Weaning från respirator
Finns det någon State of the Art?

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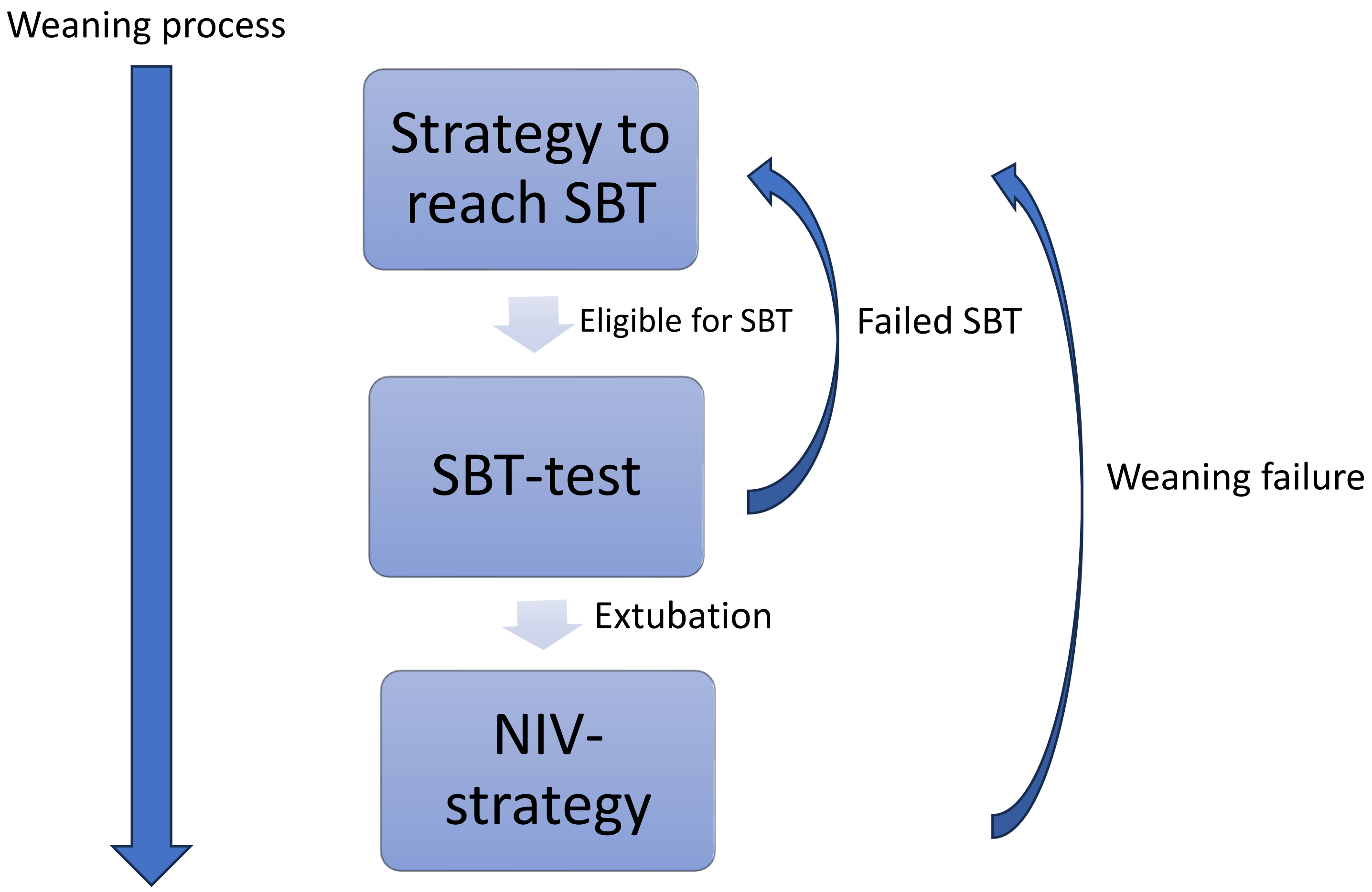
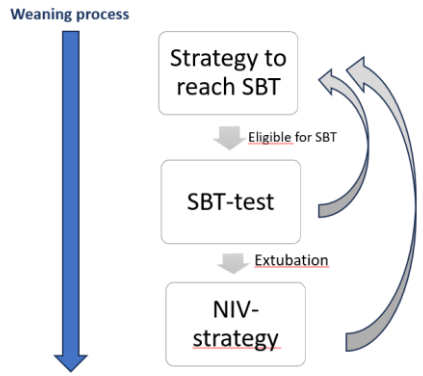
Content


Weaning process
Strategy to reach SBT
Eligible for SBT
Failed SBT
SBT-test
Weaning failure
Extubation
NIV-strategy

Epidemiology



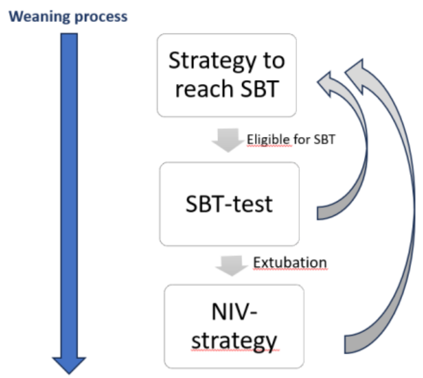
Burns, JAMA 2021

- Worldwide, 19 countries
- Prospective observational
- 2000 pts
- Intubated ≥ 24h
- Followed for 28d
- Variation in weaning practices

Phan, WEAN SAFE, Lancet Resp Med 2023

- Worldwide, 50 countries
- Prospective observational
- 6000pts
- Intubated ≥ 48h
- Followed for 90d
- Variation in weaning practices

Weaning practices vary internationally

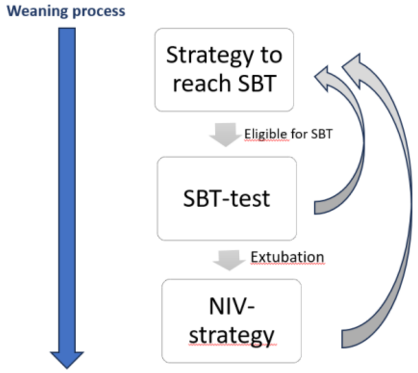


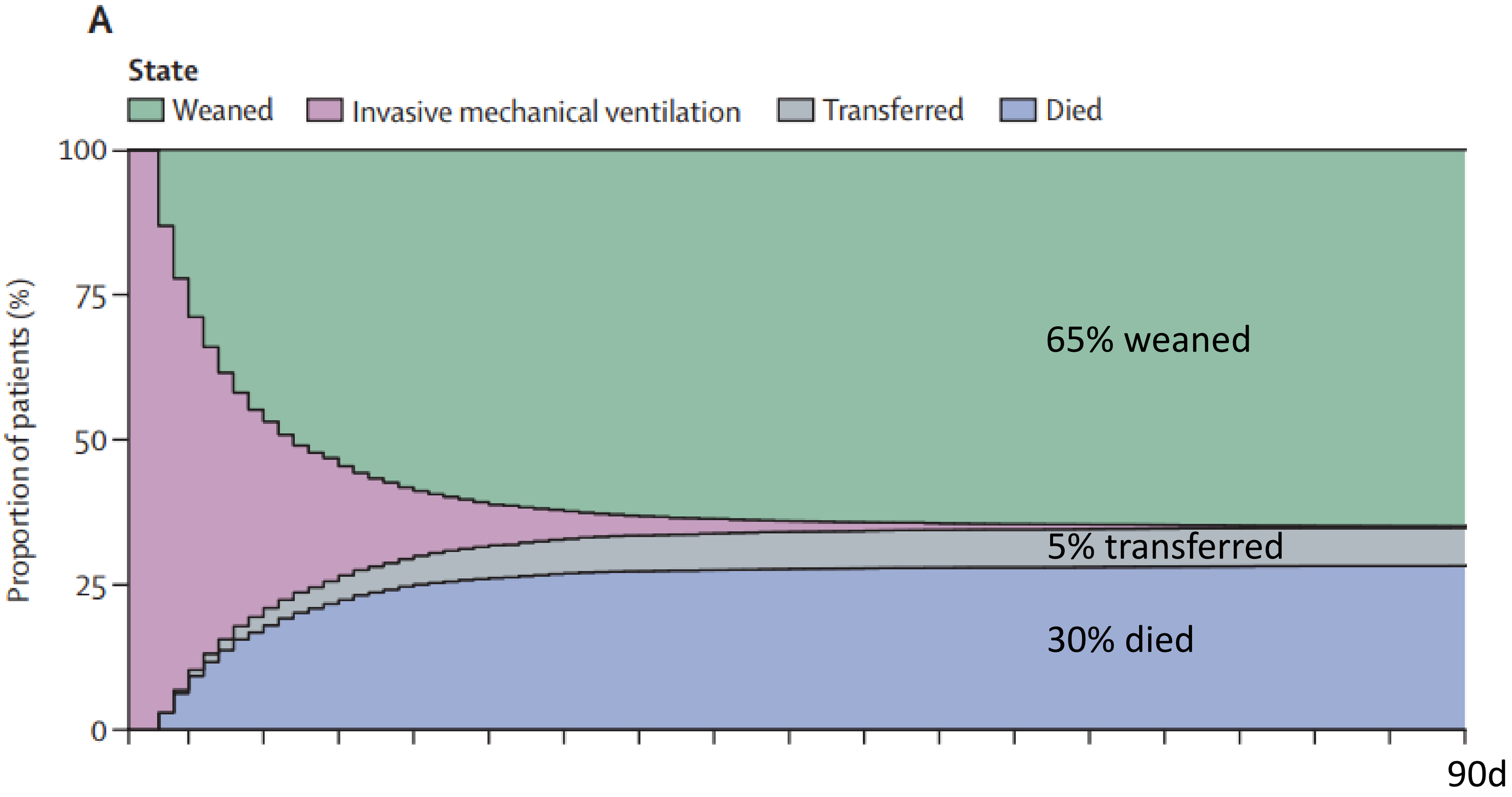
- Modes of ventilation before SBT
- Practice in screening for SBT (daily)
- Personnel involved in screening/conducting SBT
- Personnel involved in adjusting ventilator support
- Practices in conducting SBT:

  PS+PEEP 50%; T-piece 25%; CPAP 10%; PS without PEEP 10%

Burns et al, JAMA 2021

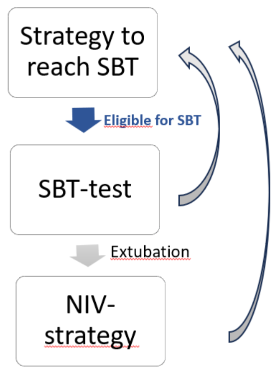
Wean SAFE- Outcome over time





Pham, Wean *Safe* 2023

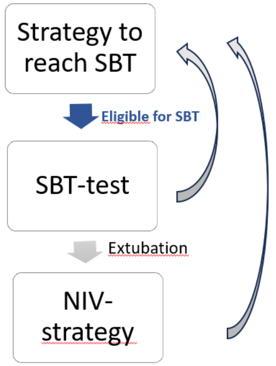
SBT eligibility criteria

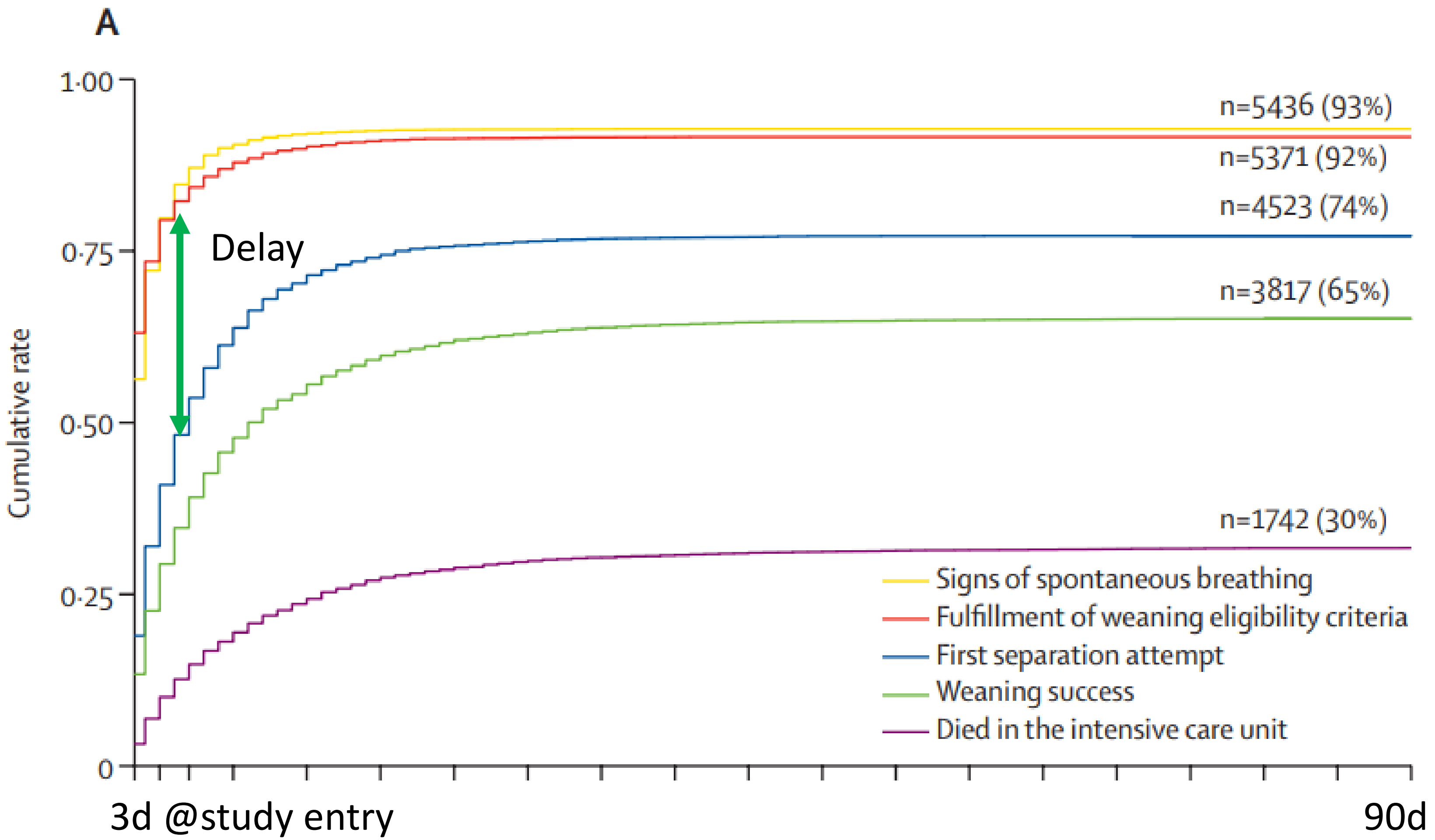


- $FiO_2 < 0,5$
- PEEP<10cmH_2O
- Vasopressor <0,2mcg/kg/min
- No paralytic agents

Pham, Wean Safe 2023

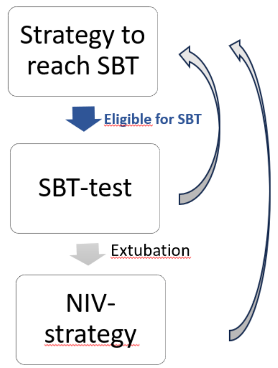
Delay to first separation attempt



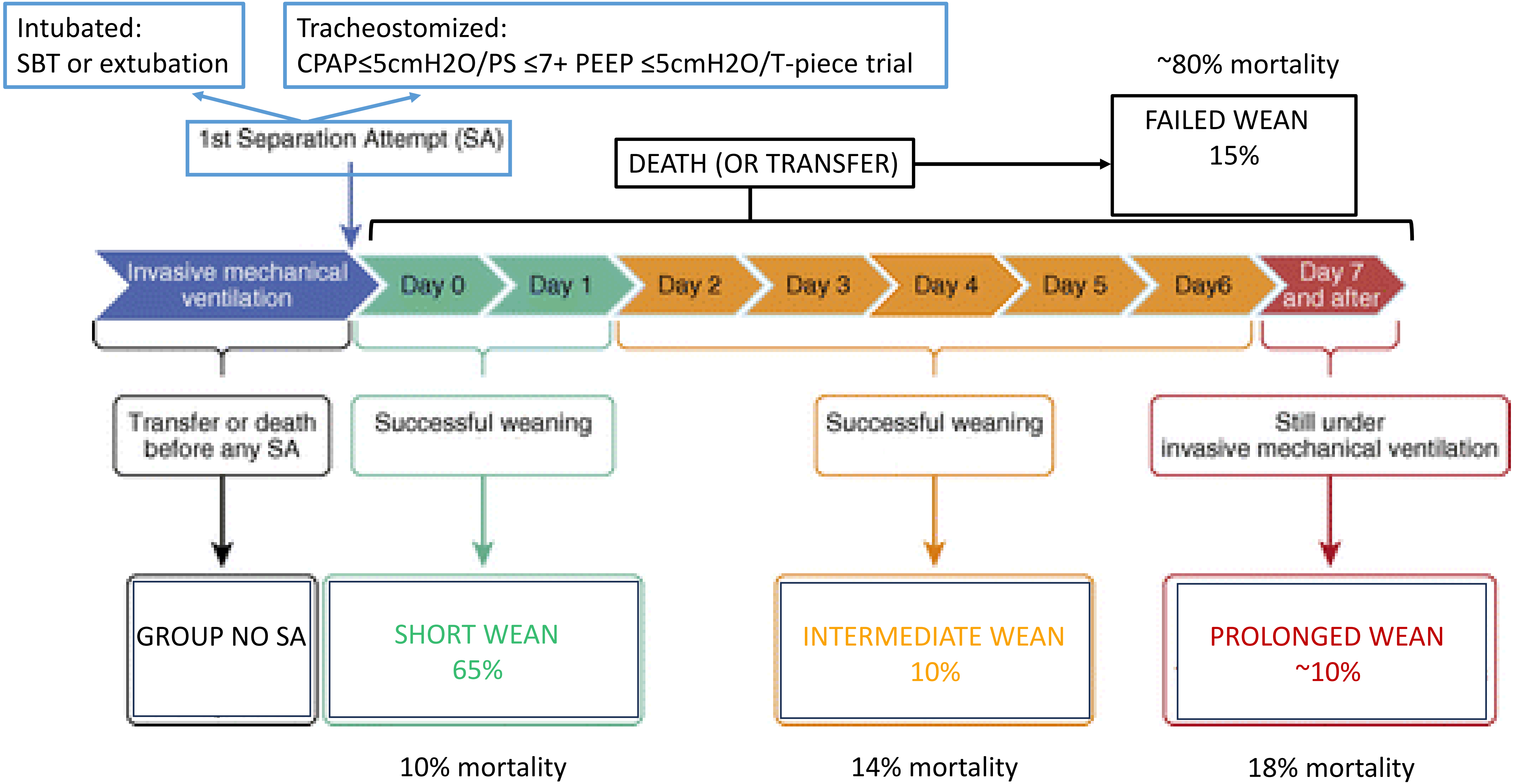


Pham, Wean Safe 2023

Factors associated with delay

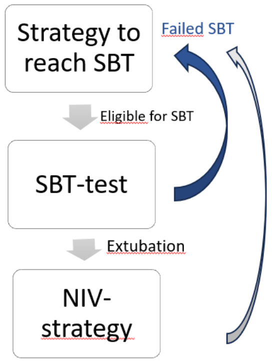


- Degree of Sedation (strongest factor)
- Patient frailty
- Neuro
- Trauma



Wean safe, classification according to Béduneau, Wind study 2016

Factors associated with SBT failure



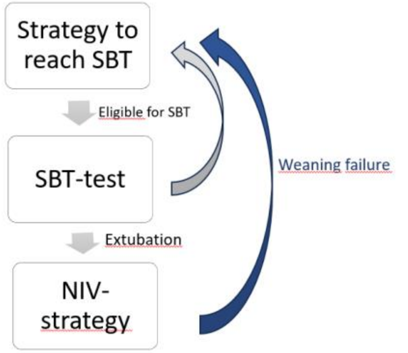
Burns, JAMA 2021

- Higher sedation score
- Unrelated to SBT technique
- More severe resp disease
- Lack of a protocol to adjust ventilator settings

Wean Safe

- High sedation strongest & modifiable
- Long delay to first separation attempt
- Older age >65
- Medical admission
- Frailty
- Immunocompromised
- Neuro

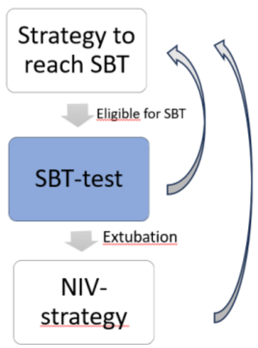
Characteristics of pts who failed weaning



	All patients with a separation attempt (n=4523)	Short wean <24 h (n=2927)	Intermediate wean (n=457)	Prolonged wean (n=433)	Died (n=553) or transferred (n=153) before weaning success	p value*
Sex						
Age, years	60·9 (17·2)	59·7 (17·6)	60·8 (17·1)	60·3 (16·9)	66·4 (14·3)	<0·0001
Body-mass index, kg/m²	27·0 (7·1)	26·9 (7·1)	26·6 (6·0)	27·4 (7·3)	27·1 (7·5)	0·32
Intensive care unit admission category	..	..	..	..	..	<0·0001
Medical	3027 (66·9%)	1899 (64·9%)	312 (68·3%)	277 (64·0%)	539 (76·3%)	..
Planned surgery	380 (8·4%)	287 (9·8%)	30 (6·6%)	25 (5·8%)	38 (5·4%)	..
Trauma	404 (8·9%)	250 (8·5%)	51 (11·2%)	56 (12·9%)	47 (6·7%)	..
Urgent surgery	712 (15·7%)	491 (16·8%)	64 (14·0%)	75 (17·3%)	82 (11·6%)	..
Trauma	404 (8·9%)	250 (8·5%)	51 (11·2%)	56 (12·9%)	47 (6·7%)	..
Urgent surgery	712 (15·7%)	491 (16·8%)	64 (14·0%)	75 (17·3%)	82 (11·6%)	..
Cause for intensive care unit admission						
Hypoxaemic respiratory failure	1500 (33·2%)	921 (31·5%)	172 (37·6%)	145 (33·5%)	262 (37·1%)	<0·0001
Sepsis	1003 (22·2%)	635 (21·7%)	111 (24·3%)	93 (21·5%)	164 (23·2%)	0·54
Hypercapnic respiratory failure	662 (14·6%)	420 (14·3%)	71 (15·5%)	62 (14·3%)	109 (15·4%)	0·83
Non-traumatic neurological event	656 (14·5%)	385 (13·2%)	73 (16·0%)	80 (18·5%)	118 (16·7%)	0·0038
Emergency surgery	641 (14·2%)	425 (14·5%)	63 (13·8%)	72 (16·6%)	81 (11·5%)	0·081
Airway protection	562 (12·4%)	382 (13·1%)	53 (11·6%)	51 (11·8%)	76 (10·8%)	0·35
Cardiac arrest	366 (8·1%)	190 (6·5%)	27 (5·9%)	33 (7·6%)	116 (16·4%)	<0·0001
Comorbidities and risk factors						
At least one comorbidity or risk factor	2921 (64·6%)	1845 (63·0%)	301 (65·9%)	269 (62·1%)	506 (71·7%)	<0·0001
Outcomes						
Total duration of invasive mechanical ventilation, days	7 (4–12)	5 (3–8)	10 (8–15)	20 (15–28)	11 (7–18)	<0·0001
Length of intensive care unit stay, days	10 (7–18)	9 (6–13)	15 (11–22)	26 (19–37)	12 (7–19)	<0·0001
Length of hospital stay, days	23 (14–39)	21 (14–35)	32 (20–49)	47 (32–68)	14 (8–24)	<0·0001
Intensive care unit mortality	633 (14·5%)	52 (1·8%)	12 (2·6%)	16 (3·7%)	..	..
Hospital mortality	986 (22·6%)	294 (10·1%)	62 (13·6%)	77 (17·9%)	..	..

Pham, Wean Safe 2023

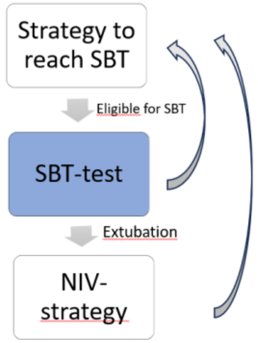
Spontaneous breathing trial



- Screening test
- Can the patient breathe without ventilator?
- Reduce time on IMV
- Reduce reintubation (~ 20% in high risk pts, ~ 10% in low risk)

Haaksma 2021

Spontaneous breathing trial



Different practices:

- Nr times/day
- Duration: 30-120min
- Inspiratory/expiratory pressure applied

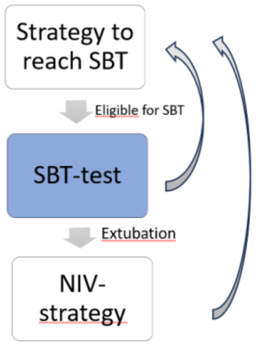
    PS to overcome endotracheal tube resistance

    PEEP to compensate for inability to keep FRC while intubated

    T-piece disconnected from ventilator

Haaksma 2021

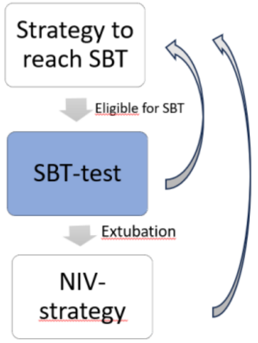
RCT SBT PS vs T-piece



2 large RCT, total 2000 pts:

- Subira´ in low risk pts
- Thille TiP-Ex study in high risk pts

RCT PS vs T-piece



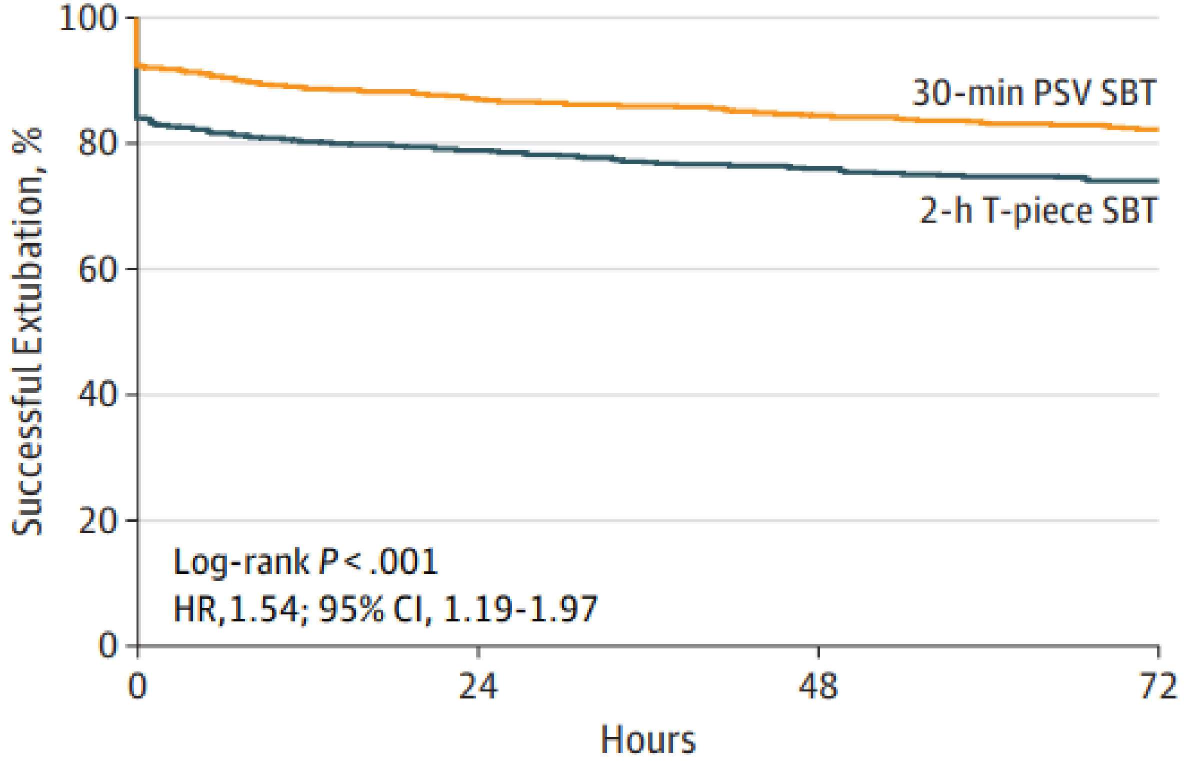
- Spanish RCT, 1000pts
- Intub>24h
- Compared 2 strategies:

  Less demanding SBT 30min in PS 8cmH2O PEEP 0 cmH2O

  More demanding SBT in T-piece 120min

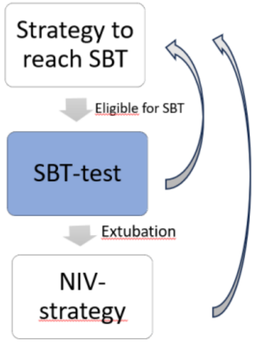
Subira´JAMA 2019

Figure 2. Probability of Successful Extubation After First SBT in Each Group



No. at risk				
30-min PSV SBT	575	501	484	472
2-h T-piece SBT	578	456	438	426

PSV indicates pressure support ventilation; SBT, spontaneous breathing trial. Successful extubation was defined as remaining free of mechanical ventilation for 72 hours after first SBT.

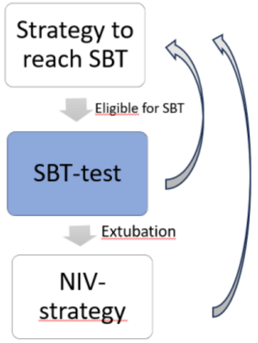


- PS higher success rate of extub: 82% vs 74%
- Lower hospital and 90d mortality: 10% vs 15%
- Same reintubation rate of 11% in both groups within 72h

Is it true in pts at high risk of extub failure?

Subira´JAMA 2019

SBT PSV or T-piece



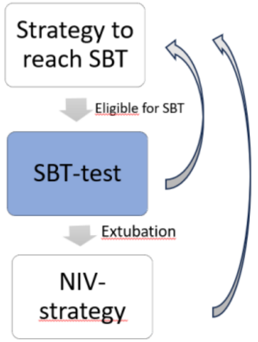
- French multicenter RCT around 1000pts
- Pts @high risk of extub failure (>65y, chronic cardiac/resp disease)
- Compared 2 strategies:

  PS 8cmH2O PEEP 0cmH2O

  T-piece with max 6L/min O2
- Faster extub in PS group
- Same ventilator free days
- Same reintubation rate, <15% (~ 80% preventive NIV)

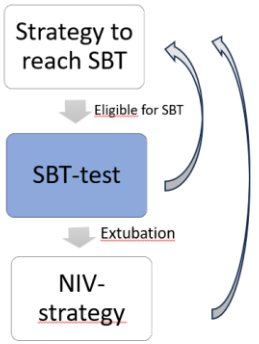
Thille, TiP-Ex study 2022

Conclusion of SBT technique



2 large RCT are in favour of PS

- Faster extubation without increased risk of reintubation even @high risk
- Easier to perform
- Monitoring Vt and RR
- Less demanding



Conclusion of SBT technique

2 large RCT are in favour of PS

- Faster extubation without increased risk of reintubation even @high risk
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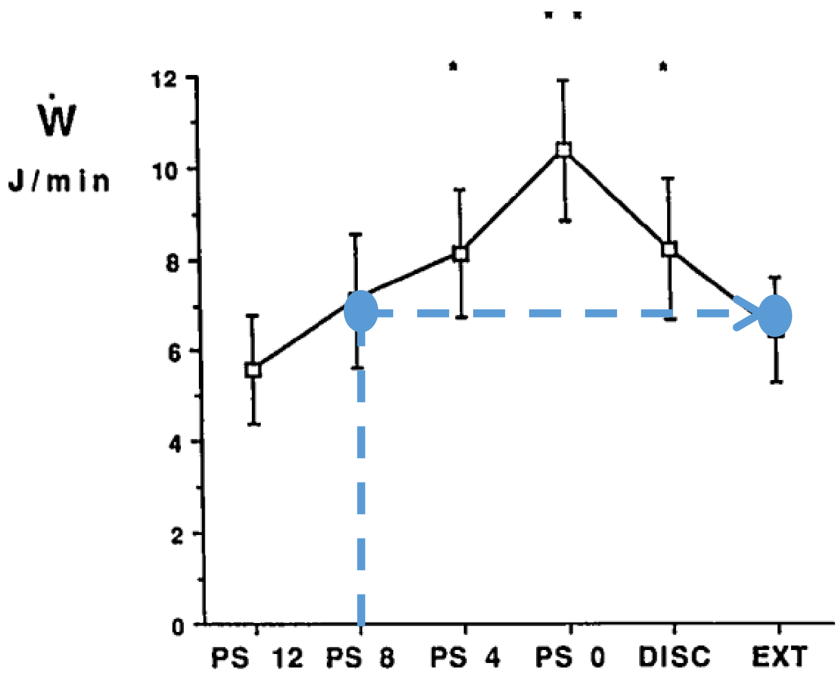
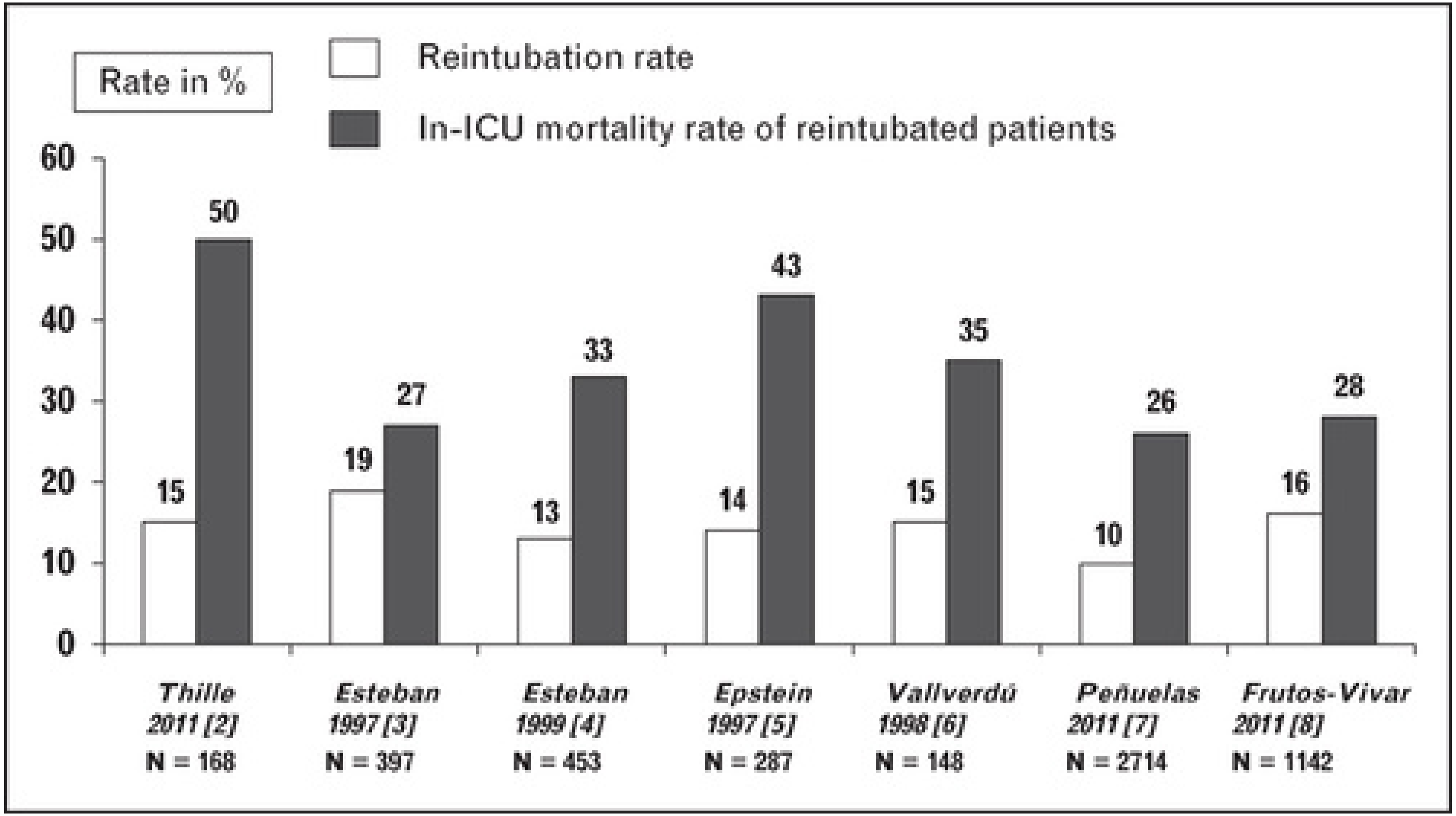
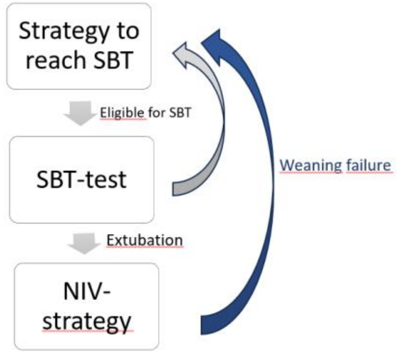


Brochard 1991

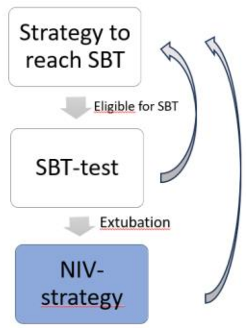
Reintubation associated with mortality





Thille 2013

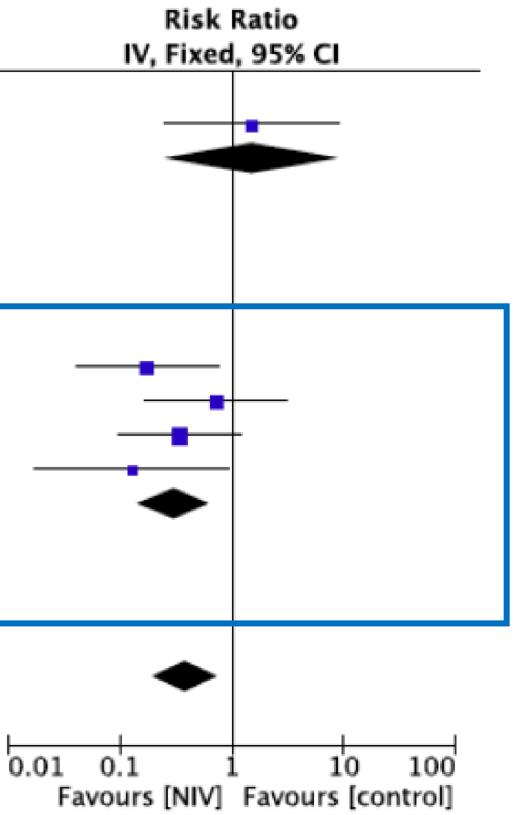
How to prevent post extubation failure? NIV



Question #10a: Should NIV be used in the prevention of respiratory failure post extubation?

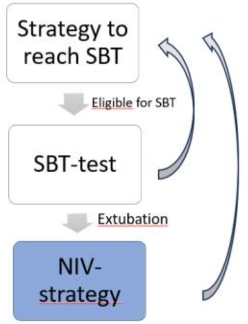
Mortality

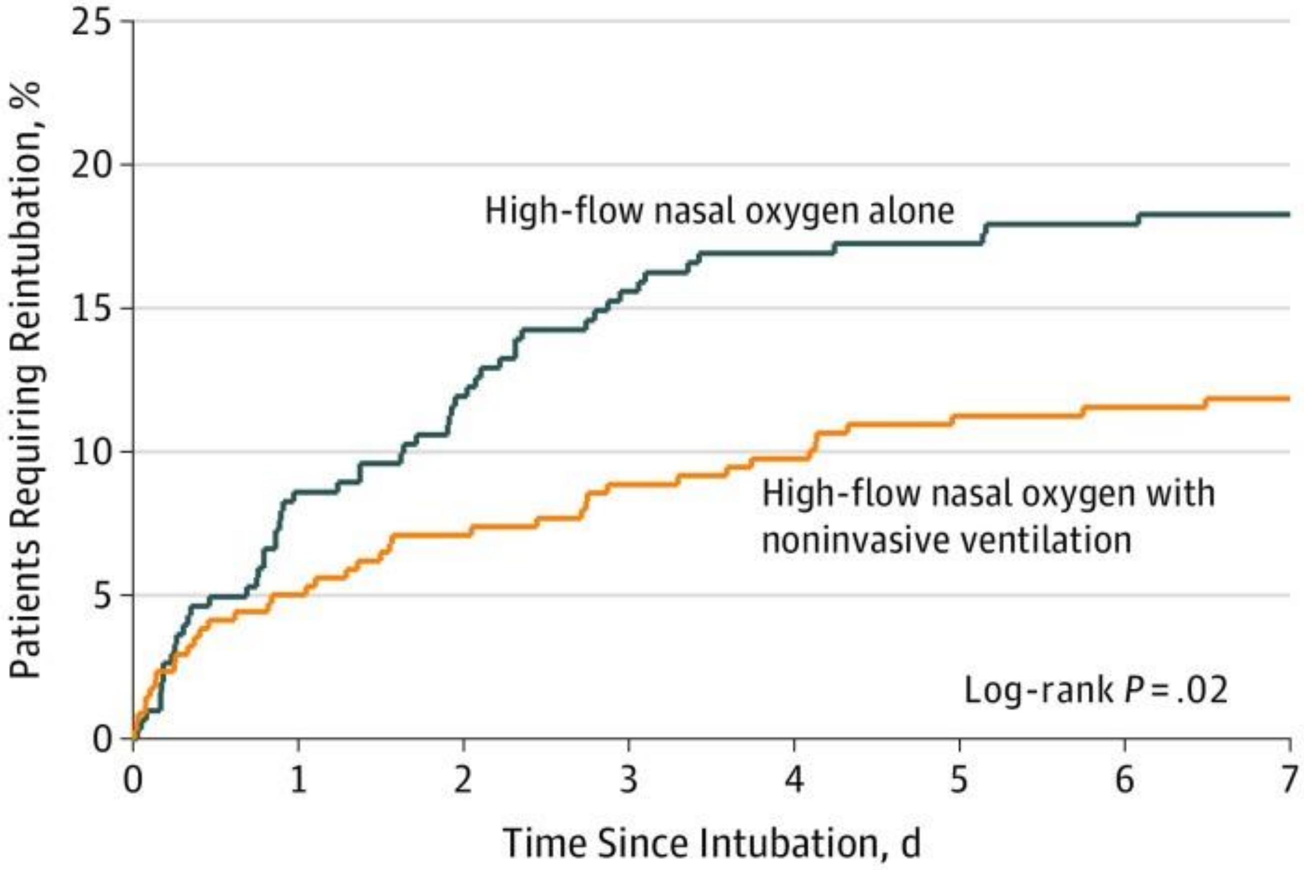
Study or Subgroup	NIV Events	NIV Total	Control Events	Control Total	Weight	Risk Ratio IV, Fixed, 95% CI
1.2.1 Unselected Patients						
Su 2012	3	202	2	204	14.7%	1.51 [0.26, 8.97]
Subtotal (95% CI)		**202**		**204**	**14.7%**	**1.51 [0.26, 8.97]**
Total events	3		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.46 (P = 0.65)						
1.2.2 At Risk Patients						
Ferrer 2006	2	79	12	83	21.6%	0.18 [0.04, 0.76]
Ferrer 2009	3	54	4	52	22.1%	0.72 [0.17, 3.07]
Nava 2005	3	48	9	49	29.9%	0.34 [0.10, 1.18]
Ornico 2013	1	20	7	18	11.6%	0.13 [0.02, 0.95]
Subtotal (95% CI)		**201**		**202**	**85.3%**	**0.31 [0.15, 0.64]**
Total events	9		32			
Heterogeneity: $Chi^2 = 2.66$, df = 3 (P = 0.45); $I^2 = 0\%$						
Test for overall effect: Z = 3.15 (P = 0.002)						
Total (95% CI)		**403**		**406**	**100.0%**	**0.39 [0.20, 0.76]**
Total events	12		34			
Heterogeneity: $Chi^2 = 5.31$, df = 4 (P = 0.26); $I^2 = 25\%$						
Test for overall effect: Z = 2.73 (P = 0.006)						
Test for subgroup differences: $Chi^2 = 2.65$, df = 1 (P = 0.10), $I^2 = 62.3\%$						



ERS/ATS guidelines Rochwerg ERJ 2017

How to prevent post extubation failure? HFNC +NIV



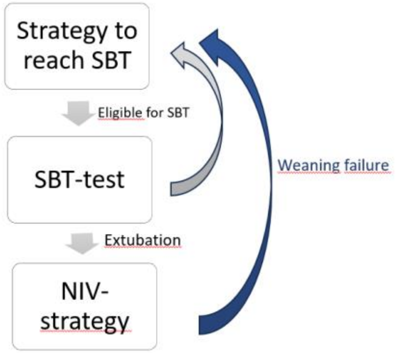


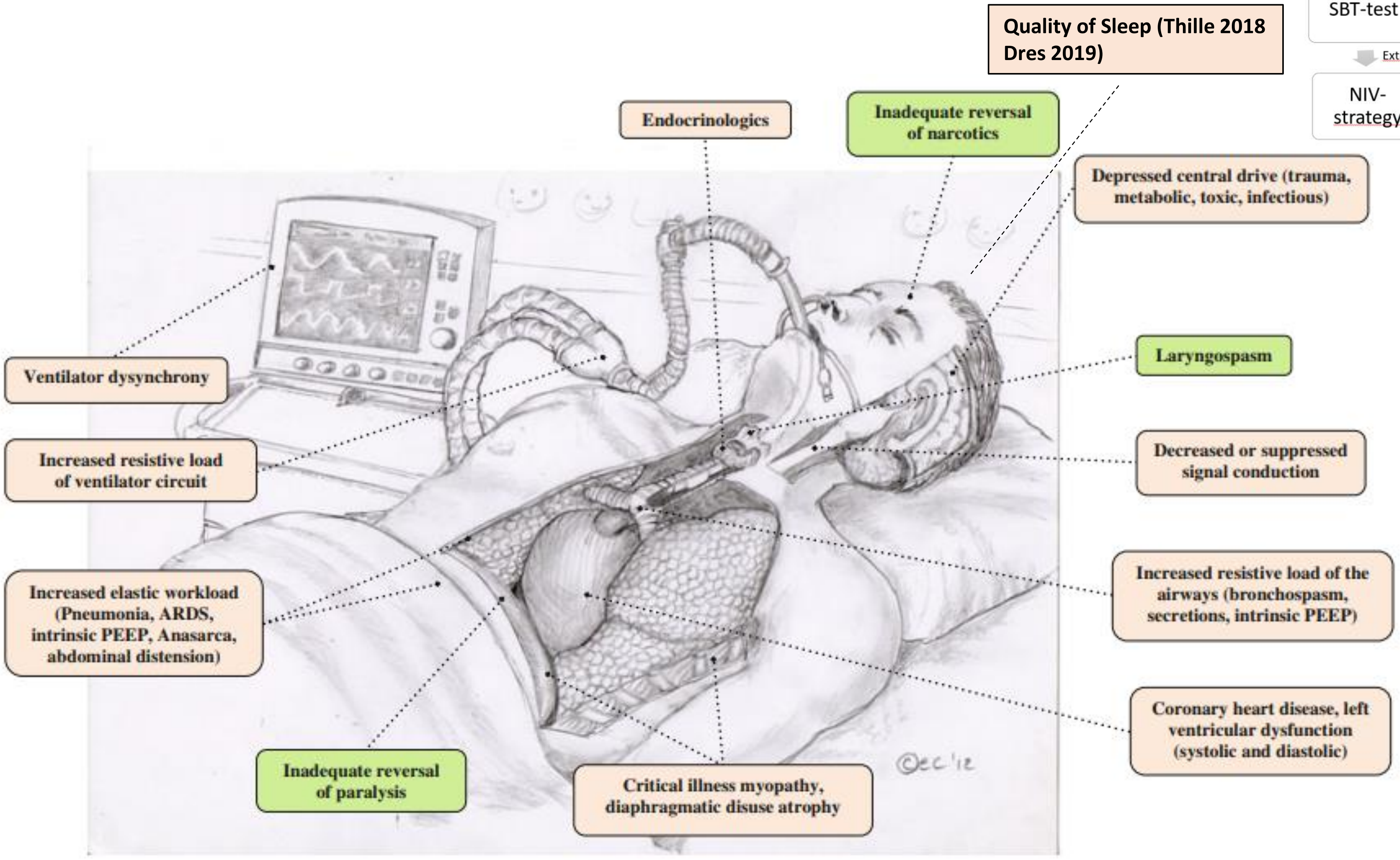
18,2%

11,7%

Thille JAMA 2019

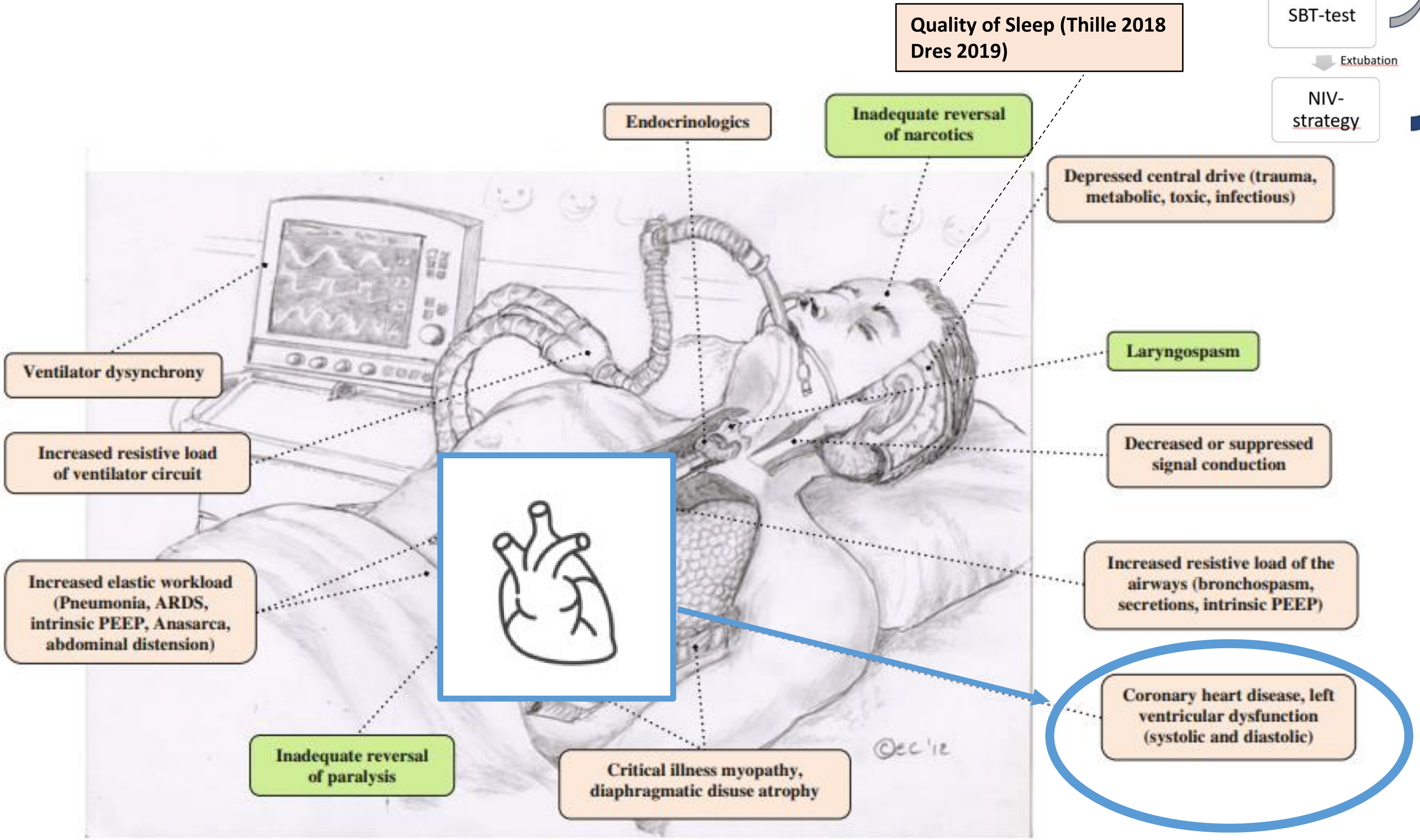
Physiologic mechanisms underlying weaning failure

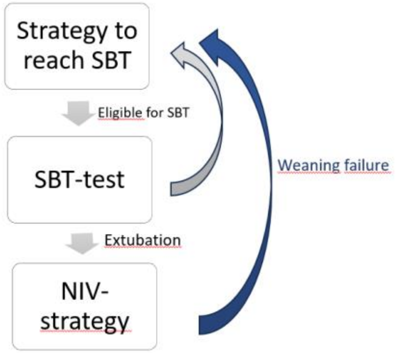




Adapted from Perren, 2013

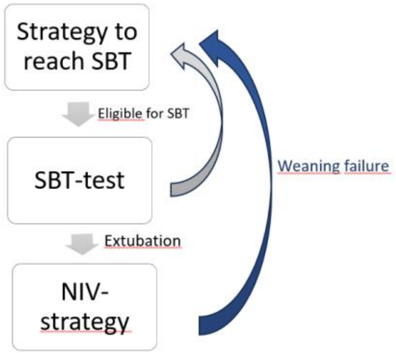
Weaning failure-Cardiac dysfunction



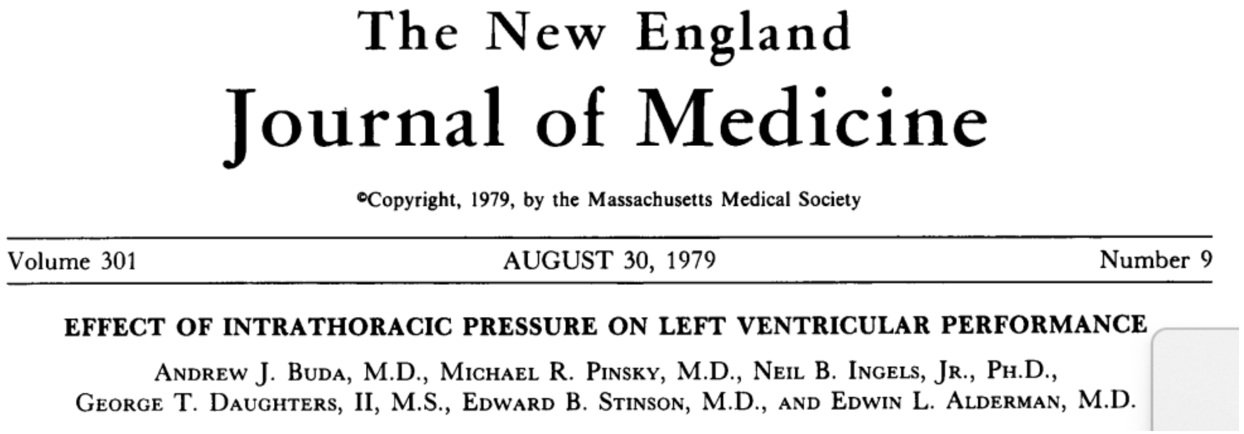


Adapted from Perren, 2013

Cardiac failure during weaning



- Up to 2/3 of cases
- ↑ pre and afterload for the LV--> LV failure
- In cardiac ischemic ↑ MVO2--> AMI
- Large negative force --> reduction in LV EF



The New England Journal of Medicine

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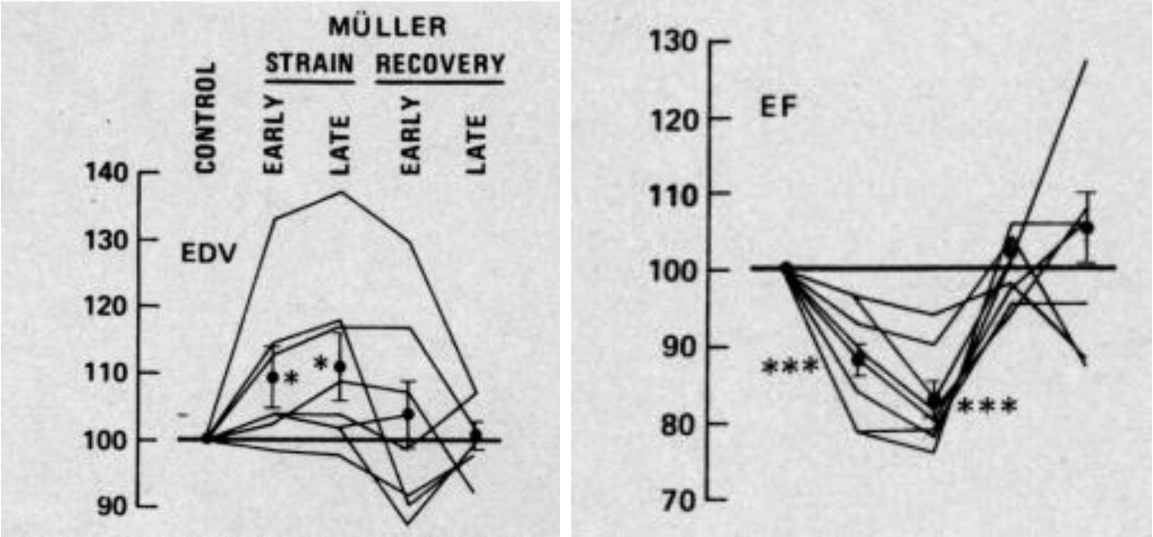
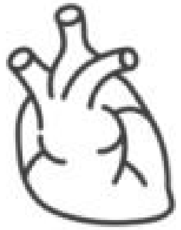
Volume 301 AUGUST 30, 1979 Number 9

EFFECT OF INTRATHORACIC PRESSURE ON LEFT VENTRICULAR PERFORMANCE

Andrew J. Buda, M.D., Michael R. Pinsky, M.D., Neil B. Ingels, Jr., Ph.D., George T. Daughters, II, M.S., Edward B. Stinson, M.D., and Edwin L. Alderman, M.D.

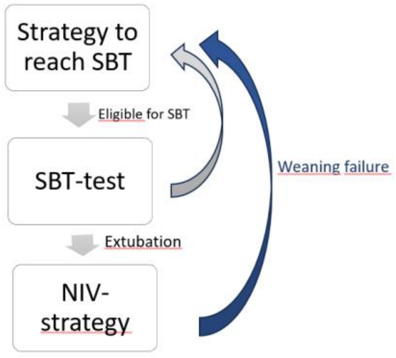


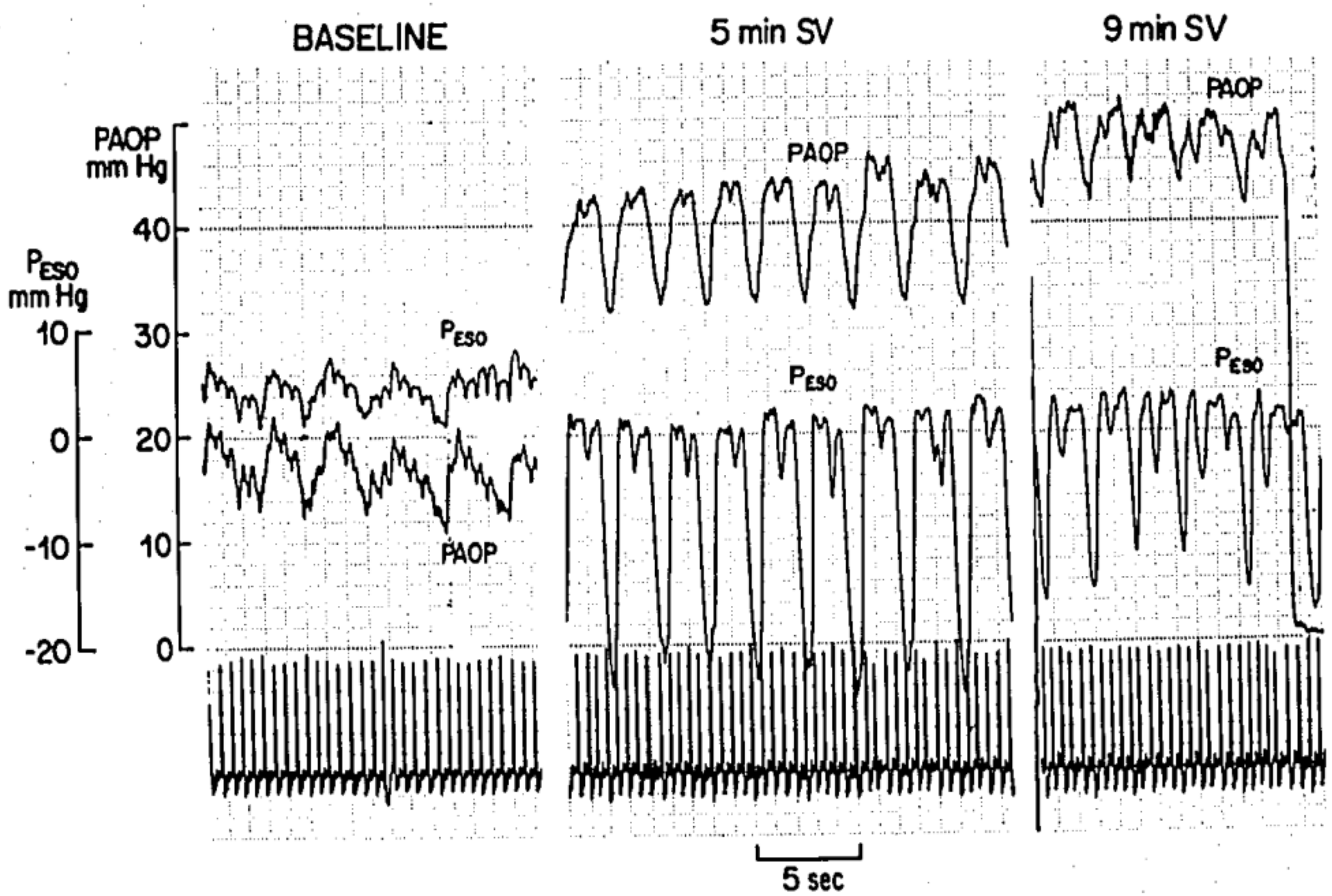


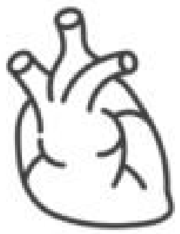
Anesthesiology
69:171–179, 1988

Acute Left Ventricular Dysfunction during Unsuccessful Weaning from Mechanical Ventilation

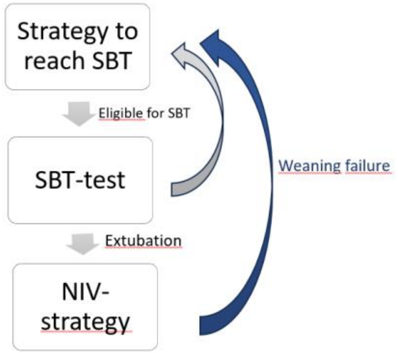
Francois Lemaire, M.D., Jean-Louis Teboul, M.D.,† Luc Cinotti, M.D.,‡ Guillen Giotto, M.D.,§ Fekri Abrouk, M.D.,§ Gabriel Steg, M.D.,§ Isabelle Macquin-Mavier, M.D.,¶ Warren M. Zapol, M.D.***







PLR test predicts weaning failure

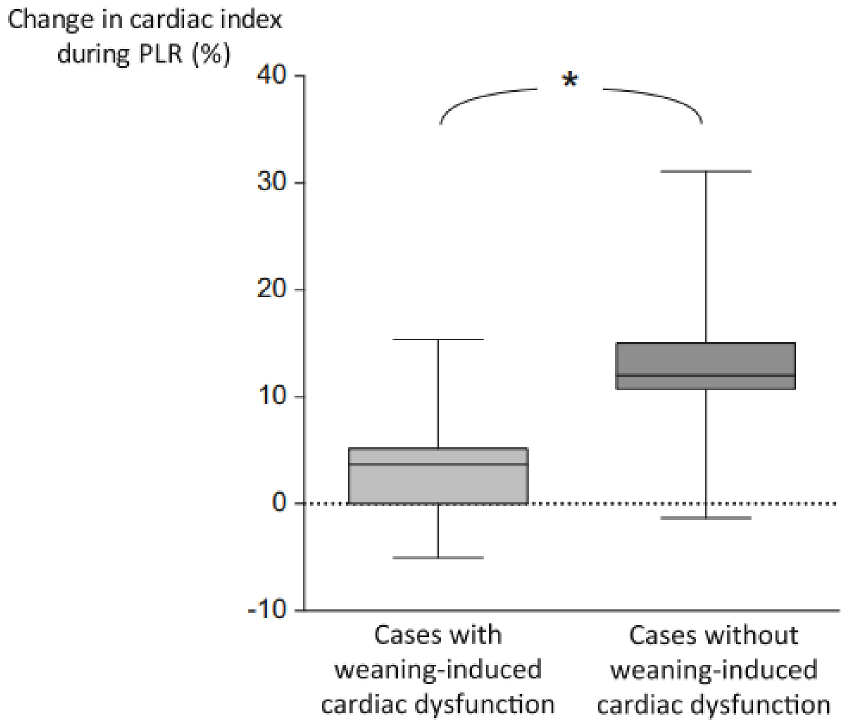


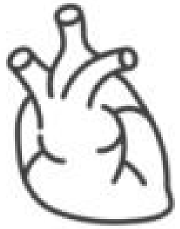
Intensive Care Med (2015) 41:487–494
DOI 10.1007/s00134-015-3653-0

ORIGINAL

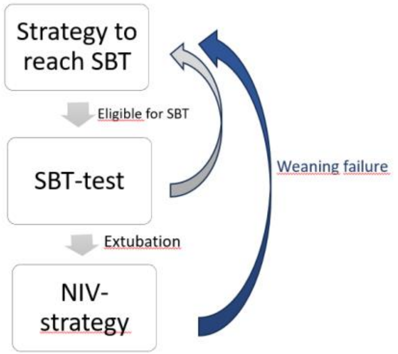
Martin Dres
Jean-Louis Teboul
Nadia Anguel
Laurent Guerin
Christian Richard
Xavier Monnet

Passive leg raising performed before a spontaneous breathing trial predicts weaning-induced cardiac dysfunction





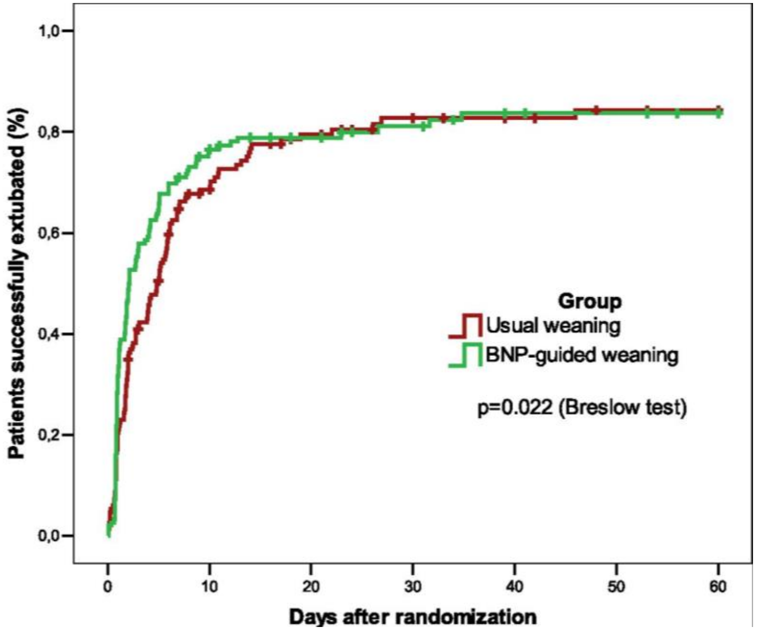
Optimize fluid balance

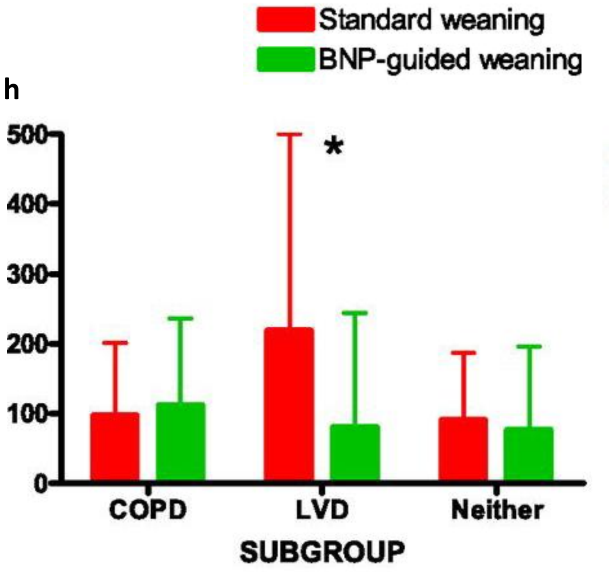


Natriuretic Peptide–driven Fluid Management during Ventilator Weaning

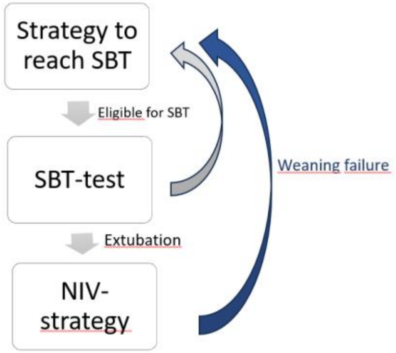
A Randomized Controlled Trial

Armand Mekontso Dessap[1,2,3], Ferran Roche-Campo[1,4], Achille Kouatchet[5], Vinko Tomicic[6], Gaetan Beduneau[7], Romain Sonneville[8], Belen Cabello[4], Samir Jaber[9], Elie Azoulay[10], Diego Castanares-Zapatero[11], Jerome Devaquet[12], François Lellouche[13], Sandrine Katsahian[14], and Laurent Brochard[1,2,3,15]





Echocardiografy to identify pts at risk



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Review Article

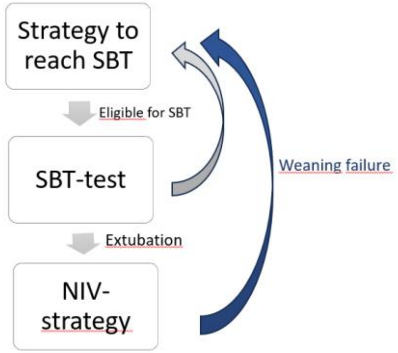
RESPIRATION AND THE AIRWAY

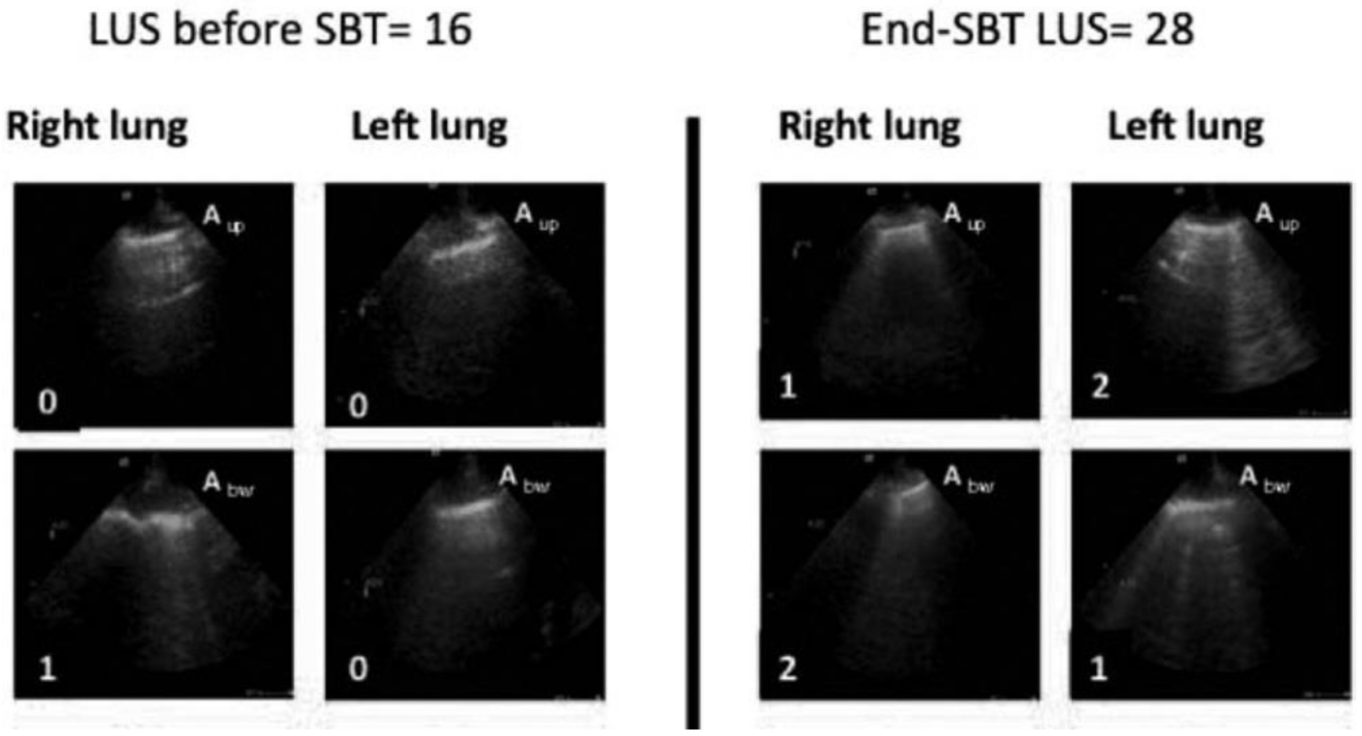
Association of weaning failure from mechanical ventilation with transthoracic echocardiography parameters: a systematic review and meta-analysis

Filippo Sanfilippo[1,*], Davide Di Falco[2], Alberto Noto[3], Cristina Santonocito[1], Andrea Morelli[4], Elena Bignami[5], Sabino Scolletta[6], Antoine Vieillard-Baron[7,8] and Marinella Astuto[1,2,9]

Parameters of LV diastolic disfunction and elevated LV filling pressures are associated with higher weaning failure

US assessment during weaning trial

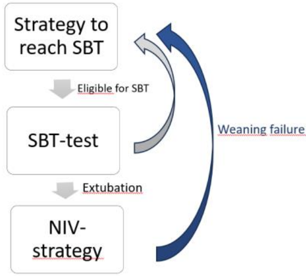




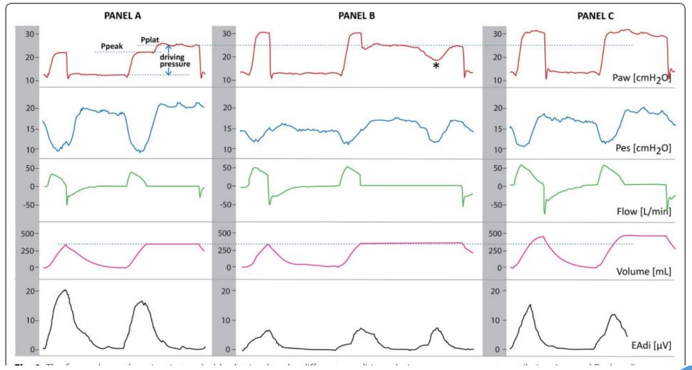
Ultrasound assessment of lung aeration loss during a successful weaning trial predicts postextubation distress*

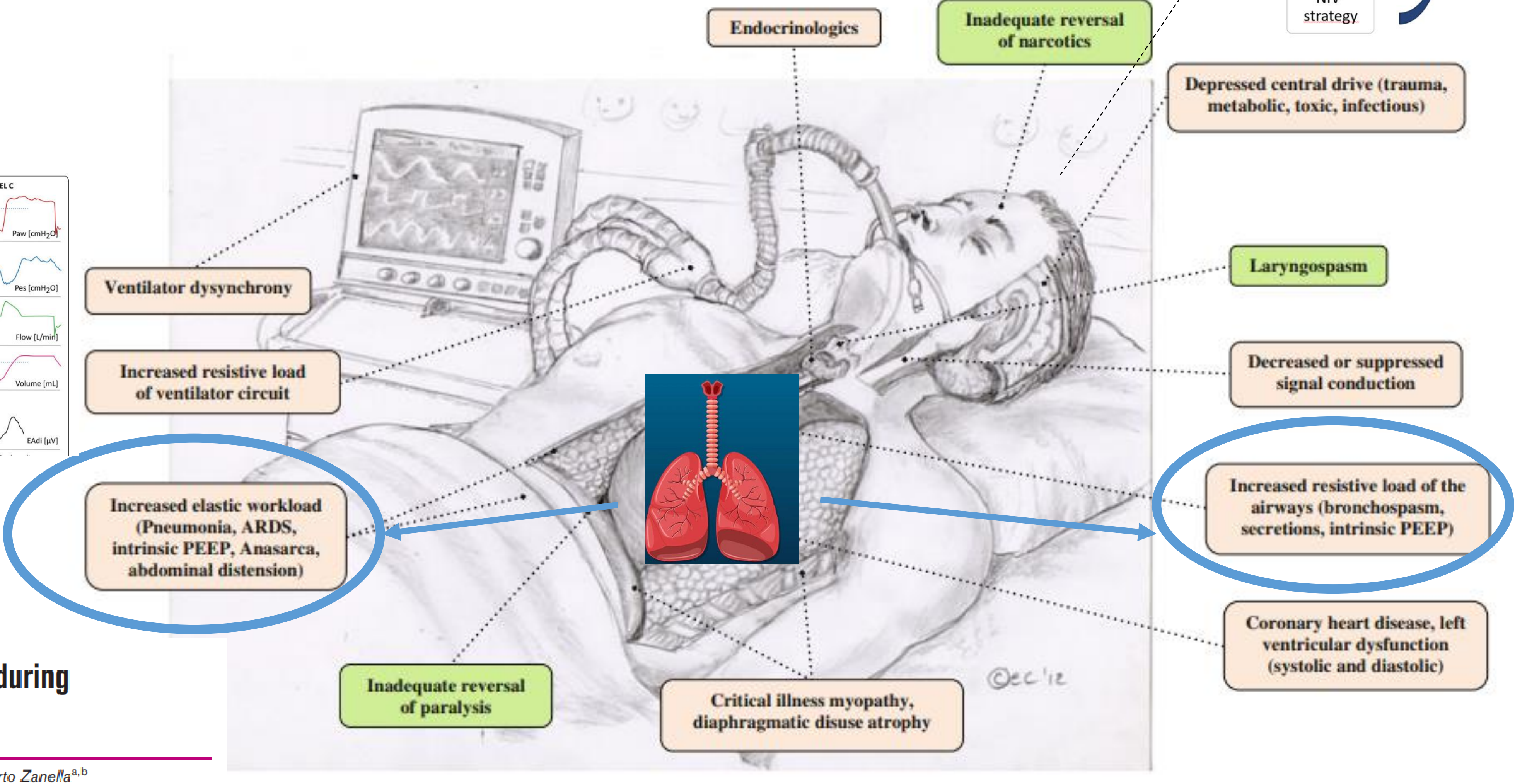
Alexis Soummer, MD; Sébastien Perbet, MD; Hélène Brisson, MD; Charlotte Arbelot, MD; Jean-Michel Constantin, MD, PhD; Qin Lu, MD, PhD; Jean-Jacques Rouby, MD, PhD; and the Lung Ultrasound Study Group

Weaning failure-Respiratory system mechanics



Quality of Sleep (Thille 2018 Dres 2019)





Monitoring respiratory mechanics during assisted ventilation

Giacomo Grasselli[a,b], Matteo Brioni[a], and Alberto Zanella[a,b]

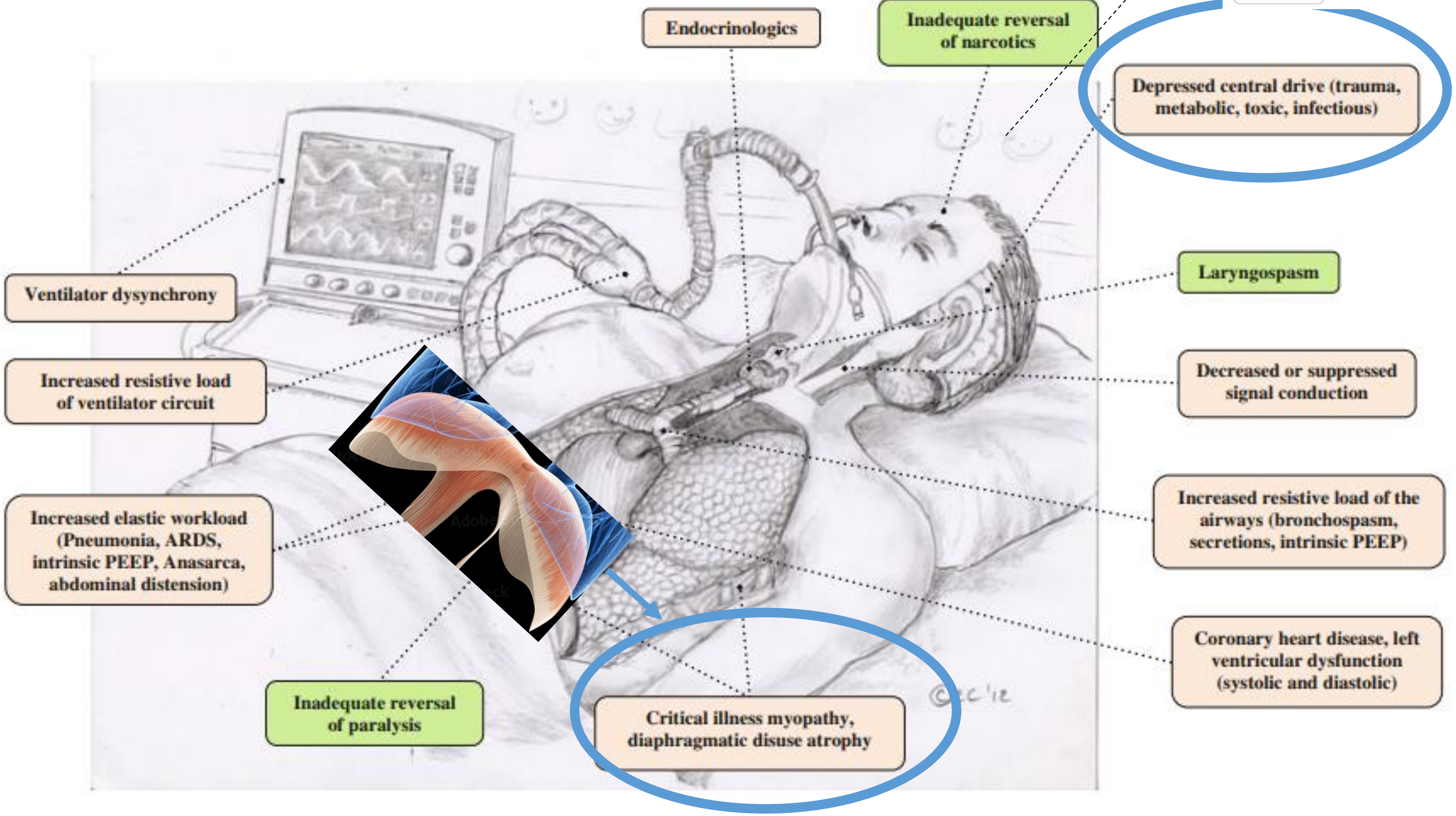
Adapted from Perren, 2013

Weaning failure-Respiratory drive and muscle weakness

Quality of Sleep (Thille 2018 Dres 2019)

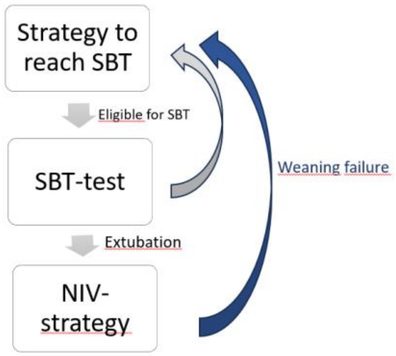
Respiratory drive issues?
Respiratory muscle weakness?

Monitor
- P0,1
- Pocc
- PMI
- Edi
- Pes
- Diaphragm US paralysis, thickening fraction and excursion

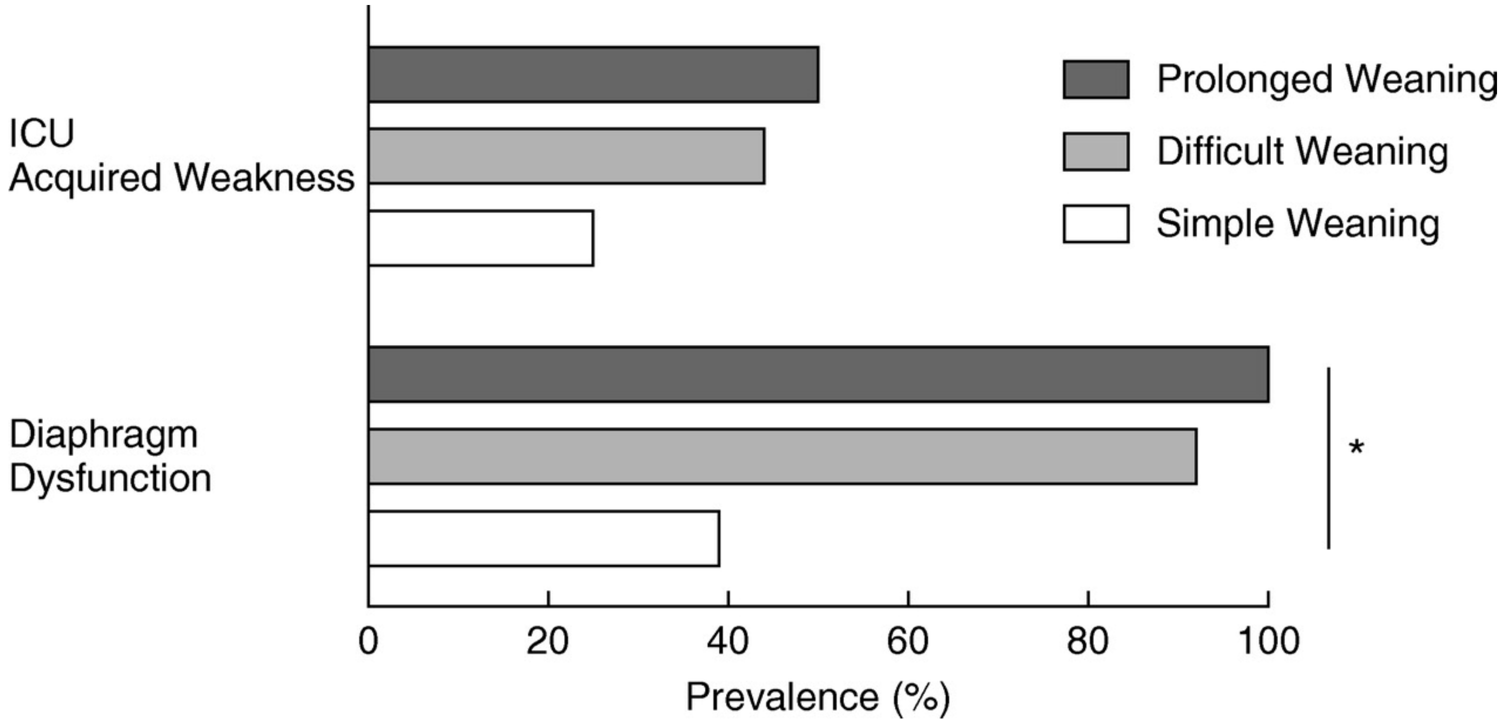


Adapted from Perren, 2013

Respiratory muscle weakness

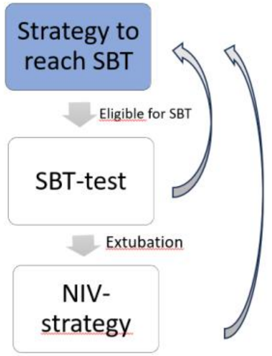


Diaphragm dysfunction is twice as frequent as limb muscle weakness and is strongly associated with prolonged MV



Dres 2017

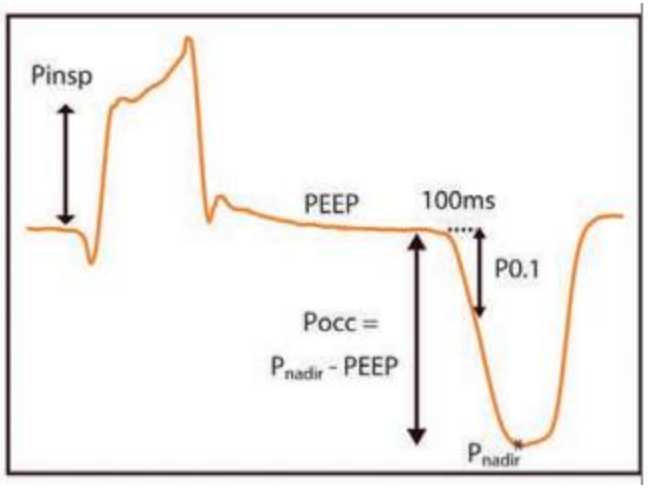
What to do if there is resp muscle weakness?



1) Titrate the respiratory muscle activity during ventilation to avoid atrophy and load-induced injury

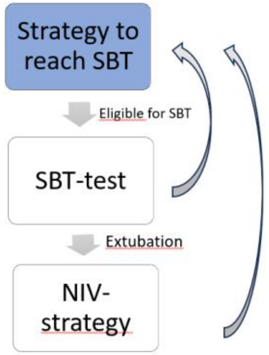
Estimate respiratory effort with Pocc

ΔPocc <7 cmH2O	ΔPocc 7-15 cmH2O	ΔPocc >15 cmH2O
↓	↓	↓
Consider reducing sedation/support	Within reasonable diaphragm effort	Under assistance: Consider increasing Inspiratory support



Adapted from De Vries and Heunks 2022-2023

What to do if there is resp muscle weakness?



2) Use proportional modes of ventilation

Weaning success

Study or Subgroup	NAVA Events	NAVA Total	Control Events	Control Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Fakher 2019	8	15	6	15	15.0%	1.71 [0.40, 7.29]
Hadfield 2020	23	39	20	38	44.5%	1.29 [0.53, 3.19]
Kacmarek 2020	153	153	151	153	2.6%	5.07 [0.24, 106.40]
Liu 2020	33	47	25	52	37.9%	2.55 [1.11, 5.83]
Total (95% CI)		**254**		**258**	**100.0%**	**1.93 [1.12, 3.33]**
Total events	217		202			

Heterogeneity: $Chi^2 = 1.60$, df = 3 (P = 0.66); $I^2 = 0\%$
Test for overall effect: Z = 2.36 (P = 0.02)

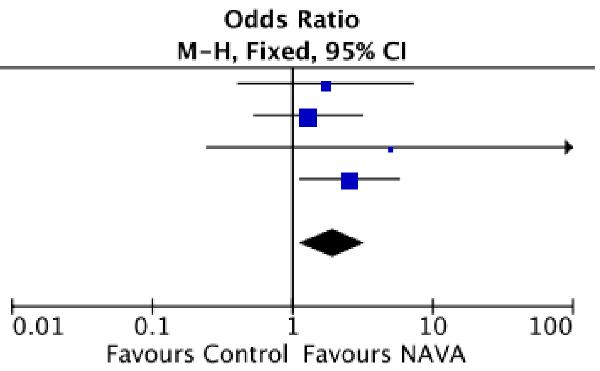


Fig. 2 Forest plot for weaning success

Hospital mortality

Study or Subgroup	NAVA Events	NAVA Total	Control Events	Control Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Fakher 2019	4	15	6	15	5.9%	0.55 [0.12, 2.55]
Hadfield 2020	9	39	19	38	19.8%	0.30 [0.11, 0.80]
Kacmarek 2020	39	153	47	153	46.9%	0.77 [0.47, 1.27]
Kuo 2016	1	14	6	19	6.3%	0.17 [0.02, 1.58]
Liu 2020	16	47	25	52	21.0%	0.56 [0.25, 1.26]
Total (95% CI)		**268**		**277**	**100.0%**	**0.58 [0.40, 0.84]**
Total events	69		103			

Heterogeneity: $Chi^2 = 4.18$, df = 4 (P = 0.38); $I^2 = 4\%$
Test for overall effect: Z = 2.88 (P = 0.004)

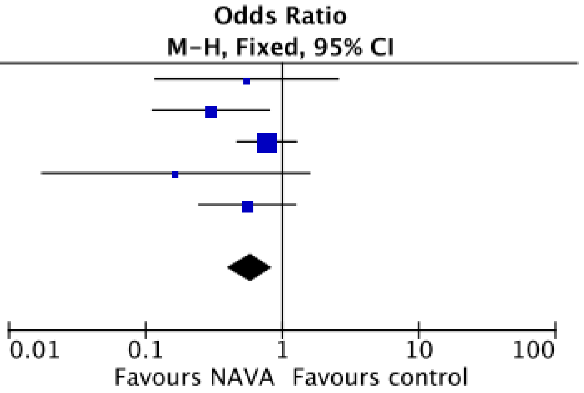
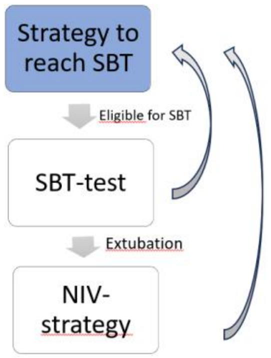


Fig. 5 Forest plot for hospital mortality. *NAVA* neurally adjusted ventilatory assist; CI, confidence interval

Yuan Crit Care 2021

What to do if there is resp muscle weakness?



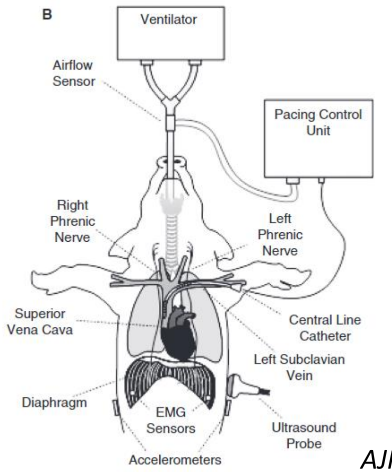
Proof of Concept for Continuous On-Demand Phrenic Nerve Stimulation to Prevent Diaphragm Disuse during Mechanical Ventilation (STIMULUS): A Phase 1 Clinical Trial

Idunn S. Morris[1,2,4,6], Thiago Bassi[4,7], Catherine A. Bellissimo[8], Marc de Perrot[5], Laura Donahoe[5], Laurent Brochard[1,9], Nawzer Mehta[7], Viral Thakkar[7], Niall D. Ferguson[1,2,3,4,8], and Ewan C. Goligher[1,2,4,8]

AJRCCM 2023

Mitigation of Ventilator-induced Diaphragm Atrophy by Transvenous Phrenic Nerve Stimulation

Steven C. Reynolds[1,2,3], Ramasamy Meyyappan[4], Viral Thakkar[4], Bao D. Tran[4], Marc-André Nolette[4], Gautam Sadarangani[4], Rodrigo A. Sandoval[4], Laura Bruulsema[4,5], Brett Hannigan[4,5], Jason W. Li[5], Elizabeth Rohrs[2], Jason Zurba[2], and Joaquín Andrés Hoffer[4,5]

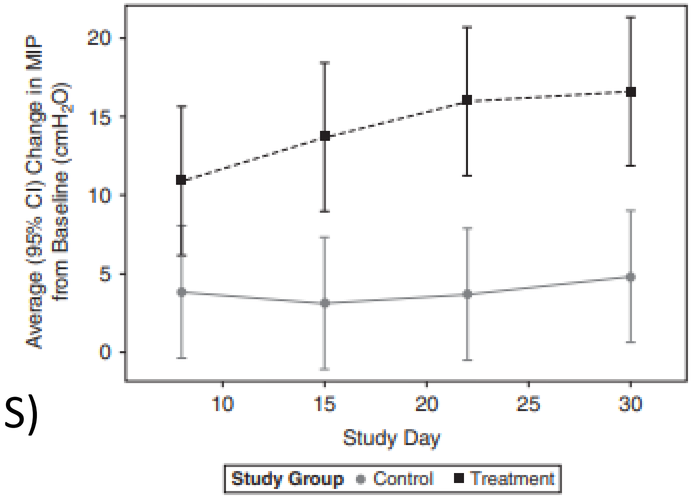


AJRCCM 2016

3) Train the diaphragm

Randomized Clinical Study of Temporary Transvenous Phrenic Nerve Stimulation in Difficult-to-Wean Patients

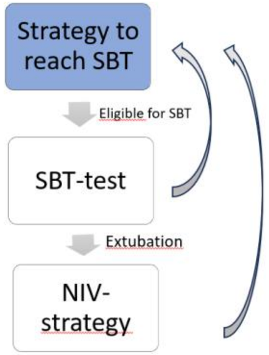
Martin Dres[1,2*], Marcelo Gama de Abreu[3,4,5*], Hamid Merdji[6], Holger Müller-Redetzky[7], Dominic Dellweg[8], Winfried J. Randerath[9], Satar Mortaza[10], Boris Jung[11], Christian Bruells[12], Onnen Moerer[13], Martin Scharffenberg[3], Samir Jaber[14], Sébastien Besset[15], Thomas Bitter[16], Arnim Geise[17], Alexander Heine[18], Maximilian V. Malfertheiner[19], Andreas Kortgen[20], Jonathan Benzaquen[21], Teresa Nelson[22], Alexander Uhrig[7], Olaf Moenig[8], Ferhat Meziani[6], Alexandre Demoule[1,2], Thomas Similowski[1,23], and the RESCUE-2 Study Group Investigators



Increase of MIP, successful weaning rate 82% vs 74% (NS)

AJRCCM 2022

What to do if there is resp muscle weakness?



4) Abdominal muscles stimulation

Breath-synchronized electrical stimulation of the expiratory muscles in mechanically ventilated patients: a randomized controlled feasibility study and pooled analysis

Annemijn H. Jonkman[1,2], Tim Frenzel[3], Euan J. McCaughey[4,5], Angus J. McLachlan[6], Claire L. Boswell-Ruys[4,5], David W. Collins[7], Simon C. Gandevia[4,5], Armand R. J. Girbes[1,2], Oscar Hoiting[8], Matthijs Kox[3], Eline Oppersma[9], Marco Peters[8], Peter Pickkers[3], Lisanne H. Roesthuis[3], Jeroen Schouten[3], Zhong-Hua Shi[1,2], Peter H. Veltink[10], Heder J. de Vries[1,2], Cyndi Shannon Weickert[4,11,12], Carsten Wiedenbach[8], Yingrui Zhang[1], Pieter R. Tuinman[1,2], Angélique M. E. de Man[1,2], Jane E. Butler[4,5] and Leo M. A. Heunks[1,2*]

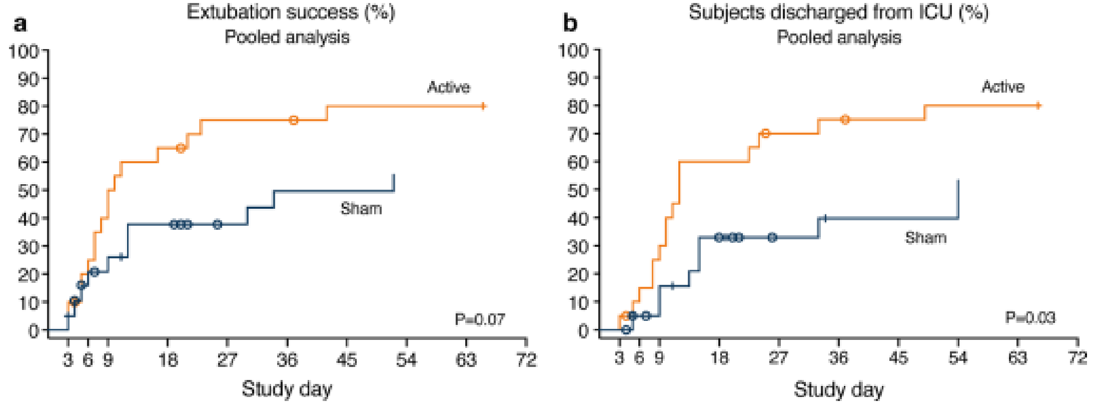
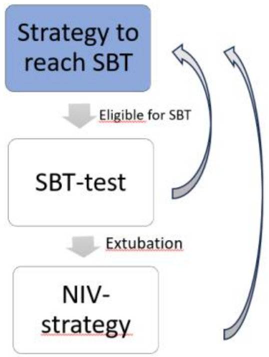


Fig. 4 Pooled results on clinical endpoints. **a** Pooled results on extubation success. **b** Pooled results on ICU length of stay. *P* values are based on Gray's test. Cumulative event rates were estimated based on competing risk analysis, with the competing risks of death or withdrawal of ICU treatment (e.g., ventilator support) with the intention of subsequent death. Symbols: o for competing events; + for censored data

Jonkman 2020

What to do if there is resp muscle weakness?



5) Inspiratory muscle training

- Sessions of training against a resistance or an threshold valve.
- ↑MIP and MEP
- 3d shorter MV

Bissett 2019

Study	Experimental Total	Experimental Mean	Experimental SD	Control Total	Control Mean	Control SD	MD	95% CI	Weight
Regimen = Endurance									
Özyürek 2014	15	35.00	9.0000	16	25.00	9.0000	10.00	[3.66; 16.34]	4.1%
Holliday 1990	20	12.00	4.0000	16	6.00	2.0000	6.00	[3.99; 8.01]	12.1%
Porta 2005	32	9.00	12.0000	34	5.00	9.0000	4.00	[−1.14; 9.14]	5.5%
Caruso 2005	12	5.00	9.0000	13	7.00	19.0000	−2.00	[−13.52; 9.52]	1.5%
Chang 2011	8	10.00	8.0000	5	14.00	10.0000	−4.00	[−14.37; 6.37]	1.9%
Random effects model	87			84			4.75	[1.28; 8.22]	25.2%
Regimen = Strength									
Bissett 2016	33	16.00	19.0000	36	5.00	17.0000	11.00	[2.46; 19.54]	2.6%
Condessa 2013	45	7.00	8.0000	47	−3.00	6.0000	10.00	[7.10; 12.90]	9.8%
Pascotini 2014	7	5.00	13.0000	7	−4.00	4.0000	9.00	[−1.08; 19.08]	2.0%
Cader 2010	14	10.00	2.0000	14	2.00	1.0000	8.00	[6.83; 9.17]	14.1%
Dixit 2014	15	15.00	6.0000	15	7.00	3.0000	8.00	[4.61; 11.39]	8.7%
Martin 2011	35	10.00	11.0000	34	2.00	11.0000	8.00	[2.81; 13.19]	5.5%
Mohamed 2014	20	8.00	2.0000	20	2.00	1.0000	6.00	[5.02; 6.98]	14.5%
Ibrahiem 2014	15	5.00	1.0000	15	1.00	2.0000	4.00	[2.87; 5.13]	14.2%
Tonella 2017	11	7.00	12.0000	8	10.00	11.0000	−3.00	[−13.41; 7.41]	1.8%
Shimizu 2014	8	−5.00	7.0000	5	2.00	11.0000	−7.00	[−17.79; 3.79]	1.7%
Random effects model	203			201			6.62	[4.82; 8.43]	74.8%
Random effects model	**290**			**285**			**6.22**	**[4.71; 7.72]**	**100.0%**

Heterogeneity: $I^2 = 72\%$, $\tau^2 = 3.8396$, $p < 0.01$
Test for subgroup differences: $\chi^2_1 = 0.88$, df = 1 ($p = 0.35$)

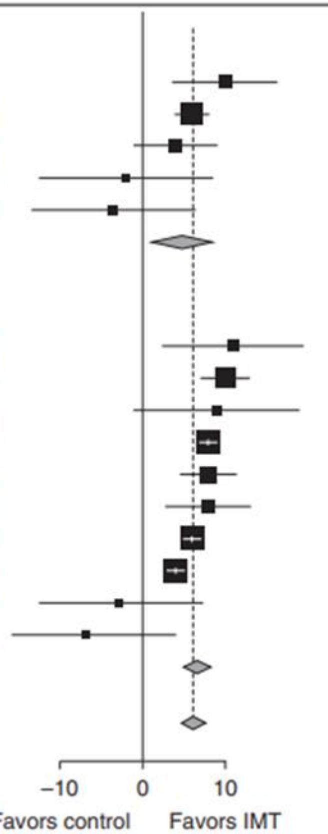


Figure 2. Effect of inspiratory muscle training (IMT) on the change in maximal inspiratory pressure from baseline to the completion of the treatment course. The effect of IMT did not significantly differ with strength training versus endurance training regimens. Weight refers to the contribution of each study to the meta-analysis estimate of effect. CI = confidence interval; MD = mean difference; SD = standard deviation.

Vorona, Meta-analysis 2017

To sum up

Limit duration of invasive MV is a priority

- Use PS for SBT
- Reduce sedation if possible
- Prevent muscle weakness (method 1-5)
- Individualize the strategy to the patient with advanced monitoring and assessments

To sum up

Limit duration of invasive MV is a priority

- Use PS for SBT
- Reduce sedation if possible
- Prevent muscle weakness (method 1-5)
- Individualize the strategy to the patient with advanced monitoring and assessments

The large studies shows that there is no State-of-the-Art for the weaning process followed worldwide, but recommendations and best practices exist.