

Breathing Dysfunction in Treating Long Covid

What you should know;

What you can do in clinical practice

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What is a Breathing Pattern Disorder?

Breathing dysfunction ?

- **Dysfunctional breathing** is a term describing breathing disorders where chronic changes in breathing pattern result in dyspnoea and other symptoms in the absence or in excess of the magnitude of physiological respiratory or cardiac disease.

- Breathing Pattern Disorders are harder to pin down...

- **Breathing Pattern Disorder's**

Inappropriate breathing which is persistent enough to cause symptoms, with no apparent organic cause. They may also exist alongside an organic cause. BradCliff 2008

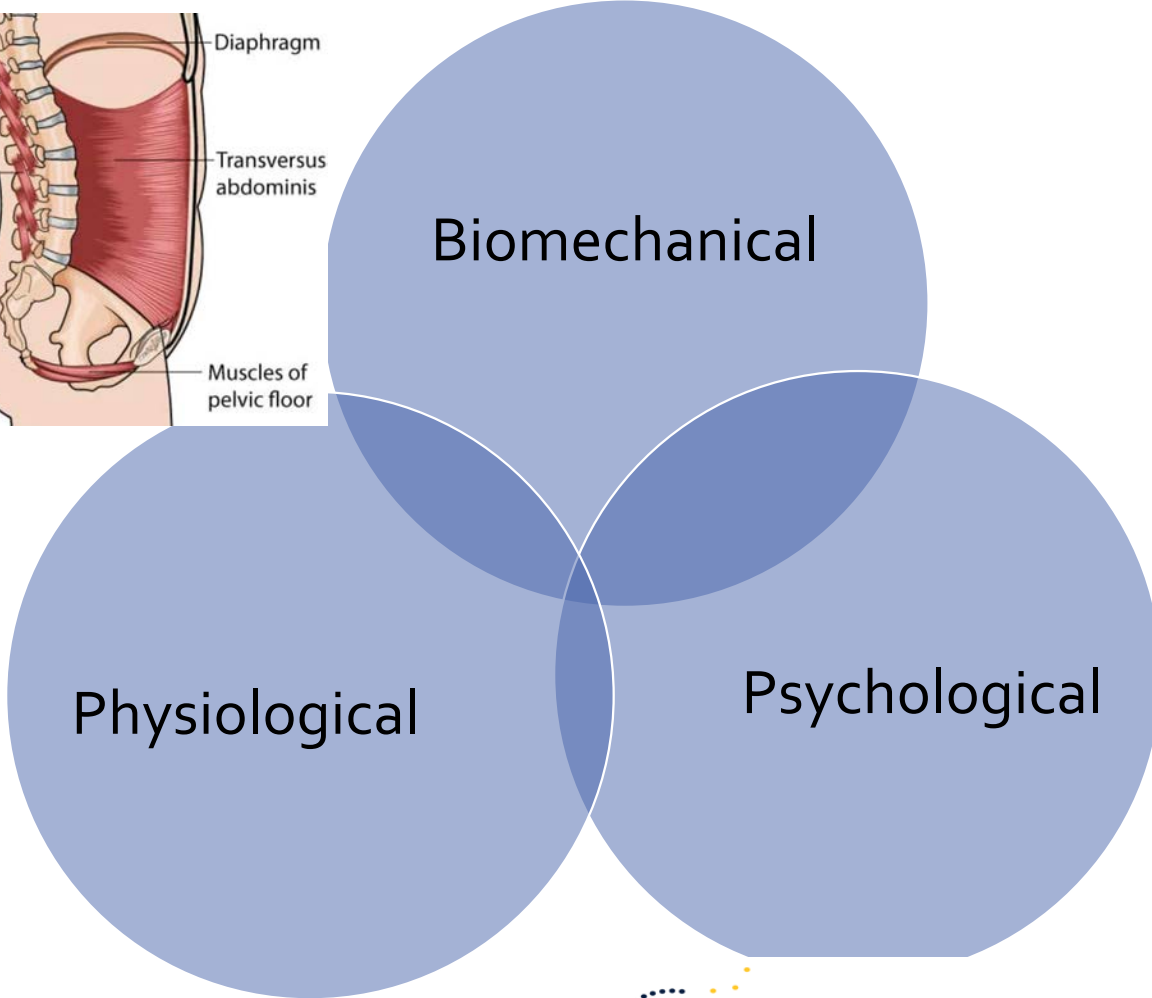
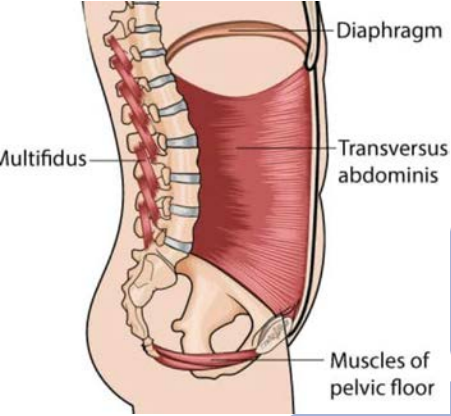
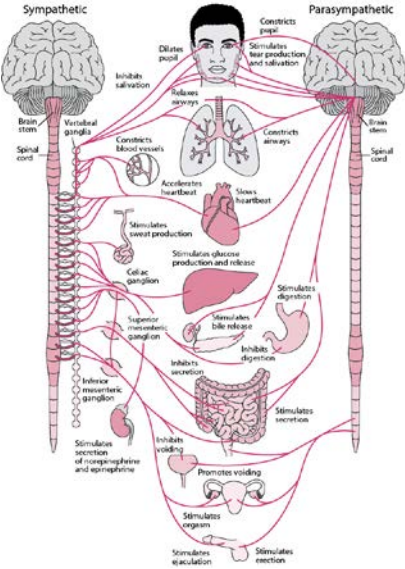
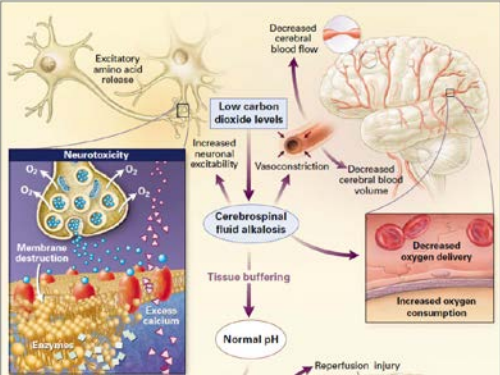


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BREATHING METHOD

Multi-dimensional

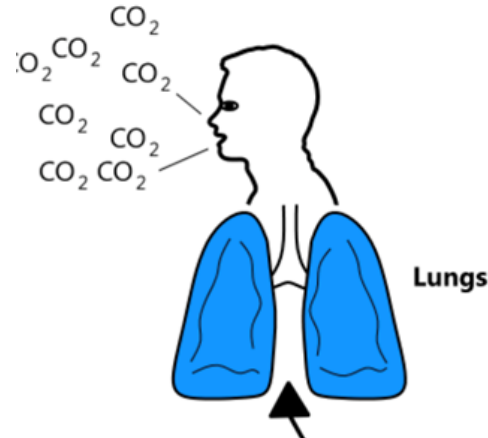
Maintains pH = Homeostasis

- Biomechanical
 - Nose vs mouth, abdominal vs apical
- Physiological / neural
 - CO2/O2, sympathetic/parasympathetic
- Psychological
 - Role of stress/anxiety



Chronic (full compensation occurs in 2 - 5 days)

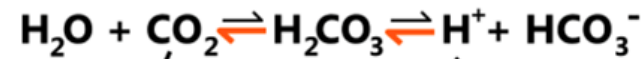
Bicarbonate Buffer & Role in CFS/ ME & ? Long Covid?



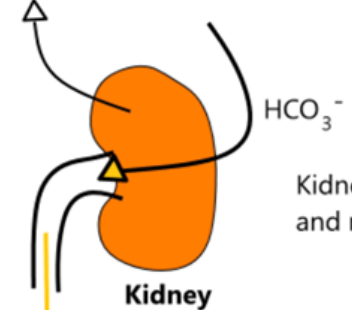
pH > 7.45
PaCO₂ < 35 mmHg

HCO₃⁻
Acute: decreases by 2 mEq/L for every PaCO₂ ↓ of 10 mmHg below 40 mmHg
Chronic: decreases by 4 - 5 mEq/L for every PaCO₂ ↓ of 10 mmHg below 40 mmHg

A-a gradient
 < 10 mmHG (< 20 elderly): hyperventilation without intrinsic lung disease
 > 10 mmHG (> 20 elderly): hyperventilation with intrinsic lung disease



In respiratory alkalosis, excessive CO₂ is removed by the lungs. The equation shifts to the left and H⁺ is removed.



Kidneys start to excrete HCO₃⁻ and retain H⁺ in order to lower pH

- Causes:**
- Hyperventilation (anxiety, mechanical ventilation)
 - Hypoxia
 - Sepsis
 - Central Nervous System disorders (e.g. stroke, infections)
 - Salicylate toxicity - salicylates stimulate respiratory centers in the CNS
 - Lung disease (interstitial lung disease)
 - Pregnancy
 - Hepatic encephalopathy

HCO₃⁻
HCO₃⁻
HCO₃⁻

Reference [1,2,3,5]

Effect of BPD on Long Covid

- Loss of homeostasis/physiological stability
- Potential for hypocapnia causing vasoconstriction
 - Brain fog
 - Fatigue
 - Vascular control - Dysautonomia /POTS
- Inefficiency of BPD
 - Apical dominant breathing can use up to 30% energy (vs 1-2% from diaphragmatic breathing)
- Adding to the disruption of the ANS
 - Facilitates the sympathetic “flight or fight” response



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BREATHING METHOD

Breathing Pattern Disorders

Nijmegen Questionnaire

80-85% of L.C display a BPD anecdotal observations and discussions L.C management team U.K.

The Nijmegen Questionnaire

The Nijmegen questionnaire gives a broad view of symptoms associated with dysfunctional breathing patterns. It is only a preliminary guide to breathing training.

Please ring the score that best describes the frequency with which you experienced the symptoms listed

Symptom	Never	Seldom	Some-times	Often	Very often
Chest pain	0	1	2	3	4
Blurred vision	0	1	2	3	4
Dizziness	0	1	2	3	4
Confusion or loss of touch with reality	0	1	2	3	4
Fast or deep breathing	0	1	2	3	4
Shortness of breath	0	1	2	3	4
Tightness across chest	0	1	2	3	4
Bloated sensation in stomach	0	1	2	3	4
Tingling in fingers and hands	0	1	2	3	4
Difficulty breathing or taking deep breaths	0	1	2	3	4
Stiffness or cramps in fingers and hands	0	1	2	3	4
Tightness around the mouth	0	1	2	3	4
Cold hands or feet	0	1	2	3	4
Palpitations in the chest	0	1	2	3	4
Anxiety	0	1	2	3	4
Totals					

Grand Total Score



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Breathing Pattern Disorders

Self Evaluation of Breathing Questionnaire

The Self Evaluation of Breathing Questionnaire

Scoring: (0) never/not true at all; (1) occasionally/a bit true; (2) frequently-mostly true; and, (3) very frequently/very true

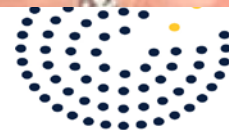
	0	1	2	3
1. I get easily breathless out of proportion to my fitness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I notice myself breathing shallowly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I get short of breath reading out loud or talking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I notice myself sighing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I notice myself yawning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I feel I cannot get a deep or satisfying breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I notice that I am breathing irregularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. My breathing feels stuck or restricted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. My ribcage feels tight and cannot expand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I notice myself breathing quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. I get breathless when I'm anxious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I find myself holding my breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I feel breathless in association with other physical symptoms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. I have trouble coordinating my breathing when I am speaking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. I can't catch my breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. I feel that the air is stuffy, as if not enough air in the room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I get breathless even when I am resting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. My breath feels like it does not go in all the way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. My breath feels like it does not go out all the way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. My breathing is heavy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. I feel that I am breathing more	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. My breathing requires work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. My breathing requires effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. I find myself breathing through my mouth during the day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. I breathe through my mouth at night while I sleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total				<input type="text"/>
A score greater than 11 may indicate problems with your breathing.				

Observe :

Nose vs Mouth

Hi-Lo

Resting Breathing
Rate per minute



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What is a normal breath?

- Adult at rest
 - Nose: humidifies, warms, filters, nitric oxide
 - Diaphragm: 90- 95% of work at rest
 - 8-12 breaths per minute
- Adolescent
 - 14-23 bpm
- Baby
 - 99 % Diaphragm (lack of calcification of ribs and sternum)
 - Rate-30-50 bpm



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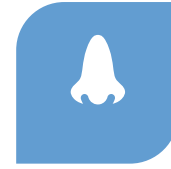
Treatment

Educate

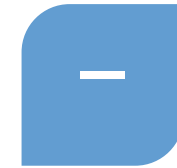
What we aim
for...at rest

During Exertion

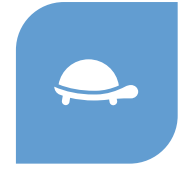
- Regular
- Rhythmical
- Effortless
- Quiet
- Nose Abdominal
- “Nose, low, slow”



NOSE



LOW



SLOW



"WHEN IN DOUBT BREATHE
OUT"



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Clinically

- Many are having a disrupted breathing pattern that is contributing to worsening symptoms and function
 - Breathing is not matching task
- Finding respiratory muscle weakness, however not clear whether frank weakness or related to fatigue/energy issues
- **Symptoms are stabilizing with breathing retraining and pacing and inspiratory muscle training where appropriate.**



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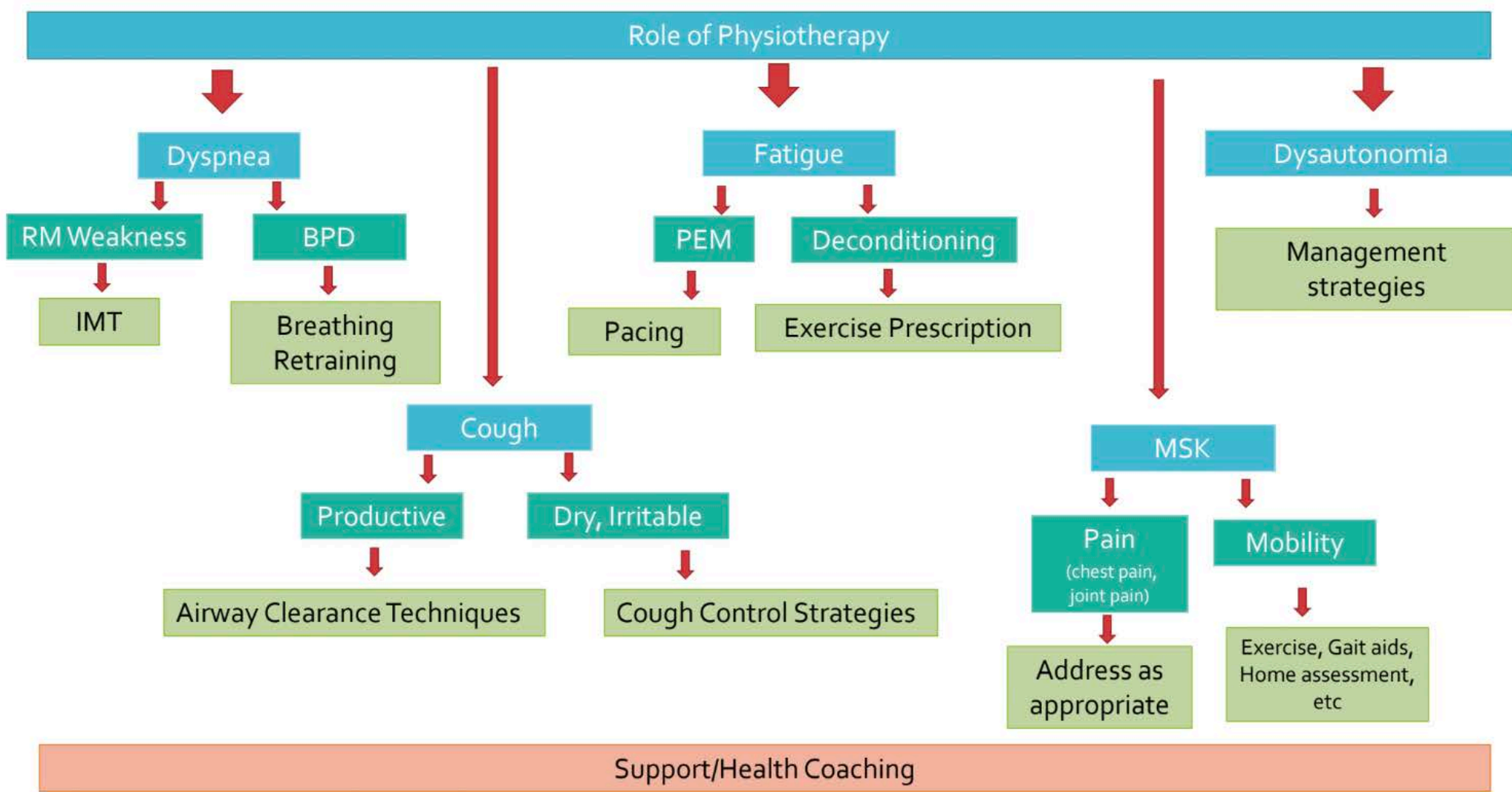
Treating Long Covid

Physiotherapy has further roles in support, education, and awareness of Long-COVID

Clinically, breathing retraining seems to be a logical and gentle starting point for rehabilitation in this patient group.

World Physiotherapy. World Physiotherapy Response to COVID-19 Briefing Paper 9. Safe rehabilitation approaches for people living with Long COVID: physical activity and exercise. London, UK: World Physiotherapy; 2021.

<https://longcovid.physio/our-work/world-physio-briefing-paper>



Source :www.physiotherapyforbpd.org.uk UK BPD Group



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Key Points

- Breathing pattern disorders can be driving some of the breathlessness as well as other symptoms
- Respiratory muscle weakness can drive breathlessness – especially in the post-intubated patients
- Breathing well can help individuals access better rest/recovery
- Breathing well can help break the symptom/anxiety cycle
- BPD up to 85-90% Long Covid cases- *NHS U.K observations.*



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Resources

- *"RECOGNIZING AND TREATING BREATHING PATTERN DISORDERS: a multidisciplinary approach."* Chaitow, Bradly, Gilbert
- *"BREATHING MATTERS: A New Zealand Guide"* By Tania Clifton-Smith, Jim Bartley
- Hot off the press! "How to take a Breath: Reduce stress and improve performance by breathing well" By Tania Clifton-Smith
- www.bradcliff.com
- Long Covid Physio
<https://longcovid.physio/>

