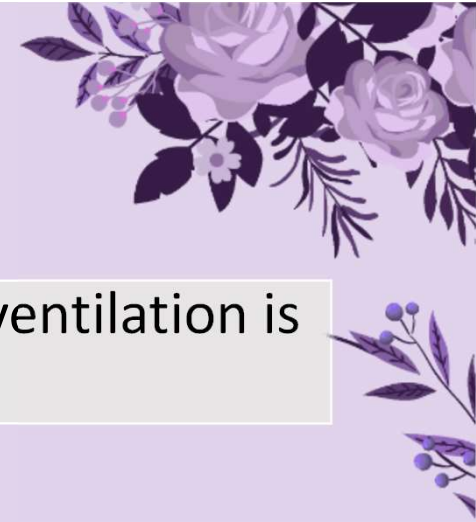


Extubation in the Emergency Department

Travis Nelson

YKHC

11/13/22



Who gets extubated in the ED?

‘once the underlying process that necessitated mechanical ventilation is resolved, SBT and weaning should start’ - ACCCM

Good candidate

- EtOH, no longer intoxicated
- Negative trauma workups
- Agitation d/t substance
- ?carbon monoxide poisoning?

Bad candidate

- EtOH, still heavily intoxicated
- Trauma workup with ICH or requiring surgery
- Airway swelling (inhalation injury, anaphylaxis)
- Processes requiring days to improve (PNA, CHF, COPD)
- On vasopressors



Spontaneous Awakening Trial

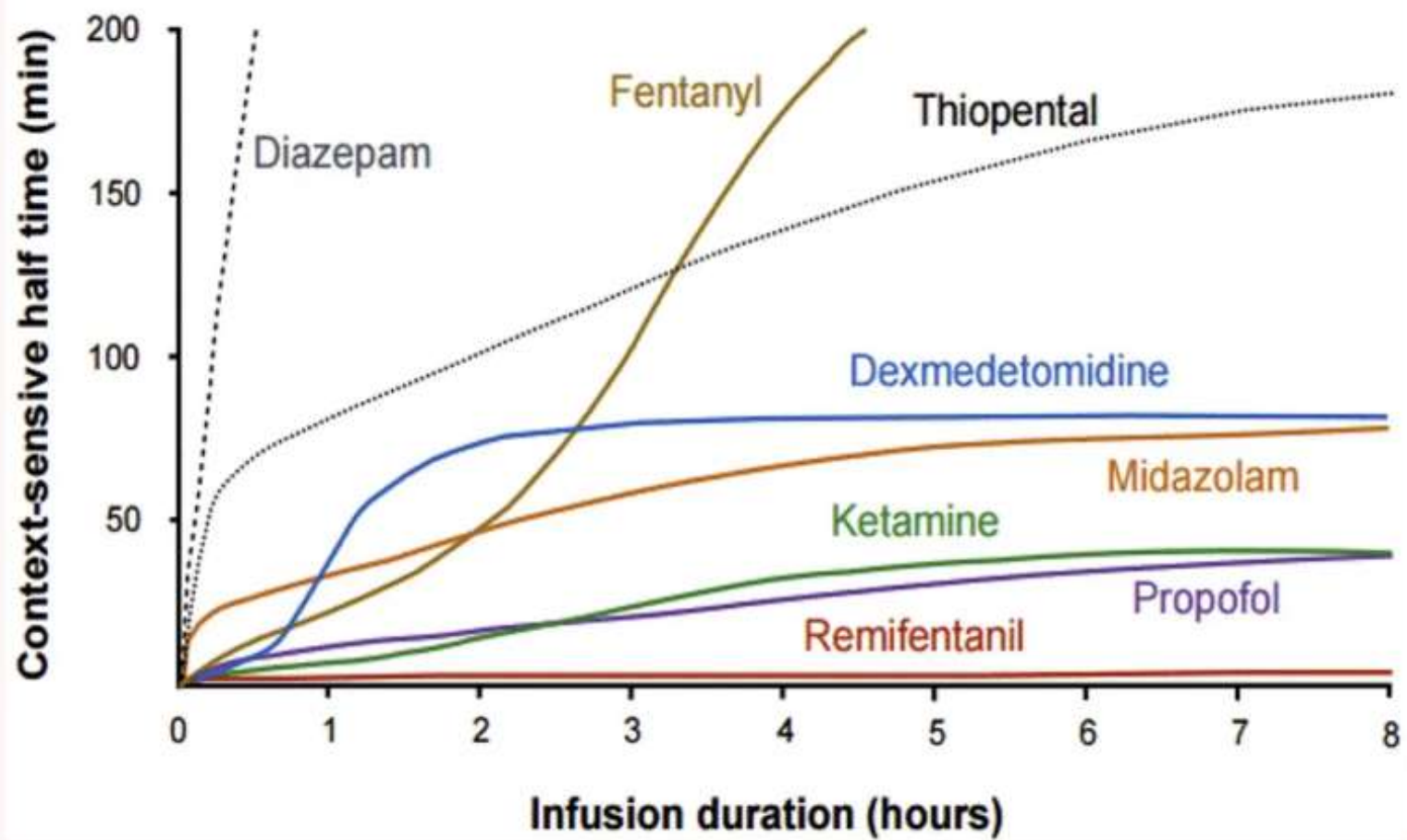
- Assess at 4 hours off sedatives (analgesics may be continued)
- Patient may waken well before 4 hours depending on agent

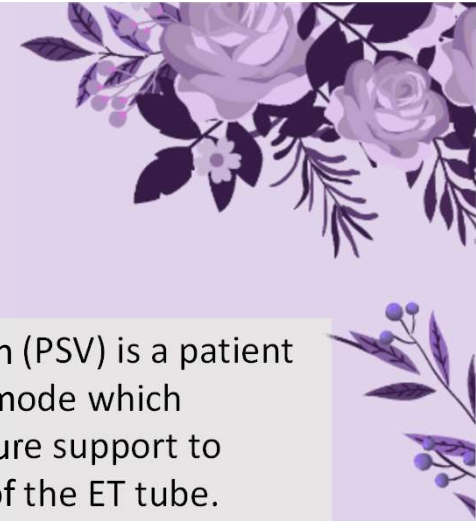
Present:

- Open eyes
- Look at caregiver
- Squeeze hand
- Hold arm in air
- Raise head off bed

Not present:

- Sustained anxiety/ agitation
- RR \geq 35 (28) for 5 minutes
- SpO₂ < 88% (92) for 5 minutes
- Signs of resp distress
 - Dyspnea
 - Tachycardia / bradycardia
 - Use of accessory muscles





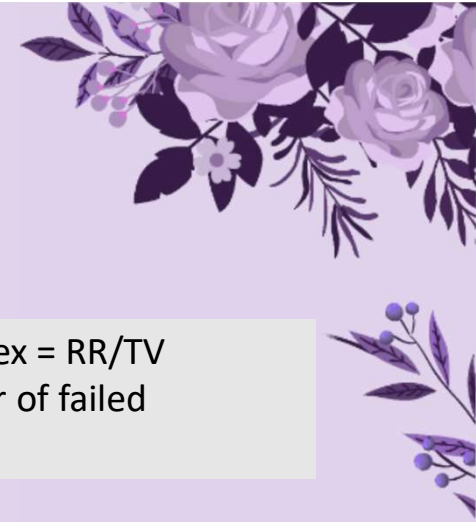
Spontaneous Breathing Trial

- Ventilatory support removed x 15-30 min
 - Ventilator set to 'flow-by' with PEEP 5
 - T-piece SBT on pressure support ventilation
- Failed SBT:
 - RR < 8 bpm or > 30
 - HR > 140 (some criteria say 120 or 100)
 - Tv \geq 6 ml/kg
 - Hypoxemia (SpO₂ < 88% (92%) for > 5 min
 - Change in mental status
 - Cardiac arrhythmia
 - Anxiety / agitation / discomfort
 - Signs of resp distress (same as SAT)

Pressure support ventilation (PSV) is a patient triggered pressure limited mode which provides just enough pressure support to overcome the dead space of the ET tube.

Initial settings:

- Inspiratory pressure 5-8
- PEEP 5
- FiO₂ < / = 40%

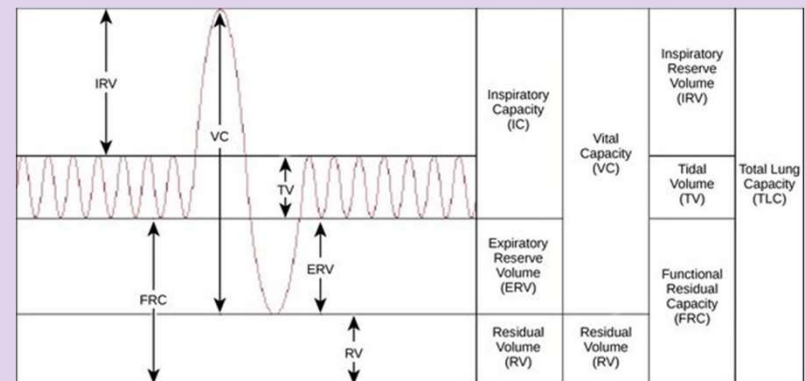


Rapid Shallow Breathing Index

$$= RR / TV \text{ (min/L)}$$

Rapid shallow breathing index = RR/TV
- Most consistent predictor of failed extubation

- ≥ 105 is BAD : 95% chance of failed extubation
- E.g. : A 70 kg male is breathing at 32 bpm with a TV of 420 mL
- $420/1000 = 0.42$
- $32/0.42 = 76 = \text{good 2 go!}$



EMERGENCY DEPARTMENT EXTUBATION GUIDELINES

Step 1:

assess risk of extubation

LOW-RISK

- resolution of issue requiring intubation
- A: not a difficult intubation
- B: $SpO_2 \geq 95\%$ on $FiO_2 \leq 40\%$, $PEEP \leq 5$, $RR < 30$, $TV \geq 6ml/kg$
- C: $SBP > 100$, $HR < 100$

NO

DO NOT EXTUBATE

ICU referral
ext: 8409

Step 2:

test readiness for extubation

YES

- turn off sedatives to allow washout
- minimise ventilatory support ($PEEP \leq 5$, $PS \leq 2$, $RR \leq 4$) for 15-30mins (Spontaneous Breathing Trial)
- sit up to 45°
- allow patient to wake up enough to understand and obey commands
 - cough/FVC $> 12ml/kg$
 - raise head off bed
 - hold arm in air for 15 seconds

FAIL

- $SpO_2 < 90\%$,
- $HR > 140$,
- $SBP > 200$
- $RR > 30$
- severe anxiety
- \downarrow GCS

Step 3:

prepare for extubation

palliative patients start here

- re-oxygenate with FiO_2 100%
- DIFFICULTY AIRWAY TROLLEY and NON-INVASIVE VENTILATION to bedside
- insert a bite-block
- suction oropharynx and ETT tube

Step 4:

perform extubation

- apply positive pressure and simultaneously cut pilot-balloon tube + tube-tie
- as patient exhales/coughs, remove ETT
- suction oropharynx again

Step 5:

post extubation care

- apply 4-6L O_2 via Hudson mask
- observe in Resus bay for 1 hour

RESPIRATORY DISTRESS

- apply NON-INVASIVE VENTILATION
- prepare for (difficult) RSI- use paralysis
- if palliative, do not re-intubate

LARYNGOSPASM

- jaw-thrust (+/- Larson's Manoeuvre) + 100% O_2 via BVM- IPPV+PEEP
- prepare for (difficult) RSI- use paralysis
- if palliative, do not re-intubate



Post extubation stridor

- HR 100s RR 20s SpO2 100%
- 3-30% of extubations
- Risk factors:
 - Female, children, short necks, tracheomalacia
 - Traumatic intubations, multiple attempts, large ET size
 - Prolonged intubations (>36 hrs)
- Treated with nebulized epinephrine
- [Post-extubation stridor • LITFL Medical Blog • CCC Airway](#)



Cuff leak test (quantitative)

- 1) Set ventilator to volume control / assist control
 - 2) Record expiratory TVs with cuff inflated (X)
 - 3) Deflate cuff
 - 4) Record expiratory TVs (Y) with cuff deflated, average three lowest values
 - 5) $X - Y = \text{cuff leak volume}$
 - 6) If cuff leak volume $> 110 \text{ mL}$ (or 25%), concern for post-extubation stridor
- Increased exhaled volume after cuff deflation is evidence for obstruction
 - Qualitative assessment by listening over trachea
 - Consider pretreatment with steroids or delaying extubation
 - Remember: prediction of post-extubation stridor is not a contraindication to extubation