Dorset County Hospital NHS
NHS Foundation Trust

OBSTETRIC ANAESTHETIC HANDBOOK

Completed November 2017
For review November 2020
Dr Rob Swanton

Contents

INTRODUCTION

Anaesthetic Staff

There are 6 consultants with a specialist interest in obstetric anaesthesia:

Dr Rob Swanton (Obstetric Anaesthetic Lead)
Dr John Wilson
Dr Karina Maclachlan
Dr Claire Joannides
Dr Chris Smith
Dr Katharine Barr (starting December 2017)

24/7 provision of an obstetric ODP - name on board in main theatres (bleep 556)

Dorset County Hospital Maternity Unit

The maternity unit is situated on East wing level 1 (directly below Kingfisher paeds wards and opposite SCBU). The maternity unit has approximately 2000 deliveries a year, of which anaesthetists are involved with 50% of births.

The unit consists of:

17 delivery rooms
1 operating theatre
1 post-operative recovery bed

Elective Caesarian section lists are every Monday and Thursday morning, which are covered by a consultant obstetric anaesthetist. Every morning the unit is covered by a consultant anaesthetist. Afternoons are generally covered by the staff grade or middle grade trainee as the first port of call, with the starred consultant and/or the ICU consultant as an escalation point of contact.

There is 24 hour anaesthetic service provided, but out of hours the anaesthetist (209 bleep holder) also covers other hospital areas with non-resident consultant as back up.

Currently there are no obstetric HDU beds on the unit, but if higher care/critical care is required then the patient needs admitting to General HDU/ICU.

Responsibility of the Anaesthetist Covering Maternity

The basic role of the anaesthetist is to provide:

Safe and effective anaesthesia for obstetric operative procedures

Safe and effective epidural analgesia for the first/second stages of labour

Help and advice for mothers, midwives and medical staff with particular regard to obstetric emergencies (HDU/ITU Care), anaesthesia and analgesia

Pre op assessment of women booked for elective Caesarian sections

Postnatal assessment of women who have had any input or procedure performed by the covering anaesthetist

Antenatal assessment is usually referred to the consultant obstetric anaesthetists on their day on labour ward, but at times when they are not available it is expected for the covering anaesthetist to review the patient and discuss this with the most appropriate senior colleague

Prior to covering the maternity unit, it is essential you know:

The layout of the unit

The location of:
- blood fridge
- arrest trolley
- Red box for massive obstetric haemorrhage (guidelines for Code Red)
- Eclampsia box
- Difficult intubation equipment, videolaryngoscope & sugammadex
- Level 1 infusor and cell saver

How to set up and operate the epidural infusion pumps

Who and when to call for help

When covering the Maternity Unit

Be aware of what is happening:

Check the board (in midwife coordinator's office) in conjunction with the senior midwife (bleep 521) regularly
Join the obstetric rounds if possible
Visit mothers in labour to discuss pain relief options as requested.

Be considerate:

Remember the mothers are often in pain and distressed
Always knock and wait before entering a labour room.

Be professional:

Introduce yourself to midwives/obstetricians/mothers if you or they are new. Good communication is essential.

Never leave the unit uncovered. If you are otherwise engaged maintain communication with the senior midwife and call for help if there is an urgent case which cannot wait for you.

Daily Routine

0800 Handover of bleep 209 from night middle grade to morning anaesthetist. Handover should cover all of the following:

- **Activity overnight**
- **Epidurals running**
- **Plan for day e.g. elective LSCS if known**
- **High risk patients, i.e. comorbidities, raised BMI, IUD etc**
- **Obstetric complications e.g. Haemorrhage, PET, sepsis, thrombosis**
- **Anaesthetic complications e.g. Dural puncture, spinal catheters**

1. **Board round**

This occurs 08:30 daily in the Co-coordinator's Office on the Maternity Suite. Led by the Co-coordinator (Senior Midwife) and attended by the Anaesthetic Consultant, Obstetric Consultant, Day and Night Obstetric Registrars, and the Day and Night Obstetric SHO.

Following the board round, we are welcomed by the obstetric team to join the maternity unit ward round which is led by the Co-coordinating Midwife.

Each morning has a dedicated task (see below). During the morning, it is expected for the duty anaesthetist to complete the follow-up assessments for women who have had an anaesthetic intervention.

2**. Monday and Thursday morning: Elective CS Lists**

The list will be pinned on the noticeboard in the anaesthetic prep room located adjacent to the maternity theatre. There will usually be up to 3 women booked onto each list. Team brief will usually occur by 9am outside maternity theatre.

3. **Tuesday and Friday mornings: Pre-clerking Assessments**

This is when women attend for their pre-operative assessment before their planned CS. Between 1-4 women present for assessment each morning. The Day Assessment Team will bleep you when the women arrive for their pre-clerking. You are expected to take a pre-operative history and discuss the anaesthesic plan, and notify the relevant consultant of potential difficulties.

4. **Wednesday mornings: High Risk Anaesthetic Assessments**

This is when high-risk anaesthetic women present for their anaesthetic assessment. This can be for a range of reasons, including:

- Musculoskeletal problems
- Previous adverse experiences during maternity-related anaesthetic interventions
- General anaesthetic issues (MH, Sux Apnea, anaphylaxis etc.)
- Health issues / co-morbidities
- Raised BMI (>40)

5. **Afternoons**
Handover occurs by 13:00 daily to the afternoon duty anaesthetist. During the afternoon, routine obstetric anaesthetic practice occurs, however occasionally there will be an elective CS, which may have overrun from the morning list to be performed or follow-up assessments to complete. Should the need arise for senior advice or a 'second pair of hands', the starred consultant (ext 3704) is the first point of contact, the ICU consultant (ext 3444) is the second point of contact.

Documentation

Clear documentation of everything is essential. When performing an anaesthetic procedure there are three documents to fill in – the main anaesthetic chart with which you should be familiar as part of induction, the follow up sheet which does not go in the patients notes, it is to be placed in one of the two follow up slots, and the prescription chart. When performing follow-ups on subsequent days the forms can be found in theatre or in the anaesthetic department, and after follow-up complete please put them in the relevant slot in the anaesthetic department.

Policies & Procedures

Access the Trust intranet – click on "Clinical Guidelines" on the right hand side of Home page – search under "Anaesthetics"and "Maternity" for local policies and guidelines

Suggested reading

Analgesia, anaesthesia and pregnancy: A Practical Guide. Steve Yentis

Learning Resources

- RCOG Green Top Guidelines (www.rcog.org.uk/guidelines)
- NICE Maternity Guidelines (www.nice.org.uk/guidance/service-delivery--organisation-and-staffing/maternity-services)
- MMBRACE report (and past CEMACH reports)
- OAA guidelines (www.oaa-anaes.ac.uk/home)
- Patient info leaflets (www.labourpains.com)
- DAS and OAA difficult airway guidelines (www.oaa-anaes.ac.uk/ui/content/content.aspx?id=3447)

Teaching Opportunities

- Direct daily clinical teaching from Obstetric Anaesthetic Consultants
- List of Core Training Topics
- Daily Maternity Risk Meeting – 12:30 in Co-ordinator's Office
- Maternity unit ward rounds
- High-risk anaesthetic reviews (Wednesday am)
- SPARC sponsored research e.g. DREAMY study

We offer a multitude of training opportunities including basic competencies and higher training. Please refer to the WOA and Deanery documentation, or discuss with consultants, for relevant requirements for certification.

As part of the multidisciplinary education we offer, the midwives have as part of their mandatory training days an update on ‘Epidural Analgesia’. This is run monthly and registrars are encouraged to participate as rotas allow.

A multidisciplinary PROMPT course is also run approximately once a month, for further details please contact Miss Audrey Ryan’s secretary. It is expected that all trainees on labour ward attend this once a year.

Achievement of Competencies in Higher and Advanced Level Obstetric Anaesthesia

The following recommended activities have been mapped to the 2010 Curriculum for CCT in Anaesthetics Annex D (Higher) and Annex E (Advanced) http://www.rcoa.ac.uk/system/files/TRG-CCT-ANNEXD_0.pdf
http://www.rcoa.ac.uk/system/files/TRG-CCT-ANNEXE.pdf

Attainment of these will go a significant way to attaining a sign-off for Higher or Advanced Level training. Other competencies are more directly clinical and should be achievable during the clinical placement. Many trainees have found the list of potential activities helpful in attaining their Unit of Training and they can enhance the understanding and interest of the module.

Assessment of the Unit will follow the CCT in Anaesthetics Assessment Guidance 2017 - http://www.rcoa.ac.uk/system/files/TRG-ASMT-GDNCE-2015_0.pdf – to ensure all Core Clinical Learning Outcomes have been met.

These selected activities have been chosen as they may require some forward planning/thought on the part of the trainee. Most of the activities should be completed during the obstetric block of training, but some can be attained outside this period within a reasonable timescale e.g. attendance at a maternal resuscitation course.

Higher Level Training

Core clinical learning outcomes (CCLO):

- To be able to provide the appropriate anaesthetic management for any patient who requires emergency obstetric anaesthesia
- To be able to provide elective anaesthetic services to the obstetric unit [excepting those patients with unusual problems who would normally be referred to a specialist centre]

Competence	Activity	Possible evidence on e-portfolio
OB_HK_01	Discusses the limitations of a non specialised maternity unit and appropriate referral to a tertiary unit	CBD Reflective practice after shadowing obstetrician and/or senior MW
OB_HK_02	Discusses current advances and controversies in obstetrics	
OB_HS_01	Demonstrates the ability to assess women with factors complicating pregnancy	Attend anaesthetic assessment clinic (reflective notes) WPBA during clinic
OB_HS_02	Demonstrates the ability to construct a safe and effective plan for the management of a women with factors complicating pregnancy	
OB_HS_03	Demonstrates the ability to be an effective part of a multidisciplinary team	CPD or reflective notes on: Running LW Attending Red reviews Attending risk/ peri-natal mortality Participating in audit
OB_HS_13	Participates in local processes for monitoring the standards of practice	
OB_HS_11	Demonstrates skill in providing information about analgesia and anaesthesia to pregnant women, with or without complicating factors, to midwives and other professional groups	Teach midwives on local courses, PROMPT...etc
OB_HS_12	Demonstrate ability to supervise and teach less experienced trainees in all aspects of obstetric anaesthesia	Teaching sessions for junior trainees Run LW and delegate to junior trainees
*	Attend WOA Annual Meeting	
*	Attend maternal & neonatal resuscitation training: ALSO, PROMPT, MOET or local simulator-based training	

Advanced Level Training

Core Clinical Learning Outcomes:

- To be capable of undertaking the perioperative care for a wide variety of complex obstetric cases & list management independently; this implies ability to:
  - Provide perioperative anaesthetic care to a wide range of obstetric cases performed both in the labour ward and theatre, demonstrating a fundamental understanding of the problems encountered
  - Show the decision making & organisational skills required of an anaesthetist to manage busy labour ward and operating sessions, ensuring that the care delivered is safe and timely, benefiting both patients and the organisation
  - To assist colleagues in decisions about the suitability of surgery in difficult situations
  - Provide teaching to less experienced colleagues of all members of the multi-disciplinary team

Competence	Activity	Sessions	Evidence on e-portfolio
OB_AK_02	Shadow Obstetrician on LW	2	Reflective notes WPBA CPD entry
	Shadow senior midwife on LW	2	
	NNU or shadow paediatric input to LW	1	
OB_AK_03	Attend High Risk ANC	2	
	Attend fetal assessment clinic	1	
OB_AK_04	Familiarity with current topics as evidenced by for example updating current guideline, performing audit, presenting obstetric controversies locally/regionally or case report leading to presentation/poster/publication At least one of the above examples (or similar) should be achieved at *each* centre		Presenting locally or regionally Case report Poster presentation Updating guidelines
OB_AK_04 CCLO	Anaesthetic Assessment Clinic	6	WPBA during clinic Reflective notes from clinic
	Attend risk/perinatal mortality meeting	2	Meeting minutes/ agenda Reflective notes CPD
CCLO	Run LW during daytime	16	Reflective notes
CCLO	Teach midwives/PAM	2	Course certificate Feedback
*	Attend WOA Annual Meeting	1	
	Attend WOA eve/pm meeting	1	
*	Attend maternal & neonatal resuscitation training: ALSO, PROMPT, MOET or local simulator-based training		
	Membership of the OAA is highly recommended and would undoubtedly be seen as favourable for those considering ‘obstetric anaesthetic’ Consultant jobs		

* It is acceptable for these to be performed outside the module of training

N.B. The above activities should ideally be split equally between the two centres

STAFF AND RESOURCE TROUBLESHOOTING

1. Elective LSCS lists

   The anaesthetist assigned to the elective LSCS list should be protected from activity on labour ward whereby this list is delayed, unless the theatre is required for an emergency.

   Should there be a need for an extra pair of hands, where there is not a doubled up competent trainee already on labour ward, the first point of contact should be the **starred consultant x3704**. The second point of contact is the **ICU consultant x3444**.

2. Requirement to open a second obstetric theatre

   Due to good prior planning from the multidisciplinary team this is a rare event. However should there be an unanticipated need to urgently open a second theatre the procedure should be as follows:

   - **Labour ward anaesthetist notified in theatre**
   - **Communication with obstetrician and midwife coordinator (bleep 521)**
   - **Midwife coordinator (or anaesthetist) to communicate with:**
     - **Starred consultant x3704 (or ICU consultant x3444 if busy)**
     - **Main theatre coordinator (x5633)**
   - **Appropriate destination theatre and anaesthetist / theatre team decided upon. This may involve either utilizing an already empty theatre or breaking into an elective list**
   - **Midwife coordinator to organize equipment (e.g. resuscitaires, paeds team etc) to be transferred to the appropriate theatre**

3. Availability for emergencies within 5 minutes

   Daytime (0800-1800)
   Obstetric anaesthetist carrying bleep 209 to attend.
   If busy, the starred consultant should be contacted x3704 and he/she will organize prompt attendance by an appropriately trained anaesthetist. If this fails, the ICU consultant x3444 should be contacted.

   Out of Hours (1800-0800)
   On call anaesthetist carrying bleep 209 to attend.
   If busy, a pragmatic allocation of available resource to be decided by the most senior anaesthetist. This may involve the anaesthetist carrying bleep 204 either attending if obs competent, or 204 relieving the activity which 209 is busy with. The consultant on call should be contacted and should attend as soon as possible.

Consent and Risks

General points

Signed consent is not necessary for regional anaesthesia in labour or anaesthesia for Caesarian section. However, you should make a brief record of the risks/benefits that you have discussed with the woman since it is not uncommon for women to subsequently deny that they were warned about a possible complication.

The woman in the throes of painful labour will not be particularly amenable to a long and complex explanation, especially if under the influence of pethidine/entonox. Keep explanations short and simple. The **epidural information card** which should be found hanging in each labour room is a very useful adjunct and will ideally have been read by the woman in early labour or before.

Always offer women the opportunity to ask questions and give honest answers. Any problems regarding consent must be referred to a senior anaesthetist and/or obstetrician, unless prevented by extreme clinical urgency.

General anaesthesia for Caesarian Section

The woman who chooses general anaesthesia (GA) in preference to a regional technique should be warned about the consequences of her decision upon neonatal sedation, blood loss and postoperative pain (all increased). Awareness, failed intubation and aspiration may be mentioned. However, although it might be appropriate to warn of the overall increased maternal risk, it would not be wise to overemphasise as a means of persuading the woman to have a regional anaesthetic. In the event of a failed regional block the anaesthetist may then be in a predicament when reassuring the woman about GA. A suitable form of words might be ‘both methods are very safe but epidural/spinal more so than general anaesthesia.

The mother who refuses operative delivery

In general, medical treatment can be undertaken in an emergency without consent. This is provided the treatment is a necessity and does no more than is reasonably required in the ‘best interests’ of the patient – meaning that the operation/treatment will save life / ensure improvement / prevent deterioration of physical / mental health. However, treatment must not be given if the woman has previously refused the treatment when competent. A mentally competent parturient has the absolute right to refuse to consent to medical treatment for any reason, rational or irrational, or for no reason at all. This pertains even though the consequence may be her own death or the death or serious handicap of the child she bears.

Please refer to the AAGBI document on consent and the epidural information card (appendix)

THE LABOURING MOTHER

Pain relief in labour

Anaesthetists are often involved with pain relief of mothers at an early stage, working together with midwives, physios and obstetricians. Antenatal talks are an important starting point and mothers should be advised not to expect total pain relief but that every effort will be made to ensure adequate pain relief during labour, employing a variety of techniques. Communication of knowledge, understanding and empathy between anaesthetist and mother goes a long way towards gaining the confidence of the mother which could dispel fear.

Analgesic options

1. **Waterbath** Midwife controlled. Located in pool delivery room.

2. **TENS** Administered by midwives. Machines available for hire, useful in approx 50% of cases.

3. **Pethidine** Usually given by the midwife in consultation with the obstetric team. Doses vary between 50mg to 150mg depending on patients weight. A maximum of 2 doses is administered before resorting to another form of analgesia. Diamorphine 7.5mg is an alternative.

4. **Entonox** 50:50 Oxygen:Nitrous oxide. A safe and effective method when used properly. It is important to take time and make sure the woman starts to inhale the Entonox 15-20 seconds before the contraction builds.

5. **Epidural** See later

6. **Spinal/CSE** One shot spinal can be useful in the uncooperative patient to gain rapid analgesia prior to insertion of an epidural. Queen Charlotte's regimen is 1ml 0.25% bupivacaine +/- 10-20micrograms fentanyl.

7. **PCA** Either fentanyl or diamorphine may be used. Particularly useful in patients with intra-uterine death, occasionally as an alternative where regional anaesthesia is contra-indicated. Speak with senior anaesthetist first. Fentanyl loading dose 50-100 micrograms, bolus 10 micrograms with 5 min lockout. Total doses up to 1200micrograms in labour have been shown not to adversely affect the foetus.

   Remifentanil PCA is not available at Dorset County Hospital for labour.

Epidural Analgesia During Labour

Indications for epidural

Maternal request
Multiple pregnancy/ malpresentation
Maternal medical disorder
- Specific CVS disease (myocardial ischaemic, regurgitant valvular disease)
- Severe respiratory disorder (CF)
- Specific neuro disorders (AV malformations, space occupying lesions)

Obstetric disorders (Pre-eclampsia, if platelets and C/S ok)
Consider when GA contraindicated
Consider in women in who rapid regional anaesthesia would be difficult eg morbid obesity

Absolute contraindications

Patient refusal
Allergy to local anaesthetics
Local sepsis/infection
Coagulopathy see special considerations (INR<1.4 and platelets<80)
Raised intracranial pressure (ICP)

Relative contraindications

Untreated systemic sepsis (risk of seeding infection into epidural space with this procedure is said to be minimal if patient has been treated with IV Antibiotics)
Some forms of anticoagulants (see later)
Haemorrhage/expectant haemorrhage and hypovolaemia
Specific CVS disorders:
- severe valvular stenosis
- Eisenmenger's syndrome
- peri partum cardiomyopathy

Previous back surgery (due to scarring of epidural space may increase the difficulty of achieving an adequate block and increase the risk of a dural puncture. But usually regional analgesia/anaesthesia can be achieved in patients with bad backs and previous surgery.

Issues to Explain to Patient for Epidural Insertion

It is essential to explain the procedure, associated risks and obtain verbal consent from the patient.

The epidural information cards can be found in all rooms and can be used (see appendix 2), this should be recorded in the epidural chart.

Risks that should be explained include:

- absolute failure rate (1:1000)
- partial failure/patchy block (1:10)
- need to re-site catheter (1:20)
- weak legs
- hypotension
- dural puncture headache (ideally less than 1:100-250), if it occurs then there is a high likelihood of epidural blood patch
- local back pain
- remote risk of neurological damage (temporary nerve damage 1:1000-2000, permanent nerve damage 1:10000-13000)
- slight higher risk for instrumental delivery
- prolonged second stage of labour with epidural analgesia.
- paralysis / epidural haematoma / abscess (extremely rare)

There is some debate as to the validity of consent obtained in labour; ideally all women should have had the risks of the procedure explained to them beforehand.

The midwife must document in the notes that the mother agrees to regional analgesia.

Technique for epidural insertion

Know who to call in the event of difficulty.

Ensure there is adequate i.v. access (a 16G cannula) and connect to a giving set attached to 1L Plasmalyte. It is no longer expected to preload prior to epidural insertion.

Position the patient (sitting or lateral) and assess the anatomy of the lumbar spine

Full aseptic technique is essential – gown, gloves and mask as well as preparation of the site with 0.5% chlorhexidine spray. When skin dry sterile drape should be placed

Once the patient is suitably positioned, infiltrate the skin with lignocaine 1%.

Insert the Tuohy needle into the ligamentum flavum - this is identified by a slight ‘grittiness’.

Withdraw the introducer from the Tuohy needle and advance it slowly, using an intermittent or continuous loss of resistance technique using normal saline

Please note that the use of air is associated with an increased rate of accidental dural puncture, ascending back pain, intense and immediate headache, convulsions, patchy block and air embolus

Always maintain tight control of the needle, even if the patient is moving and only advance the needle between contractions and try to minimise risk to the patient

When there is a loss of resistance, remove the syringe and thread the catheter through the Tuohy needle, aiming to leave about 4 - 5 cms in the epidural space

Check placement using meniscal drop, aspiration and dependency tests

Never withdraw the catheter back through the Tuohy needle as this can lead to the catheter shearing and part of it being left within the epidural space.

If there is difficulty in threading the catheter, either inject more saline through the Tuohy needle and then try to thread the catheter, alternatively, get the patient to slightly straightened her legs or her back slightly, depending on the initial position chosen to site the epidural (sitting or lying). Never try to force the catheter through the Tuohy needle

Never rotate the Tuohy needle once the epidural space has been located - this is associated with a higher incidence of dural puncture.

Firmly secure the epidural catheter in place

If you have difficulty in inserting an epidural after multiple attempts have been made, call for more experienced assistance. Do not persist in trying to site an epidural for more than 20 minutes.

Routine monitoring will be performed by the midwives - fetal heart rate during and after the procedure, maternal heart rate and blood pressure

If at any stage there are concerns re the fetal well being the procedure should be abandoned until a proper assessment is made of the fetal status.

Maternal hypotension may make the mother feel dizzy and nauseated and cause fetal heart rate abnormalitites. If this happens, place the mother in the left lateral position (relieves aorto-caval compression) and give fluids/vasoconstrictors as necessary.

Setting up the low dose epidural (PCEA)

Routine preloading and maintenance intravenous fluid is NOT required unless a clinical indication such as vomiting, dehydration or prolonged labour exists. (NICE 2014). **NB caution if hypovolaemia is present e.g. PET, APH etc**.

If an oxytocin infusion is administered via the same venous access the Plasma- Lyte 148 infusion must be connected with a non-return valve (R-Lock) before attaching to a 3-way tap. This will prevent oxytocin being infused into the fluid bag if the venous access becomes blocked, with subsequent accidental bolus upon flushing.

First dose (test dose and initial dose)

The anaesthetist should double check all epidural drugs and epidural infusion connections with another trained member of staff prior to administration unless to do so would incur an unacceptable delay in an emergency.

Given by the anaesthetist. The initial dose is at the discretion of the anaesthetist. The standard test dose is 15-20 mL of the low dose mixture 0.1% levobupivacaine + fentanyl 2 micrograms/mL. Following the test dose the next dose (initial / loading dose) is given as the first push of the PCEA button. This prevents the woman pushing the button as soon as she is given it. Alternatively the anaesthetist may use levobupivacaine.

The analgesic effect should be apparent within 10-20 minutes, although the sensation of contractions may still be present.

Attach 2 yellow '**For Epidural Use Only'** stickers onto the end of the PCEA line next to the filter section of the epidural line.

It is the responsibility of the anaesthetist to set up and connect the PCEA pump and line to the epidural catheter and document the correct connection by signing on the epidural chart. If the anaesthetist is unfamiliar with the PCEA set-up they must get help from another anaesthetist trained in setting up the PCEA.

The maternity PCEA pumps are pre-programmed for ease of use. Should you wish to use an alternative regimen please seek senior advice first.

The standard settings are as follows:

	Default	Range
BOLUS DOSE	10 MLS	4-10 MLS
LOCKOUT PERIOD	30 MINUTES	10-30 MINUTES
BACKGROUND INFUSION RATE	5 MLS/HR	0-10 MLS/HR
ANAESTHETIST BOLUS DOSE	10 MLS	0-10 MLS
MAX HOURLY TOTAL DOSE	35 MLS	0-35 MLS

The woman is not allowed to use the PCEA bolus function until the initial assessment following the first dose has been made by the anaesthetist.

An indwelling catheter will be inserted once the woman is comfortable. See 'Bladder care guideline'

Observations following the first dose

Maternal blood pressure and pulse should be measured and recorded on the anaesthetic chart every 5 minutes for 20 minutes

The fetal heart rate should be monitored continuously use a CTG machine

The anaesthetist should be available during this time in case the blood pressure falls or other complications occur.

Between 5-20 minutes the anaesthetist will assess the components of the block

Sympathetic –warm feet

Motor – ability to raise the legs off the bed against the resistance

Sensory – reduced sensation to ethyl chloride spray. An upper level of T8-10 is usually adequate.

Fentanyl may delay gastric emptying so food should be discouraged.

Every 30 minutes the midwife will:

Check height of block and record the level on the anaesthetic chart. **The ideal level of a block for labour analgesia is T10 – S5. Block level can be tested using ice cubes.**

Measure and record the woman's pulse and blood pressure.

Pressure areas will be checked and change of positions encouraged. Gel mats are located in the Epidural cupboard and should be used beneath the woman to assist pressure area care.

Every 2 hours the midwife will:

Document the total volume of the epidural infusion given on the anaesthetic chart. This running total is available by pressing the 'Reports' button on the Epidural pump.

After every patient controlled bolus the midwife will:

Measure and record the woman's pulse and blood pressure every 5 minutes for 20 minutes on the anaesthetic chart.

Check the height of the block at 10 and then 15 minutes

The fetal heart rate should be continuously monitored.

Epidural top-ups must be given by the anaesthetist in the following situations:

When the midwife is concerned about the level of the block

When the anaesthetist is concerned about the block

Where an inadequate or unusual prescription has been ordered

There is a hypotensive episode (systolic blood pressure < 100mmHg) after the previous top-up

When analgesia is persistently inadequate and consideration should be made for resiting the epidural

To extend block for forceps deliveries.

To extend the block for caesarean sections

After a dural tap or suspected dural puncture

If there are suspicions of a subdural placement of the catheter

Special considerations when performing epidural/spinal

Thrombocytopaenia

Causes of thrombocytopaenia in pregnancy include

PET / Eclampsia
HELLP syndrome
Auto-immune disease
Idiopathic thrombocytopaenia of pregnancy (ITP)
AIDS
Antiphospholipid syndrome

In patients where thrombocytopaenia is suspected a FBC/clotting sample should be available from within 6 hours of the request for regional anaesthesia.

>100,000	Epidural as indicated. No need for clotting screen.
80-100,000	Perform a clotting screen. Why is this helpful? If normal – epidural as indicated (D/W senior) If abnormal – epidural contraindicated
<80,000	**Do not site an epidural until the clinical situation has been discussed with a senior anaesthetist.** It may be necessary to use an IV PCA as an alternative.

Patients with platelets <100,000 in whom an epidural has been sited must be carefully monitored postpartum for evidence of a neurological deficit. Management must be carefully documented in the mothers notes.

Pre-eclampsia (PET)

In PET a good working epidural can reduce the surges in BP during labour and is something that is commonly requested by the obstetricians for this reason.

Patients with mild to moderate PET should have a recent (within 6hrs) platelet count before a regional block. Patients with severe PET should have a full blood count **and** clotting screen performed within usually 6 hours or immediately prior to epidural insertion if platelet count has been falling (see thrombocytopenia section above).

Maternal pyrexia

Many patients may have pyrexia during labour often secondary to prolonged rupture of membranes. Current opinion is that epidural analgesia is safe for these patients who are at high risk of operative delivery anyway. If these patients are not already on antibiotics then discuss with obstetricians and administer antibiotics **before** siting the epidural. Be aware that siting an epidural is associated with a rise in maternal temperature so a further rise in both maternal and fetal temp should be expected in the already pyrexial mother, and also that a mildly raised WCC can be normal for pregnancy.

Haematological Disorders

The most common type of patient presenting for regional blockade are *Haemophilia carriers* and patients with *von Willebrands disease*. In the majority of patients factor VIII levels increase with pregnancy and at term many of these patients will have normal factor VIII levels. These patients can safely have a regional block. Please check that a recent factor VIII level has been performed, if a normal level has existed at some point in the latter stages of pregnancy it is unlikely that it will fall. If you are unsure about these patients contact the on-call haematologist and/or senior anaesthetist for advice.

HIV

HIV is **NOT** a contraindication to regional block. Standard high risk precautions should be taken, consider double glove / eye protection. Do not resheath needles. Most patients with HIV will be booked for LSCS.

Thromboelastography (TEG)

As yet TEG is not validated in obstetric practice, but may become useful in the future in guiding the acceptability of regional blockade and the appropriate use of blood products peripartum.

Whilst TEG is not validated it is very helpful in guiding use of blood products

Concurrent Anticoagulant Therapy LMWH (Fragmin, Clexane)

Many patients at risk of venous thromboembolism are on daily sc enoxaparin(clexane) or dalteparin(fragmin). The risk of epidural haematoma in this "hypercoagulable" population is unknown but extremely rare. A routine clotting screen (PT, aPTT) will not pick up LMWH activity. Monitoring the anti-Xa level is not recommended as it is not predictive of bleeding. LMWH activity up to 50% may still occur up to 12 hours after sc injection. There are now clear guidelines from American Society of Regional Anaesthesia (ASRA).

Delay siting or removing an epidural catheter until 12 hours after LMWH. **Alternatively administer LMWH 2 hours after removing an epidural catheter – this applies to patients on a prophylactic dose of LMWH (eg 40mg/day) and NOT a therapeutic dose of LMWH (eg 1mg/kg/day). If a patient is on a higher/therapeutic dose of LMWH please leave at least 24 hours before inserting or removing an epidural catheter.

**After removal of catheter it is recommended to wait 6 hrs prior to giving next dose
**Contradicts previous sentence

Most patients who have a Caesarian section will require a prophylactic dose of 40mg of Enoxaparin(clexane) subcut. This should be given 6-8h post-surgery. **The ASRA guidelines say that doses >1mg/kg (which is a therapeutic dose) should only be given 12-24h after an operation. This rule will not apply to a prophylactic**

dose (eg 40mg sc od), which can be given 6-8h after LSCS. Post LSCS compression boots (flowtrons) can be left on until mother mobilises. See obstetric guideline.

Unfractionated heparin (UH)

This is rarely used today because of the unpredictability of drug levels. Full heparinisation is a contraindication to having an epidural.
If heparin has been used, then you should wait a minimum of 4hrs after stopping it and have an APTR of < 1.3 prior to siting an epidural.
Should it be used, it is regarded as safe to prescribe and administer UH immediately **after** siting an epidural block and to wait 2 hour after removing the catheter before giving the next dose of UH.
Remove the catheter at least 4 hours after the last dose of UH.
Heparin induced thrombocytopaenia may occur if administration is prolonged therefore patients receiving heparin for greater than 4 days should have a platelet count checked before siting a regional block.

Aspirin

These agents by themselves do not appear to pose additional risk of spinal/epidural haematoma in patients undergoing regional block. A bleeding time is not required. The use of aspirin along with other agents affecting clotting may pose greater risk. If in doubt seek senior advice.

Other antiplatelet medication

There is no evidence regarding the risk associated with other new antiplatelets for regional anaesthesia. The current ASRA recommendations suggest a time interval after stopping the drug before regional anaesthesia.

Ticlodipine 14 days
Clopidogrel 7 days
Glycoprotein IIb/IIIa inhibitors 24-48 hours

Please refer to the excellent resource on the AAGBI website 'Regional Anaesthesia and patients with abnormalities of coagulation' for information regarding other DOAC/novel antiplatelets.

http://www.aagbi.org/sites/default/files/rapac_2013_web.pdf

Dealing with a poorly functioning epidural

Assess distribution of the block using ethyl chloride or frozen steel lollipop? Feel the woman's feet looking for a difference in temperature (? unilateral). Observe the woman during a contraction to establish the site/type of pain. If in doubt seek senior advice.

Missed segment – try increased concentration of LA eg 0.25-0.5% bupivacaine, or consider 50micrograms bolus of epidural fentanyl while lying on affected side.

Unilateral block – (a) try further dose lying on affected side, or consider pulling catheter back so that 2-3cm remains in space and topping up. (b) resite catheter if all else fails

Patchy block – Try stronger dose as above. Consider subdural block (see in next section).

No block – probably not in epidural space. Consider re-insertion.

Back Pain - associated with an occipito-posterior position of foetus, and may require a denser block, consider top up with more local anaesthetic and fentanyl

Perineal pain - check sacral block and that bladder is empty. Consider topping up with patient in sitting position. If no improvement then consider resiting the epidural.

Pain despite good block - causes include a full bladder, baby's head pressing on pelvic structures, or more **rarely a ruptured uterus**. These are pains are usually constant and not associated with contractions.

Always remember that the catheter may have worked its way out of the epidural space. Poor regional analgesia in labour is predictive of poor surgical anaesthesia. If high risk for LSCS consider early re-siting of epidural.

Please also note, that in order to give a manual top up, the epidural infusion has to be disconnected, and therefore needs to be kept clean and sterile. Once the top up has been given then the infusion should be reconnected and continued.

Complications of Epidural Analgesia

Failure to thread the catheter

You are probably not in the epidural space. If however you think you are, open up the space with 5-10mls saline and re-thread the catheter.

Blood in catheter

Best avoided by inserting the catheter between contractions and inserting a maximum of 5cms (further if obese) into the space so as to minimise the risk of penetrating an engorged epidural vein. If you have sufficient length withdraw while flushing with saline and repeat the dependency/aspiration tests. You may wish to check the position by injecting LA with adrenaline 1:200,000 and observing maternal heart rate for tachycardia. "**If in doubt, take it out**" and resite in adjacent space.

Paraesthesia upon insertion of catheter

Always warn the mother of some paraesthesia during insertion of the catheter. This is usually transient, but if it continues then stop injecting, withdraw the needle and catheter together and re-site the epidural.

Hypotension

A fall in BP of 20% is acceptable if there is no presence of foetal distress. But be aware that uterine blood flow is not auto regulated and therefore a prolonged or severe hypotension can lead to fetal compromise.

The commonest cause is aorto-caval compression by the foetus in addition to the relative hypovolaemia induced by the epidural.

Can be avoided by preloading (although some feel with the use of low dose local anaesthetics preloading is not routinely required) with fluid and adopting a position sitting/lateral.
If no effect then position the mother in the full lateral tilt and increase IV fluid infusion.
Despite fluids and tilt patient is still hypotensive consider 3-6mg boluses of ephedrine and oxygen.
Note that if there is fetal distress related to epidural or spinal insertion then treat as above even in the absence of severe hypotension

Subdural Block

Can occur when the epidural catheter is misplaced between the dura and arachnoid mater. They are characterised by a negative epidural test dose followed by extensive sensory block (sometimes up to cervical dermatomes, with nasal stuffiness and Horner's syndrome) they can also be patchy, asymmetrical and sparing of the motor fibres to the lower limbs can occur.

(Beware after a top up into a subdural catheter a total spinal can occur due to an increased volume causing rupture of the arachnoid mater).
Treat hypotension as above.
Reassure patient and advise of likely regression of high sensory block after 1 hour.
If subdural suspected inform senior anaesthetist, consider removing and resiting epidural at a different level.

(If catheter still in situ postpartum can be confirmed by injection of radio-opaque dye and appearance of classical ‘tramline’ appearance on Xray).

Unexpected high block / total spinal
Summon senior help. Patient will require active resuscitation including aggressive fluid and vasoconstrictor therapy and possibly ventilatory support. No patient should come to any harm from a total spinal.

Assess adequacy of breathing – may need immediate intubation and ventilation. May or may not be unconscious–explain/reassure/sedate

Maintain circulation / BP with colloid, ephedrine or metaraminol, and/or atropine.

Discuss delivery with senior anaesthetist and obstetrician
CVS and respiratory function may be deranged for up to 48 hrs. May need ICU management.
Manage as for dural puncture
Full discussion with patient including explanation and apology.

Local anaesthetic toxicity

Prevention – do not exceed toxic dose limits, aspirate before injection, inject slowly while watching / holding conversation with patient. Stop giving if patient spontaneously describes symptoms.
Detection – CNS (numbness of tongue, tinnitus, slurred speech, muscle twitching, irrational conversation, convulsions), CVS (hypotension, dysrhythmias, collapse).
If cardiac arrest follow appropriate ALS algorithm. Give bolus 1.5ml/kg over 1 min of 20% intralipid IV and start an infusion of 20% intralipid IV at 15ml/kg/hr (found in yellow box in sideroom off maternity theatre). Bolus dose can be repeated (maximum two repeats) at 5 minute intervals if no ROSC.
After ROSC commence continuous infusion of intralipid 0.25ml/kg/min until haemodynamic stability restored and admit to ICU.

Neurological deficit / injury following delivery

If epidural haematoma or abscess suspected (pain, sepsis, weakness, bladder/bowel dysfunction) contact **urgently** a senior anaesthetist and consider MRI and referral to neurologist/surgeon.

Most neurological problems in obstetrics are a result of pregnancy or labour and delivery and the quoted incidence is 1%. There is a tendency to implicate anaesthetic interventions for the neurology as these take place in close relation to the time of presentation of the neurology.

Types of neurology in pregnancy

Neuraxial injury due to anaesthetic interventions

- Trauma: direct nerve injury by needle, presents as paraesthesia, loss of sensation and muscular weakness in the distribution of the nerve.
- Chemical: neurotoxin induced
- Ischaemic: compression by an epidural haematoma /abscess). This is the most significant and needs evaluation and treatment within 6-12 hours to avoid permanent neurological sequelae. Maintain a high index of suspicion.
    - Epidural haematoma (early presentation 0-2 days): Back pain (localised), leg weakness, sensory disturbance, bladder/bowel dysfunction
    - Epidural abscess (later presentation >3 days): fever, bladder/bowel dysfunction, malaise, leg weakness, back pain, confusion, sensory disturbance

Obstetric palsies

The risk factors are primiparity, prolonged 2nd stage of labour and forceps delivery causing nerve compressions. Some specific injuries

- Lateral femoral cutaneous nerve and femoral nerve injury: nerves compressed over the anterior superior iliac spine or inguinal ligament with prolonged thigh flexion.
- Lumbosacral trunk compression by the fetal head where it crosses the posterior pelvic brim before descending in front of the sacral ala. Foot drop is the main symptom. It is almost always unilateral and causes weak dorsiflexion and eversion with decreased sensation on the lateral lower leg and dorsal foot.
- Femoral or obturator neuropathy (bilateral in 25%): often mistaken for an intraspinal lesion. Femoral dysfunction may result in inability to climb stairs, decreased patellar reflex, and femoral distribution sensory loss. Obturator neuropathy causes decreased inner thigh sensation and weakness of hip adduction and rotation
- Damage to the common peroneal nerve from inappropriate positioning of the patient in stirrups will result in an area of sensory loss limited to a wedge-shaped area on the dorsal side and proximal to the great and second toe.

Non specific

Many patients present with non-specific neurological symptoms after delivery. They may or may not be related to a regional anaesthetic.

If a patient presents with abnormal neurology post delivery

1. Take a thorough history, including that of any anaesthetic interventions.
2. Look through the anaesthetic record to see if any mention has been made of difficulty in insertion of a regional and/or parasthesia at the time.
3. If the patient is in hospital, perform a neurological examination. If the patient is at home, but you feel the neurology is significant, offer the patient an assessment on the labour ward.
4. Rule out red flag signs, which indicate an epidural haematoma/abscess: bilateral lower limb weakness, bowel/bladder symptoms, perianal numbness.
5. If you suspect epidural pathology
    a. Discuss with anaesthetic senior (Obstetric anaesthetist or on-call consultant)
    b. Consider urgent MRI
    c. Refer to neurosurgery registrar on-call (via switch).

6. If the neurology is non specific,
    - Reassure patient that it is mostly self limited?limiting not sure what this means
    - Explain that pregnancy and delivery can also result in neurology, which is usually self-limited. It is not always due to the anaesthetic. Explanation of the mechanism of obstetric palsies reassures many patients.
    - Give them the phone number for the delivery suite and ask them to call back and speak to an anaesthetist if symptoms get worse
    - Inform a consultant who may wish to follow up.

ACCIDENTAL DURAL PUNCTURE MANAGEMENT

When loss of CSF is greater than production, as might occur through a dural tear, CSF pressure falls and the brain sinks, stretching the meninges. This stretching is thought to cause headache. Compensatory vasodilation of intracranial vessels may further worsen symptoms.

The incidence of dural puncture should be less than 1% of epidurals. All midwives, as well as obstetric and anaesthetic staff, should be alert to the signs of post dural puncture headaches, as symptoms may not develop for several days. If untreated, headaches are not only unpleasant, but on rare occasions can be life threatening, usually as a result of intracranial haemorrhage or coning of the brain stem.

Management of accidental dural puncture can be divided into immediate and late.

Immediate management (during labour)

The initial aim is to achieve effective analgesia without causing further complication.

Either

If a dural puncture occurs, pass the “epidural” catheter into the subarachnoid space. There is some evidence that this leads to inflammatory processes around the dural tear and therefore less severe sequelae but this is controversial at the time of writing.

Clearly Label the catheter an an "intrathecal catheter and for anaesthetist use only"

Anaesthetist only to give boluses

For labour give 1-2 ml 0.25% bupivacaine boluses every 1-2 hours (fentanyl 25micrograms can be given with first bolus)

For LSCS titrate 0.5% bupivacaine in 0.5ml boluses till appropriate block is achieved. (consider 300micrograms diamorphine for post analgesia).

Or

Remove the epidural catheter

Reinsert the epidural at a different interspace – usually one interspace higher. If the reason for tap was difficult anatomy, a senior colleague should be involved

Run the epidural as normal but beware of intrathecal spread of local anaesthetic (bear in mind due to a meningeal tear lower doses may be required and my need titration to effect).

The anaesthetist must give all top ups.

With either technique the patient should be informed at the earliest opportunity that a dural puncture has occurred and of the likely sequelae. Labour itself may be allowed to continue normally.

DURAL PUNCTURE IS NOT AN INDICATION FOR AN ASSISTED (forceps or ventouse) DELIVERY.

Arrangement must be made for daily postnatal follow-up. Fill out a dural puncture form and put it with the follow up form. The forms are to encourage appropriate follow up and management. **They are not kept in the notes, so do not forget to document your opinions and actions in the notes as well**. Handover to anaesthetist on next shift.

When symptoms have settled and further follow up not required a photocopy of the dural puncture form should be taken and given to the obstetric anaesthetist lead for audit purposes and the original form placed in the patient's notes.

Late Management

Following a dural puncture with a 16 Tuohy needle, the incidence of post dural puncture headache is approximately 75%. Not all dural punctures are recognised in labour. Headaches in the postnatal period are common. The key-differentiating factor between a “normal” post-natal headache and a post dural puncture headache is the positional nature of the latter.

Common features of post dural puncture headache include:

typically onset is 24-48 hours post dural puncture. Untreated they usually last 7-10 days.

characteristically worse on standing. Headache is often absent after overnight bed rest, but returns after mobilising.

usually in the fronto-occipital regions and radiates to the neck, with associated neck stiffness.

photophobia, diplopia and difficulty in accommodation common. Hearing loss, tinnitus and VIth nerve palsy possible.

nausea in up to 60%

Treatment is either to alleviate symptoms while waiting for the dural tear to heal itself, or to seal the puncture. Epidural blood patching is the only commonly used method of sealing dural tears.

Differential diagnosis

Headaches are common in the postpartum period, affecting up to 40% of all parturients.

The following are a list of differential diagnosis for postpartum headaches (common causes listed in bold):

1. Sleep deprivation and fatigue
2. Irregular food intake and dehydration
3. Psychological stress / tension-type headache
4. Viral, chemical or bacterial meningitis
5. Intracranial haemorrhage or tumours
6. Cerebral venous thrombosis
7. Cerebral infarction
8. Uncal herniation
9. Migraine
10. Drugs (e.g. caffeine)
11. Pre-eclampsia
12. Musculo-skeletal/cervicogenic

Post dural puncture headache

Approximately 75% of parturients who have had an accidental dural puncture will go on to develop a post dural puncture headache. Postdural puncture headache is caused by leakage of cerebrospinal fluid from the dura resulting in low CSF volume and pressure thus causing traction on pain-sensitive structures. Consequences of untreated post dural punctures include intracranial subdural haematomas, cerebral herniation and death which often initially present as low GCS and seizures.

Signs and symptoms:
1. History: Multiple attempts at siting the epidural; proven / witnessed dural puncture
2. Frontal or occipital headache +/- radiating to neck and shoulders
3. Postural (worse on standing, sitting, coughing, straining; improves on lying flat)
4. Nausea and vomiting
5. Visual changes such as diplopia or cortical blindness
6. Photophobia
7. Neck stiffness
8. Hearing changes: Tinnitus / ‘odd’ hearing / loss of hearing
9. Vertigo/dizziness
10. CN palsies (most commonly affected is Cranial Nerve VI Abducens)

<u>Clinical course</u>
Typical onset of headache occurs 24-48 hrs post procedure. Ninety percent of headaches will occur within 3 days of the procedure and 2/3 within the first 48 hours. PDPH can develop immediately (although this is very rare and most headaches which occur immediately during the procedure are due to air being unintentionally injected into the CSF) and also up to 14 days post procedure. 70% of PDPH will resolve spontaneously within 7 days.

Management of post dural puncture headache:

Following delivery, in women with a recognised dural puncture, allow the mother to mobilise as normal. Lying flat in bed will not prevent the incidence of post-dural puncture headache.

If she gets a headache she should be encouraged to lie supine in bed and rest.

Prescribe effective analgesia (regular paracetamol and ibuprofen). Codeine and oramorph have not been shown to provide any more effective analgesia than simple regular analgesia.

We advise conservative treatment for the first 48 hours as the success rate of EBPs improve after 48 hours post procedure (thought to be due to the residual local anaesthetic within the epidural space acting as an anticoagulant).

Adequate fluid intake is to be encouraged although there is no evidence that hydration, above and beyond that of maintenance, reduces the incidence of PDPH. Encourage caffeine intake. Caffeine acts by reducing intracranial vasodilation which is partially responsible for the headache.

Sumatriptan/ACTH have been advocated but according to the literature are ineffective and is contraindicated in breastfeeding by the BNF.

TED stockings and prophylaxic LMWH should be prescribed to prevent thromboembolism.

Stool softeners should be prescribed e.g. lactulose 10 mls BD

Daily review by the duty obstetric anaesthetist or consultant until the headache has gone. If she wishes to go home, follow the patient up with daily telephone consultations until the headache has gone

Provide the women the Trust's patient information leaflet *"Headache following epidural or spinal anaesthesia"* (Appendix 1) OR the OAA leaflet at www.labourpains.com

Epidural blood patching should be considered in a patient with a persisting moderate / severe headache following definite or suspected dural puncture.

If the diagnosis is in doubt there should be discussion with a radiologist and/or neurologist to consider MRI/CT of the head and whole spine to exclude other causes of headache.

EPIDURAL BLOOD PATCH

It is thought to work acutely by exerting a mass effect within the epidural space, raising CSF pressure, and then by effectively clotting and 'patching' the dural tear, reducing CSF leakage and allowing regeneration of CSF within the subarachnoid space.

Success rates vary from 56% - 98% depending on the study. Overall success rates are probably in the region of 50% complete relief after 1 blood patch, and 75% complete relief after 2 EBPs.

Contraindications:

1. Patient with signs of bacteraemia (e.g. temp > 37.5 Celsius and raised white cell count / C-reactive protein)
2. Infection at or near the site of proposed injection
3. Coagulopathies
4. Patient refusal

Timing of EBP:

Prophylaxic blood patches, in the cases of a witnessed dural puncture, are not recommended. Delaying an epidural blood patch for 48 hours after the dural tap has been associated with a higher success rate and is to be recommended

Complications:

1. Backache: Tends to occur in 20-35% of patients and usually lasts 48hrs, although it has been described up to 27 days. This is probably due to the pressure effect of the blood and the tracking of the injected blood into the subcutaneous tissues.
2. Failure to work or recurrence of PDPH
3. Repeat dural tap
4. Nerve damage

Procedure:

1. A senior anaesthetist must be involved in both the decision and the procedure (the most senior anaesthetist should perform the epidural).
2. Obtain patient's consent and record in the notes
3. The women should be encouraged to go to the toilet and feed her baby before the procedure as she will be encouraged to have strict bed rest for 4-6 hours post procedure.
4. It should be performed in theatres.
5. The patient should be apyrexial (<37.5oc) and have no signs of sepsis.
6. FBC and coagulation should be taken and the results reviewed before the procedure.

7. Full aseptic precautions must be taken by both the clinician performing the epidural and the assistant taking the blood.

8. Perform an epidural as close to the original puncture site as possible, ideally one interspace below. MRI scans have shown that a blood patch spreads twice as far cranially as it does caudally and over 3 to 5 segments. Clot resolution occurs in 7 hours.

9. Once the epidural space has been located 30 mls of blood should be taken aseptically and 20 – 30 mls should be injected slowly into the epidural space. Stop if back pain or radicular pain is experienced by the patient.

10. The practice of taking blood cultures at the time of EBP is controversial however, in this Trust we advocate that blood cultures should be sent at the time of the epidural blood patch.

11. Keep supine for 4-6 hours post procedure

12. Treat the patient with care and compassion - ensure all health professionals within the maternity suite are aware that the woman has a PDPH and may require additional help to care for her newborn.

13. Review daily.

14. Advise the patient to avoid heavy lifting, or straining at stool (prescribe a laxative if necessary) for 2 days

PDPH Follow up:

MBRRACE has highlighted that women experiencing a dural tap or post-dural puncture headache should have outpatient follow-up and also that their GP should be notified, in case subsequent complications occur:

1. Please complete a Post Dural Puncture headache follow up form.

2. It is the responsibility of the anaesthetist seeing the patient in the first instance to subsequently review the patient or effectively handover the patient's care to the next duty anaesthetist

3. Offer the patient the option of being followed up by phone or in person the following day and then again at 6 weeks where:

   o a patient has reported a headache suggestive of PDPH
   o unintentional dural puncture has occurred
   o a patient has received an epidural blood patch

4. File a copy of the PDPH Follow form in the patient's notes and in the Obstetric Follow Up Audit box in the anaesthetic office

5. Complete the Post Dural Puncture Headache letter and send to the patient's GP (appendix) and place a copy in the patient's notes.

6. Advise the patient to contact the resident anaesthetist if headache returns, backache does not resolve or becomes much worse, or neurological symptoms develop e.g. motor, bladder or bowel dysfunction.

Antacid prophylaxis in high risk labour

Obstetric patients are at increased risk of aspiration of gastric contents during anaesthesia when compared with the non-pregnant population. This is because progesterone causes relaxation of the musculature at the gastro-oesophageal junction and delayed gastric emptying. In addition increased intra-abdominal pressure, due to the gravid uterus, tends to force stomach contents upwards.

By reducing the volume and raising the pH of gastric contents, this helps to minimise the damage that will be done if it occurs.

Management

Ranitidine 150mg orally or ranitidine 50mg IV (if urgent), thereafter 150mg orally every 6 hours for all high risk women. Sips of water or isotonic oral fluids (eg sport drinks) should be encouraged throughout labour.

This regimen should be started for all women who are in established labour if they have the following conditions:

Previous caesarian delivery
Previous retained placenta
Breech
Multiple pregnancy
Pre-eclampsia
Diabetes mellitus
Morbid obesity BMI>35
IUGR / poor biophysical profile

The regimen should be initiated in labour if the following are identified:

APH / Abruption
Fetal distress
Failure to progress
Pre-eclampsia identified during labour

Once a decision is made that a woman will require an anaesthetic, then 10mg metaclopromide should be given IV. Sodium Citrate 30mls should also be given orally just before operation if GA is a possibility.

For elective sections

The standard starvation times (6 hours for solids, 4 hours for liquids and 2 hours for water) should be observed.
Pre-med 150mg ranitidine to be give the night before the elective LSCS

GUIDELINE FOR ADMINISTRATION FOR FOOD AND DRINK

Our aim is to prevent undue dehydration of the mother during labour, while reducing potential problems associated with the ingestion of inappropriate meals during labour. Maternal safety is of prime importance.

Low risk women can be provided with a light, non-acidic, low fat diet if requested. High risk women are provided with clear fluids only.

High risk women include:

Those receiving opiates / epidural
Medical disease – cardiac, pulmonary, diabetes etc.
Hypertensive
Multiple pregnancy
Abnormal presentation
Prolonged labour
Previous caesarian section
IUGR.
APH
Polyhydramnios
Grand multips (5)
Estimated fetal weight >4.5kg
Fetal distress
Meconium liquor
Premature labour
Prev IUD/stillbirth
Anaesthetic problems
Age >38
Stature <5ft

INTRAPARTUM MANAGEMENT OF DIABETES MELLITUS

Diabetes mellitus is a chronic metabolic disorder caused by defects in insulin secretion and action. There are two major types of diabetes: type 1 and type 2.

Type 1 diabetes the pancreas makes little or no insulin because the islet beta cells, which produce insulin, have been destroyed through an autoimmune mechanism. Therefore people with type 1 diabetes depend on insulin injections to survive.

Type 2 diabetes results from failure of insulin production to overcome reduced tissue sensitivity to insulin. Type 2 diabetes is a progressive disease in which insulin production declines as the disease progresses. Type 2 diabetes can often be managed through diet and exercise.

Gestational Diabetes Mellitus (GDM) occurs due to glucose intolerance of varying degrees during pregnancy which may or may not resolve after pregnancy. Women with GDM have a higher risk of developing GDM again in future pregnancies as well as Type 2 diabetes in the future.

The following guidance is taken from Trust policy – please refer to guideline on intranet for antenatal and postpartum management

Spontaneous onset of labour

- Obstetric Registrar on call to review and confirm a plan of care.
- The diabetes nurse specialist must be informed of the admission, if out of hours advice is required then contact Medical registrar on call. If medical consultant oncall is a diabetologist, specialist advice can be sought by contacting medical consultant oncall.
- Please look in maternity notes or hand-held notes for a coloured sheet entitled "**Diabetes in Pregnancy: Glucose Management during delivery**" which will have a personalized plan for diabetes management during delivery.
- **If there is no plan in place, please use the following guidance:**
- Check the woman's blood sugar level with a hospital capillary blood glucose machine. Do not use the woman's own blood sugar monitoring machine as it has not been calibrated.
- Women on diet alone or metformin should have their CBG monitored every 2 hours. If able to eat/drink, continue with metformin. At onset of active labour, metformin can be omitted. **If CBG >8 at any point, VRIII should be commenced** (Appendix 2)
- **Women on insulin – should continue on usual insulin dose while able to eat/drink. Consider half usual insulin if due around onset of active labour. At onset of active labour, monitor CBG every hour. If >8 at any point, commence VRIII.**
- Continuous CTG monitoring should be commenced once the woman is in active labour
- Remain vigilant for features pointing to potential shoulder dystocia
- Discuss benefits of early skin-to-skin contact and breastfeeding

Induction of labour

- Aim for two stretch and sweep vaginal examinations in the week preceding admission for induction. Please look in maternity notes or hand-held notes for a coloured sheet entitled "**Diabetes in Pregnancy: Glucose Management during delivery**" which will have a personalized plan for diabetes management during delivery.

- **If there is no plan in place, please use the following guidance:**

- Check the woman's blood sugar level with a hospital capillary blood glucose machine. Do not use the woman's own blood sugar monitoring machine as it has not been calibrated.

- **Women on diet alone or metformin should have their CBG monitored every 2 hours. If able to eat/drink, continue with metformin. Omit metformin on day 2 of admission. At onset of active labour, metformin can be omitted. If CBG >8 at any point, VRIII should be commenced.**

- **Women on insulin – should continue on usual insulin dose while able to eat/drink. Consider half usual insulin if due around onset of active labour or if birth expected in next 12 hours. For patients on meal-time short-acting insulin like novorapid, if not eating, the novorapid dose can be omitted. At onset of active labour, monitor CBG every hour. If >8 at any point, commence VRIII.**

11d Elective Caesarean Section

- Aim for first on the list. Women may not all require an overnight admission on the day before Caesarean section

- Nil by mouth from midnight. No preoperative enhanced recovery drinks are given to women with diabetes.

- **Women on diet alone: CBG monitoring on admission and before going to theatre. If >8mmol/l, commence VRIII**

- **Women on metformin should have their usual metformin the day before admission. When fasting, omit metformin. They should have their CBG monitored on admission, and before going to theatre. If >8mmol/l at any point, start VRIII.**

- Women with pre-existing diabetes on multiple daily doses of insulin – to continue usual meal time insulin doses the day before but **REDUCE** their long-acting insulin by 50% or return to pre-pregnancy dose. Omit their meal-time insulin doses on the day of caesarean section till after surgery. Meal times doses should also then return to those required pre-pregnancy. CBG should be checked that morning, and hourly thereafter till after caesarean section. If CBG >8mmol/l, commence VRIII

- Document all CBG results on the Insulin Prescription chart

- If GA is used then the woman's blood sugar level needs to be checked and acted upon every 30 minutes by the Anaesthetist.

Emergency Caesarean Section

- Follow the caesarean section guideline

- Postnatal debrief by surgeon undertaking procedure about the events leading to the Caesarean and options for future delivery, should take place before discharge home.

Intrapartum Management of patient on CSII (Continuous Subcutaneous Insulin Infusion) or 'Insulin Pump'

General Points

- Some patients with Type 1 Diabetes may be using an insulin pump to control their diabetes.

- This is a continuous infusion of short-acting insulin like Novorapid or Humalog or Apidra through a catheter connected to a subcutaneous cannula. The pump delivers a continuous background or 'basal' infusion of insulin at pre-programmed rates. Bolus insulin can be given under direction of patient in order to cover meals and correct high blood glucose levels.

- As patients are not on any long-acting insulin, any interruption to the pump (e.g. cannula blocked or dislodged) can result in hyperglycaemia and DKA very rapidly.

- Insulin Pumps must only be adjusted by the patient or a member of the diabetes team with the correct knowledge and skills.

- Insulin Pumps are expensive and steps should be taken to ensure it is not lost when patients are admitted into hospital.

- If patient is unconscious or incapacitated, ask relative to look after the pump or store this in patients' medication locker. Please document location of the pump in the medical notes.

- **In the event if the pump needs to be disconnected (patient unconscious or incapacitated or partner unavailable), disconnect pump TOGETHER with the tubing while leaving the pump cannula in. DO NOT cut the tubing. DO NOT DISCONNECT the pump from the tubing as the remaining insulin in the tubing may infuse quickly risking hypoglycaemia.**

- There is no need to attempt to stop or turn off the pump.

Spontaneous Labour, Induction of Labour or Elective Caesarian Section

- If the partner/patient is happy to continue using the CSII/Insulin Pump, this can be continued on the current settings. Ensure site of insulin pump infusion is away from operative site and the pump is accessible.

- Insert iv cannula in case iv insulin or fluids are required

- Measure CBG hourly once in active labour. If CBG >/=8, patient/partner to deliver correction dose using the insulin pump. If CBG >/=8 on two consecutive tests

despite correction dose, switch to VRIII. Remove pump and tubing but the pump cannula can remain.

- If CBG <4, treat with standard hypo treatment using fast-acting glucose. Recheck after 30 mins and then hourly. If further hypo, patient needs to reduce basal rate by 50%.

Caesarian Section under sedation or GA

- If patient is not going to miss more than one meal and the CBG levels are <8, continue with the insulin pump for the procedure.

- Insert iv cannula in case iv insulin or fluids are required.

- Ensure site of insulin pump infusion is away from operative site and the pump is accessible.

- Monitor glucose levels every 30 minutes.

- If CBG >8, disconnect pump and tubing (leave pump cannula in place) and commence VRIII.

- If CBG <4, treat with standard hypo treatment and check CBG every 30 minutes. If further hypo, disconnect pump and tubing (leave pump cannula in place).

- Post-procedure, patient can consider a correction bolus of insulin using their pump if CBG is >10.

OPERATIVE INTERVENTIONS IN OBSTETRICS

General Information

Pre-operative Assessment

Elective LSCS patients are pre-clerked 10 days before surgery, usually on the Tuesday before a Thursday list, or on the Friday before a Monday list.

All patients should be seen before surgery. A normal anaesthetic history and examination should be performed and documented on the anaesthetic chart, with special emphasis on:

Indication for LSCS
Past medical/anaesthetic/obstetric history eg Pre-eclampsia,
Drug history / allergies
Airway assessment especially in obese and Pre-eclamptics (if likely difficult airway summon help).
Placenta position within uterus (look for ultrasound report in notes)
Discuss anaesthetic options (GA vs regional) including complications
Consent for suppositories, explain PCA if GA or no IT opiates.

Pre-operative Haemoglobin

All women should have a check Hb at 34 weeks. If this is normal (>10.5g/dL) and no bleeding or obstetric/medical complication there is no need to re-check the Hb.

Group & Save, Cross match and Cell Salvage indications

The following women are classed as higher risk (this list is not exhaustive) and should have group and save performed and cross match considered. It should also be considered to collect blood for cell salvage in these women:

- Placenta praevia
- Anaemia
- Previous postpartum haemorrhage
- Multiple pregnancy
- Anticipated difficult surgery
  - >2 previous Caesarians
  - known fibroids
  - previous difficult operation
- Women with antibodies that may cause delay in crossmatching
- Bleeding diathesis, including appropriate clotting factors if necessary

Enhanced Recovery in Obstetrics

From October 2014 we have offered to parturients the ability to go on the enhanced recovery programme. This effectively consists of encouraging drinking until 0630 on the morning of surgery, carbohydrate pre-op drinks, adequate analgesia (spinal, post op drugs as described later), regular ondansetron, early decatheterisation (6 hrs) and early mobilisation.

Basic Requirements

Anaesthetic machine and equipment are checked at the beginning of each day. Emergency drugs are drawn up and kept in the theatre fridge.

Functioning large bore IV cannula.

No patient in the third trimester should be lying on her back. Either place a wedge under the right hip or tilt the table 12-15^0 to the left to prevent aortocaval compression. In cases of fetal distress the only reliable way to do this is the full left lateral position prior to delivery.

Trained assistant / ODP

Full (ECG, pulse oximeter, NIBP, ETCO2) monitoring throughout anaesthesia.

Electives

For elective Caesarian sections regional anaesthesia is the method of choice.

Elective patients are usually pre-clerked in the Day Assessment Unit a few days before their planned LSCS and then go home until the day of surgery.

Assess and document as above. They will be given a pre-med (ranitidine 150mg) to take the night before LSCS and another to take on the morning of surgery.

Sodium citrate can be omitted for elective LSCS under regional anaesthesia because it:

- Contributes to N&V, especially if hypotension occurs
- May be ineffective if GA conversion required >30 mins after administration
- Remember to give if converting to a GA.

Classification of Emergency Caesarian Sections

Category 1
immediate threat to life of woman or fetus, "crash section"
Decision to delivery should aim to be < 15 mins
Delivery is done under general anaesthetic

Category 2
Maternal or foetal compromise that is not immediately life threatening
Decision to delivery should aim to be < 30 mins
Usually done under regional, spinal or epidural top-up. (time allowing)
CTG monitoring should be continued in theatre

Category 3
No maternal or fetal compromise but needs early delivery
Decision to deliver at obstetrician's discretion
Regional block, spinal or epidural top-up method of choice

The decision as to which anaesthetic technique is most appropriate depends on:
Discussion with obstetricians as to the urgency
Confidence and experience of the anaesthetist
Patient factors eg recent oral intake, BMI, airway assessment
Presence of a working epidural

Each patient must be individually assessed – medical problems should have been picked up early in labour and a plan formulated following discussion with a senior anaesthetist.

IV ranitidine 50mg if not already given (may take 30 mins to be effective but will help at extubation)
(10mg IV metaclopromide as a prokinetic can be considered)
Sodium citrate 0.3M 30mls

Spinal Anaesthesia for Caesarian Section

Spinal anaesthesia is the commonest technique used for LSCS. It is rapid and easy (within reason) to perform even when time is limited. It produces a more reliable and denser block compared with epidural anaesthesia. When combined with opiates can have long lasting postoperative pain relief.

Technique

Full history, examination, explanation of procedure and consent

Ensure IV access with 14g/16g cannula

Start crystalloid preload (15ml/kg, take care in PET patients)

Start phenylephrine infusion (see later)

Establish full monitoring BP/ECG/pulse oximetry (measure BP every 1-2mins)

Full aseptic technique including mask

For safety, the L3/4 lumbar interspace is preferred. Remember that assessment of the spinal level is inaccurate (consider use of ultrasound), and for that reason it is best to avoid L2/3 as it may be L1/2 and consequently risk spinal cord trauma. Use the line between iliac crests (Tuffiers' line) as your upper margin for spinals and epidurals/CSEs

Fine pencil point needles (24-27G Sprotte or Whitacre) should be used. **No Quincke (cutting) needles should be used in obstetrics because of the increased incidence of PDPH**

2.0-2.5mls (depending on maternal height) of 0.5% heavy bupivacaine in combination with 300-400micrograms diamorphine should achieve an adequate block to T4 or above. It is preferable to have a block slightly too high because the sequelae can be easily treated than too low.

'Single-shot' spinal is the most well established technique. If obese a Tuohy needle can be inserted as an introducer to keep the long (12cm) spinal needle in the midline

In the event of an inadequate height of block after a 'single-shot' spinal an epidural catheter can be placed (patient in lateral position) to extend the block

Aspirate drugs from glass ampoules using the supplied 5 micron filter needle

Because of the risk of contamination during aspiration spinal drugs not in a wrapped/sterile ampoule should ideally be drawn up using a bacterial filter (0.2 micron)

Documentation should be full and concise

Although more reliable than an epidural, the block must be tested and documented in the same way

The block required for LSCS:

Test bilaterally for loss of cold sensation T4-S2
Loss of light touch/pinprick up to T6
Loss of motor power of hip flexion
Reduced motor power of ankle flexion

Note: Prior to surgical incision, antibiotics should be given (see perioperative drugs section)

After delivery of baby
5 units oxytocin should be given slowly after delivery of the baby. (beware the second twin)
If tachycardia is to be avoided then consider a oxytocin infusion

At the end of the operation 100mg diclofenac PR should be given unless contraindicated.

Treatment of Hypotension after spinal

With spinal there is a greater incidence of hypotension than with epidural blockade. We now offer a phenylephrine infusion for all elective patients to prevent spinal-induced hypotension (caution in pregnancy induced hypertension / PET)

Nausea is due to hypotension until proven otherwise
Position the woman so as to avoid aortocaval compression
Always preload with fluid before institution of spinal blockade
DO NOT GIVE EPHEDRINE UNTIL AFTER DELIVERY.
Give incremental doses of metaraminol (0.25-0.5mg) if the systolic blood pressure falls by 20% or if the mother feels nauseous or lightheaded.
Consider early use of 100-200micrograms glycopyrollate if bradycardic
If the BP fall persists consider more lateral tilt of the table.

PHENYLEPHRINE INFUSION SET-UP:

Equipment required

1 x ampoule of phenylephrine 10mg (1mL of 1%)
1 x 250mL bag sodium chloride 0.9%
1 x 50mL syringe and giving set
1 x syringe driver

Method

1. Inject the 10mg phenylephrine into the 250ml bag of sodium chloride 0.9%.
2. Withdraw 50mLs of this mixture into a 50mL syringe and connect to PCA line. Put in syringe driver.
3. Connect to patient and run at 1mL/hr until spinal is in. Co-load with 1000mL crystalloid stat.
4. As soon as spinal is in immediately adjust the rate to 50mL/hr (range 30-50) and monitor HR/BP.
5. When baby delivered turn down to approx. 25mL/hr and continue to monitor HR/BP, aiming to titrate down and get phenylephrine off by end of case (Oxytocin infusion could replace this infusion if required).
6. Overtreatment of bradycardia with vagolytics could lead to rebound hypertension, and cardiac output is maintained with BP. However consider vagolytic treatment and reducing phenyl rate if HR < 60.

PLEASE NOTE THAT THESE NUMBERS ARE A GUIDE ONLY AND SHOULD BE TITRATED TO EFFECT. CAUTION IN PRE-ECLAMPTICS AND CARDIAC DISEASE ETC.

Fractionated epidural top-up for LSCS

Indications

Patients with established epidural analgesia for labour

Specific maternal disease (certain cardiac disorders). Where rapid changes in SVR is to be avoided.

Solution

Either 0.5% bupivacaine

Or 17mls 2% lignocaine + 2mls 8.4% bicarbonate + 1ml 1:10,000 adrenaline (makes 1:200,000)

Volume

Usually 15-20mL in divided doses of 5mL.

(Remember to give initial test dose as catheter may have migrated on transfer).

This is usually enough to extend an epidural that has had only standard top-ups for labour, although may require up to 30mls.

Can take 30-40 minutes to top-up

Additives

50-100micrograms fentanyl or 2.5-3mg diamorphine for post op analgesia

Always preload with fluid (eg 1L Plasmalyte)

Addition information for epidural top-ups

If the anaesthetist needs to start the top-up in the delivery room, some means of monitoring the patient (HR, BP) needs to be available and the anaesthetist should stay with the woman at all times. Have ephedrine or metaraminol to hand.

Test the block as for subarachnoid block (see above)

Consider O2 via Hudson mask if SpO2<94 or if fetal distress, at least until delivery.

Treatment of hypotension should be aggressive as for spinal

The epidural may be removed immediately postoperatively, provided platelets and clotting are satisfactory (see PET, coagulation sections), unless there is an indication to leave the catheter in eg morbidly obese woman or in anticipation of further surgery. Inform the surgeons and midwives if this is done.

Spinal anaesthesia after failed epidural blockade

There is an increased incidence of high block in this situation. If this anaesthetic technique has been chosen there must be increased vigilance for:

Motor block in the upper limbs NB. The mother does not have a total spinal if she can squeeze the anaesthetists hands

Maternal difficulty breathing (lower chest wall blockade – reassurance and O2 usually sufficient)

Excessive sedation

If the epidural has failed because the catheter has fallen out and the last epidural top-up was more than 45 minutes before then a spinal dose of 2-2.5mls heavy bupivacaine can be used (normal dose)

If the epidural has failed after repeated top-ups then reduce the injectate volume by 25%, since the presence of fluid in the epidural space compresses the dural sac (note for author-csf is a liquid therefore non compressible so cannot be squeezed.) and reduces its volume.

If uncertain it is better to give a controlled general anaesthetic – judge each case on its merits and consider a balance of risks (eg risk of GA in obesity / maternal comorbidity) – SEEK SENIOR ADVICE.

Management of pain during LSCS under regional anaesthesia

Establish whether the patient is feeling pressure or pain. If in pain, management will depend on the urgency of the LSCS, the type of anaesthetic used and the stage of the operation.

The mother should always be asked if she would like to receive general anaesthesia. If the mother wishes it, and provided it can be carried out safely, then conversion to GA is appropriate.

If the pain occurs before uterine incision, then it is likely that general anaesthesia will be required.

If pain occurs after delivery:

Give N2O/O2 (entonox) via anaesthetic machine
If an epidural is in place, give a further top-up
Try incremental aliquots of a short acting opioid (eg alfentanil/fentanyl)
If the pain occurs on wound closure ask the obstetrician to infiltrate with local anaesthesia

Document events clearly. If the woman declines GA this must be documented but don't forget to offer again if pain persists.

Combined Spinal Epidural (CSE)

Advantages
Rapid dense block
Intra operative top up
Epidural can be used for post op pain relief

Disadvantages
Technically more difficult
Higher failure rate of spinal and untested epidural
Can get changes in BP and cardiac output
Higher risk of PDPH

CSE are rarely done in this hospital and should only be consider by a consultant or by experienced senior anaesthetists after consultation with appropriate consultant

Indications
When prolonged surgery in anticipated
When limiting the speed of onset of block, (eg aortic stenosis)

Technique

Needle through needle
Associated with increased failure to locate CSF with the spinal needle
But only involves one injection
The epidural space is located first with a Touhy needle
A 25/26G Whitacre needle is then passed through the Touhy needle intrathecal space and anaesthetic mixture injected
Then the epidural catheter is passed through the Touhy needle and secured like a normal epidural

Two Needle Technique
The epidural is placed first (due to delay that potentially can happen in locating the epidural space)
Then a spinal is placed in L3/4 or below

Remember to take care to use space L3/4 or below with either technique as spinal cord damage has been reported.

Addition information for CSE
To increase the block height using the epidural catheter, 3mls 0.5% bupivacaine may be sufficient
Or 3-10mls of normal saline can be titrated carefully (this works by compressing the dural sac causing cephalad spread of the intrathecal LA
Test block at 5 minutes.
Can use a further 12-17mls of 0.5% levobupivacaine to achieve sufficient block, using 2-4mls at a time and checking the block repeatedly.
The full 20mls of levobupivacaine should only be required if the spinal has completely failed

General Anaesthesia for Caesarian Section

Elective general anaesthesia is now rare, limiting opportunities for training. The majority of complications relate to the airway, as failed intubation is much more common in obstetric than non-obstetric anaesthesia (1:250[1] vs. 1:2000[2] respectively). All anaesthetists should all be familiar with a failed intubation drill and make themselves aware of the equipment available to them in the obstetric theatre.

Indications for general anaesthesia include:

- Maternal request
- Urgency of surgery/Category 1 LSCS due to:
    - Umbilical cord prolapse with abnormal fetal heart trace
    - Abruption / severe ante partum haemorrhage
    - Non-recovering fetal bradycardia <100bpm
    - Fetal scalp pH <7.1
- Abnormally invasive placenta (possibly)
- Regional anaesthesia contraindicated (e.g. coagulopathy, maternal hypovolaemia etc.)
- Failed regional anaesthesia
- Additional surgery planned at the same time as caesarean section.

NOTE
Discuss with the obstetrician the urgency of delivery. A good working epidural can often be topped up and working as quickly as general anaesthesia can be achieved. Such cases should be discussed as a team.

Technique

The following is a recommended standard technique, which may be modified to suit special circumstances. Continue fetal monitoring throughout this process – intrauterine resuscitation may be achieved with fluids/oxygen/lateral tilt (which may allow a rethink of approach to delivery).

- History and examination. In particular allergies and assessment of the maternal airway - Mallampati score[3], thryomental distance (<7cm predicting difficulty) and ability to protrude lower incisors in front of upper incisors.
- CONSIDERATION OF DIFFICULT AIRWAY GUIDELINES (Appendix)
- Antacid prophylaxis. Ensure ranitidine 150mg po has been given within the last 2 hours, or administer ranitidine 50mg IV as a slow bolus
- Give sodium citrate 0.3M 30mls
- NASAL OXYGENATION VIA NASAL SPECS
- OBTAIN VIDEOLARYNGOSCOPE IF REQUIRED
- Start appropriate monitoring and check suction
- Position supine with left lateral tilt or wedge.
- **Pre-oxygenate** for 3-5 minutes or, in an emergency, with four vital capacity breaths with a high flow through the circuit. A seal must be obtained with the face mask. At term, women have a reduced FRC and a higher respiratory rate and oxygen consumption. This reduces the time required for denitrogenation, but also reduces the time from apnoea to arterial oxygen desaturation
- **Induction**: Rapid Sequence Induction
    - PROPOFOL INDUCTION. Thiopentone 5-7mg/kg could be used but this is discouraged unless in experienced hands.
    - Cricoid pressure. As soon as consciousness is lost. Ensure direction of pressure is at right angles to patient not to the floor (ie. allow for bed tilt).

    - 100mg suxamethonium when unconscious NB you may need more if the woman is >100kg. For PET/PIH add 20micrograms/kg alfentanil so as to avoid the hypertensive response to laryngoscopy. Warn the paediatrician you have done so.
    - ALTERNATIVELY CONSIDER USE OF ROCURONUM 1MG/KG AND HAVE SUGAMMADEX APPROPRIATE DOSE AVAILABLE.
- **Maintenance**
    - 50% O2 in 50% N2O (or adjust FiO2 to keep SpO2>95%) and SEVOFLURANE
    - IPPV to ETCO2 35mmHg or 4kPa.
    - Avoid hyperventilation – the resulting alkalosis will cause a left shift of the oxyhaemoglobin dissociation curve and may worsen or cause fetal hypoxia.
- **Relaxation**
    - Wait for suxamethonium to wear off (may take longer than normal in the term mother).
    - Give a non-depolarising muscle relaxant (usually atracurium/rocuronium – reduce dose if pt has had MgSO4 for PET/eclampsia).

- **After delivery**
    - give IV oxytocin 3-5units slowly after clamping of cord, additional infusion if required (40units in 500mL sodium chloride 0.9% over 4 hours)
    - Give opioid of choice eg. morphine 10-20mg +/- 100micrograms fentanyl
    - During emergency GA LSCS if full stomach suspected consider carefully passing a large bore orogastric tube and aspirating. Remove before extubation.
    - Consider bilateral ilioinguinal nerve blocks or transversus abdominis plane blocks (TAP block)
    - Prior to extubation, give 100mg diclofenac PR (unless contraindicated) and 1g paracetamol IV. (PR paracetamol is 3 x cost of iv)
- **Extubation**
    - Reverse neuromuscular block, and extubate when fully awake head down left lateral position
- **Post-operative care**
    - Ensure monitoring / suction / O2 / trained recovery staff available in recovery before end of operation
    - Do not leave patient until fully awake
    - If the mother has an epidural in situ give diamorphine 2-3mg through catheter
    - If no regional block, consider PCA morphine/fentanyl why not zomorph – you will have to make this up yourself as the midwives are not trained.
    - Balanced analgesia
        - Diclofenac (unless contraindicated) 50-75mg bd po
        - Paracetamol 1g qds for 24hrs
        - Ondansetron / Oramorph prn.

Effect of general anaesthesia on the fetus

- Most anaesthetic agents, except for the muscle relaxants, rapidly cross the placenta.

- Thiopentone can be detected in the fetus within thirty seconds of administration with peak umbilical vein concentration occurring around 1 minute.
- Umbilical artery to umbilical vein concentration approach unity at 8 minutes.
- Opiates administered before delivery may cause fetal depression. This can be rapidly reversed with naloxone (e.g. 200µg i/m).
- If there is a specific indication for opiates before delivery they should be given, and the individual resuscitating the neonate should be informed.
- Hypotension, hypoxia, hypocapnia and excessive maternal catecholamine secretion may all be harmful to the fetus.

POST GENERAL ANAESTHETIC RECOVERY

The overriding principle is : the anaesthetist has a responsibility to be immediately availabile to attend the patient until they are safe to be left with a trained assistance. Do not go and start another case until this has happened.

It is important to prepare for the recovery phase prior to going to recovery. Make sure that all monitoring, staff, airway equipment and resuscitation equipment is available.

The patient's spouse/birthing partner should not be in recovery until invited.

It is imperative that there is appropriately trained staff in the recovery area, operating with standard Trust GA recovery guidelines. There should be a minimum of two recovery nurses. At the moment this consists of an ODP and a midwife, but will soon be changing to a dedicated recovery nurse and a midwife.

All women who have undergone LSCS must remain fully supervised in delivery room / recovery area for a period of at least 30 minutes or until discharge criteria have been met (see below).

After GA

Following extubation, women should be recovered in the lateral position until fully awake. Transfer to the recovery room where full monitoring is mandatory (make sure there is a monitor in recovery before leaving theatre). Supplementary oxygen should be administered until SpO2>95% breathing air. Pain should be treated as required. Remember that not all midwives are trained recovery nurses so it is your responsibility to stay until the woman is fully awake and the airway is patent.

After regional anaesthesia

Remember that a previously stable block can occasionally rise when a woman is moved. Make sure the blood pressure is stable before leaving, and if there is any doubt, recheck the block level.

Before discharge

Ensure the following:

Cardiovascular and respiratory variables acceptable and stable
Adequate analgesia
Post-operative fluid / analgesia / LMWH prescribed
The midwife has taken a handover

No woman should be left alone in a single room for 24 hours post LSCS.

Oral fluids
A drink of tea/ squash/ coffee may be offered to women who have undergone uncomplicated delivery under regional block, as long as there is no evidence of significant postpartum bleeding.

Perioperative drugs

Antibiotics
Pre-incision dose of 1.5g IV cefuroxime as per NICE guidance. Add metronidazole 500mg IV in emergency LSCS.
If severe allergy to penicillin give teicoplanin 400mg and gentamicin 120mg, please discuss with obstetrician / microbiologist if unsure.

Vasoconstrictors
Do NOT use ephedrine until baby is delivered.
Consider phenylephrine infusion to prevent spinal induced hypotension – see earlier protocol
Metaraminol is an acceptable alternative and may be useful as a rescue bolus.
Watch this space for noradrenaline in obstetrics – evidence currently gathering…

Oxytocin
5units oxytocin (Syntocinon) should be given slowly (good idea to dilute into 5mL) immediately after delivery of the baby (beware the second twin!). Occasionally the surgeon will request another 5units, although this should be injected very cautiously and slowly, watching for hypotension.
This is the first line drug for uterine atony. Bolus administration causes peripheral vasodilatation, hypotension and tachycardia.
If a oxytocin infusion is requested, this is 30-40units oxytocin in 500mL sodium chloride 0.9% over 4 hours (ie 125mL/hr).
Carbetocin may be used in the future but not at the time of writing.

Ergometrine
This is an ergot alkaloid and is the commonest second line treatment of uterine atony. It is restricted to postpartum use and is routinely administered IM with oxytocin (syntometrine) after vaginal delivery.
Rapidly produces tetanic uterine contraction.
Parenteral use is associated with a high incidence of nausea and vomiting. Other side effects include severe hypertension, coronary artery vasoconstriction, pulmonary hypertension and cardiac arrythmias. Ergometrine is relatively contraindicated in patients with PET, essential hypertension, peripheral vascular disease and cardiac disease.
IM onset time 2-5 minutes. IV onset time less than 1 minute. Large doses of IV ergometrine should never be given as a bolus.
Dilute 500micrograms into 10mls. Initial dose 50-100micrograms slowly, max 500micrograms total.

Prostaglandins (Hemabate or Carboprost)
15-methyl PGF 2-alpha. Second line treatment of uterine atony, especially when refractory to other treatments.
Common side effects are nausea and vomiting, diarrhoea, flushing and fever. May cause severe bronchospasm. Therefore relatively contraindicated in asthmatics. Steroids may be administered concurrently if there is an increased risk of bronchospasm.
Initial dose 250micrograms IM or intramyometrial. Not approved for intravenous use. If required further doses of 250micrograms should be given no less than 15 minutes apart to total 2mg (8 doses). Onset time 15 minutes.
If unsuccessful in achieving haemostasis then surgical techniques must be considered (hysterectomy, uterine artery ligation. Embolization may become available in the future).

TOCOLYSIS IN THEATRE

The obstetricians may sometimes request uterine relaxation during caesarean sections in patients with uterine hypertonicity. Your choices are as below, in order.

1. Sublingual glyceryltrinitrate (Sublingual spray-400micrograms/puff) :
    - 400micrograms (1 puff) to 800micrograms (2 puffs)

    Prime the spray before using.
    Major side effect is headache

2. IV glyceryltrinitrate (50mg in 50mL vial):
    Take 1mL of solution which contains 1mg of GTN in a 1ml syringe.
    - 250-500micrograms (0.25-0.5mL) as initial dose.
    - After 60-90 seconds a further dose may be given.
    - This may be repeated until uterine relaxation or maternal hypotension develops.

    Hypotension can be treated with iv ephedrine/metaraminol or increased hydration. Hypotension is usually transient.
    Be aware that some patients may need oxytocin afterwards to contract the uterus.

3. Terbutaline(250micrograms in 0.5mL ampoule):
    - 250micrograms s/c
    - IV terbutaline slowly in 50 microgram boluses up to 250 micrograms in total (often 100 micrograms will be sufficient)

    Preparation: Draw up 0.5 mL (250 micrograms) of terbutaline in a 10 mL syringe and make up to 10 mL with sodium chloride 0.9 %, giving a concentration of 25 micrograms per mL.
    Ensure monitoring of maternal pulse whilst bolus doses are administered
    Stop IV administration if maternal pulse > 140
    Principal maternal adverse effects are hyperglycemia, cardiac arrhythmias, myocardial ischemia, pulmonary oedema, hypotension, and tachycardia

Prescriptions after Caesarian Section

Anti-thrombotics

All Caesarian Sections are at increased risk of thromboembolism. They should all have TED stockings / flowtrons and low molecular weight heparin should be considered if 2 or more of the following are present:

Age >35
Obesity
Parity >3
Immobility prior to surgery
Emergency surgery
Varicose veins
Infection
Pre-eclampsia
Major current illness
Extended surgery

The usual subcutaneous dose regimens are:

Enoxaparin (clexane) 40mg od given at 1800
OR Heparin 7500iu bd (if contraindicated for LMWH)

Please refer to the below chart for Trust policy on weight (at booking) related dosing:

<50kg	20mg enoxaparin
50-90kg	40mg enoxaparin
91-130kg	60mg enoxaparin
131-170kg	80mg enoxaparin
>171kg	0.6mg/kg enoxaparin daily in divided doses

Patients with known thrombophilia (lupus anticoagulant, protein C/S / antithrombin III deficiency) should already have an anticoagulant regime arranged in consultation with the obstetricians and haematologists.

Analgesia/ anti-emetic

All cases (unless contraindicated):

- Diclofenac 100mg PR at end of surgery (record on once only section of chart).
- *Regular* paracetamol 1g qds PO & ibuprofen 600mg qds (max 2.4g/day) for 3 days.
- *Regular* omeprazole 20mg od PO
- *Regular* ondansetron 4mg tds PO & rescue prn anti-emetic
- Oramorph 10-30mg orally 1-2 hourly prn.

General anaesthesia (if no regional blockade in situ)

Immediately after delivery IV bolus of morphine 10-20mg
Post-op titrate morphine in recovery, consider PCA.

Intravenous fluids
Bear in mind that 2 litres of fluid will have been given in the course of a regional block, and that an uncomplicated LSCS should not prevent the woman from drinking within a short time. Particularly in pre-eclampsia, be wary of potential fluid overload. The oxytocin infusion + further 500mL of fluid should suffice. More fluid should only be prescribed according to clinical need (haemorrhage, protracted vomiting).

Other procedures requiring anaesthesia

Manual Removal of Placenta (MROP)
Choice of spinal / epidural top-up or GA. Check cardiovascular stability and estimated blood loss. If in doubt choose GA, but if stable then regional preferable.
If GA assume full stomach for the first 2 days post delivery and perform RSI.
If spinal give 2ml 0.5% bupivacaine, no opiates required. Adequate dense block to T6/T8 is required – although innervation of the uterus is no higher than T10, movement within the peritoneal cavity necessitates higher block.

Trial of Instrumental Delivery
Spinal or epidural top-up anaesthesia is the technique of choice. Give regional anaesthetic doses as if the woman is having an LSCS because the procedure may convert to LSCS. If surgeon not sure or known to be slow then CSE may be considered. If epidural in situ the obstetrician may sometimes elect to perform the ventouse/forceps in the delivery room, depending on his/her experience and the likelihood of conversion to LSCS.
Repair of third degree tear
As for MROP, though block does not need to be as high.

Multiple pregnancies
In certain circumstances it may be necessary to deliver twins in theatre for fear of problems delivering the second twin. Multiple pregnancies often require early epidurals both for pain relief and for this reason so it can be topped up for delivery. A GA is occasionally required for delivery of the second twin.
Ensure adequate paediatric staff are available.
Don't forget to wait until the last baby is delivered before giving the oxytocin.

Cell salvage in obstetrics

Use of intraoperative cell salvage (ICS)

ICS is being increasingly used in the UK in obstetrics for women at risk from post-partum haemorrhage during caesarean section.
In the year 2005-2006, 38% of UK maternity units used ICS, and 28% included the use of ICS in their Massive Obstetric Haemorrhage (MOH) protocol. This has increased massively.
Early, theoretical concerns over amniotic fluid embolism have not been borne out in clinical practice and 80% of maternity units identified the barrier to more use as lack

of training rather than safety concerns. However a leucocyte depletion filter is still recommended.
There should be a dedicated (Do you mean dedicated? This suggests they can do nothing else other than cell salvage), appropriately trained operator (usually an ODP)

Indications for ICS

Patient selection for ICS is at the discretion of the obstetrician and anaesthetist caring for the patient. If Blood loss is anticipated as being . 500mls cell salvage should be considered.The type of obstetric cases that should be considered for selection includes:

- Emergency situations:
- Ruptured ectopic pregnancy
- Post-partum haemorrhage

Group & Save, Cross match and Cell Salvage indications

The following women are classed as higher risk (this list is not exhaustive) and should have group and save performed and cross match considered. It should also be considered to collect blood for cell salvage in these women:

Placenta praevia
Anaemia
Previous postpartum haemorrhage
Multiple pregnancy
Anticipated difficult surgery
>2 previous Caesarians
known fibroids
previous difficult operation
Women with antibodies that may cause delay in crossmatching
Bleeding diathesis, including appropriate clotting factors if necessary

It is suggested that should the LSCS warrant a G&S as per previously described categories then consideration should be given to collecting blood for cell salvage. This blood can be kept for up to 6 hours prior to the need to use it.

Elective situations:

- Patients with an anticipated blood loss of >1000mls e.g. placenta accreta, large uterine fibroids, and other predictable causes of massive obstetric haemorrhage.
- Patients who for religious or other reasons refuse allogeneic blood and have consented to the use of ICS.

Additional measures required for ICS in obstetrics

Amniotic fluid should not ideally be aspirated into the ICS collection reservoir, but should be removed by separate suction prior to starting cell salvage and use of a leucocyte depletion filter.

Rhesus negative women

The presence of fetal red cells in the ICS blood is likely because the ICS device cannot distinguish fetal from maternal cells.

All rhesus negative women must have a kleihauer performed in the postpartum period to determine the amount of fetal red cell exposure to ensure that the woman receives the correct does of Anti-D immunoglobulin.

OBSTETRIC AND ANAESTHETIC EMERGENCIES

MATERNAL MORTALITY REPORT

The Confidential Enquiry into Maternal and Child Health (CEMACH) was a triennial report which outlined national data and recommendations over a three year period. This has now become MBRRACE (mothers and babies reducing risk through audits and confidential enquiries) which publishes yearly, focusing on particular subjects in a rolling cycle.

The leading causes of death continue to be thrombosis, pre-eclampsia / eclampsia and haemorrhage. Sepsis and amniotic fluid embolism also feature highly, and there are a handful of deaths directly attributable to anaesthesia.

Obstetric Early Warning Scores (ME(O)WS)

An obstetric-specific early warning scoring system chart (MEOWS) is available at DCHFT (Appendix). Please familiarise yourself with the chart and encourage the midwives to use it and act on it.

High Dependency Care

There is currently no obstetric-specific HDU, and patients requiring critical care are admitted to the general HDU/ICU. This is for monitoring and treatment of women whose clinical condition dictates that a level of care is required higher than ward level. Transfer to ICU will be indicated by the need for ventilatory, inotropic or renal replacement support. HDU admission criteria include:

Major haemorrhage (>1.5L) and/or the potential for continued blood loss
Severe coagulopathy
Severe pre-eclampsia / eclampsia / HELLP syndrome
Post-op care – decision by anaesthetist/obstetrician/midwife
Any organ failure

If you require HDU/ICU assistance or need advice please speak to the ICU consultant (daytime extension 3444) or on-call consultant out of hours.

Team 66

The duty anaesthetist (carrying 209) is a member of TEAM 66. This is an emergency bleep system whereby the midwives etc have the ability to rapidly gain the obstetric team, the anaesthetic team and the theatre team.

Obstetric Haemorrhage

Obstetric haemorrhage remains a significant cause of maternal and foetal morbidity and mortality. It can rapidly become life-threatening and the emphasis should be on vigilance, good communication and the early involvement of senior obstetric, anaesthetic and haematology staff. Remember Airway, Breathing, Circulation. Monitor on ME(O)WS chart.
Remember haemorrhage may be concealed.

Antepartum Haemorrhage
All women with significant vaginal bleeding >18 weeks before delivery

Placenta praevia
Placental abruption
Vasa previa
Uterine rupture

Postpartum Haemorrhage
Haemorrhage exceeding 500mls or any substantial loss of blood which causes deterioration in the woman's condition in the postpartum period.

Uterine atony
Retained placenta
Placenta accreta / percreta
Genital trauma
Acute uterine inversion
Coagulopathy

Massive Haemorrhage	• More than 1500mls blood loss with ongoing loss (>150mls/min) • Hb <40g/L • Signs of clinical shock • Where the senior clinician believes it to be so
Major	Blood loss between 1000 and 1500 mls
Minor	Blood loss between 500 and 1000 mls

Major/Massive Obstetric Haemorrhage >1000mls
Communicate, resuscitate, monitor, investigate, and stop the bleeding.

Communicate
Involve senior Anaesthetist, obstetrician, midwife. Call haematology and blood transfusion service. Call porter for delivery of specimens/blood.

Resuscitate, monitor, investigate, and stop the bleeding.

Airway and breathing assessment
Full monitoring – SpO2, NIBP, ECG, CTG
Give Oxygen by mask 8L/min
Head down / left lateral tilt

2 large bore IV cannulae (14 or 16G), 20 mls of blood for FBC, clotting, U&E, crossmatch 6 units urgently
Ask midwife to get PPH BOX
Record blood loss and events
Infuse crystalloid max 2L, colloid max 1.5L.
1g Tranexamic Acid
If no blood available after 3.5L fluid, give emergency O negative blood as required whilst awaiting type specific / crossmatched blood.
Use a warming device
Consider early insertion of invasive monitoring and transfer to critical care.
Anticipate coagulation problems. Consider interventional radiology
Insert urinary catheter and monitor urine output hourly
Consider theatre for operative delivery / treatment options

USEFUL NUMBERS:

Maternity coordinator bleep 521
ODP on call bleep 556
4320 Blood Bank
Bleep 596 Blood Bank out of hours
Bleep 583 Porter (for blood sample and product delivery)
5999 CODE RED – see below.

Massive Obstetric Haemmorhage >1500mls

'Code Red' is triggered by a consultant in anaesthetics, based on their clinical assessment of the patient alone. The call can be made by another member of staff ringing on their behalf.

Massive haemorrhage is defined as:

- Replacement of 50% of blood volume within 3 hours or less.
- ongoing transfusion requirement to compensate greater than 150mLs per minute

'Code red' must only be used where death through significant haemorrhage is expected within the next 30-60 minutes.

CALL EXTENSION 5999 (24hours) hold until answered.

State

- **Code red transfusion and the telephone extension**
- **Consultant authorising the code red**
- **Your name**
- **Patient details**
- **Location of the patient.**

Pathology department will:

- Issue 6 units of group O red cells
- immediately thaw 4 units fresh frozen plasma
- Telephone Southampton to 'blue light' 4 pools platelets
- Begin cross-match 6 unit's red cells when patients' blood sample has arrived.

When resuscitating with blood products please be aware that a 1:1:1 strategy may make the coagulopathy worse, due to the replacement of the maternal 'high fibrinogen' blood with lower concentration FFP. Further protocols involving TEG analysis are currently undergoing production.

It is suggested that a 2 PRC: 1 FFP strategy may be more appropriate in the meantime. This doesn't make sense as there will be even less fibrinogen given.
Need to put a link to the massive haemorrhage policy

TREATMENT OF UTERINE ATONY

1. Resuscitation as above

2. **Immediate action** – obstetric team to rub up a contraction and expel blood clots from the uterus. Bi-manual compression of the uterus will arrest the bleeding from atony during resuscitation until drugs take effect. Insert indwelling urinary catheter and commence 4 hourly measurement of urine output.

3. **Pharmacological treatment**

- First Line
  Syntometrine (oxytocin 5 units with ergometrine 500micrograms), standard prophylaxis given IM at the delivery of the infant. Identify what has already been given, a second dose can be given after 15 mins in the delivery room.

  OR
  Oxytocin dilute 10units into 10mL, 3 unit aliquots as necessary. Follow this with an oxytocin infusion 40units in 500mL Sodium Chloride 0.9% over 4 hours (125mL/hr).
  IV oxytocin can cause hypotension and circulatory collapse if given in the presence of hypovolaemia or any form of shock. Must be given at the slowest possible rate in the presence of cardiac disease or pulmonary oedema. Oxytocics are however necessary to reduce blood loss – keep in close communication with the obstetrician about the state of uterine contraction. Reduce the dose as soon as possible, all such cases must be discussed with a consultant.

  Ergometrine
  500micrograms neat IM or 100micrograms aliquots IV (dilute 500micrograms in 10mL Sodium Chloride 0.9%, give 2mL aliquots).
  IV ergometrine will act within 40 seconds, when given intramuscularly it acts in about 7 minutes. It is a hypertensive agent and is relatively contraindicated in pre-eclampsia and other hypertensive conditions; it should also be avoided if the patient is receiving pure alpha agonists. Can cause feeling unwell, nausea, vomiting, abdo/chest pain, headache, arrhythmias, palpitations and pulmonary oedema.

Second line

Carboprost (Haemabate or prostaglandin F2alphs)

250micrograms IM or IU (not IV) repeated at 15 min intervals (max eight doses)

Can cause hypertension, bronchospasm. Use with caution in asthma and PIH/PET.

Third line

Misoprostol (prostaglandin E1)

Dose 800micrograms-1000micrograms PR

One off dose when obstetrician checks the birth canal. Side effect: diarrhea

Other drugs

- **Tranexamic Acid**

  Dose 15mg/kg every 4h as required. Average dose 1g in 10mL sodium chloride 0.9% over 10 mins.

  Antifibrinolytic agent which stabilizes the formation of blood clots by inhibiting the conversion of plasminogen to plasmin. **Indicated for massive obstetric haemmorhage as a first line measure (WOMAN TRIAL)**. Postoperative thromboprophylaxis with clexane should be established to prevent further fibrin deposition. Should not be used when DIC results from activation of the coagulation system, such as in major abruption, retained dead foetus, severe PET or amniotic fluid embolism. If in doubt discuss with haematology.

  Do not use if interventional radiology is anticipated to be used. Anecdotal case reports of ischaemic limbs as a result…

- **Calcium**

  1g Calcium Chloride over 10 min

  The citrate used as the anticoagulant in transfusion products binds to calcium resulting in hypocalcaemia, of which the most common clinical symptom is hypotension. Arrythmias and myocardial depression can lead to further haemodynamic instability. Treatment should not be based on the total calcium levels but rather the ionized calcium levels as this is the active form. Calcium chloride is preferred over calcium gluconate as the former has 3 times as much calcium. Close monitoring of serum ionized calcium to guide.

Non-pharmacological measures

- **Rusch/Bakri Balloon catheter** – this is inserted into the uterus in theatre to exert pressure on the inside of the uterus once inflated. Oxytocin infusion continued. Inflated with 300-500mL Plasmalyte. 12-24 hrs later may be deflated by 100ml/hr to assess bleeding and may be removed completely.
- **B-Lynch Brace Suture**
- **Bilateral ligation of uterine arteries or internal iliac arteries** (consider interventional radiology as an alternative)

- **Hysterectomy** (may be planned electively in the management of abnormally invasive placenta)
- **Interventional radiology** – call either Dr Tippett or Dr Ward to assess availability, unfortunately we do not yet run a 24/7 service.

An obstetrician who does not feel or appear competent or confident to perform any of the above procedures should immediately call for colleague assistance. As the anaesthetist, you should prompt this process.

Pregnancy Induced Hypertension (PIH) and Pre-Eclampsia

Hypertensive disease of pregnancy remains the second leading cause of direct deaths with a mortality rate of 7.1/million maternities. 5:1000 women in the UK suffer with severe pre-eclampsia, and 5:10000 women suffer eclampsia (RCOG 2006).

Definitions

Pre-existing hypertension

Some women may have been diagnosed as hypertensive prior to pregnancy. If a woman is sufficiently hypertensive to require treatment before pregnancy, the risk of pre-eclampsia is approximately doubled (Nelson-Piercy 2006).

Pregnancy-Induced Hypertension

Usually appears in the second half of pregnancy and is resolved within 6 weeks post delivery, although BP may remain elevated for up to 3 months postpartum

If hypertension develops after 20 weeks, the likelihood of progression to pre-eclampsia is about 15%

Pregnancy-induced hypertension tends to recur in subsequent pregnancies (Nelson-Piercy 2006)

Pre-Eclampsia

Pregnancy-specific multi-system disorder with unpredictable, variable and widespread manifestations

Women with pre-eclampsia are usually asymptomatic when the disease first manifests

The classic signs are hypertension (see below), proteinuria (>0.3g/l in 24hr urine) and oedema but their absence does not exclude the diagnosis (Nelson-Piercy 2006)

Eclampsia

Tonic-clonic (grand mal) seizure occurring with features of pre-eclampsia

More than 1/3rd of women experience their first convulsion before the development of hypertension and proteinuria

Convulsions may occur antepartum (38%), intrapartum (18%), or postpartum (44%)

Although eclampsia, like pre-eclampsia, is more common in primiparous women, 18% of women with eclampsia are multiparous without a previous history of pre-eclampsia (Nelson-Piercy 2006)

Hypertension
Diastolic >110mmHg on any one occasion
Diastolic >90mmHg on 2 consecutive occasions >4hrs apart, after 20 weeks gestation in a previously normotensive woman.

Severe Hypertension
Diastolic >120mmHg on any one occasion or
Diastolic >110mmHg on 2 consecutive occasions >4hrs apart or
Systolic >170mmHg on 2 consecutive occasions >4hr apart

Clinical symptoms of severe pre-eclampsia (RCOG 2006)

Visual disturbances
Severe headache
Platelets <100
Epigastric pain and/or vomiting
Marked hyperreflexia especially ankle clonus
Oliguria <20mls/hr over 4 hours
Abnormal liver enzymes
HELLP syndrome
Papilloedema
Liver tenderness

Risk factors for hypertensive disorders in pregnancy (Nelson-Piercy)

- Age >40 (double risk of pre-eclampsia)
- Obesity (BMI>30 doubles risk)
- Family history (mother 20-25% risk, sister 35-40%)
- Primiparity (2-3 fold risk)
- Multiple pregnancy (2 fold risk)
- Previous pre-eclampsia (7 fold risk)
- Long birth interval (2-3 fold if >10 years)
- Pre-existing hypertension
- Renal disease
- Diabetes

Complications of PET

- CNS – eclampsia, cerebral haemorrhage, oedema, cortical blindness, retinal oedema or detachment
- Renal – renal cortical or tubular necrosis
- Respiratory – laryngeal oedema, pulmonary oedema
- Liver – jaundice, hepatic infarction, hepatic rupture, HELLP
- Coagulation – DIC, microangiopathic haemolysis, HELLP
- Placenta – Placental infarction, retroplacental bleeding / abruption

Pathophysiology of pre-eclampsia

Not clear at present. An unknown trigger from the placental bed leads to endothelial dysfunction. May be associated with an imbalance in the production of prostaglandins (prostacyclin and thromboxane). The physiological consequences include hypertension and a contracted intravascular volume (relative hypovolaemia) and decreased protein content. The disease process is multisystem leading to the complications described above.

Management of Pre-Eclampsia

The overall aim of managing pre-eclampsia is to prevent development of complications and to maintain health of both mother and baby. The primary treatment involves control of blood pressure and strict fluid management. **A multidisciplinary input is absolutely essential.** Close monitoring including use of the ME(O)WS chart.

Control of Blood Pressure

Antihypertensive treatment should be started in women with systolic blood pressure >160 or diastolic >110. In women with other markers of potentially severe disease treatment can be considered at lower degrees of hypertension. (RCOG 2006, CEMACH 2007). Antihypertensive treatment should continue throughout labour.

Oral medications

First line – **Methyldopa**. Has been used for several years. Side effects include depression, sedation, postural hypotension, which may restrict its use. The starting dose is usually 250mg 2-3 times daily. This can be increased gradually over a 2 day period to maximum 3g/day.

Second line – **Adalat retard (nifedipine)**. Initial dose 10mg bd. Can be increased to a maximum of 40mg bd. Can be used in conjunction with methyldopa. Side effects include headaches, facial flushing and oedema. If used in conjunction with magnesium sulphate may lead to profound hypotension. Should not be given sublingually.

Third line – **Labetalol**. Starting dose 200mg 1-2 times daily increasing to a maximum of 2.4g/day in divided doses. Better tolerated than methyldopa but there is concern that it can inhibit fetal growth in the long-term. Hence best reserved until the second or third trimesters. Contraindicated in asthma.

Acute management of severe hypertension (MOET course manual 2007)

Oral labetalol initial dose 200mg. should result in a reduction in blood pressure within 30 minutes. If a second dose is required then 200mg can be given 1 hour after the initial dose. 50% of women requiring antihypertensive treatment can be controlled with oral therapy.

If labetalol contraindicated then nifedipine 10mg capsule (not slow release). BP should be checked every 10 mins for 30 minutes, as a marked drop in BP can occur.

Next oral hypertensive medication can be started 6 hours later if BP stabilises.

Other agents like oral hydralazine or doxazosin can be considered if the first and/or second line of treatment does not work.

Consider epidural if in labour, check clotting. Discuss with Anaesthetist.

Intravenous Treatment (MOET course manual 2007)

Additive effects of other antihypertensive if already given should be considered, as it is not advisable to bring about a rapid drop in BP.

- Aim MAP <125mmHg
- Full continuous monitoring including HR, NIBP, SpO2, CTG

EITHER

- Give labetalol 10-20mg (2-4mL of 5mg/mL) slowly (over 5-10 mins). Onset time 10 mins. If diastolic still raised repeat dose after 20 mins. Make infusion up to 5mg/mL, and infuse at a rate of 4ml/hour (20mg/hr) via syringe driver. Double dose/rate every 30 mins to a maximum of 32 mL/hr until target BP is achieved.

OR

- Give hydralazine 10mg. Dilute with 10mL sodium chloride 0.9% and give slowly IV. Repeat every 20-30 minutes to a maximum cumulative dose of 20mg as needed. Effective for 6 hours. Can be associated with tachycardia and headaches. Discontinue if maternal HR>120bpm. Maintenance infusion 40mg in 40mL sodium chloride 0.9% (1mg/mL) at rate 2mL/hr. Increase 0.5mg/hr increments to max 20mg/hr until target BP achieved.

Fluid Therapy

Remember these patients have a constricted circulation and reduced intravascular protein content.

Close monitoring of fluid balance is mandatory. Over the last 20 years pulmonary oedema has been a significant cause of death (CEMACH 2007). Fluid therapy should be limited to maintenance crystalloid (80mL/hr or urine output in previous hour plus 30mL). Consider CVP monitoring but will need HDU admission. If oliguric may respond to cautious fluid challenge. Oral fluids when not contraindicated can be taken without restriction to quench thirst.

Subsequent management

- Repeat FBC, U&E, urate, LFTs, clotting 4-6-12 hourly
- Record all results on flow chart with date and time blood taken
- Women with HELLP should have 4hrly BMs taken and recorded
- Stay on labour ward for minimum of 24hours post delivery – the decision to transfer elsewhere should be taken by the consultant
- ME(O)WS chart to be continued
- Chart fluid balance for 4 days postnatally
- Regular review by multidisciplinary team

Imminent Eclampsia / Eclampsia

A patient with imminent eclampsia may or may not demonstrate the prodromal signs as described earlier. If the prodromal signs are present particularly with other signs of upper motor neurone disturbances such as hyperreflexia and clonus, then prophylaxis against convulsions is desirable. This is achieved by prophylactic use of magnesium sulphate (see below for instructions).

The MAGPIE study has demonstrated that administration of magnesium sulphate to women with pre-eclampsia reduces the risk of eclamptic seizure (Altman et al 2002). Women allocated magnesium had a 58% lower risk of an eclamptic fit.

Eclampsia

Over a thirteen month period in the UKOSS survey (Feb 2005-Feb 2006) an incidence of 26.8 cases per 100,000 deliveries was estimated.

Call for help 2222

Turn the woman left lateral

Secure airway and administer oxygen
Insert 2 large bore cannulae
Urgent bloods – FBC, U&E, urate, LFTs, G&S, clotting
Magnesium therapy – see below
Antihypertensives as prescribed
Attach monitoring. Record all observations on ME(O)WS chart
Insert urinary catheter and monitor hourly urine output
Nil by mouth. IV fluids restricted to 80mls/hr
Once stable consider need for delivery
TED stockings, consider clexane.

Magnesium Sulphate Therapy

Indications

For the prevention of recurrent fits after eclampsia
For the prevention of fits in severe pre-eclampsia. Please note that meticulous control of hypertension is the essential first step.

Contraindications

Cardiac disease, acute renal failure.
Consider diazemuls 10mg then 2.5mg/hr (max infusion rate 5mg/minute)

Loading dose

Loading dose 4g IV should be given slowly over 15-20 minutes (8mL of magnesium sulphate 50% added to 12mL of sodium chloride 0.9%, 60mL/hr)

Maintenance dose

Maintenance infusion 1g/hr for 24 hours.
10mL magnesium sulphate 50% in 50mL syringe. Add 50mL sodium chloride 0.9% to a total volume of 60mL. Infuse at 12mL/hr.
Maintenance dose should be continued for 24hrs after the last seizure. (RCOG 2006)

Monitoring whilst on magnesium sulphate

Check BP and respiratory rate every 15 mins for first hour and hourly
Check patellar reflexes, SpO2, urine output hourly.
Features of magnesium toxicity include respiratory depression, hypotension and reduced reflexes.
There is no role for routine monitoring of plasma magnesium levels. However if toxicity is suspected this may be required in discussion with the obstetrician and anaesthetist.

Magnesium Toxicity

Therapeutic range	1.7-3.5mmol/l
Abolition of knee jerk/somnolence	>3.5mmol/l
Respiratory arrest, slurred speech, muscle paralysis	5-7.5mmol/l
Cardiac arrest	15mmol/l

It is extremely unlikely for the patient to be in the toxic range if there is preservation of the knee jerk, resp rate >16 and urine output >0.5mL/kg/hr.

Stop magnesium infusion if:

Absent reflexes OR
Respiratory rate <16 OR
Oliguria <100mL/hr

Magnesium should be reintroduced only when urine output improves. 97% of magnesium sulphate is excreted renally therefore if a woman has oliguria it can lead to toxic levels.

Antidote for MgSO4 is 1g (10mls 10%) of IV calcium gluconate given slowly over 10 minutes. Indications are:

Loss of knee jerk not returning within 1 hour of reducing or stopping the infusion
Respiratory depression not improving
Cardiac arrest due to magnesium toxicity

Recurrent seizures after starting magnesium sulphate

Treat seizure with further dose of magnesium 2-4g over 5 minutes
2g if <70kg, 4g if >70kg
if possible take blood for Mg level prior to additional bolus
if further seizures continue despite the above, consider:
Diazemuls 10mg IV bolus then infusion 2.5mg/hr.
Thiopentone infusion (on ITU)

Other points about hypertensive disease

Choose methods of anaesthesia on an individual basis. Epidurals can help lower blood pressure and may occasionally stay in postpartum. However the risk of coagulopathy may contraindicate this. On the other hand the airway may be more difficult for a GA. If in doubt, ask for senior advice and assistance.
Avoid ergometrine (and syntometrine) in the third stage
Take precautions against hypertensive response to laryngoscopy on induction if performing general anaesthesia (eg alfentanil)
Remember to add all the infusions together on the chart so as not to exceed the fluid restriction 80ml/hr
Do not forget DVT prophylaxis
Avoid NSAIDs until it is clear the woman is not developing HELLP (>24hrs after delivery)
Monitor closely even after delivery (including bloods)
Do not allow discharge inappropriately early

HELLP Syndrome

The syndrome of **H**aemolysis, **E**levated **L**iver enzymes and **L**ow **P**latelets.
Considered to be a complication of severe pre-eclampsia / eclampsia but it may be a separate entity. Its pathogenesis remains unclear. (Hallack 1999)

HELLP occurs in approximately 0.2-0.6% of all pregnancies. The syndrome generally presents in the third trimester of pregnancy, although 27% of cases are pre-27 weeks (Wolf 1996).

The syndrome presents antepartum in 69% of women and postpartum in 31%. In the postpartum period onset is usually within 48 hrs post delivery (Sibai 1993). The time between delivery and recovery has been found to be as long as 11 days in severely affected women. Most however reach a nadir level after 27 hours (Hallack 1999).

Management is again multidisciplinary by senior medical personnel including obstetricians, anaesthetists and haematologists. Management is as for pre-eclampsia, with meticulous control of blood pressure. HELLP is a rapidly changing condition and should be treated as such.

Consider transfer to HDU/ICU if:

1) DIC is developing
2) Signs of organ failure
3) CVP line required
4) The woman's condition deteriorates

The timing of delivery is a multidisciplinary decision and should be planned once the woman is stable and appropriate personnel present. The only definitive treatment is delivery of the placenta, although high dose steroids may delay progress of the disease. Conservative management at very early gestations eg with steroids may improve perinatal outcome but must be carefully balanced with maternal wellbeing.

RESUSCITATION OF THE COLLAPSED PATIENT

Causes of collapse:

Absent cardiac output due to aortocaval compression
Pulmonary embolism
Amniotic fluid embolism
Cerebral haemorrhage
Haemorrhage (large haemorrhage may be concealed)
Labour management factors eg anaesthesia, hypermagnasaemia
Total spinal
Anaphylaxis
Acute LVF precipitated by MI, valvular disease, PET, tocolytics
Cardiac arrythmias
Uterine inversion
Eclampsia
LA toxicity

Treatment

Treat the cause if known. Follow appropriate algorithms eg anaphylaxis, LA toxicity.
Position : Left lateral where possible (after 20 weeks), unless there is a need for external cardiac compression. If CPR is needed, tilt pelvis to left hand side with wedge or rolled up blanket and manually displace uterus to the left. One of the team members should be designated to continue this during CPR.
Advanced Life Support (ERC guidelines) with the use of cricoid pressure until intubated. (more rapid hypoxia and increased chance of aspiration pneumonitis late in pregnancy).
Caesarian section or immediate vaginal delivery should be performed if no maternal circulation established after 5 minutes of full advanced life support, and within 15 minutes in any case in order to improve maternal circulation as uterine displacement does not guarantee full relief of IVC obstruction.
Continue CPR throughout procedure until spontaneous circulation returns.
After delivery consider compression of the aorta to increase peripheral resistance and to improve coronary and cerebral perfusion. This can be done directly if abdomen open or externally using fist pressed backwards towards vertebral column in midline just above umbilicus.
Transfer patient to ITU when stable.

Neonatal resuscitation

The paediatricians are normally responsible for neonatal resuscitation but you may be asked to help occasionally. Remember that your first priority is to the mother who you are anaesthetising, however it is worth keeping familiar with neonatal resuscitation algorithms.

INCIDENTAL SURGERY DURING PREGNANCY

1-2% of women require incidental surgery during pregnancy. Surgery is associated with increased fetal loss and premature delivery, although this probably reflects the underlying condition that necessitated surgery rather than the anaesthetic or the surgery itself. The risk of teratogenicity is very small.

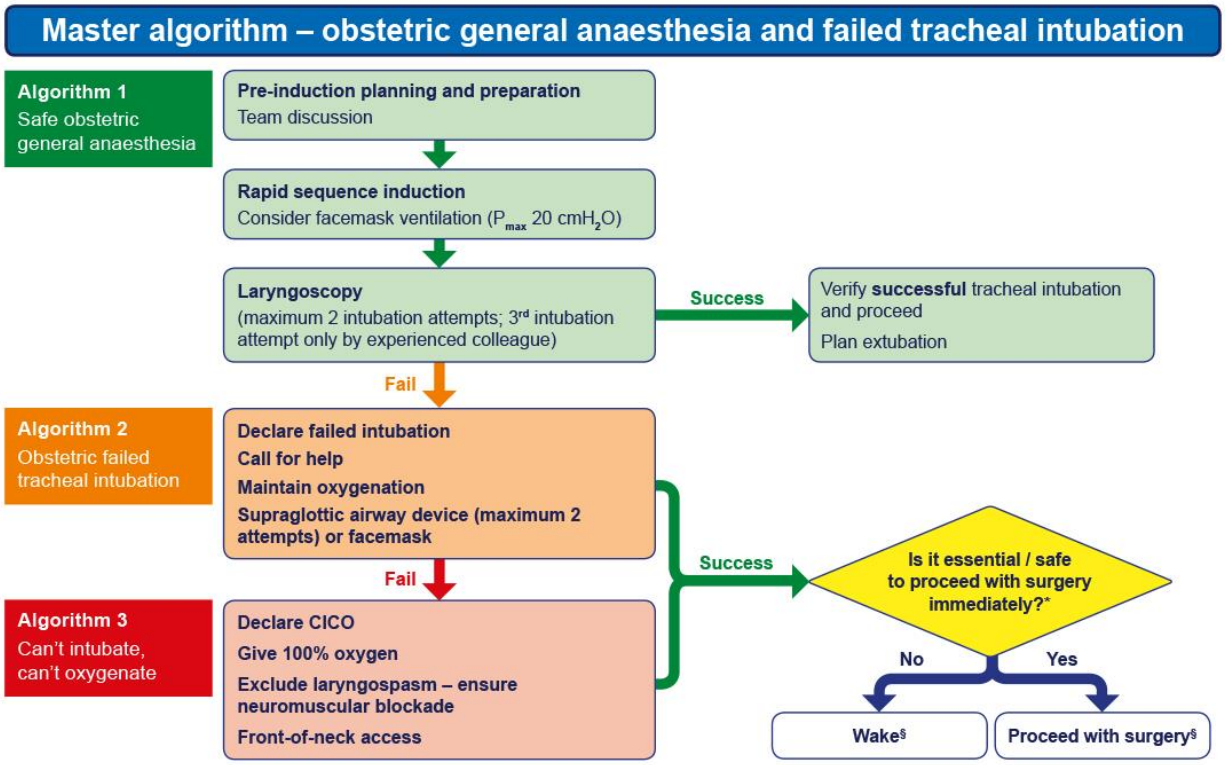
General considerations

- When possible delay surgery until the postnatal period or alternatively into the second trimester, when teratogenic risks to the fetus are reduced (the fetus is at greatest risk of teratogenicity in the period of organogenesis which continues until the 12th gestational week)
- Make sure the obstetric team know that surgery is planned
- Remember gastric acid prophylaxis
- Remember DVT prophylaxis. Pregnant women are hypercoagulable.

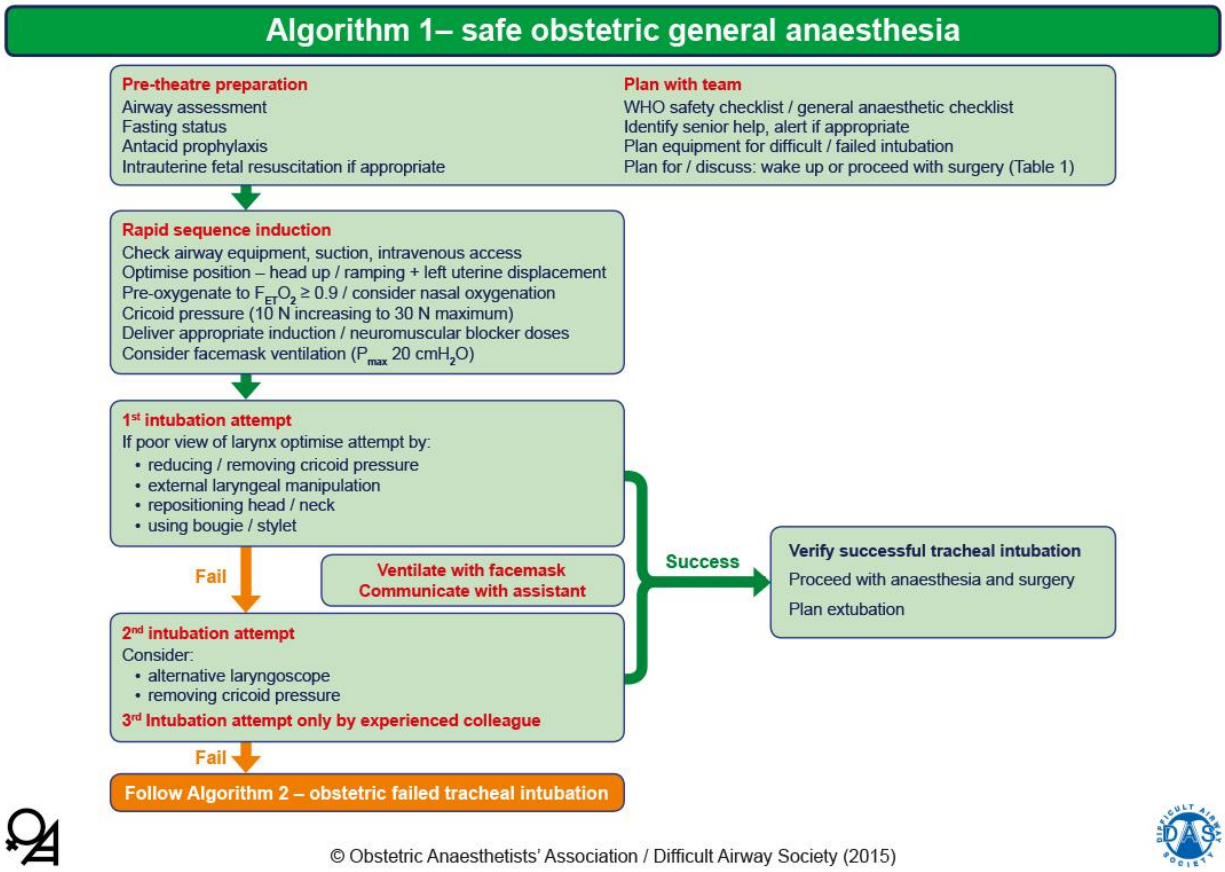
- Consider regional anaesthesia. The combination of a mother maintaining her own airway together with minimal fetal drug exposure is desirable, however data demonstrating that regional anaesthesia is safer is lacking.
- Airway management is controversial. In asymptomatic women with no other indication for intubation it is acceptable not to perform an RSI up to 18 weeks gestation. However be aware that lower oesophageal tone is reduced in the first few weeks of pregnancy and intraabdominal pressure rises in the second trimester. If doubt, RSI.
- Treat haemorrhage aggressively. Avoid hypovolaemia and anaemia as both impact on fetal oxygenation.
- From the 20th week a left lateral tilt is required to prevent aortocaval compression
- Maintain normal physiological parameters for the gestational age.
- If GA is used, ensure adequate doses of inhalational agents. Light anaesthesia is associated with increased catecholamine release, which reduced placental blood flow. The tocolytic effects of volatiles is advantageous.
- Fetal monitoring may be beneficial although its value remains unproven. If fetal distress is detected, maternal physiology can be manipulated to optimise uterine blood flow.
- The primary risk to the fetus is premature labour in the postoperative period. Women should be told to report contractions early so that appropriate tocolytic therapy can be instituted.

Remember labour ward does not currently use EPMA so there is a risk if both electronic and paper systems are used on the same patient of doubling up or missing doses.

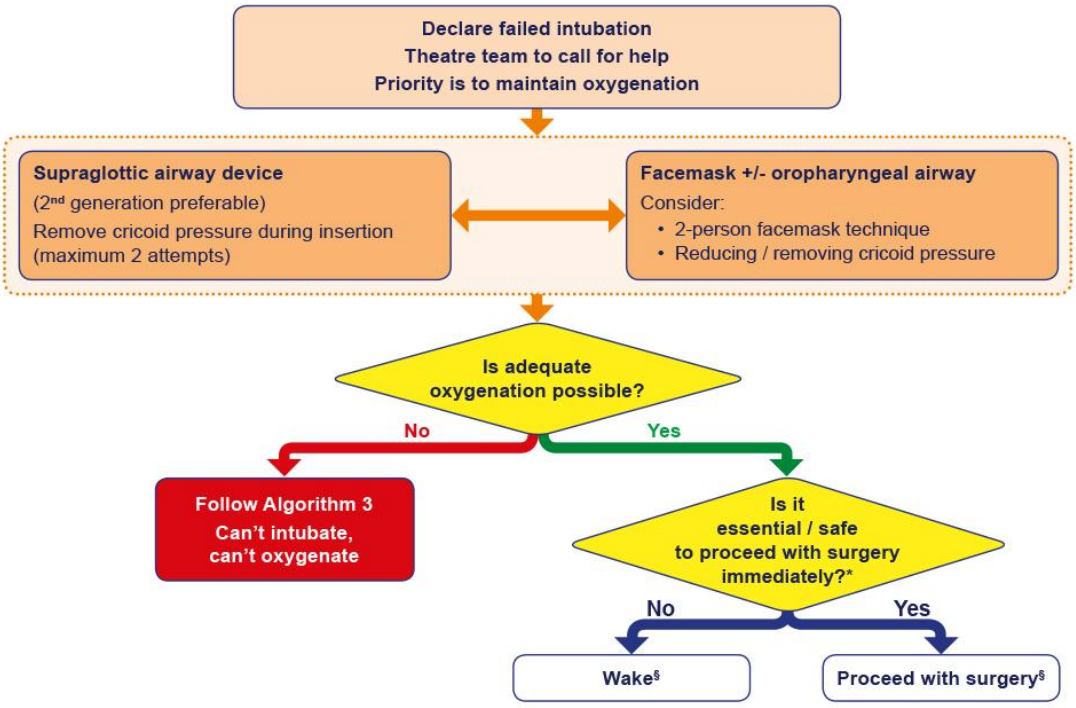
"Safe drugs"	**Drugs to avoid if poss**	**Do not use**
Thiopentone	Benzodiazepines	Ketamine
Propofol	Etomidate	NSAIDS
Volatiles	Nitrous oxide	
Muscle relaxants	Opiates	
Anticholinesterases		
Local anaesthesia		



*See Table 1, §See Table 2

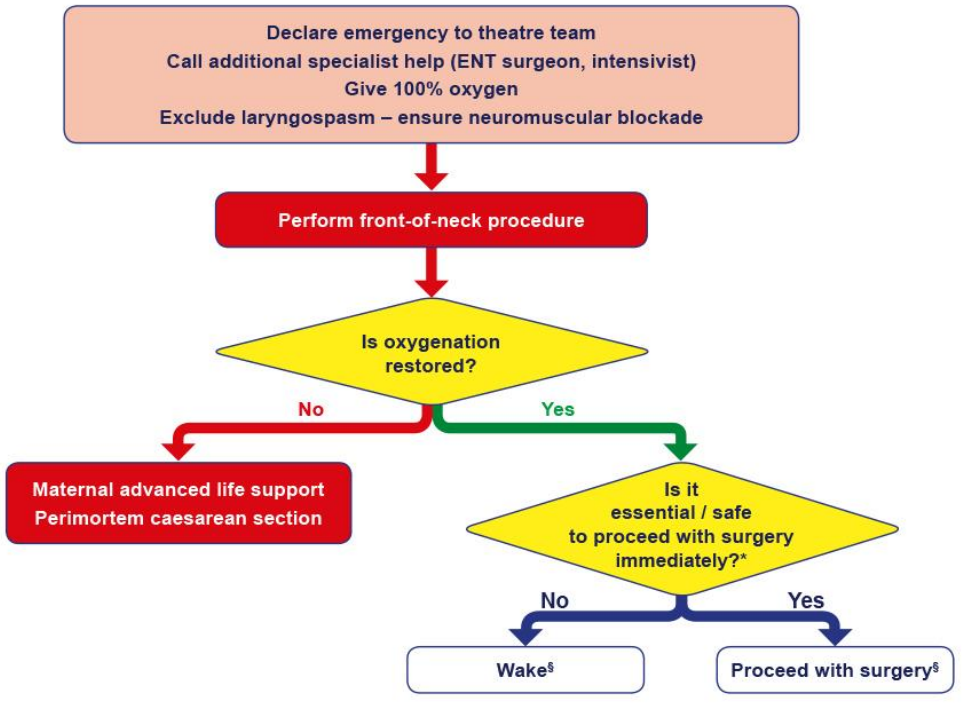

Algorithm 1– safe obstetric general anaesthesia
Pre-theatre preparation
Airway assessment
Fasting status
Antacid prophylaxis
Intrauterine fetal resuscitation if appropriate
Plan with team
WHO safety checklist / general anaesthetic checklist
Identify senior help, alert if appropriate
Plan equipment for difficult / failed intubation
Plan for / discuss: wake up or proceed with surgery (Table 1)
Rapid sequence induction
Check airway equipment, suction, intravenous access
Optimise position – head up / ramping + left uterine displacement
Pre-oxygenate to $F_{ET}O_2 \geq 0.9$ / consider nasal oxygenation
Cricoid pressure (10 N increasing to 30 N maximum)
Deliver appropriate induction / neuromuscular blocker doses
Consider facemask ventilation (P_{max} 20 cmH_2O)
1st intubation attempt
If poor view of larynx optimise attempt by:
• reducing / removing cricoid pressure
• external laryngeal manipulation
• repositioning head / neck
• using bougie / stylet
Fail
Ventilate with facemask
Communicate with assistant
Success
Verify successful tracheal intubation
Proceed with anaesthesia and surgery
Plan extubation
2nd intubation attempt
Consider:
• alternative laryngoscope
• removing cricoid pressure
3rd Intubation attempt only by experienced colleague
Fail
Follow Algorithm 2 – obstetric failed tracheal intubation
© Obstetric Anaesthetists' Association / Difficult Airway Society (2015)

Algorithm 2 – obstetric failed tracheal intubation



*See Table 1, §See Table 2

Algorithm 3 – can't intubate, can't oxygenate



*See Table 1, §See Table 2

Table 1 – proceed with surgery?

	Factors to consider	WAKE	←		PROCEED
Before induction	**Maternal condition**	• No compromise	• Mild acute compromise	• Haemorrhage responsive to resuscitation	• Hypovolaemia requiring corrective surgery • Critical cardiac or respiratory compromise, cardiac arrest
	Fetal condition	• No compromise	• Compromise corrected with intrauterine resuscitation, pH < 7.2 but > 7.15	• Continuing fetal heart rate abnormality despite intrauterine resuscitation, pH < 7.15	• Sustained bradycardia • Fetal haemorrhage • Suspected uterine rupture
	Anaesthetist	• Novice	• Junior trainee	• Senior trainee	• Consultant / specialist
	Obesity	• Supermorbid	• Morbid	• Obese	• Normal
	Surgical factors	• Complex surgery or major haemorrhage anticipated	• Multiple uterine scars • Some surgical difficulties expected	• Single uterine scar	• No risk factors
	Aspiration risk	• Recent food	• No recent food • In labour • Opioids given • Antacids not given	• No recent food • In labour • Opioids not given • Antacids given	• Fasted • Not in labour • Antacids given
	Alternative anaesthesia • **regional** • **securing airway awake**	• No anticipated difficulty	• Predicted difficulty	• Relatively contraindicated	• Absolutely contraindicated or has failed • Surgery started
After failed intubation	**Airway device / ventilation**	• Difficult facemask ventilation • Front-of-neck	• Adequate facemask ventilation	• First generation supraglottic airway device	• Second generation supraglottic airway device
	Airway hazards	• Laryngeal oedema • Stridor	• Bleeding • Trauma	• Secretions	• None evident

Criteria to be used in the decision to wake or proceed following failed tracheal intubation. In any individual patient, some factors may suggest waking and others proceeding. The final decision will depend on the anaesthetist's clinical judgement.

Table 2 – management after failed tracheal intubation

Wake

- Maintain oxygenation
- Maintain cricoid pressure if not impeding ventilation
- Either maintain head-up position or turn left lateral recumbent
- If rocuronium used, reverse with sugammadex
- Assess neuromuscular blockade and manage awareness if paralysis is prolonged
- Anticipate laryngospasm / can't intubate, can't oxygenate

After waking

- Review urgency of surgery with obstetric team
- Intrauterine fetal resuscitation as appropriate
- For repeat anaesthesia, manage with two anaesthetists
- Anaesthetic options:
  - Regional anaesthesia preferably inserted in lateral position
  - Secure airway awake before repeat general anaesthesia

Proceed with surgery

- Maintain anaesthesia
- Maintain ventilation - consider merits of:
  - controlled or spontaneous ventilation
  - paralysis with rocuronium if sugammadex available
- Anticipate laryngospasm / can't intubate, can't oxygenate
- Minimise aspiration risk:
  - maintain cricoid pressure until delivery (if not impeding ventilation)
  - after delivery maintain vigilance and reapply cricoid pressure if signs of regurgitation
  - empty stomach with gastric drain tube if using second-generation supraglottic airway device
  - minimise fundal pressure
  - administer H_2 receptor blocker i.v. if not already given
- Senior obstetrician to operate
- Inform neonatal team about failed intubation
- Consider total intravenous anaesthesia

Dorset County Hospital
Williams Avenue
Dorchester
Dorset
DT1 2JY
Telephone: 01305 251150
Fax: 01305 254155

Dorset County Hospital NHS
NHS Foundation Trust

Dear Dr ……

Affix addressograph

Your patient received □An epidural for pain relief in labour on (date)……
□ A spinal anaesthetic on (date) ……..

This was complicated by a probable dural puncture and she unfortunately developed a **Post Dural Puncture Headache**. This was treated;

□ Conservatively with simple analgesics, morphine, oral fluids and caffeinated drinks
□ with an epidural blood patch performed on (date)……..

She has been regularly assessed by the obstetric Anaesthetic Team throughout her in patient stay. After discharge, she will be initially contacted by our Department by 'phone to check on her continued recovery and also an outpatient appointment has been made for her on (6/52 from discharge) ……
She has been given a patient information leaflet and has been asked to telephone 01305 251150 and ask for bleep 209, Duty Anaesthetic doctor, if there are any concerns.

The presence of any of the symptoms below should prompt urgent referral to the on call Anaesthetic Doctor Tel: 01305 251150, bleep 209.

- Recurrence or worsening of headache
- Other signs of intracranial hypotension e.g. nausea, vomiting, neck pain, diplopia or changes in hearing (tinnitus, deafness)
- altered conscious level, fever or signs of meningism
- Severe back pain
- Altered neurology or weakness affecting lower limbs or saddle area

Dr ……Date……

Dorset County Hospital NHS
NHS Foundation Trust

PATIENT LABEL

Surname ……..

Forename …….

DOB ……..

Patient N^{o} ……

Accidental Dural Puncture (ADP) and Post Dural Puncture Headache (PDPH) Management and follow up form

Home no.
Mobile no.

Part 1: Details of accidental dural puncture and immediate management

Date and time of procedure: Anaesthetist:

Dural puncture apparent during procedure? : Yes / No

Level of insertion: Depth to epidural / sub arachnoid space:

Management of dural puncture e.g spinal catheter/ resited epidural

Part 2: Next day review of patient with accidental dural puncture, or onset of suspected PDPH

Headache Y / N Headache Description:

Photophobia Y / N Neck stiffness Y / N Diplopia Y / N Hearing loss/ Tinnitus Y / N

Fits Y/ N If yes please give details.

Findings on CNS/PNS examination

Management of patient

Date: **Signed:** **Name:** **Grade:**

Once complete, photocopy and place original in patient notes

Dorset County Hospital NHS
NHS Foundation Trust

Patient Name……..……
Hospital Number……..

Part 2: Follow Up

Date	Symptoms
F/Up Day	Management Signed Name

Date	Symptoms
F/Up Day	Management Signed Name

Date	Symptoms
F/Up Day	Management Signed Name

Date	Symptoms
F/Up Day	Management Signed Name

Once complete, photocopy and place original in patient notes

Epidural Blood Patch Procedure Record

PATIENT LABEL

Surname ……..

Forename …….

DOB ……..

Patient N^{o} ……

Pre-Procedure Checks:

Is the patient apyrexial? Y / N
White cell count normal? Y / N
Prophylactic LMWH given >12hours ago? Y / N
Has consent been obtained? Y / N
Side effects discussed include: *circle as appropriate*
Failure *Repeat dural puncture* *Backache* *Infection*
Neurological injury *Radicular pain* *Success Rate*

Procedure:

Epidural performed by: Venesection by:
Epiduralist: *Gloves/Gown/Mask* Venesector: *Gloves/Gown/Mask*
Chlorhexidine and LA used Monitoring Used:
Level: Loss of resistance to: *Air / Saline*
Depth to epidural space: Any blood or CSF from Tuohy needle? Y / N
Volume of blood injected: Injection limited by pain? Y / N
Immediate improvement in symptoms? Y / N

Post Epidural Blood Patch Management:

Strict bed rest for minimum of hours
Minimise mobilisation for *none* *6 hours* *overnight*
Discharge if symptom free not before:

Comments

Signature: **Name:** **Grade:**

Once complete, photocopy and place original in patient notes

EPIDURAL INFORMATION CARD
Epidurals in labour – what you need to know

(This card is a summary. Further information is available from www.oaaformothers.info
Please discuss anything that is not clear with your anaesthetist).

Setting up your epidural

- You will need to have an intravenous cannula and maybe a drip.
- While the epidural is being put in, it is important that you keep still and let the anaesthetist know if you are having a contraction.
- Usually takes 20 minutes to set up and 20 minutes to work.
- Some epidurals do not work fully and need to be adjusted or replaced.

Advantages of an epidural

- Usually provides excellent pain relief.
- Sometimes a **spinal** is given first for a quicker effect.
- The dose or type of local anaesthetic can sometimes be altered to allow you to move around the bed. This is a low-dose (or mobile) epidural.
- In general epidurals do not affect your baby.
- Can be topped up for caesarean section if required.

Possible problems with your epidural

- Repeated top-ups with stronger local anaesthetic may cause temporary leg weakness and increase the risk of forceps or ventouse delivery.
- The epidural may slow down the second stage of labour slightly.
- You may develop low blood pressure, itching or a fever during the epidural.
- The epidural site may be tender but usually only for a few days. Backache is NOT caused by epidurals but is common after any pregnancy.

The other side of this card gives important risks of epidurals

EPIDURAL INFORMATION CARD

Risks of having an epidural or spinal to reduce labour pain

Type of risk	How often does this happen?	How common is it?
Significant drop in blood pressure	One in every 50 women	Occasional
Not working well enough to reduce labour pain so you need to use other ways of lessening the pain	One in every 8 women	Common
Not working well enough for a caesarean section so you need to have a general anaesthetic	One in every 20 women	Sometimes
Severe headache	One in every 100 women (epidural) One in every 500 women (spinal)	Uncommon
Nerve damage (numb patch on a leg or foot, or having a weak leg)	Temporary - one in every 1,000 women	Rare
Effects lasting for more than 6 months	Permanent - one in every 13,000 women	Rare
Epidural abscess (infection)	One in every 50,000 women	Very rare
Meningitis	One in every 100,000 women	Very rare
Epidural haematoma (blood clot)	One in every 170,000 women	Very rare
Accidental unconsciousness	One in every 100,000 women	Very rare
Severe injury, including being paralysed	One in every 250,000 women	Extremely rare

The information available from the published documents does not give accurate figures for all of these risks. The figures shown above are estimates and may be different in different hospitals.

The other side of this card gives information about epidurals for labour pain

THE ASSOCIATION OF ANAESTHETISTS
of Great Britain & Ireland

Management of a Patient with Suspected Anaphylaxis During Anaesthesia SAFETY DRILL

(Revised 2009)

Immediate management

- Use the ABC approach (Airway, Breathing, and Circulation). Team-working enables several tasks to be accomplished simultaneously.
- Remove all potential causative agents and maintain anaesthesia, if necessary, with an inhalational agent.
- CALL FOR HELP and note the time.
- Maintain the airway and administer oxygen 100%. Intubate the trachea if necessary and ventilate the lungs with oxygen.
- Elevate the patient's legs if there is hypotension.
- If appropriate, start cardiopulmonary resuscitation immediately according to Advanced Life Support Guidelines.
- Give adrenaline i.v.
  - Adult dose: 50 µg (0.5 ml of 1:10 000 solution).
  - Child dose: 1.0 $\mu g.kg^{-1}$ (0.1 $ml.kg^{-1}$ 1:100 000 solution).
- Several doses may be required if there is severe hypotension or bronchospasm. If several doses of adrenaline are required, consider starting an intravenous infusion of adrenaline.
- Give saline 0.9% or lactated Ringer's solution at a high rate via an intravenous cannula of an appropriate gauge (large volumes may be required).
  - Adult: 500 - 1 000 ml
  - Child: 20 $ml.kg^{-1}$
- Plan transfer of the patient to an appropriate Critical Care area.

CONTINUED OVERLEAF

Secondary management

• Give chlorphenamine i.v.	Adult:	10 mg
	Child 6 - 12 years:	5 mg
	Child 6 months - 6 years:	2.5 mg
	Child <6 months:	250 $\mu g.kg^{-1}$
• Give hydrocortisone i.v.	Adult:	200 mg
	Child 6 - 12 years:	100 mg
	Child 6 months - 6 years:	50 mg
	Child <6 months:	25 mg

- If the blood pressure does not recover despite an adrenaline infusion, consider the administration of an alternative i.v. vasopressor according to the training and experience of the anaesthetist, e.g. metaraminol.
- Treat persistent bronchospasm with an i.v. infusion of salbutamol. If a suitable breathing system connector is available, a metered-dose inhaler may be appropriate. Consider giving i.v. aminophylline or magnesium sulphate.

Investigation

- Take blood samples (5 - 10 ml clotted blood) for **mast cell tryptase**:
  - Initial sample as soon as feasible after resuscitation has started – do not delay resuscitation to take the sample.
  - Second sample at 1 - 2 h after the start of symptoms.
  - Third sample either at 24 h or in convalescence (for example in a follow-up allergy clinic). This is a measure of baseline tryptase levels as some individuals have a higher baseline level.
- Ensure that the samples are labelled with the time and date.
- Liaise with the hospital laboratory about analysis of samples.

Later investigations to identify the causative agent

The anaesthetist who gave the anaesthetic or the supervising consultant anaesthetist is responsible for ensuring that the reaction is investigated. The patient should be referred to a specialist Allergy or Immunology Centre (see www.aagbi.org for details). The patient, surgeon and general practitioner should be informed. Reactions should be notified to the AAGBI National Anaesthetic Anaphylaxis Database (see www.aagbi.org).

AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity

1 Recognition

Signs of severe toxicity:

- Sudden alteration in mental status, severe agitation or loss of consciousness, with or without tonic-clonic convulsions
- Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur
- Local anaesthetic (LA) toxicity may occur some time after an initial injection

2 Immediate management

- Stop injecting the LA
- Call for help
- Maintain the airway and, if necessary, secure it with a tracheal tube
- Give 100% oxygen and ensure adequate lung ventilation (hyperventilation may help by increasing plasma pH in the presence of metabolic acidosis)
- Confirm or establish intravenous access
- Control seizures: give a benzodiazepine, thiopental or propofol in small incremental doses
- Assess cardiovascular status throughout
- Consider drawing blood for analysis, but do not delay definitive treatment to do this

3 Treatment

IN CIRCULATORY ARREST

- Start cardiopulmonary resuscitation (CPR) using standard protocols
- Manage arrhythmias using the same protocols, recognising that arrhythmias may be very refractory to treatment
- Consider the use of cardiopulmonary bypass if available

GIVE INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

- Continue CPR throughout treatment with lipid emulsion
- Recovery from LA-induced cardiac arrest may take >1 h
- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

WITHOUT CIRCULATORY ARREST

Use conventional therapies to treat:

- hypotension,
- bradycardia,
- tachyarrhythmia

CONSIDER INTRAVENOUS LIPID EMULSION
(following the regimen overleaf)

- Propofol is not a suitable substitute for lipid emulsion
- Lidocaine should not be used as an anti-arrhythmic therapy

4 Follow-up

- Arrange safe transfer to a clinical area with appropriate equipment and suitable staff until sustained recovery is achieved
- Exclude pancreatitis by regular clinical review, including daily amylase or lipase assays for two days
- Report cases as follows:
  - in the United Kingdom to the National Patient Safety Agency (via **www.npsa.nhs.uk**)
  - in the Republic of Ireland to the Irish Medicines Board (via **www.imb.ie**)

If Lipid has been given, please also report its use to the international registry at **www.lipidregistry.org**. Details may also be posted at **www.lipidrescue.org**

Your nearest bag of Lipid Emulsion is kept Room next to obs theatre

Author/Reviewer: Georgina Randall
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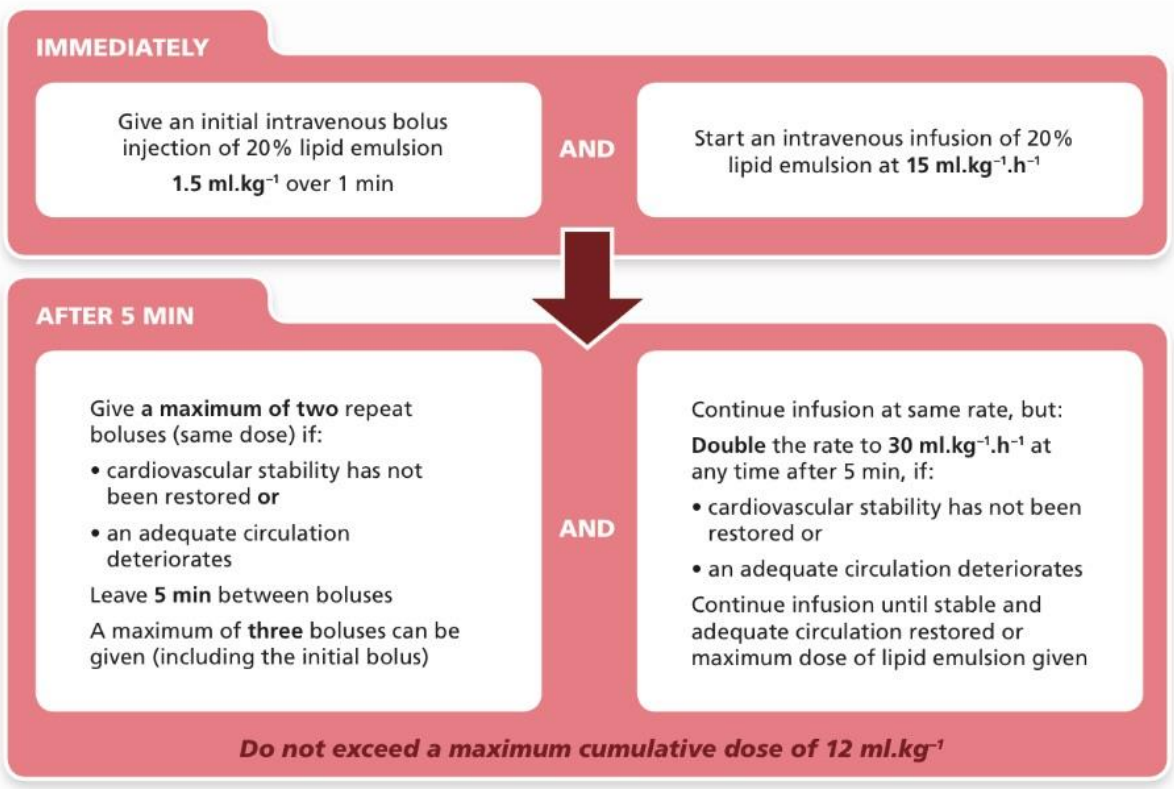
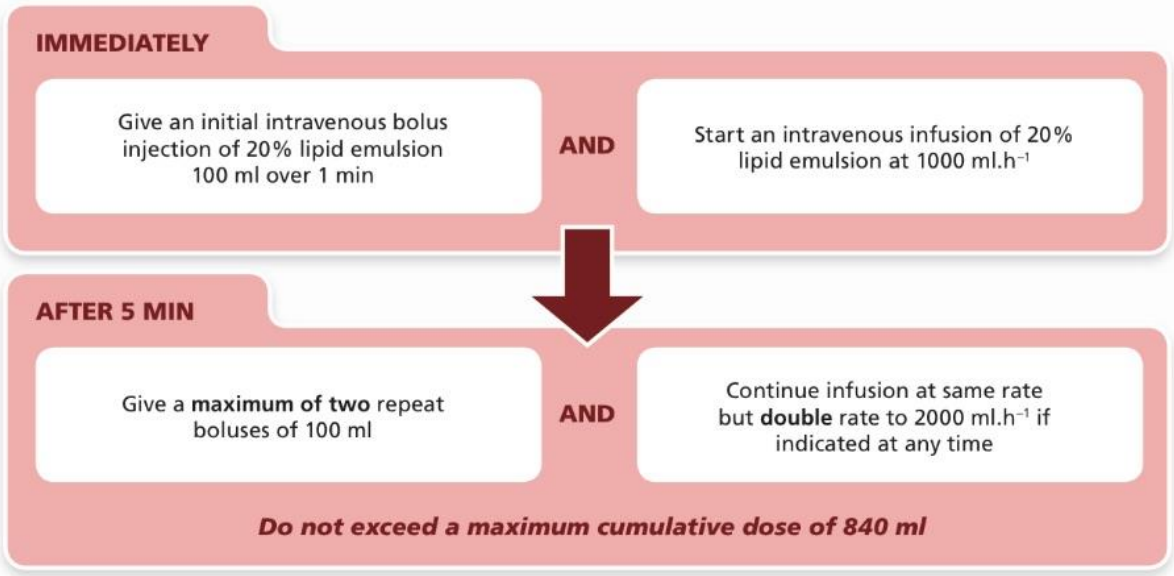


An approximate dose regimen for a 70-kg patient would be as follows:



This AAGBI Safety Guideline was produced by a Working Party that comprised:
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This Safety Guideline is endorsed by the Australian and New Zealand College of Anaesthetists (ANZCA).