

Treatment of Dysfunctional Breathing

Types and Trials for those “Outside the Box” patients
GMBC 16th Voice Conference



JOHNS HOPKINS
M E D I C I N E

Disclosures

- Ashley C. Davis does not have any disclosures to make
- Rebecca Goldstein does not have any disclosures to make

What is Dysfunctional Breathing?

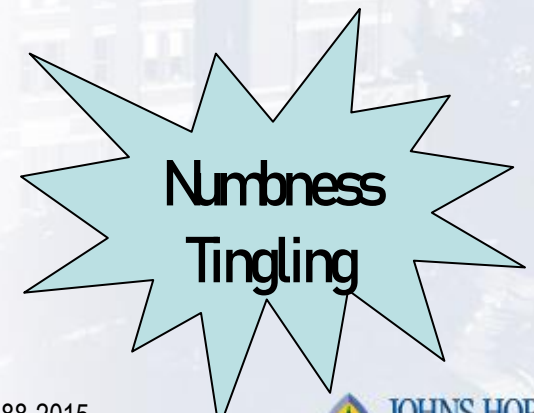
Irregular Breathing Pattern



Primary Air Hunger



No Stridor
Chronic Process
Non Episodic



April 10, 2024

Eur Respir Rev 2016; 25: 287–294 | DOI: 10.1183/16000617.0088-2015

3

Normal = respiratory rate and rhythm that is not labored with passive exhalation (RR 12-17 BPM)

Abnormal Respiration=

Tachypnea is an abnormal breathing pattern characterized by rapid breathing. It is defined as a respiratory rate that is greater than 20 breaths per minute (Heart failure, COPD, Pneumonia, Sepsis, Asthma, Pleural Effusion)

Bradypnea is the opposite of tachypnea and is defined as a respiratory rate of fewer than 12 breaths per minute (Drug overdose, Brain injury)

Apnea is a term that refers to the absence of spontaneous breathing. Therefore, the breathing pattern for apnea appears as a flat line because the patient is not performing inhalation or exhalation (CNS disorders, Severe brain injury, Cardiac Arrest) (Voluntary Breath Holding)

Hyperpnea is an abnormal breathing pattern characterized by an increased depth of breathing with or without an increase in rate. Therefore, the blood gas values of a patient with hyperpnea are normal (Exercise, High Altitude, Anemia, Acute lung injury)

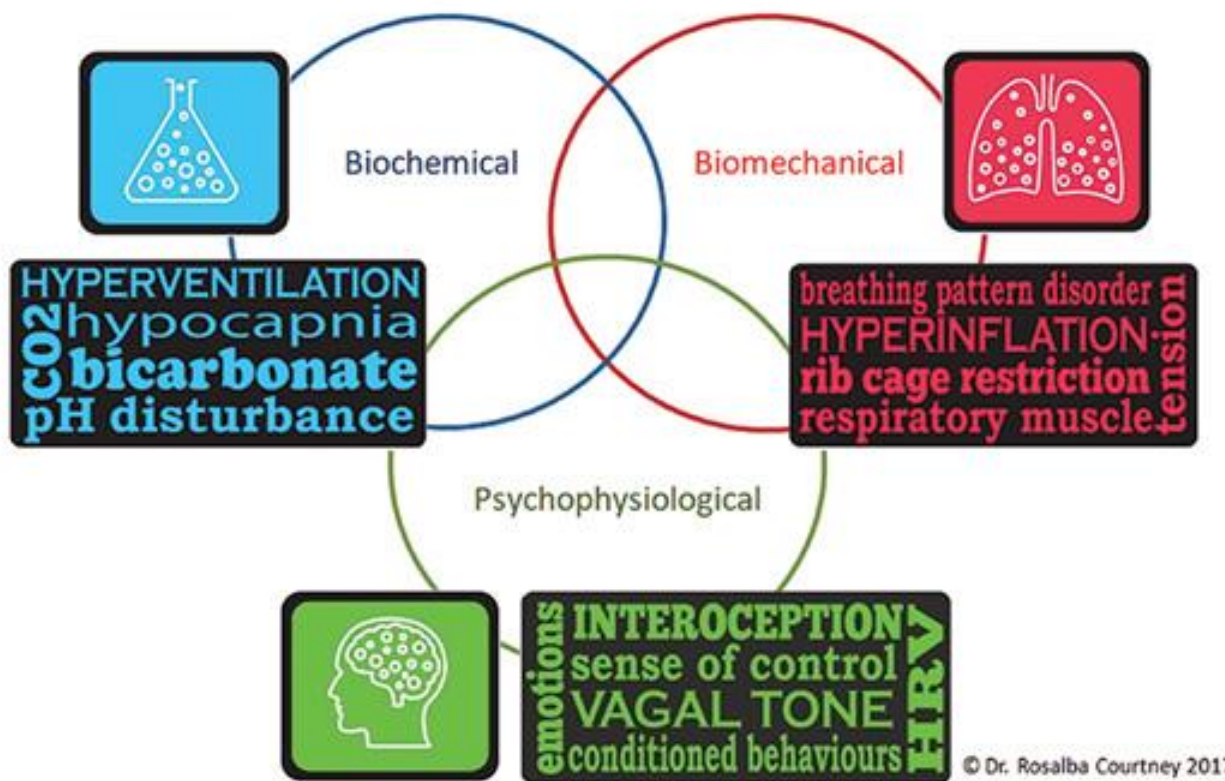
Hypopnea is an abnormal respiratory pattern characterized by a decrease in depth of breathing with or without a decrease in rate. This can result in hypoxemia and an increase in PaCO₂ (OSA/Partial Airway Obstruction)

Some Additional Abnormal Breathing Patterns SLP Will Encounter

- **Shallow breathing**- patient takes shallow, quick breaths can result in **hypoventilation** and lead to hypercapnia, which is an accumulation of carbon dioxide in the blood
- **Dyspnea**-shortness of breath and difficulty breathing as perceived by the patient
- **Hyperventilation**-abnormal respiration characterized by an **increase** in the rate and depth of breathing. This results in a **decrease** in the levels of carbon dioxide in the blood, which results in respiratory alkalosis
- **Hypoventilation-decrease** in the rate and depth of breathing. This results in an **increase** in the levels of carbon dioxide in the blood, which results in respiratory acidosis
- **Sighing**-involuntary inspiration that is deeper and longer than a normal tidal volume breath.
- **Gasping**-type of labored breathing with sudden, forced inspirations that often indicates shortness of breath or dyspnea
- **Mouth breathing**- nasal obstruction, pediatrics, can occur as a result of problems with the autonomic nervous system, such as cerebral palsy. In some cases, mouth breathing can lead to sleep apnea

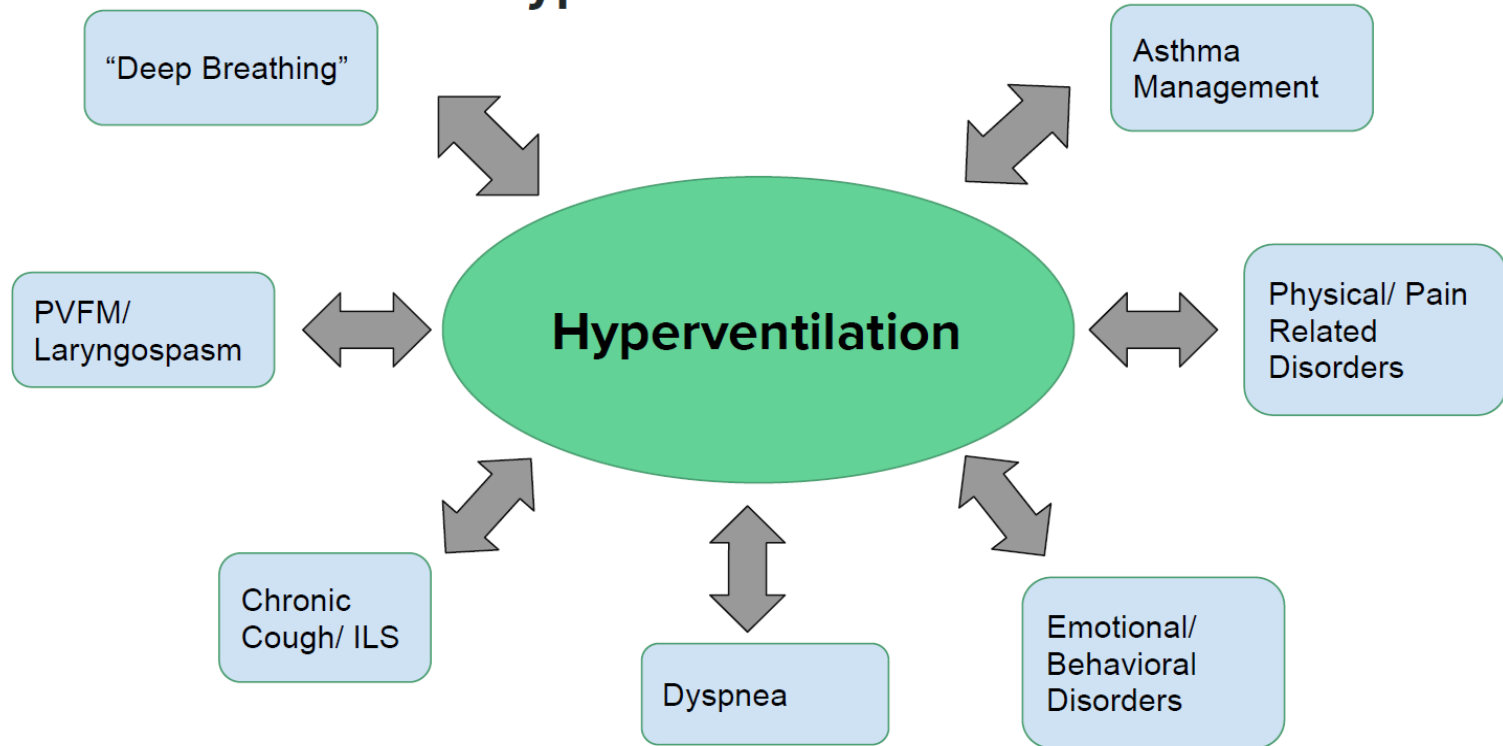
What Causes Dysfunctional Breathing?

Dimensions of Dysfunctional Breathing



Hyperventilation

The Hyperventilation Wheel



Symptoms of Over Breathing

BREATHING: shortness of breath, breathlessness, feelings of suffocation

CHEST: chest tightness, pressure, and pain

SKIN: sweaty, cold, tingling, and numbness

HEART: palpitations, irregularities, rate

EMOTION: anxiety, apprehension, worry, emotional outburst, crying

STRESS: tenseness, fatigue, weakness, headache, hypertension

HEAD: dizziness, lightheadedness, fainting, black-out, confusion, disorientation

SENSES: blurred vision, dry mouth, sound seems distant, reduced pain threshold

PSYCHOLOGICAL SHIFTS: memory discharge, hallucinations, self-esteem

COGNITION: attention deficit, loss of focus, inability to think

CONSCIOUSNESS: feelings of “other worldliness,” sense of disconnectedness

PERIPHERAL CHANGES: trembling, twitching, and shivering

MUSCLES: tetany, spasm, weakness, fatigue, and pain

ABDOMEN: nausea, cramping, and bloatedness

Signs on Evaluation

- Failure to breathe diaphragmatically
- Failure to exhale completely
- Failure to allow transition time between breaths
- Reaching for air through deep breathing
- Intentional manipulation of breathing
- Mouth breathing
- Using accessory muscles, when not required

Can SLP Treat Breathing?

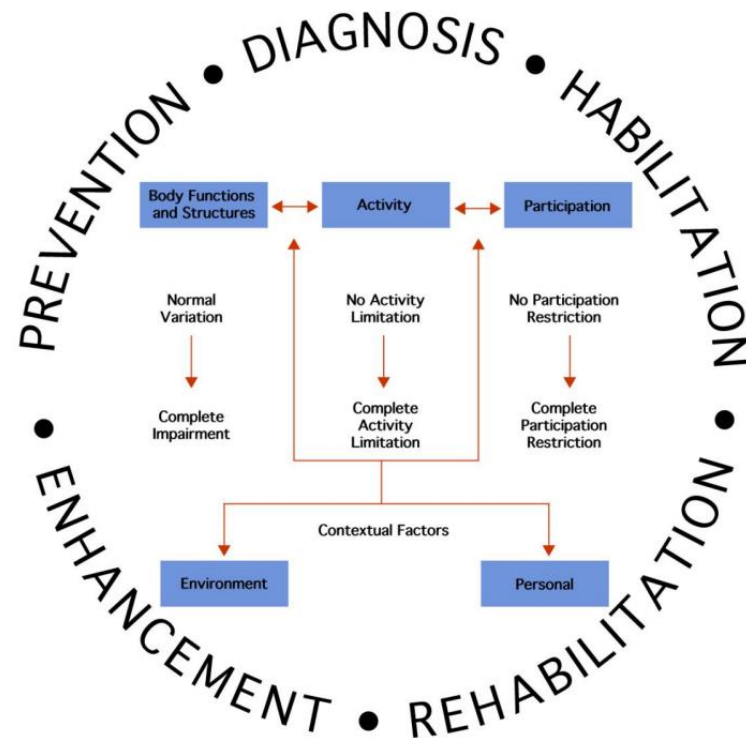


Figure 2. Interaction of the various components of the ICF model. This model applies to individuals or groups.

Ways To Measure Symptoms

Breathing Vigilance Questionnaire

TABLE 1 Initial 11-item version of the Breathing Vigilance Questionnaire (Breathe-VQ)

Item	Never	Sometimes	Always
1. I closely monitor how difficult my breathing feels	1	2	3 4 5
2. I become alarmed when I experience breathlessness or tightness in my chest	1	2	3 4 5
3. I am highly aware of small changes in how my breathing feels	1	2	3 4 5
4. I feel as if I am more aware of my breathing than other people	1	2	3 4 5
5. When something happens that affects my breathing, I am anxious to work out how breathless I am	1	2	3 4 5
6. I worry about fluctuations in my breathing	1	2	3 4 5
7. I avoid situations that I fear will increase feelings of breathlessness	1	2	3 4 5
8. I become preoccupied with monitoring my breathing	1	2	3 4 5
9. I remain calm in situations that affect my breathing	1	2	3 4 5
10. I worry that physical activity will increase my sensation of breathlessness	1	2	3 4 5
11. I dwell on my breathing	1	2	3 4 5

Instructions were: "Please read the sentences below and choose a number between 1 (never) and 5 (always) that best describes how you typically feel in relation to your breathing."

Dyspnea Severity Index

TABLE 2. Dyspnea Index (DI)*

Name: _____
Date: ____/____/____
Date of Birth: ____/____/____

These are some symptoms that you may be feeling. Please circle the response that indicates how frequently you experience the same symptoms (0 = never, 1 = almost never, 2 = sometimes, 3 = almost always, 4 = always)

1. I have trouble getting air in.	0	1	2	3	4
2. I feel tightness in my throat when I am having my breathing problem.	0	1	2	3	4
3. It takes more effort to breathe than it used to.	0	1	2	3	4
4. Changes in weather affect my breathing problem.	0	1	2	3	4
5. My breathing gets worse with stress.	0	1	2	3	4
6. I make sound/noise breathing in.	0	1	2	3	4
7. I have to strain to breathe.	0	1	2	3	4
8. My shortness of breath gets worse with exercise or physical activity.	0	1	2	3	4
9. My breathing problem makes me feel stressed.	0	1	2	3	4
10. My breathing problem causes me to restrict my personal and social life.	0	1	2	3	4

* DI, 2014 © is protected by international copyright / copyright registration, with all rights reserved to Jackie Gartner-Schmidt, Clark A. Rosen, Adrianna Shembel. Do not use without permission. For information on, or permission to use the DI 2014 ©, please contact Jackie Gartner-Schmidt or Clark A. Rosen.

Steinmann J, Lewis A, Ellmers TJ, et al. Validating the Breathing Vigilance Questionnaire for use in dysfunctional breathing. Eur Respir J 2023; 61: 2300031 [DOI: 10.1183/13993003.00031-2023].

Control pause

- What is it?
 - Butyeko breathing technique used to increase control of airflow
 - Good for patients with any type of dysfunctional breathing
- Why?
 - Measuring “equal breathing,” - maintain equal O₂ intake and CO₂ exhalation
- How do we teach it?
 - Inhale through your nose and exhale through your nose
 - Pinch your nose and hold until you feel like you need to breathe in again



Initial respiratory rate

What is it?

- Measurement of how rapidly or slowly someone is breathing
- Good for patients who are chronic hyperventilators or dysfunctional breathers

Why?

- To reduce breathing rate and help reduce hyperventilation, stress, calm parasympathetic nervous system
- Above 12-17 BPM considered to be disordered

How do we teach it?

- Sit calmly, count how many breaths you take in a minute.
- To reduce your breathing rate:
 - Sit for another minute, count in for 2:3 ratio, 2:2 ratio, etc.

Diaphragmatic breathing

What is it?

- Reduced chest breathing, feeling the diaphragm muscle expand out and down on the inhale and retract on the exhale
- Good for any type of dysfunctional breather or human!

Why?

- Belly breathing can aid in reduce chest, neck and shoulder tension, allowing for efficient and effective breathing patterns
- How do we teach it?
 - Lay in supine position and place one hand on chest and one on belly. Feel belly expansion on the inhale
 - Place hands on sides, below the ribcage. Focus on lateral expansion
 - Advance to seated or standing position when ready



Biphasic breathing

What is it?

- Rescue breathing technique
- Good to use for athletes with PVFM

Why?

- Helps to maintain vocal fold abduction even during intense activity

How to teach it?

- 3 variants: tongue, tooth, lip
- First phase: Inhale with high resistance through reduced opening
- Second phase: Release high resistance to obtain a lower resistance (but still controlled) breathing posture on inhalation
- Repeat every 4 breath



Laryngospasm

What is it?

- Vocal folds close when they should be open. Often triggered by irritation
- Good for patients often report sensation of choking, spasm, and stridor

What exercise do we do?

- Controlled breathing: Nasal inhalation with pursed lip exhalation

How do we teach it?

- Take 2 sharp sniffs in through your nose, and exhale through pursed lips. Repeat this until the laryngospasm sensation subsides

(Murry & Sapienza, 2010)

Alternate nostril breathing

What is it?

- Rescue and controlled breathing technique.
- Good for patients with stress, anxiety, hyperventilation, PVFM

Why?

- Focusing on this slowed breathing pattern, with increased exhalation can induce a calming sensation to the parasympathetic nervous system. This can also help regulate breathing patterns and manage the O₂- CO₂ exchange

How do we teach it?

- Block one nostril with your thumb, breathe in for 4 counts
- Cover your other nostril with your pointer finger, hold for 7
- Release the first nostril and exhale for 8
- Repeat



(Ghiya, 2017)

Contraindications to Breathing exercises

- Patients with hypertension, heart disease, epilepsy, history of stroke, cancer, acute respiratory disease, and who are pregnant.
- Patient specific- Your exercise routine should be customized based on how patient presents at baseline and how they progress each week.
- Even slow progress can be effective and can improve patient quality of life.

