Daily Sedation Awakening Trial (SAT)/ Spontaneous Breathing Trial (SBT) Protocol for Adult Intensive Care Unit Patients

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PURPOSE

The Spontaneous Awakening Trial (SAT) and Spontaneous Breathing Trial (SBT) are important part of the ABCDEF Bundle recommended by the Society of Critical Care Medicine (SCCM) to improve care provided in the intensive care unit (ICU).[1,2] The B element of the Bundle refers to "Both SAT and SBT" and focuses on setting a time every day in the ICU to perform sedation holiday and ventilation weaning, in an effort to orient patients to time and day and facilitate earlier extubation. Previous study showed that performing daily SAT alone leads to improved patient outcomes, such as decreased duration of mechanical ventilation, decreased ICU length of stay, and decreased neurologic evaluations, such as lumbar puncture, head CT, and neurologic consults.[3] Further study that evaluated the combination of SAT and SBT not only confirmed the benefit in decreased mechanical ventilation time and ICU length of stay, but also showed improved 1-year survival rate.[4] Recent studies also showed association between the ABCDEF Bundle compliance and improved patient outcomes, such as higher hospital survival rate and increased days free of delirium and coma.[5]

Decreasing the duration of ventilation time is an important goal for ICU patients as prolonged ventilation can lead to many adverse clinical outcomes, such as anxiety, agitation, traumatic memories, and ventilator associated pneumonia. The goal of this institutional protocol is to provide a standardized process for SAT and SBT for the adult ICU patients.

PROCEDURE

General Procedure

1. The SAT and SBT screening process will be started by the nurse every day at least four hours prior to the physician rounding time.
2. The initial screening for SAT and SBT should be performed by the nurse on patients ≥ 18 years old in the ICU who require mechanical ventilation for ≥ 12 hours (full ventilatory support and those being weaned eligible).

   a. Patients who meet at least one of the following criteria should be excluded[4]:
      i. Admission after cardiopulmonary arrest
      ii. Continuous mechanical ventilation for ≥ 2 weeks
      iii. Withdrawal of life support or imminent death
      iv. Profound neurological deficits (e.g., large stroke, severe dementia)
   b. If the patient meets ≥ 1 exclusion criteria, the nurse should not proceed with the rest of the SAT and SBT process and should notify the physician. The physician will then screen the patient individually and make clinical judgment on whether to proceed with the SAT and SBT protocol.
   c. If the patient meets no exclusion criteria, then the nurse should proceed to SAT.
3. For any medically complicated patients who fail any part of the protocol (initial screening, SAT and/or SBT), the nurse should notify the physician.

Spontaneous Awakening Trial (SAT)[3,4]

1. The nurse should perform the following SAT safety screen on patients who passed the initial screening before proceeding with sedation interruption.
   a. The SAT screening and sedation weaning process are done **regardless** of whether the patient meets the criteria for SBT.
   b. Patients will **NOT** pass the safety screen for SAT if they meet at least one of the following criteria:
      i. Sedatives for active seizures or alcohol withdrawal
      ii. Escalating sedative doses due to ongoing agitation
      iii. Neuromuscular blockade
      iv. Active myocardial ischemia in previous 24 hours
      v. Increased intracranial pressure
   c. Patients meeting ≥ 1 criteria above are considered **in**eligible for SAT and should be rescreened for SAT in the next 24 hours.
2. If patient passes the SAT safety screen, then assess Richmond Agitation Sedation Scale (RASS). If RASS is NOT at 0 to -1, then continuous infusions of sedatives are to be decreased using the following steps:
   a. Decrease sedative infusion rate by 50% every 30 minutes until the patient reaches a RASS of 0 to -1.
      i. Note: If the patient is on multiple sedatives (including fentanyl drip), titrate down benzodiazepine infusion to off first, then decrease the other agent(s).
   b. After each titration, assess neurological status and ability to move extremities for any changes from pre-sedation assessments.
   c. If the patient remains responsive and calm, continue to decrease infusion rate as tolerated to achieve the target level of sedation.
      i. Note: The patient does not need to be completely off of all sedatives until after meeting the criteria for SBT (see #1 in SBT section); the goal at this stage is to lighten the sedation to RASS goal 0 to -1.

3. Determine success or failure of SAT based on the following criteria:
   Table 1. Criteria for Determining Success or Failure of SAT[3,4]

Success	Failure
Success if meet ≥ 3 of the following: • Open eyes in response to verbal stimuli • Use eyes to follow object on request • Squeeze a hand on request • Stick out tongue on request *OR* Sedative interruption for ≥ 4 hours without exhibiting failure criteria	Failure if meet ≥ 1 of the following: • Sustained anxiety, agitation, or pain • RR > 35 bpm for ≥ 5 minutes • SpO2 < 88% for ≥ 5 minutes • Acute cardiac dysrhythmia • ≥ 2 signs of respiratory distress[a]

[a]tachycardia > 140 bpm, bradycardia < 60 bpm, tachypnea > 35 rpm, use of accessory muscles, abdominal paradox, diaphoresis, marked dyspnea

   a. If patient fails SAT and has been taken off of sedative(s), reinitiate sedative infusions at half of the previous doses if clinically indicated and titrate to goal RASS (usually light level of sedation: RASS 0 to -2) using the bolus dosing and drip titration strategy per the institutional Pain Agitation Delirium Guideline. Rescreen patient for SAT in the following 24 hours.
   b. If patient meets the criteria for SAT success, then proceed to SBT screening.

Spontaneous Breathing Trial (SBT)[4]

1. The nurse should coordinate with a respiratory therapist for SBT on eligible patients who tolerate sedation interruption and meet **all** of the following SBT screening criteria:
   a. $SpO_2 \geq 88\%$ on $FiO_2 \leq 50\%$ and PEEP ≤ 8 cmH_20
   b. Arterial pH > 7.15
   c. No agitation
   d. No myocardial ischemia in the previous 24 hours
   e. No hemodynamic instability (use of > 1 vasoactive agent, SBP < 90 mmHg or > 180 mmHg, HR > 140 bpm, cardiac arrhythmias, or milrinone unless at stable home dose)
   f. No increased intracranial pressure
2. **Once patient meets all criteria above, the nurse should coordinate with physician to confirm the patient may proceed with SBT and possible extubation.**
3. Consider the following regarding the management of sedatives during SBT.
   a. Patients must be off of **all** continuous sedative drips when SBT is performed with the following exceptions:
      i. Severely agitated patients (RASS > 0) may be kept on dexmedetomidine infusion during SBT – contact the provider if not ordered.
      ii. Fentanyl and midazolam boluses may be given for anxiety as needed.
   b. Patients who do not meet the criteria for SBT and therefore are not getting extubated may stay on the continuous infusion of sedatives.
4. Perform SBT for a minimum duration of 30 minutes to maximum of 120 minutes. If performed for > 30 minutes, then the respiratory therapist should coordinate with the physician to provide enough pressure support and/or PEEP as needed based on patient selection to prevent atelectasis during the trial.
5. The following criteria should be used to determine failure of SBT.
   a. Indications for termination of SBT are:
      i. RR > 35 bpm or < 8 bpm
      ii. SpO2 < 88%
      iii. Abrupt changes in mental status

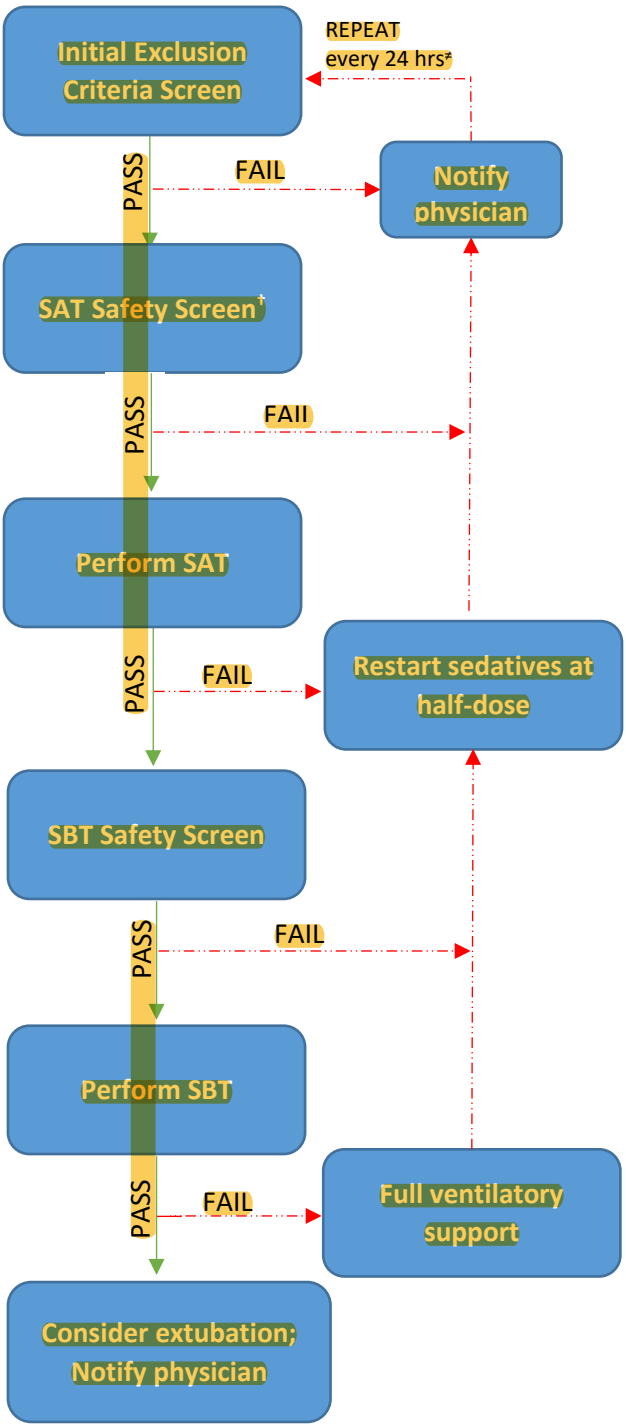
iv. Acute cardiac dysrhythmia
v. ≥ 2 signs of respiratory distress (HR > 140 bpm or < 60 bpm, tachypnea > 35 rpm, use of accessory muscles, abdominal paradox, diaphoresis, marked dyspnea)

b. If the patient meets ≥ 1 criteria, then the following steps should be taken:
   i. Notify the physician for evaluation and document the reason for failure in the chart;
   ii. Stop SBT and resume full ventilation support;
   iii. Reinitiate sedative infusions at half of the previous doses if clinically indicated and titrate to goal RASS (usually light level of sedation: RASS 0 to -2) using the bolus dosing and drip titration strategy per the institutional Pain Agitation Delirium Guideline;
   iv. Rescreen patient for SAT and SBT in the following 24 hours.
c. If the patient does not meet any failure criteria for SBT above, then the physician should be notified for consideration of extubation and weaning parameters should be obtained by respiratory therapist.

Daily Sedation Awakening Trial (SAT)/ Spontaneous Breathing Trial (SBT) Protocol for Adult Intensive Care Unit Patients, #5238

Inclusion	Exclusion*
≥ 18 years old in intensive care who require mechanical ventilation for ≥ 12 hours (full ventilatory support and those being weaned eligible)	• Admission after cardiopulmonary arrest • Continuous mechanical ventilation for ≥ 2 weeks • Withdrawal of life support or imminent death • Profound neurological deficits (e.g., large stroke, severe dementia)

*Contact physician for ineligible patients to be assessed individually



*Or earlier than 24 hours based on physician discretion.
†Failure to meet the criteria for SBT does NOT preclude patients from getting SAT.

SAT protocol

SAT Safety Screen

Must meet *all* of the following criteria:

- Sedatives for active seizures or alcohol withdrawal
- Escalating sedative doses due to ongoing agitation
- Neuromuscular blockade
- Active myocardial ischemia in previous 24 hours
- Increased intracranial pressure

SAT Failure

Failure if meet ≥ 1 of the following:

- Sustained anxiety, agitation, or pain
- RR > 35 bpm for ≥ 5 minutes
- SpO2 < 88% for ≥ 5 minutes
- Acute cardiac dysrhythmia
- ≥ 2 signs of respiratory distress[a]

SAT Success

Success if meet ≥ 3 of the following:

- Open eyes in response to verbal stimuli
- Use eyes to follow object on request
- Squeeze a hand on request
- Stick out tongue on request

OR

Sedative interruption for ≥ 4 hours without exhibiting failure criteria

[a] heart rate > 140 bpm or < 60 bpm, respiratory rate > 35 rpm, use of accessory

SBT protocol

SBT Safety Screen

Must meet *all* of the following criteria:

- SpO_2 ≥ 88% on FiO_2 ≤ 50% and PEEP ≤ 8 cmH_20
- Arterial pH > 7.15
- No agitation
- No myocardial ischemia in the previous 24 hours
- No hemodynamic instability[c]
- No increased intracranial pressure

Confirm with physician if okay to proceed with SBT/extubation

SBT Failure

Failure if meet ≥ 1 of the following:

- RR > 35 bpm or < 8 bpm
- SpO2 < 88%
- Abrupt changes in mental status
- Acute cardiac dysrhythmia
- ≥ 2 signs of respiratory distress[b]

SBT Success

Success if do not meet any failure criteria during ≥ 30-minute trial

[b] use of > one vasoactive agent, SBP < 90 mmHg or > 180 mmHg, HR > 140 bpm, cardiac arrhythmias, or milrinone unless at stable home dose
[c] heart rate > 140 bpm or < 60 bpm, respiratory rate > 35 rpm, use of accessory muscles, abdominal paradox, diaphoresis, marked dyspnea

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5. Barnes-Daly M, Phillips G, Ely E. Improving hospital survival and reducing brain dysfunction at seven California community hospitals: implementing PAD guidelines via the ABCDEF bundle 6,064 patients. *Crit Care Med*. 2017;45(2):171-178.