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- 'docendo ac discendo' - 'by teaching and learning'

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Our sincere gratitude for the kind support from Sir Liam Donaldson, the Chief Medical Officer for England, United Kingdom.

The International Journal of Clinical Skills looks forward to contributing positively towards the training of all members of the healthcare profession.

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A Message from the Chief Medical Officer for England, United Kingdom

The systematic and safe acquisition of high quality clinical skills is an essential part of modern medical training as highlighted in my Annual Report published in March 2009. I wish the International Journal of Clinical Skills every success in highlighting research and knowledge in this important area.

Sir Liam Donaldson
The Chief Medical Officer for England

Examination of the respiratory system

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Abstract

Clinical examination is an important tool in helping to identify pathology and contributes to reassuring patients without disease. This paper lays out a thorough routine for examining the respiratory system that is appropriate both for day-to-day clinical practice and for sitting undergraduate Objective Structured Clinical Examinations (OSCEs).

Examination of the respiratory system follows the classic sequence of inspection, palpation, percussion and auscultation. We emphasize the steps involved in examining the respiratory system, rather than on specific signs. For these, please refer to other cited references [1, 2, 5-8].

For the sake of simplicity, this paper refers to the patient as being male, but the examination is identical for a patient of the female gender.

Before starting the examination

After washing your hands introduce yourself to the patient, explain the examination, and ask for consent to carry it out. Also ask if he is in any pain and adapt your routine accordingly.

Ask the patient to expose himself from shoulder to waist, or as in most clinical encounters, simply to remove his top. Ask him to lie on a couch that is inclined at 45°. Ensure his comfort and dignity at all times. Ensure that ambient noise is minimised so that chest sounds can be picked up by auscultation [3].

General inspection

The aim of the general inspection is to identify clues about the patient's physical condition and the underlying diagnosis. From the end of the couch, observe the patient's general appearance (age, state of health, nutritional status and any other obvious signs). Is he visibly breathless or cyanosed? Does he have to sit up to breathe? Is his breathing audible? Is he coughing? Note in particular:

- The rate, depth and regularity of his breathing
- Any deformities of the spine and chest (barrel chest, pectus excavatum, pectus carinatum)
- Any asymmetry of chest expansion
- The use of accessory muscles of respiration
- The presence of operative scars, including in the axillae and around the back

Next observe the surroundings. Is the patient on oxygen? If so, note the device (see Tables 1 and 2), the concentration and the flow rate of oxygen. Look in particular for inhalers, nebulisers, peak flow meters, intravenous lines, infusions and chest drains. If there is a sputum pot make sure you examine its contents.

Table 1: Guide to oxygen masks

Type of mask	Oxygen concentration	Indications
Low flow masks - deliver a variable concentration of oxygen		
Nasal cannula	24-44% depending on the flow rate*	Patients with mild hypoxia who are otherwise stable; long-term domiciliary treatment
Simple face mask	Up to 60% at 6-10L/min	Acutely breathless patients
Partial rebreather mask	60-80% at 10L/min	As above
Non-rebreather mask	Up to 95% at 15L/min	As above
High flow (Venturi) masks		
Deliver a fixed concentration of oxygen	24-60% in steps depending on the valve used (see Table 2)	"Carbon dioxide retainers" in whom oxygen control is a requirement**

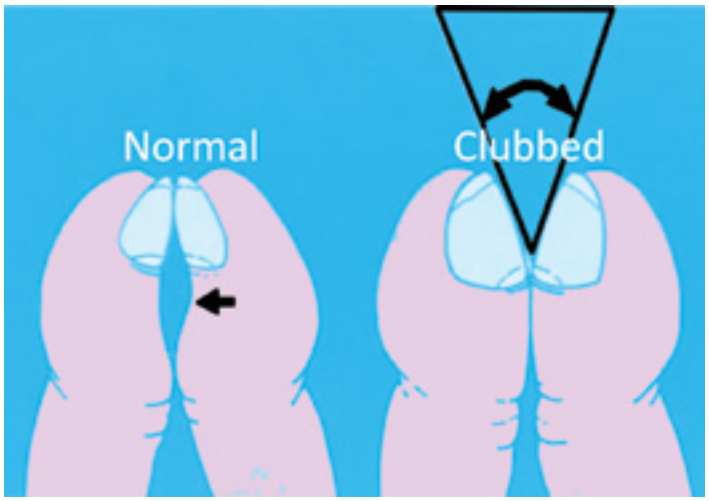
* For every litre of flow delivered up to 6 litres, the oxygen concentration increases by about 4%, e.g. at 4L/min, oxygen concentration is 36%.
**Note that the commonest cause of a high PaCO2 is not carbon dioxide retention but ventilatory failure, in which the patient requires a high concentration of oxygen.

Table 2: Venturi mask valves

Valve colour	Flow rate (L/min)	Oxygen delivered (%)
Blue	2	24
White	4	28
Yellow	6	35
Red	8	40
Green	12	60

Inspection and examination of the hands
Take both hands and assess them for temperature and colour. Peripheral cyanosis may be indicated by a bluish discoloration of the fingertips. Look for nicotine tar staining and finger clubbing. When the dorsum of a finger from one hand is opposed to the dorsum of a finger from the other hand, a diamond-shaped window ('Schamroth's window') is formed at the base of the nail beds. In clubbing, this diamond shaped window is obliterated and a distal angle is created between the fingers (Figure 1). Respiratory causes of clubbing include carcinoma, fibrosing alveolitis and chronic suppurative lung disease.

Figure 1: Finger clubbing and the loss of Schamroth's Window (indicated by the arrow on the normal fingers)



Inspect and feel the thenar and hypothenar eminences – these could, for example, be wasted if there is an apical lung tumour that is invading or compressing the roots of the brachial plexus. Test for the hand flapping tremor of carbon dioxide retention, by asking the patient to extend both arms with the wrists in dorsiflexion and the palms facing forwards. Ideally, this position should be maintained for a full thirty seconds. During this time assess the radial pulse and determine its rate, rhythm and character.

Inspection and examination of the head, neck and upper body
Inspect the patient's eyes. Look for a ptosis (an upper eye lid that encroaches upon the pupil) and for anisocoria (unequal pupil size). Ipsilateral ptosis, miosis, enophthalmos and anhidrosis constitute Horner's syndrome – which may result from compression of the sympathetic chain by an apical lung tumour. Next inspect the conjunctivae looking for pallor which would suggest anaemia. Ask the patient to open his mouth and inspect the underside of the tongue for the blue discoloration of central cyanosis.

Assess the jugular venous pressure (JVP) and the jugular venous pulse form [see reference 4]. A raised JVP is suggestive of right-sided heart failure. Examine for lymph nodes with the patient sitting up – have a systematic approach for examining all of the submental, submandibular, parotid, pre- and post-auricular, occipital, anterior cervical, posterior cervical and supraclavicular lymph nodes.

Palpate for tracheal deviation by placing your index and middle fingers of one hand on either side of the trachea in the suprasternal notch. Alternatively, you can place the index and annular fingers of one hand on either clavicular head and use your middle finger to palpate the trachea.

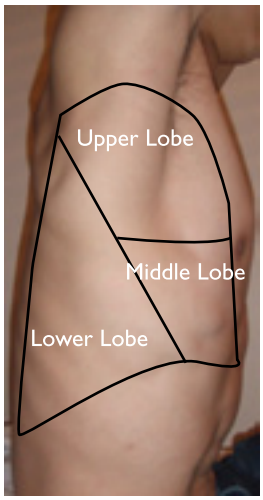
Inspection and examination of the chest

Inspection and palpation

Ask the patient once again if he is in any pain. Inspect the chest more carefully looking for asymmetries, deformities and scars. Inspect the precordium and palpate for the position of the cardiac apex. Difficulty palpating for the position of the cardiac apex may indicate hyperexpansion [6] although this is not a specific sign.

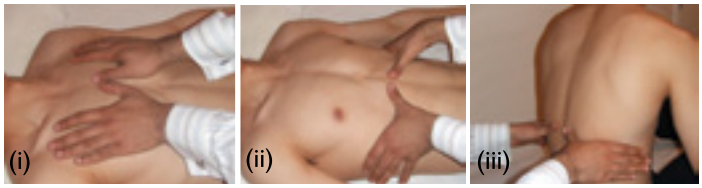
Carry out all subsequent steps on the front of the chest and once finished, repeat these on the back of the chest. This is far more elegant than to keep asking the patient to bend forwards and backwards. Pulmonary anatomy is such that examination of the back of the chest yields information about the lower lobes, whereas examination of the front of the chest yields information about the middle lobe (right-side only) and the upper lobes.

Figure 2: A right lateral view demonstrating lobar anatomy



Palpate for equal chest expansion, comparing one side to the other (Figure 3). Reduced unilateral chest expansion might be caused by, for example, pneumonia, pleural effusion, pneumothorax or lung collapse. If there is a measuring tape, measure the chest expansion.

Figure 3: Assessing chest expansion (i) anteriorly, first position (ii) anteriorly, second position (iii) posteriorly



Percussion

Percuss the chest. Start at the apex of one lung and compare one side to the other. Do not forget to percuss over the clavicles and on the sides of the chest. For any one percussed area, is the resonance increased or decreased? A hyper-resonant or tympanic note may indicate emphysema or pneumothorax, whereas a dull note may indicate consolidation, fibrosis or fluid (the latter is usually stony dull). If you uncover any variation in the percussion note, be sure to map out its geographical extent.

Finally, test for 'tactile vocal fremitus' by placing the flat of the hands on the chest and asking the patient to say 'ninety-nine'. Tactile vocal fremitus is pathologically increased over areas of consolidation and decreased or absent over areas of pleural effusion or pneumothorax.

Auscultation

Ask the patient to take deep breaths through an open mouth and using the diaphragm of your stethoscope, auscultate the chest in the same locations as for percussion. Start at the apex of one lung, in the supraclavicular fossa and compare one side to the other. Note that the bell of the stethoscope may fit more conveniently into the supraclavicular fossae.

Normal breath sounds are described as 'vesicular' and have a low pitched and rustling quality. Reduced breath sounds may indicate hyperinflation, pneumothorax, pleural effusion or obesity. Increased breath sounds may indicate consolidation. Take note of any added sounds such as wheezes, crackles (crepitations), bronchial breathing and pleural friction rubs.

Whilst auscultating you can test for 'vocal resonance' by asking the patient to say 'ninety-nine'. Both consolidation and pleural effusions can lead to a dull percussion note, but in consolidation vocal resonance is increased, whereas in pleural effusions vocal resonance is decreased. 'Vocal resonance' and 'tactile vocal fremitus' (see above) provide similar clinical information.

Inspection and examination of the legs

Inspect the legs for erythema and swelling. Palpate for tenderness and pitting oedema. A unilateral red, swollen and tender calf suggests a deep vein thrombosis, whereas bilateral leg swelling may indicate right-sided heart failure.

Completing the examination

Thank the patient and cover him up. If appropriate offer to help him get dressed. Enquire about and address any concerns that he may have. In an academic exam situation, indicate that you would look at the patient's observation chart, examine a sputum sample, measure the peak expiratory flow rate (PEFR) and request some simple investigations such as a chest x-ray and a full blood count. Finally, summarise your findings to the examiner and offer a differential diagnosis.

The respiratory conditions most likely to appear in an OSCE examination setting include 'stable' conditions such as chronic obstructive pulmonary disease (COPD), cryptogenic fibrosing alveolitis and lobectomy.

References

1. Munro J F, MacLeod J, Campbell C R. (2005). Macleod's Clinical Examination. 11th Edition. Edinburgh, New York, Churchill Livingstone.
2. Diaz-Guzman E, Budev M M. (2008). Accuracy of the physical examination in evaluating pleural effusion. Cleveland Clinic Journal of Medicine. **75**(4):297-303.
3. Delaunois L M. (2005). Lung auscultation: back to basic medicine. Swiss Medical Weekly. **35**:511-512.
4. Stockmann T, Burton N. (2009). Examination of the Cardiovascular System. International Journal of Clinical Skills. **3**(2):91-94.
5. Levick C, Dwight J. (2007). Expert Review: Examination of the Cardiovascular System. The Journal of Clinical Examination. **3**:8-14.
6. Sharma O P. (1995). Symptoms and signs in pulmonary medicine: old observations and new interpretations. Disease-a-Month. **41**(9):577-638.
7. Burton N. (2008). Clinical Skills for OSCEs. 3rd Edition. Scion Publishing Ltd.
8. Gaunt A C, Frang T. (2007). Examination of the Respiratory System. The Journal of Clinical Examination. **4**:14-22.

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The Clinical Skills Lab database will comprise information on over 200 clinical skills, broadly separated into:

- ➔ History taking skills
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- ➔ Clinical examination/interpretation skills
- ➔ Practical skills

Not only will this valuable resource provide material to students as a learning tool and revision aid, for example, OSCEs, it will also offer educational materials for teachers from all disciplines, allowing some standardisation of practice. The Clinical Skills community will also be encouraged to contribute, making this database interactive.

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