KINÉSITHÉRAPEUTE À L'EXTUBATION

OUI OUI OUI

ANNE FREYNET

MKDE RÉANIMATION CHU BORDEAUX

réanimation 2025
PARIS 11-13 JUIN

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)

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 ;
- 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.

SFAR

srlf SOCIÉTÉ DE RÉANIMATION DE LANGUE FRANÇAISE

Recommandations Formalisées d'Experts

INTUBATION ET EXTUBATION DU PATIENT DE REANIMATION

RFE commune SFAR- SRLF
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 Kinesitherapeutes de Réanimation

INTUBATION AND EXTUBATION OF THE ICU PATIENT

R7.6 - Il faut probablement faire un 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

2016

RESEARCH ARTICLE

WILEY

Physiotherapist prediction of extubation outcome in the adult intensive care unit

Gabriella Cork[1,2,3] | Luigi Camporota[4,5] | Leyla Osman[1,2] | Harriet Shannon[2]

Physiotherapists also have a role in supporting patients at high risk of reintubation following extubation, with techniques including augmented cough (Berney, Stockton, Berlowitz, & Denehy, 2002) and adjuncts such as NIV and mechanical in-exsufflation (Bach, Goncalves, Hamdani, & Winck, 2010; Vianello et al., 2011), with previous research concluding that physiotherapy following extubation prevents reintubation (Hanekom, Louw, & Coetzee, 2012). Accurate assessment methods for classifying patients as high

Rationnel

réanimation 2025
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Thille, Critical Care 2020

Background

The decision of extubation is a critical moment in the ICU because mortality is particularly high in case of extubation failure leading to reintubation [1, 2]. The overall rate of reintubation after planned extubation is around 10% but may exceed 20% in some subsets of patients [1, 2]. Identification of patients at high risk of reintubation deserves consideration in order to apply specific measures that may prevent reintubation.

Fragilité clinique des patients / raisonnement clinique

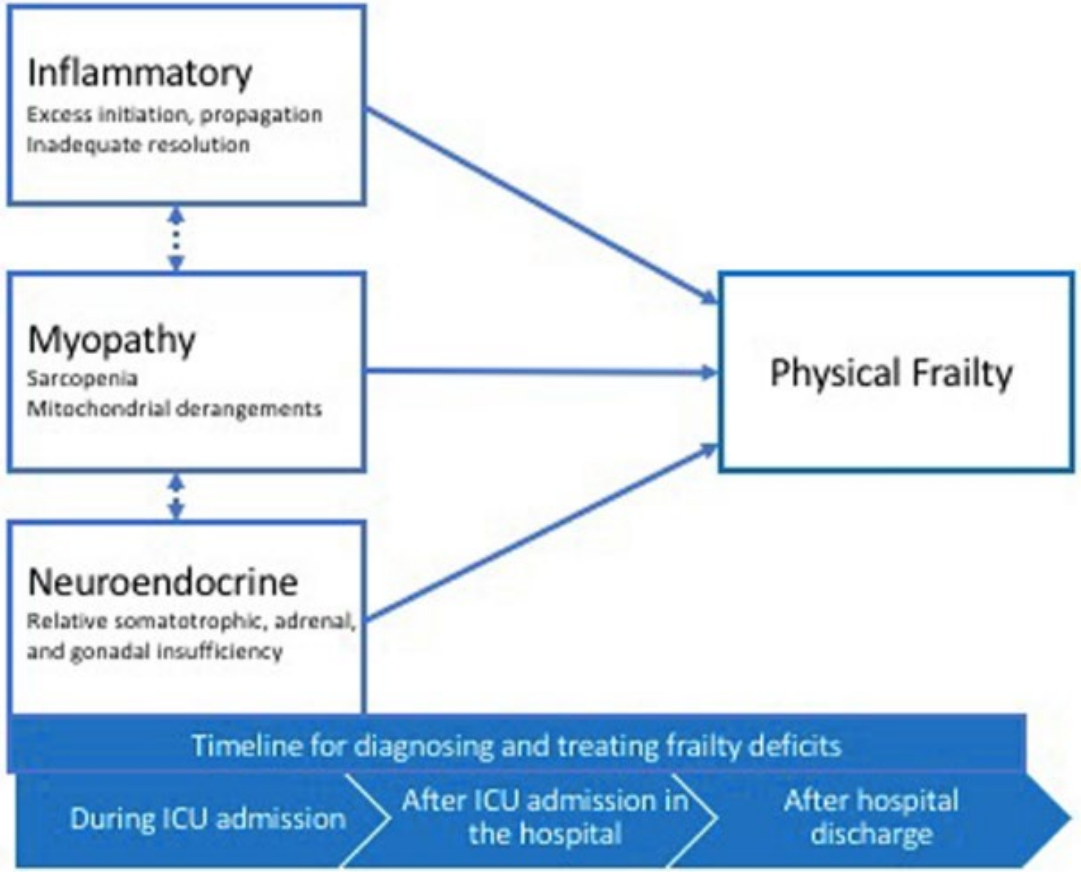

Figure 1.
Biologic mechanisms of the frailty syndrome in critical illness.

Situation complexe

Sevrage complexe

Intensive Care Med (2008) 34:1188–1199
DOI 10.1007/s00134-008-1026-7

R. Gosselink
J. Bott
M. Johnson
E. Dean
S. Nava
M. Norrenberg
B. Schönhofer
K. Stiller
H. van de Leur
J. L. Vincent

Physiotherapy for adult patients with critical illness: recommendations of the European Respiratory Society and European Society of Intensive Care Medicine Task Force on Physiotherapy for Critically Ill Patients

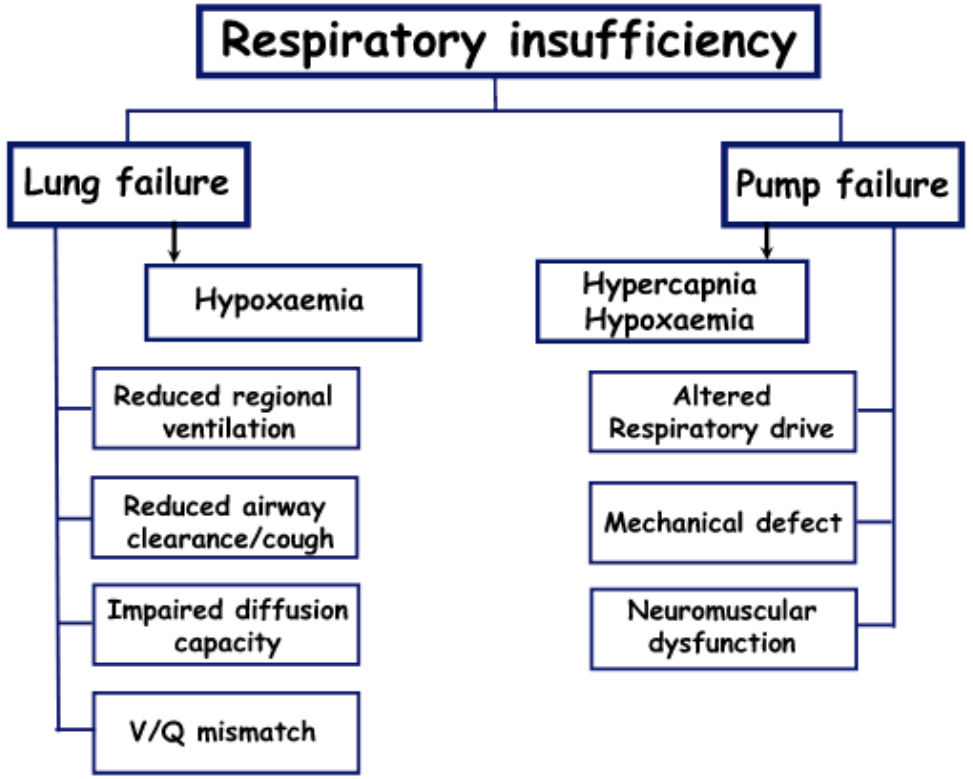

Fig. 1 Model of respiratory insufficiency (adapted from [90])

Les échecs de l'extubation

Extubation failure

S. Jaber *, G. Chanques, M. Sebbane, J.-J. Eledjam

Unité de réanimation et transplantation DAR B, hôpital Saint-Éloi, CHU de Montpellier, avenue Bertin-Sans, 34295 Montpellier cedex 5, France

Reçu et accepté le 15 octobre 2003

Tableau 1
Principales causes des échecs de l'extubation

→ Obstruction des voies aériennes supérieures (œdème, inflammation, ulcération, granulome...)
→ Sécrétions abondantes/encombrement bronchique/troubles de déglutition/toux inefficace
Troubles de conscience/encéphalopathie
Dysfonction cardiaque (ischémie, œdème pulmonaire)
→ Atélectasie
→ Hypoxémie
→ Paralysie ou dysfonction diaphragmatique
Autres : sepsis, reprise chirurgicale, hémorragie digestive...

RESEARCH ARTICLE

WILEY

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2019

réanimation 2025
PARIS 11-13 JUIN

TABLE 3 Physiotherapy assessment items for extubation failure compared with extubation success

Variable	Total (n = 81)	Extubation success (n = 56)	Extubation failure (n = 25)	p value	Mean/median difference or odds ratio	95% CI
Inappropriate neurology	15 (19%)	7 (13%)	8 (32%)	p = .037*	3.3	[1.04, 10]
Abundance of secretions						
Minimal	42 (51%)	31 (55%)	11 (44%)		0.63	[0.24, 1.6]
Moderate	32 (40%)	21 (37%)	11 (44%)	p = .581	1.3	[0.5, 3.4]
Copious	7 (9%)	4 (7%)	3 (12%)		1.8	[0.4, 8.5]
PCEF (L min^{-1})	97 ± 34	99 ± 32	92 ± 38	p = .417	−6.65	[−22.9, 9.58]
P0.1 (cmH_2O)	3.3 (2.1–4.75)	3.1 (2–4.6)	4.0 (2.2–5.5)	p = .172	0.7	[−0.3, 1.7]
MIP (cmH_2O)	29 ± 11	30 ± 11	28 ± 10	p = .452	−2	[−3, 7]
RSBI (f/V_T)	40 (27.5–55)	40 (25–58)	42 (32–55)	p = .602	3	[−7, 12]
Physiotherapy risk assessment						
Low risk	34 (42%)	29 (52%)	5 (20%)		0.23	[0.07, 0.7]
Moderate risk	29 (36%)	19 (34%)	10 (40%)		1.29	[0.49, 3.4]
High risk	18 (22%)	8 (14%)	10 (40%)	p = .009*	4	[1.3, 12]
Failed SBT	8 (10%)	5 (9%)	3 (12%)	p = .669	1.4	[0.3, 6.3]
Type of physiotherapist						
Specialized	25 (31%)	19 (34%)	6 (24%)		0.615	[0.21, 1.8]
Nonspecialized	56 (69%)	37 (66%)	19 (76%)	p = .372	1.63	[0.56, 4.7]

Note. Values are displayed as number (%), mean (±SD), or median (IQR). Odds ratios are calculated for proportions as odds of having this characteristic with extubation failure compared with extubation success.

Abbreviations: MIP, maximal inspiratory pressure; PCEF, peak cough expiratory flow; P0.1, occlusion pressure; RSBI, rapid shallow breathing index; SBT, spontaneous breathing trial.

*Statistical significance $p < .05$.

Patients à haut risque 43 %
9 items d'évaluation
Haut risque d'échec évalué
par MK expert corrélé aux échecs

Kiné et extubation

réanimation 2025
PARIS 11-13 JUIN

AVANT

Encombrement
Toux
Délirium
Déglutition
Pimax
MRC
Réhabilitation

PENDANT

Test de fuite

Positionnement
Geste en fin d'inspiration

APRÈS

OHD / VNI
Encombrement
Aide à la toux
Déglutition
Réhabilitation

Bien vidanger l'espace sous-glottique au dessus du ballonnet

Intensive Care Med (2004) 30:1334–1339
DOI 10.1007/s00134-004-2231-7

ORIGINAL

Adil Salam
Lisa Tilluckdharry
Yaw Amoateng-Adjepong
Constantine A. Manthous

Neurologic status, cough, secretions and extubation outcomes

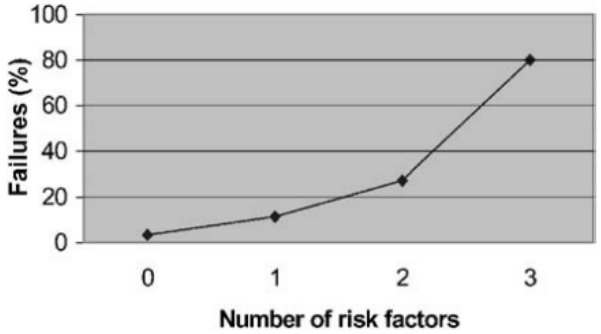


Fig. 1 Cumulative modifiable risks and risk of extubation failure. Risk factors included: inability to perform all four simple tasks, cough peak flow of 60 l/min or less and secretions of 2.5 ml/h or more. The accumulation of risks was additive

Table 2 Predictive characteristics of various parameters in predicting extubation failure

Variable	Sensitivity (%)	Specificity (%)	Likelihood ratio	Risk ratio (95% CI)
CPF ≤60 l/min	76.9	65.7	2.2	4.8 (1.4–16.2)
Secretions ≥2.5 ml/h	71.4	62.0	1.9	3.0 (1.01–8.8)
<4 tasks	42.8	90.5	4.5	4.3 (1.8–10.4)
Any 2 risks	71.4	81.1	3.8	6.7 (2.3–19.3)
Negative WCT	71.4	51.4	1.5	2.3 (0.8–6.7)
RSBI >100/min per l	14.3	93.2	2.1	1.9 (0.5–6.9)

CPF cough peak flow, *<4 tasks* inability to perform any one command, *Any 2 risks* of CPF ≤60 l/min, secretions ≥2.5 ml/h or <4 tasks, *WCT* white card test, *RSBI* rapid shallow breathing index (=f/V_t)

Force de toux

- Cough Peak Flow (CPF) sur respi = CPF externe

- Cut-off CPF : 60 L/min

Ferreira, 2021

Study	Cutoff (L/min)
Smailes et al.[9]	60.0
Smina et al.[18]	60.0
Beuret et al.[19]	35.0
Salam et al.[20]	60.0
Duan et al.[23]	70.0
Su et al.[34]	58.5
Duan et al.[35]*	62.4
Duan et al.[35]†	49.8
Duan et al.[36]	62.4
Kutchak et al.[37]	80.0
Bai et al.[38]‡	56.4
Bai et al.[38]§	56.0
Gobert et al.[39]	60.0
Xiao et al.[40]	60.0

AUC - area under the curve. *Voluntary cough:

Fig. 1. The electronic peak flow meter is connected to the proximal tip of the endotracheal tube via a bacterial/viral filter.

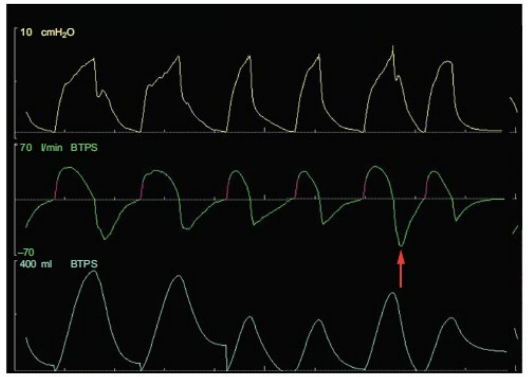


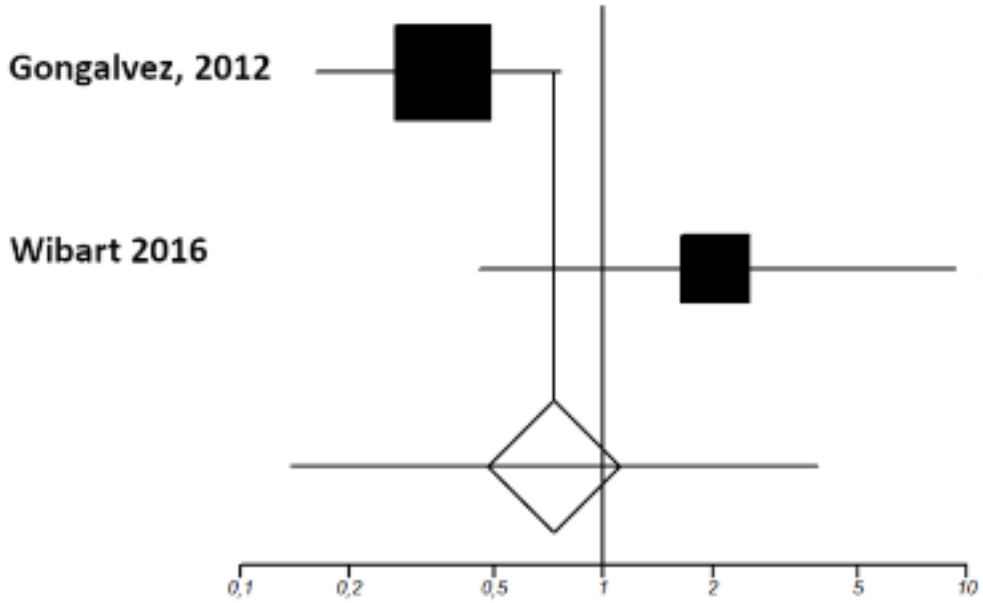
Fig. 2. On this ventilator screen, the central curve displays the inspiratory and expiratory flow. The red arrow shows the peak expiratory flow.

Fossat, 2023

EFFECTIVENESS OF COUGH ASSIST IN THE EXTUBATION OF ADULT PATIENTS: SYSTEMATIC REVIEW AND META-ANALYSIS

Giulia Montigiani [1]; Davide Papi[1]; Lorenzo Proietti[1]; Beatrice Meucci [2]; Mara Taddei[1]; Luca Bucciardini[3]; Mauro Di Bari[4].

réanimation 2025
PARIS 11-13 JUIN



DL pooled effect size = 0,73 (95% CI= 0,14 - 3,89) p=0,71

Figure 4.Metanalysis of the risk of reintubation.

CONCLUSIONS

New methods and techniques are nowadays actively searched in many centers around the world to improve the outcome of extubation and avoid reintubation. The available literature, systematically reviewed and meta-analyzed in this study, suggests that cough assistant might contribute to successful extubation in ICU patients, by improving airway clearance. Studies with larger sample sizes,clearly-defined protocols and outcomes are required to obtain conclusive evidence. We hope that this meta-analysis will stimulate research on this field.

Predictors of Extubation Failure Related to Aspiration and/or Excessive Upper Airway Secretions

Marie-Hélène Houzé, Nicolas Deye, Joaquim Mateo, Bruno Mégarbane, Françoise Bizouard, Frédéric J Baud, Didier Payen de la Garanderie, Eric Vicaut, Alain P Yelnik; for the EVAKIN Study Group

Table 1. Analysis of the 9 Criteria Defining the Global Swallowing Pattern

Criteria		Re-Intubation Due to AEUAS	No Re-Intubation Due to AEUAS	*P*
Salivary stasis during the hour preceding extubation†	> 10 mL	6 (86)	124 (83)	> .99
	≤ 10 mL	1 (14)	26 (17)	
Holding the head†	No	0 (0)	17 (11)	> .99
	Yes	7 (100)	133 (89)	
Opening the mouth*	No	0 (0)	7 (5)	> .99
	Yes	7 (100)	144 (95)	
Pursing the lips*	No	1 (14)	15 (10)	.53
	Yes	6 (86)	136 (90)	
Clenching the teeth*	No	2 (29)	12 (8)	.12
	Yes	5 (71)	139 (92)	
Sticking out the tongue†	No	0 (0)	20 (13)	.60
	Yes	7 (100)	130 (87)	
Gag reflex: right side‡	No	4 (57)	21 (14)	.01
	Yes	3 (43)	128 (86)	
Gag reflex: left side§	No	4 (57)	22 (15)	.02
	Yes	3 (43)	126 (85)	
Swallowing function*	No	3 (43)	26 (17)	.12
	Yes	4 (57)	125 (83)	

- The **global swallowing pattern assessment** was significantly **lower** in subjects reintubated within the first 72h after extubation **because of aspiration or excessive upper airway secretions** versus those not re-intubated for aspiration or excessive upper airway secretions p=0.008).
- Only **right and left gag reflexes were associated** with re-intubation related to aspiration or excessive upper airway secretions within the first 72 h after extubation (p=0,01 and .02, respectively).

Houzé, 2019, respiratory Care

Inspiratory Muscle Rehabilitation in Critically Ill Adults

A Systematic Review and Meta-Analysis

Stefannie Vorona[1], Umberto Sabatini[1], Sulaiman Al-Maqbali[1], Michele Bertoni[1], Martin Dres[2,3], Bernie Bissett[4,5], Frank Van Haren[5,6,7], A. Daniel Martin[8], Cristian Urrea[1], Debbie Brace[1], Matteo Parotto[9,10,11], Margaret S. Herridge[1,9,12], Neill K. J. Adhikari[9,13,14], Eddy Fan[1,9,12,15], Luana T. Melo[16], W. Darlene Reid[9,16], Laurent J. Brochard[2,9,12], Niall D. Ferguson[1,9,12,14,15], and Ewan C. Goligher[1,9,15]

Study	Experimental Total	Mean	SD	Control Total	Mean	SD	Mean Difference	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 ($p = 0.35$)

−10 0 10
Favors control Favors IMT

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.

Bhat A, Vasanthan LT, Babu AS.
Role of physiotherapy in weaning of patients from mechanical ventilation in the Intensive Care Unit. Indian J Respir Care 2017;6:813-9.

Table 1: Adverse effects of immobilization

Organ system	Effect
Musculoskeletal	
Muscles	Reduced strength, endurance, flexibility, and bulk
Joints	Reduced flexibility, joint contractures
Bone	Osteopenia and osteoporosis
Cardiovascular	Reduced stroke volume, cardiac output, and exercise capacity
	Reduced orthostatic tolerance and venous return
	Deep vein thrombosis
Respiratory	Atelectasis
	Pneumonia
Integumentary	Pressure ulcers
Psychological	Reduced self-image and stress tolerance
	Anxiety
	Depression

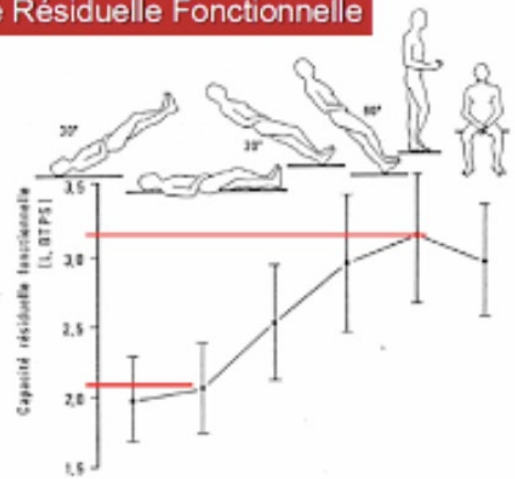
Table 2: Physiological effects of mobilization

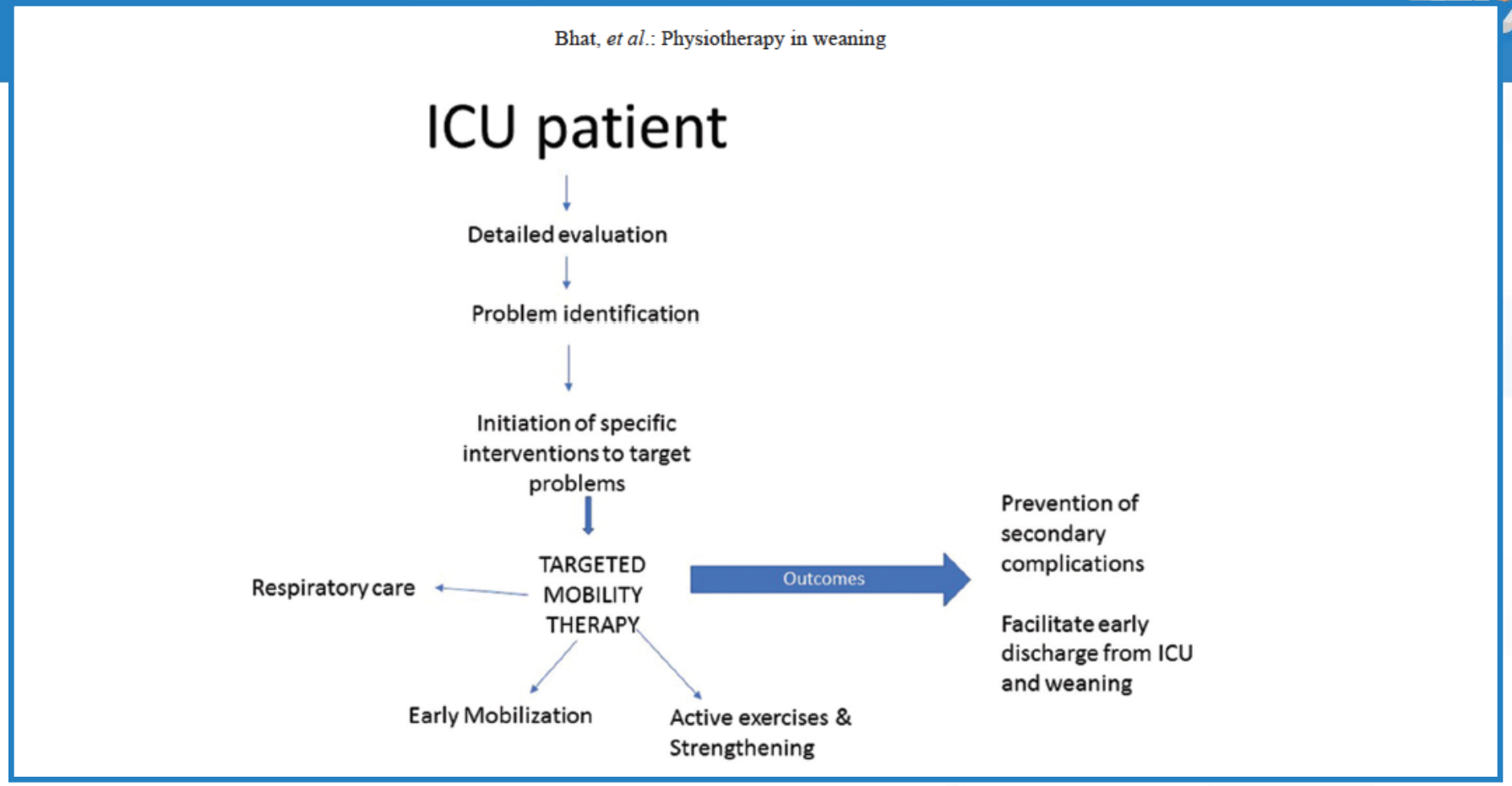
Organ system	Effects
Pulmonary system	Improves ventilation-perfusion
	Improves rate and depth of respiration
	Facilitates mucociliary clearance
	Improves strength and quality of cough
Cardiovascular system	Improves stroke volume and venous return, myocardial contractility, coronary perfusion, and heart rate
	Reduces peripheral vascular resistance and improves peripheral blood flow
Muscular system	Improves blood flow to exercising muscle
	Facilitates better oxygen extraction
Neurological system	Improves alertness and arousal
	Increases cerebral electrical activity
Hematological system	Reduces circulatory stasis
Lymphatic system	Improves pulmonary lymphatic flow and drainage
Endocrine system	Increase release, distribution, and degradation of catecholamines
Renal system	Improves glomerular filtration and urine output
Gastrointestinal system	Improves gut mobility
Integumentary system	Improves cutaneous circulation

Mobilisation précoce

Soin respiratoire ?
OUI

Effets de la position sur la Capacité Résiduelle Fonctionnelle





Bhat A, Vasanthan LT, Babu AS.
Role of physiotherapy in weaning of patients from mechanical ventilation in the Intensive Care Unit. Indian J Respir Care 2017;6:813-9.

Thille *et al. Critical Care* (2020) 24:86
https://doi.org/10.1186/s13054-020-2807-9

Critical Care

RESEARCH Open Access

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 Muller[4], Albrice Levrat[4], Gaël Bourdin[5], Sylvène Rosselli[5], Jean-Pierre Frat[1,2], Rémi Coudroy[1,2] and Emmanuel Vivier[5]

Patients à haut risque

- Âge > 65 ans
- Maladie cardiaque chronique
  - Dysfonction ventriculaire gauche
  - OAP
  - Maladie cardiaque ischémique
  - FA chronique
- Maladie respiratoire chronique
  - BPCO
  - SHO
  - Maladie respiratoire restrictive
- Durée VM > 7 jours

Thille et al. Critical Care (2020) 24:86
https://doi.org/10.1186/s13054-020-2807-9

Critical Care

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strong predictor of reintubation [6–17]. Ineffective cough is mainly due to altered expiratory muscle function including at varying degrees of the diaphragm, accessory respiratory muscles, and abdominal muscles [18, 19]. ICU-acquired weakness combining polyneuropathy, myopathy, and muscle atrophy [20–22] is clinically diagnosed as limb paresis but may affect all respiratory muscles with an altered inspiratory and expiratory strength, as well pharyngeal muscles, and which can lead to overall respiratory muscle weakness [23, 24] and to swallowing disorders [25].

Thille *et al. Critical Care* (2020) 24:86
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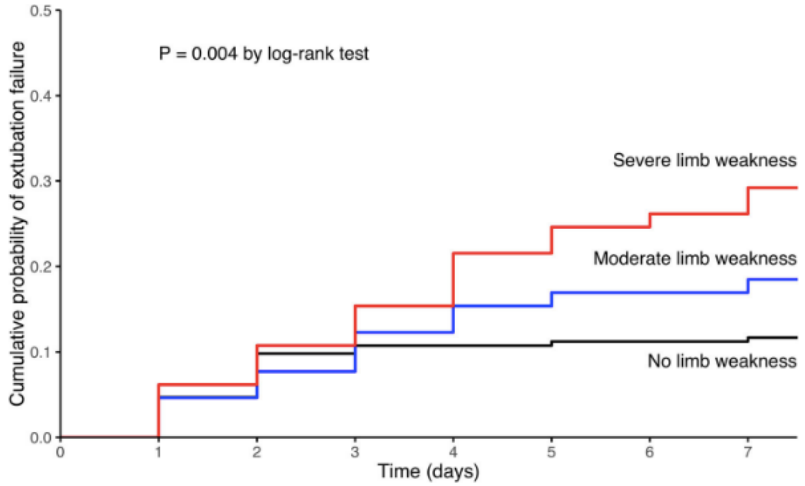

Fig. 1 Kaplan-Meier curves of the cumulative probability of extubation failure defined as reintubation or death from extubation to day 7 in patients with no limb weakness (MRC sum-score ≥ 48 points) represented by the black line, moderate limb weakness (MRC sum-score ≥ 36 and below 48 points) represented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

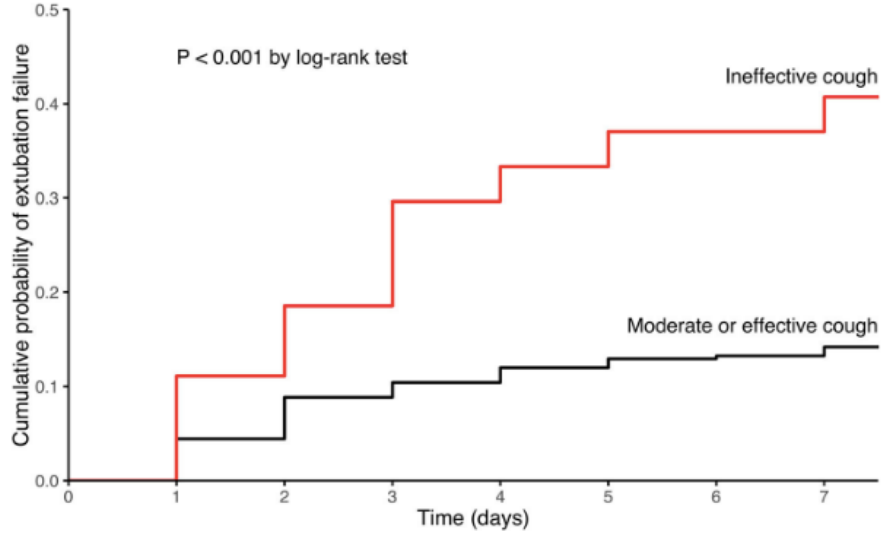

Fig. 2 Kaplan-Meier curves of the cumulative probability of extubation failure defined as reintubation or death from extubation to day 7 in patients with ineffective cough (red line) and in those with moderate or effective cough (black line)

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https://doi.org/10.1186/s13054-020-2807-9

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RESEARCH Open Access

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

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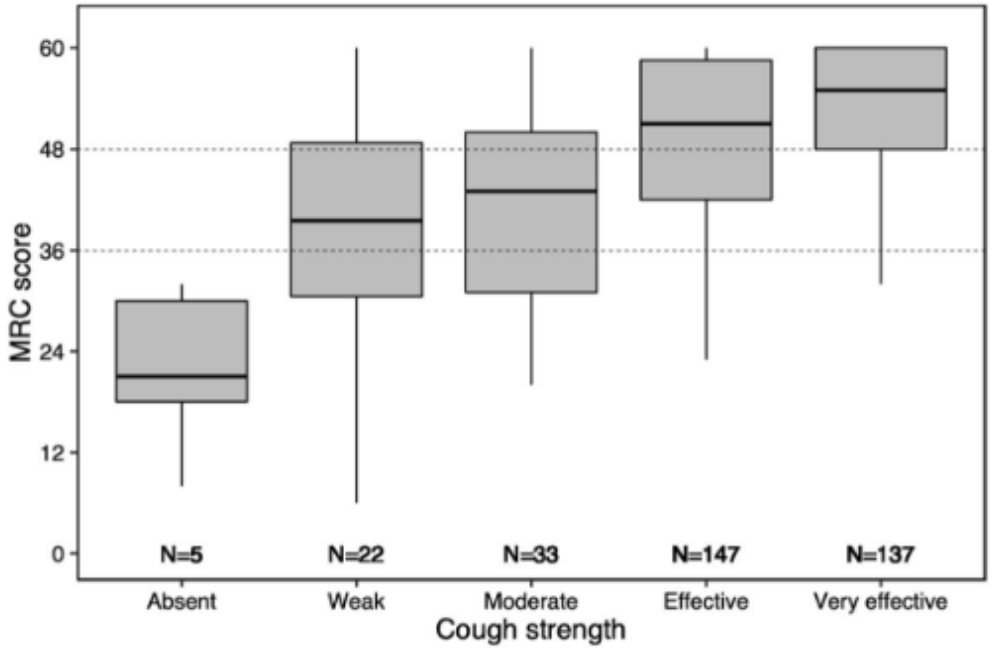

Fig. 3 Box plots showing median MRC sum-score (25th–75th percentiles) according to cough strength considered as absent, weak or ineffective, moderate, effective, and very effective. MRC sum-score and cough strength were weakly but significantly correlated (rho 0.28; $p < .001$ using Spearman's test)

Patients ciblés

- Âge > 65 ans
- Maladie cardiaque chronique
  - Dysfonction ventriculaire gauche
  - OAP
  - Maladie cardiaque ischémique
  - FA chronique
- Maladie respiratoire chronique
  - BPCO
  - SHO
  - Maladie respiratoire restrictive
- Durée VM > 7 jours

- NMR (MRC < 36)
- Muscles respi
- Patients neurologiques
- Pb déglutition
- Insuffisance toux

Réalisation de l'extubation du patient en réanimation chirurgicale digestive par un(e) kinésithérapeute en lieu et place d'un médecin anesthésiste réanimateur

Mise en place d'un
Protocole de coopération

Commission médicale d'établissement
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Take home message

réanimation 2025
PARIS 11-13 JUIN

- Kiné doit intervenir en péri-extubation
- Pour limiter les réintubations et mortalité
- Patients cibles :
  - Âge
  - Maladie cardio / respi chronique
  - NMR <36
  - Neuro
  - Troubles déglutition
  - Réintubation
  - Toux / sécrétions / Delirium
- Faisceau d'arguments