1. INTRODUCTION

1.1 Weaning is the process of removing a patient from mechanical ventilation (MV) when it is decided he/she is able to support his/her own ventilator requirements. The use of protocol guidelines has the potential advantage to reduce both the duration of mechanical ventilation and the weaning process.

1.2 Weaning from MV as early as possible is an essential part of the ventilator bundle to decrease incidence of ventilator associated pneumonia (VAP).

2. PURPOSE

2.1 To describe the steps and guidelines involved in the weaning of mechanically ventilated patients.

2.2 To provide more consistent practice in weaning by providing structured guidance.

2.3 To improve efficiency of practice by following an expert consensus to reduce variation produced by the application of individual judgment and experience.

3. POLICY

3.1. Respiratory Care Practitioners (RCP) must acquire from the attending physician a written order to "**Wean per protocol**".

3.2. The attending physician must issue a written order of "Do not follow protocol when weaning", if he or she deems deviation from the protocol is necessary.

3.3. RCP must correctly identify patient using two patient identifiers (wrist band and medical record number).

3.4. RCP must ensure patient privacy, washes hands, and implements Standard Precautions.

3.5. RCP must review medical records for medical history, diagnosis, and current pulmonary status before starting to wean.

3.6. RCP must apply appropriate weaning protocol for their patient's category i.e." Protocol for initial weaning of patients", " Protocol for Difficult to Wean Patients- PSV mode", Protocol for Difficult to wean Patients – SIMV mode".

3.7. RCP must document all weaning attempts, duration and outcomes in the patient's medical records.

3.8. RCP must document adverse patient reaction in the "critical Events List".

3.9. RCP must relay any patient data pre, during and post weaning during physicians rounds to achieve better patient care and better communication.

4. RESPONSIBILITIES

4.1 Physicians:

4.1.1 To assess a patient's readiness to wean from mechanical ventilation.

4.1.2 To write an order if patient is not suitable for weaning by the protocol.

4.1.3 To order the administration of appropriate medications to facilitate weaning if required.

4.2 RCP's:

4.2.1 Patient will be screened for Spontaneous Awakening Trial (SAT) before proceeding to SBT

4.2.2 On a daily basis prior to physician rounds. Screen the patient for possibility of Spontaneous Breathing Trial (SBT).

4.2.3 Assess and determine a patient's need for mechanical ventilation and relay any relative findings to the physician.

4.2.4 Confirm and check the physician's order to 'wean by protocol'.

4.2.5 Perform daily screening using the 'ABCD screen model'. See appendix 1.

4.2.6 Measure and use the RSBI as a preliminary predictor of successful or unsuccessful weaning.

4.2.7 Use the 'automatic tube compensation' feature to help the patient overcome the resistance from the artificial airway.

4.2.8 Once the DTW protocol is initiated, the RCP must implement two weaning attempts per 24 hours, as tolerated by the patient.

4.2.9 Perform continuous patient monitoring using the 'ACBD assess model' throughout the weaning process. See appendix 2.

4.2.10 Perform arterial blood gases as indicated throughout the weaning process.

4.2.11 Perform appropriate documentation of initiation, progress, and termination of the weaning process using the SOAP format.

4.2.12 Communicate and document any relevant information regarding the patient's condition to the bedside nurse and the attending physician.

4.2.13 Anticipate and/or recognize actual or potential weaning failure symptoms through on-going patient assessment and surveillance.

4.2.14 Involvement in the coordination of care activities by working directly with the bedside nurse.

4.3 **Nurses:**

4.3.1 On a daily basis prior to physician round, contribute to the screening and assessment of the patient for possibility of weaning.

4.3.2 Continuous monitoring of patient's vital signs and communicate changes in the patient's condition to the attending physician and the bedside RCP.

4.3.3 Administration of medications as ordered by the physician to enhance the patient's tolerance for weaning.

4.3.4 Intervenes to promote successful weaning from mechanical ventilation by ensuring adequate nutrition, pain management, rest, and alleviation from anxiety.

4.3.5 Assist the RCP in any necessary interventions to optimize the patient's weaning process. i.e. correct positioning, managing secretions.

5. DEFINITION OF TERMS

5.1 A 'weaning from mechanical ventilation' protocol is a set of written structured guidelines or algorithms for reducing ventilator support. It usually includes three components:

5.1.1 A list of objective criteria to determine a patient's readiness to wean.

5.1.2 Structured guidelines for reducing ventilator support.

5.1.3 List of criteria for assessing a patient's tolerance of the weaning process.

5.2 The 'difficult to wean' (DTW) patient is a patient that requires prolonged mechanical ventilation, which is usually $\geq$ 7 days. In our department's weaning protocol, patients are considered DTW when weaning trials fail for three or more consecutive days.

5.3 The rapid shallow breathing index (RSBI) is the ratio of a patient's spontaneous respiratory rate (f) in breaths per minute divided by the spontaneous tidal volume (Vt) in liters. Values above 105 are associated with poor weaning outcomes.

6. APPLICABILITY

This policy applies to all health care professional (HCP) who give direct care to patients. This includes respiratory care practitioners (RCP), physicians, and nurses.

7. PROCEDURES

7.1 Utilize the following three algorithms as specified in the:

7.1.1 Protocol-Initial Weaning of Patients (Appendix 3)
7.1.2 Protocol of Difficult to Wean Patients (PSV) (Appendix 4)
7.1.3 Protocol for Difficult to Wean Patients (SIMV mode) (Appendix 5)

8. REFERENCES

8.1. Bill Croft PhD, RRT, RCP, "Ventilator Weaning Protocols" February 2nd, 2012.

8.2. Blackwood B, Alderdice F, Burns KE, Cardwell CR, Lavery G, O'Halloran P. Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill patients. Cochrane Database Syst Rev. 2010; 5: CD006904

8.3. Koch RL. Therapist driven protocols: a look back and moving into future. Crit Care Clin. 2007; 23: 149-59, vii-viii.

8.4. MacIntyre Nr. Evidence-based guidelines for weaning and discontinuing ventilatory support: a collective task force, Facilitated by the American College of Chest Physicians; the American Association of Respiratory Care; and the American Society of Critical Care Medicine: Chest, 2001; 120 (6 suppl): 3755-955.

8.5. MacIntyre NR: Respiratory mechanics in the patient who is weaning from the ventilator, Respiratory

8.6. Care, 2005; 50:275-86.

9. APPENDICES

9.1. ABCD Screen (Appendix 1)
9.2. ACBD Assess (appendix 2)
9.3. Protocol – Initial Weaning of Patients (Appendix 3)
9.4. Protocol for Difficult to Wean Patients (PSV) (Appendix 4)
9.5. Protocol for Difficult to Wean Patients (SIMV mode) (Appendix 5)

10. ORIGINATING DEPARTMENT/S

10.1 Respiratory Care Department.

10.2 Intensive Care Services.

Compiled by: • **Deemah Al-Essa** **Respiratory Care Department Educator**	**Signature:**	**Date:**
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Authorized by: **Brig. Gen. Dr. Adnan Al Ghamdi** **Director of Intensive Care Services (ICS)**	**Signature:**	**Date:**
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Approved by: **Maj. Gen. Dr. Saud Othman Al Shlash** **General Executive Director of Prince Sultan Military Medical City**	**Signature:**	**Date:**
Date Reviewed	**Date of Next Review**	

10. ORIGINATING DEPARTMENT/S

10.1 Respiratory Care Department.

10.2 Intensive Care Services.

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Date Reviewed 25 January 2021	**Date of Next Review** 3 February 2024	

Protocol – Initial Weaning of Patients

(Assess Patient at 08:00 A.M. Daily)

Is Patient Ready?

1. Is there evidence of reversal of the underlying cause of respiratory failure?
2. Is oxygenation adequate?
3. Is patient Hemodynamically Stable?
4. Is the patient capable of initiating an effective respiratory effort?

→ No → **Postpone screening & weaning trial till next day**

↓ Yes

Screen the patient using ABCD

ABCD Screen

A. Assessment:
- Is sedation interrupted?
- Is cough Present?
- Is there a cuff leak?

B. Breathing:
- Is NIF >20 cmH2O?
- Is P0.1 < 5?

C. Cardiovascular Stability:
- Is Hb > 7 g/dL?
- Are inotropes low or off?
- Are vasopressors low or off?

D. Diffusion:
- PaO2/FiO2 > 150–200

→ No → **Daily screening, then start weaning at the begining of protocol.**

↓ Yes

Monitor RSBI X 1minute
with patient on CPAP 5 CmH2O
Ensure Automatic Tube Compensation is on

Is RSBI <105 after 1 minute? → No

↓ Yes

PSV Trial X 30 to 60 minutes.
Begin PS level to achieve RR 20 –25 Breath/min or less and tidal volume of 6–8 mls/kg IBW.
* If tolerated reduce PS by increments
  * 2 to 4 cmH_2O every 15 minutes until PSV level of 5 cmH_2O is reached.
  * Continually assess by:
    * A&C – Assessment & Comfort
    * B – Respiratory Rate < 35 bpm
    * D – Diffusion: sustained SpO_2 > 90%

Note: Ensure that Automatic Tube Compensation is used if available.

ACBD Assess

Continue monitoring the patient using the following:

* A&C – Assessment & Comfort/Circulation
  * No use of accessory muscles.
  * No diaphoresis
  * No anxiety, agitation, somnolence, coma.
  * No persistant tachycardia >20% from baseline.
  * No hypotension (BP <90/60 mmHg)
* B – Breathing
  * Respiratory Rate < 35 bpm
  * No paradoxical breathing
  * No dyspnea.
* D – Diffusion:
  * Sustained SpO_2 > 90%
  * PaO_2 > 60 mmHg
  * $PaCO_2$ < 50 mmHg &/or no ⬆ of 20% from baseline.

→ No → **Daily screening, then start weaning at the begining of protocol.**

↓ Yes

Do ABG:
* pH 7.35 to 7.45?
* $PaCO_2$ 35 to 45 mmHg?
* PaO_2 ≥ 60 mmHg?
* FiO_2 ≤ 0.40?

Inform attending Physician to obtain order to extubate.

Consider shifting out of ICU when medically appropriate.

Is patient successfully weaned within three (3) days?

Yes → **Daily screening, then start weaning at the begining of protocol.**

No

* On the fourth day of un-successful weaning label the patient as "difficult to wean"
* Continue weaning from four to 28 days in ICU if needed, while considering the following: Percutaneous tracheostomy starting from 10 to 14 days post intubation.

Post Tracheosotomy is patient successfully weaned within 3 to 5 days?

Yes → **Consider shifting out of ICU when medically appropriate.**

No

Transfer to RICU if patient meets these criteria:
* Level of consciousness (GCS ≥ 8/15)
* Single organ system failure (Respiratory)

&

Consider using the protocol for difficult to wean using (PSV) or (SIMV)

Successfully weaned within three (3) months?

Yes → Shift patient to ward or other facilities

No →
* Shift patient to ward using homecare ventilator
* Refer patient to Homecare Services

Steps for Difficult to Wean Tracheostomy Patients

1. Begin with a PSV level that achieves a RR of 20 to 25 breaths/minute or less.
2. Use PS to achieve a tidal volume of 6 to 8 ml/Kg IBW.
3. Rest patient on an appropriate & comfortable level of ventilation X 4–6 hours.
4. Then retry PSV trial for another 2 hours only.
   NOTE: Assess the patient between trial for tolerance of weaning using these criteria & discontinue trial if criteria are not met.
   - RR ≥ 25 breaths/minute
   - HR ≥ 100 to 120 bpm or 20% change from baseline.
   - Systolic BP > 180 mmHg or < 90 mmHg or 20% from baseline.
   - Agitation, anxiety, diaphoresis.
   - Any changes in the respiratory patterns.
5. Rest patient on full support ventilation overnight.
6. Increase PSV trial (period) by 2 hours each day.
7. Once patient tolerates PS for 12 hours proceed to ATM trial X 2 hours only.
8. Rest patient on appropriate mode X 4 to 6 hours.
9. Re-try ATM for another 2 hours only.
10. Rest patients on an appropriate mode overnight.
11. If patient tolerates ATM > 12 hours, do an ABG. If results are acceptable, continue on ATM.
12. Document all weaning trials and outcomes in the "RICU Daily Weaning Trial" Sheet. If patient is in RICU or in RT progress note if patient is in ICU.
13. At any stage of weaning, if the patient fails to wean, patient will be restarted on appropriate mode of ventilation. Plan is rolled back to 1 day prior to the day that the patient failed. In 2–3 days consider SIMV.

Abort Weaning if ANY of the Following Occur

- Respiratory Rate ≥ 30 breaths/minute.
- Large increase or decrease in Ve.
- Decrease in SpO_2 ≤ 90%
- PaO_2 < 60 mmHg
- $PaCO_2$ > 50 mmHg &/or ⬆ 20% from baseline.
- pH < 7.30
- Increased use of accessory muscles.
- Paradoxical breathing.
- Diaphoresis
- Dyspnea.
- Persistant tachycardia ≥ 120 bpm.
- Hypotension (BP <90/60 mmHg)
- Angina
- New arrhythmias.
- Anxiety, agitation, somnolence, coma.

Abbreviations

RSBI – Rapid/Shallow Breathing Index)
CPAP – Continuous Positive Airway Pressure
PSV – Pressure Support Ventilation
ATM – Aerosol Trach Mask
RR – Respiratory Rate
PS – Pressure Support
IBW – Ideal Body Weight
SpO_2 – Pulse Oximetry Oxygen Saturation
RICU – Respiratory Intensive Care Unit
VE – Minute Ventilation
NIF – Negative Inspiratory Force
P0.1 – Occlusion Pressure (0.1 second)
Hb – Hemoglobin
GCS – Glascow Coma Scale

References:

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MacIntyre N. Discontinuing mechanical ventilator support. Chest. 2007; 132: 1049–56
Durbin CG. Tracheostomy: why, when, and how? Respir Care. 2010; 55:1056–68

Protocol for Difficult to Wean Patients (PSV)

(Assess Patient at 08:00 A.M. Daily)

PRINCE SULTAN MILITARY MEDICAL CITY
RESPIRATORY CARE SERVICES

Is Patient Ready?

1. Is there evidence of reversal of the underlying cause of respiratory failure?
2. Is oxygenation adequate?
3. Is patient Hemodynamically Stable?
4. Is the patient capable of initiating an effective respiratory effort?

→ No → **Postpone screening & weaning trial till next day**

Yes

Start Here:
Screen the patient using ABCD

ABCD Screen

A. Assessment:
Is sedation interrupted?
Is cough Present?

B. Breathing:
Is NIF >20 cmH2O?
Is P0.1 < 5?

C. Cardiovascular Stability:
Is Hb > 7 g/dL?
Are inotropes low or off?
Are vasopressors low or off?

D. Diffusion:
PaO2/FiO2 > 150-200

→ No

Yes

Monitor RSBI X 1minute
with patient on PSV (PS = 0)
Ensure Automatic Tube
Compensation is on

RSBI < 105
> 1 minute

→ No

Yes

Rest Patient 4 – 6 Hrs.
Repeat ABCD Screening
& weaning trail.
If after 2 trials patient does not achieve 2 hours of spontaneous breathing resume weaning the next day, and start at the beginning of the algorithm

Start PS Trial.

* Begin with a PSV level that achieves a RR of 20 to 25 breaths/minute or less.
* Use PS to achieve a tidal volume of 6 to 8 ml/Kg IBW.

ACBD Assess

Continue monitoring the patient using the following:

* A&C – Assessment & Comfort/Circulation
  * No use of accessory muscles.
  * No diaphoresis
  * No anxiety, agitation, somnolence, coma.
  * No persistant tachycardia >20% from baseline.
  * No hypotension (BP <90/60 mmHg)
* B – Breathing
  * Respiratory Rate < 35 bpm
  * No paradoxical breathing
  * No dyspnea.
* D – Diffusion:
  * Sustained SpO_2 > 90%
  * PaO_2 > 60 mmHg
  * $PaCO_2$ < 50 mmHg &/or no ⬆ of 20% from baseline.

→ No

Yes

After 2 Hrs, is trial successful?

→ No → Use SOAP format to document PSV level, duration of the trial, reason(s) for failure.

Yes

1. Rest patient on an appropriate & comfortable level of ventilation X 4-6 hours.
2. Then retry PSV trial for another 2 hours only.
   NOTE: Assess the patient between trial for tolerance of weaning using these criteria
   - RR ≥ 25 breaths/minute
   - HR ≥ 100 to 120 bpm or 20% change from baseline.
   - Systolic BP > 180 mmHg or < 90 mmHg or 20% from baseline.
   - Agitation, anxiety, diaphoresis.
   - Any changes in the respiratory patterns.
3. Rest patient on full support ventilation overnight.
4. Increase PSV trial (period) by 2 hours each day.
5. Once patient tolerates PS for 12 hours proceed to ATM trial X 2 hours only.
6. Rest patient on appropriate mode X 4 to 6 hours.
7. Re-try ATM for another 2 hours only.
8. Rest patients on an appropriate mode overnight.
9. If patient tolerates ATM > 12 hours, do an ABG. If results are acceptable, continue on ATM.
10. Document all weaning trials and outcomes in the "RICU Daily Weaning Trial" Sheet. If patient is in RICU or in RT progress note if patient is in ICU.
11. At any stage of weaning, if the patient fails to wean, patient will be restarted on appropriate mode of ventilation. Plan will be rolled back to 1 day prior to the day that the patient failed. In 2-3 days consider SIMV.

Abbreviations

RSBI – Rapid/Shallow Breathing Index)
CPAP – Continuous Positive Airway Pressure
PSV – Pressure Support Ventilation
ATM – Aerosol Trach Mask
RR – Respiratory Rate
PS – Pressure Support
IBW – Ideal Body Weight
SpO_2 – Pulse Oximetry Oxygen Saturation
RICU – Respiratory Intensive Care Unit
VE – Minute Ventilation
NIF – Negative Inspiratory Force
P0.1 – Occlusion Pressure (0.1 second)
Hb – Hemoglobin
GCS – Glascow Coma Scale

Abort Weaning if ANY of the Following Occur

Respiratory Rate ≥ 30 breaths/minute.
Large increase or decrease in Ve.
Decrease in SpO_2 ≤ 90%
PaO_2 < 60 mmHg
$PaCO_2$ > 50 mmHg &/or ⬆ 20% from baseline.
pH < 7.30
Increased use of accessory muscles.
Paradoxical breathing.
Diaphoresis
Dyspnea.
Persistant tachycardia ≥ 120 bpm.
Hypotension (BP <90/60 mmHg)
Angina
New arrhythmias.
Anxiety, agitation, somnolence, coma.

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Durbin CG. Tracheostomy: why, when, and how? Respir Care. 2010; 55:1056-68

Protocol for Difficult to Wean Patients (SIMV Mode)

(Assess Patient at 08:00 A.M. Daily)

PRINCE SULTAN MILITARY MEDICAL CITY
RCS
RESPIRATORY CARE SERVICES

Is Patient Ready?

1. Is there evidence of reversal of the underlying cause of respiratory failure?
2. Is oxygenation adequate?
3. Is patient Hemodynamically Stable?
4. Is the patient capable of initiating an effective respiratory effort?

→ No → **Postpone screening & weaning trial till next day**

Yes

Start Here:
Screen the patient using ABCD

ABCD Screen

A. Assessment:
Is sedation interrupted?
Is cough Present?

B. Breathing:
Is NIF >20 cmH2O?
Is P0.1 < 5?

C. Cardiovascular Stability:
Is Hb > 8 g/dL?
Are inotropes low or off?
Are vasopressors low or off?

D. Diffusion:
PaO2/FiO2 > 150-200

No → Rest Patient 4 - 6 Hrs.
Repeat ABCD Screening
& weaning trail.
If after 2 trials patient does not achieve 2 hours of spontaneous breathing resume weaning the next day, and start at the beginning of the algorithm

Yes

Monitor RSBI X 1minute
with patient on CPAP 5 CmH2O
Ensure Automatic Tube Compensation is on

After 1 minute is RSBI < 105? → No

YES

* Shift to combination SIMV/PS X 30 minutes
* Determine SIMV rate based on (Full Control) rate -2
  - Use Automatic Tube Compenastion feature
* PS level:
  - Set PS at a minimum tolerated level & keep it FIXED to:
    - To maintain patient's comfort
    - To achieve RR 20 to 25 breaths/min
    - To achieve tidal volumes of 6 to 8 ml/Kg of IBW
* Use same FiO_2 & PEEP as in full control mode

Use ACBD for continuous patient assessment

ACBD Assess

Continue monitoring the patient using the following:

* A&C - Assessment & Comfort/Circulation
  * No use of accessory muscles.
  * No diaphoresis
  * No anxiety, agitation, somnolence, coma.
  * No persistant tachycardia >20% from baseline.
  * No hypotension (BP <90/60 mmHg)
* B - Breathing
  * Respiratory Rate < 35 bpm
  * No paradoxical breathing
  * No dyspnea.
* D - Diffusion:
  * Sustained SpO_2 > 90%
  * PaO_2 > 60 mmHg
  * $PaCO_2$ < 50 mmHg &/or no ↑ of 20% from baseline.

→ No

YES

Is the SIMV trial tolerated? → No

YES

* Continue trial or same SIMV rate/PSV
* Set PS level to:
  - To maintain patient's comfort
  - To achieve RR 20 to 25 breaths/min
  - To achieve tidal volumes of 4 to 6 ml/Kg of IBW
* Use same FiO_2 & PEEP as in full control mode
* Use ACBD Assess for continuous monitoring

Is the SIMV trial tolerated? → No

* Increase by increments of 2 to alleviate high RR & ensure patient comfort.
* If patient still does not tolerate weaning, rest patient for the rest of the day on full support ventilation.
* Restart weaning trial the next day using the previous tolerated setting.

Yes

* Decrease SIMV rate by 2 each day, with an appropriate level of PS to ensure patient's comfort. (RR 20-25, Vt 6-8 ml/Kg of IBW)
* When SIMV rate = 4 breaths/minute shift patient to PSV.
* Refer to the protocol for PSV weaning.

Steps for Difficult to Wean Tracheostomy Patients

1. Begin with a PSV level that achieves a RR of 20 to 25 breaths/minute or less.
2. Use PS to achieve a tidal volume of 6 to 8 ml/Kg IBW.
3. Rest patient on an appropriate & comfortable level of ventilation X 4-6 hours.
4. Then retry PSV trial for another 2 hours only.
   NOTE: Assess the patient between trial for tolerance of weaning using these criteria & discontinue trial if criteria are not met.
   - RR ≥ 25 breaths/minute
   - HR ≥ 100 to 120 bpm or 20% change from baseline.
   - Systolic BP > 180 mmHg or < 90 mmHg or 20% from baseline.
   - Agitation, anxiety, diaphoresis.
   - Any changes in the respiratory patterns.
5. Rest patient on full support ventilation overnight.
6. Increase PSV trial (period) by 2 hours each day.
7. Once patient tolerates PS for 12 hours proceed to ATM trial X 2 hours only.
8. Rest patient on appropriate mode X 4 to 6 hours.
9. Re-try ATM for another 2 hours only.
10. Rest patients on an appropriate mode overnight.
11. If patient tolerates ATM > 12 hours, do an ABG. If results are acceptable, continue on ATM.
12. Document all weaning trials and outcomes in the "RICU Daily Weaning Trial" Sheet. If patient is in RICU or in RT progress note if patient is in ICU.
13. At any stage of weaning, if the patient fails to wean, patient will be restarted on appropriate mode of ventilation. Plan is rolled back to 1 day prior to the day that the patient failed. In 2-3 days consider SIMV.

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Large increase or decrease in Ve.
Decrease in SpO_2 ≤ 90%
PaO_2 < 60 mmHg
$PaCO_2$ > 50 mmHg &/or ↑ 20% from baseline.
pH < 7.30
Increased use of accessory muscles.
Paradoxical breathing.
Diaphoresis
Dyspnea.
Persistant tachycardia ≥ 120 bpm.
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New arrhythmias.
Anxiety, agitation, somnolence, coma.

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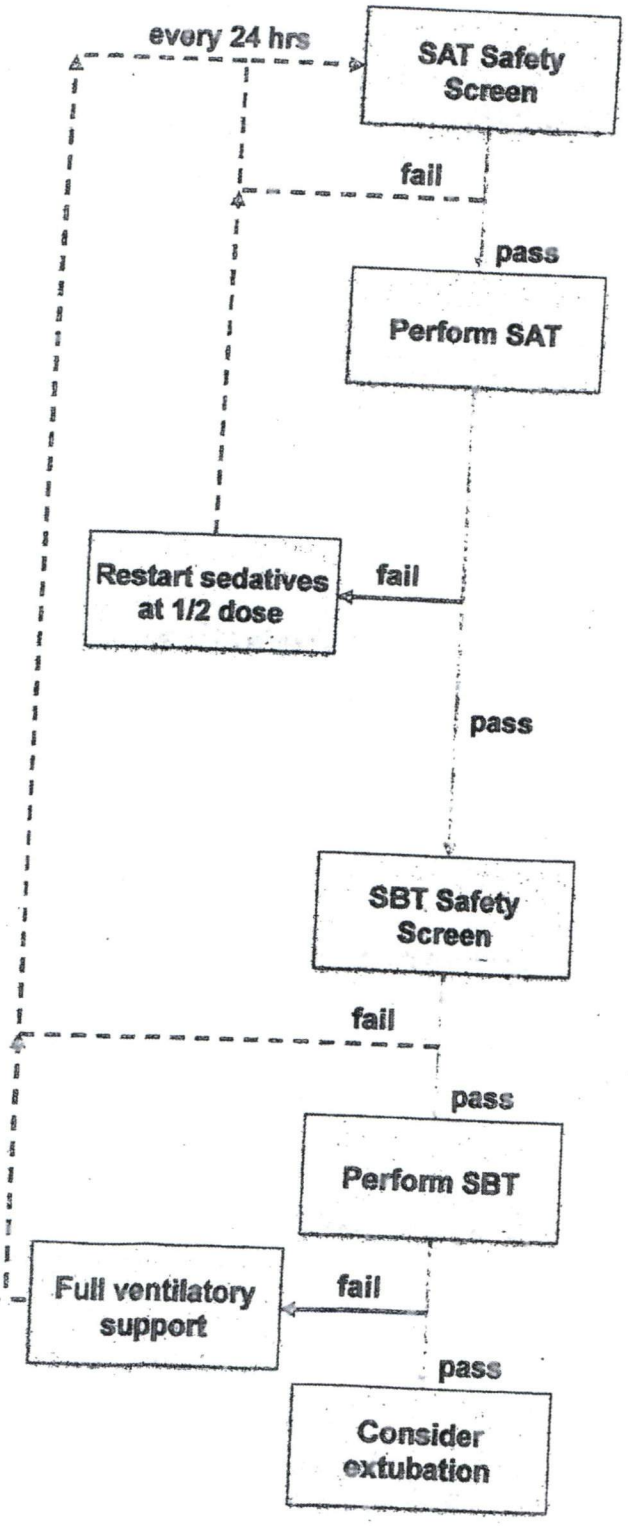
Durbin CG. Tracheostomy: why, when, and how? Respir Care. 2010; 55:1056-68

"Wake Up and Breathe" Protocol
Spontaneous Awakening Trials (SATs) + Spontaneous Breathing Trials (SBTs)



SAT Safety Screen

- No active seizures
- No alcohol withdrawal
- No agitation
- No paralytics
- No myocardial ischemia
- Normal intracranial pressure

SAT Failure

- Anxiety, agitation, or pain
- Respiratory rate > 35/min
- Oxygen saturation < 88%
- Respiratory distress
- Acute cardiac arrhythmia

SBT Safety Screen

- No agitation
- Oxygen saturation ≥ 88%
- FIO2 ≤ 50%
- PEEP ≤ 7.5 cm H2O
- No myocardial ischemia
- No vasopressor use
- Inspiratory efforts

SBT Failure

- Respiratory rate > 35/min
- Respiratory rate < 8/min
- Oxygen saturation < 88%
- Respiratory distress
- Mental status change
- Acute cardiac arrhythmia