In brief

Breathlessness post COVID-19

26 April 2022

Questions

• How to determine those patients who present with ongoing breathlessness in need of urgent review or intervention due to suspected pulmonary embolus?
• What is the evidence-based management approach for breathlessness as a symptom of post-acute sequelae of COVID-19?

Background

• SARS-CoV-2 infection can affect multiple organs, including the respiratory and cardiovascular system.1
• Shortness of breath (dyspnoea) is one of the commonly reported symptoms in people experiencing post-acute sequelae of COVID-19.2
• The prevalence of persistent breathlessness is estimated to be around 25% three to 12 months after recovery from the acute phase of COVID-19.3

Summary

Assessment of ongoing breathlessness and suspected pulmonary embolism

• The National Institute for Health and Care Excellence (UK) guideline, as well as other guidelines and individual studies, recommends that patients with ongoing breathlessness and a history of COVID-19 should be referred to relevant acute services if they have signs or symptoms that could be caused by an acute or life-threatening complication. Possible complications include (but are not limited to) cardiac chest pain, acute onset or severe shortness of breath, and other signs of severe lung disease.4-6
• In investigating suspected pulmonary embolism post COVID-19 infection, the following are recommended:
  o High suspicion if the respiratory symptoms worsen abruptly, typical symptoms of deep-vein thrombosis and/or acute unexplained right ventricular dysfunction7
  o The same D-dimer threshold (500ng/ml) used among non-COVID-19 patients to rule out pulmonary embolism can be used as it had high sensitivity at above 90%.8 Age-adjusted D-dimer strategy had superior specificity compared to the absolute D-dimer test threshold.9
  o Using pre-test probability or predictive scores for suspected pulmonary embolism to decrease imaging testing, including CT pulmonary angiogram (CTPA), was found to be promising.10-12

Managing breathlessness
Peer-reviewed literature most commonly suggests non-pharmacological strategies for managing breathlessness as a symptom of post-acute sequelae of SARS-CoV-2. These strategies include:

- **Self-management:**
  - Breathing exercise
  - Limiting factors that exacerbate dyspnea, including stopping smoking, avoiding pollutants, avoiding extremes in temperature and exercising
  - Optimal body positioning
  - Ongoing education and support

- **Rehabilitation:**
  - Individualised rehabilitation programs, including pulmonary rehabilitation, provided by an interdisciplinary team. Nature and extent of rehabilitation should be informed by the care setting and COVID-19 severity
  - Telerehabilitation and virtual rehabilitation programs
  - Moderate to high-intensity aerobic exercise
  - Modified rehabilitation such as stretching, body rotations, acupressure and massage

In Australia, the Royal Australian College of General Practitioners (RACGP) published guidelines recommending care of patients with post–COVID-19 conditions. Recommendations for care include pulmonary rehabilitation, chest X-ray if breathlessness persists after 12 weeks, an individualised plan to return to exercise, and corticosteroids for inflammatory lung disease.

**Evidence**

**Peer-reviewed literature**

- Compared to the other post-acute symptoms which showed a progressive decrease in prevalence over time, dyspnoea remained at a stable prevalence over one-year follow up. Dyspnoea was the most reported symptom (around 70%) in both the COVID-19 and non-COVID-19 patients with pulmonary embolism.

- For ongoing breathlessness post COVID-19, supported self-monitoring at home, which may include heart rate, pulse oximetry or symptoms, was often recommended. Other assessment and monitoring options include offering appropriate exercise tolerance tests or pulmonary function tests suited to the person’s ability. A chest X-ray may be required if the person is continuing to experience breathlessness by 12 weeks, and it is clinically indicated.

- Strategies to manage breathlessness as a symptom of post-acute sequelae of COVID-19 with promising results include: individualised rehabilitation programs provided by an interdisciplinary team with pulmonary rehabilitation component, telerehabilitation programs based on respiratory exercises, deep breathing exercises with Triflo, and moderate-to high-intensity aerobic and breathing exercises.

- Evidence suggests that risk factors for developing pulmonary embolism in the post-acute COVID-19 phase include admission into an intensive care unit during the acute phase, corticosteroid administration during COVID-19 treatment, recent immobilisation, previous thromboembolic
disease, obesity, and being male.\textsuperscript{20, 26-33} The risk of developing pulmonary embolism is highest in the first two weeks following infection and diagnosis, and the risk decreases over time.\textsuperscript{26, 34}

- For investigating suspected pulmonary embolism in patients with breathlessness, the D-dimer measurement which is generally used for exclusion of pulmonary embolism, has decreased specificity in COVID-19 patients.\textsuperscript{10, 35, 36} However, its sensitivity (with a threshold of 500ng/ml) remained high at above 90\%.\textsuperscript{8} Age-adjusted D-dimer strategy improved specificity compared to absolute D-dimer threshold.\textsuperscript{9}

- Studies suggest using pretest probability or predictive scores for suspected pulmonary embolism to decrease imaging testing, including CTPA. One systematic review found the CHOD score (C-reactive protein, heart rate, oxygen saturation, D-dimer) to be the most promising predictive score for the occurrence of pulmonary embolism in hospitalised COVID-19 patients.\textsuperscript{37} Recent studies also suggest risk prediction models using D-dimer and the extent of lung damage on CT scan,\textsuperscript{10} or echocardiography, troponin, cell blood count parameters.\textsuperscript{11, 12}

Grey literature

- The Royal Australian College of General Practitioners (RACGP) published a guideline to support general practice teams to collaborate with local hospital services and/or community-based multidisciplinary services in the care of patients with post-COVID-19 conditions. For management of breathlessness, recommendations include:
  - Optimise management of pre-existing respiratory conditions
  - Recommend respiratory muscle conditioning (pulmonary rehabilitation)
  - Consider chest X-ray at 12 weeks for patients who have had significant respiratory illness
  - Corticosteroids could be considered for inflammatory lung disease
  - Recommend gradual commencement or return to symptom-limited exercise, guided by tertiary-trained exercise professionals
  - Referral to a speech pathologist for management of chronic cough, hoarse voice or dysphagia
  - Consider home pulse oximetry measurement
  - Referral to an accredited practising dietitian if symptoms interfere with nutrition, and speech pathology if dysphagia is present\textsuperscript{4}

- The National Health Service (NHS) lists pulmonary embolism for consideration as a compilation from post-acute SARS-CoV-2 in patients presenting with breathlessness. The requirements for assessment in this population include oxygen saturation at rest and post-exertion, if safe to do so, using the one-minute sit-to-stand test, chest X-ray, electrocardiogram, and B-type natriuretic (BNP).\textsuperscript{38}

- In the UK, the National Health Service Leeds Clinical Commission Group published a flowchart for managing the long-term effects of SARS-CoV-2. It recommends that if breathlessness is not improving three months post-covid, a review can be considered. Red flags for patients with breathlessness include:
  - Acute onset (<48 hours) and severe shortness of breath O$_2$<93\% (if new for the patient)
  - Resting pulse <60 bpm or >120 bpm
  - Respiration rate >30 breaths per minute
  - Myocardial ischaemia (chest pain)
  - Syncope/postural dizziness
  - Heart failure

In brief documents are not an exhaustive list of publications but aim to provide an overview of what is already known about a specific topic. This brief has not been peer-reviewed and should not be a substitute for individual clinical judgement, nor is it an endorsed position of NSW Health.
COVID-19 Critical Intelligence Unit: Breathlessness post COVID-19

To inform this brief, PubMed and Google searches were conducted using terms related to (COVID-19 AND pulmonary embolism) AND (assess OR manage) on 04 April 2022.

References


Evidence checks are archived a year after the date of publication.