

DYSPNOEA

Introduction

Dyspnoea can be defined as an awareness that an abnormal amount of work is required for breathing.¹

In lay terms dyspnoea refers to “breathlessness” or “shortness of breath”.

Dyspnoea is an important symptom as it may indicate serious underlying pathology.

Precise diagnosis may not always be possible in first presentations to the ED.

More importantly than precise diagnosis, the critical issues from an ED perspective will include:

- How unwell is the patient?
- What immediate treatment does the patient require?
- What further investigation does the patient require?
- Does the patient require admission into hospital?

Pathophysiology

Breathlessness is an important symptom as it may indicate serious underlying disease.

When the cause is unclear, all the important differential diagnoses will need to be carefully considered.

Causes

The important groups of the causes of dyspnoea include the following:

1. Respiratory:
 - Infective, pneumonia
 - Exacerbation of airways diseases, (asthma, COAD)
 - Exacerbation of restrictive diseases, (pulmonary fibrosis)

- Malignant disease
- Pulmonary embolism
- Pneumothorax
- Aspiration, (in particular those with impaired airway reflexes or nursing home patients)

2. Cardiac:

- Acute cardiogenic pulmonary oedema
- Non-cardiogenic pulmonary oedema
- Exacerbation of chronic heart failure
- Valvular heart disease
- Cardiomyopathy (of any cause)
- Pericardial effusion with cardiac tamponade (see separate guidelines)

3. Metabolic:

- Acidosis, from any cause
- Toxic causes:

Examples include:

Carbon monoxide poisoning

Methaemoglobinaemia

Cyanide poisoning

4. Anaemic:

- Anaemia from any cause can lead to breathlessness.

5. Psychogenic:

- **Although benign, this is an important group, as it is a very common presentation.**
- Hyperventilation, (see separate guidelines, and sensation of “choking” are common manifestations of psychogenic shortness of breath).

Less commonly:

6. Neurological causes:
 - Muscular paralysis, as in Guillain-Barré syndrome, multiple sclerosis or poliomyelitis
7. Mechanical restrictive causes:
 - Gross ascites
 - Advanced pregnancy

Clinical Assessment

Important points of history

1. It is important to establish the **degree** to which the patient has become short of breath.
 - In this regard compare how the patient is now as compared to how they are “normally”
2. The acuteness of onset and the rapidity of progression of symptoms.
3. Nature of the dyspnoea:
 - Are there cardiac features, orthopnoea or paroxysmal nocturnal dyspnoea?
3. Are there any associated symptoms, in particular:
 - Chest pain, cough, wheeze, haemoptysis?
4. Past history, in particular a patient's **risk profile** for important conditions:
 - For cardiovascular disease
 - Respiratory disease
 - Smoking
 - Pulmonary embolism.

Important points of examination

1. Any obvious airway problem:

Rule out signs of upper airway obstruction, in particular assess for:

- Stridor
- Drooling
- In-drawing of intercostal spaces
- Inability to talk/ swallow.

2. Altered conscious state:

- This is a serious sign, and indicates **hypoxia** and/ or hypercarbia.
- It may also indicate severe hypocarbia, in cases of hyperventilation.

3. Exhaustion:

- Sweating/ altered conscious state/ use of accessory muscles of respiration
- This can be a sign of impending respiratory arrest.

4. Vital signs:

- Fever (infection/ pneumonia)
- Pulse (a persisting associated tachycardia is a significant finding)
- Blood pressure
- Respiratory rate (a persisting tachypnoea is a significant finding)
- **Pulse oximetry (this should be measured in all cases).**

3. Cyanosis:

This will most commonly be due to **hypoxia**. It is a late sign.

Other differential diagnosis however can include:

- Polycythaemic patients
- Methaemoglobin poisoning

- Vascular congestion (massive PE or cardiac tamponade).

Note that patients with **carboxyhaemoglobin** or **cyanide poisoning** may not initially appear cyanosed, despite being severely “metabolically” hypoxic.

4. CVS:

- Murmurs
- Evidence of heart failure
- Beck’s triad (cardiac tamponade).

5. Respiratory:

- Decreased air entry.
- Wheeze
- Crepitations.

6. Signs of **anaemia**:

7. Legs:

- Swelling of ankles (possible heart failure)
- For signs of **DVT** (although absence of signs does not rule out the possibility of a DVT)

Investigations

The type and extent of investigation will obviously depend on how unwell the patient is and on the degree of suspicion for any given pathology.

The following may be considered:

Blood tests:

1. FBE:

- Infection, anaemia.

2. CRP:

- Infection/ other inflammatory conditions/ malignancy.

3. U&Es/ glucose

4. BNP:

- The role of this test is not currently well established in the acute setting. It is very helpful in distinguishing a cardiogenic from a non-cardiogenic cause for breathlessness.

5. ABGs:

- This will not be diagnostic, but will help indicate the degree of “unwellness” in a patient who is short of breath.
- Pulse oximetry and the clinical state of the patient in most cases will provide sufficient information on how hypoxic a patient is and so ABGs will often not be necessary for this indication alone. ABG testing can be difficult and distressing to a patient. In a significantly distressed patient, it is not initially indicated where cooperation may not be possible and where the result will not alter decisions required about the patient’s *immediate* management.
- It is useful for establishing, the degree of acidosis or hyper- (or hypo-) capnia of a patient, and in documenting the *trend* of a patient’s response to treatment.
- Note that by “**co-oximetry**”, this will be the *only immediate* way that a diagnosis of **carbon monoxide** or **methaemoglobinaemia** can be made.

Other blood tests are done as clinically indicated, and in general terms may include:

6. Cardiac enzymes, if an ACS is suspected.

7. Serological tests for various suspected respiratory infections.

- Although this will not be of any immediate assistance in managing the patient and so need not necessarily be done in the emergent setting.

8. D-dimer:

- This test should not be done indiscriminately, as it is a very non-specific test with a high level of false positives and negatives.
- It is best reserved for scenarios of ruling out the need for further investigation in patients with possible PE and whose pre-test probability for a PE is low (see PE guidelines).

ECG:

- This should always be done in any significantly breathless patient.

- The priority of the test will be in accordance with the degree of suspicion for a cardiac cause of the patient's symptoms.
- Look for any evidence of ischaemia or arrhythmias.

CXR:

All patients with significant symptoms should have a CXR

Significant cardiomegaly may represent:

- Heart failure (from any cause)
- Dilated cardiomyopathy
- Valvular heart disease
- Pericardial effusion (an important cause often overlooked in the initial presentation).

Bilateral pulmonary infiltrates is a common, but non-specific finding. Further diagnostic refinement in these cases will depend on:

- The clinical setting.
- Whether the finding is acute or chronic.
- Whether the pattern can be determined as predominantly "reticular" or "alveolar"

Localized opacities may represent:

- Infective consolidation
- Malignancy
- Pulmonary infarction
- Aspiration
- Contusion (in cases of trauma)

Pleural effusions:

These can often be distinguished from regions of consolidation by:

- Dense opacification (without air-bronchograms)

- An upper meniscal shaped border.

Ultra sound or CT however may need to be done to make a definitive diagnosis of pleural effusion.

A clear CXR:

- **This does not rule out a potentially serious lung problem**
- The diagnosis may be pulmonary embolism
- It may be early lung infection, as radiological changes can be delayed in onset compared to the clinical onset of symptoms.

V/Q scan:

For the patient suspected of having a pulmonary embolism.

CT scan chest:

This will depend on the diagnosis that is being considered.

In the **acute setting** this will most often be done as a CTPA to rule out pulmonary embolism.

High resolution scans are also done to assist in the precise diagnosis of respiratory disease. This however is usually done on a more “elective” basis.

Echocardiography:

This is the “gold standard” imaging test when a cardiac cause for the patient’s symptoms needs to be ruled out.

Any patient with significant undiagnosed cardiomegaly should undergo echocardiography.

The urgency of this examination will depend on how unwell the patient is together with the index of suspicion for a cardiac aetiology of the patient’s symptoms.

It can provide information on

- Direct diagnosis, in some cases (such a cardiac tamponade or valvular heart disease).
- Indirect evidence, in other cases (pericarditis or myocarditis).
- The **degree** of myocardial compromise.

Pulmonary Function testing:

Bedside spirometry testing may be useful in certain patients, providing the patient is able to fully cooperate.

Stable patients with more chronic symptoms, may benefit from referral for formal lung function testing under a respiratory physician, when the diagnosis remains unclear, or for establishing a baseline in function in patients with diagnosed chronic lung disease.

Management

The immediate priority in any patient that presents short of breath will be to quickly establish how unwell the patient is and how **hypoxic** they are.

Airway obstruction is treated according to its immediate merits.

Psychogenic causes are ruled out.

The first consideration of treatment will be oxygenation to a satisfactory SaO₂ level. This is generally taken to mean a value of at least 90%.

Escalating options for oxygenation will include:

- Nasal prongs with low flow oxygen.
- Hudson mask with high flow oxygen.
- 100% oxygen delivered with use of an oxygen reservoir.
- NIV, by means of CPAP or BIPAP.
- Intubation and mechanical ventilation.

Once oxygenation has been optimized, then other modalities of treatment may be initiated as clinically indicated.

Admission to hospital

In general terms admission to hospital will be required for:

- Any patient with acute hypoxia.
- Any patient diagnosed with or suspected of having a potentially and rapidly life threatening condition.

This may be readily apparent, but patients may also be admitted on the basis of their **risk profile**, or simply on the basis of **persistently abnormal vital signs**.

- Patients requiring timely investigation for their symptoms.

In general terms dyspnoea is an indicator of potentially serious underlying pathology and as such, in cases of uncertainty, the threshold for admission for further investigation and observation must always be low.

References

1. Talley NJ, O'Conner S. Clinical Examination 3rd ed 1996.

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