



Inspiratory/Expiratory Resistive Breathing Training (RBT) *Sample Protocol*

I. Description

The principle of inspiration and expiration through resistance is similar to any resistance training of the skeletal/limb muscles. In a sense, it is weight training for the respiratory muscles. Various diseases and conditions (i.e., neuromuscular disease, head/neck injury or surgery, vocal fold pathology) can cause the airways to be altered creating symptoms such as dysphagia, dysarthria, and dysphonia. Speech, swallowing, and phonation are normal functions that involve respiration/respiratory control. It has been well documented that resistive breathing training (RBT) can strengthen respiratory muscles including the accessory neck muscles which are in close proximity to the pharyngeal and laryngeal muscles. By strengthening these muscles, the functions of voice, speech, and swallowing may be improved.

II. Purpose

- A. Strengthen and tone inspiratory muscles. (i.e., diaphragm, external intercostals, accessory muscles of the neck, pharyngeal, and laryngeal muscles)
- B. Strengthen and tone expiratory muscles. (i.e. internal intercostals, abdominals)
- C. Generate improved airflow through the vocal folds.
- D. Improve swallowing.
- E. Improve protective cough and assist airway clearance.
- F. Assist teaching diaphragmatic breathing / deeper breathing (incentive spirometry).

III. Indications

- A. Dysarthria
- B. Dysphonia or Aponia
- C. Pharyngeal Dysphagia
- D. Shortness of Breath (i.e., stress; chronic obstructive lung disease; asthma)

IV. Contra-indications

Special considerations: Although no absolute contra-indications to RBT have been reported, the following should be carefully evaluated before the initiation of therapy: active hemoptysis, untreated pneumothorax, esophageal surgery, intracranial pressure > 20 mm Hg, recent facial, oral, or skull surgery or trauma, acute sinusitis, epistaxis, hemodynamic instability, bolus emphysema, extreme nausea, and suspected tympanic membrane rupture or other middle ear pathology.

V. Precautions

- A. May give patient training breaks as necessary, given that many disorders result in generalized fatigue and weakness to engage in strenuous lengthy regimens. However, it is important to be mindful that the benefits will usually be realized only with consistent, assertive training.
- B. Carefully increase resistances as RBT is more strenuous than appears. Note: Patient may be showing signs of fatigue when some of the inspirations cause an inward movement of the stomach or expansion of the upper chest rather than from the diaphragm.
- C. Patient should try to maintain diaphragmatic breathing throughout the session. Note: The stomach should be expanding during inspiration.

- D. Training may trigger coughing. This is therapeutic in that coughing helps to clear the airways.
- E. If patient experiences shortness of breath or a "panicking feeling," he should simply inhale and exhale comfortably through the Breather and avoid forceful use as in strength training. Often it takes less than a moment for breathing to become under control.
- F. Patient should try to train on a daily basis as it may take up to 4-6 weeks for beginning results.
- G. Initially training may cause a light-headed sensation which is normal and should quickly subside. Some patients may yawn or sigh during training due to the opening of smaller airways and alveoli.
- H. If shortness of breath, increased heart rate, or breathing difficulties occur during or after training, notify patient's physician and document.
- I. The optional oxygen adaptor may be used for patient's who have a prescription for supplemental oxygen. Note A: The optional oxygen adaptor *is not necessary* if patient is using a cannula and has normal, patent airways for normal inhalation naturally entrains the oxygen enriched air into the lungs. Note B: Ensure appropriate liter flow of oxygen in accordance with physician orders if adaptor is used. Note C: If nose clips are used, the oxygen adaptor is necessary.
- J. The Breather is designed for single patient use and should be cleaned according to manufacturer's instructions.

VI. Equipment

- A. Gloves.
- B. One resistive Breather per patient as it is for single patient use. Note: Permanent marker to label patient's resistive Breather for individual use.
- C. Pulse Oximetry may be considered to monitor patient's heart rate and oxygen saturation levels.
- D. Watch or clock with a second hand to monitor patient's respiratory rate.
- E. Soap, water and/or bactericidal agent to clean the Breather on a daily basis according to manufacturer's instructions on package insert.
- F. Nose clips (single patient use item) may be considered if patient exhibits impairment of the velopharyngeal port to the extent that air is flowing in and out of the nose during resistive breathing exercise.
- G. Disposable valve face mask (single patient use item) may be considered if patient cannot maintain a seal with the mouth due to weak labial muscles. Mask can also be used for patients with velopharyngeal closure deficits.

VII. Procedure

- A. Obtain physician's order (if it can't be assumed to be covered in general order) specifying the type of therapy to be administered with frequency and duration of treatment (e.g.; breathing retraining, dysphagia therapy, voice therapy, dysarthria therapy, etc.) *The Breather's classification by the FDA is spirometer-therapeutic. This is incentive spirometry because it creates a low-flow, sustained, maximum inspiration.* This encourages the patient to breathe more deeply.
- B. Establish resistive breathing tasks as part of patient's plan of treatment via appropriate long term and short term goals on appropriate documentation form per facility protocol.
- C. Read manufacturer's instructions on package insert prior to initiating RBT.
- D. Explain resistive breathing therapy to patient.
- E. Position the patient to maximize patient's ability to breathe diaphragmatically.
- F. Obtain and perform monitoring of patient's heart rate, respiratory rate, and, if indicated, oxygen saturation.
- G. SLP/therapist should set inspiratory resistance level by rotating the hub according to the engraved arrow setting indicator at the top of the Breather.
- H. Begin with the easiest settings: Inhalation setting of "1" and the exhalation setting of "1."

- I. Instruct the patient to inhale deeply and forcefully for 2 to 3 seconds feeling the stomach expand in order to reinforce diaphragmatic breathing; then pause approximately 1 second; then exhale forcefully for 3 to 4 seconds as the stomach muscles contract. Note: The training load (resistance) is fairly easy to determine; it is simply the inspiratory resistance that, on a few but not all inspirations, causes an inward movement of the stomach - an observation that can be taught to the patient and seen by the SLP/therapist. The stomach should be slightly expanding during most inspirations, therefore, do not further increase resistance until the patient is ready. Also instruct the patient not to puff cheeks while exhaling. If this is noted, exhalation resistance may be too intense.
 - 1. The mouth piece should be held securely between the lips, not the teeth, as it may cause undue jaw pressure or an inadequate seal.
 - 2. Patient should swallow normally, and when necessary, slightly remove the Breather from the mouth and swallow to prevent a build up of saliva in the Breather.
 - 3. Holding the nose closed or using nose clips may cause an uncomfortable sensation in the sinuses or ear canals but may be initially used in order for the patient to use the Breather correctly.
 - 4. A face mask may also be used by taking the mouth piece off the Breather and securely pushing the Breather into the mask. Caution should also be used as a mask may cause a smothering sensation; therefore, proper use should be clearly explained before using a mask on the patient.
 - 5. A strong flow of air should be heard while patient is inhaling and exhaling through the Breather; effective training requires a fairly intense level of effort but not to the point of exhaustion. The mere sound of breathing is part of the audio feedback incentive to breathe deeply and correctly.
- J. Have patient hold resistive Breather to his/her mouth, or hold the Breather with gloved hand if the patient is unable to do so.
- K. Continue increasing the resistances.
 - 1. After maintaining the prescribed training level, the level of resistance may be increased. Inhalation and exhalation settings are independent from each other; i.e., inhalation may increase more quickly than exhalation resistance. Each breath should still be forcefully maintained approximately 2 to 3 seconds. Note: Both inhalation and exhalation resistance should be set at levels where the patient and clinician detect that there is an adequate level of resistance being met.
 - 2. As resistance levels increase, training time may initially be decreased and then gradually increased again as tolerated.
- L. After final use of the day, the Breather should be cleaned with warm, soapy water or a bactericidal agent. Rinse well, shake off excess water; allow device to air dry on a clean paper towel. Store in a plastic bag after device is dry. Note: If the rubber diaphragm sticks from moisture buildup after training or cleaning, simply exhaling forcefully through the Breather will release the moisture seal.
- M. SLP/therapist should monitor patient for signs of distress before, during, and immediately after Rx.
- N. Document patient's progress. i.e. levels of resistance, number of sets, time, etc.
- O. Obtain and document the patient's heart rate, respiratory rate, and, if indicated, oxygen saturation at the close of the RBT treatment session.