



# Primary Care Respiratory Society

## Get Winter Wrapped

## The differential diagnosis of the breathless patient



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### Introduction

Breathlessness is the subjective sensation of difficulty in breathing, which may be laboured or uncomfortable.<sup>1</sup> 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.<sup>2</sup> Behaviour and emotional state also exert an important influence on the expression of respiratory sensations.<sup>3</sup> Breathlessness 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 disorder<sup>4</sup> there are other causes that need to be considered. It often has multiple causes particularly in the elderly.<sup>5</sup> As with the symptom of pain, patients use distinct descriptors when describing it. 'Chest tightness', 'choking', 'suffocation' and 'air hunger' are some of the terms used. However, the language used to describe it is not specific, and individual descriptions are dependent upon physiological context, personality, social and ethnic factors.<sup>6,7</sup>

Common causes of breathlessness include asthma, chronic obstructive pulmonary disease (COPD) pneumonia, pulmonary embolism, lung cancer or pleural effusion.<sup>8</sup> Distinguishing between these potential causes requires a careful evaluation of the presenting breathlessness, patient history, physical examination and, in some cases, further investigations.

### Taking a history

A careful history will yield important diagnostic clues (Table 1). 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). Acute cause (Table 2) often overlaps with chronic (duration greater than four weeks) (see Table 3). In primary care, telephone triage is an important initial step in assessing the degree of urgency, and adequate training of reception staff and a framework to identify urgent cases is recommended to provide proper care and to minimise risk.<sup>9</sup> Those describing severe breathlessness or sudden onset of chest pain should be directed to the emergency department as an emergency usually by ambulance. Rapid assessment will establish if the patient is unstable (Table 4). Unstable patients requiring emergency hospital care may present with one or more of the following (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)



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**Table 1: Diagnostic clues from the history (adapted from references 2 and 4)**

Clues from symptoms or history	Possible diagnosis
Nocturnal cough; intermittent breathlessness; wheezing; triggering asthma factors; allergic rhinitis	Asthma
Pleuritic chest pain	Pericarditis, pulmonary embolism, pneumothorax, pneumonia, empyema
History of hypertension; CAD; MI; diabetes; orthopnea; nocturnal paroxysmal dyspnoea; oedema	Congestive heart failure
Recent trauma; surgery; pregnancy; 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 dependency	COPD, congestive heart failure, malignancy
Indigestion, dysphagia, cough after eating	GERD, aspiration (foreign body)
Postprandial dyspnoea	GERD, 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

CAD, coronary artery disease; COPD, chronic obstructive pulmonary disease; GERD, gastroesophageal reflux disease; MI, myocardial infarction

**Table 2: Differential diagnosis of acute breathlessness in adults (NICE 2020)**

<b>Cardiac</b>	Silent MI, cardiac arrhythmia, acute pulmonary oedema, cardiac tamponade, chronic heart failure
<b>Pulmonary</b>	Asthma, COPD, pneumonia, pulmonary embolism, pneumothorax/tension pneumothorax, pleural effusion, lung/lobar collapse, bronchiectasis, interstitial lung disease, lung or pleural cancer
<b>Other causes</b>	Anaemia, diaphragmatic splinting, anxiety-related breathlessness

COPD, chronic obstructive pulmonary disease; MI, myocardial infarction

**Table 3: Differential diagnosis of chronic breathlessness**

<b>Cardiac</b>	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
<b>Pulmonary</b>	COPD, asthma, interstitial lung disease, pleural effusion, malignancy (primary or metastatic), bronchiectasis, upper airway obstruction (laryngeal disease, tracheal stenosis)
<b>Other causes</b>	Thromboembolic disease, neuromuscular disorders (myasthenia gravis, amyotrophic lateral sclerosis), chest wall deformities (kyphoscoliosis), anaemia, obesity, psychogenic causes (GAD, PTSD, panic disorders, dysfunctional breathing), deconditioning, GERD, metabolic conditions (acidosis, uraemia), liver cirrhosis, thyroid disease

COPD, chronic obstructive pulmonary disease; GAD, generalised disorder; GERD, gastroesophageal reflux disease; PTSD, post-traumatic stress

**Table 4: The initial face to face assessment of patients with breathlessness<sup>2</sup>**

- 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

- Respiratory rate above 30 breaths per minute, cyanosis, and signs of respiratory distress.

In stable patients and those with a long term established cause a comprehensive history and analysis of clinical signs are the most important factors in establishing the current cause.<sup>2,4</sup> 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.<sup>10</sup> Breathlessness when supine (orthopnoea) commonly occurs in LVF. The presence of cough, chest pain or palpitation can help narrow the diagnosis.<sup>11</sup> 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 (Table 5). 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, displacement 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, a normal B-type natriuretic peptide (BNP or NT proBNP) rules out heart failure. ECG may reveal abnormal heart

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

Physical exam findings	Possible diagnosis
Wheezing, pulsus paradoxus, accessory muscle use	Acute asthma, COPD exacerbation
Wheezing, barrel chest, decreased breath sounds, flap, peripheral vasodilation	COPD exacerbation (+/- acute CO <sub>2</sub> retention)
Fever, crackles, increased fremitus, bronchial breathing	Pneumonia
Oedema, neck vein distension, S3 or S4, hepatojugular reflux, murmurs, coarse Congestive heart failure, pulmonary oedema 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) fibrosing 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 <sub>2</sub> ; right ventricular heave; murmurs	Pulmonary hypertension

COPD, chronic obstructive pulmonary disease

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.<sup>12,13</sup> 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 identifying left ventricular systolic dysfunction, left ventricular hypertrophy and raised pulmonary arterial pressure.<sup>12</sup> 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. Fractional exhaled nitric oxide levels can support a clinical suspicion of asthma. Capnography or blood gas analysis may reveal hypocapnia indicative of hyperventilation.

## Remote assessment of breathlessness

Where initial face to face assessment of a patient presenting in primary care with breathlessness is not possible or appropriate, assessment can be undertaken remotely via telephone or video messaging. While there are currently no validated tests for the remote assessment of breathlessness in patients presenting with breathlessness the ability of a patient to complete full sentences and the recently proposed algorithm from the Centre for Evidence-Based Medicine (CEBM) are helpful.

In response to the COVID-19 situation and the challenge of face to face evaluations, the CEBM proposed an algorithm for the remote assessment of breathlessness in the acute primary care setting. The algorithm takes into account the patient's own description of their problem, asks specific questions to enable the patient to describe their breathing in more detail and focuses

**Table 6: Centre for Evidence-Based Medicine (CEBM) recommendations for the remote assessment of breathlessness<sup>14</sup>**

1	Ask the patient to <b>describe the problem with their breathing in their own words</b> and assess the ease and comfort of their speech. Ask open-ended questions and listen to <b>whether the patient can complete their sentences</b> “How is your breathing today?”
2	Align with NHS111 symptom checker, which asks three questions (developed through user testing but not evaluated in formal research): “Are you so breathless that you are unable to speak more than a few words?” “Are you breathing harder or faster than usual when doing nothing at all?” “Are you so ill that you’ve stopped doing all of your usual daily activities?”
3	Focus on change. A <b>clear story of deterioration</b> is more important than whether the patient currently feels short of breath. Ask questions like “Is your breathing faster, slower or the same as normal?” “What could you do yesterday that you can’t do today?” “What makes you breathless now that didn’t make you breathless yesterday?”
4	Interpret the breathlessness in the <b>context of the wider history and physical signs</b> . For example, a new, audible wheeze and a verbal report of blueness of the lips in a breathless patient are concerning

on recent changing in breathing in the context of the patients wider clinical picture (Table 6).<sup>14</sup>

## Who should we refer?

Patients should be referred for specialist opinion when:<sup>4</sup>

- 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.

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### Further reading:

The IMPRESS Breathlessness Algorithm, developed by the PCRS in collaboration with the British Thoracic Society, provides additional guidance on managing the patient presenting with breathlessness. <https://www.respiratoryfutures.org.uk/resources/imp-press-documents/imp-press-breathlessness-algorithm/>

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