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Liberation from mechanical ventilator

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Patricia Colgan, Ibrahim Mohd Fawzy M A Hassan, Mohammad Faisal Abdullah Malmstrom, Abdul Aziz Ahmed M. Alhashemi, Thiruppathi Chockalingam, Ashok Parchani, MP Sujith, Mahesh Chandra, Damodaran CU, Flordevic P Guerra, Talib Yaseen
Hamad Medical Corporation, Qatar

Correspondence: Thiruppathi Chockalingam, Acting Assistant Director of Respiratory Therapy, Hamad Medical Corporation, 3050 Doha, Qatar, Tel (+974) 55319021, (+974) 44392376, Fax (+974) 44391829, Email tchockalingam@hamad.qa

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Objectives

Discuss the variables that are used to indicate readiness to wean from mechanical ventilation Discuss the use of protocols to wean patients from ventilatory support Discuss the criteria used to indicate readiness for extubation Describe the most common reasons why patients fail to wean from mechanical ventilation.

Predicted success rate

75% of mechanically ventilated patients are easy to be weaned off the ventilator with simple process 10-15% of patients require a use of a weaning protocol over a 24-72hours 5-10% require a gradual weaning over longer time 1% of patients become chronically dependent on MV

Assessment criteria for weaning

i. **Neurological**: (No sedation, GCS>8,Pain controlled)

ii. **Respiratory:** (NoWOB, PS <10,PEEP 5,FIO2-40%,sat >90%, PF >200)

iii. **Cardiovascular :** (Stable Hemodynamics, Hb >7, Normal ECG)

Ventilation status

i. Intact ventilatory drive: ability to control their own level of ventilation

ii. Respiratory rate <30

iii. Minute ventilation of <10 L to maintain PaCO2 in normal range

iv. VD/VT <60% (Vd/Vt=0.320+0.0106 (PaCO2 - end-tidal carbon dioxide measurement)+0.003 (RR per minute)+0.0015 (age in years)

v. Functional respiratory muscles

Intact airway protective mechanism

i. Appropriate level of consciousness

ii. Cooperation

iii. Intact cough reflex

iv. Intact gag reflex

v. Functional respiratory muscles with ability to support a strong and effective cough

Approaches to weaning

i. Spontaneous breathing trials

ii. Pressure support ventilation (PSV) SIMV

iii. New weaning modes

Maximal inspiratory pressure

i. Negative Expiratory pressure must be more than -20cmH2o

ii. Assures ability to mobilize secretions

Shallow breathing index

Index of rapid and shallow breathing=RR/Vt in litre

Single study results

i. RR/Vt>105 95% wean attempts unsuccessful

ii. RR/Vt<105 80% successful

iii. One of the most predictive bedside parameters

Spontaneous Breathing Trial (SBT)

i. Explore Exclusion Criteria

ii. Assess Readiness for SBT

iii. If passed proceed sedation vacation for 30min

iv. Initiate SBT for 30minutes

v. Assess the tolerance to SBT

vi. If SBT passed assess Readiness for Extubation

Exclusion Criteria for SBT

i. GCS <8 unsedated use of Neuro muscular drugs

ii. Neuro Muscular Disease with VC <20ml/kg or NIP <20

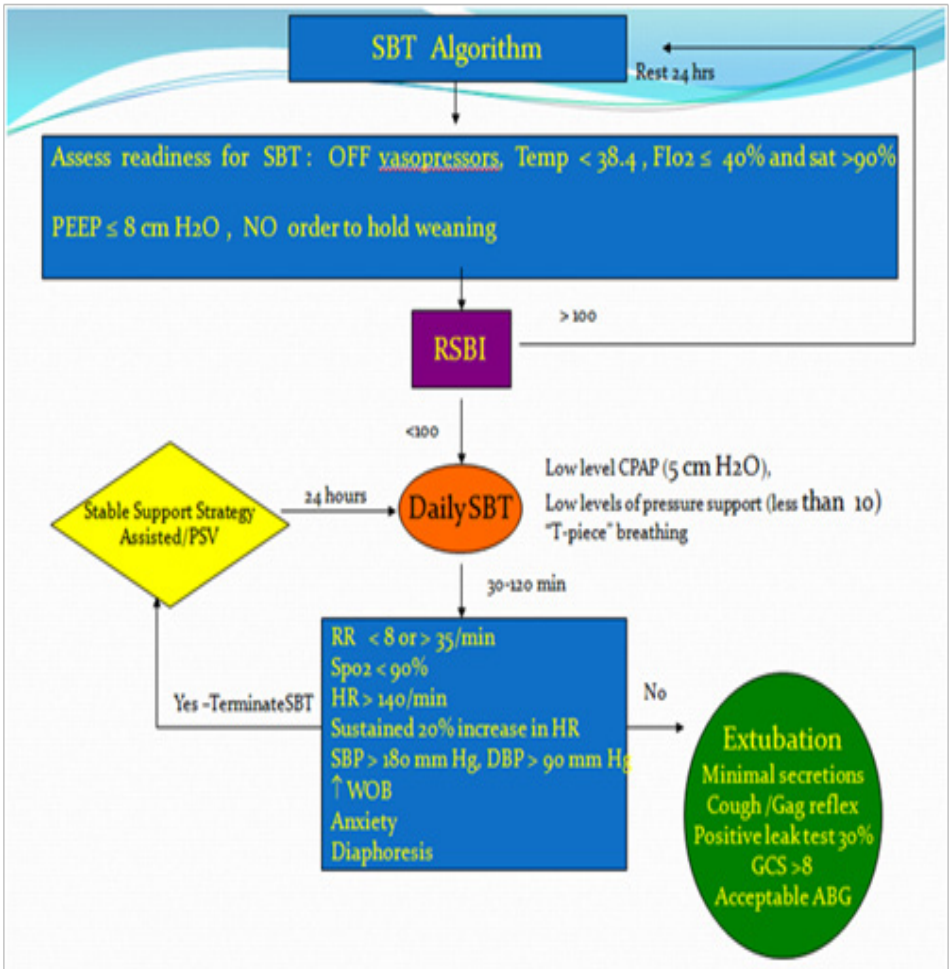
iii. RASS sedation and agitation scale +1 and higher, -3 and lower

iv. Immediate pending Invasive procedure

v. ICP >20 or needing RX in last 12hours

vi. Ongoing Cardiac Ischemia

vii. Uncontrolled seizures



Failure to wean

i. Weaning to exhaustion

ii. Auto-PEEP

iii. Excessive work of breathing

iv. Poor nutritional status

v. Overfeeding

vi. Left heart failure

vii. Infection/fever

viii. Major organ failure

ix. Technical limitation

Appendix

Protocols

i. Developed by multidisciplinary team

ii. Implemented by respiratory therapists and nurses to make clinical decisions

iii. Results in shorter weaning times and shorter length of mechanical ventilation than physician-directed weaning

Points to remember

i. The primary prerequisite for weaning is reversal of the indication of mechanical ventilation

ii. Adequate gas exchange should be present with minimal oxygenation and ventilatory support before weaning is attempted

iii. The function of all organ systems should be optimized, electrolytes should be normal, and nutrition should be adequate before weaning is attempted

iv. The most successful predictor of weaning is RSBI <100

v. Maximum inspiratory pressure is the best predictor of weaning failure

vi. Ventilatory discontinuation should be done if patient tolerates SBT for 30-120minutes

vii. Use of liberation and weaning protocol facilitates the process and decreases the ventilator length of stay.[1–4]

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Conflict of interest

The author declares no conflict of interest.

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