

Critères d'extubation

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Recommandations Formalisées d'Experts

INTUBATION ET EXTUBATION DU PATIENT DE RÉANIMATION

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Société Française d'Anesthésie et de Réanimation
Société de Réanimation de Langue Française

En collaboration avec les Sociétés SFMU, GFRUP, ADARPEF, SKR
Société Française de Médecine d'Urgence, Groupe Francophone de Réanimation et Urgences Pédiatrique, Association Des Anesthésistes-Réanimateurs Pédiatriques d'Expression Française, Société Kinesithérapeutes de Réanimation

INTUBATION AND EXTUBATION OF THE ICU PATIENT

R7.6 - Il faut probablement faire intervenir un kinésithérapeute avant et après l'extubation chez les patients ventilés plus de 48h afin de diminuer la durée de sevrage et limiter le risque de réintubation.

(Grade 2+) Accord FORT

R7.7 - Il faut probablement faire intervenir un kinésithérapeute au cours du geste de l'extubation, afin de limiter les complications immédiates liées au sur-encombrement chez les patients à risque.

(Grade 2+) Accord FORT

Peu de littérature
Pas vraiment de consensus



Connaissances

- Indications et techniques de l'intubation endotrachéale, type, diamètre et longueur de la sonde, complications potentielles de l'intubation ;
- Indications de la trachéotomie, complications de la trachéotomie ;
- Technique de mise en place d'une canule de trachéotomie ;
- Connaissances des différents types de canule de trachéotomie.

Compétences

- Assurer une ventilation au moyen d'un insufflateur manuel ;
- Vérifier le bon positionnement d'une sonde d'intubation ou d'une canule de trachéotomie ;
- Savoir mesurer la pression de ballonnet d'une sonde d'intubation ou d'une canule de trachéotomie ;

Réanimation
DOI 10.1007/s13546-011-0243-1

RÉFÉRENTIEL / GUIDELINES



Référentiel de compétences et d'aptitudes du masseur kinésithérapeute de réanimation (MKREA) en secteur adulte

Guide to skills and abilities required for physiotherapist masseurs
in adult intensive therapy

Société de kinésithérapie de réanimation (SKR)

- Réaliser une préoxygénation par réglage du ventilateur ;
- Utiliser un capnographe pour détecter une hypercapnie ou une hypocapnie aiguë ;
- Surveiller les dispositifs d'humidification des voies aériennes ;
- Réaliser une extubation ;
- Savoir gérer le sevrage de la ventilation d'un patient ;
- Gestion et évaluation de la déglutition chez un patient.

Patients à risque

- Un âge supérieur à 65 ans,
- Un score APACHE II > 12 le jour de l'intubation,
- Des antécédents de maladie respiratoire (BPCO modérée à sévère),
- Un indice de masse corporelle > 30 kg/m²,
- Patient ayant déjà présenté un échec d'extubation en réanimation,
- Une toux partiellement efficace ou inefficace

- Extubation : geste à risque (morbidités/mortalité)
- Patients à haut risque de ré-intubation
- OHD / VNI
- Kiné :
 - Sevrage
 - Préparation à l'extubation
 - MRC
 - Geste
 - Suivi

Echecs d'extubation

- Epreuve de sevrage
- Diaphragme
- Etat neuro
- Voies aériennes : toux, déglutition, encombrement bronchique
- Obstruction des voies aériennes (test de fuite)

EVALUATION

Poumon

Force de toux
Sécrétions
CVF

Déglutition

Tests moteurs

Muscle
diaphragme

PiMax

Muscle
Périphériques

MRC
FIM

Test de
sevrage

7/0
Tube en T
Test de fuite

ACTIONS

Désencombrement
Aide à la toux

Electrostimulation
Exercices moteurs

IMT

Réhabilitation
Mobilisation précoce

Participation protocole pluridisciplinaire

Independent effects of etiology of failure and time to reintubation on outcome for patients failing extubation.

Epstein SK¹, Ciubotaru RL.

TABLE 3
CAUSES OF EXTUBATION FAILURE

Cause of Extubation Failure	Patients*		Deaths†	
	(n)	(%)	(n)	(%)
Respiratory failure	21	28	12	57
Congestive heart failure	17	23	8	47
Aspiration/excess secretions	12	16	2	17
Upper airway obstruction	11	15	2	18
Encephalopathy	7	9	3	43
Other	6	8	4	67

* Percentage of all patients (n = 74) requiring reintubation.

† Percentage of patients dying compared with all patients reintubated secondary to that cause for extubation failure.

Crit Care Med. 2015 Mar;43(3):613-20. doi: 10.1097/CCM.0000000000000748.

Risk factors for and prediction by caregivers of extubation failure in ICU patients: a prospective study.

Thille AW¹, Boissier F, Ben Ghezala H, Razazi K, Mekontso-Dessap A, Brun-Buisson C.

- **Facteurs de risque d'échec d'extubation :**
- Toux inefficace
- Défaillance cardiaque
- Ventilation > 7 jours

- Si absence d'un de ces trois critères : 5% d'échec

Adil Salam
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Yaw Amoateng-Adjepong
Constantine A. Manthous

Neurologic status, cough, secretions and extubation outcomes

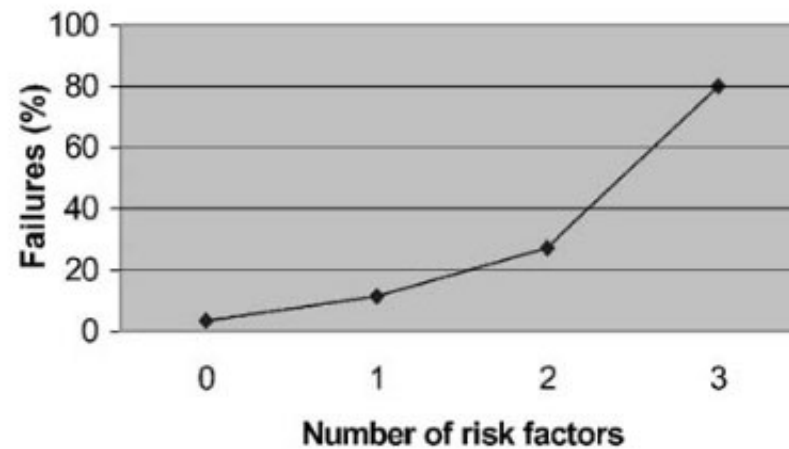


Fig. 1 Cumulative modifiable risks and risk of extubation failure. Risk factors included: inability to perform all four simple tasks, cough peak flow of 60 l/min or less and secretions of 2.5 ml/h or more. The accumulation of risks was additive

Evaluation of cough peak expiratory flow as a predictor of successful mechanical ventilation discontinuation: a narrative review of the literature

Chuan Jiang^{1*}, Antonio Esquinas² and Bushra Mina³

Jiang et al. *Journal of Intensive Care* (2017) 5:33
DOI 10.1186/s40560-017-0229-9



CPEF probablement intéressant comme critères d'extubation
MAIS études nécessaires pour la valeur seuil

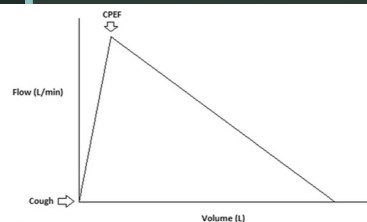


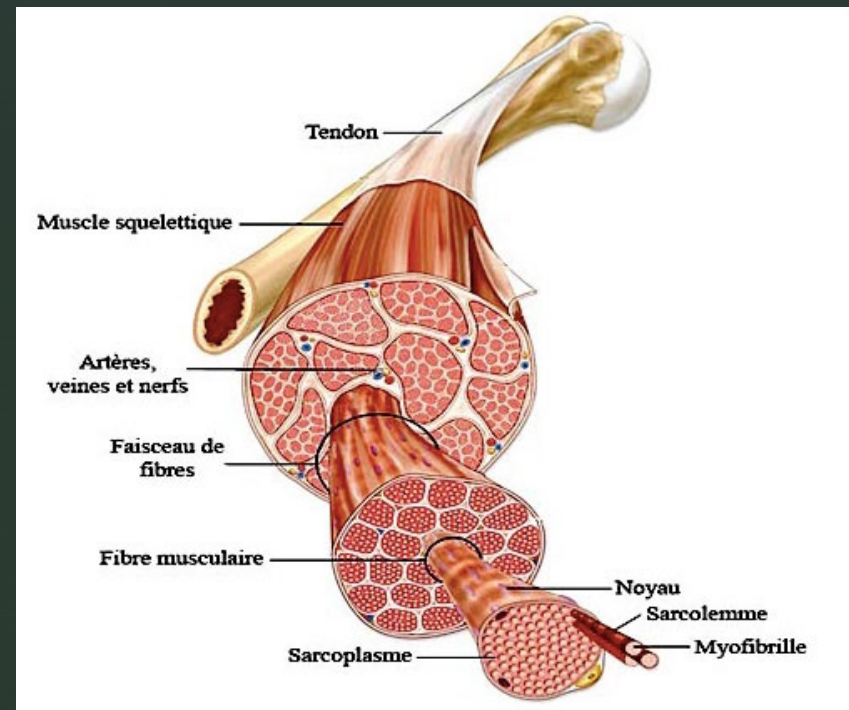
Fig. 1 Cough peak expiratory flow. Cough peak expiratory flow (CPEF) measures an individual's maximum speed of expiration during cough and represents the airflow through bronchi and is inversely proportional to the degree of airway obstruction. It is measured by connecting an electronic peak flow meter to the connector of an endotracheal tube.

Table 1 Summary of included studies and extubation success based on cough peak expiratory flow thresholds

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
Smina et al. 2003 [17]	102/115 success 13/115 failure	81.9 64.2	60.0	Extubation failure RR 5.1 (95% CI 1.7–15.4)
Salam et al. 2004 [18]	74/88 success 14/88 failure	79.7 58.1	60.0	Extubation failure RR 4.8 (95% CI 1.4–16.2)
Beuret et al. 2009 [19]	116/130 success 14/130 failure	63.6 36.3	35.0	Extubation failure RR 6.9 (95% CI 2–24)
Su et al. 2010 [22]	118/150 success 32/150 failure	74.0 42.0	58.5	Extubation success RR 0.95 (95% CI 0.93–0.98)
Smailes et al. 2013 [20]	10/125 success 17/125 failure	125.8 74.2	60.0	Extubation failure RR 9.1 (95% CI 4–20.6)
Duan et al. 2014 [23]	95/115 success 20/115 failure	81.3 51.3	62.4	Predicting re-intubation Sensitivity 85.0% Specificity 64.2%
Kutchak et al. 2015 [21]	90/135 success 45/135 failure	115.3 75.8	80.0	Extubation success RR 0.64 (95% CI 0.51–0.83)
Duan et al. 2015 [16]	158/186 success 28/186 failure	74.3 51.7	Semiquantitative cough strength score (SCSS) SCSS 5 (113.7 L/min) SCSS 4 (79.0 L/min) SCSS 3 (57.5 L/min) SCSS 2 (44.7 L/min) SCSS 1 (39.5 L/min) SCSS 0 (38.4 L/min)	Extubation failure RR 1.0 (reference) RR 3.2 (95% CI 0.7–15.7) RR 4.0 (95% CI 0.8–19.1) RR 4.7 (95% CI 1.0–22.0) RR 6.1 (95% CI 1.3–29.0) RR 7.2 (95% CI 1.5–33.8)

Le muscle périphérique

- Hand-grip test
- MRC



Hand-grip test is a good predictor of extubation success in adult ICU patients

D De Bels¹, J Devriendt¹, P Gottignies¹, D Chochrad², S Theunissen³,
T Snoeck³, C Balestra³, U Pilard³, S Roques¹

¹Brugmann University Hospital, Brussels, Belgium; ²Hôpitaux IRIS Sud, Brussels, Belgium; ³ISEK Environmental Physiology Laboratory, Brussels, Belgium
Critical Care 2011, **15**(Suppl 1):P161 (doi: 10.1186/cc9581)

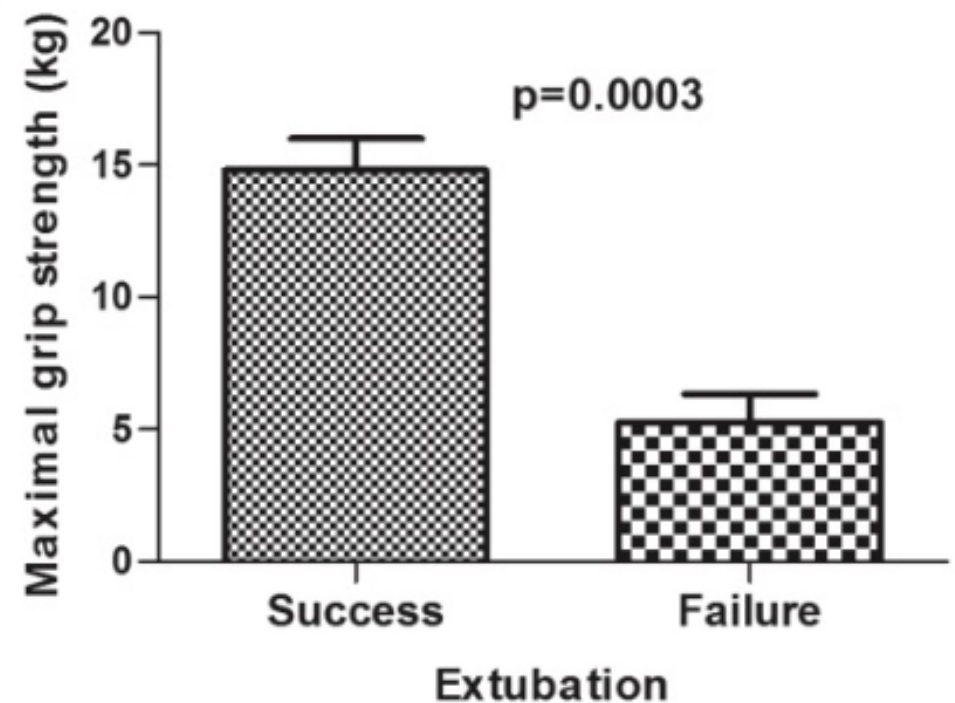


Figure 1 (abstract P161). Difference between maximal grip forces.

Vanpee

MRC

MRC-SUMSCORE ¹						
Name: _____		Date: ____/____/____ Hour: ____:____				
Pre-Existing NMD: ☐ No ☐ Yes: _____						
SSQ Correct Answer: /5	Right	Reason	EP	Left	Reason	EP
MS: Abduction of the arm						
MS: Flexion of the forearm						
MS: Extension of the wrist						
MS: Flexion of the leg						
MS: Extension of the knee						
MS: Dorsal flexion of the foot						
STRENGTH SUBTOTAL VALUE					STRENGTH TOTAL =	
EP SUBTOTAL VALUE					EP TOTAL =	
MRC TOTAL SUMSCORE						

MRC: Medical Research Council; NMD: Neuromuscular disease; SSQ: Score 5 Questions; EP: Extrapolation; MS: Muscle Test.

EP CLASSIFICATION

A	Hemiplegia After Stroke:
B	Paraplegia Spinal Cord Injury:
C	Prohibited Orthopaedics Reason:
D	Peripheral Nerve Injury:
E	Amputation:
F	Others:

Name prospector: _____

Day: _____

SCORE 5 QUESTIONS²

- A. Open and close your eyes
- B. Look at me
- C. Open your mouth and put out your tongue
- D. Nod your head
- E. Raise your eyebrows when I have counted up to five

MRC-SCALE¹

0 = No visible contraction

1 = Visible contraction without movements of the limbs

2 = Movements of the limbs but not against the gravity

3 = Movement against gravity over (almost) the full range

4 = Movement against gravity and resistance

5 = Normal

REFERENCES

1. Kleyweg R.P., et al. Muscle Nerve 1991; 14(II): 1003-09.

2. De Jonghe B., et AL. Crit Care Med 2007; 35(9): 2007-14.

2020

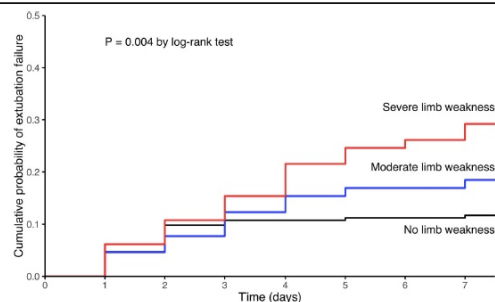


Fig. 1 Kaplan-Meier curves of the cumulative probability of extubation failure defined as reintubation or death from extubation to day 7 in patients with no limb weakness (MRC sum-score ≥ 48 points) represented by the black line, moderate limb weakness (MRC sum-score ≥ 36 and below 48 points) represented by the blue line, and severe limb weakness (MRC sum-score < 36 points) represented by the red line

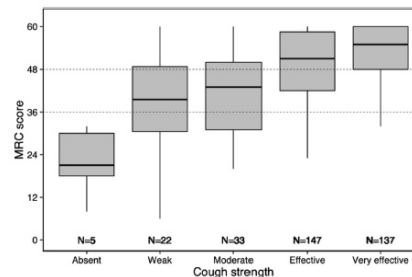


Fig. 3 Box plots showing median MRC sum-score (25th–75th percentiles) according to cough strength considered as absent, weak or ineffective, moderate, effective, and very effective. MRC sum-score and cough strength were weakly but significantly correlated ($\rho = 0.28$; $p < .001$ using Spearman's test)

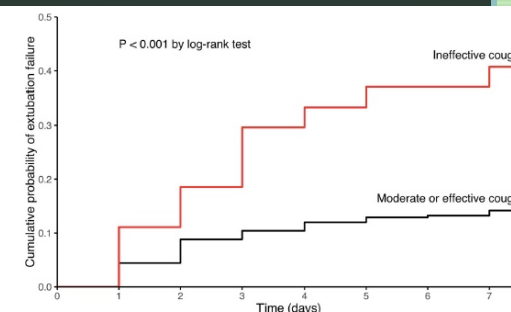


Fig. 2 Kaplan-Meier curves of the cumulative probability of extubation failure defined as reintubation or death from extubation to day 7 in patients with ineffective cough (red line) and in those with moderate or effective cough (black line)

Conclusions

In our study, severe limb weakness and ineffective cough were both independently associated with extubation failure in patients at high risk of reintubation, even after adjustment on severity.

RESEARCH

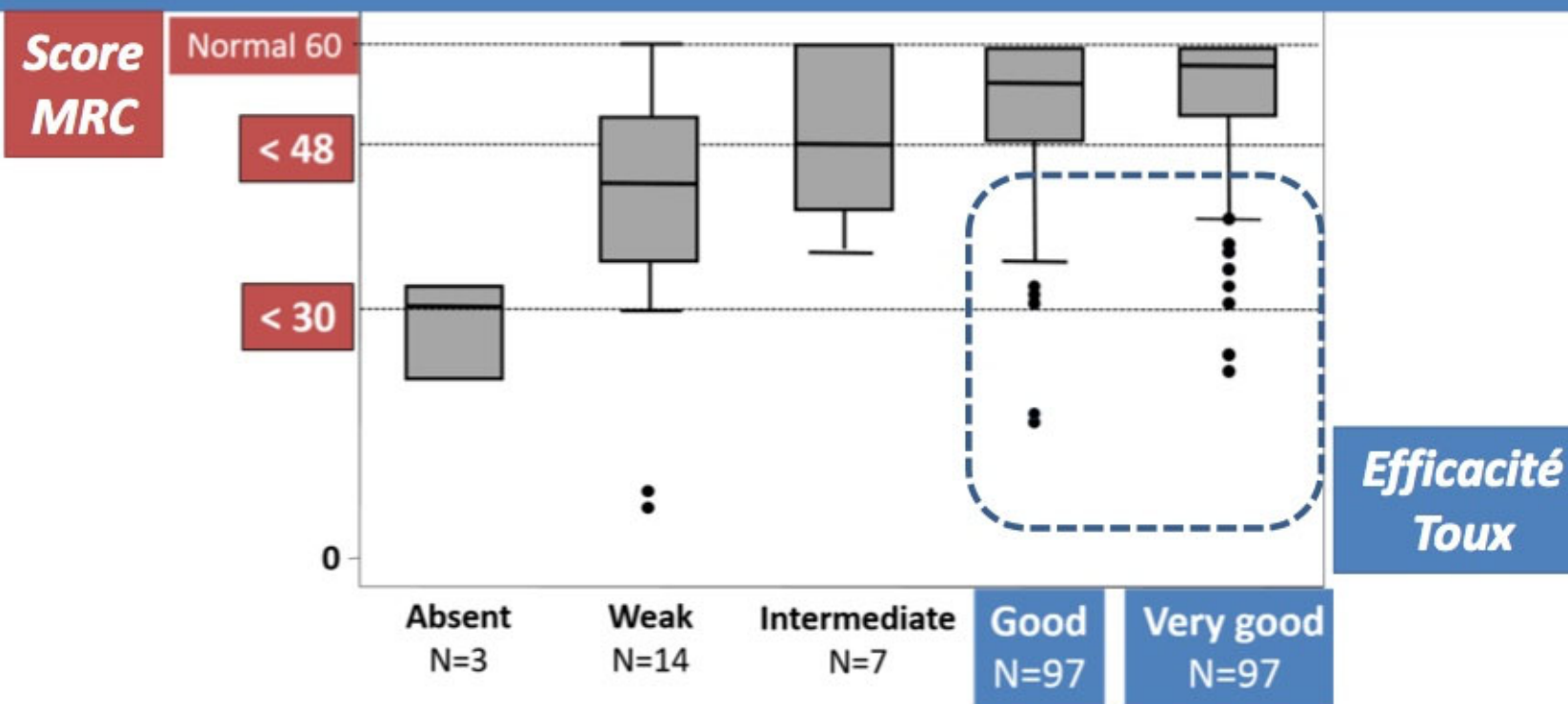
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Role of ICU-acquired weakness on extubation outcome among patients at high risk of reintubation

Arnaud W. Thille^{1,2,3*} , Florence Boissier^{1,2}, Michel Muller⁴, Albrice Levrat⁴, Gaël Bourdin⁵, Sylvène Rosselli⁵, Jean-Pierre Frat^{1,2}, Rémi Coudroy^{1,2} and Emmanuel Vivier⁵



Relation toux MRC score



Critical illness-associated diaphragm weakness

Dres, 2017 ICM

- Atteinte diaphragmatique et périphérique ne sont pas forcément corrélées
- Physiopathologie différente
- PIM et MRC moyennement corrélées
- Atteinte diaphragmatique corrélée à un échec de sevrage et d'extubation
- IMT intéressant comme stratégie de renforcement

Swallowing disorders as a predictor of unsuccessful extubation: a clinical evaluation.

Colonel P¹, Houzé MH, Vert H, Mateo J, Mégarbane B, Goldgran-Tolédano D, Bizouard F, Hedreul-Vittet M, Baud FJ, Payen D, Vicaut E, Yelnik AP.

Test de déglutition au lit du patient
Patients I/V depuis au moins 6 jours

3 tests:

- Motilité
- Réflexe nauséeux
- Déglutition complète / incomplète

Table 1
Bedside evaluation of swallowing
function before extubation

Function	Score
Motility ^a	
Holding the head up	Not able 1 ☐ Able 2 ☐
Opening the mouth	Not able 1 ☐ Able 2 ☐
Pursing the lips	Not able 1 ☐ Able 2 ☐
Gritting the teeth	Not able 1 ☐ Able 2 ☐
Sticking the tongue out over the lower teeth	Not able 1 ☐ Able 2 ☐
Total (5-10)	
Gag reflex ^b	
Right side	None 1 ☐ Weak 2 ☐ Normal 3 ☐
Left side	None 1 ☐ Weak 2 ☐ Normal 3 ☐
Total (2-6)	
Swallowing ^c	Incomplete 0 ☐ Complete 1 ☐
Total (0-1)	

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Echec d'extubation pour sécrétions excessive

Tests prédictifs:

- Motilité (5)
- Déglutition complète/incomplète

Nécessité d'aide à la toux post-extubation

Tests prédictifs:

- Réflexe nauséeux

Table 3

Value of evaluation before extubation to predict unsuccessful extubation due to excessive bronchial secretions: successful vs unsuccessful extubation

Characteristic	Extubation		P
	Successful (n = 46)	Unsuccessful (n = 9)	
Age, median (10th-90th percentile), y	46 (25-79)	56 (36-75)	.30
Sex, No. of patients			.70
Male	30	8	
Female	16	1	
Intensive care unit, No. of patients			.90
Surgical	24	5	
Medical	22	4	
Central nervous system diseases, %	41	44	.90
Intubation duration, median (10th-90th percentile), d	12 (7-26)	13 (7-23)	.80
Simplified Acute Physiology Score II, median (10th-90th percentile)	47 (24-69)	60 (45-81)	.005
Death in intensive care unit, %	0	33	<.001
Evaluation before extubation			
Motility scores (scale, 5-10), median (10th-90th percentile)	10 (9-10)	9 (6-10)	.003
Gag reflex scores (scale, 2-6), median (10th-90th percentile)	5 (2-6)	5 (1-5)	.30
Swallowing process, No. of patients			.005
Complete	34	2	
Incomplete	12	7	

Conclusion

- Toux
- Quantité des sécrétions bronchiques (2H au moins entre deux aspirations, ou $<2,5$ mL/h)
- CVF (1500 mL Ok/ <1200 mL mauvais) prédictif VNI post extubation ou assistance toux mécanique
- MRC (>48) / Hand-grip test (>10 kg)
- PIM >-30
- Déglutition (score motilité >6 et processus complet)
- Etat de conscience + encombrement + force de toux non-défaillant ensemble