Dysfunctional Breathing: the Functional Screening Frequently Forgotten

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Objectives

- Differentiate between normal and dysfunctional breathing
- Identify paradoxical breathing in a patient population
- Identify various assessment techniques to assist in identification of dysfunctional breathing
- Understand various treatment options for dysfunctional breathing
- Describe how breathing can create or reduce dysfunction

- Breath taking Video
Breathing Testing

- Breathing count (White, 1997)
- Breathing Pause (White, 1997)

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<tr>
<th>Number count</th>
<th>%Percentage of Users</th>
<th>Rating</th>
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<tbody>
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<td>Excellent</td>
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<tr>
<td>110-149</td>
<td>5</td>
<td>Very Good</td>
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<td>90-109</td>
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<td>60-89</td>
<td>35</td>
<td>Fair</td>
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<td>2-59</td>
<td>47</td>
<td>Poor</td>
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<th>Pause Length</th>
<th>%Percentage of Users</th>
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<td>45-59</td>
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<td>15-29</td>
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<td>Fair</td>
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<td>0-14</td>
<td>23</td>
<td>Poor</td>
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Patient Reported Outcome – SEBQ
(Courtney & Greenwood, 2009)

- Self-Evaluation of Breathing Questionnaire
- Scoring
  - (0) Never/not true at all
  - (1) Occasionally/a bit true
  - (2) Frequently/mostly true
  - (3) Very Frequently/very true

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<tr>
<td>1. I get easily breathless out of proportion to my fitness.</td>
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<td>2. I notice myself breathing shallowly.</td>
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<td>3. I get short of breath reading aloud and talking.</td>
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<td>4. I notice myself sighing.</td>
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<td>5. I notice myself yawning.</td>
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<td>6. I feel I cannot take a deep or satisfying breath.</td>
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<td>7. I notice I am breathing irregularly.</td>
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<td>8. My breathing feels stuck or restricted.</td>
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<td>9. My ribcage feels tight and can’t expand.</td>
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<td>10. I notice myself breathing quickly.</td>
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<td>11. I get breathless when I’m anxious.</td>
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<td>12. I find myself holding my breath.</td>
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<td>13. I feel breathless in association with other symptoms.</td>
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<td>14. I have trouble coordinating my breathing when speaking.</td>
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<td>15. I can’t catch my breath.</td>
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<td>16. I feel that the air is stuffy, as if there isn’t enough air in the room.</td>
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<td>17. I get breathless even when resting.</td>
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<td>18. My breath feels like it doesn’t go in all the way.</td>
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<tr>
<td>19. My breath feels like it doesn’t go out all the way.</td>
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<td>20. My breathing is heavy.</td>
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<td>21. I feel that I am breathing more.</td>
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<td>22. My breathing requires work.</td>
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<td>23. My breathing requires effort.</td>
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<td>24. I breathe through my mouth during the day.</td>
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<td>25. I breathe through my mouth at night while I sleep.</td>
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Definition & Background

- Breathing pattern disorder (BPD)
  - Inappropriate breathing that is persistent enough to create symptoms with no apparent organic cause
    - Poor posture
    - Scapular dyskinesis
    - Low back pain
    - Neck pain
    - Temporomandibular joint pain
- The prevalence rate of BPD in the general population has been suggested to be as high as 5-11% in the general population, around 30% in asthmatics, and up to 83% in anxiety suffers. (Courtney 2009)
Breathing Mechanics

- Normal breathing should take little effort
  - 10-14 breaths per minute (Chaitow et al, 2014)
  - 5-6 breaths per minute (White, 1997)
  - Ratio or inspiration to expiration of 1:1.5 – 2 (Chaitow, 2014)
  - 21,000 breaths per day (Courntey, 2009)
  - Diaphragm and chest wall excursion during deep breathing is typically between 4 to 7 cm in healthy patients
Breathing Mechanics – Respiration

- The primary muscle responsible for respiration are the diaphragm, intercostal muscles, scalenes, transverse abdominis, muscles of the pelvic floor and deep intrinsic muscles of the spine (Perri & Halford, 2014)
  - Serves to function as postural function, core stabilizers in addition to respiration

- Accessory muscle
  - Scalenes
  - SCM
  - Upper Trapezius
Breathing Mechanics – Inspiration

- During inspiration the diaphragm moves inferior to increase the pressure in the abdominal cavity while decreasing its volume
  - Initiated in the abdomen, not the chest
- With continued contraction the vertical fibers attached to the lower ribs expand them open in a horizontal direction or “bucket handle” motion
- The dimensions of the thorax expand in all directions as if filling up a balloon

Perri & Halford, 2004
Breathing Mechanics – Inspiration

- Movement of the upper ribs develops in the last phase of inspiration and is commonly known as a “pump handle”

Perri & Halford, 2004
Faulty Breathing Pattern

- Vertical displacement of the sternum instead of widening of the horizontal plane -- “chest breathing”
  - Result of bilateral over activity of the scalenes, trapezius and lavator scapula
  - Most common fault in respiration resulting in:
    - Chronic cervical overstrain
    - Diminished activity of the inter costal muscles
    - Reduced rib motion
    - Increase in pectoralis major and minor, latissimus, serratus anterior and trapezius activity assuming a more respiratory function over postural responsibility

Frank et al, 2013
Breathing Mechanics – expiration

- In quiet respiration – expiration occurs passively
- The diaphragm relaxes and ascends
- The abdominal wall is drawn in towards the spine and the ribs and thorax move down and in
Intra-abdominal Pressure

- Stability of the spine is dependent on the dynamic coordination of numerous synergists and antagonist muscles for precise control (Frank et al., 2013)
- An increase in intra-abdominal pressure (IAP) stabilizes the spine
- The integrated spinal stabilizing system (ISSS) (Kolar, 2006)
  - Balanced co-activation between deep spinal flexors and spinal extensors in the cervical and upper thoracic region
  - The diaphragm, pelvic floor, and transverse abdominis regulate IAP and anterior lumbo-pelvic postural stability (Frank, 2013)
Breathing and Posture

• Since trunk muscles perform both breathing and posture, disruption of one function, can negatively affect the other (Hodges et al, 2007)

• Habitual chronic breathing pattern disorders interfere with normal function of key stabilizing muscles such as transverse abdominis and diaphragm (Chaitow, 20014)
Paradoxical Breathing

- Most severe dysfunction
- Abdomen is drawn in during inspiration and out during expiration
  - Occurs as a temporary reaction to bracing for anticipated action.
    - Stress
    - COPD
    - Habit of holding the abdomen rigid in an attempt to create the appearance of a flat stomach
Assessment
Hi-Lo Breathing Assessment

- Used to assess the movement of the upper rib cage and the lower rib cage/abdomen and determine aspects of breathing such as rate, rhythm, relative motion, and phase relation of upper and lower breathing compartments (Chatiow, Bradley, Gilbert, 2014)
  - Lower hand is related to the movement of the diaphragm
  - Upper hand represents upper chest breathing (scalenes)
Rib Palpation and Assessment

- Palpation of the first rib
  - Patient is placed in a seated position
  - Clinician pulls the trapezius posterior to access the first rib
  - Identification of the bony prominence of the first rib

- Seated Lateral Expansion
  - Patient seated with clinician behind patient
  - Clinician fingers along shafts of ribs 8-10
  - Clinician thumbs on either side of the spine
Breathing Retraining
Primal Reflex Release Technique (PRRT) (Iams, 2005)

- Diaphragm release
  - Patient in a supine position
  - Reach towards the toes by side flexing at the waste
  - Cough loudly one time
  - Repeat for opposite side
Dynamic Neuromuscular Stabilization (DNS)

- Supine with hips and knees flexed to 90 degrees
- Knees shoulder width apart
- Therapist applies a downward pressure in the patient’s groin area
- Patient feels that area of the abdominal wall and presses against the therapist’s fingers.
- The patient practices breathing without relaxation of the lower abdominals
- Goal of reflex stimulation is to set up an experience that transfers into exercise with volitional control (Kolar, 2006)

Frank et al, 2013
Crocodile Breathing

- Retraining the body to breath diaphragmatically
  - Lie prone
  - Inhale through the nose and press the belly into the floor
    - Sides of the bones of your hips and and lower ribs starts to expand
  - Exhale and sink into the floor
Conclusion

- BPDs are associated with anxiety and anxiety is associated with altered motor function, muscle imbalances, postural imbalances, trigger points (Cheitow, 2004)
- Breathing retraining can have a positive effect in normalizing BPD
- There is large number of breathing therapies utilizing a wide range of techniques
- Breathing techniques may be beneficial as an adjunct to the functional evaluation or when traditional treatments have not proved to adequately address a dysfunction
References


Questions