

# **CDHB CLINICAL SKILLS UNIT**

## **HEART AND LUNG AUSCULTATION**

## **Contents:**

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### **ACKNOWLEDGEMENTS**

This pack has been produced in consultation with

- CDHB Consultant Physician
- CDHB Respiratory Nurse specialist

## **AUSCULTATION**

### **Learning objectives**

Completion of this package will encourage learners to:

- Communicate with patients in a way, which reduces anxiety, provides necessary information, earns their trust and ensures safe practice.
- 1. Describe the relevant anatomy of the heart and lungs and related structures in relation to auscultation.
- 2. Competently perform a thorough and appropriate examination on a teaching model or peer and correctly identify sounds on the Smartscope model.
- 3. Document findings accurately in a structured systematic way, which communicates effectively and meets quality standards.

### **Before learning this skill, it is expected that learners will;**

- Have up to date knowledge of related anatomy and physiology
- Be aware of cultural sensitivities relating to this procedure (see associated “Maori Healthcare, Clinical Skills Information” document)
- Have read through the whole package before starting
- Identify own learning needs relating to this procedure

### **This pack can be used for:**

- Practical group teaching session using simulation models and / or training video
- Individual self-directed learning session, with / without peer support using simulation models and / or training video

### **Using this pack is intended to help learners to:**

- Meet stated objectives
- Meet some / all own learning needs
- Feel prepared for any formative / summative assessment

### **It is recommended that learners:**

- Complete self evaluation form (in this pack) and amend on-going professional development action plan – useful for professional portfolio
- Complete user feedback sheet (in this pack) to contribute to the on-going improvement of Clinical Skills Unit facilities.

## TUTORIAL OUTLINE

The following guidance is offered in an attempt to improve your technique when required to examine a patient's heart and/or lungs.

If you are new to this skill, you are encouraged to study the written guidance and practice the skill in the safety of the unit, as frequently as you feel necessary before being assessed and ultimately taking responsibility for performing this procedure with patients.

Alternatively, even if you have experience, the opportunity to revise your knowledge and practice the skill in a safe environment will improve your technique, thus increasing your confidence and competence.

**Your patients will be thankful that you spent time with this activity.**

This procedure is performed to assess the Respiratory and Cardiac sounds of the patient and to note any deviations from normal, so that appropriate referrals and recommendations can be made for the client.

To perform this task in a sensitive and well-organised way, you need to apply your of

- ✓ anatomy and physiology (Appendix 1 )
- ✓ good communication including common courtesy
- ✓ appropriate cultural considerations

Having considered the issues raised in the associated document "Maori healthcare, Clinical Skills Information Pack", think about how you may:

- Involve the family/whanau in care of the patient
- Reinforce the holistic care perspectives, including the 4 components of well being described in the associated document, in your practice and make this explicit to the patient
- Show through words and actions that you understand Maori concepts of health and wellbeing.

## AUSCULTATION

### PREPARE

#### a) ENVIRONMENT

Ensure the room is warm and quiet, that privacy can be maintained during examination and that you will not be interrupted.

#### b) SELF

Ensure that you incorporate appropriate greeting processes, such as getting up from your seat and interacting personally and warmly with the person coming to see you, and their *whanau*/supporters who may be present, looking for cues about whom the *whanau* identify as their spokesperson. A Māori person may not immediately reveal their name or their situation, without the preliminary formalities having been appropriately completed.

Time needs to be allowed for issues to be set out and explained, talked through sufficiently for a clear decision pathway to emerge. Be aware that silence does not equal assent – and may be more likely to indicate that further debate is required.

Think through the whole procedure and consider the potential problems you might encounter (Appendix 2)

Wash your hands carefully in warm water.

#### c) PATIENT


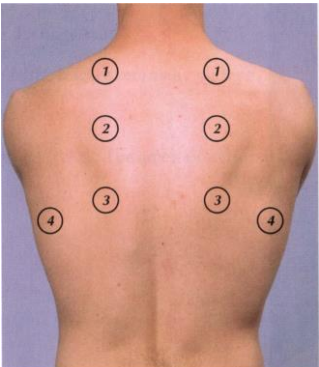
Introduce yourself and confirm the client's identity.

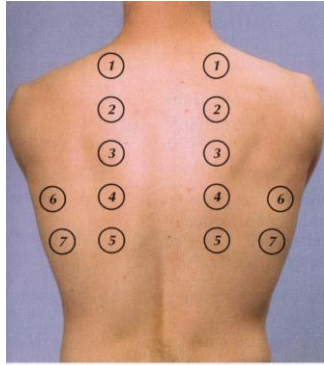
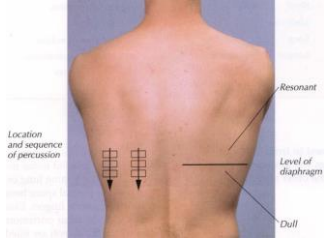
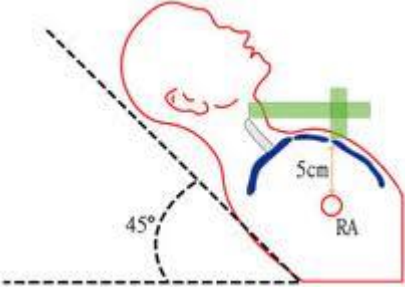
Explain and discuss the procedure, to both reduce patient anxiety and embarrassment, and to ensure understanding, so that consent which is given, is well informed.

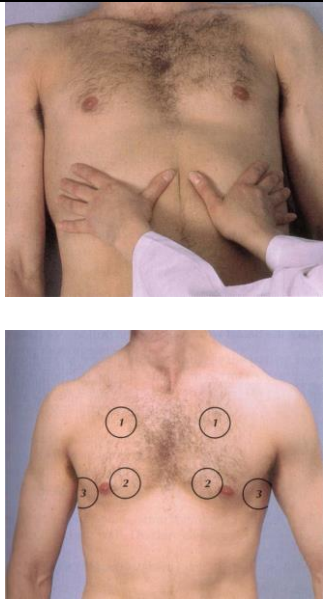
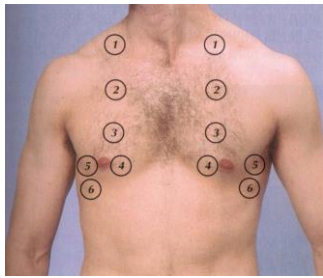
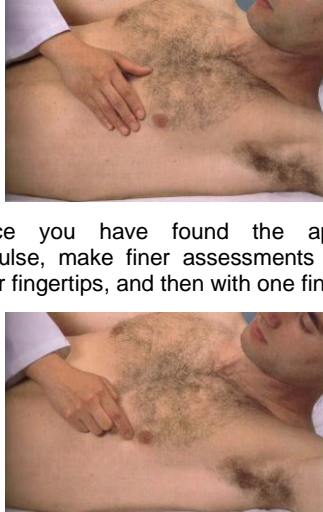
Ask if the client wishes for a chaperone / whanau / support person to be present

All upper clothing should be lifted clear of the area to be examined. Be alert to the possibility of "*whakamā*" being exhibited ie. When Māori are embarrassed, shy, feeling powerless, frustrated, under scrutiny or at a disadvantage, they may express unhappiness, and this will require time and sensitivity to discover what is creating the unhappiness. Note the potential influence of "cultural inhibitions on modesty and what is or isn't proper exposure is ingrained into most Maori girls at an early age." (Cartwright 1988:115). This may be equally difficult for non-Maori women during examination of the chest.

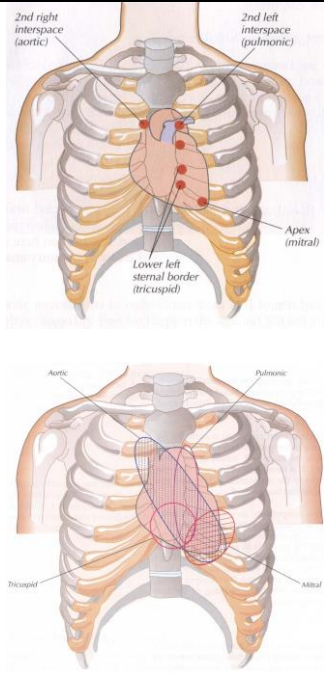


**AUSCULTATION  
PROCEED**

Step	Action (Rationale in italics)	PHOTO
1.	Observe for general signs of heart or respiratory disease (see Appendix 2).	
2.	Ask the patient to lower the gown. <i>Indicating patient in control of exposure</i>	
3.	<b>INSPECT</b> the chest for asymmetry, deformity, injury, scars, skin colour, lifts/heaves or pulsations, and increased or decreased antero-posterior chest diameter, or use of accessory muscles.	
4.	Observe rate, rhythm, depth and effort of breathing, noting if expiratory phase is prolonged or any bulges or retractions present. Record findings.	
5.	<b>PALPATE</b> the ribs and sternum noting any tenderness, muscle spasm, surgical emphysema. <i>Helps to distinguish traumatic chest pain from lung or cardiac pain.</i>	
6.	Confirm that the trachea is near the midline. <i>Unilateral change in pressure in the chest may result in displacement of the trachea.</i>	
7.	Assess chest expansion and symmetry by placing hands on patient's back at the level of and parallel to 10 <sup>th</sup> ribs, with thumbs sliding together at the midline to raise loose skin folds and ask client to breathe deeply. <i>Note any lag / asymmetry/ pain /amount of movement and elasticity of chest wall.</i>	
8.	Check for tactile fremitus by asking patient to say "99" with either the "ball" or ulnar surface of one hand against the posterior chest in the pattern shown	 <p style="text-align: center; font-size: small;">LOCATIONS FOR FEELING FREMITUS</p>

<p><b>9.</b></p>	<p>Asking the patient to cross arms across front of chest, <b>PERCUSS</b> the intercostal spaces on posterior chest in the pattern shown. Note the symmetry, location and quality of percussion note and locate diaphragmatic dullness on both sides.</p>	 <p>LOCATIONS FOR PERCUSSION AND AUSCULTATION</p>
<p><b>10.</b></p>	<p>Estimate diaphragmatic excursion by comparing the level of dullness on full expiration and full inspiration – normally a distance of about 5-6cm.</p>	
<p><b>11.</b></p>	<p><b>AUSCULTATE</b> the posterior chest, with the stethoscope diaphragm, asking the patient to breathe deeply through open mouth to identify breath sounds (Appendix 3). Follow the same pattern as for percussion, listening through at least one full breath at each location. <i>Note quality of sounds and location and timing in cycle of breathing or any adventitious (additional) sounds</i></p>	
<p><b>12.</b></p>	<p>Assess Jugular Venous Pressure Position patient at 45 degree angle with head supported by pillows to allow for a natural zero point from which to measure the vertical height. To distinguish from arterial pulsation observe that JVP:</p> <ul style="list-style-type: none"> <li>• Is visible but not palpable and as a more pronounced inward movement</li> <li>• it is usually seen to flutter twice with every cardiac cycle ( in normal sinus rhythm)</li> <li>• when applying light pressure to the base of the neck it will disappear and return from the top</li> </ul> <p>(Appendix 4)</p>	
<p><b>13.</b></p>	<p>Moving to anterior chest, <b>INSPECT, PALPATE</b> as before, assessing expansion and fremitus as shown</p>	

		
<p><b>14.</b></p>	<p><b>PERCUSS</b> the anterior and lateral chest in pattern as shown, noting any abnormal notes  <i>Expect dullness over heart at 3<sup>rd</sup> to 5<sup>th</sup> interspace on left.</i></p>	
<p><b>15.</b></p>	<p><b>AUSCULTATE</b> using same pattern, noting intensity of sounds and variation from normal.</p>	
<p><b>16.</b></p>	<p>If indicated, listen for transmitted voice sounds as before.</p>	
<p><b>17.</b></p>	<p>Position patient supine with head slightly elevated and examining from the right – <b>INSPECT</b> and <b>PALPATE</b> for apical impulse.  <i>Normally located in 4<sup>th</sup> or 5<sup>th</sup> intercostal space, medial to midclavicular line. If location is difficult ask patient to exhale and hold breath. Note location, diameter, amplitude and duration. (Appendix 6)</i>  <i>Positioning patient on the left side increases the intensity of the apical beat.</i></p>	 <p>Once you have found the apical impulse, make finer assessments with your fingertips, and then with one finger.</p>
<p><b>18.</b></p>	<p><b>AUSCULTATE</b> with the diaphragm of</p>	



	<p>stethoscope at right 2<sup>nd</sup> interspace at the sternal border (aortic area), left 2<sup>nd</sup> interspace (pulmonic area), then left 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> interspaces (tricuspid area) and at the apex 5<sup>th</sup> interspace at midclavicular line (mitral area)</p> <p><i>Intensity, rhythm and splitting of sound on each event of the cardiac cycle should be noted (Appendix 6)</i></p>	
<p><b>18</b></p>	<p>Positioning patient over onto left side, <b>AUSCULTATE</b> with the bell of stethoscope at apex (mitral area). <i>Low pitched sounds of S3 and S4 and murmur of mitral stenosis are heard more easily.</i></p>	
<p><b>19</b></p>	<p>Asking patient to sit up, lean forward and hold breath in exhalation, listen with diaphragm of stethoscope along left sternal border and at apex, pausing periodically for patient to breathe. <i>Accentuates aortic murmurs. Pericardial friction rub may be heard.</i></p>	
<p><b>20</b></p>	<p>Ask the patient to hold their breath, <b>AUSCULTATE</b> for bruits using the bell of the stethoscope over the carotid arteries in turn. <i>Indicates arterial narrowing.</i></p>	

## AUSCULTATION FINISH

### a) PATIENT

Check with the patient that they are comfortable and understand the outcome of the examination and any necessary follow-up and/or self care advice

**b) DOCUMENTATION**

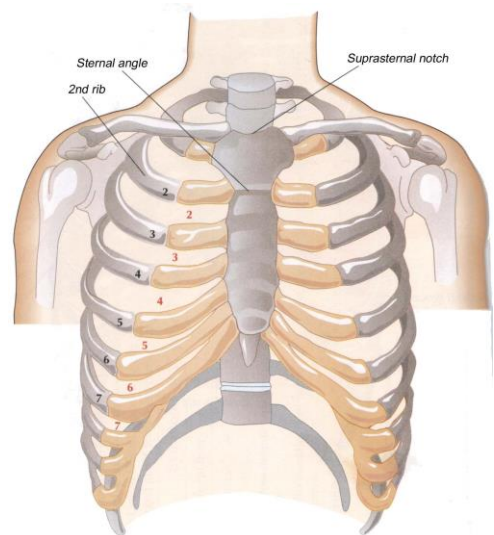
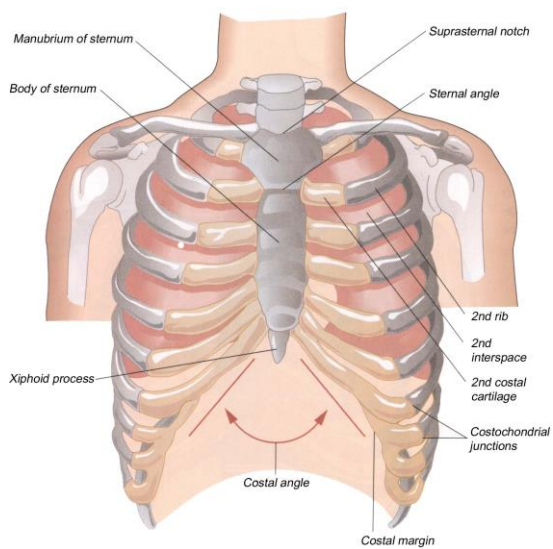
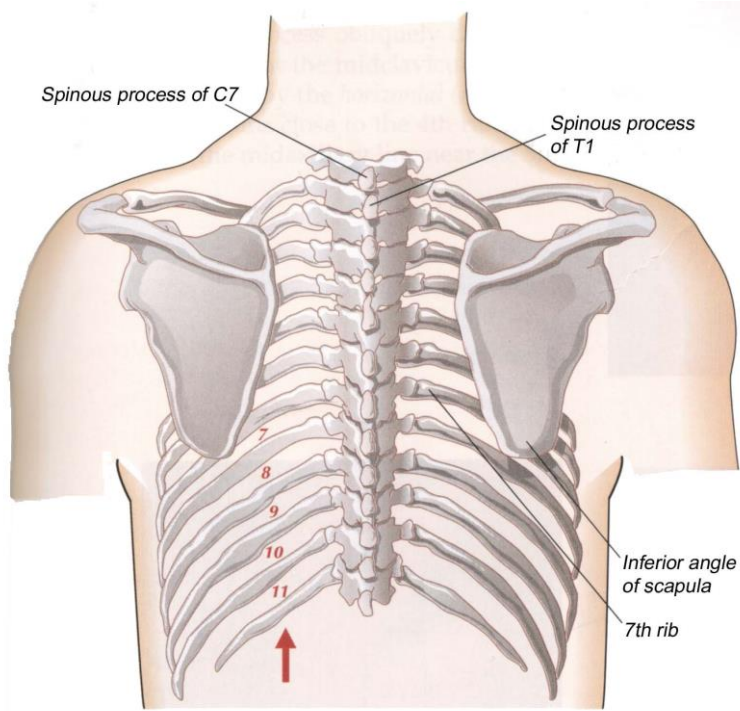
Murmurs should be described in terms of timing, shape, location of maximal intensity, radiation or transmission from this location, intensity, pitch and quality. (Appendix 8)

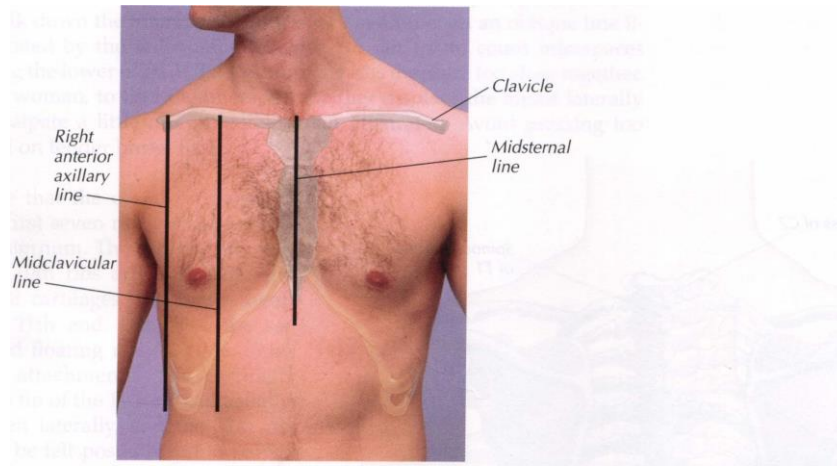
**c) SELF**

Wash your hands

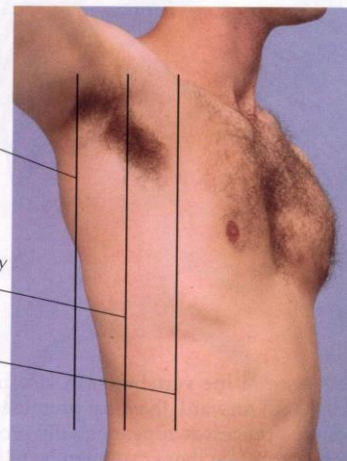
Think about what you learned from the procedure on this occasion

# ANATOMY AND PHYSIOLOGY

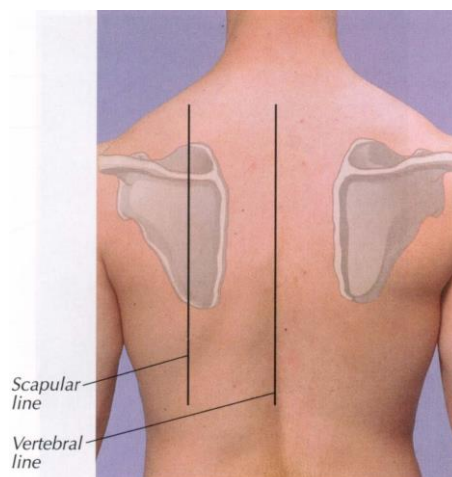




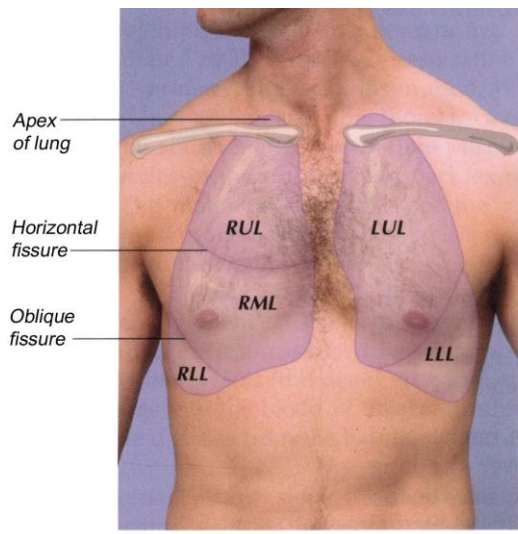
ANTERIOR VIEW



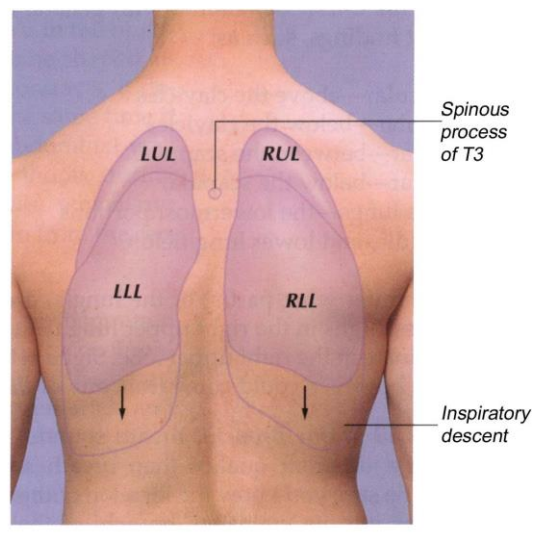
RIGHT ANTERIOR OBLIQUE VIEW



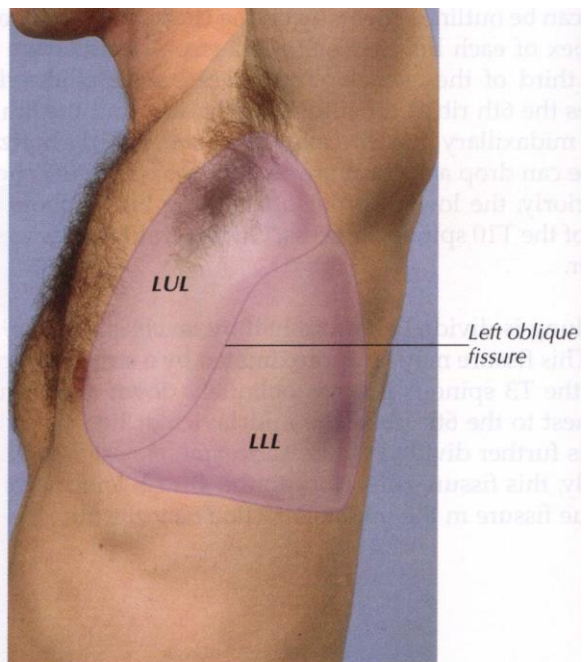
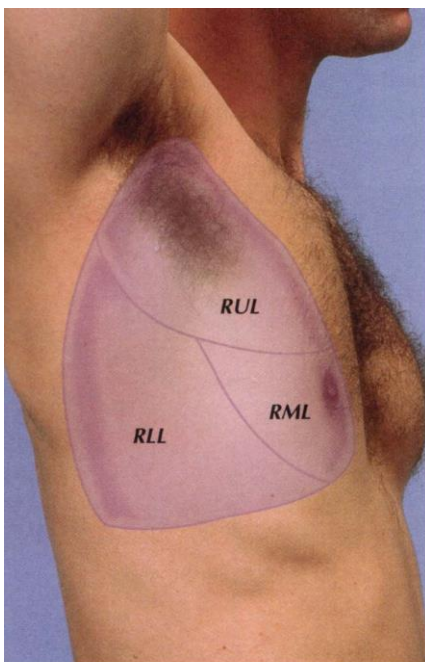
POSTERIOR VIEW



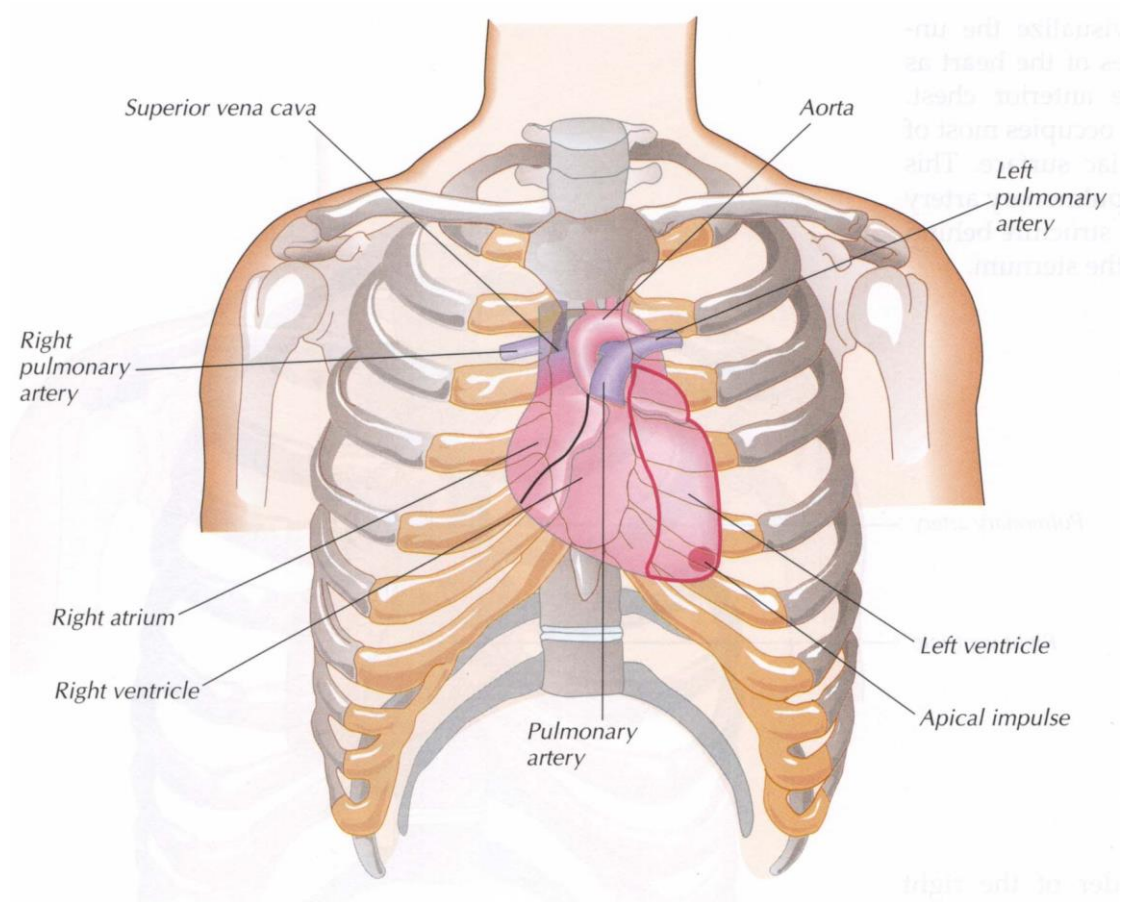
ANTERIOR VIEW

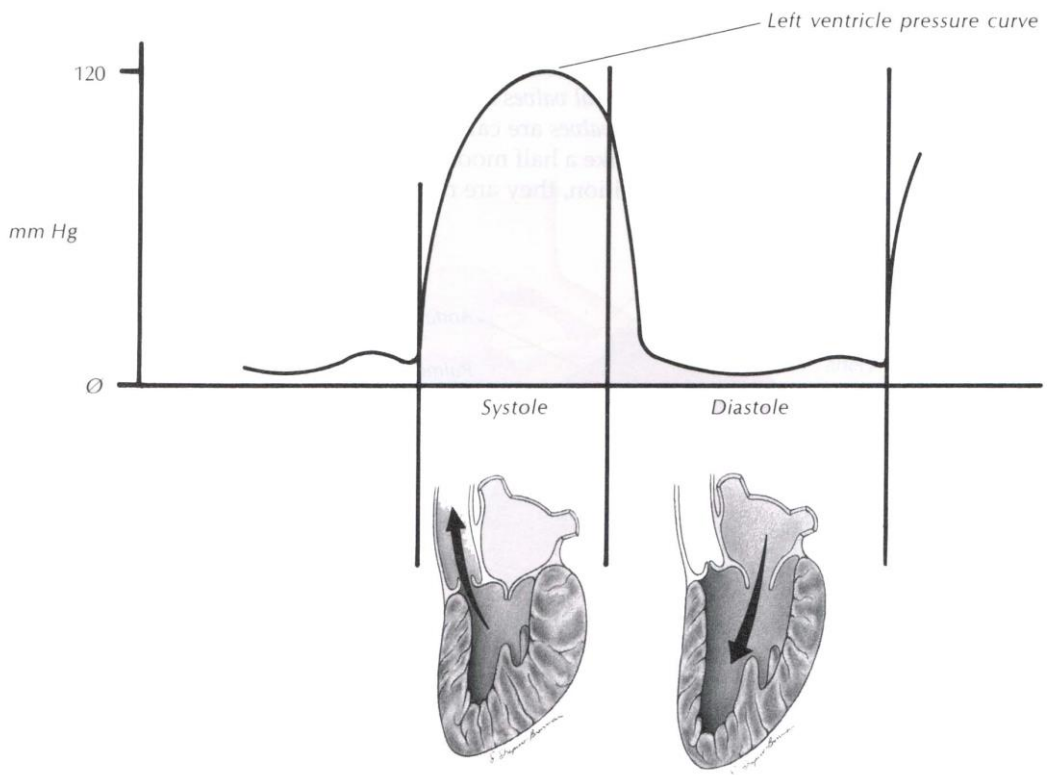
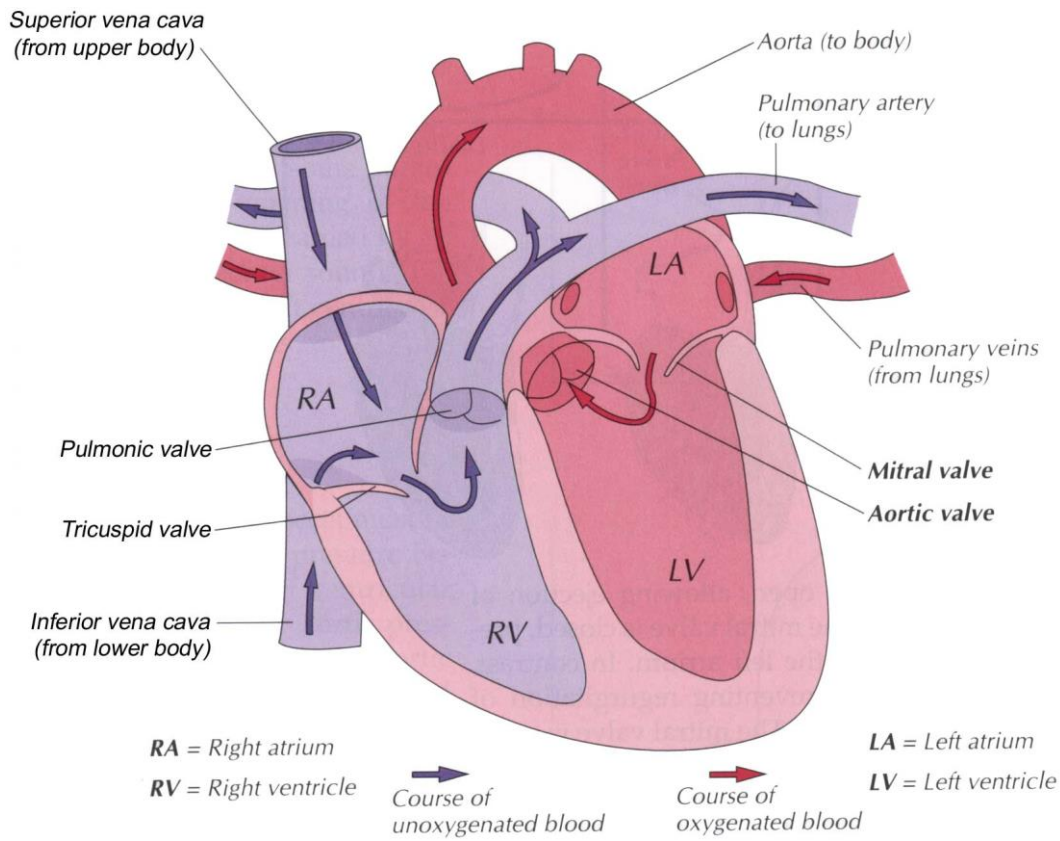


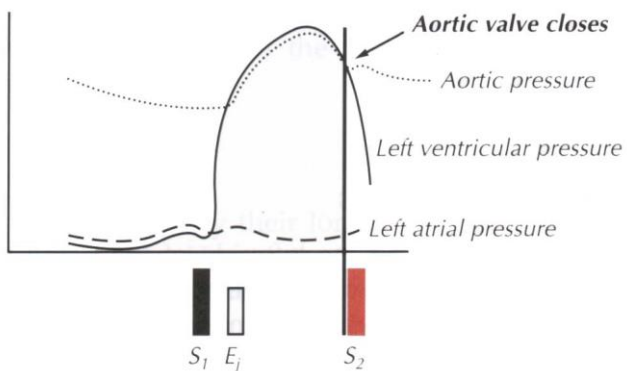
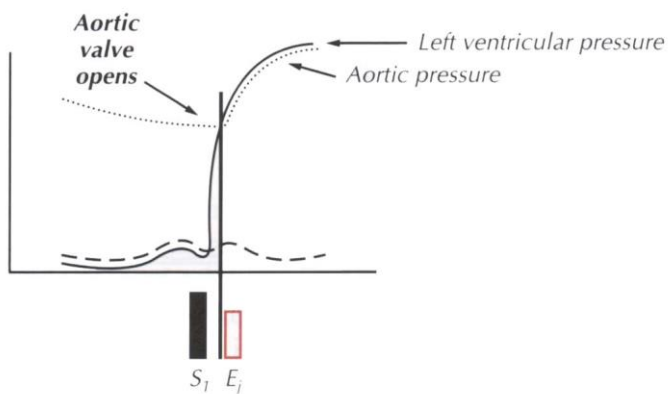
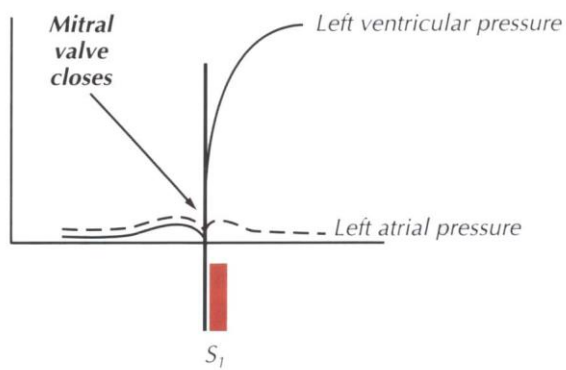
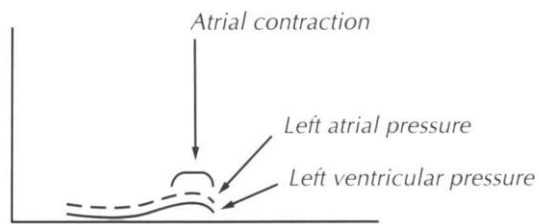
POSTERIOR VIEW



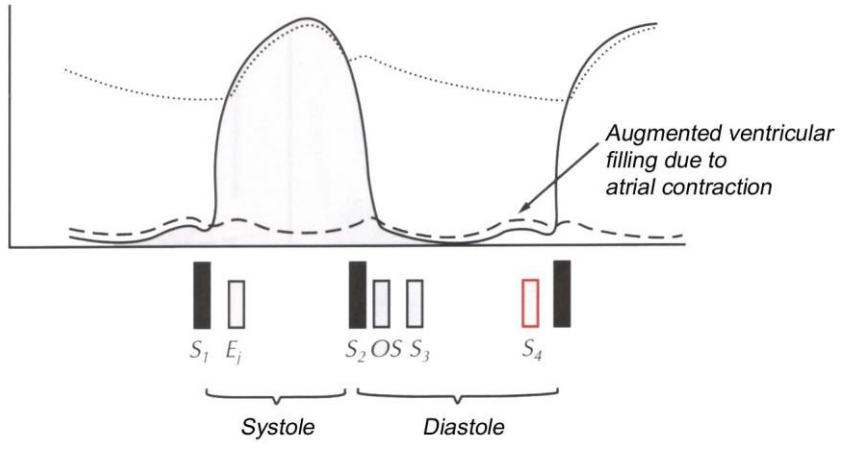
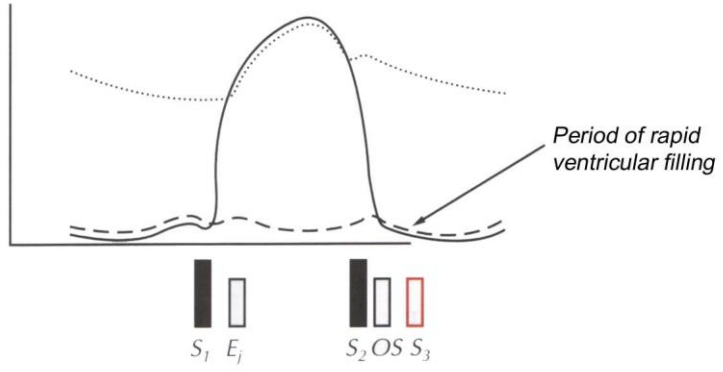
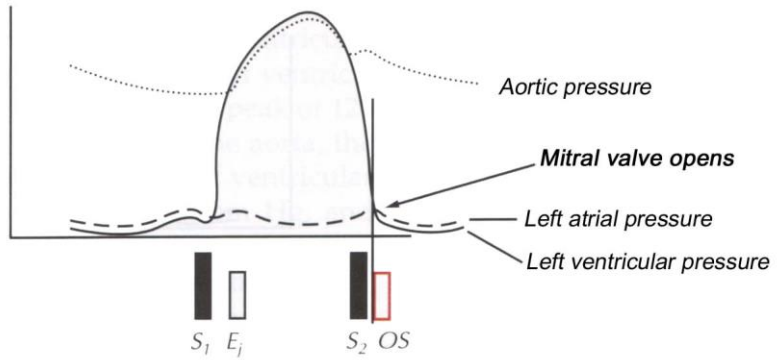
RIGHT AND LEFT LATERAL VIEWS











**APPENDIX 2**

**GENERAL SIGNS OF RESPIRATORY OR CARDIAC DISEASE –**

**Well developed sternomastoid muscles**

**Finger clubbing**

**Cyanosis**

**Air hunger**

**Poor exercise tolerance**

**Poor capillary refill**

**Pursed lip breathing**

**“Tripod” resting body position**

**Head bobbing**

**APPENDIX 3****NORMAL BREATH SOUNDS**

<b>Type</b>	<b>Duration</b>	<b>Intensity of expiratory sound</b>	<b>Pitch of expiratory sound</b>	<b>Location where heard normally</b>
<b>Vesicular</b>	<b>Inspiratory is longer than expiratory</b>	<b>soft</b>	<b>Relatively low</b>	<b>Over most of both lungs</b>
<b>Broncho-vesicular</b>	<b>Inspiratory and expiratory are equal</b>	<b>Intermediate</b>	<b>Intermediate</b>	<b>In 1<sup>st</sup> and 2<sup>nd</sup> interspaces anteriorly and between scapulae</b>
<b>Bronchial</b>	<b>Expiratory longer than inspiratory</b>	<b>Loud</b>	<b>Relatively high</b>	<b>Over manubrium, if at all</b>
<b>Tracheal</b>	<b>Inspiratory and expiratory are equal</b>	<b>Very loud</b>	<b>Relatively high</b>	<b>Over trachea</b>

APPENDIX 3 (continued)

ADVENTITIOUS BREATH SOUNDS

Type	Pattern	Possible cause
Fine crackles / rales	Intermittent, may be early or late in inspiration and/or expiration, non-musical, brief Soft, high-pitched	Pneumonia, fibrosis, early heart failure, bronchitis, bronchiectasis
Coarse crackles / rales	Intermittent, may be early or late in inspiration and/or expiration, non-musical, brief Louder, lower than crackles	
Wheezes	Longer, musical, intermittent High pitch, hissing or shrill	Narrowed airways eg. asthma (expiratory phase), COPD (in worsening condition chest will become silent), bronchitis (often cleared with cough), tumour / foreign body (persistent, localised on inspiration and/or expiration)
Stridor	Predominantly inspiratory wheeze, louder in neck than chest	Partial obstruction of larynx or trachea eg foreign body or croup
Pleural rub	Discrete or numerous, creaking, usually confined to small area and in both phases	Inflamed, roughened surfaces grating against each other eg. pleurisy
Rhonchi	Longer, musical, intermittent Lower pitch than wheezes, snoring quality	Secretions in large airways eg. bronchitis (often cleared with cough)

## APPENDIX 4

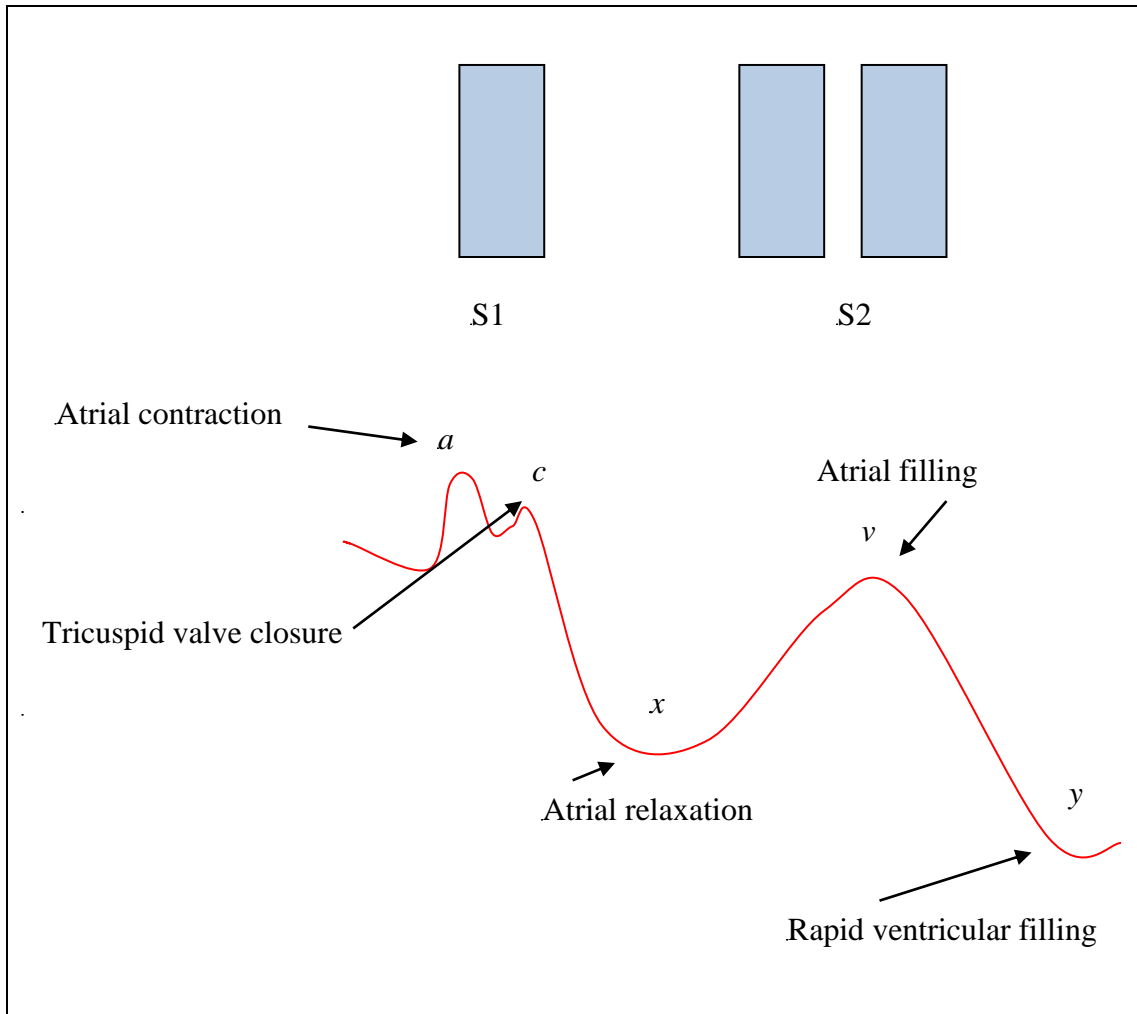
### The JVP is comprised of two positive waves

**a wave** – corresponds with right atrial systole (due to arterial contraction) and the first heart sound

**v wave** – is due to arterial filling when the tricuspid valve remains closed during ventricular systole

Between **a** and **v waves** the trough caused by atrial relaxation is called **x descent**  
**y descent** results from the tricuspid valve opening and rapid ventricular filling

(Talley and O'Connor 201)



(Adapted from Talley & O'Connor 2010)

## APPENDIX 4 (continued)

### Jugular Vein pressure (Pulse)

#### **Courses of an elevated JVP**

Right ventricular failure  
Tricuspid stenosis or regurgitation  
Pericardial effusion or constrictive pericarditis  
Superior vena cava obstruction  
Fluid overload  
Hyperdynamic circulation

#### **Causes of dominant a wave**

tricuspid stenosis ( also causes slow tricuspid stenosis ( also causes slow y descent)  
Pulmonary stenosis  
Pulmonary hypertension

#### **Causes of cannon a waves**

Complete heart block  
Proxysmal nodal tachycardia with retrograde atrial conduction or atrioventricular dissociation

#### **Causes of dominant v wave**

Tricuspid regurgitation

#### **x descent**

absent: arterial fibrillation  
exaggerated: acute cardiac tamponade, constrictive pericarditis

#### **y descent**

Sharp: severe tricuspid regurgitation, constrictive pericarditis  
Slow: tricuspid stenosis, right atrial myxoma

(Adapted from Talley & O'Connor 2010)

## APPENDIX 5

### APICAL IMPULSE

	<b>NORMAL</b>	<b>ABNORMAL</b>
<b>Location</b>	At or medial to midclavicular line in 4 <sup>th</sup> or 5 <sup>th</sup> interspace	Upward and left as in pregnancy or raised left diaphragm Displacement by thoracic deformity, masses, mediastinal shift or enlargement of heart
<b>Diameter</b>	Less than 2.5cm, occupying only one interspace	If larger than 3cm in left decubitus position, indicative of left ventricular enlargement.
<b>Amplitude</b>	Feels like gentle tap (except in event of excitement or after exercise)	Greater "force" may reflect hyperthyroidism, severe anaemia, pressure overload of left ventricle eg. Aortic stenosis or volume overload of left ventricle eg. mitral regurgitation
<b>Duration</b>	Compared with simultaneously <u>heard</u> heart sound, the felt impulse lasts less than 2/3 <sup>rd</sup> systole	Felt impulse continuing into simultaneously <u>heard</u> second heart sound, associated with higher amplitude but in normal location suggests left ventricular hypertrophy eg. Hypertension. If displaced, consider volume overload. If sustained but low amplitude consider dilation eg. cardiomyopathy

Heart sound	What to consider	Where	Possible causes of variations
S1 (first sound / "lub")	<p>Is it same intensity as second sound?</p> <p>Any splitting?</p>	<p>Softer than second sound at right and left 2<sup>nd</sup> interspace and often (but not always) louder at apex</p> <p>Normal splitting (due to tricuspid component becoming audible) heard along lower left sternal border</p>	<p><u>Accentuated</u> in tachycardia, short PR interval rhythms, exercise, anaemia, hyperthyroidism, mitral stenosis</p> <p><u>Diminished</u> in first degree heart block, mitral regurgitation, congestive heart failure or coronary heart disease</p> <p><u>Varying</u> in complete heart block, atrial fibrillation</p> <p>Abnormal splitting may be due to right bundle branch block or premature ventricular contractions</p>
S2 (second sound / "dub")	<p>Is it same intensity as second sound?</p> <p>Where in respiratory cycle does split occur? (normally late inspiration, disappearing during expiration)</p> <p>How wide is split? (normally narrow)</p>	<p>Listen at 2<sup>nd</sup> and 3<sup>rd</sup> interspace with patient breathing more deeply.</p> <p><u>Physiological</u> split usually disappears on expiration.</p> <p><u>Pathological</u> split occurs during expiration</p>	<p>Wide split or persistently single, may indicate ASD, heart block or disease of valve relating to absent component ie. Aortic or pulmonic.</p> <p>Persistent splitting results from delayed closure of pulmonic valve or early closure of</p>



	Which component is loudest? (A2 component of the split is usually louder than P2 component.)	At 2 <sup>nd</sup> interspace, A2 may be increased or decreased  A louder P2 at apex and right base  Decreased or absent P2	aortic valve.  Hypertension, aortic stenosis  Pulmonary hypertension, ASD  Effect of aging on anteroposterior diameter of chest or pulmonic stenosis
Extra sounds in systole	Location, timing, intensity, pitch and effect of respiration. Ejection sound           Systolic click	Shortly after 1 <sup>st</sup> sound, high pitch, sharp clicking quality = early systolic ejection which may be a) Aortic ie. heard at base and (louder at) apex, not varying with respiration b) Pulmonic ie. heard in 2 <sup>nd</sup> and 3 <sup>rd</sup> interspace  Mid or late systolic ie before S2, heard best at or medial to apex or at left lower sternal border, high pitched and clicking quality often followed by murmur	Dilated aorta, valve disease or congenital stenosis  Dilatation of pulmonary artery, pulmonary hypertension, pulmonic stenosis  Usually due to mitral valve prolapse. Can be extracardial or of mediastinal origin.

Heart sound	What to consider	Where	Possible causes of variations
Extra sound in diastole	Location, timing, intensity, pitch and effect of respiration of additional sound(s) or opening snap (Note : can be normal in athletes)	Opening snap .... Physiological 3 <sup>rd</sup> sound..... Pathological 3 <sup>rd</sup> sound (ventricular gallop) .... Atrial gallop.... Summation gallop...	
Systolic and diastolic murmurs	Sounds of longer duration – can be midsystolic (between S1 and S2),  pansystolic (between S1 and S2) or  diastolic (between S2 and S1)	Innocent..... Physiologic..... Pathologic (pulmonic stenosis / aortic stenosis / hypertrophic cardiomyopathy)  Mitral regurgitation..... Tricuspid regurgitation..... Ventricular septal defect.....  Aortic regurgitation..... Mitral stenosis.....	

## APPENDIX 6

### DOCUMENTATION OF MURMURS

Systolic (mid, pan or late) or diastolic (early, mid or late) or continuous (eg patent ductus arteriosus)

Crescendo (grows louder) or decrescendo (grows softer), crescendo-decrescendo (rises then falls) or plateau (same throughout)

Location of maximal intensity (ie related to interspace, sternum, apex, midsternal, midclavicular or axillary line)

Radiation or transmission

Intensity (expressed as a fraction on 6 point scale)

GRADATION OF MURMURS	
GRADE	DESCRIPTION
1	Very faint and may not be heard in all positions
2	Quiet but heard immediately stethoscope placed on chest
3	Moderately loud
4	Loud
5	Very loud. Heard even when stethoscope partly off chest
6	May be heard with stethoscope entirely off chest

Pitch (high, medium or low)

Quality (blowing, harsh, rumbling, musical)

#### EXAMPLE OF GOOD DOCUMENTATION MIGHT BE:

“Medium-pitched, grade 2/6, blowing decrescendo murmur, heard best in the 4<sup>th</sup> left interspace, with radiation to the apex”

## REFERENCES

Bickley, L. S., Hoekelman, R. A. 1999. *Bates Guide to Physical Examination and History Taking*. 7th Edition. Lippincott.

Talley, N. J., & O'Connor, S. ((2010). *Clinical Examination A systematic guide to physical diagnosis*. 6<sup>th</sup> ed. NSW: Elsevier.

**Self / peer assessment form**

**NAME**

**DATE**

Performance criteria	Done well	Could be better	Not done
Prepares self			
Prepares patient			
Washes hands			
Maintains patient's dignity throughout procedure			
INSPECTS the			
PALPATES the			
AUSCULTATES			
AUSCULTATES the			
Informs patient of findings			
Documents findings accurately			
Checks patient is satisfied with procedure			

**ACTION PLAN:**

.....  
 .....

## User feedback sheet

This feedback will be used to improve the environment and learning opportunities in the Clinical Skills Unit. Summarised feedback (maintaining the anonymity of the user) will be available to those monitoring the Clinical Skills Unit facility and specific skills tutors. If you would like us to follow up your comments, please add your contact details.

**Session topic**

**Date**

**Skill(s) taught / practiced**

Please rate your experience as follows:-

- |     |   |                |   |
|-----|---|----------------|---|
| 1   | = | Unsatisfactory | So poor that it had a negative effect on me |
| 2   | = | Poor           | Below what I would consider acceptable      |
| 3   | = | Satisfactory   | Generally acceptable                        |
| 4   | = | Good           | Very positive / helpful                     |
| 5   | = | Exceptional    | Highly stimulating                          |
| N/A | = | Not applicable |   |

		1	2	3	4	5	N/A
1	Prior planning / information						
2	Structure of session						
3	Instruction given (rationales explained)						
4	Access to simulation model						
5	Opportunity to ask questions						
6	Written information provided						
7	Physical environment of the unit						
8	Time available						

**Comments**

.....  
 .....  
 .....  
 .....

**Suggestions for improvements**

.....  
 .....  
 .....  
 .....

Professional group / current role

Name / contact details (OPTIONAL)

**THANK YOU VERY MUCH FOR CONTRIBUTING TO THE ONGOING DEVELOPMENT OF THE CLINICAL SKILLS UNIT**