    (Can rpt every 2mins - must ensure adequate ventilation)

15e 16e

- **Signs** of LA toxicity:
  - **CNS**: Numb tongue, tinnitus, metallic taste, slurred speech, seizures, unconscious
  - **CVS**: ↓MAP, broad QRS, bradycardia deteriorating into PEA & asystole
- Temporary pacing may be required for symptomatic bradycardias (see tab 30d)

PAEDS Dosing (see tab 8e or tab 36e for 👶 resus doses)

- ***Midazolam***: IV 0.15mg/kg; IM 0.2mg/kg; buccal 0.5mg/kg. Can repeat at 5mins
- ***Intralipid*** 20%: bolus: 1.5ml/kg. Can rpt every 5mins x2. Infusion: 15ml/kg/hr. At 5mins can double rate if no improvement. Max cumulative dose = 12ml/kg

16e. MALIGNANT HYPERTHERMIA

Main Priority: **Early Recognition, Removal of Triggers, Dantrolene**

- ☐ **Recognise problem** - if in doubt treat
- ☐ Call for **MH trolley** (if you prefer: distribute & follow MH task cards)
- ☐ Delegate & organise help into teams
- ☐ **Stop volatile** & washout with **100% oxygen at 15 litres**. Switch to **TIVA**
- ☐ Add charcoal filters to circuit. Change soda lime if easy (**Do not** waste time changing machine/circuit)
- ☐ Give **IV dantrolene** (👶 2.5mg/kg) & **get more** from on call pharmacist:
  - 9 vials of 20mg. Reconstitute each vial into 60ml syringe with water
  - Repeat every 10mins until control achieved (max total 35vials or 10mg/kg)
- ☐ Increase **monitoring** if not already in place:
  - **Arterial line** +/- CVL. Take serial bloods: ABGs (every 30min), Coags, CK
  - **Urinary catheter**. Aim for urine output >2ml/kg/hr
  - **Core temperature probe** eg rectal or bladder
- ☐ Treat **complications**:
  - **>38.5°C**: refrigerated IV fluids (& intraperitoneal if surgical access), surface ice, cold operating room
  - **pH <7.2**: Ventilate $EtCO_2$ to 30cmH_2O (+/- **sodium bicarbonate**)
  - **K^+ >7 or ECG changes**: Give **IV calcium chloride, IV insulin-dextrose infusion, salbutamol puffs**
  - **Arrhythmias**: Defibrillate. Consider **IV amiodarone** +/- **lignocaine** +/- **esmolol**
  - **MAP <65mmHg**: start **noradrenaline** infusion
- ☐ Consider abandoning surgery & ICU referral

15e 16e

- Rapid diagnosis: ABG = mixed respiratory & metabolic acidosis
- **Signs** suggesting possible MH:

Early	Developing	Late
↑ing EtCO2	↑ing temp/sweating	Cola coloured urine
Masseter spasm	CVS instability	Coagulopathy, ↑↑CK
THR/arrhythmia	↓pH, ↑K	Cardiac arrest

- [*pH<7.2*]: ***Sodium bircarbonate*** 8.4% 50mls, rpt every 2mins
- [*K^+ >7*]: ***Calcium chloride*** 10% 10mls IV (👶 0.2ml/kg); 10units of ***actrapid*** in 250mls ***10% dextrose*** over 30mins (👶 0.1u/kg actrapid in 2ml/kg of dextrose over 30mins); 12puffs ***salbutamol*** into circuit (👶 2-4puffs) rpt every 20mins
- [*arrhythmias*] ***Amiodarone*** 300mg slow IV push (👶 5mg/kg); 7mls ***1% lignocaine*** slow IV push (👶 0.1-0.2ml/kg) (Can rpt every 10 mins - max 0.3ml/kg); ***Esmolol*** 10mg increments
- [*↓MAP*]: ***Noradrenaline*** infusion: 5mg in 50mls NSL. Infuse at 0-20mls/hr

•Do you have neopuffs?

•Do you have a LA Toxicity box. Maybe time for one?

•Do you have a MH trolley? (I say no more)

23e. PERI-PARTUM SEIZURE

Main Priority: **Oxygenation, Magnesium & Treating Hypertension**

- ☐ Call **777** & state "**obstetric emergency**"
- ☐ Call for **eclampsia box**
- ☐ Give **O_2** 15L/min via non-rebreathe facemask
- ☐ Apply monitoring: SpO_2, ECG, NIBP
- ☐ **Start timer**: Measure length of seizure (eclamptic seizures normally self terminate)
- ☐ **Maximise patient safety** while displacing gravid uterus (if antenatal):
  - Pillows & covered bed sides
  - Depending on staff safety: Lift uterus up & to left *or* place in **full left lateral**
- ☐ Prepare and give **Magnesium (49.3%) asap**:
  - **Loading dose**: IV 8mls in 100mls NSL. Infuse at 300mls/hr to completion. (if no IV then give 10mls IM into each gluteal region (total 20mls))
  - Then **Maintenance** infusion (see green box)
  - If repeat seizure give **rescue dose** (see green box)
- ☐ **If ongoing seizures *or* seizure lasting >10mins:** then escalate treatment:
  - give **Midazolam IV 2mg bolus**, repeat every minute (max 10mg) (if no IV then use high concentration 5mg/ml **midazolam**: **Nasal**: 2ml via atomiser or **IM**: 2ml into deltoid)
  - perform **RSI** & refer to ICU
- ☐ **Post seizure**:
  - **Review A, B, C** & check **blood sugar level**
  - Send **blood tests** (FBC, LFTs, U&Es, uric acid, coag screen, Mg, G&H)
  - Consider chance of **aspiration**: SpO_2, auscultate chest, perform chest XR (if needed)
  - If **bp >160/100mmHg** the consider treatment with drugs:
    - **Labetalol IV** (neat=5mg/ml): 4ml over 2mins. Repeat every 10 mins (max 3 doses)
    - **Hydralazine IV** (neat=1mg/ml): Give 5ml over 10mins. Do not repeat within 30min
  - **Restrict total fluid** input to 80mls/hr & monitor hourly urine with catheter
- ☐ **If antenatal:** Discuss with obstetric team: Plan for delivery of baby
- ☐ Consider **other causes** of seizure other than eclampsia: discuss with **neurologists**

- Check reflexes, sedation score & vitals: Initially every 30min, then hourly
- Serum magnesium levels are only needed if concurrent renal dysfunction:
  - Therapeutic Mg^{2+} level = 2-4mmol/L
  - Send yellow top 1 hour after start of maintenance dose. Rpt levels every 4 hrs if concern
- If concern over magnesium toxicity: Stop infusion & give **calcium chloride 10% 5mls** IV push

- ***Magnesium*** :
  - Maintenance: add 25mls (5 vials) to 100mls NSL. Infuse at 10mls/hr for 24hrs
  - Rescue (i.e. another seizure): 4mls with 6mls NSL. Infuse at 30ml/hr
- ***Labetalol*** infusion: Make 200mg up to 200mls with NSL. Infuse at 20ml/hr. Double rate 30mins (max 160ml/hr)
- ***Hydralazine*** infusion (neat=1mg/ml): Start infusion at 5ml/hr. Change rate every 30mins (max 18ml/hr)

24e. AMNIOTIC FLUID EMBOLISM

Main Priority: **Recognition & Aggressive Resuscitation**

- ☐ Get senior help or call 777 & declare an "**obstetric +/- neonatal emergency**"
- ☐ For **all patients:** Start treatment for **haemorrhage** & **coagulopathy** (see tab 12e):
  - Activate **MTP** now & give **O negative blood** until MTP boxes arrive
  - Call for & give empirically **3 units cryoprecipitate asap**
  - Consider early **tranexamic acid**: **1g over 10min**, then 1g over 8hrs
  - Send urgent blood tests including FBC, coagulation studies, TEG (if available)
- ☐ **If no cardiac output:** Start CPR & consider reversible causes - see tab 6e / tab 7e
  - If **antenatal** perform maternal specific CPR tasks:
    - Removal all foetal monitoring
    - **Lift uterus** skyward & displace to left
    - **Intubate early** & ventilate with $EtCO_2$ target of 30mmHg
    - Perform chest **compressions higher** on chest & **push deeper**
    - If **no rapid ROSC** then start **immediate** preparations to **deliver baby** within 5mins
- ☐ **If signs of cardiac output:** then start resuscitation:
  - Ensure patent airway. Consider **early intubation**
  - Address **oxygenation**: High flow oxygen, BiPAP, CPAP or high PEEP
  - Give **blood** & **products** as MTP. Use **vasopressors** or **inotropes** as required
  - Perform early **ECHO** (Any signs of right heart dysfunction or pulmonary hypertension?)
- ☐ Discuss with **obstetricians**:
  - If antenatal: urgent delivery of baby
  - Rule out sources of haemorrhage (eg placenta, uterine rupture or tone, trauma)
  - Possibility of hysterectomy if controllable bleeding
- ☐ Refer to ICU early

- Amniotic fluid embolism is rare, but life threatening. Always consider it in your differential
- **The following** features are suggestive of AFE:
  - sudden agitation e.g. non compliance, pulling out drips etc.
  - symptoms with no clear other explanation
  - peri-partum onset: during labour, delivery or within 30mins of baby delivery

System & Signs		Lab/Investigation Findings
General =	Restless, anxious, chest pain, vomiting	Pulmonary hypertension
Respiratory =	Hypoxia, bronchospasm, pulmonary oedema, ARDS	Right heart strain
Cardiovascular =	Hypotension, chest pain, cardiac arrest	Coaguloapthy
Neurological =	Headaches, seizure, loss of consciousness	DIC
Fetus =	Acute bradycardia	

- [Bolus]: ***metaraminol*** 1mg; ***phenylepherine*** 100mcg, ***ephedrine*** 9mg, ***adrenaline*** 10-50mcg
- [Infusions]: ***noradrenaline/adrenaline*** infusion: 5mg in 50mls. infuse 0-20ml/hr

34r. TELEPHONE DIRECTORY

EMERGENCY OUT OF THEATRE
- MET Team .....

ANAESTHETICS & THEATRES
- Duty Anaesthetist .....
- Duty Technician .....
- Theatre Coordinator .....
- PACU Coordinator .....
- Perfusionist .....

OBSTETRICS
- Obstetric Doctor .....
- Delivery Technician .....
- Charge Midwife .....
- Paed/NICU Doctor .....

LABORATORY/X-RAY
- Blood bank .....
- Blood tests .....
- X-Ray Technician .....
- Duty Radiologist .....

REFERRALS
- ICU Doctor .....
- ICU Coordinator .....
- Haematology Doctor .....
- Surgical Doctor .....
- Paediatric Doctor .....
- Cardiology Doctor .....

- •What is your switchboard trigger for abs emergencies
- •Where is the midaz in your delivery suite
- •Do you have a diff magnesium protocol
- •do you have a diff PET HTN protocol
- •how do you contact a neurologist?
- •what is the switchboard trigger to get the right people there?
- •what is ICU's number?
- •Obviously…..

The End

- Hope all this helps any rollout.
- I’ve put a lot of work into this project, so if it helps a quality implementation then that would make me happy
- Even If all this work only helped one crisis my happiness would be magnified
- And of course I’d love any feedback

Cheers, Adam