INTRODUCTION:
- Discontinuation of invasive mechanical ventilation consists of 2 phases: weaning (abolishing the need for ventilatory support) and extubation (removal of the endotracheal tube (ETT) when it is no longer required). Extubation is a commonly performed procedure in ICUs.
- Weaning from MV accounts for up to 40% of time spent on MV and an SBT constitutes the gold standard diagnostic test to determine a patients’ readiness for extubation.
- Currently used SBT modalities include methods that provide ventilatory support, such as pressure support ventilation (5-8 cm H2O with or without PEEP), CPAP or automatic tube compensation; and methods without any ventilatory support, such as T-piece.
- Decades of research have been dedicated to finding the optimal protocolized SBT modality that best simulates physiologic conditions post-extubation, in order to infer a patients’ readiness to liberate from MV.
- Recent meta-analyses and guidance have been inconclusive or contradicting.
- Studies have shown that different SBT modalities and duration demonstrate no significant difference regarding success rate of extubation (PSV vs. T-piece for 2h, 30-minute vs. 2h PSV or 30-minute vs. 2h T-piece). The optimal SBT modality and duration to ascertain a patients’ readiness to be extubated remains unknown.

Design:
- Prospective case control study.
- An estimated extubation success rate of 75%, with an increase in absolute success rate of 7%, with a sample size of 100 patients per group to detect a significant difference of successful extubation between groups.
- A prespecified interim analysis was performed when half of the sample was enrolled. There was a nonsignificant difference in successful extubation between groups.
- Analysis was performed using an intention-to-treat principle.

Setting:
- Patients from ICU were included in the study.

Population:
Inclusion criteria:
- Patients ≥ 18 years of age, met weaning criteria after at least 24 hours of mechanical ventilation.
- Suitable cough (Ability to raise secretions to the endotracheal tube) (Or Pmax > -15 cmH2O).
- Absence of excessive secretions (<3 aspirations in the last 8 hours).
- Resolution or improvement of the pathology that led to intubation.
- Clinical stability (HR <140 bpm, SBP 90-160, without vasopressors or at minimum doses).
- Adequate oxygenation (SatO2 >90% with FiO2 <0.4).
- Adequate ventilatory mechanics (RR <35 rpm, MIP <20 cmH2O, VT >8 ml/kg, VC >10 ml/kg, RR/VT <100 rpm/l).
- Confident awareness level (Glasgow Coma Scale >13).

Exclusion criteria:
- Patient not consenting for the study.
- Tracheostomy.
- do-not-reintubate orders.
- decision of the responsible physician (e.g., due to a preference for a particular weaning technique according to the underlying pathology), absence of informed consent.
- mental incapacity without legal representation.
- Baseline characteristics: well-balanced for age, APACHE score on admission, reason for admission and days on MV before SBT. Most were medical ICU patients.

Control:
- High respiratory work strategy.
- SBT with T-piece for 2 hours.
- Management common to both groups.
- FO2: maintained the same as before the SBT.
- Postextubation non-invasive support: before SBT attending physician had to choose between providing ventilatory support with non-invasive ventilation or oxygenation support with high-flow nasal cannula or conventional low-flow oxygen therapy.
- One-hour rest: patients could be rested for 1 hr on mechanical ventilator prior to extubation.
- This was determined prior to randomization.
- Failure of SBT Criteria.
- Neurological causes: Agitation or anxiety. Low level of consciousness (Glasgow Coma Scale <13).
- Increased respiratory work: use of accessory muscles, facial expression suggesting stress, severe dyspnea.
- Hypoxemia: PaO2 <60 mmHg or SaO2 <90% with FiO2 >0.5.
- Tachypnea: RR >35 rpm.
- Hemodynamic instability: HR >140 bpm or >20% from baseline; SBP >180 mmHg or >20% from baseline; SBT <90 mmHg; Cardiac arrhythmias.

Outcome:
- Primary outcome: successfully extubated, defined as remaining free of MV 72 h after the first SBT. Most were frequent in the low respiratory work strategy group (SBT + PSV).
- SBT+PSV: 82.3%.
- SBT+T-piece: 74%.
- Absolute Risk Reduction (ARR): 8.2% (95% CI 3.4-13%).
- Kaplan-Meier curves show a higher successful extubation rate in SBT-PSV group.
- Hazard Ratio (HR): 1.54 (95% CI 1.19-1.97; P <0.001).
- Secondary outcome: Comparing SBT + PSV vs SBT + T-piece.
- Successful extubation after first SBT: 92.5% vs 84.1%.
- Difference: 8.4 (95% CI 7.4 to 12.1; P <0.001).
- Reintubation within 72 h: 11.1% vs 11.9%.
- Difference: -0.8 (95% CI -4.8 to 3.1; P =0.63).
- ICU length of stay: 9 days vs 10 days.
- Difference: -0.3 (95% CI -1.7 to 1.1; P =0.69).
- Hospital length of stay: 24 days vs 24 days.
- Difference: 1.3 (95% CI -2.2 to 4.9; P =0.45).
- Hospital mortality: 10.4% vs 14.9%.
**Post-hoc outcome:**
- ICU mortality: 5% vs 6.6%

**Conclusions:**
- Among mechanically ventilated patients, an SBT consisting of 30 minutes of PSV, compared with 2 hours of T-piece ventilation, led to significantly higher rates of successful extubation.
- These findings support the use of a shorter, less demanding ventilation strategy for SBTs.

**REFERENCES**