

SLEEP-DISORDERED BREATHING IN HEART FAILURE

KEY FACTS

- Europe has an estimated 14 million patients suffering from heart failure and, as life expectancy increases, it is likely that so will this disease.^{1,2}
- Sleep-disordered breathing (SDB) is one of the most common co-morbidities in people with chronic heart failure and is estimated to be present in almost three quarters of patients.^{3,4,5}
- SDB causes a variety of issues that can put additional stress on a failing heart. The condition has therefore been linked to poorer outcomes in this patient population.⁶
- Despite high prevalence and potentially serious effects, the diagnosis and correct treatment of SDB in heart failure remains low.⁷
- The two main types of SDB are obstructive sleep apnea (OSA) and central sleep apnea (CSA), the latter is often associated with Cheyne-Stokes respiration (CSR).⁵
- CSA-CSR is a common form of sleep apnea where periods of hyperventilation alternate with central apneas (prolonged airflow pause) and/or hypopneas (air flow reduction).⁵
- In Europe, as many as 7 million people are suffering with heart failure combined with CSA-CSR, and could be at increased risk of death compared to people with heart failure alone.^{1,2,7,8,12}
- CSA-CSR can be effectively treated with adaptive servo-ventilation (ASV); a non-invasive ventilator therapy where an easy-to-fit mask carefully senses breathing patterns and makes intelligent adjustments that stabilise breathing.⁹ Error! Bookmark not defined.

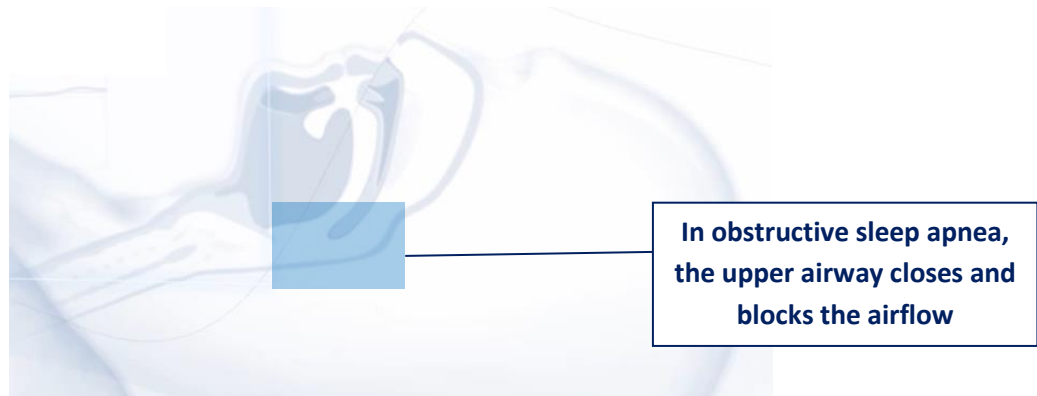
Heart failure

- Heart failure is a common, costly and potentially fatal condition, which occurs when the heart is prevented from, or unable to, pump enough blood to maintain the body's needs.⁹
- Common symptoms of heart failure include breathlessness or fatigue, either at rest or during exertion, ankle swelling and evidence of cardiac dysfunction at rest.¹⁰

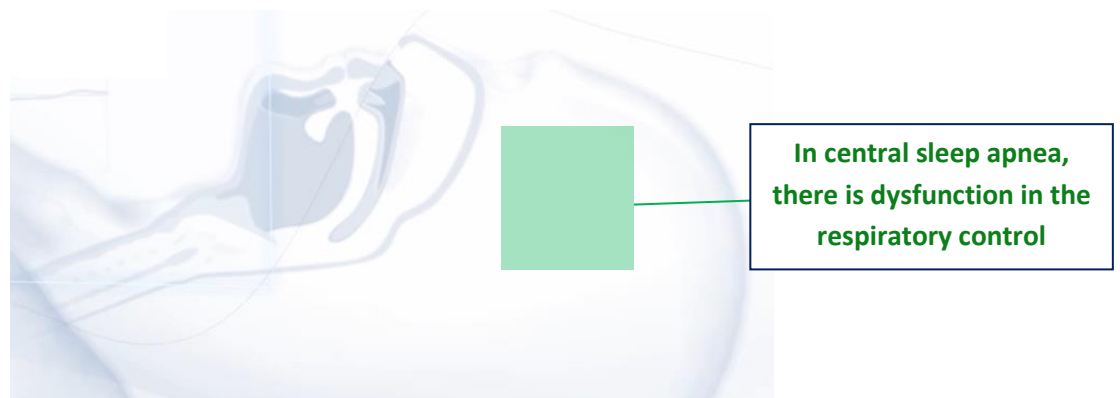
Sleep-disordered breathing (SDB)

- Sleep-disordered breathing (SDB) is a term commonly used to describe atypical breathing during sleep. It usually refers to a patient whose breathing rate increases and/or decreases in an unusual fashion, leading to pauses in breathing and reduced blood oxygen saturation levels.⁵
- SDB has been linked to a number of potentially harmful health issues, however it is commonly recognised to disrupt sleep, lead to a low oxygen saturation level and cause, or exacerbate, cardiovascular complications such as heart failure.⁵

- The decrease of breathing flow in SDB is referred to as:
 - Apneas (where breathing flow stops for an abnormally long period of time)
 - Hypopneas (where breathing flow significantly decreases).¹¹
- The two most common forms of SDB are:
 1. **Obstructive sleep apnea (OSA):**
Obstruction of the upper airway causes repetitive pauses in breathing during sleep.⁵

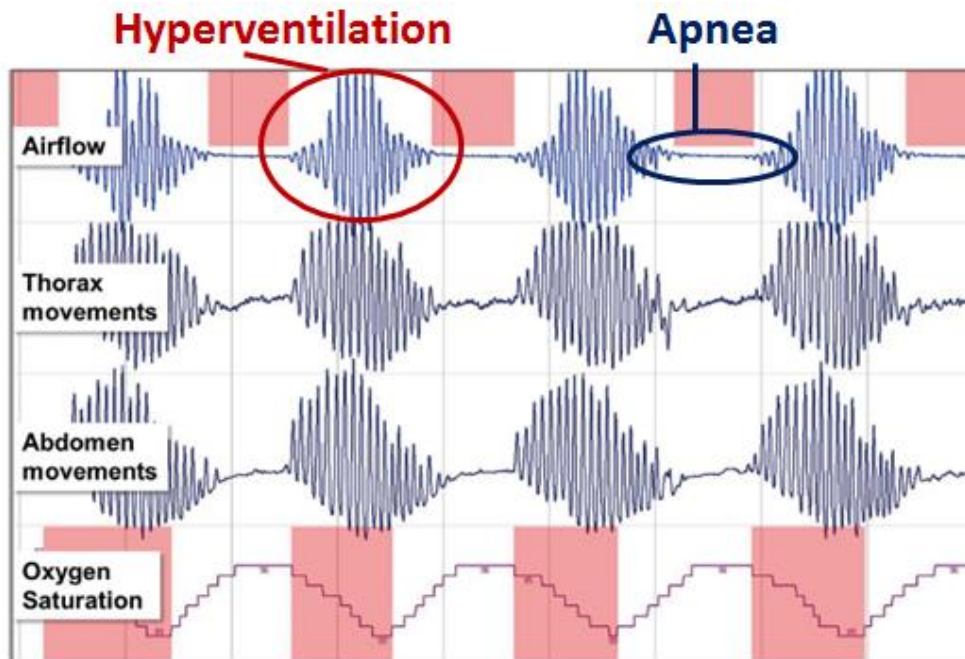


2. **Central sleep apnea (CSA)**
Malfunction of respiratory control causes a lack of drive to breathe during sleep. This results in periods of insufficient ventilation and compromised oxygen supply.



- **Cheyne-Stokes respiration (CSR)** is another form of SDB, characterised by periods of hyperventilation alternating with periods of breathing cessation (central apneas/hypopneas). This causes waxing and waning of breathing effort.
- CSA-CSR is a common type of sleep-disordered breathing in patients with heart failure, occurring in 30-50 percent of them.^{12, 8}

The below is an excerpt of a polygraphy recording of a heart failure patient with nocturnal CSA-CSR. This shows the waxing-waning breathing pattern associated with this condition and the increasing and decreasing oxygen saturation levels these patients experience.¹³



Sleep-disordered breathing in heart failure

- Among multiple heart failure co-morbidities, SDB is one of the most common. However it remains the one of the least recognised by cardiologists.⁵
- CSA-CSR can occur as a consequence of heart failure, and can be associated with increasing severity of the condition.^{1,14}
- Both OSA and CSA-CSR interfere with neurohumoral systems*, which may intensify a patient's heart failure condition.¹² Deprivation of oxygen affects the sympathetic nervous system, worsens the vascular endothelial function and puts stress on the heart.¹⁵
- Studies have indicated that a patient with heart failure and central sleep apnea may have a significantly reduced quality of life, compared to that of one with heart failure alone.¹⁶
- In addition to risk of death, it has also been shown that central SDB may significantly increase the chance of cardiac hospital readmissions in heart failure patients.¹⁷

*Neurohumoral activation refers to increased activity of the sympathetic nervous system, renin-angiotensin system, vasopressin and atrial natriuretic peptide.

Treating sleep-disordered breathing in heart failure

Treatment of SDB can improve cardiac function and may improve survival in heart failure patients.⁵

Obstructive sleep apnea:

- Moderate to severe cases of sleep apnea may need to be treated using a type of treatment called continuous positive airway pressure (CPAP). This involves using a breathing apparatus to enable breathing while asleep. A mask delivers a continuous supply of compressed air which prevents the airway from closing.

Central sleep apnea / CSA-CSR:

- Treating CSA-CSR using ventilator support devices such as adaptive servo-ventilation (PaceWave™ ASV) has shown:
 - To normalise nocturnal breathing pattern, improving sleep quality in patients with heart failure and CSA-CSR⁵
 - To normalise the Apnea-Hypopnoea-Index (AHI) and enable breathing. ASV-therapy has also been linked to significant increases in cardiac function⁵
 - That long-term PaceWave™ ASV treatment of CSA-CSR in heart failure patients may have potentially beneficial effects, particularly improvements in quality of life¹³

References

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