

The differential diagnosis of the breathless patient

Introduction

Dyspnoea or breathlessness is the subjective sensation of difficulty in breathing, which may be laboured or uncomfortable.¹ In health it is not always unpleasant and not associated with anxiety or fear. It results from multiple interactions of signals and receptors in the autonomic nervous system, motor cortex and peripheral receptors in the upper airways, lungs and chest wall.² Behaviour and emotional state also exert an important influence on the expression of respiratory sensations.³

Dyspnoea commonly presents in primary care and establishing a diagnosis represents a challenge. Whilst approximately two thirds of cases are due to a pulmonary or cardiac disorder⁴ there are other causes that need to be considered. It often has multiple causes particularly in the elderly.⁵

As with the symptom of pain, patients use distinct descriptors when describing dyspnoea. 'Chest tightness', 'choking', 'suffocation' and 'air hunger' are some of the terms used. However, the language used to describe dyspnoea is not specific, and individual descriptions are dependent upon physiological context, personality, social and ethnic factors.^{6,7}

Taking a history

A careful history will yield important diagnostic clues. Key points include the speed of onset and duration of breathlessness. Sudden onset is characteristic of pulmonary embolism or pneumothorax whereas a progressive history associated with fever, cough and purulent sputum would suggest a chest infection. Association with characteristic central chest pain may suggest a myocardial infarction (MI), pleuritic pain may point to pericarditis, and palpitations to an arrhythmia (often fast atrial fibrillation).

Causes of acute dyspnoea (Table 1) often overlap with chronic dyspnoea (duration greater than four weeks) (see Table 2). In primary care, telephone triage is an important initial step in assessing the degree of urgency, and adequate training of reception staff and a frame-

Table 1. Differential diagnosis of acute dyspnoea in Adults

Cardiac:	Pulmonary oedema, arrhythmia (especially atrial fibrillation), pericarditis, pericardial effusion, acute myocardial infarction
Pulmonary:	COPD exacerbations, acute asthma attack, pneumonia, pneumothorax, pulmonary embolism, pleural effusion, large airway obstruction (e.g. foreign body, bronchial carcinoma, anaphylaxis and epiglottitis)
Other causes:	Panic attacks, hyperventilation, pain, metabolic acidosis (diabetic ketoacidosis), trauma, drugs (e.g. aspirin overdose), altitude sickness

work to identify urgent cases is recommended to provide proper care and to minimise risk.⁸ Those describing severe dyspnoea or sudden onset of chest pain should be directed to the casualty department as an emergency usually by ambulance.

Rapid assessment will establish if the patient is unstable (see Table 3).

Unstable patients requiring emergency hospital care present with one or more symptom pattern (adapted from reference 2):

- Hypotension
- Altered mental status,
- Hypoxia and low oxygen saturation
- Central chest pain
- Unstable arrhythmia,
- Stridor and breathing effort without air movement (suspect upper airway obstruction)
- Unilateral tracheal deviation, unilateral breath sounds (suspect tension pneumothorax)
- Respiratory rate above 40 breaths per minute, cyanosis, and signs of respiratory distress.

In stable patients and those with a chronic history a comprehensive history and analysis of clinical signs are the most

Table 2. Differential diagnosis of chronic dyspnoea

Cardiac	Cardiac failure (left ventricular systolic or diastolic dysfunction) Coronary artery disease Left ventricular hypertrophy Cardiomyopathy Cardiac arrhythmias (especially atrial fibrillation) Pericardial disease Valvular heart disease Pulmonary hypertension Congenital Heart Disease
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Pulmonary

Chronic obstructive pulmonary disease
Asthma
Interstitial lung disease
Pleural effusion
Malignancy (primary or metastatic)
Bronchiectasis
Upper airway obstruction (laryngeal disease, tracheal stenosis)

Other Causes

Thromboembolic disease
Neuromuscular disorders (myasthenia gravis, amyotrophic lateral sclerosis)
Chest wall deformities (kyphoscoliosis)
Anaemia
Obesity
Psychogenic causes (GAD, PTSD, panic disorders, dysfunctional breathing)
Deconditioning
Gastro esophageal reflux disease
Metabolic conditions (acidosis, uraemia)
Liver cirrhosis
Thyroid disease

GAD = generalised disorder;
PTSD = post-traumatic stress

Table 3. The initial assessment of patients with dyspnoea²

- Assess airway patency and listen to the lungs
- Observe breathing pattern including use of accessory muscles
- Monitor cardiac rhythm
- Measure vital signs and pulse oximetry
- Obtain history of cardiac, pulmonary disease or trauma
- Evaluate mental status

Table 4. Diagnostic clues from the history (adapted from references 2 and 4)

Clues of symptoms or history	Possible diagnosis
Nocturnal cough Intermittent breathlessness; wheezing, triggering factors; allergic rhinitis	Asthma
Pleuritic chest pain	Pericarditis, pulmonary embolism, pneumothorax, pneumonia, empyema
History of hypertension, coronary artery disease, MI or diabetes Orthopnoea, nocturnal paroxysmal dyspnoea, oedema	Congestive heart failure
Recent trauma, surgery, pregnancy or prolonged immobility	Pulmonary embolism
Haemoptysis	Pulmonary embolism, malignancy, bronchiectasis, pulmonary vasculitis / pneumonia; mitral stenosis; arteriovenous malformation
Orthopnoea, weakness, hoarseness of voice	Neuro-muscular weakness, diaphragmatic dysfunction
Tobacco use	Chronic obstructive pulmonary disease, congestive heart failure
Indigestion, dysphagia, cough after eating	GORD, aspiration (foreign body)
Postprandial dyspnoea	Gastro esophageal reflux disease; aspiration; food allergy; coronary artery disease
Recurrent pneumonia	Lung cancer; bronchiectasis; aspiration; organising pneumonia
Drug exposure	Beta blockers aggravating airways disease Amiodarone / nitrofurantoin / Methotrexate lung fibrosis Illicit drugs (e.g., heroin): talcosis
History of immunosuppressive disease or therapy; acquired immunodeficiency syndrome	Opportunistic infections: Pneumocystis carinii pneumonia; bacterial (tuberculosis; Legionella); viral (cytomegalovirus); or fungal (Aspergillus)
Exposure to inorganic dust, asbestos, or volatile chemicals	Pneumoconiosis; silicosis; berylliosis; coal workers lung; asbestosis
Organic exposure to dust (birds, laboratory workers)	Hypersensitivity pneumonitis (bird fancier's lung)
Stress/Emotional problems	Hyperventilation/dysfunctional breathing

Table 5. Diagnostic clues from physical examination (adapted from references 2 and 4)

Physical exam finding clues	Possible diagnosis
Wheezing, pulsus paradoxus, accessory muscle use	Acute asthma, COPD exacerbation
Wheezing, barrel chest, decreased breath sounds, flap, peripheral vasodilation	COPD exacerbation (+/- acute CO2 retention)
Fever, crackles, increased fremitus, bronchial breathing	Pneumonia
Oedema, neck vein distension, S ₃ or S ₄ , hepatojugular reflux, murmurs, coarse crepitations, wheezing	Congestive heart failure, pulmonary oedema
Pleuritic rub, tachycardia, lower extremity swelling	Pulmonary embolism
Localised, decreased or absent breath sounds	Pneumothorax ,pleural effusion
Inspiratory stridor, rhonchi, tracheal tug	Croup, tracheitis
Stridor, drooling, fever	Epiglottitis
Stridor, wheezing, persistent pneumonia	Foreign body aspiration
Finger clubbing	Bronchial carcinoma, intrathoracic suppuration (bronchiectasis, empyema) fbrosing alveolitis, bacterial endocarditis, cyanotic congenital heart disease
Sighing, peripheral or peri-oral paraesthesia	Hyperventilation
Abnormal inspiratory or expiratory sounds heard over the trachea	Central airway obstruction;vocal cord paralysis; tracheal stenosis
Accentuated P ₂ ; right ventricular heave; murmurs	Pulmonary hypertension

important factors in establishing the cause.⁹

The timing of breathlessness is important as paroxysmal nocturnal dyspnoea is characteristic of left ventricular failure (LVF). Early morning waking with wheeze and breathlessness is typical of asthma. A diagnosis of COPD should be considered in patients over the age of 35 who have a risk factor (generally smoking) and who present with exertional breathlessness, chronic cough, regular sputum production, frequent winter 'bronchitis' or wheeze.¹⁰ Breathlessness when supine (orthopnoea) commonly occurs in LVF. The presence of cough, chest pain or palpitation can help narrow the diagnosis.¹¹ The

severity of dyspnoea can be measured in terms of how it limits daily activities.

Personal and family history of chest or cardiac disease is important. A patient with a previous MI and breathlessness is likely to have heart failure. Ask about current medication and tobacco consumption. Social and occupational history can reveal important clues as to possible causes. It is helpful to enquire about associated feelings of anxiety.

Physical examination

Examination should be systematic and should include a general observation looking for respiratory distress, anaemia, cyanosis, clubbing or lymphadenopathy.

Nasal passages and pharynx should be examined to look for evidence of obstruction and the neck should be palpated for an enlarged thyroid gland and evidence of any tracheal deviation. The thorax should be examined for chest deformity or kyphosis and the movements should be observed for evidence of any asymmetry. Percussion may indicate dullness over a pleural effusion or hyperresonance over a pneumothorax. Auscultation of the chest should look for the presence of bronchial breathing or added sounds such as rhonchi, crepitations or stridor.

Cardiovascular examination may identify abnormalities such as an abnormal heart rate or rhythm, hypertension, dis-

placement of the apex, murmurs and added heart sounds. The presence of carotid bruits or diminished peripheral pulses should be noted. The legs should be examined for oedema and evidence of deep vein thrombosis.

A systolic murmur may indicate aortic stenosis or mitral regurgitation and the presence of a third heart sound, a displaced apex beat and a raised JVP could indicate the presence of cardiac failure.

Non-cardiac and non-pulmonary disease should be considered in patients with minimal risk factors and no clinic evidence of cardiac or pulmonary disease.

Investigations

Following a careful history and physical examination, certain tests should be carried out in order to confirm a diagnosis or to provide further information.

Routine blood tests should include a full blood count, urea and electrolytes, random blood sugar and thyroid function tests. If available, a normal B-type natriuretic peptide (BNP or NT proBNP) rules out heart failure.

ECG may reveal abnormal heart rate or rhythm. There may be evidence of ischaemic changes, ventricular hypertrophy or pericardial disease. Heart failure is unlikely in the presence of a normal ECG.^{12,13}

If BNP and/or ECG are abnormal the patient should be referred for echocardiography, which will help to confirm the presence of valve abnormality as well as identifying left ventricular systolic dysfunction, left ventricular hypertrophy and raised pulmonary arterial pressure.¹²

Chest x-ray may reveal chest wall abnormalities, evidence of pleural disease, neoplastic lesions, interstitial lung

disease, cardiomegaly or cardiac failure.

Pulse oximetry abnormalities may indicate desaturation at rest or after exercise – an indicator of gas exchange abnormalities.

Serial peak flow monitoring will identify variable airway obstruction and spirometry may show evidence of obstructive and restrictive lung disease.

Capnography or blood gas analysis may reveal hypocapnia indicative of hyperventilation.

Who should we refer?

Patients should be referred for specialist opinion when:⁴

- the underlying cause cannot be established definitively and referral is indicated for further investigation.
- symptoms are disproportionate to the apparent severity of the disease
- symptoms do not respond to therapy in order to confirm the diagnosis or alter therapy in order to alleviate symptoms

References

1. Toben MJ. Dyspnoea: Pathophysiological Status, The clinical presentation and management. *Arch Int Med* 1990;**150**:1604-13.
2. Zorob RJ & Campbell JS. Acute dyspnoea in the office. *American Family Physician* 2003; **68**(9):1803-10.
3. Parshall MB, *et al.* An Official American Thoracic Society Statement: Update on the Mechanisms, Assessment, and Management of Dyspnea. *Am J Respir Crit Care Med* 2012;**185**:435-452. (see <http://www.atsjournals.org/doi/abs/10.1164/rccm.201111-2042ST#UkXzcJ1wbGg>)
4. Kamani MG *et al.* Evaluation of chronic dyspnoea. *American Family Physician* 2005; **71**(8):1529-37.
5. Cosio BG, Agusti A. Co-morbidity; a distinc-

tive feature of elderly respiratory patients. *Eur Resp Mon* 2009;**43**:205-16.

6. Scaono G, Stendardi L, Grazzini M. Understanding dyspnoea by its language: *Eur Resp J* 2005;**25**:380-5.
7. Mahler DA. Do you speak the language of dyspnoea? *Chest* 2000;**117**:928-9.
8. Carson D, *et al.* Urgent Care: a practical guide to transforming same-day care in general practice. Primary Care Foundation <http://www.primarycarefoundation.co.uk/report.html>
9. Leach RM. Symptoms and signs of respiratory disease. *Medicine* 2008;**36**(3):119-25
10. National Clinical Guideline Centre. (2010) Chronic obstructive pulmonary disease: management of chronic obstructive pulmonary disease in adults in primary and secondary care. London: National Clinical Guideline Centre. Available from: <http://guidance.nice.org.uk/CG101/Guidance/pdf/English>
11. Morgan WC, Hodge HL. Diagnostic evaluation of dyspnoea. *American Family Physician* 1998;**57**(4):711-18.
12. Davie NP *et al.* Assessing diagnosis in heart failure which features are any use. *QJM* 1997;**90**:335-9.
13. National Clinical Guideline Centre. (2010) Chronic heart failure: the management of chronic heart failure in adults in primary and secondary care. London: National Clinical Guideline Centre. Available from: <http://guidance.nice.org.uk/CG108/Guidance/pdf/English>

Further reading:

- Penumonia Opinion sheet http://www.pcrs-uk.org/opinions/os33_pneumonia.pdf
- IPCRG Diagnosis Guidelines – PCRJ - Levy ML, Fletcher M, Price DB, Hausen T, Halbert RJ, Yawn BP. International Primary Care Respiratory Group (IPCRG) Guidelines: Diagnosis of respiratory diseases in primary care. *Prim Care Resp J* 2006;**15**(1):20-34. doi: <http://dx.doi.org/10.1016/j.pcrj.2005.10.004>