



Stephen's Breathing'

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Stephen's presentation

- Stephen, 29, presents to the emergency department with a two-hour history of laboured breathing, non-productive cough and chest tightness.
- His mother gives his medical history as he is becoming increasingly confused and exhausted.
- He has a 16-year history of poorly controlled asthma, characterized by sudden, severe exacerbations and increasing use of bronchodilator therapy.
- Since the onset of the current attack, he has used his salbutamol puffer twice with no relief.
- A differential diagnosis is established (Table 1).

Table 1

Differential diagnosis
like asthma

- Sudden, rapid symptom progression
- Prior intubation or admission to the intensive care unit for asthma
- More than two admissions to hospital for asthma in the past year
- Frequent ED visits (more than three per year)
- Excessive use of vasodilator therapy (more than two canisters per month)
- Current use of, or recent withdrawal from, systemic corticosteroids
- Comorbidities, including systemic, cardiovascular or psychiatric disease
- Use of recreational drugs, particularly inhaled cocaine and heroin
- History of allergies or allergic triggers

Physical exam

- Patient is in obvious distress sitting forward, using accessory muscles of respiration and wheezing on expiration.
- He is diaphoretic, cyanotic and mildly agitated.
- Vitals are as follows:
 - Heart rate: 140 beats per minute
 - Respiration rate: 42 breaths per minute
 - Blood pressure: 120/80 mmHg
 - Temperature: 37.3 C
 - Oxygen saturation: 86% on room air

Questions & Answers

1. What questions should be asked?

For any patient presenting to the emergency department (ED) with symptoms consistent with asthma, a detailed history of the current episode as well as previous asthma-like symptoms is vital. Patients tend to experience episodes of similar course and severity, so a good past asthma history is invaluable to guide current management. This history should include the date of onset and triggers for previous attacks, the need for intubation, and the need for admission to the intensive care unit.

3. What investigations should be done?

Pulmonary function testing (PFT) directly assesses the degree of airflow obstruction in asthmatics and is, therefore, the most useful tool in guiding treatment decisions. PFT should be routine for all patients presenting to the ED with asthma-like symptoms, but is often not feasible during a severe attack. PFT includes measurement of forced expiratory volume in one second from maximal inspiration

Stephen's management

- Systemic corticosteroids, 100% oxygen and continuous four beta agonist and anticholinergic therapy were initiated.
- Vitals are still deteriorating with oxygen saturation at 88%, despite oxygen therapy and heart rate falling to 124 beats per minute.
- On further inquiry, Stephen has had one admission to the intensive care unit six months ago following a similar attack and uses an average of three canisters of vasodilator per month.
- He was unable to comply with the PFT due to his current condition.
- Arterial blood gas analysis revealed a partial pressure of oxygen in arterial blood of 58 mmHg and a partial pressure of carbon dioxide in arterial blood of 47 mmHg and chest radiograph was normal.

Stephen's condition is entering the near-death category and he has several risk factors for serious morbidity and/or mortality, necessitating admission, frequent assessment and possibly intubation.


This department covers selected points to avoid pitfalls and improve patient care by family physicians in the ED. Submissions and feedback can be sent to diagnosis@sta.ca.

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and peak expiratory flow rate. These measures are important to assess, as the degree of airflow obstruction experienced by asthmatics is often underestimated when objective tools are not employed. Arterial blood gasses (ABGs) are not usually required in clinical assessment, as they correlate poorly with PFT and prognosis. In the case of a patient who is unable to comply with PFT, ABGs can be used to assess the severity of an attack, as the partial pressure of carbon dioxide in arterial gas increases with worsening hypoxemia. Severe asthma is indicated by partial pressure of oxygen in arterial blood ≤ 60 mmHg or partial pressure of carbon dioxide in arterial blood ≥ 42 mmHg. A chest radiograph should be obtained whenever a complicating cardiopulmonary condition is suspected and should be routine in any patient not responding to optimal therapy.

4. How should Stephen be managed?

Stephen is presenting with severe to near-death asthma. The Canadian Association of Emergency Physicians has published guidelines for emergency management of adult asthma ranging in severity from mild to life-threatening cases. Keeping with their recommendations, Stephen should be placed on 100% oxygen, administered systemic corticosteroids (Solumedrol IV, 120 mg) and given frequent to continuous beta agonists/anticholinergics. He should be monitored closely for improvement using cardiac monitoring and pulse-oximetry. In addition, an ABG should be obtained to search for a respiratory acidosis, which would indicate impending respiratory failure. A chest X-ray should be performed, as well as pulmonary function tests (if the patient is able to comply). In this range of severity, intubation should be considered. 

References available—contact *The Canadian Journal of Diagnosis* at diagnosis@sta.ca.