

# Hyperventilation Syndrome [238–249]

## 1. Introduction

- Hyperventilation syndrome (HVS) is a common presentation in prehospital care.
- It is defined as ‘**a rate of ventilation exceeding metabolic needs and higher than that required to maintain a normal level of plasma carbon dioxide (CO<sub>2</sub>).**’
- Hyperventilation can occur in a number of conditions, including life-threatening conditions such as:
  - pulmonary embolism
  - diabetic ketoacidosis
  - asthma
  - hypovolaemia.

The cause of hyperventilation cannot always be determined in the prehospital environment, especially in the early stages.

## 2. Incidence

- It is estimated that 6–11% of primary care patients may suffer from some form of HVS. The condition is more common in women.
- HVS most commonly occurs between 15 and 55 years of age, although it can occur at any age, but it is rare in children where the most likely cause is physical illness.

## 3. Severity and Outcome

- Although death is rare, the condition can be debilitating with physical signs and symptoms and is distressing.

## 4. Pathophysiology

- The cause of HVS is unknown but it is hypothesised that stress may result in an exaggerated respiratory response. Stressors may include: psychological distress, caffeine, isoprenaline, cholecystokinin and deficiencies in sodium lactate metabolism. Other causes include elevated level of CO<sub>2</sub>, and some have argued that sufferers have a lower threshold trigger for the ‘fight-flight response’.
- HVS presents in two forms, acute and chronic. Acute HVS accounts for 1% of cases.

- Over-breathing results in hypocapnia (decreased level of carbon dioxide in the blood) causing respiratory alkalosis and a decreased level of serum-ionised calcium, resulting in a number of physical and psychological signs and symptoms. Patients may present with one or more of the signs and symptoms listed in Table 3.37.

**Table 3.37 – PRESENTING FEATURES**

### Signs and Symptoms

#### Breathing:

- Sudden dyspnoea.
- Hyperpnoea.
- Tachypnoea.

#### Electrolyte imbalance:

- Tetany due to calcium imbalance.
- Paraesthesia (numbness and tingling of the mouth and lips and extremities).
- Carpopedal spasm.

#### Psychological:

- Acute agitation and anxiety.

#### Other:

- Chest pain – may resemble angina pectoris.
- Palpitations.
- Tachycardia and electrocardiographic changes.
- Aching of the muscles of the chest.
- Feeling of light-headedness or dizziness.
- Weakness and fatigue.
- Frequent sighing.
- Non-diaphragmatic respiratory effort.

## Assessment and Management

For the assessment and management of hyperventilation syndrome refer to Table 3.38 and Figure 3.2.

## Methodology

For details of the methodology used in the development of this guideline refer to the guideline webpage.

## KEY POINTS

### Hyperventilation Syndrome

- **HVS is a diagnosis of exclusion.**
- **Medical conditions can cause hyperventilation.**
- **In children a medical cause is more likely than stress.**
- **Administer supplemental oxygen if hypoxaemic (SpO<sub>2</sub> <94%)**
- **Tetany, paraesthesia and carpopedal spasm may occur.**