Spontaneous breathing trial

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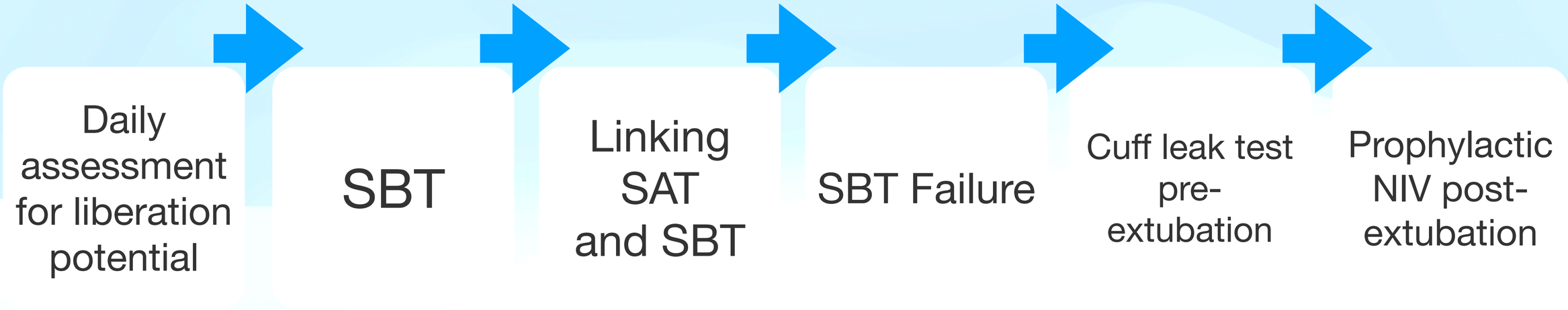
Liberation from mechanical ventilation:

- **Step by step :**



Daily assessment for liberation potential

An assessment should be conducted at least daily to determine whether the patient meets criteria to move forward in the liberation process.

The criteria might include:

About 50% - 70% of patients are successfully liberated following their initial SBT, suggesting that identifying the earliest point in time to conduct the SBT is important.

Required criteria
1. The cause of the respiratory failure has improved
2. PaO_2/FiO_2 ≥150* or SpO_2 ≥90 percent on FiO_2 ≤40 percent and positive end-expiratory pressure (PEEP) ≤5 cmH_2O
3. pH >7.25
4. Hemodynamic stability (no or low dose vasopressor medications)
5. Able to initiate an inspiratory effort
Additional criteria (optional criteria)
1. Hemoglobin ≥7 mg/dL
2. Core temperature ≤38 to 38.5°Centigrade
3. Mental status awake and alert or easily arousable

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TASK FORCE

Weaning from mechanical ventilation

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Statement of the Sixth International Consensus Conference on Intensive Care Medicine

Organised jointly by the European Respiratory Society (ERS), the American Thoracic Society (ATS), the European Society of Intensive Care Medicine (ESICM), the Society of Critical Care Medicine (SCCM) and the Société de Réanimation de Langue Française (SRLF), and approved by the ERS Executive Committee, February 2007

: WHAT IS THE USUAL PROCESS OF INITIAL WEANING FROM THE VENTILATOR?

Assessing readiness to wean:

Prolonged mechanical ventilation is associated with significant morbidity and mortality. Therefore, weaning should be considered as early as possible in the course of mechanical ventilation.

The process of initial weaning from the ventilator involves **a two-step strategy.**
It begins with an **assessment regarding readiness** for weaning,
which is then **followed by SBT as a diagnostic test to determine the likelihood of successful extubation.**

In fact, for the majority of patients, the entire weaning process simply involves confirmation that the patient is ready for extubation.
Patients who meet the criteria should be considered as being ready to wean from mechanical ventilation.
Failing to extubate patients who can in fact be successfully weaned is more injurious than a failed SBT.
Since many patients who do not meet all the criteria are able to wean successfully from mechanical ventilation, these criteria should be viewed as considerations for probable weaning rather than as strict criteria that must all be met simultaneously.

Daily spontaneous breathing trials (SBTs)

Evidence supporting daily SBTs:

The practice of performing daily SBTs is supported by randomized controlled trials and meta-analyses

- **SBT versus usual care:**
- compared with usual care (ie, weaning at the discretion of the attending physician), performing daily SBTs reduces MV duration. In a meta-analysis of eight trials (1188 patients), protocolized weaning with daily SBTs reduced MV duration by 16 percent (95% CI 0 to 30 percent), which corresponds to a reduction of approximately 15 hours (95% CI 0 to 29 hours) assuming an average MV duration of 96 hours without daily SBTs. [Blackwood B, Burns KE, Cardwell CR, O'Halloran P. Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients. Cochrane Database Syst Rev 2014; :CD006904.]

CLINICAL CRITERIA

— Clinical criteria that are listed in the table should be used to identify patients who are ready to begin weaning. While these criteria are widely used, it should be recognized that up to 30 percent of patients who never satisfy such criteria may be successfully weaned.

To be considered ready for weaning, patients should have **all** of the following:

- Improvement in the underlying cause of respiratory failure
- Adequate oxygenation
- An arterial pH >7.25
- Hemodynamic stability
- Ability to take spontaneous respirations

Other criteria that are ideally in place but not critical for readiness assessment include a hemoglobin level ≥7 g/dL, core temperature ≤38.5ºC, and an awake or easily arousable mental status .

TABLE 5 Considerations for assessing readiness to wean

Clinical assessment	Adequate cough
	Absence of excessive tracheobronchial secretion
	Resolution of disease acute phase for which the patient was intubated
Objective measurements	Clinical stability
	Stable cardiovascular status (*i.e.* f_C ⩽140 beats·min^{-1}, systolic BP 90–160 mmHg, no or minimal vasopressors)
	Stable metabolic status
	Adequate oxygenation
	S_{a,O_2} >90% on ⩽F_{I,O_2} 0.4 (or $P_{a,O_2}/F_{I,O_2}$ ⩾150 mmHg)
	PEEP ⩽8 cmH_2O
	Adequate pulmonary function
	f_R ⩽35 breaths·min^{-1}
	MIP ⩽-20– -25 cmH_2O
	V_T >5 mL·kg^{-1}
	VC >10 mL·kg^{-1}
	f_R/V_T <105 breaths·min^{-1}·L^{-1}
	No significant respiratory acidosis
	Adequate mentation
	No sedation or adequate mentation on sedation (or stable neurologic patient)

Data taken from [5, 6, 13, 16–18, 22]. f_C: cardiac frequency; BP: blood pressure; S_{a,O_2}: arterial oxygen saturation; F_{I,O_2}: inspiratory oxygen fraction; P_{a,O_2}: arterial oxygen tension; PEEP: positive end-expiratory pressure; f_R: respiratory frequency; MIP: maximal inspiratory pressure; V_T: tidal volume; VC: vital capacity. 1 mmHg=0.133 kPa.

These criteria are derived from studies that predicted successful weaning with their use performed within the context of a liberation protocol:

●A randomized trial of 304 mechanically ventilated patients compared those who underwent readiness testing using objective clinical criteria alone with those who underwent readiness testing using objective clinical criteria plus a weaning predictor, the rapid shallow breathing index . The group that used objective clinical criteria alone took one day less to discontinue mechanical ventilation. There was no difference in length of stay or reintubation rate.

●The **A**wakening and **B**reathing **C**ontrolled (ABC) trial screened 336 mechanically ventilated patients daily for adequate oxygenation (peripheral oxygen saturation [SpO2] >88 percent while receiving a fraction of inspired oxygen [FiO2] <50 percent and a positive end-expiratory pressure [PEEP] ≤8 cm H2O), for hemodynamic stability and any spontaneous inspiratory effort during a five-minute period, as well as the absence of agitation, myocardial ischemia, and increased intracranial pressure. Weaning predictors were not measured.

Those who passed the screen underwent a spontaneous breathing trial (SBT). More than 50 percent of patients who underwent an SBT tolerated it, suggesting that these criteria are reasonable indicators of successful weaning.

The complication rate of using readiness criteria for subsequent SBTs appears to be low.

In a study of more than 1000 patients who underwent an SBT following the use of clinical readiness weaning criteria, only one complication was identified (<0.1 percent) .

Another study of 19 patients who underwent an SBT following readiness criteria found that low frequency fatigue, which can hinder future weaning attempts, did not occur .

Patients who are ready to wean

perform a weaning trial, which predicts the patients' potential for spontaneous breathing following extubation.

Readiness testing is imperfect, and some patients deemed ready to wean fail a subsequent spontaneous breathing trial (SBT). Failed weaning has not been shown to be harmful **if** it is well monitored and the patient is returned to full ventilatory support at the **first** sign of intolerance (ie, ventilatory fatigue should be avoided). This justifies repeated daily readiness assessments and SBTs in those deemed ready to wean, provided the reason for weaning failure is investigated and treated (eg, excess sedation, development of myocardial ischemia, neuromuscular weakness, electrolyte disturbances).

Patients not ready to wean

— For patients who do not meet readiness criteria, we continue to treat the underlying disorder or complications of mechanical ventilation until readiness criteria can be eventually met. In many cases, if the patient improves, they can undergo a weaning trial when ready. If they do not improve, then we assess the patients for long term mechanical ventilation with a tracheostomy. Management of the difficult to wean patient is discussed separately.

Patients with uncertainty

— For patients in whom uncertainty exists as to whether the readiness criteria will predict a successful weaning trial, we sometimes use a weaning predictor to identify potential candidates suitable for weaning or to confirm lack of readiness to wean (eg, patients with borderline readiness criteria or suspected respiratory muscle weakness). Use of weaning predictors is most pertinent among patients in whom the risk associated with a failed spontaneous trial is significantly elevated (eg, patients with prolonged mechanical ventilation, patients with critical care neuromyopathy).

TABLE 6 Failure criteria of spontaneous breathing trials

Clinical assessment and subjective indices	Agitation and anxiety
	Depressed mental status
	Diaphoresis
	Cyanosis
	Evidence of increasing effort
	Increased accessory muscle activity
	Facial signs of distress
	Dyspnoea
Objective measurements	P_{a,O_2} ⩽50–60 mmHg on F_{I,O_2} ⩾0.5 or S_{a,O_2} <90%
	P_{a,CO_2} >50 mmHg or an increase in P_{a,CO_2} >8 mmHg
	pH <7.32 or a decrease in pH ⩾0.07 pH units
	f_R/V_T >105 breaths·min^{-1}·L^{-1}
	f_R >35 breaths·min^{-1} or increased by ⩾50%
	f_C >140 beats·min^{-1} or increased by ⩾20%
	Systolic BP >180 mmHg or increased by ⩾20%
	Systolic BP <90 mmHg
	Cardiac arrhythmias

Data taken from [16, 18, 19, 62, 116]. P_{a,O_2}: arterial oxygen tension; F_{I,O_2}: inspiratory oxygen fraction; S_{a,O_2}: arterial oxygen saturation; P_{a,CO_2}: arterial carbon dioxide tension; f_R: respiratory frequency; V_T: tidal volume; f_C: cardiac frequency; BP: blood pressure. 1 mmHg=0.133 kPa.

Weaning predictors :

Measurements of oxygenation and gas exchange

paO2/FIO2	Poor predictor when used alone but is useful as part of the clinical assessment.
A-a oxygen gradient	Poor predictor when used alone.
Dead space (VD/VT)	Poor predictor when used alone.

Simple measurements of respiratory system load and respiratory muscle capacity

MIP	MIP can be measured by attaching an aneroid manometer to the opening of the endotracheal tube and asking the patient to maximally inspire against an occluded airway. Although it is a poor predictor of weaning outcome, it may be useful as supplementary information in patients with neuromuscular weakness.
Respiratory system compliance	Inconsistent predictive capacity.
Respiratory system resistance	Inconsistent predictive capacity.
minute ventilation	Weaning is improbable among patients whose minute ventilation does not exceed >10 to 15 liters/minute
Tidal volume , respiratory rate , vital capacity	Inconsistent predictive capacity.

Integrative indices:

RSBI	F/VT	Will be discussed in more details…
Dynamic CROP index	[Cdyn × MIP × (pao2/pAo2)] / RR	Positive and negative predictive value of 71 and 70%, respectively.
CORE index	Cdyn × (P0.1/MIP) × (PaO2/PAO2)] / RR	Accurate predictor of SBT success/failure but is complex and difficult to obtain.
IWI	[(Cst,rs) × SaO2] / [f/VT]	More accurate than other weaning predictors but Cst,rs is difficult to measure in a spontaneously breathing patient
IEQ	[(0.75 VT/Cdyn) × (TI/TTOT)] / MIP	An IEQ > 0.15 has been suggested as the fatiguing threshold that predicts weaning failure.

Complex measurements (may require special equipment):

P0.1	P0.1 is the airway pressure generated in the first 0.1 second during an inspiratory effort against an occluded airway and can be measured by some ventilators. P0.1 >3.2 to 6 cm H2O has been associated with weaning failure.
P0.1/MIP	Predictive capacity of P0.1 is better when normalized for MIP
Pes/Pes max	Measured by esophageal balloon. Pes is the esophageal pressure generated during a spontaneous tidal breath and Pes max is the maximal pressure that can be generated. Values >0.4 suggest a fatiguing load that is not sustainable.
O2 COB	O2COB is the difference between total oxygen consumption during spontaneous breathing and relaxed mechanical ventilation. O2COB is <5% of the total oxygen consumption in most healthy individuals. No threshold has been identified. Changes in non-respiratory oxygen consumption can confound the measurement
Mechanical work of breathing	ITp has to be measured using an esophageal balloon. A threshold value has not been identified.
Diaphragmatic ultrasound	Weaning is longer in those with a diaphragmatic descent <100 mm during inspiration.[12] A thickening fraction of >30% was associated with sensitivity 0.88, specificity 0.71, positive predictive value 0.91, and negative predictive value 0.63 for predicting extubation success.[13] Combining diaphragmatic ultrasound with the rapid shallow breathing index may further increase predictive accuracy.
Pdi/Pdi max	Pdi (diaphragmatic pressure during a spontaneous tidal breath) and Pdi max (max diaphragmatic pressure) are measured using esophageal and gastric balloons where Pdi = Pg – Pes. Values >0.4 suggest a fatiguing load that is not sustainable.
TTdi	TTdi = (Pdi/Pdi max) × (TI/TTOT). Values of >0.15 to 0.18 indicate a load on the respiratory muscles that is not sustainable.

Among the predictors, the rapid shallow breathing index (RSBI) is our preferred weaning predictor because it is well studied, easy to measure, and no alternative predictor has been shown to be superior.

For patients who have an RSBI <105 breaths/minute/L , we initiate a weaning trial.
For patients who have an RSBI ≥105 breaths/minute/L , we maintain full ventilatory support.
For patients in whom neuromuscular weakness is suspected, we also sometimes measure the maximal inspiratory pressure and/or diaphragmatic ultrasound at the bedside to confirm our suspicion.

Rapid shallow breathing index

- The RSBI is the ratio of respiratory frequency to tidal volume (f/VT).
- Can measure the f and VT using a hand-held spirometer attached to the endotracheal tube while a patient is breathing room air for one minute without any ventilator assistance.
- However, if a spirometer is not available or the patient cannot breathe room air, the RSBI may be calculated using the ventilator:

- set the ventilator to a pressure support level of 0 cm H2O and a positive end-expiratory pressure (PEEP) of 0 cm H2O, without flow or pressure trigger for one minute.
- The tidal volume can then be determined by the ventilator.
- However, the respiratory rate should be manually counted since the ventilator may underestimate the respiratory rate if the patient makes inspiratory efforts that are not sensed by the ventilator. Such unmeasured inspiratory efforts falsely lower the RSBI, particularly in patients who have chronic obstructive lung disease with dynamic hyperinflation.

Interpretation

— An RSBI ≥105 breaths/minute/L (ie, a negative RSBI) indicates that a patient is likely to fail weaning while a positive test RSBI <105 breaths/minute/L is more likely to undergo successful weaning.

However, many experts adopt an individual approach to interpreting the threshold value and allow for factors that may falsely alter it.

For example, several factors have been shown to increase the RSBI, including a narrow endotracheal tube (eg, ≤7 cm), female gender, sepsis, fever, supine position, anxiety, suctioning, and chronic restrictive lung disease.

Thus, interpretation may need to be adjusted individually under these circumstances.

Evidence suggests that a negative RSBI (RSBI ≥105 breaths/minute/L) is better at identifying patients who will fail weaning than a positive RSBI (RSBI <105 breaths/minute/L) is at identifying patients who can be successfully weaned.

RSBI was originally described in a prospective cohort study that evaluated 64 mechanically ventilated patients . An RSBI ≥105 breaths/minute/L was associated with weaning failure, while an RSBI <105 breaths/minute/L predicted weaning success with a sensitivity, specificity, positive predictive value, and negative predictive value of 97, 64, 78, and 95 percent, respectively .

The pretest probability of weaning success in the study population was approximately 60 percent. When these data were used to calculate likelihood ratios, the LR+ was 2.7 and the LR- was 0.05 .

This indicates that there is only a small increase in the probability of weaning success among patients with a positive RSBI (<105 breaths/minute/L). In contrast, there was a large increase in the probability of weaning failure among patients with a negative RSBI (≥105 breaths/minute/L). These findings were supported by a systematic review of 20 RSBI studies [1] and a bayesian analysis of the same studies [2] .

1. Meade M, Guyatt G, Cook D, et al. Predicting success in weaning from mechanical ventilation. Chest 2001; 120:400S.
2. Tobin MJ, Jubran A. Variable performance of weaning-predictor tests: role of Bayes' theorem and spectrum and test-referral bias. Intensive Care Med 2006; 32:2002.

- SBT can be done with some form of ventilatory support (eg, low-level PSV, automatic tube compensation [ATC] or continuous positive airway pressure [CPAP; eg, 5 cm H2O]) **or** no ventilatory support (eg, using a T-piece.

- Choosing among the options for ventilator support is often institution- or clinician-dependent.
- we typically use **PSV** (eg, inspiratory pressure augmentation of **5 to 8 cm H2O**), which is consistent with the recommendations of the American College of Chest Physicians/American Thoracic Society .
- When using PSV-SBT, the positive end-expiratory pressure **(PEEP) remains at 5 cm H2O** and the fraction of inspired oxygen (**FiO2) at 0.4 or lower.**

- Our approach is based on the rationale that PSV mitigates any increased **work of breathing due to resistance of the ETT** .This is especially important for patients with small ETTs (eg, size ≤7 mm), but even larger ETTs can have considerable narrowing of the lumen after intubation .

- In addition, using PSV, ATC, or CPAP during the SBT allows the ventilator's **monitoring system and alarms** to alert the clinician if there are changes in the patient's respiratory rate, tidal volumes, or minute ventilation; whereas such monitoring is not possible if a T-piece is used .

- The practice of performing the SBT on PSV is supported by several clinical trials that suggest PSV-SBT leads to higher rates of successful extubation compared with other methods [Subirà C, Hernández G, Vázquez A, et al. Effect of Pressure Support vs T-Piece Ventilation Strategies During Spontaneous Breathing Trials on Successful Extubation Among Patients Receiving Mechanical Ventilation: A Randomized Clinical Trial. JAMA 2019; 321:2175.]

- **Ventilatory support in the form of CPAP** in patients at risk for acute cardiogenic pulmonary edema and patients with acute hypercapnia from obstructive lung disease may result in a falsely reassuring SBT, since CPAP is a form of therapy and reduces the work of breathing for both of these conditions, especially in COPD patients with intrinsic positive end expiratory pressure (PEEPi) .
- A T-piece may be more appropriate in such conditions particularly when patients fail an initial PSV-SBT.

- **Ventilatory support with ATC** is not used frequently and its use may be institution-dependent.

- The evidence supporting the **use of PSV-SBT** comes from several randomized trials and a meta-analysis .
- The largest trial included 1153 patients who were deemed ready for weaning and were then randomized to a 30-minute trial on PSV (8 cm H2O) or a two-hour T-piece trial . More patients in the PSV-SBT arm achieved successful extubation at 72 hours compared with those in the T-piece arm (82 versus 74 percent). In addition, 90-day mortality was lower in the PSV-SBT group (13 versus 17 percent; hazard ratio 0.74, 95% CI 0.55-0.99). Reintubation rates and hospital length of stay were similar in both groups.
- The findings were consistent across various subgroups, including older patients (>70 years), those ventilated for longer than four days, medical and surgical patients, and those with COPD.
- However, more patients in the PSV-SBT group received some form of noninvasive support (ie, high flow oxygen delivered via nasal cannulae [HFNC] or NIV) following extubation (25 versus 19 percent), which may have contributed to the higher extubation success rate in that group.

- In an earlier meta-analysis of four randomized trials (875 patients), not including the trial described above, PSV-SBT compared with T-piece resulted in a higher rate of successful extubation (74 versus 67 percent)

- [Ouellette DR, Patel S, Girard TD, et al. Liberation From Mechanical Ventilation in Critically Ill Adults: An Official American College of Chest Physicians/American Thoracic Society Clinical Practice Guideline: Inspiratory Pressure Augmentation During Spontaneous Breathing Trials, Protocols Minimizing Sedation, and Noninvasive Ventilation Immediately After Extubation. Chest 2017; 151:166.

- The effect on ICU mortality was not statistically significant (9 versus 12 percent; relative risk 0.74, 95% CI 0.45-1.24); however, only two trials reported this outcome and the meta-analysis may have been underpowered to detect a difference.

- Data also suggest that PSV is superior to T-piece trials in patients at high risk of extubation failure. In a study of over 500 patients considered to be at risk of extubation failure, the proportion of successful extubations was higher in patients who underwent a PSV trial compared with T-tube trial (67 versus 56 percent)

- [Thille AW, Coudroy R, Nay MA, et al. Pressure-Support Ventilation vs T-Piece During Spontaneous Breathing Trials Before Extubation Among Patients at High Risk of Extubation Failure: A Post-Hoc Analysis of a Clinical Trial. Chest 2020; 158:1446..]

- Smaller trials comparing SBTs performed with T-piece versus other forms of ventilatory support, including CPAP and ATC , did not detect significant differences in extubation success rates.

1. Jones DP, Byrne P, Morgan C, et al. Positive end-expiratory pressure vs T-piece. Extubation after mechanical ventilation. Chest 1991; 100:1655.
2. Haberthür C, Mols G, Elsasser S, et al. Extubation after breathing trials with automatic tube compensation, T-tube, or pressure support ventilation. Acta Anaesthesiol Scand 2002; 46:973.

- A single small trial compared ATC with CPAP during the SBT and found a higher rate of extubation success with ATC (82 versus 65 percent).

3. Cohen JD, Shapiro M, Grozovski E, et al. Extubation outcome following a spontaneous breathing trial with automatic tube compensation versus continuous positive airway pressure. Crit Care Med 2006; 34:682.

- trial comparing ATC with PSV, found similar extubation success rates and reintubation rates in both groups.

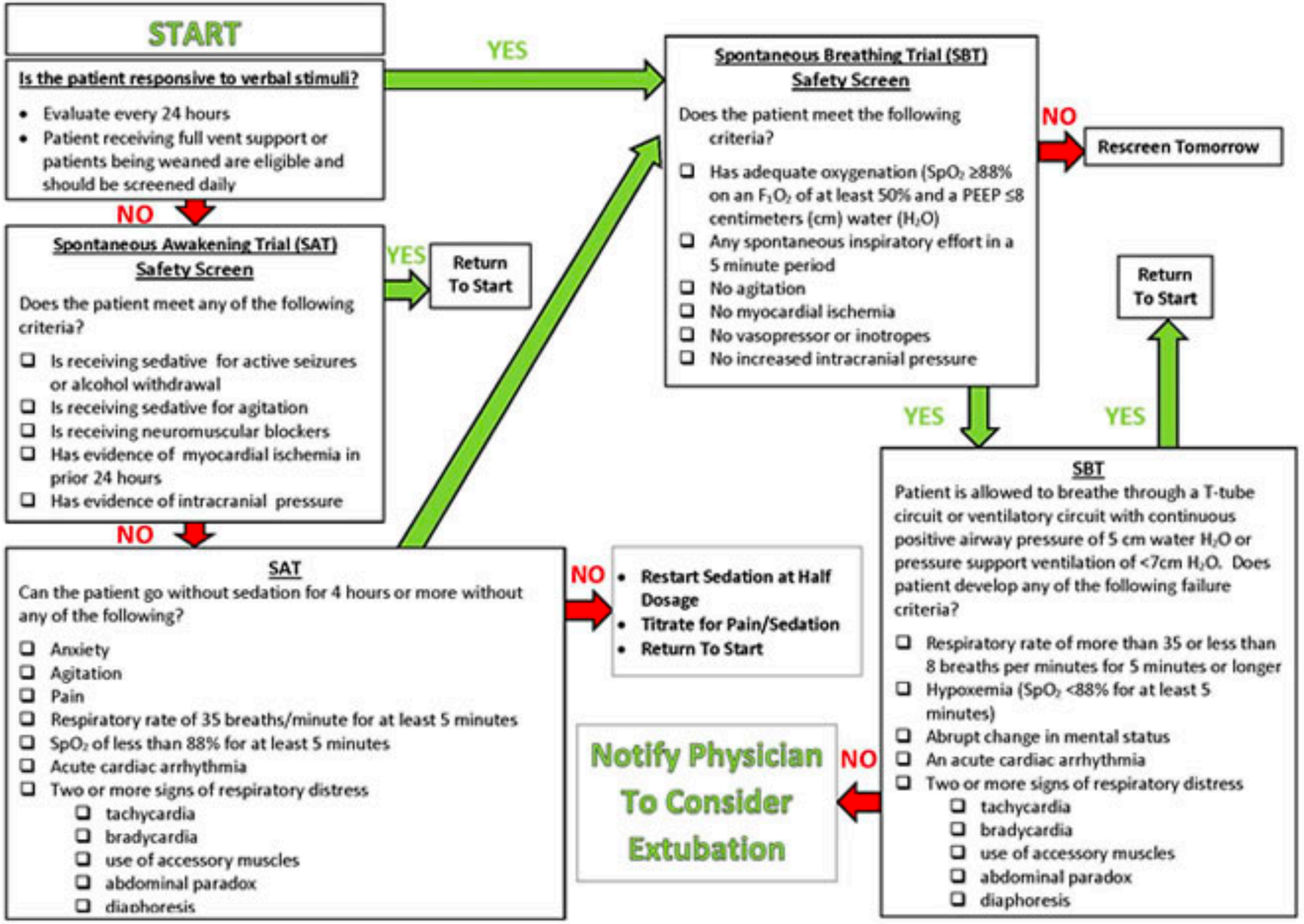
Trial duration

- typically perform SBTs for a duration of 30 minutes to two hours, which is the range used in most of the available clinical trials.
- However, the optimal duration for an SBT is uncertain and it may depend upon the underlying reason for intubation, the duration of MV prior to the weaning trial, performance on previous SBTs, and physician- or institution-specific practices.
- One of the approaches is as follows:
- **Duration of MV <24 hours** – Some patients who are intubated for <24 hours generally do not require an SBT, although a 30-minute SBT is unlikely to be harmful (eg, following surgery or for airway protection).

- **Duration of MV 1 to <10 days** – In most patients, an initial SBT of 30 minutes duration is generally sufficient to determine whether mechanical ventilation can be discontinued. In a multicenter trial of 526 patients receiving mechanical ventilation (most were intubated for <10 days) randomly assigned to 30-minute or 120-minute T-piece SBTs, rates of weaning failure and reintubation were virtually identical in both groups [Esteban A, Alía I, Tobin MJ, et al. Effect of spontaneous breathing trial duration on outcome of attempts to discontinue mechanical ventilation. Spanish Lung Failure Collaborative Group. Am J Respir Crit Care Med 1999; 159:512..

- **Duration of MV ≥10 days** – For such patients ,trials of 30 minutes may still be sufficient. However, we some experts prefer an individualized approach and in many cases extend trials for up to two hours in this population. In one study of 75 patients with chronic obstructive pulmonary disease who were mechanically ventilated for 15 or more days, the median time to SBT failure was 120 minutes [Vitacca M, Vianello A, Colombo D, et al. Comparison of two methods for weaning patients with chronic obstructive pulmonary disease requiring mechanical ventilation for more than 15 days. Am J Respir Crit Care Med 2001; 164:225..

- **Subsequent SBTs after failed initial SBT** – For patients who fail their initial SBT, some physicians extend subsequent trials for longer than 30 minutes, up to two hours.


START
Is the patient responsive to verbal stimuli?
• Evaluate every 24 hours
• Patient receiving full vent support or patients being weaned are eligible and should be screened daily
YES
NO
Spontaneous Awakening Trial (SAT) Safety Screen
Does the patient meet any of the following criteria?
❑ Is receiving sedative for active seizures or alcohol withdrawal
❑ Is receiving sedative for agitation
❑ Is receiving neuromuscular blockers
❑ Has evidence of myocardial ischemia in prior 24 hours
❑ Has evidence of intracranial pressure
YES
Return To Start
NO
SAT
Can the patient go without sedation for 4 hours or more without any of the following?
❑ Anxiety
❑ Agitation
❑ Pain
❑ Respiratory rate of 35 breaths/minute for at least 5 minutes
❑ SpO2 of less than 88% for at least 5 minutes
❑ Acute cardiac arrhythmia
❑ Two or more signs of respiratory distress
❑ tachycardia
❑ bradycardia
❑ use of accessory muscles
❑ abdominal paradox
❑ diaphoresis
NO
• Restart Sedation at Half Dosage
• Titrate for Pain/Sedation
• Return To Start
Spontaneous Breathing Trial (SBT) Safety Screen
Does the patient meet the following criteria?
❑ Has adequate oxygenation (SpO2 ≥88% on an F1O2 of at least 50% and a PEEP ≤8 centimeters (cm) water (H2O)
❑ Any spontaneous inspiratory effort in a 5 minute period
❑ No agitation
❑ No myocardial ischemia
❑ No vasopressor or inotropes
❑ No increased intracranial pressure
NO
Rescreen Tomorrow
YES
SBT
Patient is allowed to breathe through a T-tube circuit or ventilatory circuit with continuous positive airway pressure of 5 cm water H2O or pressure support ventilation of <7cm H2O. Does patient develop any of the following failure criteria?
❑ Respiratory rate of more than 35 or less than 8 breaths per minutes for 5 minutes or longer
❑ Hypoxemia (SpO2 <88% for at least 5 minutes)
❑ Abrupt change in mental status
❑ An acute cardiac arrhythmia
❑ Two or more signs of respiratory distress
❑ tachycardia
❑ bradycardia
❑ use of accessory muscles
❑ abdominal paradox
❑ diaphoresis
NO
Notify Physician To Consider Extubation
YES
Return To Start