FIELD GUIDE

ROLE OF RMT USING THE BREATHER IN MV LIBERATION

PART 01: BACKGROUND AND PREVALENCE

Up to 20 million patients require mechanical ventilation (MV) every year, resulting in a growing population with partial or complete dependence on MV. Patients on prolonged MV have an overall higher in-hospital and 5-year mortality rate (42%, and 42%, respectively), as well as higher readmission rates (19% vs 11.6%) [5,6]. The successful weaning rate from prolonged MV lies around 54% [4].

Improving rates of successful and sustained liberation from prolonged MV is therefore a key to decrease mortality and improve outcomes across care facilities.

Prolonged MV is associated with [5,7–11]:

Respiratory Muscle Weakness, contributing to:

- ICU acquired weakness (ICUAW)
- Respiratory muscle atrophy
- Dysphonia and dysphagia
- Ventilator-associated pneumonia
- Sleep disturbances

PART 02: EVIDENCE FOR THE IMPACT RMT HAS ON WEANING FROM PROLONGED MV

Respiratory muscle weakness and diaphragm dysfunction greatly contribute to failure to wean from MV. Therefore, strengthening the respiratory muscle groups to enable the muscles to meet the respiratory demand provides the rationale for the use of Respiratory Muscle Training (RMT) to facilitate weaning.

EVIDENCE SHOWS

- 63% higher weaning success rate of difficult to wean patients after COPD exacerbation [18].
- 51% higher weaning success rate of patients in prolonged ventilation [19].
- A systematic review analyzing 10 studies involving 394 participants confirmed benefits of RMT for weaning success, respiratory muscle strength, shallow breathing index, and length of stay [20].
- A systematic review and meta analysis including 28 studies involving 1184 patients revealed a 4.1 day decrease in MV and a 2.3 day decrease in weaning duration [21].

PART 03: APPLICATION OF THE BREATHER DURING WEANING FROM MECHANICAL VENTILATION

A significant number of ICU patients, especially those with COPD, are hard to wean from mechanical ventilation, contributing to complications and in-hospital mortality.

Respiratory muscle training (RMT) significantly improves liberation success, QOL and survival [32].

This field guide is intended as a set of tools for using RMT during the liberation from MV, and is not a substitute for individualized clinical judgment.

This entire document is directed at patients with tracheotomy.

PART 04: PROTOCOLS FOR USE OF RMT FOR MV LIBERATION PROCESS

Initiating Spontaneous Breathing Trials

1. The patient MUST meet the following Assessment Criteria prior to initiating spontaneous breathing attempts:
    a. Respiratory Rate < 30
    b. SpO2 of 92% on < 50% FiO2 unless otherwise ordered by the physician
    c. PEEP < 10 cmH2O & FiO2 < 50%
    d. Inspiratory pressures < 30 cm H2O
    e. Hemodynamic Stability (Stable HR & BP)
    f. For patients that are not tracheostomized: RASS = > -1

2. If criteria listed above is within acceptable limits, patient is deemed Medically Ready for Spontaneous Breathing Trials (SBTs) and SBTs will be attempted daily by taking the following steps:
    a. The Respiratory Therapist should remain at the bedside to ensure patient safety while completing the Initial Respiratory Assessment.
    b. If patient tolerates SBT times of 30 to 120 minutes, the SBT will be considered successful and patient will be deemed ready to begin the liberation process

LIBERATION PROCESS

STEP 1: Respiratory Muscle Training (RMT)

A. If the patient "fails" SBT, return to ventilator.

B. Upon recovery, initiate RMT by ensuring appropriate oxygenation, then disconnect from ventilator, and do 5 breaths using **The Breather** (if tolerated). **The Breather** should be attached to the trach using the 15/22mm adapter, at settings 1 on inhale and on exhale.
IMPORTANT: Cuff has to be inflated during RMT.

C. Repeat every 4 to 6 hours as tolerated, until patient "passes" SBT. Settings may be increased if patient easily tolerates 5 breaths (score of 4 or less on the BORG scale), and if vital signs are stable. Continue daily SBTs.

D. If the patient "passes" SBT continue RMT during spontaneous ventilation. Hyperoxygenation will no longer be necessary.

LIBERATION PROCESS

STEP 2: Trach Collar Trial (ATC)

A. Initial duration is 30 to 120 minutes with close supervision by staff, after which the patient is reassessed.

B. If Respiratory Stability Parameters are maintained, continue ATC as tolerated.

C. Trach tube cuff will be deflated as tolerated by the patient.

D. If patient appears fatigued, or respiratory parameters fall outside acceptable limits, return patient to ventilator support during the first night following ATC initiation.

E. Introduce PassyMuir on the next day after trach collar initiated, as tolerated.

F. Continue RMT through trach tube, with trach tube cuffed during RMT sessions.

> **ALTERNATIVE**: If the patient can tolerate Passy-Muir, expiratory muscle training can also be achieved by using **The Breather** orally and exhaling through it:
>
> - Deflate the cuff (if the cuff is not deflated the patient is unable to exhale!).
> - With the Massy-Muir attached to the universal hub, sit patient upright, and set the exhale setting to 1.
> - Instruct the patient to take a deep breath in, and to exhale through **The Breather**
> - Repeat 5 times as tolerated. Repeat every 4 to 6 hours. Settings may be increased if patient easily tolerates 5 breaths (score of 4 or less on the BORG scale), and if vital signs are stable.

G. After 24 hrs on trach collar, if trach tube size is #8 mm, downsize to #6 cuffed tube as tolerated.If patient remains stable after 72 hrs, consider downsizing to # 4 cuffless tube and begin capping the trach tube as tolerated.

H. Once T-trach tube has been capped and patient is tolerating well, discontinue Passy-Muir and switch to RMT by mouth:

I. Fully deflate the cuff (if present), and place a cap on the universal hub.

J. Set inhale and exhale settings to 1.

K. Sit the patient upright, and work up to 5 breaths through the mouthpiece of the Breather, using diaphragmatic breathing.

L. Work up to 2 sets of 10 breaths, twice per day, at an exertion rate of 6 to 8 out of 10.

LIBERATION PROCESS

STEP 3: Liberation of Mechanical Ventilation

A. Upon liberation, continue RMT using **The Breather** working up to 2 sets of 10 breaths, twice a day, at highest tolerated setting (scoring between 5 and 8 on the BORG scale).

B. Continue until discharge and encourage continued use thereafter.

RECOMMENDATION: Screening for RMW

ICU may acquire acquired respiratory muscle weakness (RMW) independent of type and duration of mechanical ventilation, indicating the need for respiratory muscle rehabilitation [33].

A. Screen patients at increased risk of ICU-acquired RMW for reduced maximum inspiratory or expiratory pressures (MIP/MEP). At risk groups include those
   - on mechanical ventilation for more than 48 hours
   - with pre-existing respiratory morbidities
   - with prolonged ICU stay (3 days or longer)

B. If MIP/MEP reveal RMW (< 70% of predicted value), prescribe RMT using **The Breather**.

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