L'INSUFFLATION-EXSUFFLATION: QUELLES INDICATIONS

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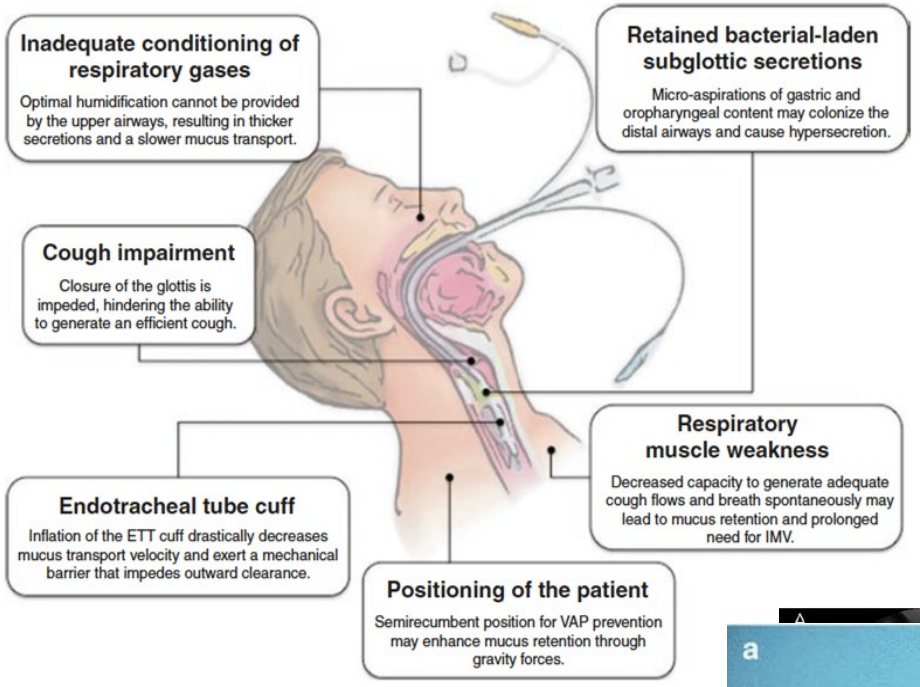
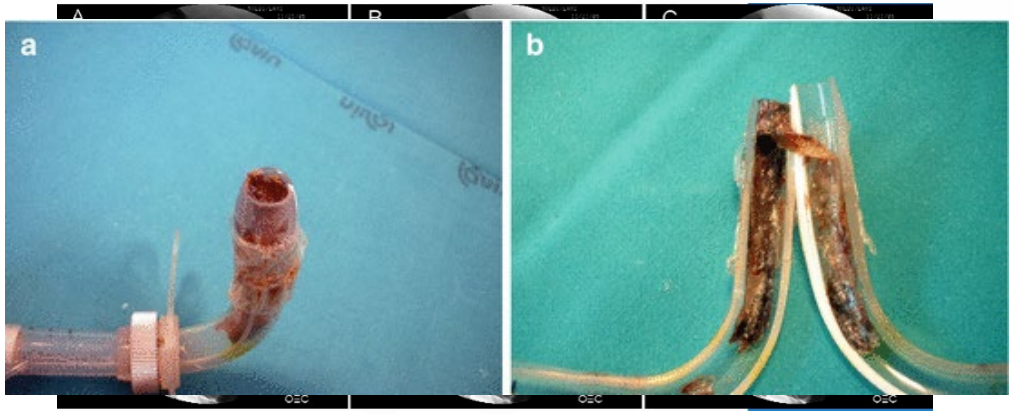
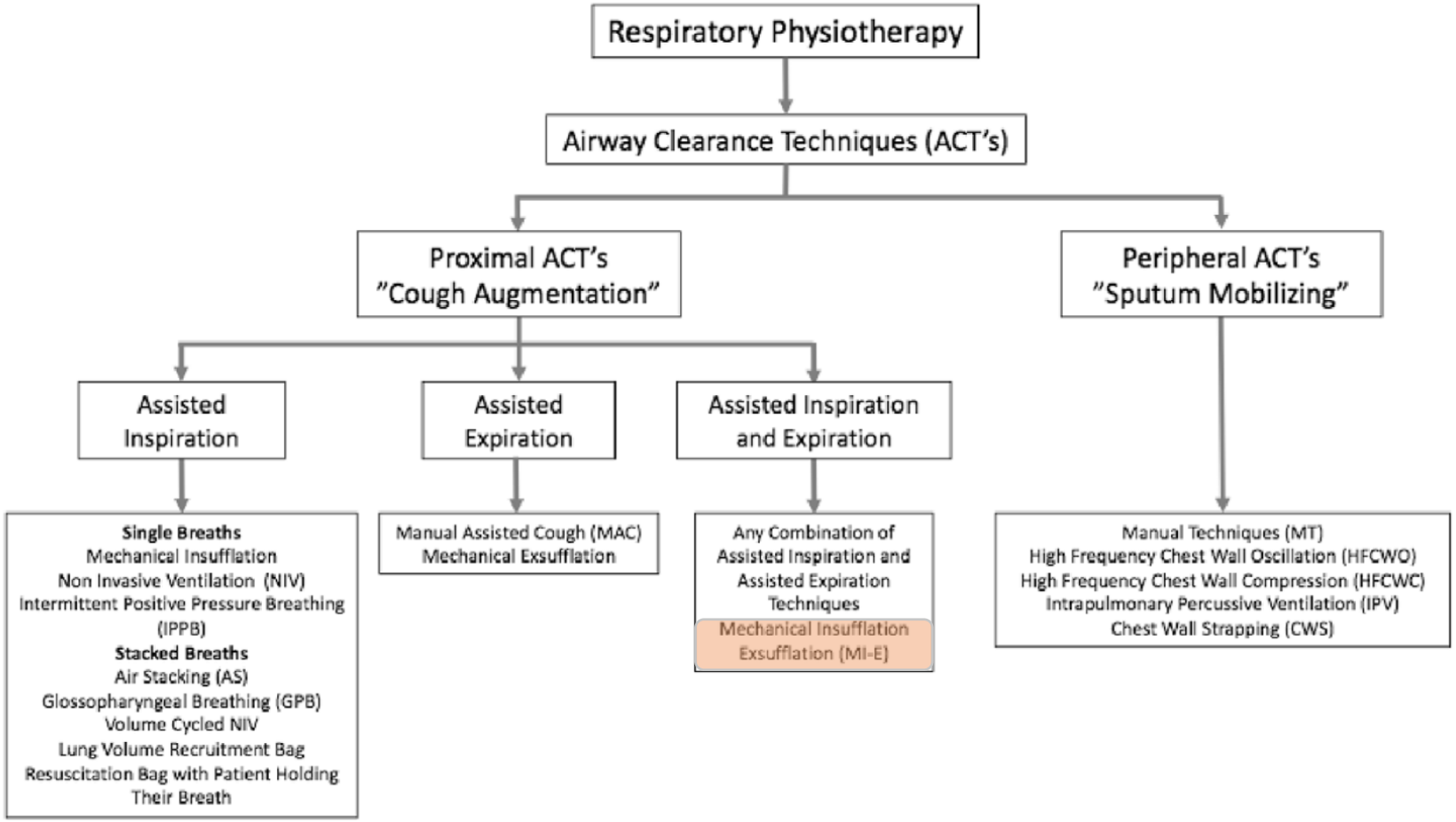
Effets de la sonde d'intubation sur la clairance



- Rétention des sécrétions sous-glottiques
- Faiblesse muscles respiratoires
- Position semi-assise du patient
- Ballonnet
- Inefficacité mécanique toux
- Conditionnement des gaz inadéquat





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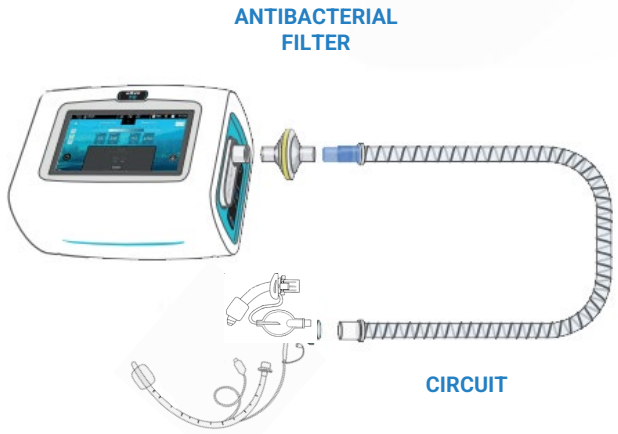
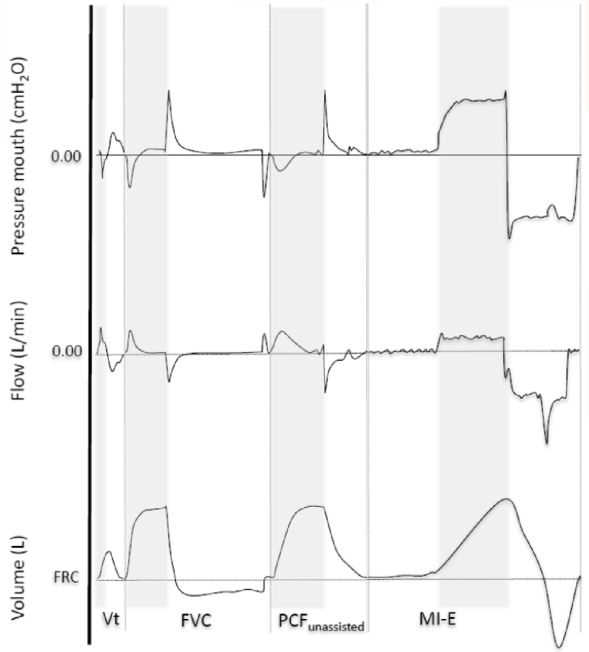
Chatwin M et al. Respir Med 2018

In-exsufflation mécanique

- Dispositif non invasif d'aide mécanique à la toux
- Inspiration à pression positive
- Passage rapide à pression expiratoire négative
- DEP élevés





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Chatwin M et al. Respir Med 2018

Indications et contrindications en réanimation

Table 2. Reported Indications and Contraindications Mechanical Insufflation-Exsufflation

Outcomes	Clinical Studies no. (%)	Survey Studies in Health Care Professionals no. (%)
Indications		
Secretions and mucus plugging	9 (32)	4 (13)
Prophylactic airway clearance	6 (21)	
Reduced cough peak flow or insufficient cough	4 (14)	2 (7)
Neuromuscular disease or spinal cord injury		13 (4)
Previous domiciliary use		7 (2)
Weaning failure	4 (14)	2 (7)
Atelectasis	3 (11)	2 (7)
Respiratory failure	2 (7)	2 (7)
ICU acquired weakness	-	1 (3)
Need for endotracheal suctioning	3 (11)	
Contraindications		
Contraindications to increased positive pressure†	9 (32)	9 (30)
Recent surgery (pulmonary/thoracic/abdominal/neuro)	3 (11)	4 (13)
Mechanical ventilation settings F_{IO_2} > 0.60 or PEEP > 10 mm Hg or Ppeak > 40 mm Hg	2 (7)	1 (3)
(Severe) bronchospasm, COPD, or asthma	1 (7)	
Hemodynamic instability	1 (7)	1 (3)
Active tuberculosis	1 (7)	
Increased intracranial pressures (> 25 mm Hg)		2 (7)
Severe COPD or asthma		2 (7)
Impaired consciousness (inability to respond to direct simple commands)		1 (3)
Trauma (facial, cranial, rib fractures)		1 (3)
Other‡	6 (21)	1 (3)

- Observation subjective ou sécrétions audibles
Aspiration sécrétions > 3 fois / jour
- Effort toux inefficace
- MNM ou blesse médullaire
- Echec de sevrage
- Atélectasie
- IRA
- ICUAW

- Contrindication de P. positive élevée
- Chirurgie « récente »
- FiO_2 > 60mmHg ou PEEP > 10 cmH_2O ou Ppic > 40mmHg
- Instabilité hémodynamique
- BPCO ou asthme grave

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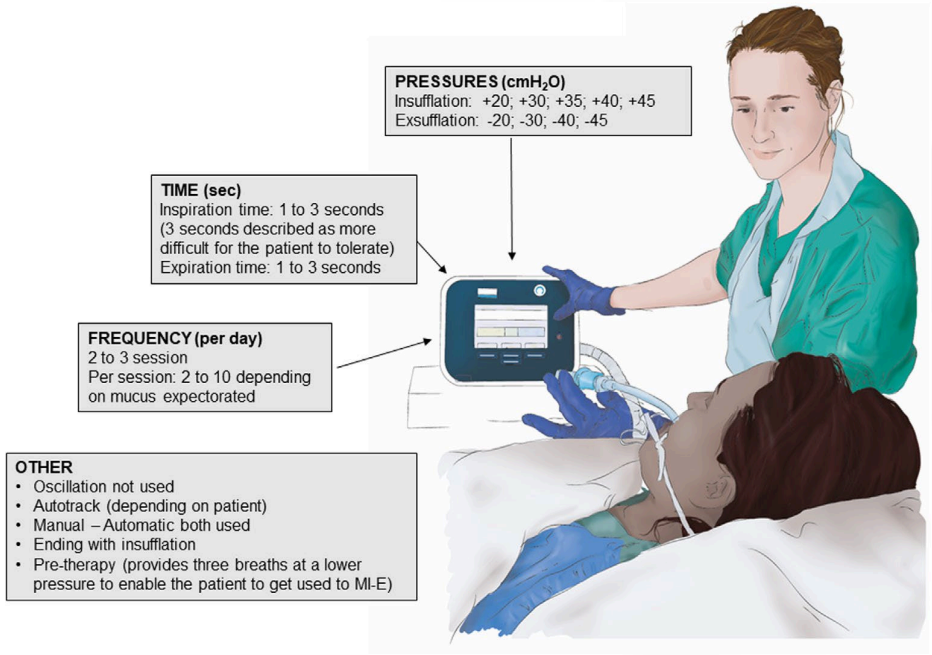
Swingood E et al. Respir Care 2022

Indications et contrindications en réanimation

Authors/year	Extubation results	CPEF, mean (L/min)	CPEF threshold established (L/min)	Predictive power
Bach et al. 1996 [13]	43/58 success 15/58 failure	278.0 101.0	160.0	N/A

Jiang C et al. Crit Care 2014

Réglages adaptés à la réanimation



P. insufflation: +20 à +45 cmH_2O

P. exsufflation: -20 à -70 cmH_2O

T. insufflation: 1 à 3 secondes

T. exsufflation: 1 à 3 secondes

Absence recommandation

2 - 3 sessions / jour

2 à 10 cycles / session

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Stilma W et al. Nurs Crit Care 2023

Paramètres d'efficacité clinique

The development of a core outcome set for trials of airway clearance techniques in the critically ill, adult population

Ema Swingwood[1,2] Roberto Martinez Alejos[3,4,5], Willemke Stilma[6], Frederique Paulus[6], Louise Rose[7]

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INTRODUCTION

Airway clearance techniques (ACT) are a key component of airway care in the ICU.
Identification of effective and safe ACTs to optimise airway clearance in the critically ill is of paramount importance.
To date, studies have used various outcomes to examine the effect of ACTs. This limits the ability to compare and synthesize clinical studies.
Without a core outcome set (COS), important barriers to evidence synthesis to inform clinical decision making remain.

OBJECTIVES

To establish a consensus-based COS for use in future studies of ACTs in the invasively ventilated, critically ill adult population.

METHODS

Two stages:
A systematic search of the evidence base established a list of outcomes used in research examining ACTs.
We then conducted semi-structured interviews with former patients and clinicians to identify outcomes of importance to them.
A two-round modified online Delphi study was completed, recruiting participants through professional and personal networks and social media.
Outcomes for inclusion in the COS were those scored as "critical for inclusion" by ≥70% of respondents and "not important" by <15%

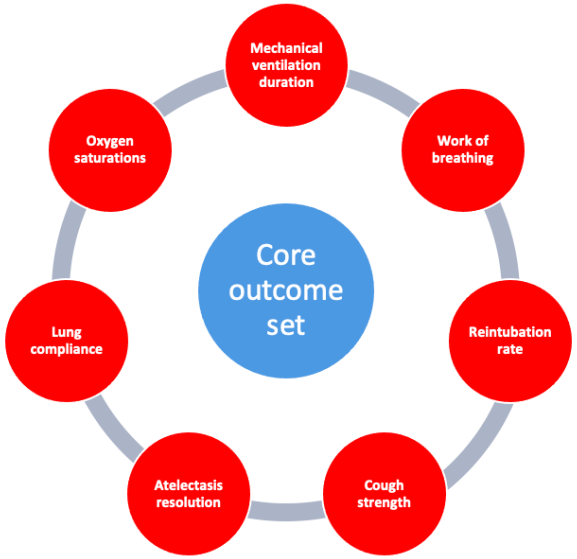

Figure 2: Core outcome set for airway clearance techniques in the critically ill intubated patient

RESULTS

We recruited 243 participants with international representation from 26 countries including multi-professional clinicians, researchers, industry members and ICU survivors/family.

Item generation through systematic searches highlighted 31 outcomes for inclusion into the Delphi (round one). Interviews did not highlight any further items for inclusion. During round one, participants suggested 40 additional outcomes. Through discussion and research group consensus, due to overlap and repetition of suggested outcomes, 7 additional outcomes were agreed, totalling 38 outcomes being included in the Delphi round two (Figure 1).

Following two Delphi rounds, seven outcomes gained consensus (Figure 2).

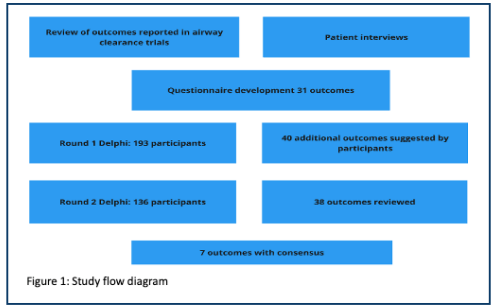

Figure 1: Study flow diagram

CONCLUSIONS

Through a rigorous method we developed a COS for future studies of airway clearance interventions in the invasively ventilated, critically ill adult population. It is now important to gain consensus on how each of these outcomes should be measured.

- Temps sous VM
- Travail respiratoire
- Taux de reintubation
- Effort de toux
- Résolution atélectasies
- Compliance
- Saturation oxygène

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Swingwood E et al. Pending to be published

Profil des patients

Pre-extubation	Peri-extubation	Post-extubation

Profil des patients

Pre-extubation	Peri-extubation	Post-extubation

	Sanchez Garcia 2018	Coutinho 2018	Ferreira de Camillis 2018	Nunes 2019	Martinez Alejos 2021
Type Study	Pilot observational	RCT Cross over	RCT Parallel	RCT Cross over	RCT Cross over
Sample size calculation	X N=13	√ N=43	√ N=180	Unclear N=16	√ N=26
MI-E Pressure settings (cmH_2O)	+50/-45	+40/-40	+40/-40	+30/-30 +50/-50	+40/-40
MI-E Time settings	Ti 3 sec, Te 4 sec, pause not reported	Ti 3 sec, Te 3 sec, 0 sec pause	Ti 2 sec, Te 3 sec, 2 sec pause	Ti 2.5 sec, Te 1.5 sec, 0.5 sec pause	Ti 3 sec, Te 2 sec, 1 sec pause
MI-E Flow settings	Not reported	Not reported	Not reported	Not reported	Medium
ICU admission - Medical - Surgical	10 3	Not reported	73 17	Not reported	5 21
Reason for MV	Lowering of consciousness 5 ARF 4 Abdominal disease 2 CRA 2	Brain trauma 10 Postop 6 Polytrauma 9 Other 18	ARF 44 Lowering of consciousness 24 Hemodynamic instability 25 Postoperative 6 Cardiac 1	Sepsis/Septic shock 8 Lowering of consciousness 3 Others 5	Abdominal surgery 16 ARF 4 Cardiac arrest 1 Neurosurgery 5
Age	62.6 ± 20.0	51.4 ± 21.2	72.7±16.9	57.6 ± 19.1	61.1± 19.2
Pao2/FiO2	218 (128-273)	Not reported	Not reported	249.6 (207.4-365.5)	243.9 ± 53.1

Adapté de Swingood E et al. Respir Care 2022

Profil des patients

Âge moyen : 51-73 ans

Hospitalisé en réanimation : 68.2% raison médicale

☐ Principales indications de VM :

- Détresse respiratoire aiguë : 40.3%
- Choc septique ou post-opératoire : 29.5%
- Trouble de la conscience : 21.7%
- Trauma crânien ou polytraumatisme : 18.6%

PaO_2/FiO_2 : 218–250

Modes ventilatoires mixtes selon l'expertise du centre

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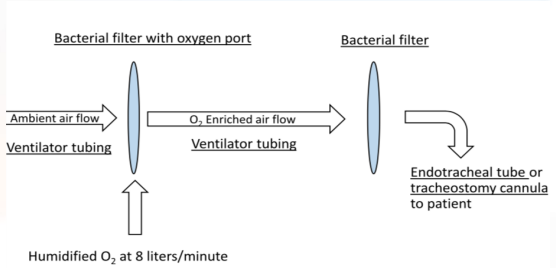
Profil des patients

Effets physiologiques

Amélioration oxygénation
(Sanchez-Garcia M 2018)

	Baseline	5′	60″	*p*
Temperature, °C	37.3 ± 0.82		37.4 ± 0.7	ns
Heart rate, bpm	97.7 ± 14.4	97.1 ± 15.1	97.3 ± 14.2	0.82
Mean blood pressure, mmHg	87 ± 11.9	87.6 ± 14.7	83.6 ± 14.7	0.57
Sat O_2, %	97.38 ± 2.37	98.3 ± 2.2	97 ± 3.4	0.04
pHa	7.43 ± 0.1	7.38 ± 0.1	7.45 ± 0.05	0.17
pHv	7.39 ± 0.1	7.44 ± 0.02	7.42 ± 0.05	0.13
PaO_2, mmHg	105.5 ± 23.9	124 ± 55.5	*143 ± 42.3	0.031
PvO_2, mmHg	54.9 ± 37.4	34.5 ± 4.9	52.4 ± 29	0.67
$PaCO_2$, mmHg	37.5 ± 12.6	40.5 ± 13.3	35.2 ± 8.2	0.058
$PvCO_2$, mmHg	45.2 ± 6.7	44.5 ± 3.5	40.2 ± 5.2	0.15
Ventilator mode				0.61
CPAP PC-IMV	20		18	
MMV VC-IMV	2		1	
Spontaneous respiration	4		7	
FiO_2	0.46 ± 0.13	0.45 ± 0.13	0.44 ± 0.1	0.73
PaO_2/FiO_2	239.8 ± 96.8	285.5 ± 140	328.7 ± 104.7	0.14
PvO_2/FiO_2	134.9 ± 114.2	105.9 ± 3.7	132.6 ± 93.9	0.96
Total breath, rate/min	22.1 ± 6.3	23.5 ± 7.1	20.7 ± 5.9	0.10
Minute volume, l/min	10.6 ± 3.6	11.0 ± 3.2	9.6 ± 2.6	0.13
Tidal volume, ml	524.1 ± 106.6	496.3 ± 118.4	493.2 ± 139	0.15
PEEP, mmHg	5.3 ± 2.9	5.3 ± 2.9	4.6 ± 3.2	0.45
Peak inspiratory pressure, cmH_2O	23.6 ± 7.8	24.0 ± 8.1	22.3 ± 5.6	0.17
Plateau pressure, cmH_2O	21.9 ± 5.1	22.5 ± 5.4	20.9 ± 4.4	0.14
Lung compliance				
Dynamic	17.7 ± 9.5	16.3 ± 9.4	17.6 ± 9.6	0.4
Static, ml/cmH_2O	18.7 ± 8.8	17.2 ± 9.1	19.1 ± 9.3	0.33
CA tidal volume, ml	1043.6 ± 649.9			



Profil des patients

Effets physiologiques

Amélioration oxygénation
(Sanchez-Garcia M 2018, Martinez-Alejos R 2021)

	ERCC+MI-E			ERCC		
	Before	After	1 Hour After	Before	After	1 Hour After
Respiratory mechanics						
Respiratory system compliance	54.7 ± 24.1	73.7 ± 35.8*	65.7 ± 54.1	50 ± 59.2	71.7 ± 136.7	50.6 ± 60.3
Airway resistance, cm H_2O/L/s	18.5 ± 12.5	17.4 ± 6.1	15.9 ± 4.8	16.3 ± 7.1	16.8 ± 6.6	15.7 ± 6.1
Lung tissue resistance, cm H_2O/L/s	14.8 ± 5.8	15.2 ± 6.1	14 ± 5.3	15.4 ± 7.1	15.3 ± 7.1	14.4 ± 7.1
Hemodynamics						
Heart rate, beats/min	85.3 ± 23.7	91.8 ± 24.2†§	87.7 ± 21.1§	91.3 ± 24.3	94.8 ± 22.9‡§	91.7 ± 23.8§
Systolic blood pressure, mm Hg	124 ± 20.7	128.9 ± 20.3	125 ± 17.3	127.1 ± 19.1	131 ± 25.8	124.8 ± 18.7
Diastolic blood pressure, mm Hg	61.4 ± 9.5	63.1 ± 12.6	59.8 ± 9	61.9 ± 10.8	61.7 ± 9.3	60.7 ± 9.4
Gas exchange						
S_{aO_2}, %	97.4 ± 2	95.9 ± 6.9	97.6 ± 1.9§	97.1 ± 1.9	96.8 ± 3	96.8 ± 2.4§
P_{aO_2}, mm Hg	93.9 ± 19.3	100 ± 28.4	99.4 ± 19.7†	94.1 ± 20.6	92.2 ± 20	92.9 ± 24.1
P_{aCO_2}, mm Hg	34.7 ± 6	36.2 ± 6.1	34 ± 6.3	34.9 ± 5.5	36.1 ± 5.3	35 ± 5.8

Augmentation significative SaO_2 1h après ERCC+MI-E vs ERCC ($p<0.01$; ANCOVA $p<0.001$)

PaO_2 plus élevée groupe ERCC+MI-E après intervention ($p<0.01$)

Profil des patients

Effets physiologiques

Amélioration oxygénation
(Sanchez-Garcia M 2018, Martinez-Alejos R 2021)

Amélioration compliance
(Ferreira de Camillis M 2018)

Variable	Intervention Group (n = 90)	Control Group (n = 90)	P
Age, y			
65 y	2.22 ± 0.21	1.22 ± 0.23	<.001
≥65 y	3.87 ± 0.58	1.77 ± 0.42	.050
COPD			
Yes	1.59 ± 0.52	0.87 ± 0.52	.09
No	2.57 ± 0.22	1.43 ± 0.22	<.001
ICU admission type			
Medical	2.41 ± 0.25	1.41 ± 0.23	.002
Surgical	2.44 ± 0.38	1.08 ± 0.48	.01

Patients plus répondants si :
plus jeunes, pas BPCO, admis en réanimation médical ou chirurgicale

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Profil des patients

Effets physiologiques

Amélioration oxygénation
(Sanchez-Garcia M 2018, Martinez-Alejos R 2021)

Amélioration compliance
(Ferreira de Camillis M 2018, Martinez-Alejos R 2021)

	ERCC+MI-E			ERCC		
	Before	After	1 Hour After	Before	After	1 Hour After
Respiratory mechanics						
Respiratory system compliance	54.7 ± 24.1	73.7 ± 35.8*	65.7 ± 54.1	50 ± 59.2	71.7 ± 136.7	50.6 ± 60.3
Airway resistance, cm H_2O/L/s	18.5 ± 12.5	17.4 ± 6.1	15.9 ± 4.8	16.3 ± 7.1	16.8 ± 6.6	15.7 ± 6.1
Lung tissue resistance, cm H_2O/L/s	14.8 ± 5.8	15.2 ± 6.1	14 ± 5.3	15.4 ± 7.1	15.3 ± 7.1	14.4 ± 7.1
Hemodynamics						
Heart rate, beats/min	85.3 ± 23.7	91.8 ± 24.2†§	87.7 ± 21.1§	91.3 ± 24.3	94.8 ± 22.9‡§	91.7 ± 23.8§
Systolic blood pressure, mm Hg	124 ± 20.7	128.9 ± 20.3	125 ± 17.3	127.1 ± 19.1	131 ± 25.8	124.8 ± 18.7
Diastolic blood pressure, mm Hg	61.4 ± 9.5	63.1 ± 12.6	59.8 ± 9	61.9 ± 10.8	61.7 ± 9.3	60.7 ± 9.4
Gas exchange						
S_{aO_2}, %	97.4 ± 2	95.9 ± 6.9	97.6 ± 1.9§	97.1 ± 1.9	96.8 ± 3	96.8 ± 2.4§
P_{aO_2}, mm Hg	93.9 ± 19.3	100 ± 28.4	99.4 ± 19.7†	94.1 ± 20.6	92.2 ± 20	92.9 ± 24.1
P_{aCO_2}, mm Hg	34.7 ± 6	36.2 ± 6.1	34 ± 6.3	34.9 ± 5.5	36.1 ± 5.3	35 ± 5.8

Amélioration significative Crs groupe ERCC+MI-E ($p<0.05$)
Non maintenue 1h après

Profil des patients

Effets physiologiques

Amélioration oxygénation
(Sanchez-Garcia M 2018, Martinez-Alejos R 2021)

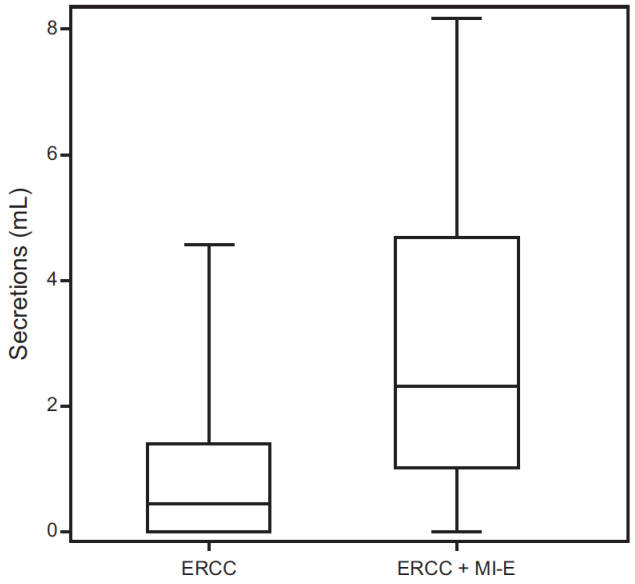
Amélioration compliance
(Ferreira de Camillis M 2018, Martinez-Alejos R 2021)

Effets cliniques

Désencombrement bronchique
(Ferreira de Camillis M 2018, Martinez-Alejos R 2021)

Table 2. Primary and Secondary Outcomes

Characteristic	Intervention Group (n = 90)	Control Group (n = 90)	P
Primary outcome, mean ± SD			
Weight of aspirated secretion, g	2.42 ± 2.32	1.35 ± 1.56	<.001
Secondary outcomes, mean ± SD			
ΔC_L, mL/cm H_2O*	1.76 ± 4.90	−0.57 ± 4.85	.001
ΔR_{aw}, cm H_2O/L/s*	0 ± 3.48	0.22 ± 3.25	.59
ΔWOB, J/L	−0.03 ± 0.16	−0.03 ± 0.15	.57



Adj mean volume sécrétions supérieur ERCC+MI-E vs ERCC (3.02 mL vs 0.84 mL; p<0.001)
Diff btw groups 2.18 mL [95% CI 1.24–3.12]

Profil des patients

Sécurité

(Martinez-Alejos R 2021)

▼ 21 épisodes brefs de désaturation et d'instabilité hémodynamique-
- 10 ERCC+MI-E
- 11 ERCC seul

	SaO_2				Systolic blood pressure				Diastolic blood pressure				Heart rate			
	Decrease ≥10 %		< 85%		Increase ≥20 %		Decrease ≥20 %		Increase ≥20 %		Decrease ≥20 %		Increase ≥20 %		Decrease ≥20 %	
	ERCC+MI-E	ERCC	ERCC+MI-E	ERCC	ERCC+MI-E	ERCC	ERCC+MI-E	ERCC	ERCC+MI-E	ERC	ERCC+MI-E	ERCC	ERCC+MI-E	ERCC	ERCC+MI-E	ERCC
Patient 1					X											
Patient 2					X	X										
Patient 3													X			
Patient 4													X			
Patient 5					X				X				X			
Patient 6									X							
Patient 7								X								X
Patient 8						X						X				
Patient 9								X				X				
Patient 10						X			X			X				
Patient 11						X			X			X				

Faible gravité clinique et courte durée EI: interventions protocolisées jamais interrompues

Profil des patients

Pre-extubation	Peri-extubation	Post-extubation

	Gonçalves 2012	Kubota 2024
Type Study	RCT parallel	RCT parallel
Sample size calculation	√ N=75	√ N=60
Primary outcome	48hr Reintubation rate	Jours sans VM J28
MI-E Pressure settings (cmH_2O)	+40/-40	+40/-40
MI-E Time settings	Ti 3 sec, Te 2 sec, 3 sec pause	Not reported
MI-E Flow settings	Not reported	Not reported
ICU admission - Medical - Surgical	18 0	23 4
Reason for MV	COPD exacerbations 4 Congestive heart failure 4 Community AP 6 Hospital AP 2 Postop respiratory failure 8 Acute lung injury 1 Thoracic trauma 3 Sepsis 4 CRA 3	Pneumonia 15 CRA 4 Sepsis 1 Cerebrovascular diseases 2 Postoperative ventilation 2 Heart failure 1 Pulmonary embolism 1 Acute pancreatitis 1
Age	61.4 ± 15.1	73 (67–86)
PaO2/FiO2	Not reported	199 (173–258)

Profil des patients

Âge moyen : 61-73 ans

Hospitalisé en réanimation : 91.1% raison médicale

Principales indications de VM :

- Pneumopathie : 51.1%
- Troubles cardiovasculaires : 26.7%
- Détresse respiratoire aiguë : 22.2%

PaO_2/FiO_2 : 199

Mode ventilatoire : VSAI-PEP

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Profil des patients

Effets cliniques

Taux reintubation
(Gonçalves M 2012)

	Group A (n = 40)	Group B (MI-E) (n = 35)
NIV application, n (%)	20 (50%)	14 (40%)
Reasons for NIV (n)		
Respiratory rate > 35 beats/min	5 (25%)	9 (64%)
SpO_2 < 90%	4 (20%)	1 (7%)
20% variation of HR or BP	1 (5%)	-
PaO_2 < 60; $PaCO_2$ >45	10 (50%)	4 (29%)
Total period of MV (days)	17.8 ± 6.4[a]	11.7 ± 3.5[a]
Patients reintubated (n, %)	19 (48%)[a]	6 (17%)[a]
Causes of reintubation (n)		
Respiratory pauses with loss of consciousness	-	1
Respiratory distress after 2-h NIV	6	2
Decreasing level of consciousness	2	-
Intolerance to NIV	2	-
Hypotension (systolic BP < 90 mm Hg for > 30 minutes)	-	1
Secretion encumbrance associated with severe hypoxemia	9	2
NIV failure rate, n (%)	13 (65%)[a]	2 (14%)[a]
Total ICU length of stay	19.3 ± 8.1	16.9 ± 11.1
Postextubation ICU length of stay	9.8 ± 6.7[a]	3.1 ± 2.5[a]

a $p < 0.05$

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Profil des patients

Effets cliniques

Taux reintubation
(Gonçalves M 2012)

Temps passé sous VM
(Gonçalves M 2012)

	Group A (n = 40)	Group B (MI-E) (n = 35)
NIV application, n (%)	20 (50%)	14 (40%)
Reasons for NIV (n)		
Respiratory rate > 35 beats/min	5 (25%)	9 (64%)
SpO_2 < 90%	4 (20%)	1 (7%)
20% variation of HR or BP	1 (5%)	-
PaO_2 < 60; $PaCO_2$ >45	10 (50%)	4 (29%)
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Decreasing level of consciousness	2	-
Intolerance to NIV	2	-
Hypotension (systolic BP < 90 mm Hg for > 30 minutes)	-	1
Secretion encumbrance associated with severe hypoxemia	9	2
NIV failure rate, n (%)	13 (65%)[a]	2 (14%)[a]
Total ICU length of stay	19.3 ± 8.1	16.9 ± 11.1
Postextubation ICU length of stay	9.8 ± 6.7[a]	3.1 ± 2.5[a]

a $p < 0.05$

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Profil des patients

Effets cliniques

Taux reintubation
(Gonçalves M 2012)

Temps passé sous VM
(Gonçalves M 2012, Kubota 2024)

Table 2. Clinical outcomes of subjects in MI-E and control groups.

Results	Control (n = 21)	MI-E (n = 27)	p-value
Primary outcome			
Ventilator-free days by day 28, median (IQR)	18 (0–23)	21 (13–24)	0.38
Secondary outcomes			
duration of mechanical ventilation in surviving subjects, median (IQR)	8 (4–14)	6 (3–9)	0.19
ICU length of stay in surviving subjects, median (IQR)	12 (6–15)	10 (7–12)	0.31
28-day mortality, no./total (%)	3/21 (14.2)	6/27 (22.2)	0.71
Tracheostomy in surviving subjects, no./total (%)	4/18 (22.2)	3/21 (14.3)	0.68

Profil des patients

Effets cliniques

Taux reintubation
(Gonçalves M 2012)

Temps passé sous VM
(Gonçalves M 2012, Kubota 2024)

Durée de séjour
(Gonçalves M 2012, Kubota 2024)

	Group A (n = 40)	Group B (MI-E) (n = 35)
NIV failure rate, n (%)	13 (65%) [a]	2 (14%)[a]
Total ICU length of stay	19.3 ± 8.1	16.9 ± 11.1
Postextubation ICU length of stay	9.8 ± 6.7[a]	3.1 ± 2.5[a]

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Profil des patients

	Group A (n = 40)	Group B (MI-E) (n = 35)
NIV application, n (%)	20 (50%)	14 (40%)
Reasons for NIV (n)		
Respiratory rate > 35 beats/min	5 (25%)	9 (64%)
SpO_2 < 90%	4 (20%)	1 (7%)
20% variation of HR or BP	1 (5%)	-
PaO_2 < 60; $PaCO_2$ >45	10 (50%)	4 (29%)
Total period of MV (days)	17.8 ± 6.4[a]	11.7 ± 3.5[a]
Patients reintubated (n, %)	19 (48%)[a]	6 (17%)[a]
Causes of reintubation (n)		
Respiratory pauses with loss of consciousness	-	1
Respiratory distress after 2-h NIV	6	2
Decreasing level of consciousness	2	-
Intolerance to NIV	2	-
Hypotension (systolic BP < 90 mm Hg for > 30 minutes)	-	1
Secretion encumbrance associated with severe hypoxemia	9	2
NIV failure rate, n (%)	13 (65%)[a]	2 (14%)[a]
Total ICU length of stay	19.3 ± 8.1	16.9 ± 11.1
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a $p < 0.05$

Concise Clinical Review

The Decision to Extubate in the Intensive Care Unit

Arnaud W. Thille[1], Jean-Christophe M. Richard[2,3], and Laurent Brochard[2,3,4]

[1]Medical ICU, University Hospital of Poitiers, Poitiers, France; [2]Intensive Care Division, Anesthesiology, Pharmacology and Intensive Care Department, University Hospital, Geneva, Switzerland; [3]School of Medicine, University of Geneva, Geneva, Switzerland; and [4]Research Unit 955, team 13, INSERM, University of Paris-Est, Créteil, France

TABLE 1. RATES OF PLANNED EXTUBATION FAILURE AND MORTALITY

Study (Reference)	Number of Extubations	Rate of Extubation Failure [% (n)]
Esteban *et al.*, 1997 (1)	397	19 (74)
Esteban *et al.*, 1999 (2)	453	13 (61)
Epstein *et al.*, 1997 (4)	287	14 (40)
Vallverdu *et al.*, 1998 (3)	148	15.5 (23)
Thille *et al.*, 2011 (6)	168	15 (26)
Frutos-Vivar *et al.*, 2011 (14)	1,152	16 (180)
Funk *et al.*, 2009 (38)	257	10 (26)
Tonnelier *et al.*, 2011 (39)	115	10 (12)
Sellares *et al.*, 2011 (34)	181	20 (36)
Peñuelas *et al.*, 2011 (40)	2,714	10 (278)

Moyen échec extubation: 14.3%

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Profil des patients

Effects of mechanical insufflation-exsufflation on ventilator-free days in intensive care unit subjects with sputum retention; a randomized clinical trial

Shota Kubota[1], Hideki Hashimoto[1], Yurika Yoshikawa[2], Kengo Hiwatashi[1], Takahiro Ono[1], Masaki Mochizuki[1], Hiromu Naraba[1], Hidehiko Nakano[1], Yuji Takahashi[1], Tomohiro Sonoo[1], Kensuke Nakamura[1,3]*

Table 1. Subject characteristics.

Characteristics		Control group (n = 21)	MI-E group (n = 27)
Age, median (IQR), years		71 (58–81)	73 (67–86)
Age-category, no. (%)	≤ 60	6 (28.6)	4 (14.8)
	61–80	9 (42.9)	11 (40.7)
	≥ 81	6 (28.6)	12 (44.4)

Table 2. Clinical outcomes of subjects in MI-E and control groups.

Results	Control (n = 21)	MI-E (n = 27)	p-value
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Patients aspirés 1 fois / heure

Randomisation 1:1 sans blocs – groupes déséquilibrés?

Echantillon non complété (n=60)

Profil des patients

Pre-extubation	Peri-extubation	Post-extubation

Profil des patients

	Wibart 2023
Type Study	RCT Parallel
Sample size calculation	√ N=122
Primary outcome	48hr ARF post extubation
MI-E Pressure settings (cmH_2O)	+20 à +40/ -20 à -60
MI-E Time settings	
MI-E Flow settings	Not reported
ICU admission - Medical - Surgical	 122 0
Reason for MV	Pulmonary disease 25 Sepsis 20 Coma 8 Heart failure 4 Others causes 4
Age	67 (59 - 77)
PaO_2/FiO_2	302 (230 - 368)

Patients neuromyopathie acquise de réanimation

Profil des patients

Effets cliniques

ARF 48h
(Wibart P 2023)

Taux reintubation
(Wibart P 2023)

Durée de séjour post réa
(Wibart P 2023)

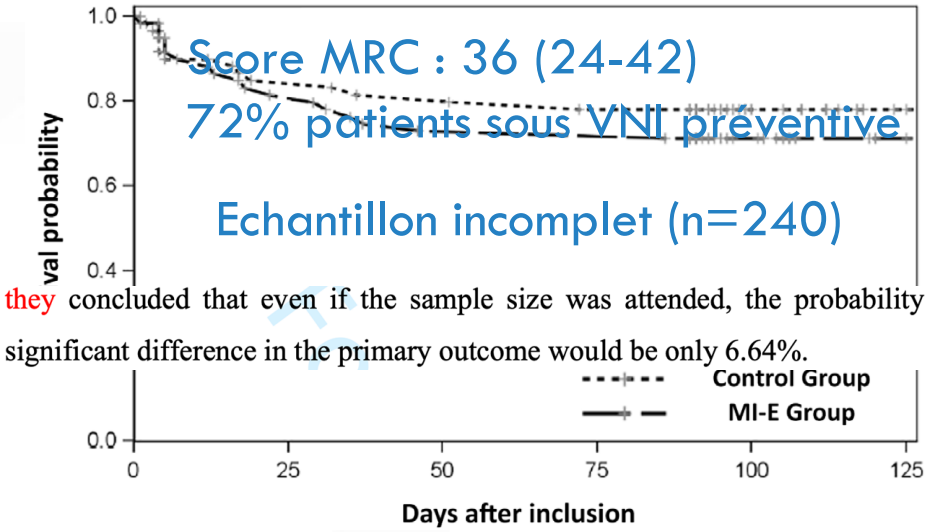
Survie à J90
(Wibart P 2023)

Outcomes	Control Group (n = 61)	MI-E Group (n = 61)*	p value
Primary outcome			
Acute respiratory failure on 48 hours after extubation	7 (11.5)	10 (16.4)	0.602
Secondary outcomes			
Reintubation on 48 hours after extubation	2 (3.6)	6 (10.7)	0.271
Postextubation ICU length of stay (days)	3 (2 - 7)	4 (2 - 7)	0.329
Patients needing at least one airway suctioning during session	19 (31.1)	7 (11.7)	0.010†
Patients needing at least one additional session	9 (14.8)	7 (11.7)	0.789
VAS comfort	5.5 (5.0 - 7.0)	5.9 (5.0 - 7.5)	0.641

Score MRC : 36 (24-42)

72% patients sous VNI préventive

Echantillon incomplet (n=240)



they concluded that even if the sample size was attended, the probability of finding a significant difference in the primary outcome would be only 6.64%.

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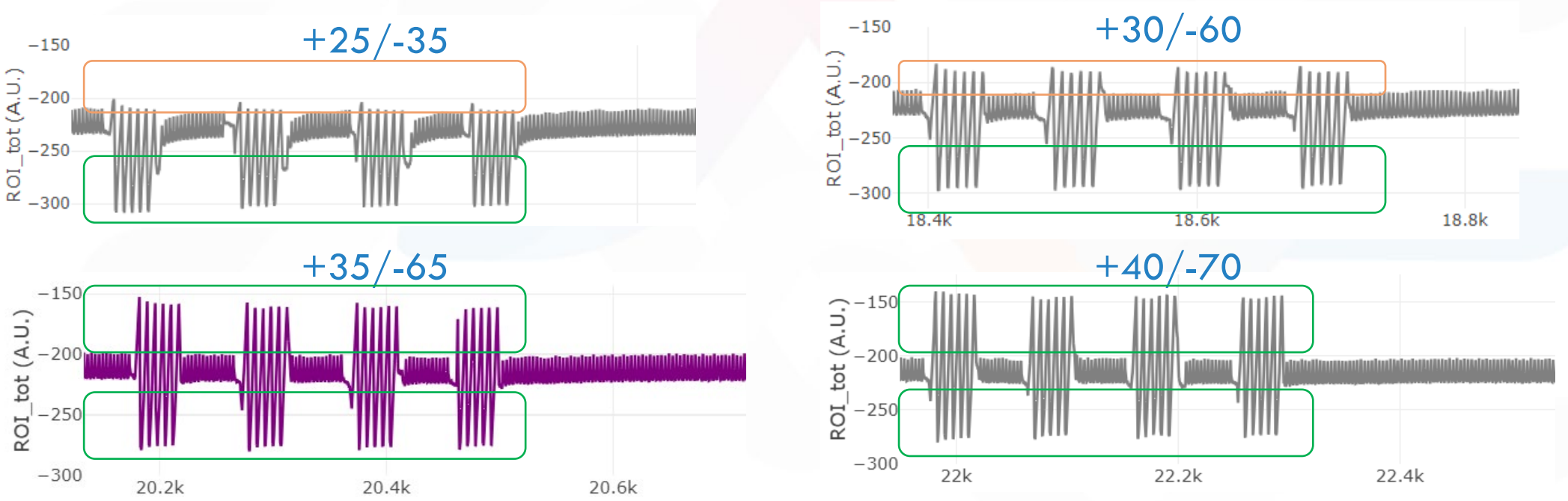
Plus de compréhension et individualisation



		Vti (mL)	Vte (mL)	PEF (L/min)	PEF-PIF (L/min)	PEF/PIF	PL insp (cmH_2O)	PL exp (cmH_2O)
Réglages	+25-/-35	676.8	118.7	106.6	83.4	4.6	17.3	-55.6
	+30/-60	873.5	-139.3	128.4	106.5	5.9	21.9	-61.5
	+35/-65	**1103.4**	**-128.2**	**140.8**	**116.6**	**6.0**	**26.8**	**-67.8**
	+40/-70	1282.2	-88.8	143.9	117.1	5.4	31.3	-72.2

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Martinez-Alejos R et al. Pending to be published

Et peut-être des nouvelles indications à venir

MI-EDON STUDY: THE ROLE OF RESPIRATORY PHYSIOTHERAPY AS TOOLS FOR THE OPTIMIZATION OF THE LUNG DONOR

Ballesteros-Reviriego G[1], Bello I[2], Miñambres E[3], Manciño JM[4], Planas B[1], Martí JD[2], Suárez A[3], Marcobal J[4], Gómez-Brey A[1], Mazo C[1], Garcés B[4], Deu M[1], Paredes D[2], Sánchez G[2], Boada M[2], Gómez A[1], Peñalver M[2], Martín A,[4] Pérez A[3], Sandiumenge A[1].

1 Hospital Universitari Vall d´hebron (Barcelona, Spain), 2 Hospital Clinic (Barcelona, Spain), 3 Hospital Marqués de Valdecilla (Santander, Spain), 4 Hospital Germans Trias i Pujol (Badalona, Spain)

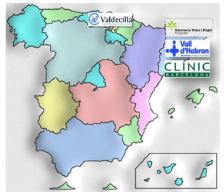
BACKGROUND

Despite aggressive maintenance measures, less than 20% of eligible donors end up being lung donors.

Mechanical Insufflation-Exsufflation (MI-E) is a non-invasive device that simulates patient cough favoring the elimination of secretions.

There is no evidence of its role on the maintenance/optimization of lung organ donors.

Study aim: To evaluate the role of MI-E use on the gas exchange and secretion clearance of eligible donors and its impact on increasing the lung donor pool without additional management complications.

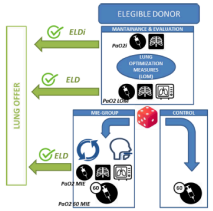


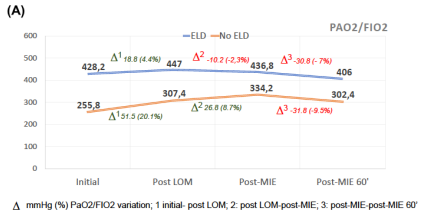
METHODS

Prospective randomized multicentre study conducted in 4 centre.

In the intervention group after the lung optimization measures (LOM) included in the national donor maintenance protocol, all patients who underwent 4 MI-E series were analysed.

Complications derived from the technique (pneumothorax, haemodynamic instability, and oxygen desaturation) were recorded.





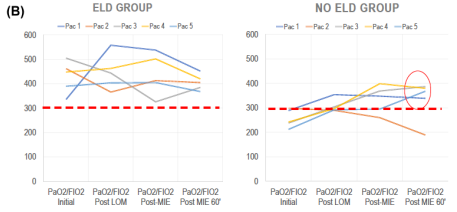
Δ mmHg (%) PaO2/FIO2 variation; 1 initial- post LOM; 2: post LOM-post-MIE; 3: post-MIE-post-MIE 60'

RESULTS

Preliminary safety analysis of the first 10 eligible consented donors of the intervention group.

Subjects were grouped in eligible lung donor ELD (PaO2/FIO2> 300mmHg and No-ELD (PaO2/FIO2 < 300mmHg)

- **No-ELD group increased their Pa02/FIO2 with respect to Post LOM and maintained to ELD levels 60 min after (A)**
- **Four of the five initially No-ELD reached ELD PaO2/FiO2 levels after MIE (B)**
- **No complications were noted in either group**



FUNDED BY

CONCLUSIONS

- MI-E is a safe technique whose routine use in the management of the eligible donor could increase the lung donor pool.
- This is the first study to evaluate respiratory physiohterapy and MI-E as a tool for lung donor optimization and maintenance.
- Comparative studies are needed to corroborate these findings.

- Pas d'évènements indésirables
- Poumons recevables: amélioration P/F et effet maintenu 60min
- Poumons non recevables, amélioration P/F au point de recevabilité (P/F > 300mHg)

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Ballesteros-Reviriego G et al. Pending to be published

Quelle message dois-je retenir pour lundi prochain?

- Chez les patients ventilés, **sédatés** et en **modes contrôlés,** l'in-exsufflation semble améliorer l'**oxygénation,** la **compliance** respiratoire et le **désencombrement** bronchique

- Chez les patients ventilés, **éveillés** et en **modes assistés,** les effets sur les **outcomes cliniques** comme le taux de réintubation, la durée de VM et la durée de séjour **restent incertains**

- Les **patients médicaux comme chirurgicaux** semblent bénéficier du traitement, avec une meilleure réponse clinique observée chez les patients de **moins de 65 ans sans BPCO**

- Les **populations** étudiées restent **très hétérogènes,** ce qui rend difficile l'extrapolation des résultats

MERCI BEAUCOUP

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