39e CONGRÈS ANNUEL DE L'ADARPEF

Association des Anesthésistes Réanimateurs Pédiatriques d'Expression Française

25 & 26 MARS 2022 MONTPELLIER Le Corum

VNI chez l'enfant : de la préparation préopératoire à la gestion postopératoire





Guillaume Mortamet

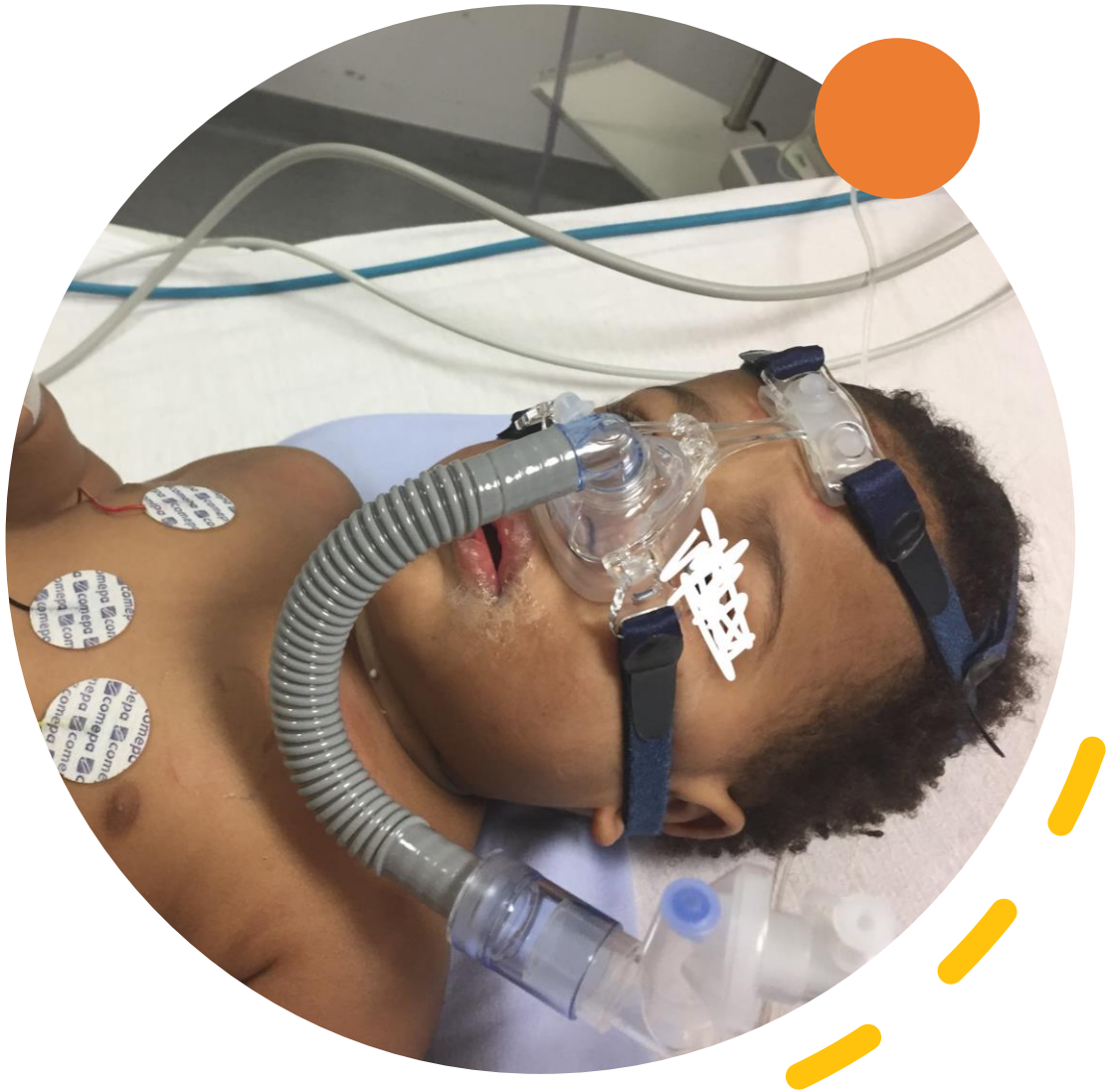
MCU-PH

Service de surveillance continue et réanimation pédiatriques

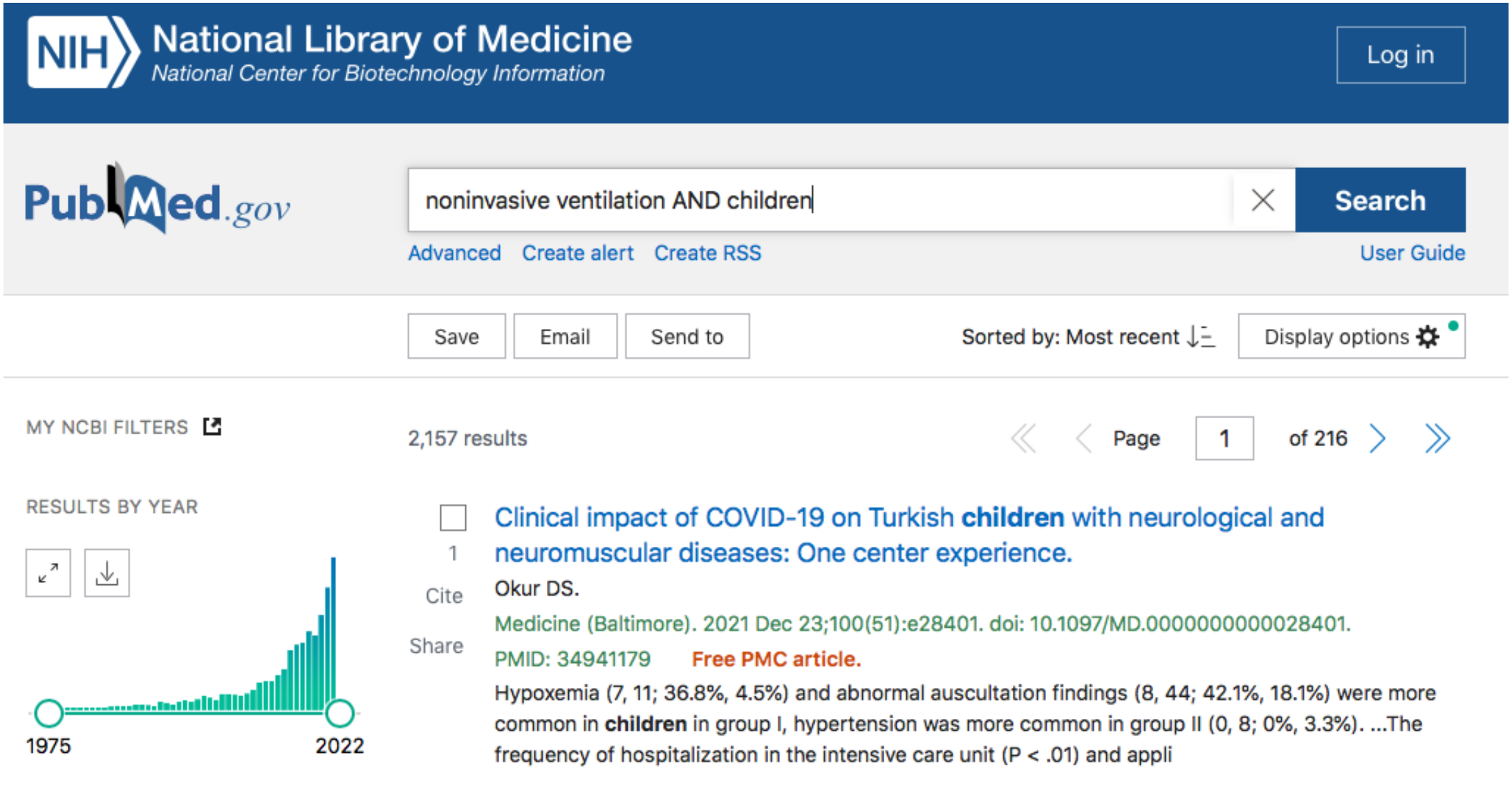
CHU de Grenoble

Plan

- Contexte
- Principes physiologiques
- Généralités
- VNI et chirurgie programmée



Contexte


National Library of Medicine
National Center for Biotechnology Information
Log in
PubMed.gov
noninvasive ventilation AND children
Search
Advanced
Create alert
Create RSS
User Guide
Save
Email
Send to
Sorted by: Most recent
Display options
MY NCBI FILTERS
2,157 results
Page 1 of 216
RESULTS BY YEAR
1975
2022
1
Cite
Share
Clinical impact of COVID-19 on Turkish children with neurological and neuromuscular diseases: One center experience.
Okur DS.
Medicine (Baltimore). 2021 Dec 23;100(51):e28401. doi: 10.1097/MD.0000000000028401.
PMID: 34941179
Free PMC article.
Hypoxemia (7, 11; 36.8%, 4.5%) and abnormal auscultation findings (8, 44; 42.1%, 18.1%) were more common in children in group I, hypertension was more common in group II (0, 8; 0%, 3.3%). ...The frequency of hospitalization in the intensive care unit (P < .01) and appli

Epidémiologie

Pediatric Critical Care

OPEN

Outcomes for Children Receiving Noninvasive Ventilation as the First-Line Mode of Mechanical Ventilation at Intensive Care Admission: A Propensity Score-Matched Cohort Study*

Jenny V. Morris, MSc[1]; Padmanabhan Ramnarayan, FFICM[2]; Roger C. Parslow, PhD[1]; Sarah J. Fleming, PhD[1]

Crit Care 2017

Characteristics	Whole Cohort ($n = 15,025$) Invasive Ventilation ($n = 10,221$)	Whole Cohort ($n = 15,025$) Noninvasive Ventilation ($n = 4,804$)	p
Age in weeks, median (IQR)	66 (12–279)	27 (7–144.5)	< 0.001
Sex, *n* (%)			
Male	5,945 (58.1)	2,698 (56.2)	0.032
Primary diagnostic group, *n* (%)			
Respiratory	3,292 (32.2)	3,427 (71.3)	< 0.001
Cardiovascular	1,496 (14.6)	409 (8.5)	
Neurologic	2,217 (21.7)	182 (3.8)	
Infection	904 (8.8)	296 (6.2)	
Gastrointestinal	306 (3.0)	63 (1.3)	
Endocrine/metabolic	333 (3.3)	72 (1.5)	
Trauma	669 (6.6)	4 (0.1)	
Oncology	167 (1.6)	70 (1.5)	
Blood/lymphatic	149 (1.5)	68 (1.4)	
Other[a]	643 (6.3)	177 (3.7)	
Not recorded	45 (0.4)	36 (0.7)	
Main reason for admission,[b] *n* (%)			
Asthma	186 (1.8)	115 (2.4)	< 0.001
Bronchiolitis	935 (9.2)	1,502 (31.5)	
Croup	108 (1.1)	16 (0.3)	
Obstructive sleep apnea	12 (0.1)	35 (0.7)	
Diabetic ketoacidosis	13 (0.1)	2 (0.1)	
Seizure disorder	78 (0.8)	5 (0.1)	
Other (none of the above)	8,804 (86.1)	3,099 (64.3)	
Not recorded	84 (0.8)	30 (0.6)	



Principes physiologiques

Physiologie de la VNI

Table 3 Effects of NPPV on breathing pattern, gas exchange and respiratory muscle output

	Spontaneous breathing	NPPVClin	NPPVPhys
Breathing pattern			
Respiratory rate (breaths min^{-1})	48 ± 13	41 ± 12*	41 ± 13*
Tidal volume (ml)	94 ± 63	125 ± 71*	132 ± 89*
Minute ventilation ($L\ min^{-1}$)	4.1 ± 2	4.8 ± 2*	4.9 ± 2*
Gas exchange			
SaO_2 (%)	97 ± 2	97 ± 3	97 ± 2
$PtcCO_2$ (mmHg)	48 ± 9	40 ± 8*	40 ± 7*
Ventilatory settings			
Pressure support (cmH_2O)		8.5 ± 5	8.8 ± 5
PEEP (cmH_2O)		6.4 ± 2	6.7 ± 2
Ramp (s)		0.2	0.2
Respiratory muscle output			
Swing Pes (cmH_2O)	26 ± 7	16 ± 9*	15 ± 9*
Swing Pdi (cmH_2O)	25 ± 7	15 ± 7*	13 ± 5*
PTPes/breath (cmH_2O s)	14 ± 7	8 ± 4*	8 ± 4*
PTPdi/breath (cmH_2O s)	15 ± 7	8 ± 3*	7 ± 3*
PTPes/min (cmH_2O s min^{-1})	627 ± 216	322 ± 250*	320 ± 243*
PTPdi/min (cmH_2O s min^{-1})	692 ± 258	303 ± 144*	302 ± 146*

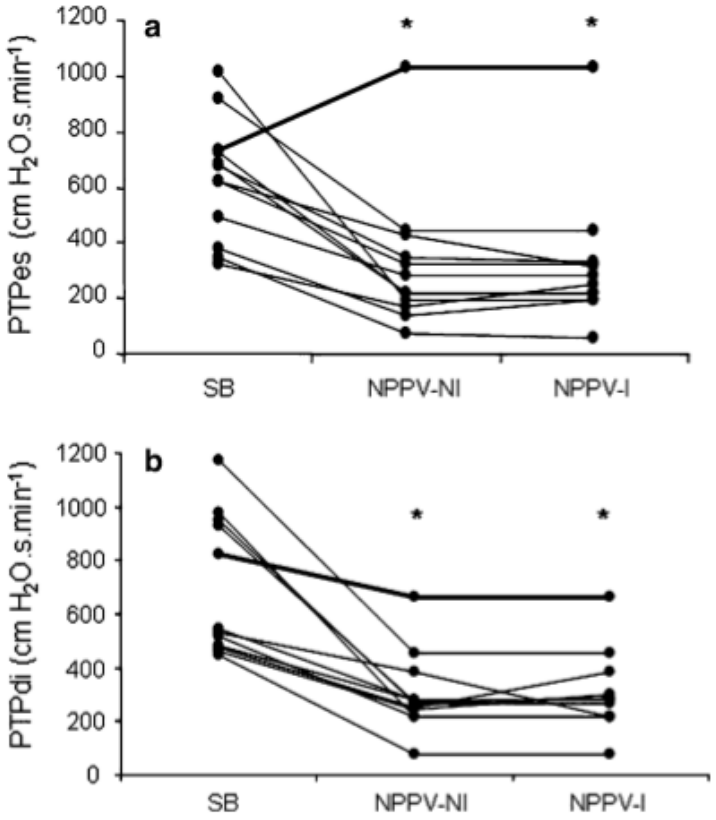


Fig. 3 Individual variations of **a** oesophageal pressure time product per minute (*PTPes*) and **b** diaphragmatic pressure time product per minute (*PTPdi*) during spontaneous breathing (SB), noninvasive positive pressure ventilation set on clinical parameters (NPPVClin) and noninvasive positive pressure ventilation set on the recording of oesophageal and gastric pressures (NPPVPhys). $P < 0.0001$ compared to SB with no difference between NPPVClin and NPPVPhys

Essouri 2008 ICM



Généralités

Indication

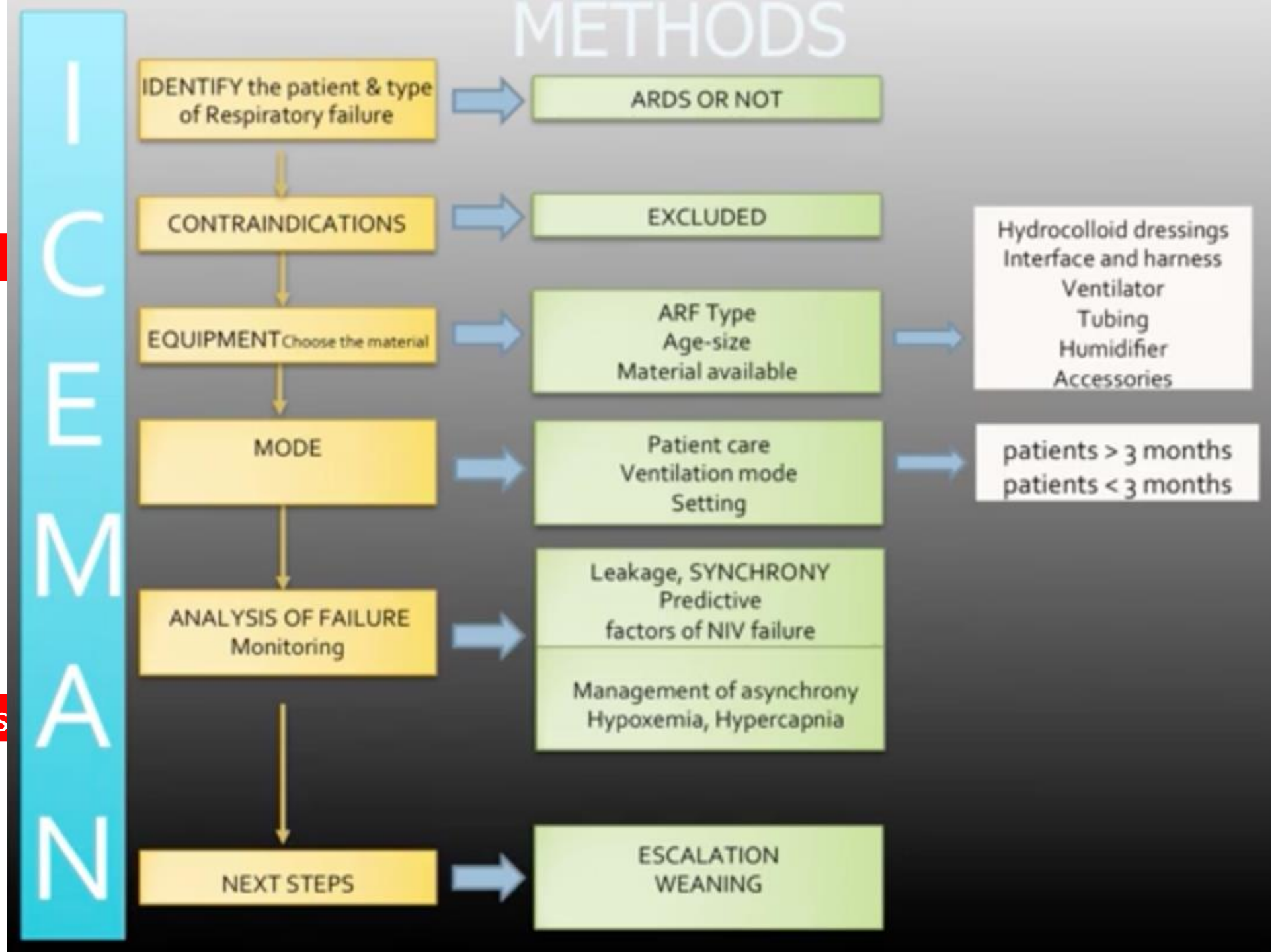
ContreIndication

Equipement

Mode

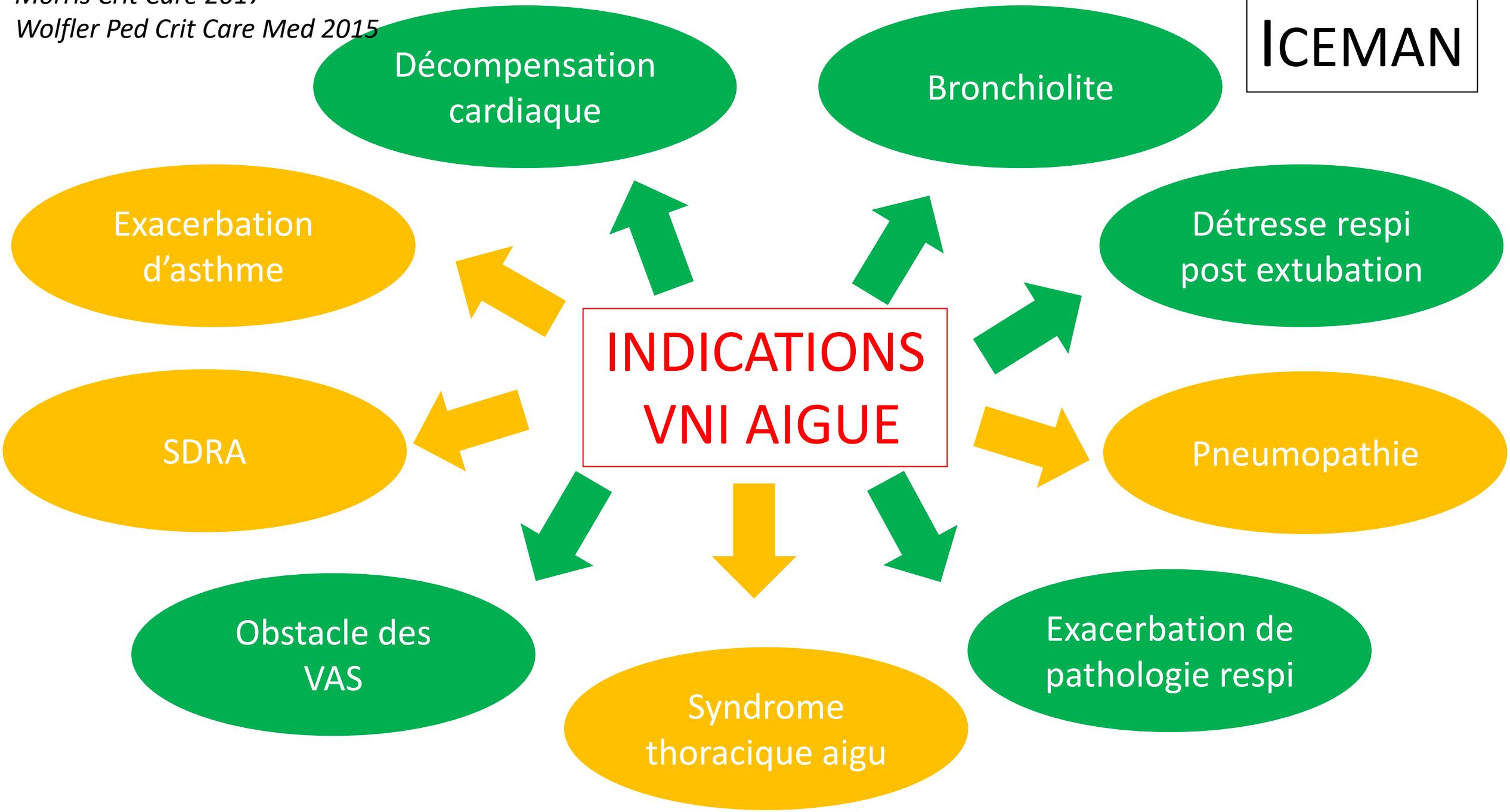
Analyse du succès

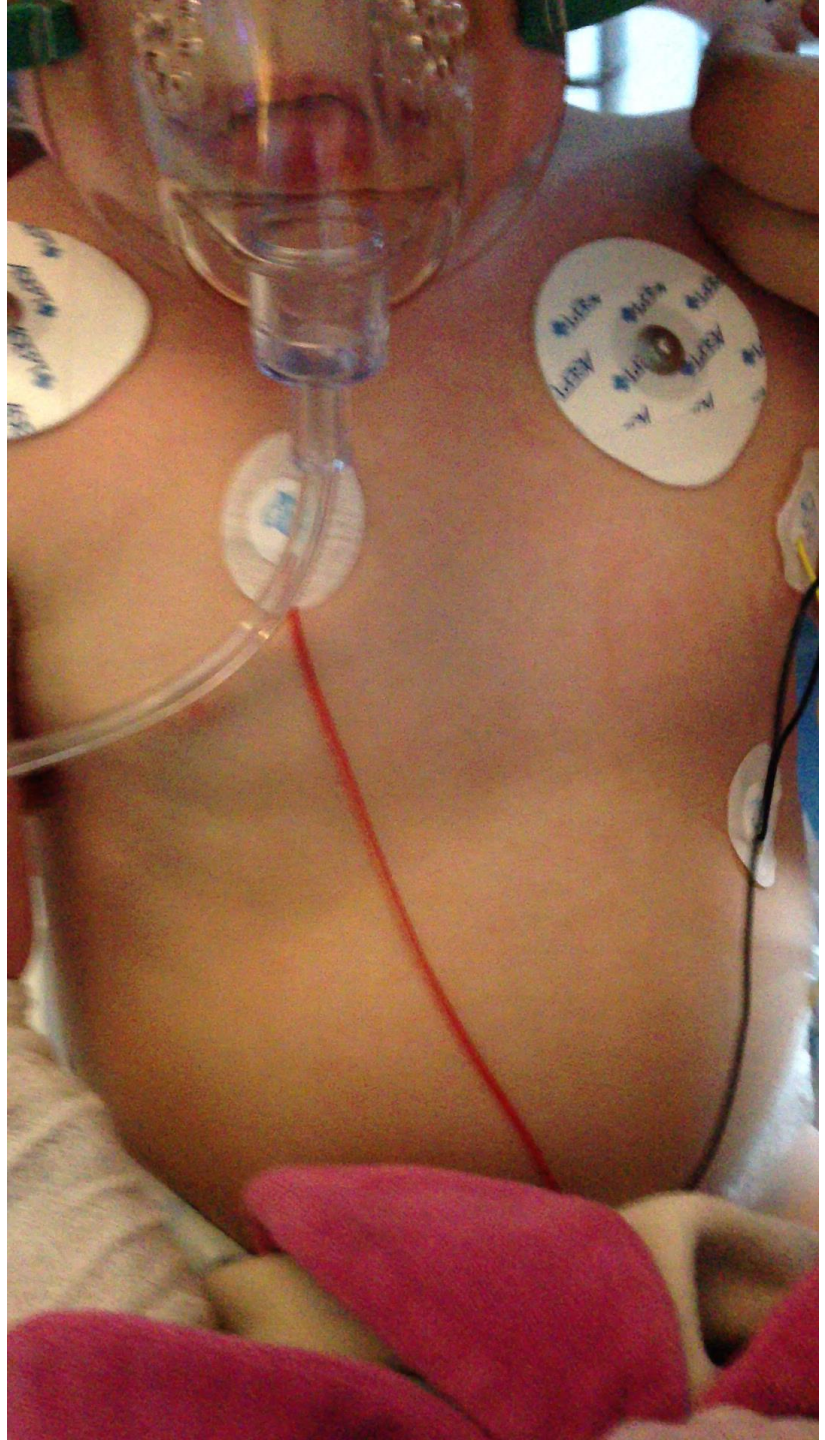
Next?



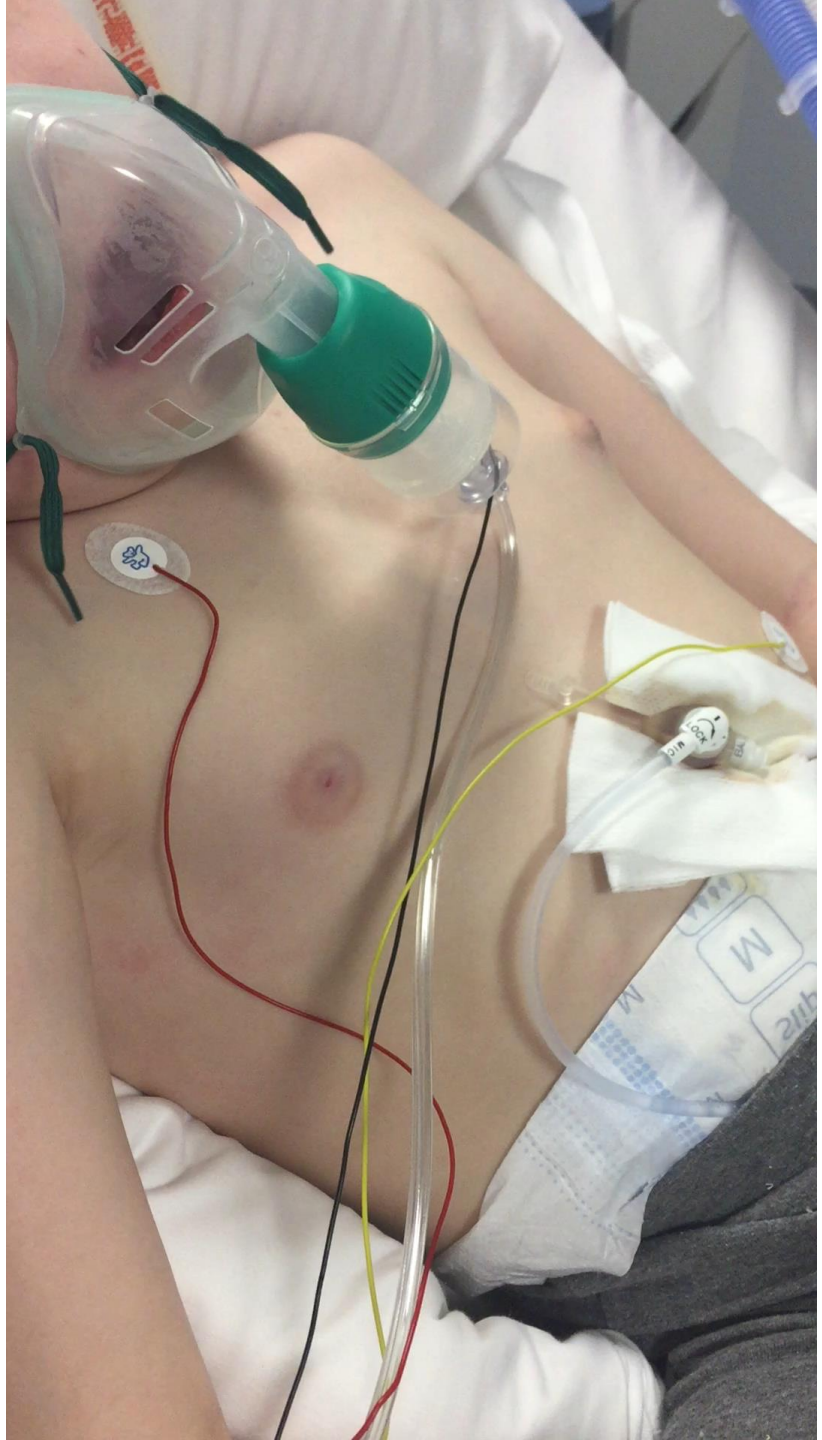
Morris Crit Care 2017
Wolfler Ped Crit Care Med 2015

ICEMAN





ICEMAN

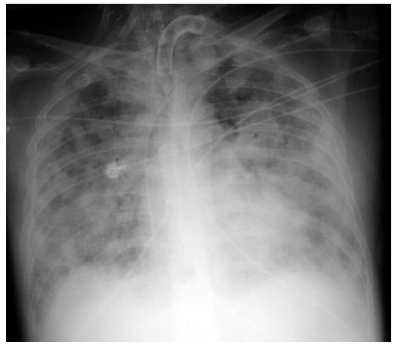


ICEMAN

Indications de la VNI : ARDS

ICEMAN

- Utilisée de plus en plus
- Peu d'études
- Indication dans les formes les moins sévères
- Ne pas l'utiliser dans les formes sévères
- Si utilisée, interface faciale ou naso buccale et 2 niveaux de pression



Age	Exclude patients with peri-natal related lung disease			
Timing	Within 7 days of known clinical insult			
Origin of Edema	Respiratory failure not fully explained by cardiac failure or fluid overload			
Chest Imaging	Chest imaging findings of new infiltrate(s) consistent with acute pulmonary parenchymal disease			
Oxygenation	**Non Invasive mechanical ventilation**	**Invasive mechanical ventilation**		
	PARDS (No severity stratification)	Mild	Moderate	Severe
	Full face-mask bi-level ventilation or CPAP ≥5 cm H_20 [2] PF ratio ≤ 300 SF ratio ≤ 264 [1]	4 ≤ OI < 8 5 ≤ OSI < 7.5[1]	8 ≤ OI < 16 7.5 ≤ OSI < 12.3[1]	OI ≥ 16 OSI ≥ 12.3[1]
Special Populations				
Cyanotic Heart Disease	Standard Criteria above for age, timing, origin of edema and chest imaging with an acute deterioration in oxygenation not explained by underlying cardiac disease. [3]			
Chronic Lung Disease	Standard Criteria above for age, timing, and origin of edema with chest imaging consistent with new infiltrate and acute deterioration in oxygenation from baseline which meet oxygenation criteria above.[3]			
Left Ventricular dysfunction	Standard Criteria for age, timing and origin of edema with chest imaging changes consistent with new infiltrate and acute deterioration in oxygenation which meet criteria above not explained by left ventricular dysfunction.			

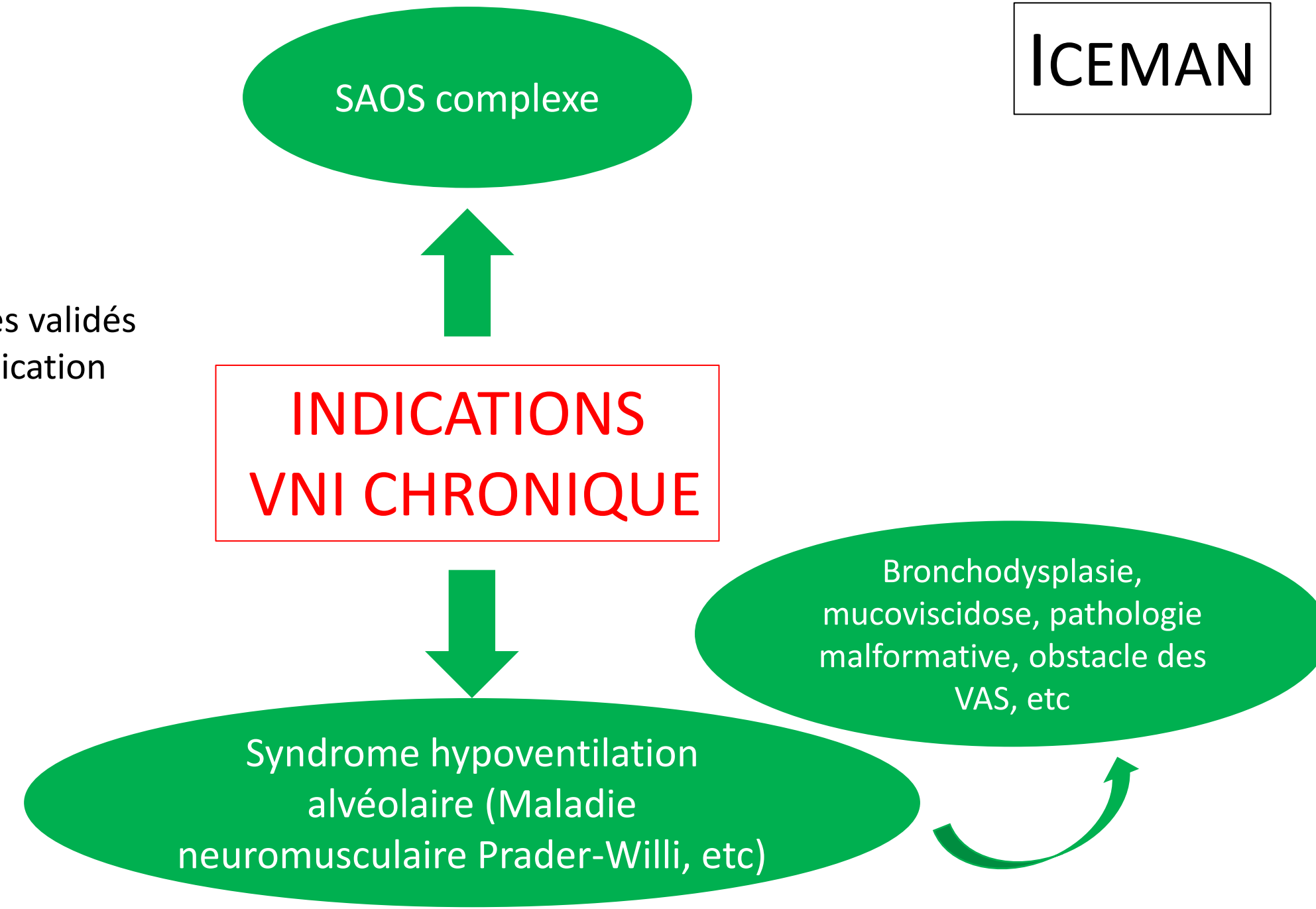
Figure 2. Pediatric acute respiratory distress syndrome definition. OI = oxygenation index, OSI = oxygen saturation index. [1]Use Pao_2-based metric when available. If Pao_2 not available, wean Fio_2 to maintain Spo_2 ≤ 97% to calculate OSI or oxygen saturation/Fio_2 ratio. [2]For nonintubated patients treated with supplemental oxygen or nasal modes of noninvasive ventilation, see Figure 3 for at-risk criteria. [3]Acute respiratory distress syndrome severity groups stratified by OI or OSI should not be applied to children with chronic lung disease who normally receive invasive mechanical ventilation or children with cyanotic congenital heart disease. OI = (Fio_2 × mean airway pressure × 100)/Pao_2. OSI = (Fio_2 × mean airway pressure × 100)/Spo_2.

Fauroux ERS 2021

ICEMAN

Mais :

- Manque de critères validés pour initiation/indication



Interfaces de VNI : à fuite ou sans fuite?

ICEMAN

Insuffisance respiratoire chronique

↓

Respirateur de domicile
(circuit monobranche +++ avec valve expiratoire
ou masque à fuite)

↓



Insuffisance respiratoire aigue

↓

Respirateur de réa
(double circuit)

↓



VNI : quelle interface?

ICEMAN

Mortamet Paed Resp Rev 2017

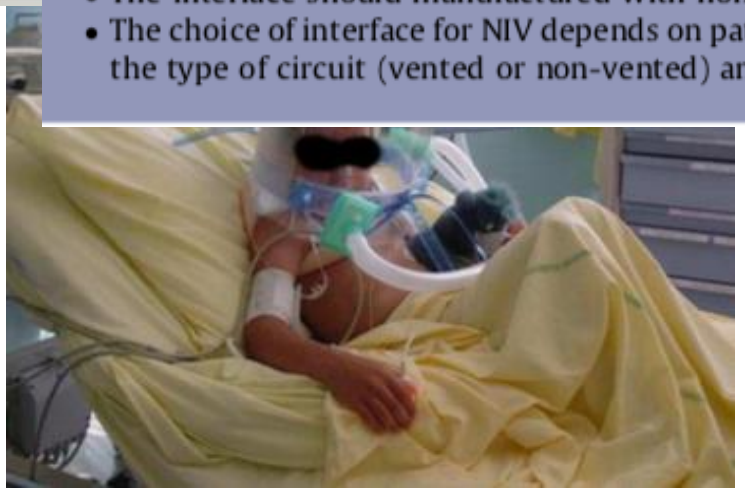




EDUCATIONAL AIMS

The reader will come to appreciate that in critically ill children:

- The ideal interface should be: small, inexpensive, comfortable, light-weight, easy to fit and remove.
- The interface should manufactured with non-allergenic material and have appropriate and well-adapted headgear.
- The choice of interface for NIV depends on patient's age, weight and clinical situation, facial anatomy the mode of ventilation and the type of circuit (vented or non-vented) and the risk of skin injury.





Mayordomo Ped Pulm 2018

Interface nasale





Interface faciale







Mayordomo Ped Pulm 2018

VNI : quel respirateur?

ICEMAN

Respirateurs de transport







Respirateurs de domicile







Attention apports max O2

Respirateurs de réanimation









VNI : quels modes, quels réglages?

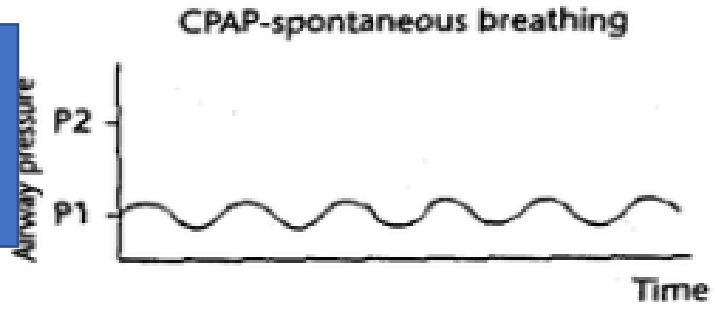
ICEMAN

1

- **CPAP +++** (Continuous Positive Airway Pressure) = PPC = EPAP
  - Support de Pression Expiratoire Positive
  - Augmente la CRF
  - Augmente recrutement
  - Effet « wash-out »

Maintien recrutement
Evite atélectasies
Réduction du travail respiratoire

2011



2

- VNI à 2 niveaux VS-AI = CPAP + Aide Inspiratoire (Trigger)
  - Non consensuelle
  - CPAP : entre 4 et 8 cmH_2 e et efficacité, entre 4 et 10 cmH_2O
  - +/- avec fréquence minin essure* : BiPAP)
  - Objectif : 4-7 ml/kg

Amélioration fonction inspiratoire
Améliore décarboxylation

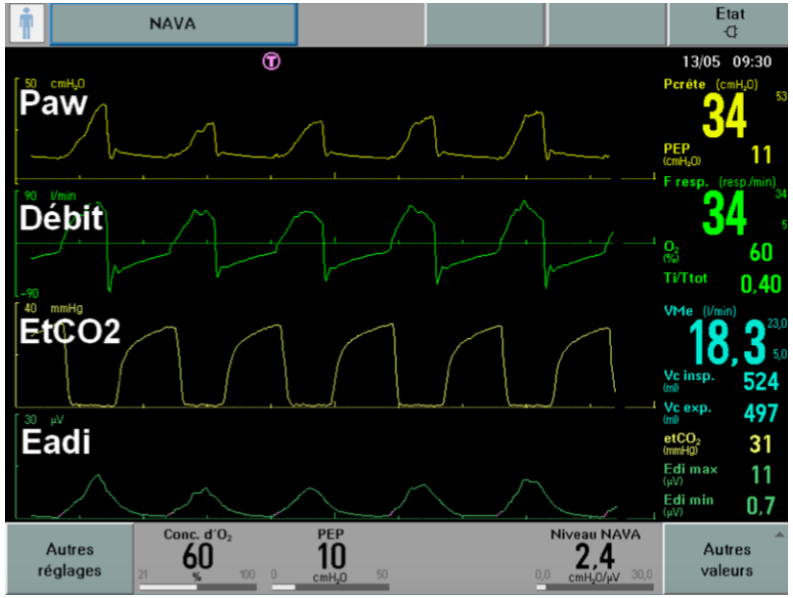
NAVA

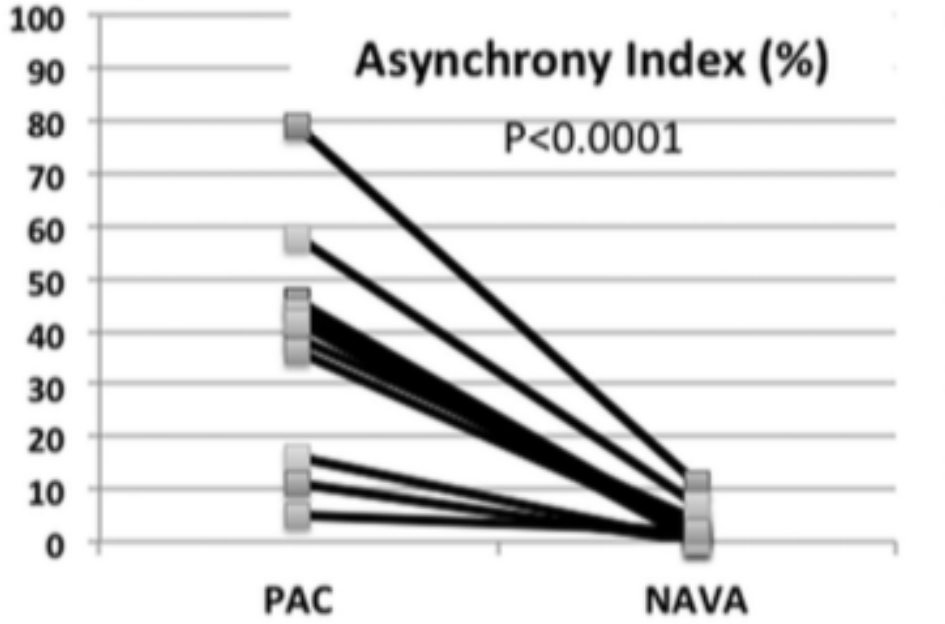
ICEMAN

- *Neurally Adjusted Ventilatory Assist*
- Ventilation dite proportionnelle à la demande du patient
- Demande du patient mesurée par l'activité Electrique du Diaphragme (EDI : Electrical Activity of the Diaphragm)
- Intérêt : améliorer la synchronisation patient-ventilateur

Baudin Ped Pulm 2015
Bronchiolite







Oxygénothérapie haut-débit (High Flow Nasal Canula) *(Hough 2014 Ped Crit Care Med, Milési Intens Care Med 2013)*

- Air + O_2 **humidifié et réchauffé**
- L'humidification :
  - Améliore la clairance muco-ciliaire
  - Limite le risque infectieux
  - Evite l'assèchement des mucosités



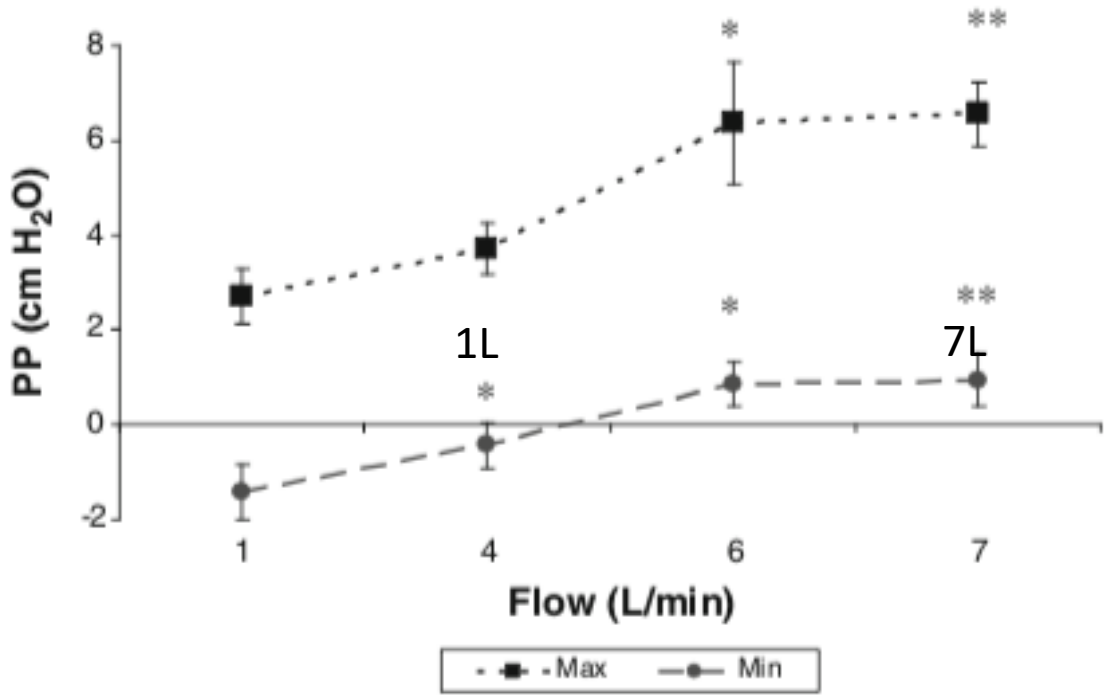


- Débit réglable : idéal entre **1 et 2 L/kg/mn** qui sera > au débit inspiratoire du patient
- FiO_2 réglable ou via un débit d'oxygène
- Avantages : Simple d'utilisation
- Inconvénients : retard à la mise en route d'un support plus important, coût, place non déterminée précisément

Oxygénothérapie haut-débit : physiologie

Milési Intens Care Med 2013

- Effet PEP autour de 4 cm H_2O
- Effet « Wash-out » nasopharyngé
- Diminution des résistances des voies aériennes grâce à un débit adéquat
- Amélioration de la compliance pulmonaire grâce à l'air chaud
- Meilleure oxygénation que 0_2 seul



Facteurs prédictifs d'échec de VNI

ICEMAN

Table 3 Predictive factors for the outcome of NPPV in children with ARF

Study	Population (n)	Age (yr)	Success rate (%)[a]	Predictors of failure
Campion et al. [20][b,c] prospective noncontrolled	Bronchiolitis (69)	0.1 (0.03-1)[d,e]	83	Apnea Higher $PaCO_2$ on admission Higher PRISM score at 24 hrs
Bernet et al. [24][b] prospective noncontrolled	Pneumonia (14), bronchiolitis (4), postoperative ARF (11), other (13)	2.4 (0.01-18)[d,e]	57	FiO_2 > 0.8 at 1 hr
Joshi et al. [26] retrospective (primary parenchymal lung disease subgroup)	Pneumonia or ARDS (29)	13[d]	62	Age ≤ 6 yr FiO_2 > 0.6 within the first 24 hrs $PaCO_2$ ≥ 55 mmHg within the first 24 hrs
Essouri et al. [27][b] retrospective	CAP (23), ARDS (9), ACS (9), immune deficiency (12), postextubation ARF (61)	5.3 (0.04-16)[e,f]	73	ARDS High PELOD score
Lum et al. [31][b] prospective noncontrolled	Pulmonary diseases (129), postextubation ARF (149)	0.7 (0.3-2.8)[d,g]	76	Higher FiO_2 needs at start of NPPV Higher PRISM score on admission Sepsis at start of NPPV
Munoz-Bonet et al. [54] prospective noncontrolled	Pneumonia (20), ARDS (10), postextubation ARF (11), other (6)	7.1 (0.1-16)[e,f]	81	MAP > 11.5 cm H_2O FiO_2 > 0.6
Mayordomo-Colunga et al. [55][b] prospective noncontrolled	Type I ARF (38), type II ARF (78)	0.9 (0.05-14)[d,e]	84	Lower RR decrease at 1 hr and 6 hrs Higher PRISM score at start and at 1 hr Type I ARF

Najaf-Zadeh 2011



VNI et chirurgie programmée

Conséquences ventilatoires de la chirurgie

(Odor, BMJ 2020, Chandler Anesthesiol 2020)



- Anesthesia
- Chirurgie thoracique/abdo
- Dysfonction diaphragmatique
- Douleur
- Surcharge hydrosodée
- Transfusion
- Comorbidités préalables

Altération fonction pulmonaire :

- Pneumopathie
- Pneumothorax
- Œdème pulmonaire
- Atélectasie

FDR complications ventilatoires

Journal of Cardiothoracic and Vascular Anesthesia

journal homepage: www.jcvaonline.com

Review Article

Perioperative Noninvasive Ventilation After Adult or Pediatric Surgery: A Comprehensive Review

Giovanni Landoni, MD[*,†,1,2], Valery Likhvantsev, MD[‡,§], Artem Kuzovlev, MD[§], Luca Cabrini, MD[¶,‖]

In press

Table 2
Postoperative Pulmonary Complications Risk Factors

Patient-related risk factors
Age
BMI
Chronic pulmonary conditions
Medical history
Respiratory reserve
Surgical risk factors
Duration of the procedure
Emergency condition
Site of intervention (especially upper abdomen and the chest)
Intraoperative anesthesiologic care–related risk factors
General anesthesia
Liberal blood and fluid administration
LPVS absence
Postoperative risk factors
ERAS absence
Inadequate pain management
NIV absence
Residual neuromuscular blockade
Respiratory physiotherapy absence

Enhanced recovery after surgery

VNI pour prévenir les complications

Journal of Cardiothoracic and Vascular Anesthesia

journal homepage: www.jcvaonline.com

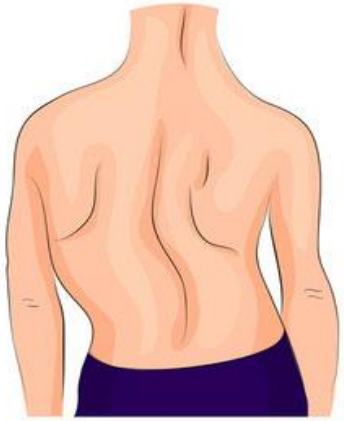
Review Article

Perioperative Noninvasive Ventilation After Adult or Pediatric Surgery: A Comprehensive Review

Giovanni Landoni, MD[*,†,1,2], Valery Likhvantsev, MD[‡,§], Artem Kuzovlev, MD[§], Luca Cabrini, MD[¶,‖]

Table 4
Noninvasive Ventilation to Prevent Postoperative Pulmonary Complications and Acute Respiratory Failure: Meta-Analysis Summary

Meta-Analysis	Objectives: NIV Effects on:	Number of Participants and Studies	Outcomes	Relative Effects (95% CI)	Comments
Olper et al. 2013[15]	Reintubation rate in cardiac, pulmonary, or thoracoabdominal surgery	1,211 (14 studies)	Reintubation rate	RR 0.29 [0.16-0.53] p for efficacy < 0.000 $I^2 = 0$	NIV reduced reintubation rate, especially in patients with ARF and at high risk of PPC.
			Ongoing ARF	RR 0.25 [0.07-0.89]	
			Increased risk of PPC	RR 0.19 [0.04-0.84]	
Ireland 2014[23]	Atelectasis, pneumonia, reintubation, and mortality after major abdominal surgery	709 (10 studies)	Atelectasis	RR 0.62 [0.45-0.86] $I^2 = 61\%$	NIV reduced atelectasis, pneumonia, and reintubation rate.
			Pneumonia	RR 0.43 [0.21-0.84] $I^2 = 0\%$	
			Reintubation	RR 0.14 [0.03-0.58] $I^2 = 0\%$	
Zhu et al. 2016[13]	Mortality, reintubation, pulmonary or non-pulmonary complications; ICU or hospital stay after cardiac, pulmonary, or thoracoabdominal surgery	1,740 (14 studies)	PPC	RR 0.70 [0.47-1.30] p = 0.340	Overall: no benefit. (Subgroup analysis: reduction in PPC and reintubation in cardiac surgery, reduced mortality in pulmonary surgery.)
			Reintubation	RR 0.52 [0.24-1.11] p = 0.090	
			Mortality	RR 0.64 [0.36-1.14] p = 0.127	
Pieczkoski et al. 2017[19]	Atelectasis, pneumonia, reintubation, and length of ICU stay	6 studies			No benefit.
		407 (4 studies)	Atelectasis	RR 0.60 [0.28-1.28] $I^2 = 69\%$	
		594 (2 studies)	Pneumonia	RR 0.20 [0.04-1.16] $I^2 = 0\%$	
		594 (2 studies)	Reintubation rate	RR 0.51 [0.15-1.66] $I^2 = 0\%$	
		641 (3 studies)	ICU stay	MD −0.04 [−0.13 to 0.05] $I^2 = 0\%$	
Torres et al. 2019[21]	Mortality, PPC rate, rate of intubation, length of ICU or hospital stay in patients undergoing pulmonary resection for lung cancer	486 (8 studies)	PPC	RR 1.03 [0.72-1.47]	No benefit.
			Intubation rate	RR 0.55 [0.25-1.20]	
			Mortality	RR 0.60 [0.24-1.53]	
			ICU stay	MD −0.75 [−3.93 to 2.43]	
			Hospital stay	MD −0.12 [−6.15 to 5.90]	
Wu et al. 2020[20]	Survival and incidence of atelectasis, pneumonia, reintubation, cardiac complications, ICU and hospital stay	830 (9 studies)	Atelectasis	RR 0.60 [0.28-1.28] p = 0.19	
			Pneumonia	RR 0.27 [0.05-1.64] p = 0.16	
			Reintubation rate	RR 0.68 [0.21-2.26] p = 0.53	
			Risk of cardiac complications	RR 0.81 [0.59-1.13] p = 0.22	
			ICU stay	MD −1.00 [−1.38 to 0.63] p < 0.00001	Reduction in length of ICU stay.
			Hospital stay	MD −1.00 [−1.12 to 0.87]	Reduction in length of



The Effect of Scoliosis Surgery on Lung Function in the Immediate Postoperative Period

Nanci Yuan, MD,* Javier A. Fraire, MD,* Monique M. Margetis, MD,*
David L. Skaggs, MD,† Vernon T. Tolo, MD,† and Thomas G. Keens, MD*

Pediatric Pulmonology 40:414–419 (2005)

Rétrospectif monocentrique n=125 (13,7 ans)

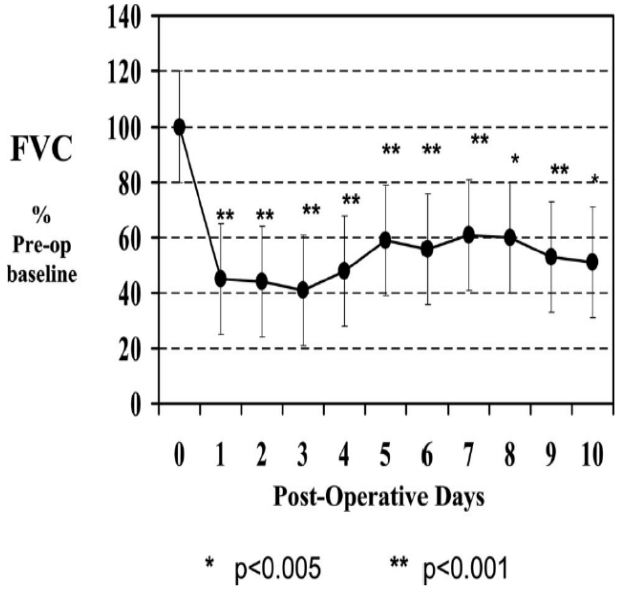


Figure 1. Forced vital capacity (FVC) is shown, as a percent of the preoperative baseline value, for the first 10 days after scoliosis

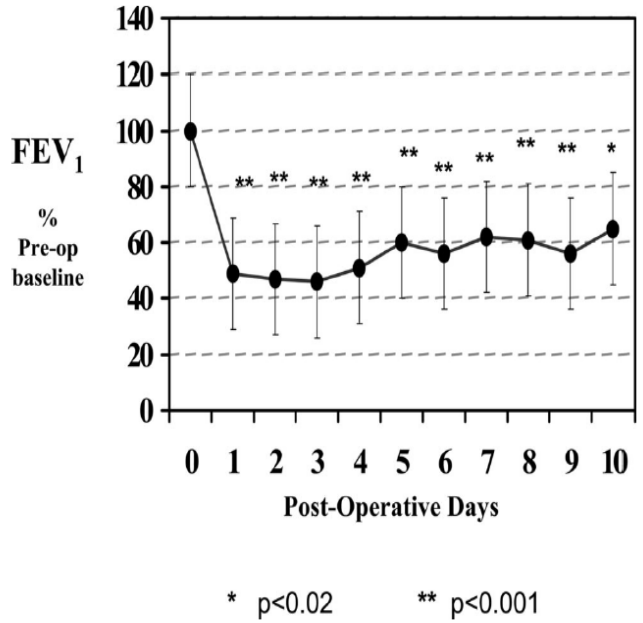


Figure 2. Forced expiratory volume in 1 second (FEV1) is shown,

Etude prospective monocentrique n=24 (12,7 ans)
Retour au baseline entre 1 et 2 mois

Preoperative Predictors of Prolonged Postoperative Mechanical Ventilation in Children Following Scoliosis Repair

Nanci Yuan, MD,* David L. Skaggs, MD, Fred Dorey, PhD, and Thomas G. Keens, MD

Factors : increase () ventilation >3 days
- Neuromuscular disease
- CVF <40%
- age > 13 years

TABLE 2—Prolonged Postoperative Mechanical Ventilation: Preoperative Pulmonary Function Test Results[1]

	Prolonged postoperative MV (MV ≥3 days)	No prolonged postoperative MV (MV <3 days)	*P*-value
N	40 (32%)	85 (68%)	
TLC (% pred)	63.7 ± 23.1	77.2 ± 16.3	0.001
VC (% pred)	46.2 ± 23.5	62.9 ± 18.4	0.001
IC (ml/kg)	23.4 ± 12.0	32.6 ± 9.6	0.001
RV (% pred)	139.5 ± 91.8	129.4 ± 41.8	0.792
FEV_1 (% pred)	42.6 ± 22.5	58.6 ± 18.1	0.001
MIP (cm H_2O)	63.6 ± 37.4	78.4 ± 33.9	0.065

[1]pred, predicted.

Maladies neuromusculaires

NARRATIVE REVIEW

Pediatric Anesthesia WILEY

Respiratory prehabilitation in pediatric anesthesia in children with muscular and neurologic disease

Aaron St-Laurent[1] | Zofia Zysman-Colman[2] | David Zielinski[3]

- A risque atélectasie, pneumopathie et hypercapnie post op
- Altération compliance
- Difficultés à la toux
- Risque de complications si FVC < 60%, toux inefficace ou sous VNI *(Hull Thorax 2012, Amin Can J Respir Crit Care Sleep Med 2017)*
- **VNI recommandée** si FVC < 50% prédite ou si anomalies de fonction pulm *(Wang Ped Pulm 1993) => Khirani, Eur Spine J 2014* : n=13 patients avec MNM et chir de scoliose : efficacité clinique et pas de complication
- **Techniques d'assistance à la toux** si peak cough flow < 270 L/min avec +15 à +40 / -15 à -40 cmH2O *(Bach Am J Phys Med Rehabil 2013)*



Post op chirurgie cardiaque



- *Kovacikova, Pediatr Cardiol, 2014* : étude observationelle (n=82, 107 épisodes, age médian 57 jours) :
  - FDR d'échec : chirurgie à risque, infection, chirurgie non réparatrice, pH <7.36
  - **Evite les réintubations**

- *Kovacikova, Interact Cardiovasc Thorac Surg 2009, Hoch Pediart Cardiol 2001, Oktem, Int J Pediatr Otorhinolaryngol 2010, Lin, Eur Respir J 1997* : succès de la VNI pour les **paralysies diaphragmatiques bilatérales**

- *Pons Odena, Ann Pediatr 2009, Fernandez Lafever BMC Pulm Med 2016, Gupta Pediatr Cardiol 2013, Rolim Pediatr Cardiol 2020* : **taux de succès de 62 à 85%** dans des études observationnelles, sans complications notables

Independent predictors for NIV success include :
a good left ventricular ejection fraction
administration of glucocorticoids within 24 h after initiation of NIV
normal RR
lower RACHS-1 score (1–3)
less organ dysfunction
and the presence of atelectasis before initiation of NIV

Original Article | Published: 30 November 2012

Efficacy and Predictors of Success of Noninvasive Ventilation for Prevention of Extubation Failure in Critically Ill Children With Heart Disease

Punkaj Gupta ✉, Jacob E. Kuperstock, Sana Hashmi, Vickie Arnolde, Jeffrey M. Gossett, Parthak Prodhan, Shekhar Venkataraman & Stephen J. Roth

Pediatric Cardiology **34**, 964–977 (2013) | Cite this article

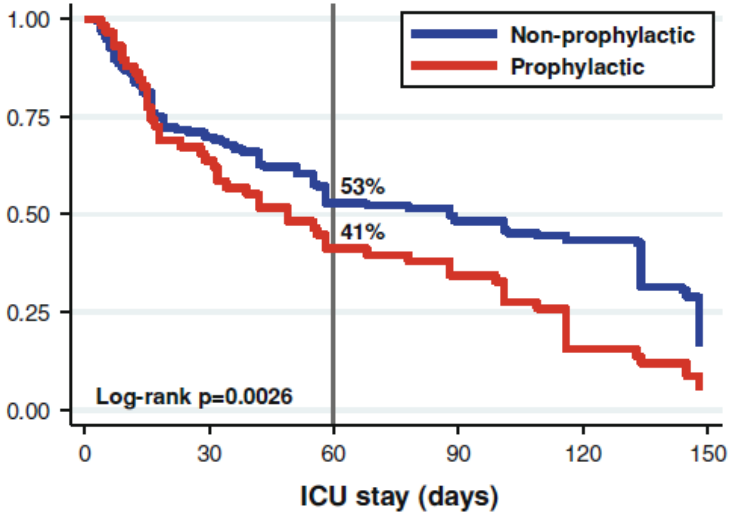


Fig. 2 Comparison of intensive care unit (ICU) lengths of stay between prophylactic events and nonprophylactic events

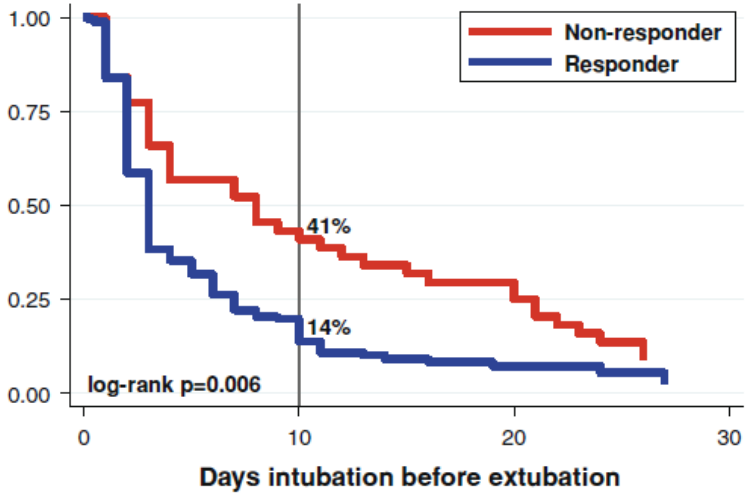


Fig. 3 Days of intubation before extubation compared between responders and nonresponders

Positive Airway Pressure Versus High-Flow Nasal Cannula for Prevention of Extubation Failure in Infants After Congenital Heart Surgery*

Robert P. Richter, MD[1]; Jeffrey A. Alten, MD[2]; R. Wilson King, BS[3]; Asaf D. Gans, MD[4]; AKM Fazlur Rahman, PhD[5]; Yuvraj Kalra, MD[6]; Santiago Borasino, MD, MPH[7]

Propensity matching
49 paires.

Patients< 6months.

TABLE 2. Outcomes for Matched High-Flow Nasal Cannula and Positive Airway Pressure Groups

Outcome	HFNC, *n* = 49	PAP, *n* = 49	*p*[a]
Respiratory support, hr, median (IQR)			
PAP duration[b]	0 (0–25)	41 (17–73)	< 0.001
HFNC duration[c]	15 (6–67)	1 (0–5)	< 0.001
LFNC duration[d]	68 (43–122)	102 (65–275)	0.057
Time to LFNC[e]	28 (7–116)	83 (44–217)	0.006
Time to room air[f]	110 (59–223)	159 (103–381)	0.013
Nutrition and LOS, d, median (IQR)			
Time to first oral attempt/modified barium swallow[g]	3 (1.5–9.5)	7 (4–12.5)	0.034
Time to goal bolus feeding[c]	6 (2–17.5)	9 (4.5–22)	0.020
Postsurgical hospital LOS	14 (7–23)	22 (10.5–29)	0.015
Extubation failure rate and mortality, *n* (%)			
48 hr extubation failure	5 (10)	8 (16)	0.549
In-hospital mortality	0 (0)	1 (2)	1.000

VNI pour autres chirurgies?

Journal of Cardiothoracic and Vascular Anesthesia

journal homepage: www.jcvaonline.com

Review Article

Perioperative Noninvasive Ventilation After Adult or Pediatric Surgery: A Comprehensive Review

Giovanni Landoni, MD[*,†,‡,2], Valery Likhvantsev, MD[‡,§], Artem Kuzovlev, MD[§], Luca Cabrini, MD[¶,‖]

- Utilisé chez l'adulte pour des **indications très précises et déjà ventilés** *(Cabrini, Br J Anaesth 2014)* : chirurgie valvulaire, stenting, césariennes, ETO, endoscopies, etc
- Chirurgie **oesophagienne** :
  - *Shah, J Paediatr Child Health 2016* : n=10, pas de complication, pas de fuite anastomotique
  - *Ferrand, J Pediatr Surg 2019* : n=25, VNI/HFNC associé à risque accru de médiastinite et HFNC associé à risque de fuite anastomotique
- Transplantation hépatique :
  - *Chin, Liver Transpl 2005* : n=15 efficacité clinique et pas de complication
  - *Murase, Liver Transpl 2012* : n=47 moins d'intubations dans groupe VNI versus O2

Transnasal humidified rapid insufflation ventilatory exchange

Pediatric Anesthesiology
NARRATIVE REVIEW ARTICLE

CME **A Narrative Review of Oxygenation During Pediatric Intubation and Airway Procedures**

Scott D. N. Else, MD,* and Pete G. Kovatsis, MD†

Pas d'effet sur CO2 clearance

Riva et al[21]: Randomized Controlled Trial in Elective Surgery			
Summary	Low-flow O_2 with nasal prongs had comparable apnea times to THRIVE 100%. THRIVE 30% had significantly shorter apnea times than the other 2 groups. There was no difference in the rate of rise of transcutaneous CO_2 among the 3 groups (median, 4.28 mm Hg/min).		
	Apnea time until desaturation to 95% (s), median (interquartile range)		
Patient age group	THRIVE 30% O_2 (2.0 L/kg/min)	THRIVE 100% O_2 (2.0 L/kg/min)	Low-flow 100% O_2 (0.2 L/kg/min)
1–6 y	180 (144–222)	456 (372–546)	414 (342–468)
Humphreys et al[5]: Randomized Controlled Trial in Elective Surgery			
Summary	THRIVE was effective in significantly delaying the onset of hypoxia during apnea but had no effect on CO_2 clearance.		
	Apnea time until desaturation to 92% or double the published age-specific apnea times (seconds)		
Patient age group	Published apnea time,[4] mean (SD)	Control, mean (95% CI)	THRIVE[a]
0–6 mo	96 (12.7)	109.2 (28.8)	192
6–25 mo	118 (9.0)	147.3 (18.9)	236
2–5 y	160 (30.7)	190.5 (15.3)	320
6–10 y	215 (34.9)	260.8 (37.3)	430

Br J Anaesth n=48 sains

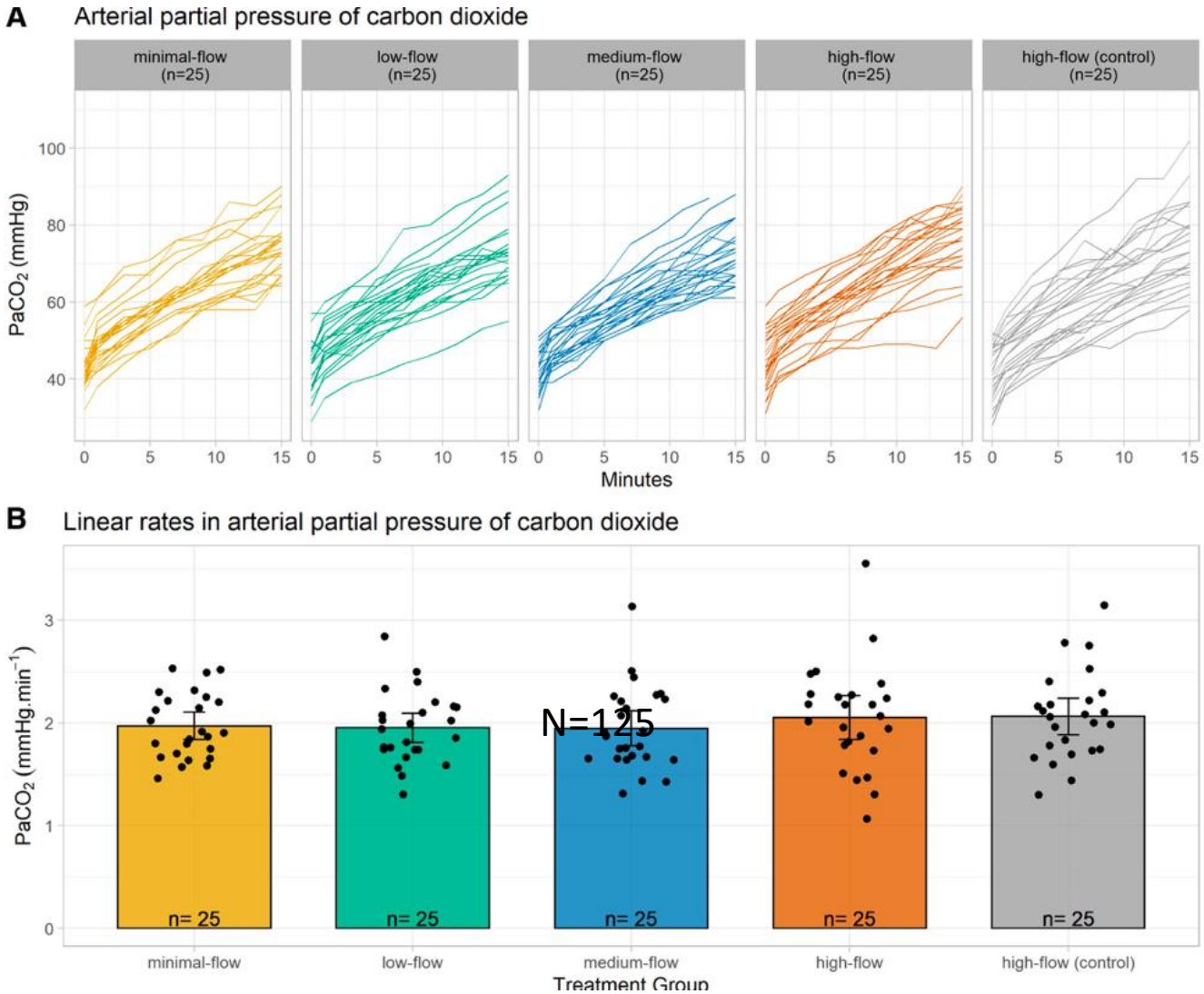
2L/kg/min

Transnasal humidified rapid insufflation ventilatory exchange

Randomized Controlled Trial > Anesthesiology. 2022 Jan 1;136(1):82-92.
doi: 10.1097/ALN.0000000000004025.

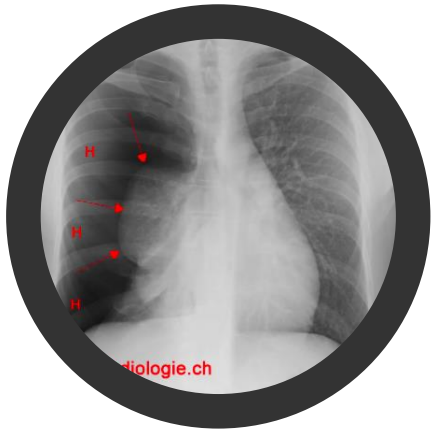
Carbon Dioxide Changes during High-flow Nasal Oxygenation in Apneic Patients: A Single-center Randomized Controlled Noninferiority Trial

Thomas Riva [1], Robert Greif [2], Heiko Kaiser [1], Thomas Riedel [3], Markus Huber [1], Lorenz Theiler [4], Sabine Nabecker [5]



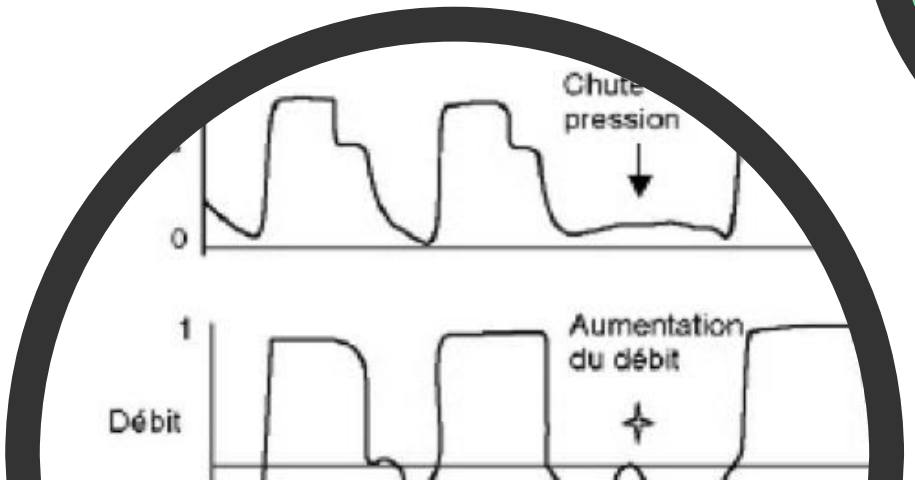
Complications

- *Fischer M Resp Care 2015*











Gestion pluridisciplinaire du patient

- Anesthésiste
- Chirurgien
- Réanimateur
- Pneumologue



Au total : quoi retenir?

- VNI utilisée largement en **situation aigue**
- Patient sous **VNI de domicile** = réserves en oxygène diminuées, consommation en oxygène augmentée, mauvaise tolérance des apnées
- Potentielle place de la VNI dans la **préparation pré opératoire** des patients
- Potentielle place en **post opératoire** des chirurgies cardiaques et de scoliose
- Attention à l'utilisation de la VNI dans les chirurgies oesophagiennes
- Très peu de travaux en pédiatrie
- Place limitée de la VNI en **préoxygénation**
- **Gestion pluridisciplinaire**