

Guide to Practical Clinical Skills

Revised:
December 2009

Edited:
Dr R. Kneebone
Dr M. Schacter
Ms L. McMillan
Dr P Booton*
Dr G Easton*
Mrs J Jones*

Acknowledgements:
Contributors from clinical sites for Imperial College London

* Skills reviewed onwards from 2009

Index:

	Page
Venepuncture	2
Peripheral Intravenous Cannulation	4
Setting up an Infusion	6
Injections	9
Performing an ECG	12
Assessing an Abdominal X-ray	14
Assessing a Chest X-ray	16
Suturing	18
Ophthalmoscopy	20
Otoscopy	23
Male Urinary Catheterisation	25
Breast Examination	28
Digital Rectal Examination	30

Introduction

This guide to practical clinical skills is a learning tool for your clinical skills practice at the various sites of Imperial College London School of Medicine. It offers a recommended, evidenced-based approach with clear learning outcomes. However it can only be a guide, and there will often be a number of acceptable alternative ways for carrying out a given procedure.

While the clinical skills lab will be an important resource for learning, remember that ***the great majority of clinical skills are learnt by talking to patients and colleagues, examining patients and, where appropriate, performing procedures. So make the most of your time in the clinical area!***

These guidelines can be found on the Intranet:

<https://education.med.imperial.ac.uk>

Follow the Clinical Skill link from the Year 3 home page.

Feedback on these guidelines is welcome and should be fed back to your current clinical skills lead or tutor.

Key points to remember:

For all skills and procedures

- Always introduce yourself to the patient and clearly identify your title/role.
- Respect the patient's privacy and individuality at all times.
- Gain informed consent and cooperation and encourage patient participation in care wherever possible.
- Always identify the patient, ensuring they tell you their own name where possible. Cross-check this information with the patient's wrist band and with relevant documentation, ensuring that they all match.
- Be aware of patient safety and your own safety at all times.

Venepuncture

Aim:

To obtain a blood specimen for analysis

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for the procedure
- Correctly identify the patient and obtain informed consent.
- Select and prepare the correct equipment.
- Identify the correct sites for venepuncture.
- Demonstrate the ability to use the required equipment and obtain a blood sample.
- Demonstrate the ability to maintain infection control standards and safe practice when performing venepuncture.
- Identify and complete the correct documentation required for venepuncture.

Equipment:

- Tourniquet
- 70% Alcohol wipe
- Dressing
- Clean tray
- Laboratory form
- Blood collection devices: Vacutainer system - tube holder with straight needle or butterfly.
- Gauze
- Blood Collection tubes
- Gloves
- Sharps bin
- Plastic specimen bag.

Recommended technique:

Before and **after** each patient contact and procedure clean hands as appropriate with soap and water or alcohol gel.

1. Identify the patient, ensuring this matches with the laboratory form.
2. Discuss the procedure with the patient and obtain informed consent.
3. Gather the required equipment, including a clean tray.
4. Prepare the patient as necessary e.g. sitting, lying down
5. Clean hands and apply non-sterile gloves.
6. Select the most suitable site for venepuncture.
7. Apply tourniquet 5-10cm above the site (maximum dwell time 1min).
8. Use other appropriate methods to encourage venous distension as required.

9. Clean the site by 70% isopropyl alcohol for 30 seconds and allow to dry for 30 seconds. Do not then repalpate or touch the skin.
10. Assemble equipment connecting needle or butterfly to holder.
11. Stabilising the vein with one hand, insert the needle with the other; with bevel upwards at approx. 15 – 30 degree angle.
12. Introduce the sample tubes following the recommended 'order of draw' and invert tubes upon removal following the recommended mixing guidelines.
13. Release tourniquet (maximum dwell time 1min).
14. Withdraw the needle, disposing of it directly into a sharps bin.
15. With sterile gauze apply mild pressure over the puncture site until bleeding ceases; if capable the patient may be able to do this.
16. Check for any complications e.g. haematoma, and apply dressing.
17. Label all blood specimens and complete the laboratory form at the patient's bedside.
18. Place blood specimens and laboratory form into a plastic specimen bag ready for collection.
19. Remove gloves and dispose of all used equipment safely and appropriately.
20. Clean hands.

Note: This excludes samples for blood cultures

References:

- Dennis J. Ernst 2005 *Applied Phlebotomy* Lippincott Williams & Wilkins, Baltimore.
- Dougherty L, Lamb J (ed) 2008 *Intravenous Therapy in Nursing Practice* 2nd Edition. Blackwell Publishing, Oxford.
- Dougherty L, Lister S (ed) 2006 *The Royal Marsden Hospital Manual of Clinical Nursing Procedures* 6th Edition Blackwell Publishing, Oxford.
- Jamieson E, Whyte L, McCall J (ed) 2007 *Clinical Nursing Practices* 5th Edition. Elsevier Science Lt, Philadelphia.

Peripheral Intravenous Cannulation

Aim:

To insert a peripheral intravenous (IV) cannula using a safe and effective technique.

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for the procedure.
- Correctly identify the patient and obtain informed consent.
- Select and prepare the correct equipment.
- Identify appropriate sites and veins for cannulation.
- Demonstrate the ability to insert a peripheral venous cannula.
- Demonstrate the ability to maintain infection control standards and safe practice when performing cannulation.
- Identify and complete the correct documentation required for cannulation.

Equipment:

- Clean tray
- Non-sterile gloves
- Tourniquet
- Sterile gauze
- Extension Set (as required)
- 2% Chlorhexidine in 70% Alcohol skin prep (or 70% Alcohol skin prep if not available).
- Disposable plastic apron
- 10ml Syringe & needle
- Sterile IV dressing
- Sharps bin
- Protective field/underlay
- Cannula (of appropriate size)
- 0.9% Sodium Chloride for injection

Recommended technique:

Before and **after** each patient contact or procedure, clean hands as appropriate with soap and water or alcohol gel.

1. Identify the patient.
2. Discuss the procedure with the patient and obtain informed consent.
3. Gather the equipment needed including a clean tray.
4. Prepare the patient as necessary.
5. Clean hands and put on gloves.
6. Prepare equipment as required e.g. draw up the flush, prime extension set.
7. Apply the tourniquet to the chosen limb.
8. Use other appropriate methods to encourage venous distension as required.
9. Select the most suitable vein.

10. Clean the area with 2% chlorhexidine gluconate in 70% isopropyl alcohol for 30 seconds and allow to dry. Do not then repalpate or touch the skin.
11. Remove the cannula from the packaging and inspect for any faults.
12. Stabilize the vein by applying manual traction on the skin.
13. Insert the cannula through the skin with bevel upwards, at an angle of 15 to 45 degrees according to the depth of the vein.
14. Observe for the first appearance of blood into the flashback chamber of the cannula.
15. Lower the angle of insertion and advance the cannula a further few millimetres into the vein.
16. Withdraw the needle slightly and observe for a second flashback of blood which will be seen along the shaft of the cannula.
17. Holding the needle in place, advance cannula off the needle into the vein.
18. Release the tourniquet and place gauze beneath the cannula end.
19. Apply digital pressure on the vein just above the cannula tip and support the cannula to prevent dislodgement.
20. Remove the needle completely and dispose of directly into a sharps container
21. Attach the cap, extension set or administration set to the cannula
22. Flush with 0.9%.sodium chloride
23. Observe the site for signs of swelling, leakage or discomfort.
24. Clean area as required
25. Apply an appropriate sterile IV dressing (this can be done prior to flushing if necessary).
26. Remove gloves and dispose of all used equipment safely and appropriately.
27. Clean hands.
28. Document the procedure within the patient's notes including cannula used, batch, size, site, flush, date inserted, date for removal and any complications (including number of attempts).

References:

- Dacre J, Kopelman P 2002 *Handbook of Clinical Skills*. Manson Publishing Ltd, London.
- Dougherty L, Lamb J (ed) 2008 *Intravenous Therapy in Nursing Practice* 2nd Edition. Blackwell Publishing, Oxford.
- Dougherty L, Lister S (ed) 2006 *The Royal Marsden Hospital Manual of Clinical Nursing Procedures* 6th Edition Blackwell Publishing, Oxford.
- Department of Health (DH) 2007 'Saving Lives': *High Impact Intervention No2: Peripheral intravenous cannula care bundle*. Crown Copyright, London. Available at: http://www.clean-safe-care.nhs.uk/toolfiles/16_SL_HII_2_v2.pdf. Last accessed 15 September 2008.
- Nicol M, Bavin C, Bedford-Turner S, Cronin P Rawlings-Anderson K 2004 *Essential Nursing Skills* 2nd Edition. Mosby, London.

Setting up an Infusion

Aim:

To prepare and set up an intravenous (IV) infusion to administer via gravity.

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for the procedure.
- Correctly identify the patient and obtain informed consent.
- Select and prepare the correct equipment.
- Demonstrate the ability to set up a gravity IV infusion according to a prescription.
- Calculate the correct rate for the prescribed gravity infusion.
- Demonstrate the ability to maintain infection control standards and safe practice throughout the procedure.
- Identify and complete the correct documentation required for setting up an infusion.

Equipment:

- Non-sterile gloves
- Drip stand
- Giving set
- 2% Chlorhexidine in 70% Alcohol wipe (or 70% Alcohol wipe if not available).
- Prescription chart
- Prescribed fluid bag
- Clean preparation tray
- Disposable plastic apron (as required)

Recommended technique:

Before and **after** each patient contact or procedure, clean hands as appropriate with soap and water or alcohol gel.

NOTE: Administration of medications should always be done under direct supervision and instruction from a suitably qualified colleague who will need to remain accountable for the procedure.

1. Identify the patient, ensuring this matches with the prescription chart.
2. Discuss the procedure with the patient and obtain informed consent.
3. Check the infusion site and date of insertion/removal for the venous access device.
4. Gather the required equipment including a clean tray.
5. Check the infusion fluid matches the prescription; check the expiry date and ensure the outer packaging is intact.
6. Check that the infusion fluid accompanied with the prescription chart with an appropriately qualified colleague.

7. Prepare the patient as necessary and inspect the venous access site. Check for other infusions in progress.
8. Clean hands and apply non-sterile gloves.
9. Remove the fluid bag from outer packaging and check for leakage, ensuring the solution is clear with no particles and recheck the expiry date.
10. Open and unwind the giving set, and close the roller clamp.
11. Rest the bag of fluid on a flat surface to prevent accidental puncturing of the side of the bag when inserting the spike.
12. Remove the protective cover from infusion bag port and remove the cover from the giving set spike, ensuring the now exposed key parts are not touched.
13. Push the spike of the giving set into the fluid bag, twisting as necessary until secure.
14. Invert the bag and hang on the stand
15. Squeeze and release the drip chamber of the giving set, and half fill with fluid (or to the designated fill line).
16. Partially open the roller clamp and prime the full length of the line with fluid, keeping the end cap on, then close the roller clamp.
17. Secure the end of the infusion line to the roller clamp for 'safe keeping'.
18. Prepare the venous access site.
19. If a needle free injection site is being used, clean with 2% chlorhexidine in 70% isopropyl alcohol wipe and allow to dry. If unavailable use a 70% Isopropyl alcohol wipe.
20. If connecting directly to a cannula, ensure sterile gauze is used underneath the cannula to prevent contamination and absorb blood leakage.
21. Flush the cannula as required with the necessary flush solution.
22. Remove the cap from the end of the giving set and connect to the venous access device.
23. Adjust the roller clamp to set the infusion to the prescribed rate - by calculating then timing the drops per minute required. Check this with a qualified colleague.
24. Secure the infusion line as required to prevent movement & mechanical phlebitis
25. Remove gloves and dispose of all used equipment safely and appropriately.
26. Clean hands.
27. Complete documentation for the procedure, including the prescription chart (along with a signature of the supervising qualified colleague) and fluid balance chart.

Formula used for Gravity Infusion Calculation

$$\frac{\text{Total Volume of Infusion Fluid}}{\text{Total Time of Infusion in Minutes}} \times \text{Drop Factor} = \text{Drops per Minute}$$

(see back of the administration set)
for drops per ml

References:

- Dacre J, Kopelman P 2002 *Handbook of Clinical Skills*. Manson Publishing Ltd, London.
- Dougherty L, Lamb J (ed) 2008 *Intravenous Therapy in Nursing Practice* 2nd Edition. Blackwell Publishing, Oxford.
- Dougherty L, Lister S (ed) 2006 *The Royal Marsden Hospital Manual of Clinical Nursing Procedures* 6th Edition Blackwell Publishing, Oxford.
- Department of Health (DH) 2007 'Saving Lives': *High Impact Intervention No2: Peripheral intravenous cannula care bundle*. Crown Copyright, London. Available at:
http://www.clean-safe-care.nhs.uk/toolfiles/16_SL_HII_2_v2.pdf.
Last accessed 15 September 2008.
- Jamieson E, Whyte L, McCall J (ed) 2007 *Clinical Nursing Practices* 5th Ed. Elsevier Science Lt, Philadelphia.
- Nicol M, Bavin C, Bedford-Turner S, Cronin P Rawlings-Anderson K 2004 *Essential Nursing Skills* 2nd Edition. Mosby, London.

Injections

Aim:

To administer an intramuscular (IM), subcutaneous (SC) or intradermal (ID) injection.

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for the procedure
- Correctly identify the patient and obtain informed consent.
- Select and prepare the correct equipment
- Identify appropriate sites for different types of injections.
- Demonstrate the ability to administer IM, SC and ID injections according to a prescription.
- Demonstrate the ability to maintain infection control standards and safe practice when performing
- Identify and complete the correct documentation required for administering injections.

Equipment:

- Non-sterile gloves
- Syringe of appropriate size
- Prescription Chart
- 70% isopropyl alcohol swab(s)
- Gauze
- Clean tray
- Needles of appropriate size
- Medication
- Sharps bin

Recommended technique:

Before and **after** each patient contact or procedure, clean hands as appropriate with soap and water or alcohol gel.

NOTE: Administration of medications should always be done under direct supervision and instruction from a suitably qualified colleague who will need to remain accountable for the procedure.

1. Identify the patient, ensuring this matches with the prescription chart.
2. Discuss the procedure with the patient and obtain informed consent.
3. Gather the required equipment, medications and any diluents necessary.
4. Cross-check the medication and any diluents accompanied with the prescription chart with an appropriately qualified colleague.

5. Clean hands and apply non-sterile gloves.
6. Prepare the injection maintain a non-touch technique. If drawing up from a glass ampoule or through a rubber bung, a smaller gauge needle is best used e.g. blue 22g. Rubber bungs must first be cleaned with a 70% isopropyl alcohol swab. Some drugs may require mixing – follow manufactures guidelines.
7. Ensure needle is covered and dispel air from the syringe (unless this is a prefilled syringe then follow the manufacturers instructions)
8. Place prepared medication into a clean tray along with any medication and diluent containers.
9. Remove gloves and clean hands.
10. Check the rights for administration (see box below).
11. Prepare the patient as necessary and expose the injection site appropriately.
12. Clean hands and apply non-sterile gloves
13. Choose the appropriate site for injection
14. Clean the injection site with a 70% isopropyl alcohol swab and allow to dry.
15. Administer the injection, following the guidelines for IM, SC and ID injection below.
16. Pause before withdrawing the needle to help preventing backtracking.
17. Quickly and smoothly withdraw the needle from the skin and discard directly into a sharps bin.
18. Press firmly on the site with the swab or gauze until bleeding stops as necessary. Do not massage the site.
19. Ensure patient comfort and dignity.
20. Complete documentation for the procedure i.e. the prescription chart.

Intramuscular Injection:

- a. Assess the muscle mass at the chosen site for injection.
- b. Choose an appropriate size needle; usually a 21 gauge (green) needle or 22 gauge (blue); 2.5-5cm in length, depending on the patient and site for injection.
- c. Stretch the skin slightly with non-dominant hand (if the patient has a low muscle mass, bunch up the muscle instead).
- d. Holding the syringe in your dominant hand between the thumb and forefinger (like a dart), insert the needle swiftly and firmly at a 90° angle, leaving approximately 1/3 of the needle showing.
- e. The z-track method may need to be used for some medications. Pull the skin downwards or to one side; inject; then withdraw while releasing the retracted skin at the same time.
- f. Injectable volumes will depend on the site chosen e.g. 1ml deltoid – 5ml vastus lateralis.
- g. Stabilise the needle and draw back on the syringe plunger slightly to ensure the needle has not inadvertently entered a blood vessel.
- h. Depress the syringe plunger slowly. A maximum rate of 1ml per 10seconds is recommended.

Subcutaneous Injection:

- a. A 25 gauge (orange) needle is usually used.
- b. Pinch up the skin into a fold using the thumb and first finger of non-dominant hand to elevate the subcutaneous tissue.
- c. Insert the needle at a 45° angle into the subcutaneous tissue. For a short needle (e.g. insulin needle) insert at 90°.
- d. Release the skin fold and inject the medication slowly. A maximum volume of 2mls should be injected.

Intradermal Injection:

- a. A 25 gauge (orange) needle is usually used.
- b. Stretch the skin taut with thumb and forefinger of free hand
- c. Insert the needle bevel up at 10°-15° angle just under the epidermis.
- d. A volume of 0.5mls or less is injected until a wheal appears on the skin surface.
- e. Observe for any inflammatory reaction.

Get it Right! Check...

Right **Patient**
Right **Drug**
Right **Dose**
Right **Route**
Right **Time & Date**

References:

- Dougherty L, Lister S (ed) 2006 *The Royal Marsden Hospital Manual of Clinical Nursing Procedures* 6th Edition Blackwell Publishing, Oxford.
- Jamieson E, Whyte L, McCall J (ed) 2007 *Clinical Nursing Practices* 5th Ed. Elsevier Science Lt, Philadelphia.
- Nicol M, Bavin C, Bedford-Turner S, Cronin P Rawlings-Anderson K 2004 *Essential Nursing Skills* 2nd Edition. Mosby, London.
- Vaccine Administration Taskforce 2001 *UK Guidance on Best Practice in Vaccine Administration* Shire Hall Communications, London. Available from: <http://www.library.nhs.uk/guidelinesfinder/ViewResource.aspx?resID=29840>
Last access 24 September 2008.
- Workman B 1999 Safe Injection Techniques. *Nursing Standard*. 13, 39, 47-53

Performing an ECG

Aim:

To obtain an electrocardiogram (ECG).

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for the procedure.
- Correctly identify the patient and obtain informed consent.
- Select and prepare the correct equipment including the ECG machine.
- Demonstrate the ability to prepare the patient and skin.
- Identify and demonstrate the correct positions for limb and chest leads.
- Demonstrate the ability to acquire an ECG recording.
- Identify technical qualities of an ECG recording.
- Demonstrate the ability to maintain infection control standards and safe practice when performing.
- Identify and complete the correct documentation required for an ECG recording.

Equipment:

- ECG Electrodes
- Gauze as required
- Clippers or shaver for hair removal as required.
- ECG machine with paper
- Blanket as required

Recommended technique:

Before and **after** each patient contact or procedure, clean hands as appropriate with soap and water or alcohol gel.

1. Identify the patient
2. Discuss the procedure with the patient and obtain informed consent.
3. Gather and prepare equipment including the ECG machine.
4. Prepare the patient e.g. maintain privacy, expose the patient's wrists, ankles and chest area; position comfortably ideally lying down or sitting if necessary; cover with blanket to maintain warmth.
5. Identify where the electrodes are to be placed and clean sites, wiping with gauze to ensure good contact with electrodes. Greasy skin may require 70% isopropyl alcohol. Excessive chest hair may require clipping/shaving.
6. Check the electrodes are in date and are still moist.

7. Apply the limb electrodes on the inner aspects of wrists and ankles
8. Apply the chest electrodes for V1-V6
9. V1 – 4th intercostal space to right of the sternal edge
10. V2 – 4th intercostal space to left of the sternal edge
11. V3 – halfway on a line joining V2 and V4
12. V4 – 5th intercostal space; mid-clavicular line
13. V5 – 5th intercostal space; anterior axillary line
14. V6 – 5th intercostal space; mid-axillary line
15. Position and connect the leads to the relevant electrodes as labelled or colour coded.
16. Check the machine is calibrated to a paper speed of 25mm/s and sensitivity is set to 10mm/milivolt. Enter the patient's details into the ECG machine if possible.
17. Ask the patient to lie still, relax and breathe normally.
18. Record the ECG
19. Check the recording and check/enter the patient's name, date of birth, time and date of the ECG, Hospital number if appropriate and any relevant symptoms e.g. chest pain or pain free.
20. Disconnect the leads from the patient.
21. Remove the electrodes and wipe away any electrode gel and instruct the patient as necessary.
22. Dispose of all used equipment safely and appropriately and ensure the ECG machine is cleaned, stocked and stored appropriately.
23. Document the procedure in the patient's notes and consult senior colleagues as required.

References:

- Dacre J, Kopelman P 2002 *Handbook of Clinical Skills*. Manson Publishing Ltd, London.
- Dougherty L, Lister S (ed) 2006 *The Royal Marsden Hospital Manual of Clinical Nursing Procedures* 6th Edition Blackwell Publishing, Oxford.
- Wolters Kluwer Health 2008 *ECG Interpretation Made Incredibly Easy*. 4th edition Lippincott Williams & Wilkins, Philadelphia.
- Hampton, J 2003 *The ECG Made Easy*. 6th Edition Churchill Livingstone, London
- Nicol M, Bavin C, Bedford-Turner S, Cronin P Rawlings-Anderson K 2004 *Essential Nursing Skills* 2nd Edition. Mosby, London.

Assessing a Chest X-Ray

Aim:

To use a systematic approach when viewing and assessing a chest X-Ray.

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for reporting on a chest X-Ray (CXR).
- Identify patient details and technical qualities of the X-Ray.
- Discuss the indications for requesting a CXR.
- Demonstrate the ability to use a systematic approach for reviewing and reporting a CXR
- Identify the normal anatomy of the chest as it is seen on the CXR
- Identify and complete documentation required for reporting a CXR.

Equipment:

- Chest X-Ray
- Adequate display field

Recommended technique:

Before and **after** each patient contact or procedure, clean hands as appropriate with soap and water or alcohol gel.

1. Identify and check the patient details on the X-Ray including name, date of birth, age, and gender and hospital number.
2. Identify the date and time the X-ray was taken.
3. Verify the **projection** defined by the direction of the x-ray beam in relation to the patient; and if the patient was erect e.g. anteroposterior (AP), posteroanterior (PA) or lateral.
4. Verify the **orientation** by identifying the left and right markers.
5. Verify the **rotation** by checking that the medial ends of the clavicles are equidistant from the spinous process
6. Assess the **penetration** of the film by looking at the lower part of the cardiac shadow. The thoracic vertebrae should be only just visible.
7. Assess the **degree of inspiration** to ensure it is sufficient. Check that the patient has taken an adequate inspiration. The anterior end of the 6th rib and posterior end of the 10th rib should be above the diaphragm
8. Inspect both **lung fields** starting at the apices and working down.
9. Assess for equal density
10. Identify the horizontal fissure and its position which should run from the right hilum to the 6th rib in the axillary line.

11. Assess the lung volumes
12. Look for any shadowing or opacities. Identify the pattern of shadowing and whether it is discrete or diffuse. Note other features such as cavitation or the presence of a well-demarcated border
13. Assess the lung markings. It is normal to have fewer markings peripherally, but they should be present. Identify any darker areas with loss of lung markings
14. Assess the pulmonary vasculature. The vessels of the upper lobe are normally smaller than those of the lower lobe vessels.
15. Inspect the **heart** for normal shape and size and assess the cardiothoracic ratio. The width of the cardiac shadow should be less than half the thoracic diameter.
16. Inspect the remaining **mediastinum** and assess the contours and diameter.
17. Inspect the **hilum** which should normally be rounded and appear concave laterally. The left hilum should be *slightly* higher than the right. Observe the size, shape, density, and any asymmetry
18. Inspect the **trachea** which should be central but slightly deviating to the right around the aortic knuckle.
19. Inspect the **diaphragm** which should be lower on the left side compared to the right; both with a smooth outline. Check for air under the diaphragm or abdominal pathology.
20. Check that the **costophrenic and cardiophrenic angles** are well defined
21. Inspect the **bony structures** and assess their integrity and density.
22. Inspect the **soft tissues** including breast shadows, commenting on any asymmetry or signs of surgical emphysema
23. Note any **foreign material** e.g. NG tube, central line, chest drain, metal heart valves.
24. Document a clear summary of your findings and report as appropriate.

References:

- Begg, JD 2005 *Accident and Emergency X-rays Made Easy*; Churchill Livingstone, London
- Bourke S 2003 *Lecture notes on Respiratory Medicine*. 6th edition. Blackwell Publishing, Oxford.
- Corne J, Carroll M, Brown I, Delany D 2002 *Chest X-ray Made Easy*. 2nd edition. Churchill Livingstone, London
- Douglas G, Nicol F, Robertson C (Ed) 2005 *Macleod's Clinical Examination* 11th Edition. Elsevier Ltd, London.
- Lisle, D 2007 *Imaging for students*. 3rd edition. Hodder Arnold, London

Assessing an Abdominal X-Ray

Aim:

To use a systematic approach when viewing and assessing an abdominal X-Ray.

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for reporting on an abdominal X-Ray (AXR).
- Identify patient details and technical qualities of the X-Ray.
- Discuss the indications for requesting an AXR.
- Demonstrate the ability to use a systematic approach for reviewing and reporting an AXR.
- Identify the normal anatomy and gas patterns of the abdomen as seen on the X-ray
- Identify and complete documentation required for reporting an abdominal X-Ray.

Equipment:

- Abdominal X-Ray
- Adequate display field

Recommended technique:

Before and **after** each patient contact or procedure, clean hands as appropriate with soap and water or alcohol gel.

1. Identify and check the patient details on the X-Ray including name, date of birth, age, and gender and hospital number.
2. Identify the date and time the X-ray was taken.
3. Ensure the whole abdomen is visible.
4. Verify the **projection** defined by the direction of the x-ray beam in relation to the patient e.g. anteroposterior (AP), posteroanterior (PA) or lateral decubitus; supine or erect.
5. Verify the **orientation** by identifying the left and right markers.
6. Assess the **penetration** of the film. You should be able to see the lumbar processes through the vertebral bodies.
7. Assess the **bowel gas patterns** observing for dilated loops of bowel.
8. The large bowel lies peripherally and normally has faecal content. It is also identifiable by the fewer segments it has and haustral folds that only go part way across the lumen.

9. The small bowel lies more centrally, has multiple segments, and has valvulae conniventes which appear as thin lines that extend right across the lumen.
10. Look for gas outside the lumen. This may present as free air under the diaphragm or contained within other structures such as the biliary tree or bowel wall. On a decubitus film look for free gas at the flank
11. Inspect for **fluid levels** which are seen as horizontal demarcations demonstrated on erect or decubitus films. Identify any distended loops of bowel with multiple fluid levels. A small level of fluid in the bowel is normal.
12. Inspect for evidence of non-bony **calcifications**.
13. Assess the **bony structures** e.g. vertebrae, pelvis, hip joints and lower ribs
14. Assess the **soft tissues**. Note discernable structures and any abnormalities e.g. distended bladder.
15. Inspect for **foreign bodies**, or evidence of surgical intervention.
16. Document a clear summary of your findings and report as appropriate.

References:

- Begg, J 2006 *Abdominal X-rays Made Easy*. 2nd edition; Churchill Livingstone, London
- Begg, J 2005 *Accident and Emergency X-rays Made Easy*; Churchill Livingstone, London
- Lisle, D 2007 *Imaging for students*. 3rd Edition; Hodder Arnold, London

Suturing

Aim:

To close an anaesthetised wound with simple interrupted sutures while maintaining a sterile technique.

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for suturing a wound
- Correctly identify the patient and obtain informed consent.
- Select and prepare the correct equipment.
- Prepare the patient before and after the procedure appropriately.
- Demonstrate understanding and use of a sterile field and technique.
- Demonstrate the ability to place interrupted sutures to close a wound.
- Demonstrate the ability to maintain the correct procedures for personal safety and sharp/waste disposal.
- Identify and complete the required documentation.

Equipment:

- Suture material
- Eye protection
- Dressing(s)
- Sterile gloves
- Dressing pack – galipot, gauze, sterile drape, plastic tray
- Suture instruments – needle holder, scissors, toothed forceps, dressing forceps.
- 0.9% Sodium Chloride
- Clean trolley
- Non sterile absorbent field

Recommended technique:

Before and **after** each patient contact or procedure clean hands as appropriate with soap and water or alcohol gel.

1. Identify the patient.
2. Discuss the procedure with the patient and obtain informed consent.
3. Clean the trolley and gather equipment.
4. Prepare the patient, lying the patient down whenever possible.
5. Prepare the wound area and check that the area has been sufficiently anaesthetised.
6. Clean hands.

7. Open dressing pack and empty out other required equipment onto the sterile field.
8. Open sterile gloves avoiding contamination of the sterile field.
9. Apply eye protection as necessary
10. Wash your hands, including wrists and distal third of forearms
11. Apply sterile gloves
12. Organise layout of items on sterile field.
13. Begin to clean tissues with normal saline; starting from the wound edges in an outwards motion away from the wound.
14. Apply a sterile paper drape with an appropriate window cut into it.
15. Map out where you plan to insert your sutures, noting the position of wound edges and skin folds.
16. Insert the first suture in the middle of the wound and then continue dividing into equal sections – approximately 5-10mm apart.
17. Grasp the needle two thirds of the way from the needle's point with the needle holder.
18. Holding the skin with toothed forceps, pierce the skin at a 90° angle not closer than 5mm from the wound edge, following the curvature line of the needle as it passes through the tissue, into the middle of the wound.
19. Remove the needle and remount it in the needle holder before taking a corresponding bite on the other side of the wound. Do not touch with fingers to avoid needle stick injury. Hold the needle with toothed forceps while repositioning it in the needle holder.
20. Pull the suture through until approximately 15cm remains.
21. Tie a surgical knot – ensuring that all knots end up on the same side.
22. Cut both ends of the suture to an appropriate length e.g. 5-10mm.
23. Clean the wound and apply gentle pressure to ensure bleeding ceases.
24. Take note of the number of sutures before applying a non-adherent dressing.
25. Instruct the patient appropriately, including precautions and aftercare.
26. Dispose of equipment safely and appropriately and remove gloves.
27. Clean hands.
28. Document the procedure in the patient notes including anaesthetic effect, suture material, number of sutures and follow up information given.

References:

- Dacre J, Kopelman P 2002 *Handbook of Clinical Skills*. Manson Publishing Ltd, London.
- Kneebone R, ApSimon D 2002 *Suture Tutor* Medical Skills Ltd, Bristol
- Moulton C, Yates D 2006 *Emergency Medicine* 3rd Edition. Blackwell Science Ltd, Oxford
- Wardrope J, Edhouse J 1999 *The Management Of Wounds And Burns*. Oxford University Press, Oxford.
- Sanders S, Dawson J, Datta S, Eccles S 2005 *Oxford Handbook for the Foundation Programme*. Oxford University Press, Oxford.

Ophthalmoscopy

Aim:

To perform a direct ophthalmoscopic examination.

Outcomes:

By the end of year 3 the student is expected to be able to:

- Demonstrate appropriate communication skills for the procedure
- Correctly identify the patient and obtain informed consent.
- Select and prepare the equipment required for ophthalmoscopy.
- Demonstrate correct technique in handling the ophthalmoscope and performing ophthalmoscopy.
- Identify normal reflex and structures within the eye.
- Complete the appropriate documentation required.

Equipment:

- Ophthalmoscope

Recommended technique:

Before and **after** each patient contact clean hands as appropriate with soap and water or alcohol gel.

1. Identify the patient.
2. Discuss the procedure with the patient and obtain informed consent.
3. Warn the patient that you will need to come quite close and will also need to turn the lights off.
4. Check that the light of the ophthalmoscope is working
5. Select the correct beam – this is usually the large round white beam
6. Ensure that the room is darkened by dimming the lights and allow the patient's eyes to adjust. (A mydriatic agent e.g. 1% tropicamide is sometimes used in clinical practice to dilate the pupils after examining the pupils and iris)
7. Remove your spectacles and ask the patient to remove theirs. You will need to make corrections for refractive errors in both your own and the patient's eyes when trying to visualise structures – see notes at end
 - *lenses (usually red numbers- dial anticlockwise from zero) correct myopia*
 - + *lenses (usually black numbers- dial clockwise from zero) correct hypermetropia*
8. Ask the patient to focus on a distant object.
9. Hold the ophthalmoscope in your right hand to examine the patient's right eye; and look through it with *your* right eye.

10. Start by putting a +3 lens on the ophthalmoscope, which turns it into a magnifying glass. Looking through the scope at the patients eye, move slowly forwards, allowing you to inspect the conjunctiva and cornea, the iris and the lens and the chambers in between, as each comes into focus.
11. Turn the lenses back to zero, or whatever you have corrected for in step 6, stand arms length from the patient and compare the red reflexes between the two eyes. Opacities will appear dark
12. Bring the light in nasally, i.e. you are slightly on the temporal side of the patient. This will prevent any troublesome reflections due to an undilated pupil and will help to localise the disc more easily.
13. Slowly move towards the patient and bring the ophthalmoscope close to the patient's eye (2-3cm). Rest your free hand on the patients forehead which allows you to approach as close as possible without bumping heads
14. When the retina comes into view you may need to adjust the lenses to bring the vessels into focus.
15. Identify a vessel and follow its course towards the optic disc. Vessels usually merge into a single vessel to form a 'V' shape. The *tip* of this 'V' points in the direction of the optic disc.
16. Identify the optic disc and note its size, margin and colour. The normal disc is pale pink/yellow with a paler central physiological cup and well defined margins
 - a. Examine the four quadrants of the retina by following the superior and inferior nasal and temporal arteries and veins, radiating away from the optic disc to the periphery. Examine systematically in a clockwise/anticlockwise manner. Note the width and colour of the vessels and appearance at arteriovenous crossings
 - b. Note any haemorrhages and exudates
17. Ask the patient to look directly at the light to examine the macula, which is a slightly darker area temporal to the optic disc. This is difficult in an undilated eye because of reflex constriction of the iris.
18. Repeat the process to examine the patient's left eye. Use your left eye and hold the ophthalmoscope in your left hand
19. Clean hands
20. Summarise and document your findings offering a differential diagnosis, as appropriate.

Notes:

Adjusting the ophthalmoscope to your own eyesight:

- If you wear glasses, you will need to adjust the ophthalmoscope to match your own lens prescription. So if you are short sighted with a prescription of -3, set up -3 on the ophthalmoscope, which will be your "zero point". To adjust the ophthalmoscope to +3 to use it as a magnifier, you will move the dial from -3 to zero. If you are a contact lens wearer, you'll normally look through your contact lenses and make no special adjustment.

Adjusting the ophthalmoscope to the patients' eyesight:

- If the patient is a glasses wearer, you will need to adjust the scope to match their prescription. You can get a rough idea by looking through the patients' glasses to see if they are negative or positive and get a rough idea of the strength. Dial up your best guess lens on the scope and try to visualize the fundus. With larger refractive errors this can be difficult. If you cannot see the fundus any other way, get the patient to put their glasses back on and examine the eye through them. This will give a good view of the central part of the fundus but a limited view of the peripheries. Nevertheless, this is better than failing to view the fundus at all.

References:

- Bickle I, Hamilton P, Kelly B, McCluskey D 2005 *Clinical Skills for Medical Students*. 2nd Edition. Pastest Ltd, Cheshire.
- Douglas G, Nicol F, Robertson C (Ed) 2005 *Macleod's Clinical Examination* 11th Edition. Churchill Livingstone Elsevier, Philadelphia.
- Ford MJ, Munro JF (2002) *Introduction to Clinical Examination*. 7th Ed; Churchill Livingstone, London
- Monaghan T, Thomas J 2007 *Oxford handbook of examination and practical skills*; Oxford University Press, Oxford

Otoscopy

Aim:

To safely and effectively perform otoscopy.

Outcomes:

By the end of year 3 the student is expected to be able to:

- Demonstrate appropriate communication skills for the procedure
- Correctly identify the patient and obtain informed consent.
- Select and prepare the equipment required for otoscopy.
- Demonstrate correct technique in handling the otoscope and performing otoscopy.
- Identify normal reflex and structures within the eye.
- Demonstrate the ability to maintain infection control standards and safe practice throughout the procedure.
- Complete the appropriate documentation required.

Equipment:

- Otoscope (auroscope)
- Speculum of various sizes

Recommended technique:

Before and **after** each patient contact or procedure clean hands as appropriate with soap and water or alcohol gel.

1. Identify the patient.
2. Discuss the procedure and obtain informed consent.
3. Check that the light of the otoscope is working.
4. Look at the pinna. Observe the size and shape. Identify any deformities or obvious discharge.
5. Look behind the ears, noting any scars or skin changes.
6. Check for tenderness of the tragus.
7. Attach a clean speculum of appropriate size to the otoscope (largest feasible).
8. Examine the 'good' ear first.
9. Hold the otoscope like a pencil. Hold in your right hand to examine the right ear. Hold in your left hand to examine the left ear.
10. Gently pull the pinna up and backwards (adults) to help straighten the ear canal - providing you with a better view and facilitating the insertion of the speculum. Note any pain or discomfort. (A different technique is used for paediatrics).

11. Insert the tip of the speculum into the external ear canal under direct vision. Steady the instrument by using your little finger as a brace against the patient's cheek.
12. Looking through the viewing window, slowly advance the otoscope.
13. Inspect the external auditory canal, noting any wax or foreign bodies.
14. Look at the walls of the external canal and observe for reddening, oedema or discharge.
15. Examine the tympanic membrane. Identify the pars tensa, pars flaccida, the handle and lateral process of the malleus, and the cone of light (light reflex).
16. Note the colour and translucency of the tympanic membrane and identify any bulging, retraction, or signs of perforation. The normal tympanic membrane is in a neutral position, slightly concave and a translucent pinkish-grey colour with a light reflex.
17. Change the speculum and repeat the process on the patient's left ear.
18. Clean hands
19. Summarise and document your findings offering a differential diagnosis, as appropriate.

References:

- Bickle I, Hamilton P, Kelly B, McCluskey D 2005 *Clinical Skills for Medical Students*. 2nd Ed. Pastest Ltd, Cheshire.
- Douglas G, Nicol F, Robertson C (Ed) 2005 *Macleod's Clinical Examination* 11th Edition. Churchill Livingstone Elsevier, Philadelphia.
- Epstein O, Perkin G, Cookson J, Watt I, Rakhit R, Robins A Hornett G 2008 *Clinical Examination*. 4th Edition. Elsevier's Health Sciences, Philadelphia.
- Monaghan T, Thomas J 2007 *Oxford handbook of examination and practical skills*; Oxford University Press, Oxford

Male Urinary Catheterisation

Aim:

To insert a urinary catheter and secure a catheter drainage device in place.

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for the procedure
- Correctly identify the patient and obtain informed consent.
- Select and prepare the correct equipment
- Prepare the patient before and after the procedure appropriately.
- Demonstrate the ability to perform male urinary catheterisation
- Demonstrate the ability to maintain infection control standards and safe practice when performing urinary catheterisation.
- Complete the appropriate documentation required.

Equipment:

- Procedure Trolley
- Disposal plastic apron
- Sachet of sterile sodium chloride
- Sterile anaesthetic lubricating gel
- Catheter drainage device
- Waterproof protection sheet
- Appropriate type, size & length of urinary catheter
- Sterile catheterisation pack – e.g. gauze, cotton wool, galipot, drape (fenestrated), receiver dish
- Sterile gloves x2
- Sterile Water
- 10ml syringe & needle
- Clinical waste bag
- Catheter stand
- Fixation device or tape

Recommended technique: *note there are a number of different techniques used for catheterisation. It is most important that you maintain a sterile procedure.*

Before and **after** each patient contact or procedure clean hands as appropriate with soap and water or alcohol gel.

1. Establish the definite need for urinary catheterisation.
2. Identify the patient.
3. Discuss the procedure with the patient and obtain informed consent.
4. Arrange a chaperone as required.
5. Clean trolley & gather equipment.

6. Prepare the patient, laying them down supine with legs extended. Avoid exposing the patient at this stage to maintain dignity.
7. Clean hands and put on a disposable plastic apron.
8. Open dressing pack and empty out other required equipment onto the sterile field using an aseptic technique.
9. Remove patients' cover and place a disposable waterproof protection sheet under the patients' buttocks.
10. Clean hands
11. Apply sterile gloves
12. Organise layout and prepare items on sterile field
13. Place sterile towel across the patient's thighs surrounding the penis
14. Wrap a sterile gauze swab around the penis.
15. Retract the foreskin if present.
16. Clean the glans penis with 0.9% sodium chloride, working away from the meatus.
17. Insert the nozzle of the lubricating anaesthetic gel into the urethra and squeeze gel slowly in. Wait the recommended time for it to take effect.
18. Apply gentle pressure to prevent the gel from escaping.
19. Remove gloves and clean hands.
20. Apply the second pair of sterile gloves.
21. With sterile gauze grasp the penis behind the glans, raising it until almost totally extended. Maintain grasp until procedure is completed.
22. Place the receiver between the patient's legs.
23. Insert the catheter for 15-25cm until urine flows.
 - If resistance is felt at the external sphincter, increase the traction on the penis slightly and apply steady, gentle pressure on the catheter. Ask the patient to strain gently as if passing urine.
24. Advance the catheter almost to its bifurcation.
25. Gently inflate the balloon with the required amount of sterile water, observing patient throughout.
26. Withdraw the catheter slightly.
27. Connect the catheter to a sterile closed urinary drainage system.
28. Position the drainage system below the level of the bladder using a urinary stand as appropriate.
29. Support the catheter using a fixation device or tape as required.
30. Ensure the glans penis is clean and then reposition the foreskin to avoid paraphimosis.
31. Ensure that the patient is comfortable and dignified, and the area is dry.
32. Measure the amount of urine in the receiver as required.
33. Remove gloves and dispose of equipment safely and appropriately
34. Wash hands
35. Document the procedure appropriately. The sticky label from the catheter packaging should be included in the patients' notes if available.

References:

- Addison R 2008 *Catheter Care – RCN Guidance for Nurses*. Royal College of Nursing, London.
- Department of Health (DH) 2007 'Saving Lives': *High Impact Intervention No 6: Urinary catheter care bundle*. Crown Copyright, London. Available at: http://www.clean-safe-care.nhs.uk/toolfiles/16_SL_HII_2_v2.pdf. Last accessed 15 September 2008.
- Dougherty L, Lister S (ed) 2006 *The Royal Marsden Hospital Manual of Clinical Nursing Procedures* 6th Edition Blackwell Publishing, Oxford.
- Mangnall J, Watterson L 2006 Principles of aseptic technique in urinary catheterisation. *Nursing Standard*. 21, 8, 49-56.
- Pratt R, Pellowe C, Wilson J, Loveday H, Harper P, Jones S, McDougall C, Wilcox M 2007. epic 2: National Evidence-based Guidelines for Preventing Healthcare-associated Infections in NHS Hospitals in England. *Journal of Hospital Infection* 655, S1-S64
- RCN 2008 *Catheter Care RCN Guidance for Nurses*. Royal College of Nursing, London. Available at: http://www.rcn.org.uk/data/assets/pdf_file/0018/157410/003237.pdf last accessed 20 October 2009
- Richardson R 2008 *Clinical Skills for Student Nurses*. Reflect Press Ltd, Exeter.

Breast Examination

Aim:

To perform a breast examination.

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for the procedure
- Correctly identify the patient and obtain informed consent
- Prepare the patient before and after the procedure appropriately
- Demonstrate the ability to perform a breast examination
- Demonstrate the ability to maintain infection control standards and safe practice when performing a breast examination.
- Identify and describe normal and abnormal findings.
- Complete the appropriate documentation required

Equipment:

- Nil noted

Recommended technique:

Before and **after** each patient contact or procedure clean hands as appropriate with soap and water or alcohol gel.

1. Identify the patient
2. Discuss the procedure with the patient and obtain informed consent.
3. Arrange a chaperone as required.
4. Instruct the patient to undress to the waist (assisting if necessary) and rest hands at their side.
5. Ask the patient to identify any areas of tenderness or abnormality.
6. With the patient sitting upright note the size, symmetry and contour of the breasts and look for local swelling or changes in the skin or nipples.
7. Ask the patient to press firmly on hips to contract the pectoral muscles and repeat the inspection.
8. Inspect the patients' breasts as you ask them to raise their arms above their head, stretching out the pectoral muscles skin covering the breast; and then asking them to lean forward so that the breasts become pendulous.

9. Ask the patient to lie down with head supported on one pillow and put their hands under their head.
10. Palpate and examine the breast systematically e.g. clock face, concentric circles or quadrants, including deep to the nipple.
11. Examine the breast tissue from the clavicle to the upper abdomen and the midline to the posterior axillary fold.
12. Examine the axillary tail between your finger and thumb as it extends towards the axilla.
13. Palpate the nipple by gently holding between you index finger and thumb observing for any discharge (alternatively the patient may be asked do this).
14. Palpate the regional lymph nodes
15. Palpate the axillae with the patient lying or sitting with arm extended and supported.
16. Examine the supraclavicular fossa first looking for any visual abnormality and then palpate the neck from behind and systematically review all cervical lymphatic chains.
17. Define the characteristics of any lumps including position, size, shape, consistency, tenderness, temperature mobility and fixation to underlying tissues or skin.
18. Ensure that the patient is comfortable and dignified, helping them to dress as needed.
19. Clean hands
20. Document the procedure and findings in the patient notes.

References:

- Dacre J, Kopelman P 2002 Handbook of Clinical Skills. Manson Publishing Ltd, London.
- Douglas G, Nicol F, Robertson C (Ed) 2005 *Macleod's Clinical Examination* 11th Ed. Churchill Livingstone Elsevier, Philadelphia.
- Epstein O, Perkin G Cookson, J Watt, I Rakhit R, Robins A, Hornett G 2008 *Clinical Examination* 4th Ed. Mosby Elsevier, Philadelphia
- Monaghan T, Thomas J 2007 *Oxford handbook of examination and practical skills*; Oxford University Press, Oxford

Digital rectal examination (DRE)

Aim: To perform a digital rectal examination

Outcomes:

By the end of year 3, the student should be able to:

- Demonstrate appropriate communication skills for the procedure
- Correctly identify the patient and obtain informed consent.
- Select and prepare the correct equipment.
- Prepare the patient before and after the procedure appropriately.
- Demonstrate the ability to perform a DRE
- Demonstrate the ability to maintain infection control standards and safe practice when performing a DRE.
- Identify and describe normal and abnormal findings.
- Complete the appropriate documentation required.

Equipment:

- Non-sterile gloves
- Disposable plastic apron
- Illumination/light source
- Gauze/tissues
- Water soluble lubricating jelly

Recommended technique:

Before and **after** each patient contact or procedure clean hands as appropriate with soap and water or alcohol gel.

1. Identify the patient.
2. Discuss the procedure with the patient and obtain informed consent.
3. Arrange a chaperone and gather & prepare equipment.
4. Prepare the patient, lying the patient down in a left lateral position with knees drawn up towards the chest and buttocks near the edge of the bed; maintaining privacy & dignity as much as possible.
5. Clean hands and put on gloves.
6. Separate the buttocks to expose the natal cleft and inspect the anus.
7. Lubricate the index finger with a water based gel.
8. Place finger at the opening of the anus for approximately 5 seconds allowing the sphincter to relax.
9. Advance finger into anal canal and then the rectum following the sacral curve.
10. Ask the patient to bear down and assess for anal tone.
11. Advance your whole finger and systematically sweep round the rectum. The anterior and anterolateral walls of the rectum may be assessed more easily by sinking down onto one knee and pronating your wrist.

12. Identify the prostate gland. Assess size, symmetry, consistency, nodularity, tenderness and whether you can feel the midline sulcus. In a female patient identify the uterine cervix.
13. Remove your finger gently and examine the glove for traces of stool, mucus or blood.
14. Wipe away any gel from the anus and perineum.
15. Ensure that the patient is comfortable and dignified, helping them to dress as needed.
16. Remove gloves and dispose of equipment safely and appropriately.
17. Wash hands
18. Document the procedure and findings in the patient notes.

References:

- Akunjee N, Akunjee M 2007 *The easy guide to OSCEs for final year medical students*. Radcliffe Publishing, Oxon.
- Douglas G, Nicol F, Robertson C (Ed) 2005 *Macleod's Clinical Examination* 11th Ed. Churchill Livingstone Elsevier, Philadelphia.
- Epstein O, Perkin G Cookson, J Watt, I Rakhit R, Robins A, Hornett G 2008 *Clinical Examination* 4th Ed. Mosby Elsevier, Philadelphia