



CLINICAL SKILLS MASTERY PROGRAMME

LABOUR EPIDURAL READING PACK



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THE MEDICAL EDUCATION DIRECTORATE

MISSION STATEMENT

The Medical Education Directorate (MED), led by the DME Dr Simon Edgar, aims to develop and translate the NHS Lothian clinical education strategy by:

Fully integrating medical training and education into the demands of a clinical service.

Planning, developing and evaluating all aspects of clinical education to ensure high quality induction, supervision, experience, environment and support for all postgraduate (PG) doctors and undergraduate (UG) students.

Ensuring UG students of medicine are prepared for clinical practice through engagement with relevant and rewarding experiences in the clinical setting.

Allocating financial, logistical and event-based resources to support undergraduate and postgraduate teaching, learning, assessment and feedback activities.

Developing and supporting a clinical educators network through NHS Lothian aligned to the GMC "Recognition of

Trainers" standards.

Ensuring on-going communication and collaboration with both the regional Postgraduate Dean and the Director of Undergraduate Learning & Teaching at the University of Edinburgh Medical School.

Oversight of the quality of both postgraduate and undergraduate medical education in clinical areas of NHS Lothian and in liaison with PG Deanery and UG medical school to ensure that all relevant aspects of the GMC standards for education are monitored and reported upon.

The MED consists of a network of Associate Directors (ADME), Undergraduate Leads and Simulation Leads across the 5 main hospital sites within NHS Lothian. There is also a team of dedicated ADME assistants led by the MED Service Manager who can assist you in accessing additional information and support.



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01 MASTERY PROGRAMME OVERVIEW

The NHS Lothian Mastery Programme has been developed to enhance the technical and non-technical skills of clinicians undertaking complex clinical procedures.

MASTERY PROGRAMME OVERVIEW

A NEW DEVELOPMENT

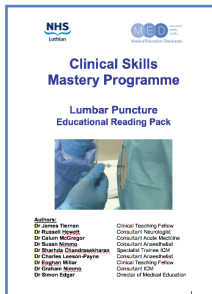
Welcome to the NHS Lothian Mastery Programme Labour Epidural Reading Pack. We hope you find this pack a valuable learning resource to compliment your simulated practice sessions.

In order to optimise your learning, you must read this pack and watch the associated video before your first simulation session.

The NHSL Mastery Programme has been developed to enhance the technical and non-technical skills of clinicians undertaking complex clinical procedures. Examples of current programmes can be seen below.

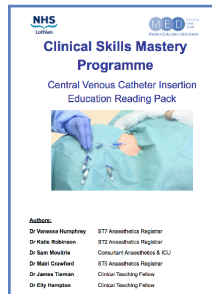
Each procedural skill will be approached via a combination of written and video educational resources with subsequent simulated practice, facilitated by appropriately-skilled trainers.

LUMBAR PUNCTURE



1

CENTRAL LINE



2

1) Lumbar Puncture

A lumbar puncture (LP) is a standard medical procedure, performed by an appropriately skilled clinician. The purpose of a lumbar puncture is to obtain a sample of cerebrospinal fluid (CSF) and measure the opening pressure.

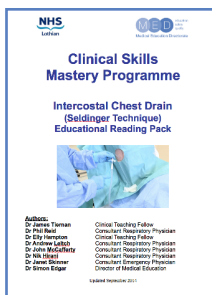
Clinical competency in performing lumbar puncture is listed as an essential learning outcome in the UK curricula for core medical and acute care common stem trainees.

2) Central Line

Central venous catheter (CVC) insertion is a complex and potentially harmful procedure most commonly required for patients in high dependency and intensive care settings.

A central venous catheter can be used to deliver fluids, blood products, medications or nutrition to a patient and for sampling of blood for testing. This is a mandatory skill for ACCS, Anaesthetic and Emergency Medicine trainees and is desirable in Core Medical Trainees

CHEST DRAIN



3

KNEE ASPIRATION



4

3) Chest Drain

Intercostal chest drain (ICD) insertion is a complex and potentially harmful procedure.

The purpose of an ICD is to remove either air or fluid (or both) from the pleural space.

ICDs are normally used for therapeutic/symptomatic purposes e.g. drainage and subsequent pleurodesis of a malignant effusion. Independent insertion of an ICD for pneumothorax is listed as an essential procedural competency in the UK curricula for core medical and acute care common stem trainees

4) Knee Aspiration

A hot swollen knee, without precipitating trauma, is a common presentation that provides an interesting diagnostic challenge. Sampling of knee joint fluid provides immediate and essential information.

A thorough understanding of the indications, local anatomy and technique are essential in order to ensure a safe and successful procedure.

METHODS

GAINING COMPETENCY

We recognise that the traditional model of “see one, do one, teach one” is no longer acceptable. Our new approach allows development of fundamental skills, in a completely safe manner before real-life practice.

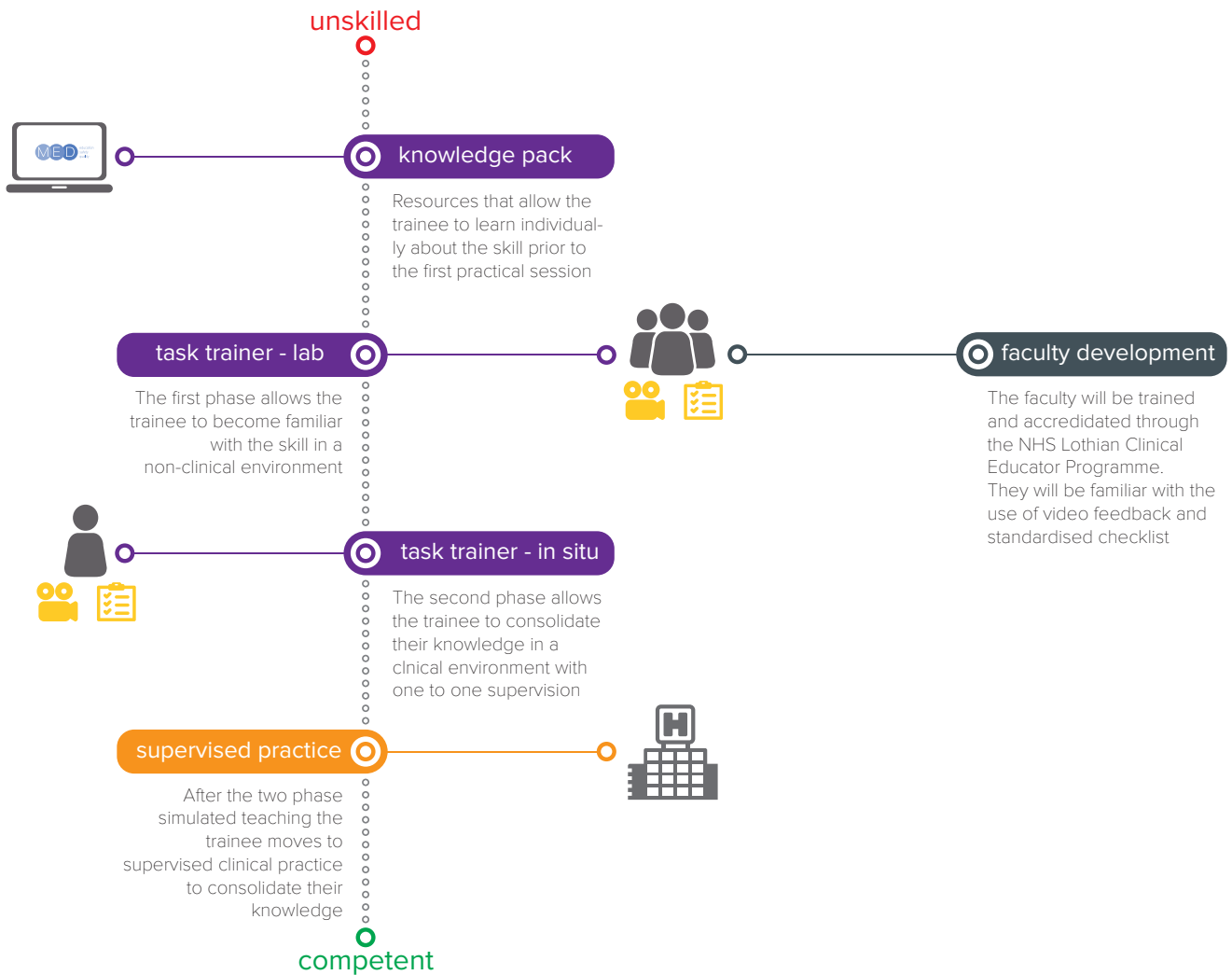
In addition, this novel approach allows refreshment of old skills, minimising the effects of potentially harmful skill decay.

The path to procedural competency for clinicians in NHS Lothian is supported by the following:

A faculty trained and accredited through the regional Clinical Educator Programme.

Knowledge Packs containing a combination of written and video educational resources for each procedural skill, with a consistent emphasis on patient safety.

A 2-phase supervised simulated procedural training programme, including checklist-based formative assessment throughout. The first occurs in a non-clinical area with a small group of trainees and the second within a clinical environment with one to one training.



PROCEDURAL PHASES

Complex procedural skills can be daunting prospects initially. It is not uncommon for novices to become overwhelmed when performing such procedures, resulting in avoidable error or harm. It can be helpful to fragment the task into discrete, manageable parts, ensuring one is complete before moving onto the next.

Our "Mastery Procedural Phases" is one method of approaching any complex skill. This will be discussed more in the videos and simulation skills sessions.

Phase 1 - preparation, assistance and positioning

Consider whether a procedure is indicated, that no contraindications exist and that informed consent has been given. An appropriately trained assistant should be available to assist you with preparing equipment and in positioning the patient correctly to make the procedure as easy as possible.

Phase 2 - asepsis and local anaesthetic infiltration

Asepsis should be strictly observed to prevent potentially life altering infective sequelae. Local anaesthetic should be used to minimise any discomfort experienced by the patient.

Phase 3 - a three point procedural pause

The procedural pause is an opportunity for all those involved in the procedure, including the patient, to acknowledge that they are content and happy to proceed.

1. Ensure that the patient is comfortable, that there is no impending contraction and that they are happy to proceed.
 2. Your assistant should have the opportunity now to voice any concerns, identify any problems or anything else that needs addressed.
 3. The clinician should ensure that the equipment is all present, checked and laid out in the order of use.
- Once this is completed the insertion can begin.

Phase 4 - insertion

This phase will be covered in a later section of this pack and during the video demonstration.

Phase 5 - secure & dress

Since an epidural catheter will remain in situ it must be

1 Prepare

2 Asepsis & LA

3 Procedural Pause

4 Insertion

5 Secure & Dress

6 Completion

appropriately secured to prevent any harm or failure from unintended movement. A suitable dressing should always be applied.

Phase 6 - completion

You should communicate to the patient and assistant about the procedure. Document the insertion, any difficulties encountered, and whether any symptoms of pain or paraesthesia have been felt. Finally you should trouble shoot any problems encountered.

02 LEARNING OUTCOMES

Each skill covered in the NHS Lothian Mastery Programme has been assigned learning outcomes for you to achieve.

LEARNING OUTCOMES

After reading and viewing the content contained within this pack the trainee should gain the following

1

An understanding of the indications for performing an epidural for labour analgesia and its place in anaesthetic management

2

An understanding of risk assessment, patient safety concerns and contraindications to epidural insertion.

3

An understanding of the potential complications of the procedure and the basic principles of their management.

4

An understanding of the practicalities of inserting a lumbar epidural in a safe and structured fashion.

5

An awareness of your own personal limitations and when to obtain help from a senior clinician.

03 INDICATIONS & RISK ASSESSMENT

Epidural analgesia is the most effective form of labour analgesia however it carries with it the risk of rare but potentially life changing complications. It is therefore essential to understand the factors that contribute to the risks of this procedure.

INDICATIONS

The indications for a labour epidural encompass good analgesia (mitigating some of the cardiovascular stress of labour), the avoidance of the risks of general anaesthesia for instrumental or operative delivery, and maternal request. It should also be acknowledged that in obese patients with a BMI >40 it is beneficial to have a working epidural as they have a 50% chance of requiring operative intervention.

- **MATERNAL REQUEST**
- **HIGH RISK OF OPERATIVE INTERVENTION**
- **PREGNANCY INDUCED HYPERTENSION**
- **CARDIAC OR RESPIRATORY DISEASE**
- **PREMATURE OR HIGH RISK FOETUS**
- **MULTIPLE PREGNANCY**
- **BREECH DELIVERY**
- **TRIAL OF LABOUR**
- **ANTICIPATED DIFFICULT AIRWAY**

CONTRAINDICATIONS

The only absolute contraindication to labour epidural insertion is maternal refusal. All other contraindications should be assessed in each case and a decision made about the risk versus benefit for each individual patient. To aid you in understanding these risks a discussion of each contraindication is included below

- **MATERNAL REFUSAL**
- **BLEEDING DIATHESIS**
- **ANATOMICAL ABNORMALITIES**
- **HYPOVOLAEMIA/CARDIOVASCULAR INSTABILITY**
- **CARDIAC DISEASE**
- **NEUROLOGICAL DISEASE**
- **SYSTEMIC/LOCAL INFECTION**

- **ALLERGY**

BLEEDING DIATHESIS

Patients with a congenital or acquired abnormality of clotting should be carefully considered prior to making a decision on the safety of an epidural insertion. The risk is that a puncture of the epidural venous plexus could lead to an expanding haematoma that would compress the spinal cord and ultimately caused neuronal damage.

In the obstetric population there are specific causes of an acquired clotting abnormality that one must be aware of;

- Pre-eclampsia - this is associated with deranged clotting function particularly if severe or late in pregnancy
- HELLP Syndrome - this variant of pre-eclampsia was

Relative risks related to neuraxial blocks in obstetric patients with abnormalities of coagulation
reproduced from Regional anaesthesia and patients with abnormalities of coagulation. Anaesthesia 2013; 68: pages 966-72.

Risk Factor	Normal Risk	Increased Risk	High Risk	Very high risk
LMWH - prophylactic dose	> 12 h	6-12 h	< 6 h	< 6 h
LMWH - therapeutic dose	> 24 h	12-24 h	6-12 h	
UFH - infusion	Stopped > 4 h and APTTr ≤ 1.4			APTTr above normal range
UFH - prophylactic bolus dose	Last given > 4 h	Last given < 4 h		
NSAID - aspirin	Without LMWH	With LMWH dose 12-24 h	With LMWH dose <12 h	
Warfarin	INR ≤ 1.4	INR 1.4-1.7	INR 1.7-2.0	INR > 2.0
Pre-eclampsia	Platelets > 100 within 6 h	Platelets 75-100 (stable) and normal coagulation tests	Platelets 75-100 (decreasing) and normal coagulation tests	Platelets < 75 or abnormal coagulation tests or HELLP syndrome
Idiopathic thrombocytopenia	Platelets > 75 within 24 h	Platelets 50-75	Platelets 20-50	Platelets < 20
Intra-uterine fetal death	FBC and coagulation tests normal within 6 h	No clinical problems but no investigation results available		With abruptio or overt sepsis
Cholestasis	INR ≤ 1.4 within 24 h	No other clinical problems but no investigation results available		

named in 1982 after its characteristics of haemolysis, elevated liver enzymes and low platelets. There can be a significant derangement of clotting function in patients with HELLP.

- Intra-uterine death (IUD) - after a time (usually several days) thromboplastin will enter the maternal circulation causing a disseminated intravascular coagulation (DIC) picture. In cases of IUD clotting function should always be checked prior to epidural insertion.
- Placental abruption - bleeding into the myometrium is a threat to both mother and foetus. The separating decidua can lead to necrosis and infusion of decidual debris, rich in thromboplastin, into the maternal venous circulation; the resulting DIC can be marked.
- Amniotic fluid embolism - this is a rare but usually life threatening condition. A DIC picture is also seen.

The table included below is an extract from the AAGBI publication "Regional Anaesthesia and Patients with Abnormalities of Coagulation". If a patient falls outwith the 'Normal Risk' categories, they should be discussed with a senior colleague prior to proceeding with epidural placement.

ANATOMICAL ABNORMALITIES

Previous back surgery or spina bifida are relative contraindications. Both situations can result in difficult or impossible placement of an epidural or abnormal spread of the local anaesthetic resulting in an unpredictable and patchy block.

HYPOVOLAEMIA OR CARDIOVASCULAR INSTABILITY

This should, where possible, be corrected before siting an epidural as the loss of sympathetic output caused by a successful block will cause significant hypotension leading

to dizziness, nausea and vomiting. If bleeding is the cause of the hypovolaemia it is likely that general anaesthesia would be more appropriate if operative intervention is required.

CARDIAC DISEASE

The cardiovascular stress of labour can be diminished with a labour epidural which can be particularly helpful in women with ischaemic heart disease. However structural cardiac disease tends to be a contraindication for epidural placement, particularly in stenotic valve lesions that create a fixed cardiac output. Each patient should however be considered on an individual basis as with careful administration of local anaesthetic via the epidural together with appropriate use of IV fluid and vasopressor one can prevent any significant changes in cardiac preload and afterload.

NEUROLOGICAL DISEASE

Although there is no definite evidence that epidurals make chronic neurological conditions worse, they are still quoted as a contraindication. It should be made clear to the woman that her condition may become worse around the stressful time of childbirth and that the epidural may or may not be a contributing factor. If the woman understands this and gives consent then you can proceed.

SEPSIS

Systemic or localised infection at the site of epidural insertion is a contraindication due to the risk of introducing infection and causing an epidural abscess. An epidural abscess may itself cause sepsis but the major concern is of enlargement of the abscess and surrounding inflammation causing compression and permanent damage to the spinal cord.

ALLERGY

Specifically to local anaesthetic solutions or opioids.

04 PATIENT SAFETY CONSIDERATIONS

With all skills time should be taken to consider patient safety and how any potential risk factors can be mitigated

SAFETY

SPECIFIC CONSIDERATIONS

When performing a lumbar epidural in a labouring woman the ultimate goal is to obtain effective analgesia in the safest manner possible. If there is any concern that the patient's safety may be compromised then a senior colleague must

be contacted prior to the procedure being undertaken. The specific safety considerations in performing a lumbar epidural for labour are below.

INTRAVENOUS ACCESS	
ACCESS TO FULL RESUSCITATION EQUIPMENT & DRUGS	Location of resuscitation trolley and intralipid should be known
FETAL MONITORING	Cardiotocography (CTG) should be undertaken for 15 minutes and interpreted prior to siting of an epidural
ACCESS TO AIRWAY EQUIPMENT	Inadvertent intrathecal placement of a catheter may lead to a high or total spinal block
ABILITY TO MONITOR BLOOD PRESSURE, ECG, AND SPO2%	
COMPETENT PRACTITIONER	Trainees must be supervised until competent
APPROPRIATE ASSISTANT	This is generally the patient's midwife however in some hospitals an ODP will be present. They must be present throughout the procedure and competent to contribute to patient positioning, equipment set-up and checking, monitoring of mother and foetus, and assistance with securing epidural. Consider a second assistant if the patient is particularly challenging
ADEQUATELY TRAINED MIDWIFERY STAFF	The patient should be receiving one to one care from a midwife with epidural care competency

QUESTIONS TO CONSIDER

ALWAYS CONSIDER THE FOLLOWING

- Will the patient benefit enough from the epidural to justify the risks?
- Are there any contraindications to the procedure?
- Am I competent to do this?
- Are there any factors which predict this to be difficult? e.g. obesity, poorly compliant patient, anatomical abnormalities, etc
- Is supervision or assistance required?
- Am I familiar with the equipment?
- Do I require any additional equipment?
- Does the patient have the capacity to consent to the procedure?

PATIENT EDUCATION

ALWAYS TALK WITH THE PATIENT

Communicating and informing the patient of exactly what the procedure involves can reduce anxiety and facilitate better positioning for the procedure. Emphasising the importance of communication between the patient and yourself with regard to contractions will allow you to minimise the risks to the patient. The patient should be made aware of the benefits and

complications of the procedure as well as a realistic expectation of the time it will take for her pain to decrease and the rates of failure or poor analgesia. Once this has been done, informed consent should be sought; currently this is given verbally and recorded on the anaesthetic chart.

05 POTENTIAL COMPLICATIONS

There are several complications associated with epidural insertion some of which, although rare, are extremely serious. It is your responsibility to explain these risks so that the patient may make an informed decision about their care

IMMEDIATE

POOR ANALGESIA

95% of epidurals will work well although to achieve this may require further top-ups, supplementation with stronger local anaesthetic or adjunct, or adjustment of catheter position prior to them providing satisfactory analgesia.

The remaining 5% will fail to provide acceptable analgesia and will require to be re-sited should it still be appropriate.

DURAL PUNCTURE

The incidence of dural tap is approximately 1% and of these 75% will go on to develop a post-dural puncture headache. This is associated with an increased maternal morbidity, prolonged hospital stay and affect interaction with patient's baby.

Please see appendix for management of inadvertent dural puncture and post dural puncture headache in obstetrics.

HIGH BLOCK/TOTAL SPINAL

Unrecognised intrathecal placement of the catheter or migration into the intrathecal space over time can result in a high block or total spinal. Careful aspiration of the epidural catheter before any injection should minimise the risk.

Symptoms and signs usually occur within minutes of local anaesthetic injection and a clinical progression usually occurs over several minutes as the block rises.

Management is supportive and dependent on degree and height of block. Severe respiratory compromise can occur without loss of consciousness and so one must provide reassurance and explanation to the patient whilst preparing for sedation and intubation.

Table 1: Clinical manifestations of complete spinal block

CARDIO-RESPIRATORY	NEUROLOGICAL
Hypotension*	Nausea and anxiety*
Bradycardia*	Arm/hand dysesthesia or paralysis*
Respiratory compromise*	High sensory level BLOCK
Apnoea*	Cranial nerve involvement
Reduced oxygen saturation	Loss of consciousness*
Difficulty speaking/coughing	
Cardiac arrest (asystole)	

Table 2: Management of typical features

FEATURE	MANAGEMENT
Bradycardia	Vagolytics eg. atropine Sympathomimetics eg. ephedrine, adrenaline
Hypotension	Vasopressors eg. metaraminol, phenylephrine Fluid boluses Leg elevation
Respiratory dysfunction	Oxygenation Intubation and ventilation
Loss of consciousness	Secure airway Supportive measures

HYPOTENSION

This is the result of peripheral vasodilatation in response to blockade of the sympathetic outflow. Ephedrine is available on the epidural trolley and pre-mixed phenylephrine in the anaesthetic room fridges; they can be used judiciously along with a IV fluids, oxygen, and a left lateral tilt to manage the hypotension.

NAUSEA & VOMITING

The result of hypotension or induced by the opioid included in the epidural infusion.

ITCHINESS

A consequence of the opioid included in the epidural infusion.

LOCAL ANAESTHETIC TOXICITY

Local anaesthetics act upon sodium channels and prevent the sodium influx required for depolarisation of the membrane. This action is not restricted to the axons of neurones; local anaesthetics will stabilise the membrane of other excitable tissue which rely on the action of sodium channels. This includes skeletal, cardiac and smooth muscle. Toxicity can occur some time after an injection and the signs include sudden alteration in mental status, severe agitation or loss of consciousness with or without tonic-clonic seizure activity. In addition, various arrhythmias may occur leading to cardiovascular collapse. The AAGBI Guideline for the management of local anaesthetic toxicity is included in the appendix for further information.

DELAYED

POST DURAL PUNCTURE HEADACHE

Around 1% of patients will develop a severe headache in the 72 hours following lumbar epidural insertion in labour. Most are managed conservatively but some may require an epidural blood patch to be performed. For more information please see appendix for management of inadvertent dural puncture and post dural puncture headache in obstetrics.

EPIDURAL HAEMATOMA

A rare but serious complication which can occur some days after the epidural has been removed. Back pain, bowel or bladder dysfunction, or a sensory or motor deficit in the lower limbs are cardinal signs. An urgent MRI should be requested

and rarely a surgical laminectomy may be required.

EPIDURAL ABSCESS

Formation of an epidural abscess can cause sepsis, spinal cord compression and, very rarely, paralysis. It can occur some time after an epidural and should therefore always be considered if a patient complains of tenderness/pain at the epidural site, if there is a swelling at the site, or frank pus is seen. The epidural catheter should be removed and sent to microbiology, the patient should be commenced on antibiotics, and an MRI of the spine must be arranged urgently.

06 ANATOMY & PHYSIOLOGY

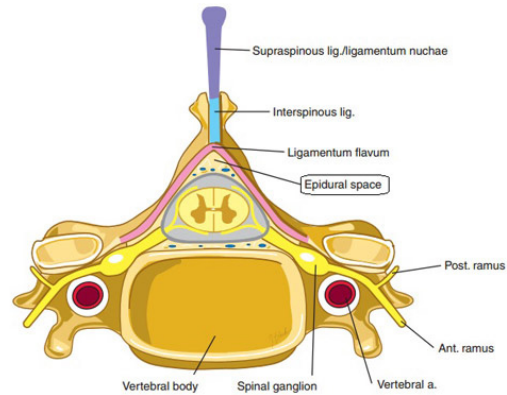
A sound understanding of the relevant anatomy and physiology related to epidural analgesia will allow you to improve your practice and predict problems.

ANATOMY

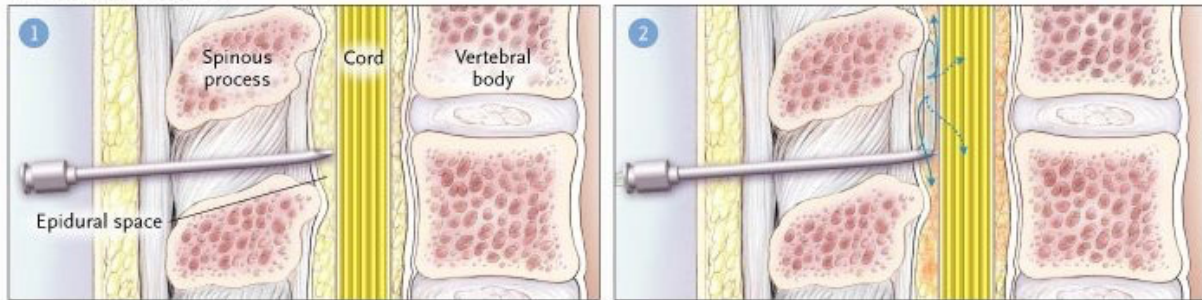
EPIDURAL SPACE

The epidural (or extradural) space is the potential space that surrounds the dural sheath within the vertebral canal. It is roughly triangular, with the apex posteriorly, and it extends from the foramen magnum superiorly to the sacral hiatus inferiorly. The boundary of the space anteriorly is the posterior longitudinal ligaments of the spinal column, the vertebral bodies, and the intervertebral discs and posteriorly it is the ligamentum flavum and vertebral lamina.

The space contains the spinal nerve roots as they emerge from the dura before exiting through the inter-vertebral foramina; the roots can carry with them a cuff of dura that may extend into the paravertebral space. In addition fat, lymphatics, arterioles, and thin-walled valveless veins that drain into the azygous system are contained within the epidural space.



A Epidural Analgesia



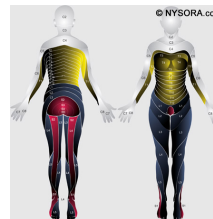
In order to reach the epidural space one must pass through skin, a variable amount of subcutaneous tissue and then the three ligaments that extend between adjacent vertebrae. The supraspinous ligament (up to 1cm thick) and the interspinous ligament (up to 6cm thick) are the first two. The ligamentum flavum is the final, and toughest, ligament to traverse; the ligamenta flava are distinct at each spinal level and not continuous. The two ligaments at each level connect the adjacent vertebrae and meet in the midline where they can vary in thickness (up to 2cm).

PAIN PATHWAYS

Pain in labour is transmitted in via two routes. In the first stage of labour, tension in the uterine wall caused by contractions and in the stretching of surrounding extra-uterine structures is relayed by the lower thoracic roots, T10-L1, with some transmission also coming from the tuba-ovarian vessels in the broad ligament. In

the second stage of labour, vaginal and perineal stretching is responsible for pain which is relayed through the sacral roots S2-4.

For the patient the perception is of abdominal pain for the first stage of labour before becoming more pelvic and perineal. In order to provide adequate analgesia for the entirety of labour, the epidural must provide block from T10 - S4.



PHYSIOLOGY

THE SPREAD OF ANAESTHETIC

Local anaesthetics injected into the epidural space will spread both cranially and caudally bathing the nerve roots as they pass through the anterolateral epidural space. The upper and lower limits of the spread are dictated largely by volume injected and gravity.

A preferential spread to one side or the other is seen commonly although not desired; it can be the result of catheter or patient position. Altering either of these can resolve the problem.

Effect of blockade at different levels

The effect on sympathetic nervous system output is largely responsible for the physiological changes seen. In ascending order of nerve root the effects expected can be seen below

Sacral Blockade

Sensory - loss of sensation from the perineum, buttocks, and posterior aspect of the legs as well as pelvic structures such as vagina and bladder.

Motor - loss of tone in anal and urethral sphincters, and weakness of anterior perineal muscles and knee and ankle flexors.

Sympathetic - not applicable

Lumbar Blockade

Sensory - loss of sensation over anterior aspect of leg and groin

Motor - weakness of hip flexors and knee and ankle extensors

Sympathetic - little effect as the sympathetic chain rarely extends this far

Lower Thoracic Blockade T10-12

Sensory - loss of sensation over lower abdomen, analgesia of lower abdominal organs (e.g. uterus)

Motor - weakness of lower abdominal wall muscles and lower intercostal muscles

Sympathetic - vasodilatation and loss of sweating in the legs. Seen as warm and dry feet, a drop in blood pressure and compensatory tachycardia

Mid Thoracic Blockade T6-9

Sensory - loss of sensation over upper abdomen and analgesia of upper abdominal organs

Motor - weakness of lower intercostal muscles

Sympathetic - blockade of coeliac plexus resulting in vasodilatation of GI tract. A significant drop in systemic vascular resistance occurs together with pooling of venous blood and decreased venous return. A significant tachycardia with or without a significant fall in blood pressure is seen.

Upper Thoracic Blockade T1-5

Sensory - loss of sensation over chest wall and medial aspect of arm

Motor - weakness in upper intercostal muscles potentially causing significant respiratory embarrassment. Some arm and

hand weakness may also occur

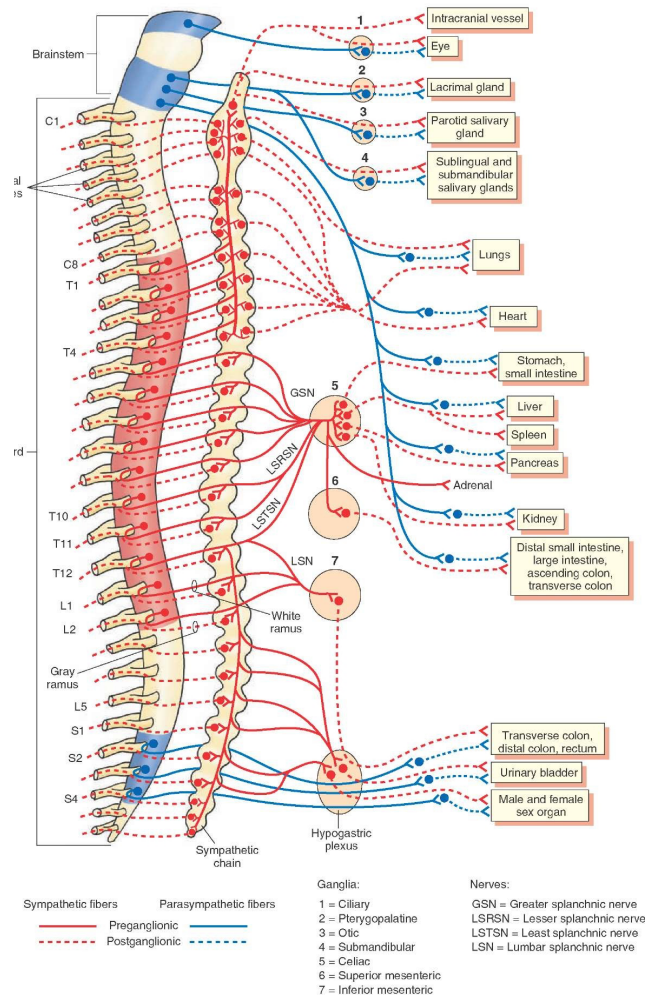
Sympathetic - blockade of outflow to the heart results in a negative inotropic state and unopposed vagal stimulation. Cardiovascular collapse and bradycardia can occur.

Cervical Blockade

Sensory - loss of sensation in arms, neck and eventually face

Motor - weakness of arms and then, at C3-5 level, diaphragmatic paralysis and life threatening respiratory compromise.

Sympathetic - blockade of outflow to stellate ganglion results in a Horner's syndrome



07 EQUIPMENT & RESOURCES

Taking time to ensure you have the equipment and resources you require will ultimately make your task easier and allow you to consider eventualities and how you will deal with them.

CHECKLIST

EQUIPMENT & RESOURCES

The following should be available before commencing the procedure. All should be found either in the Labour Ward room or the Epidural Trolley.

- **EXPERIENCED AND SKILLED ASSISTANT + / - COMPETENT SUPERVISOR**
- **EQUIPMENT TO MEASURE BLOOD PRESSURE, ECG AND SPO2%**
- **PILLOW**
- **SHARPS BIN**
- **A STANDARD REGIONAL ANAESTHETIC PROCEDURAL PACK CONTAINING:**
 - **SURGICAL GOWN**
 - **SURGICAL DRAPE**
 - **SYRINGES**
20ml, 5ml, 2ml
 - **NEEDLES**
24G, 25G
 - **STERILE SWABS**
 - **FILTER FOR DRAWING UP**
- **ANTISEPTIC SOLUTION:**
0.5% chlorhexidine topical spray or
0.5% chlorhexidine with alcohol solution
Do not use 2% Chlorprep sponge applicators due to neurotoxicity risk
- **ADDITIONAL STERILE WEAR - STERILE GLOVES, FACE MASK AND SURGICAL HEAD-CAP**
- **LIGNOCAINE 2% - 20ML AMPOULE**
- **NORMAL SALINE - 2X 10ML AMPOULE**
- **16G TUOHY NEEDLE PACK**
- **16/17G 'CLICK FIX'**

08 INSERTION PROCEDURE

Phase 1 - Preparation, Assistance & Positioning
Phase 2 - Asepsis & Anaesthesia
Phase 3 - Procedural Pause
Phase 4 - Insertion
Phase 5 - Anchoring
Phase 6 - Test Dose
Phase 7 - Completion & Documentation

PREPARATION, ASSISTANCE & POSITIONING

OBTAIN VERBAL CONSENT FOR PROCEDURE

Explain the procedure

Discuss potential complications and their management

EXCLUDE CONTRAINDICATIONS

Review platelet count

Review temperature and white cell count

Exclude pre-existing bleeding diathesis or pregnancy induced conditions (e.g. pre-eclampsia, HELLP syndrome) that may affect coagulation

Exclude anatomical abnormalities of the spine

Enquire about significant cardiac disease

PATIENT AND CLINICIAN PREPARATION

The patient may wish to visit the bathroom prior to positioning

Ensure bed height is appropriate and seat available if required. Seat should also be available for the patient to rest feet onto

Remove pager and/or phone

Assistant prepared

Reassure the patient

PATIENT POSITIONING

It is accepted that siting an epidural is easier with the patient upright in a seated position however you can perform it with them in a lateral position. It should only be on the rare occasion that the epidural is inserted in the lateral position. In either position it is important to ensure that CTG bands, patient's clothing, and patient's hair are moved well away from the intended insertion site in order to preserve asepsis.

SITTING POSITION

Sitting erect with legs over the side of the bed

Use chair for legs to rest on. This tends to roll the inferior pelvis anteriorly and help promote an outward curvature of the lumbar vertebrae.

Use a pillow and ask patient to hug it. This will promote the patient leaning forward and again increasing the outward curvature of the lumbar vertebrae.

LATERAL POSITION

Can be either left or right lateral position.

Neck and legs should be flexed as much as possible.

A pillow can be left under the patient's head for comfort.

ARRANGE EQUIPMENT

Put on head-cap and face-mask prior to opening sterile equipment. In the rare cases of epidural abscess most reports identify bacteria that are found to have come from the operator's oral flora.

Open sterile Regional Anaesthesia Pack onto procedural trolley

Open procedural equipment onto the trolley

IDENTIFY LANDMARKS

Most lumbar epidurals are inserted at the L3/4 interspace. One space above or below would also be acceptable. Tuffier's line, a line drawn between the posterior iliac crests, corresponds with the body of the L3 vertebra.

If the space immediately below Tuffier's line feels appropriate (i.e. a good space between the spinous processes) mark the space with an indentation or a marker pen

ASEPSIS & ANAESTHESIA

ASEPSIS

Ensure that the patient is sitting on absorbent pads and that CTG bands have been moved up out of the way prior to cleaning their back. Use 0.5% Chlorhexidine and spray marked interspace and surrounding skin; ensure that your equipment is not at risk of being covered by the spray particles.

Allow the chlorhexidine to dry whilst you prepare yourself and your equipment. Be vigilant that nothing contaminates the area whilst the chlorhexidine is drying.

Wash hands and dry with sterile hand towels

Put on sterile gown and gloves

Ask assistant to open and hold vials of normal saline and lignocaine 2% and draw them up. The normal saline should be drawn up through the filter provided.

Check all connections and patency of epidural components

Fill the loss of resistance syringe with normal saline

DRAPE THE PATIENT

Remove the adhesive strips from the drape and, without contaminating the field, apply the drape to the patient with the circular cut-out centred on the intended vertebral interspace

LOCAL ANAESTHETIC

Infiltrate skin with lignocaine 2%. Depending upon the amount of subcutaneous tissue up to 3-4ml of lignocaine 2% may be appropriate. Advancing the needle only just into the intervertebral ligaments will characteristically make injection very difficult and give you confirmatory feedback that you chosen angle and direction of insertion is in the midline.

PROCEDURAL PAUSE

VISUALISE THE PROCEDURE IN THE CORRECT ORDER

PERFORM A 3 POINT CHECK OF PATIENT, ASSISTANT AND YOURSELF

PROVIDE EVERYONE PRESENT THE OPPORTUNITY TO SPEAK UP PRIOR TO COMMENCING

PERFORM A FINAL EQUIPMENT CHECK

INSERTION

INSERTION OF TUOHY NEEDLE

The Tuohy needle should be inserted through skin, the supraspinous ligament, and into the interspinous ligament; the distance to this point can be as little as 1cm in those with very little subcutaneous fat. The needle should be felt to be held by the ligament at this point in comparison to the mobility the needle has in subcutaneous tissue.

The stylet should then be removed and the loss of resistance syringe attached to the needle hub

At this point the needle should be progressed with either a continuous or intermittent pressure technique as explained in the accompanying video.

On entering the ligamentum flavum the needle should feel more rigidly held and the resistance to pressure on the syringe increased. A slight scratching or 'frictional' feeling can be felt at this point. Knowledge that you are now in the ligamentum flavum should make you cautious of the impending loss of resistance

INSERTION OF THE EPIDURAL CATHETER

On loss of resistance, make a note of the distance that the Tuohy needle is inserted, remove the syringe from the hub, apply the catheter feed tool if preferred, and begin to feed the catheter into the epidural space.

Warn the patient of some possible paraesthesia in their legs.

Having inserted the catheter to the 20cm mark, make another note of the distance that the Tuohy needle is inserted.

Begin to withdraw the Tuohy needle whilst maintaining the position of the catheter.

Once the Tuohy needle has been withdrawn and removed from the catheter, the catheter itself should be pulled back to an appropriate depth. In all but those with significant obesity, this should be 4cm longer than the loss of resistance distance so that 4cm remains within the epidural space.

In patients with significant obesity it is advisable to leave more catheter in the epidural space since movement of the subcutaneous tissue could pull it out of the epidural space. 5-7cm would be acceptable.

At this time a falling meniscus should be observed and negative aspiration of the catheter checked for.

ANCHORING THE CATHETER

Following a negative aspiration, the clip hub and filter should be removed again temporarily to allow the 'fixation device' to be threaded and applied to the skin.

Your assistant should then prepare adhesive strips to fix the epidural catheter to the skin.

The clip hub and filter should be placed over a shoulder to allow access.

TEST DOSE

Once the epidural catheter is fixed the patient should return to a recumbent position in bed.

Following a repeated negative aspiration a test dose of local anaesthetic should be given to rule out intravenous or intrathecal placement of the catheter. The test dose can be either 4ml lignocaine 2% or 4ml of 0.1% bupivacaine & 2mcg/ml Fentanyl ("Bag Mix") Significant sensory or motor block of the legs, tinnitus, or perioral paraesthesia would suggest a problem and necessitate review by a senior colleague.

In the absence of these symptoms, a further dose of local anaesthesia and connection of a Patient Controlled Epidural Anaesthesia (PCEA) pump can occur.

COMPLETION & DOCUMENTATION

COMPLETION

Patient observations should be completed every 5 minutes for the first 30 minutes after epidural insertion.

Dispose of waste and sharps appropriately

Provide feedback and advice to the patient about onset of analgesia

DOCUMENTATION

All sections of the SCRH Anaesthetic Record should be completed. It is important to accurately document the insertion including any pain or paraesthesia experienced during the procedure. Finally, the prescription and monitoring forms for the PCEA should be authorised.

09 APPENDICES

AAGBI Safety Guideline Management of severe local anaesthetic toxicity.
OAA information card
Labour Epidural Procedural Checklist
Labour Epidural Formative Assessment

AAGBI Safety Guideline

Management of Severe Local Anaesthetic Toxicity



1 Recognition	Signs of severe toxicity: <ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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 <ul style="list-style-type: none">• 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) <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• hypotension,• bradycardia,• tachyarrhythmia CONSIDER INTRAVENOUS LIPID EMULSION (following the regimen overleaf) <ul style="list-style-type: none">• Propofol is not a suitable substitute for lipid emulsion• Lidocaine should not be used as an anti-arrhythmic therapy
4 Follow-up	<ul style="list-style-type: none">• 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:<ul style="list-style-type: none">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.....

This guideline is not a standard of medical care. The ultimate judgement with regard to a particular clinical procedure or treatment plan must be made by the clinician in the light of the clinical data presented and the diagnostic and treatment options available.

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IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion
 1.5 ml.kg^{-1} over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at $15 \text{ ml.kg}^{-1}.\text{h}^{-1}$

AFTER 5 MIN

Give a **maximum of two** repeat boluses (same dose) if:

- cardiovascular stability has not been restored **or**
- an adequate circulation deteriorates

Leave **5 min** between boluses

A maximum of **three** boluses can be given (including the initial bolus)

AND

Continue infusion at same rate, but: **Double** the rate to $30 \text{ ml.kg}^{-1}.\text{h}^{-1}$ at any time after 5 min, if:

- cardiovascular stability has not been restored **or**
- an adequate circulation deteriorates

Continue infusion until stable and adequate circulation restored or maximum dose of lipid emulsion given

Do not exceed a maximum cumulative dose of 12 ml.kg^{-1}

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

IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion
100 ml over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at 1000 ml.h^{-1}

AFTER 5 MIN

Give a **maximum of two** repeat boluses of 100 ml

AND

Continue infusion at same rate but **double** rate to 2000 ml.h^{-1} if indicated at any time

Do not exceed a maximum cumulative dose of 840 ml



This AAGBI Safety Guideline was produced by a Working Party that comprised:
Grant Cave, Will Harrop-Griffiths (Chair), Martyn Harvey, Tim Meek, John Picard, Tim Short and Guy Weinberg.

This Safety Guideline is endorsed by the Australian and New Zealand College of Anaesthetists (ANZCA).

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



Labour Epidural Procedural Checklist

1 Prepare

- Obtain informed consent
- Exclude contraindications
- Optimise clinician comfort + minimise distraction
- Patient positioning (crucial step to enhance procedural success rate)
- Identify landmarks
- Mark L3/4 interspace with permanent marker or indentation
- Arrange equipment (non-touch technique to ensure sterile field) - assistant or clinician can open sterile pack + place equipment onto trolley

2 Asepsis & LA

- Scrub hands
- Put on hat, mask, gloves & gown
- Apply antiseptic skin wash - 0.5% Chlorhexidine
- Prepare & check equipment
- Drape the patient
- Infiltrate local anaesthetic to skin

3 Procedural Pause

- Perform the 3-point check
- Perform final equipment check

4 Insertion

- Introduce Tuohy needle into interspinous ligament
- Remove introducer and apply loss of resistance syringe
- Advance to loss of resistance using continuous or intermittent technique
- Feed catheter through needle before withdrawing needle
- Pull back catheter to a length 5cm greater than loss of resistance depth
- Confirm dropping meniscus and negative aspiration

5 Secure & Dress

- Apply appropriate dressing
- Attach catheter to port and filter
- Securely tape catheter to patient and drape over their shoulder

6 Completion

- Return patient to recumbant position
- Give test dose of local anaesthetic
- Dispose of waste and sharps appropriately
- Commence regular measurement of blood pressure, heart rate and SpO2%
- Set-up PCEA pump and attach
- Document procedure and prescribe PCEA

Labour Epidural Formative Assessment

Candidate Name
email address

Date
Tutor

1 Prepare Baseline At End

Optimises clinician comfort + minimises distraction	<input type="checkbox"/>	<input type="checkbox"/>
Correctly positions patient	<input type="checkbox"/>	<input type="checkbox"/>
Identifies landmarks and correctly marks appropriate interspace	<input type="checkbox"/>	<input type="checkbox"/>
Opens pack in a sterile fashion	<input type="checkbox"/>	<input type="checkbox"/>
Ensures that all required equipment is available	<input type="checkbox"/>	<input type="checkbox"/>

2 Asepsis & LA Baseline At End

Able to scrub and put on sterile wear appropriately	<input type="checkbox"/>	<input type="checkbox"/>
Applies antiseptic skin wash to patient appropriately	<input type="checkbox"/>	<input type="checkbox"/>
Demonstrates preparation & checking of equipment	<input type="checkbox"/>	<input type="checkbox"/>
Correctly drapes the patient	<input type="checkbox"/>	<input type="checkbox"/>
Infiltrates local anaesthetic to skin	<input type="checkbox"/>	<input type="checkbox"/>

3 Procedural Pause

Performs the 3-point check	<input type="checkbox"/>	<input type="checkbox"/>
Performs a final equipment check	<input type="checkbox"/>	<input type="checkbox"/>

4 Insertion

Safely introduces Tuohy needle into interspinous ligament	<input type="checkbox"/>	<input type="checkbox"/>
Uses an appropriate technique to advance the needle	<input type="checkbox"/>	<input type="checkbox"/>
Achieves loss of resistance	<input type="checkbox"/>	<input type="checkbox"/>
Feeds catheter, removes needle, and confirms appropriate length in situ	<input type="checkbox"/>	<input type="checkbox"/>
Demonstrates appropriate check of catheter placement before securing	<input type="checkbox"/>	<input type="checkbox"/>

5 Secure & Dress

Correctly attaches catheter to port and filter	<input type="checkbox"/>	<input type="checkbox"/>
Correctly secures and dresses the epidural catheter	<input type="checkbox"/>	<input type="checkbox"/>

6 Completion

Correctly administers a test dose of local anaesthetic	<input type="checkbox"/>	<input type="checkbox"/>
Requests regular monitoring of blood pressure, heart rate, and SpO2%	<input type="checkbox"/>	<input type="checkbox"/>
Correctly prepares PCEA pump and attaches to the epidural catheter	<input type="checkbox"/>	<input type="checkbox"/>
Appropriately disposes of waste and sharps	<input type="checkbox"/>	<input type="checkbox"/>
Maintains asepsis throughout procedure	<input type="checkbox"/>	<input type="checkbox"/>

Comments -

Total Score =
(pass mark = 20/24)

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