

SDRA

- Prise en charge non invasive -

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Paris



Inserm

La science pour la santé
From science to health



R³S

Conflits d'intérêt

- Grants: French Ministry of Health, Assistance publique – Hôpitaux de Paris, Respinor
- Consulting fees: Respinor, Lungpacer, Lowenstein, Tribunal administrative de Cergy, Liberate Medical
- Payment or honoraria for lectures, presentations: Fisher & Paykel, Astra, Gilead, Mindray

A New Global Definition of Acute Respiratory Distress Syndrome

Michael A. Matthay^{1,2,3}, Yaseen Arabi⁵, Alejandro C. Arroliga⁶, Gordon Bernard⁷, Andrew D. Bersten⁹, Laurent J. Brochard¹⁰, Carolyn S. Calfee^{1,2,3}, Alain Combes¹¹, Brian M. Daniel⁴, Niall D. Ferguson^{12,13}, Michelle N. Gong¹⁴, Jeffrey E. Gotts¹⁵, Margaret S. Herridge¹⁶, John G. Laffey¹⁷, Kathleen D. Liu^{1,2}, Flavia R. Machado¹⁸, Thomas R. Martin¹⁹, Danny F. McAuley²⁰, Alain Mercat²¹, Marc Moss²², Richard A. Mularski²³, Antonio Pesenti^{24,25}, Haibo Qiu²⁶, Nagarajan Ramakrishnan²⁷, V. Marco Ranieri²⁸, Elisabeth D. Riviello²⁹, Eileen Rubin³⁰, Arthur S. Slutsky¹⁰, B. Taylor Thompson³¹, Theogene Twagirimugabe³², Lorraine B. Ware⁸, and Katherine D. Wick³³

- Début rapide (< 7jour)
- Condensations pulmonaires bilatérales (radio, échographie...)
- Facteur de risque : pneumonie, inhalation, choc, trauma, etc...
- *Pas d'argument pour une cause cardiaque*
- **Si patient non-intubé $\text{PaO}_2/\text{FiO}_2 \leq 300$ mmHg**
 - Haut débit ≥ 30 l/min
 - VNI ou CPAP PEP ≥ 5 cmH₂O

SDRA – Intubation d’emblée

Détresse Respiratoire aigüe

- **Coma**
- Etat de **choc**, *catécholamines*



**Intubation
d’emblée**

SDRA – Prévenir l'intubation

Détresse Respiratoire aigüe

Prévenir l'intubation

O₂
standard

haut débit
humidifié

CPAP

VNI

Intubation
d'emblée

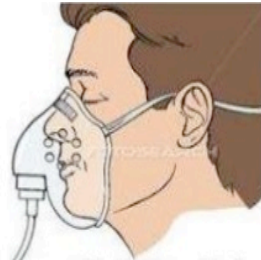


SDRA – Oxygène standard

Détresse Respiratoire aigüe

Prévenir l'intubation

O₂
standard



Simple Face Mask



Partial Rebreather Mask

Intubation
d'emblée

SDRA – Prévenir l'intubation

Détresse Respiratoire aigüe

Prévenir l'intubation

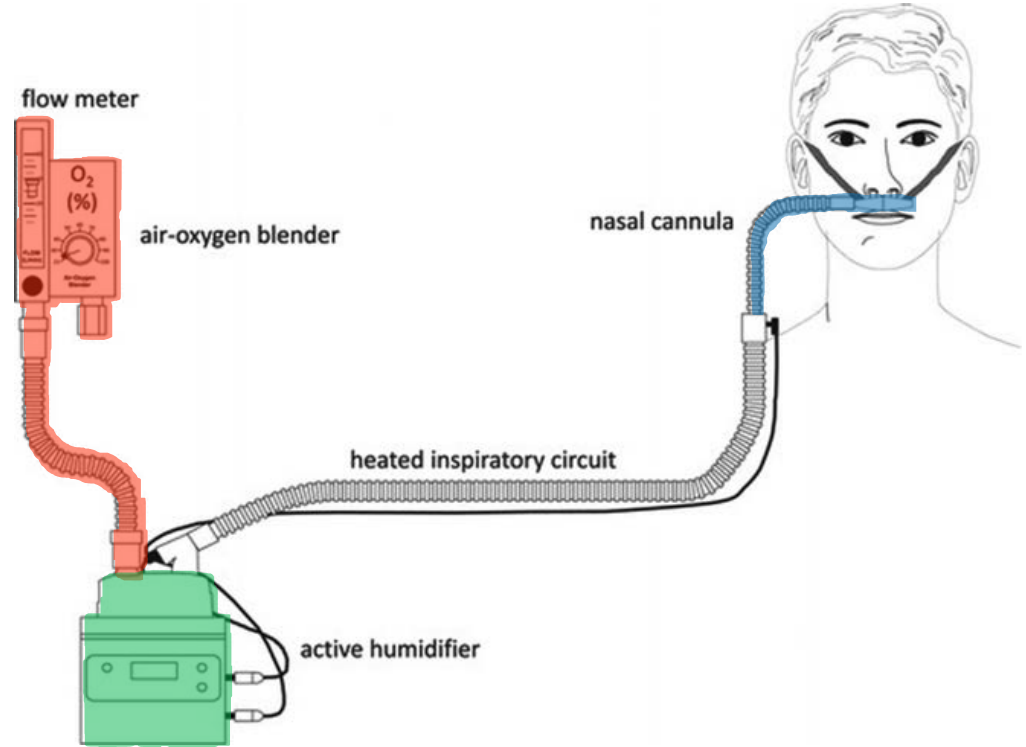
haut débit
humidifié



Intubation
d'emblée

Haut débit nasal humidifié

- Administration d'un **mélange d'air et d'oxygène** en continu
- Les gaz sont chauffés et humidifiés par un **humidificateur chauffant**
- Administration par voie nasale au moyen de **canules**



Impact physiologique du haut débit nasal

1. Gaz chauffés et humidifiés

- Sècheresse → tolérance et confort

2. Lavage de l'espace mort nasopharyngé

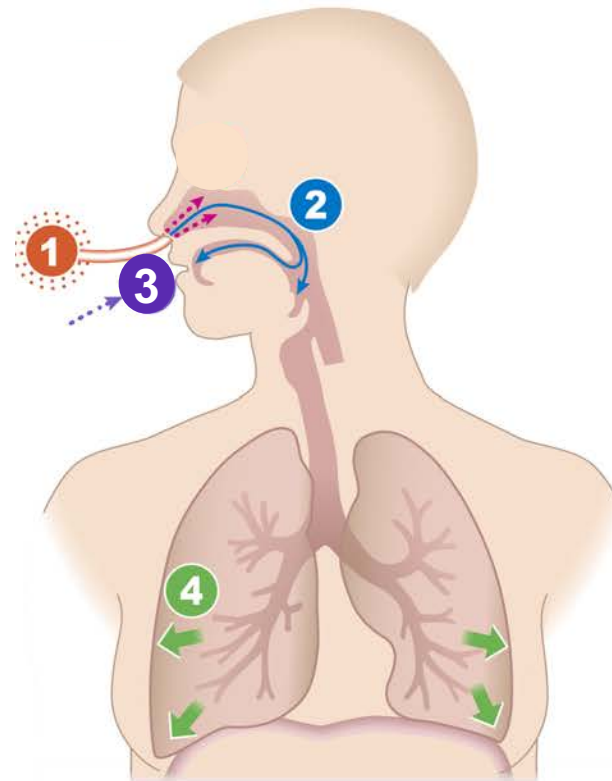
- Diminution de la ré-inhalation du CO_2

3. Augmentation de la FiO_2

- Amélioration de l'oxygénation

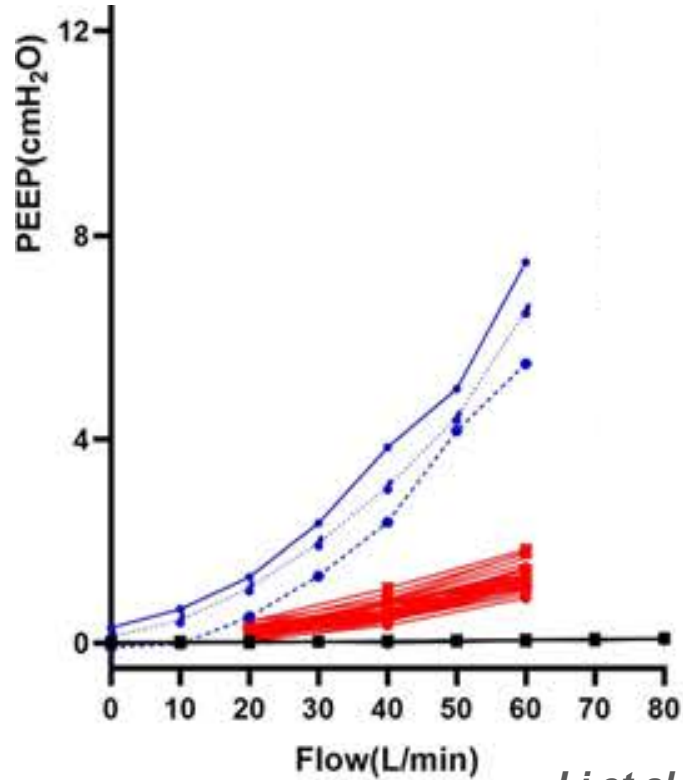
4. Effet PEP

- Améliore la compliance pulmonaire



Haut débit

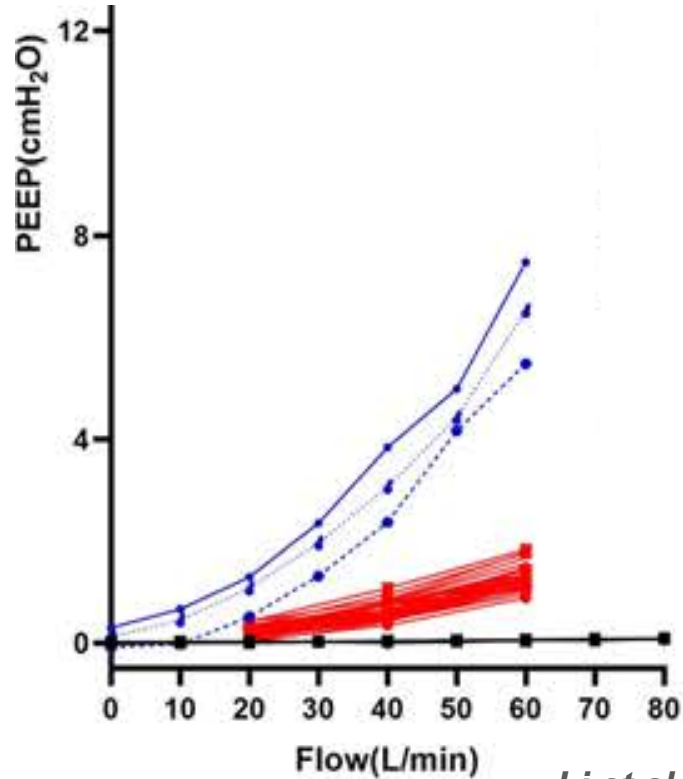
Effet PEP



Li et al. Crit Care 2023

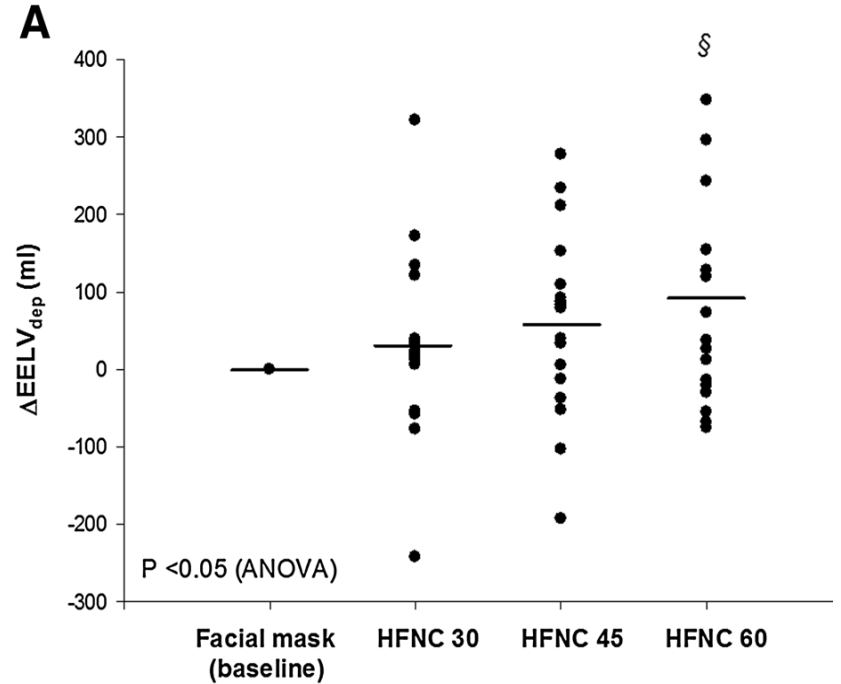
Haut débit

Effet PEP



Li et al. Crit Care 2023

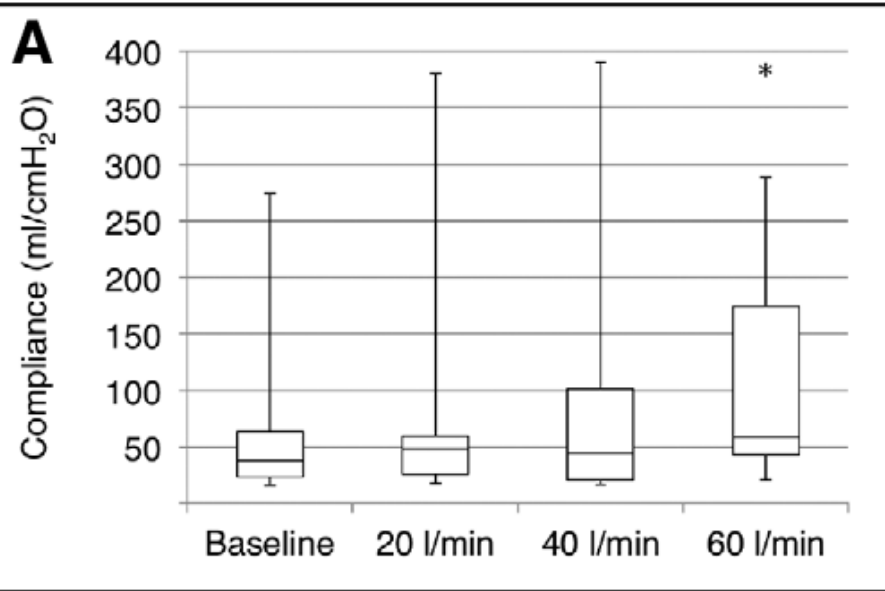
Volume de fin d'expiration



Mauri et coll. Intensive Care Med 2017

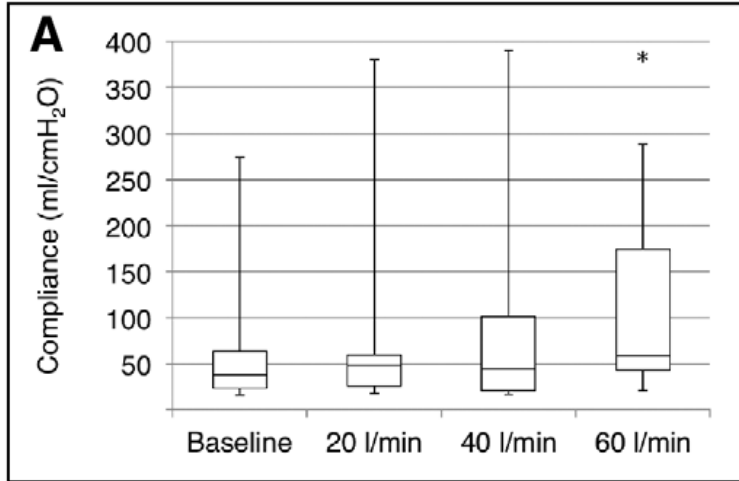
Haut débit

Compliance

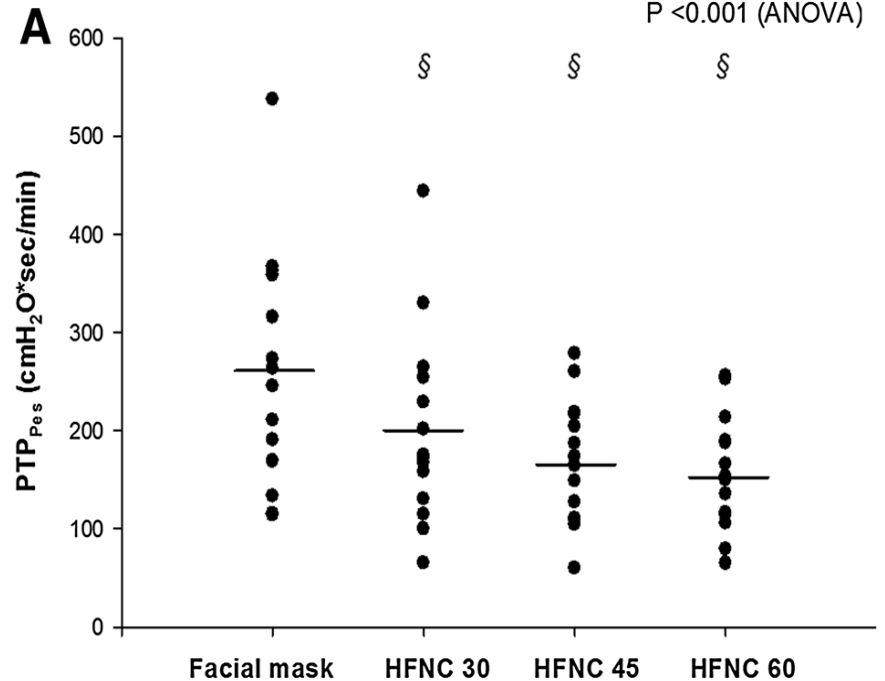


Haut débit

Compliance




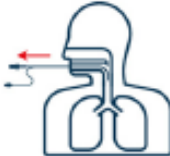

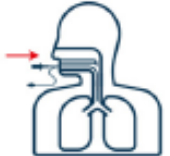
PTP





The role for high flow nasal cannula as a respiratory support strategy in adults: a clinical practice guideline

When should high flow nasal cannula (HFNC) be used in the clinical setting?

<p>Hypoxemic respiratory failure <i>(moderate certainty)</i></p>	<p>Following extubation <i>(moderate certainty)</i></p>	<p>Postoperative HFNC in high risk and/or obese patients following cardiac or thoracic surgery <i>(moderate certainty)</i></p>	<p>Peri-intubation period <i>(moderate certainty)</i></p>
			
<p>Strong recommendation</p>	<p>Conditional recommendation</p>	<p>Conditional recommendation</p>	<p>No recommendation</p>



ERS clinical practice guidelines: high-flow nasal cannula in acute respiratory failure

Simon Oczkowski^{1,2,26}, Begüm Ergan ^{3,26}, Lieuwe Bos ^{4,5}, Michelle Chatwin⁶, Miguel Ferrer⁷, Cesare Gregoretti^{8,9}, Leo Heunks¹⁰, Jean-Pierre Frat^{11,12}, Federico Longhini ¹³, Stefano Nava^{14,15}, Paolo Navalesi ^{16,17}, Aylin Ozsancak Uğurlu¹⁸, Lara Pisani^{14,15}, Teresa Renda¹⁹, Arnaud W. Thille ^{11,12}, João Carlos Winck ²⁰, Wolfram Windisch²¹, Thomy Tonia²², Jeanette Boyd²³, Giovanni Sotgiu ²⁴ and Raffaele Scala²⁵

TABLE 2 Population, intervention, comparison, outcomes (PICO) questions and recommendations

1. Should HFNC or COT be used in patients with acute hypoxaemic respiratory failure?

The ERS task force suggests the use of HFNC over COT in patients with acute hypoxaemic respiratory failure (conditional recommendation, moderate certainty of evidence)



ESICM guidelines on acute respiratory distress syndrome: definition, phenotyping and respiratory support strategies

Initier le haut débit

- 1) **Expliquer** le principe à la patiente
- 2) **Montage** du système
 - Choisir la taille des les canules *débit, confort*
 - Humidificateurs chauffant : 37 C
 - Hydrocolloïde visage *protection*
- 3) **Débuter l'administration**
 - ↑ progressivement le débit → 50 – 60 L/min
 - Adapter selon tolérance
 - FiO₂ selon SpO₂



Surveillance de l'OHD

- **Efficacité**

- FR, tirage, *signes de détresse respiratoire*
- SpO₂
- ROX index = $(SpO_2/FiO_2)/RR$
- Gaz du sang, *mais pas trop*

- **Complications**

- Pas de complications
- Inconfort : taille des canules, débit, humidification
- Risque de retard à l'intubation : FiO₂ > 60 %



Surveillance de l'OHD

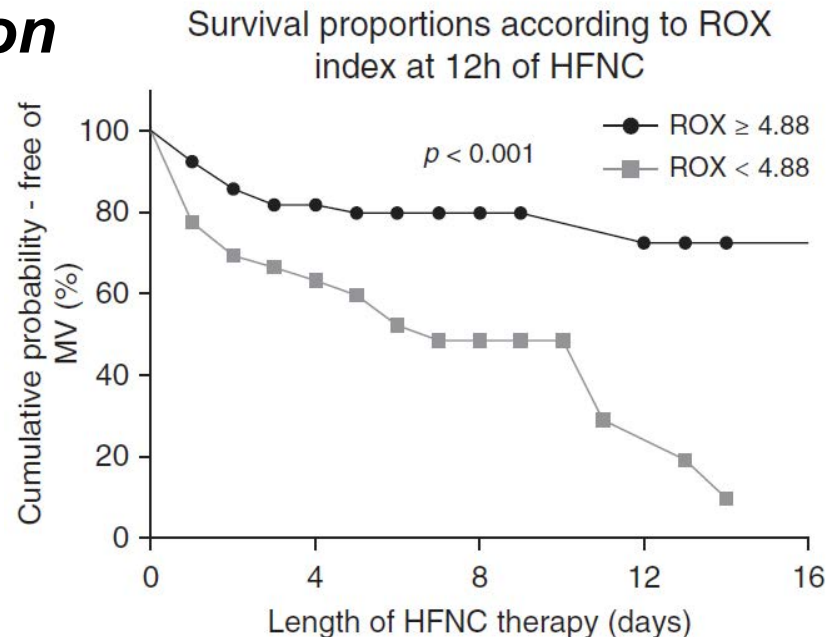
Quand arrêter ?

- ***Pas amelioration / aggravation***

- FR
- Tirage
- Oxygenation

- ***ROX index***

- $SpO_2/FiO_2)/RR$
- Cutoff = 4,88



SDRA – Prévenir l'intubation

Détresse Respiratoire aigüe

Prévenir l'intubation

VNI


Intubation
d'emblée



Official ERS/ATS clinical practice guidelines: noninvasive ventilation for acute respiratory failure



TASK FORCE REPORT
ERS/ATS GUIDELINES

Bram Rochwerg ¹, Laurent Brochard^{2,3}, Mark W. Elliott⁴, Dean Hess⁵, Nicholas S. Hill⁶, Stefano Nava⁷ and Paolo Navalesi⁸ (members of the steering committee); Massimo Antonelli⁹, Jan Brozek¹, Giorgio Conti⁹, Miquel Ferrer¹⁰, Kalpalatha Guntupalli¹¹, Samir Jaber¹², Sean Keenan^{13,14}, Jordi Mancebo¹⁵, Sangeeta Mehta¹⁶ and Suhail Raof^{17,18} (members of the task force)

Recommendation

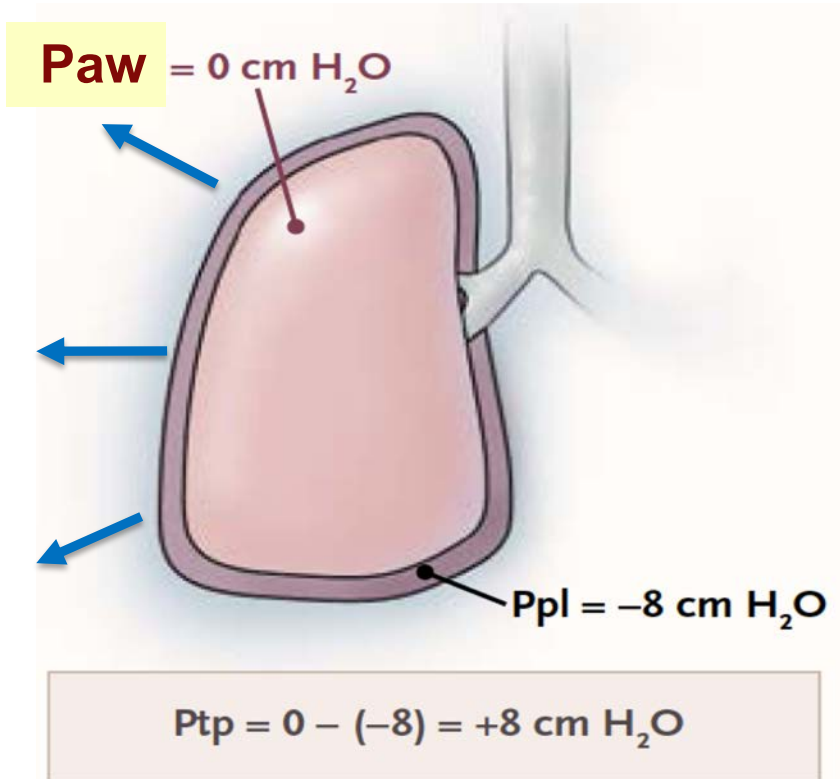
Given the uncertainty of evidence we are unable to offer a recommendation on the use of NIV for *de novo* ARF.



ESICM guidelines on acute respiratory distress syndrome: definition, phenotyping and respiratory support strategies

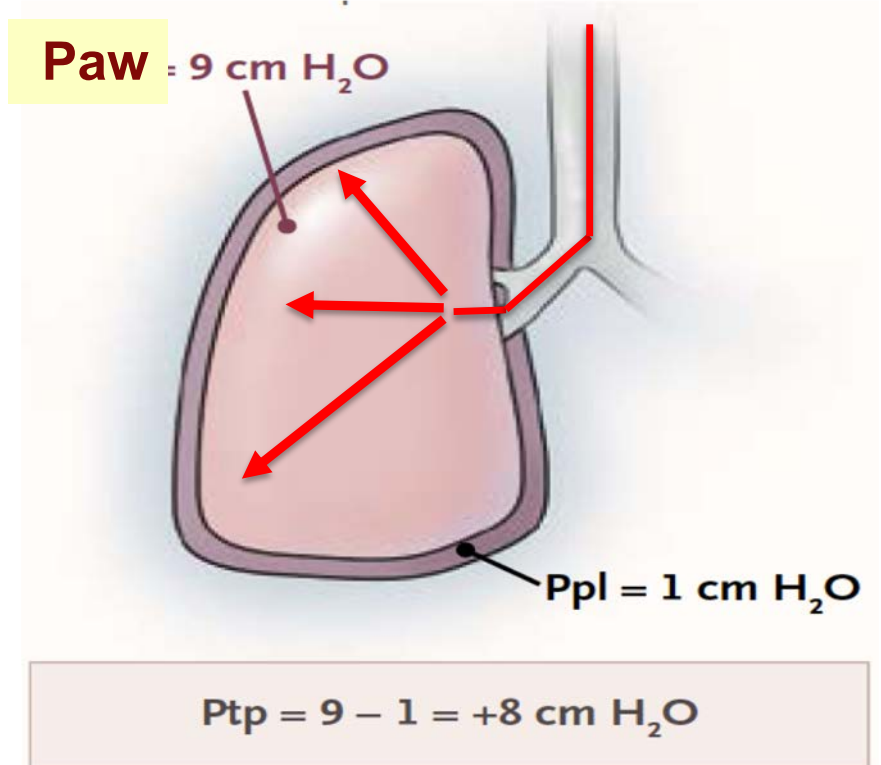
Pression transpulmonaire

Ventilation assistée



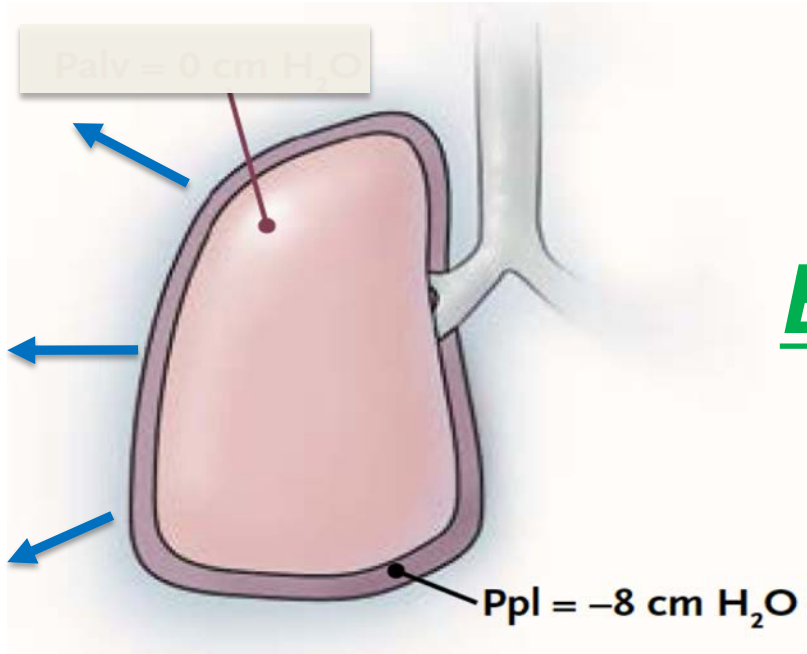
Pression transpulmonaire

Ventilation contrôlée

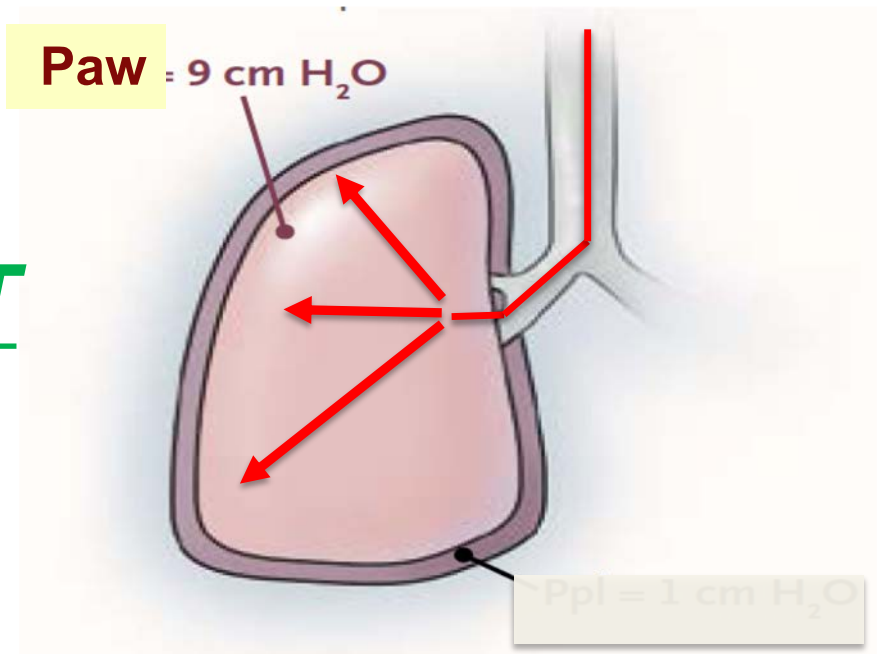


Pression transpulmonaire

Aide inspiratoire

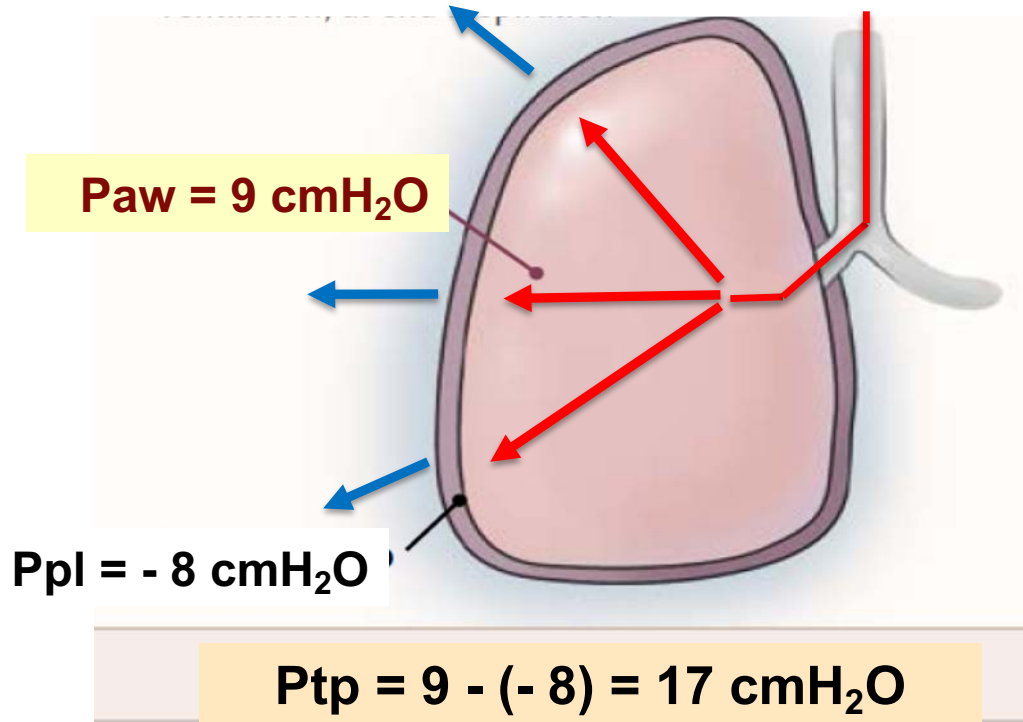


ET



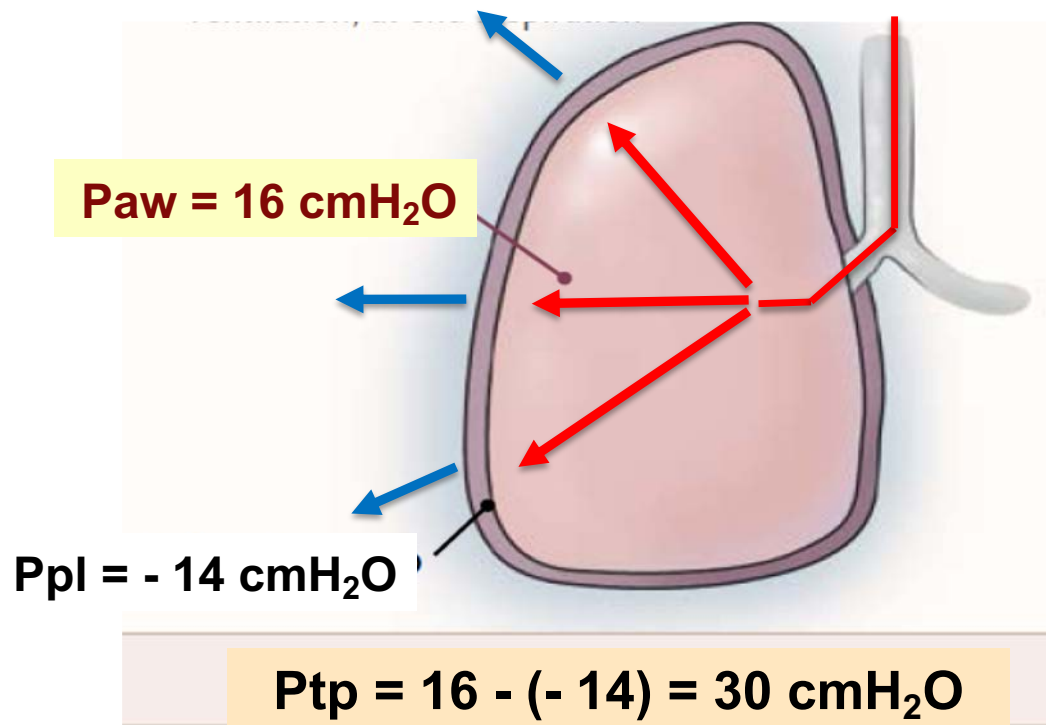
Pression transpulmonaire – Aide inspiratoire

Drive modéré – Niveau d'aide modéré



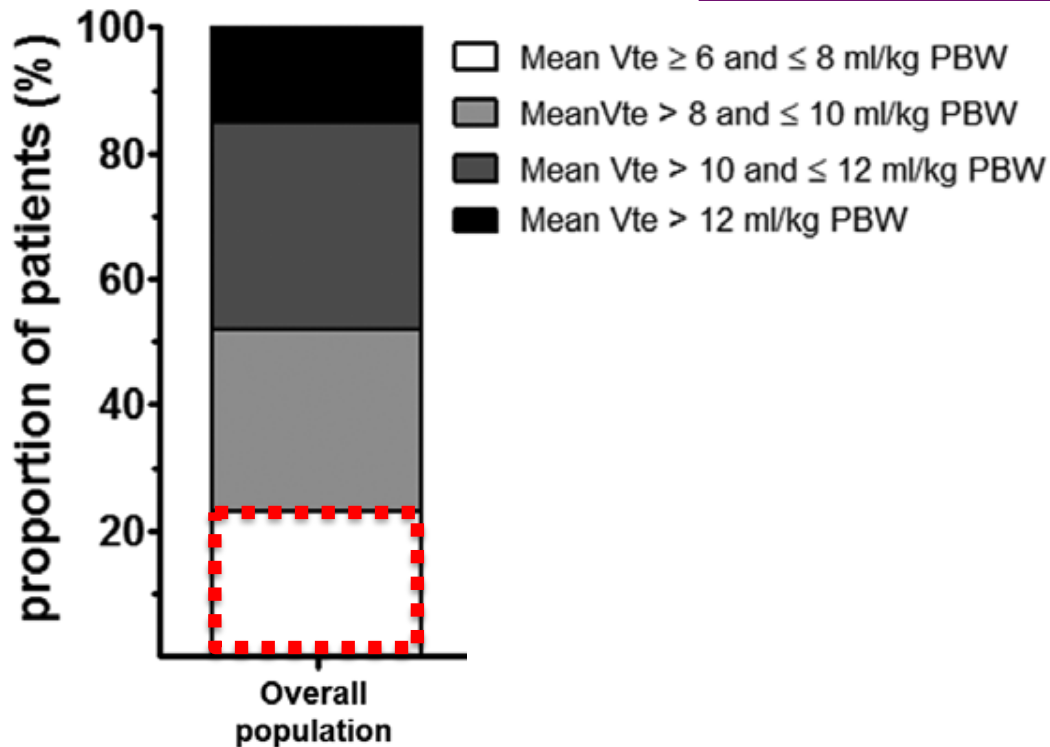
Pression transpulmonaire – Aide inspiratoire

Drive élevé – Niveau d'aide élevé



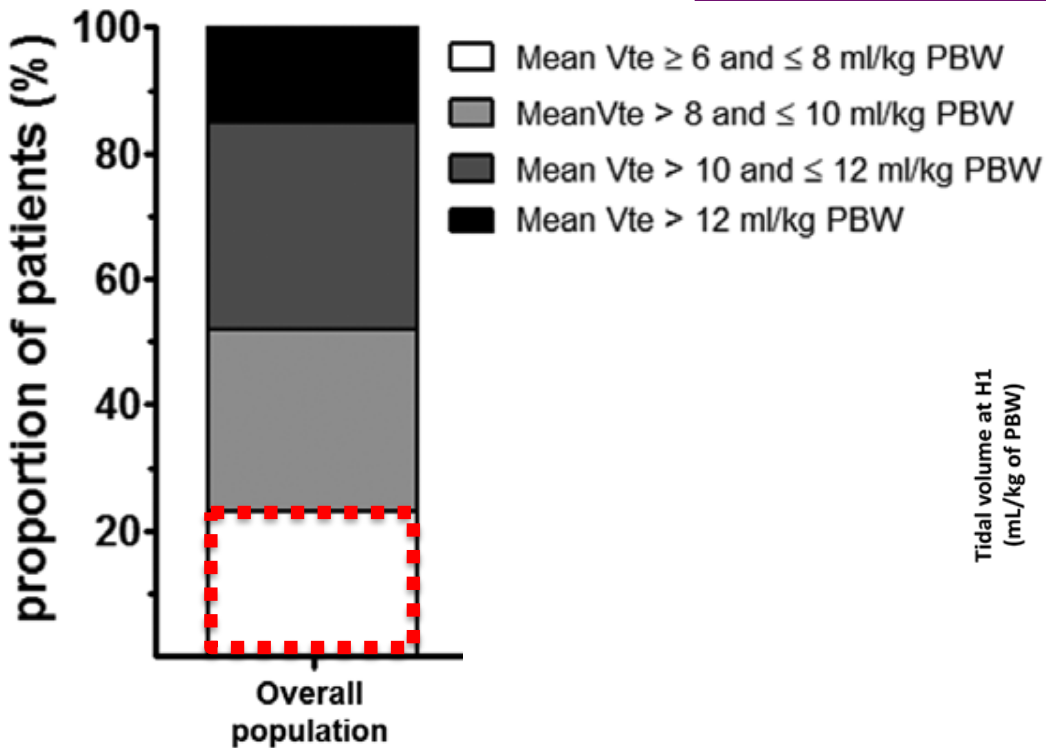
Commande respiratoire augmentée

Volume courant

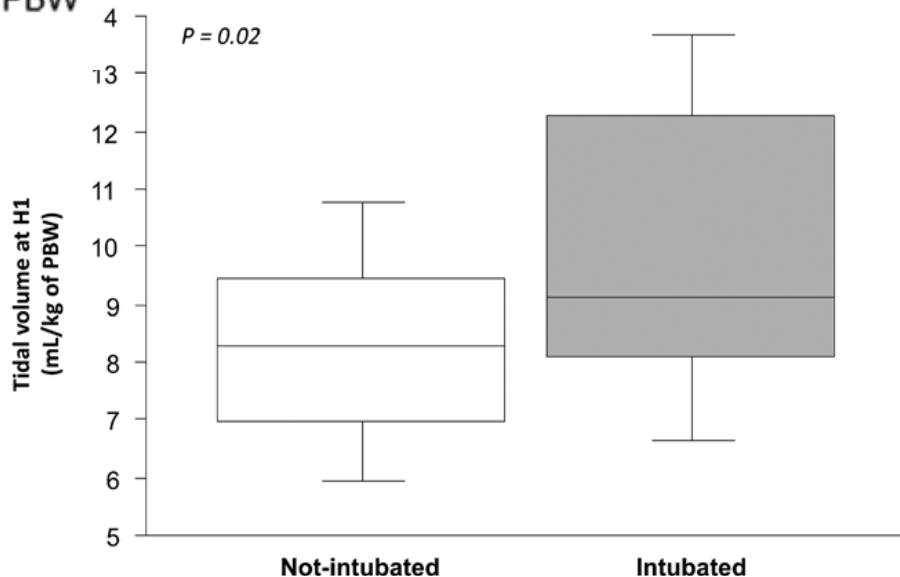


Commande respiratoire augmentée

Volume courant



Carteaux et al. Crit Care Med 2016



Frat et al. Crit Care Med 2018

Effect of Helmet Noninvasive Ventilation vs High-Flow Nasal Oxygen on Days Free of Respiratory Support in Patients With COVID-19 and Moderate to Severe Hypoxemic Respiratory Failure

The HENIVOT Randomized Clinical Trial

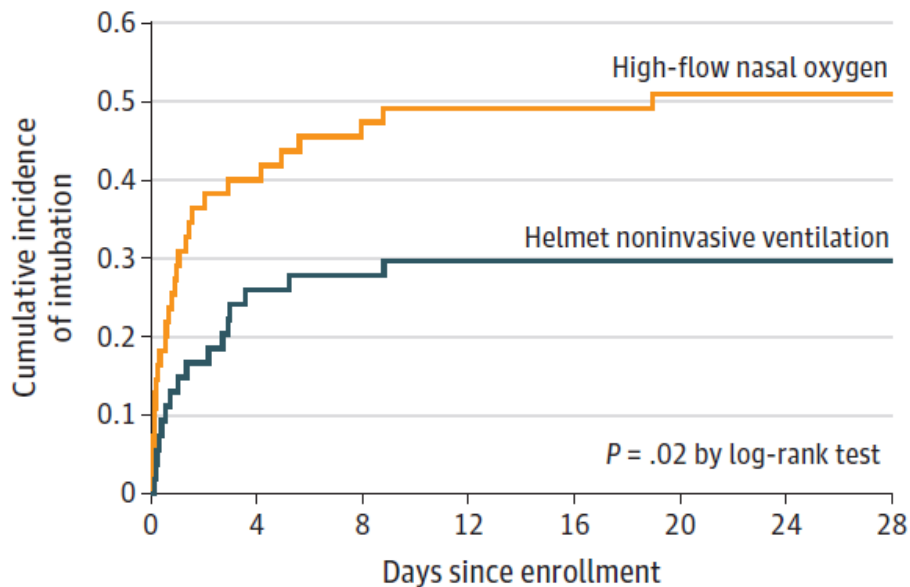
- 109 adults
- COVID-19 et $\text{PaO}_2/\text{FiO}_2 < 200$ mmHg
- VNI Helmet NIV vs. Haut débit
 - VNI Helmet x 48 hrs, PEEP = 10-12 cmH₂O, PS = 10-12 cmH₂O
 - Haut débit 60 L/min
- Primary outcome: 28-day respiratory support free days



Effect of Helmet Noninvasive Ventilation vs High-Flow Nasal Oxygen on Days Free of Respiratory Support in Patients With COVID-19 and Moderate to Severe Hypoxemic Respiratory Failure

The HENIVOT Randomized Clinical Trial

Intubation



Jours sans ventilation pas différent

Mortalité pas différente

Gérer la VNI dans l'IRA *de novo*

Restons pratiques et simples

- **Ne pas débiter la VNI**
 - *En cas de coma ou d'état de choc*
 - *Si l'hypoxémie est très sévère $PaO_2/FiO_2 < 200$ mmHg*
 - *Drive élevé $FR > 35/min$, volume courant expire > 9 ml/kg*
- **Dans les autres cas, vous pouvez tenter, mais évaluez**
- **Arrêtez la VNI si pas d'amélioration ou aggravation**
 - *Pas de ↓ de la FR, du tirage*
 - *Volume courant expire > 9 ml/kg*
 - *$PaO_2/FiO_2 < 200$ mmHg*

SDRA – Prévenir l'intubation

Détresse Respiratoire aigüe

Prévenir l'intubation

CPAP



Intubation
d'emblée

Effect of Noninvasive Respiratory Strategies on Intubation or Mortality Among Patients With Acute Hypoxemic Respiratory Failure and COVID-19

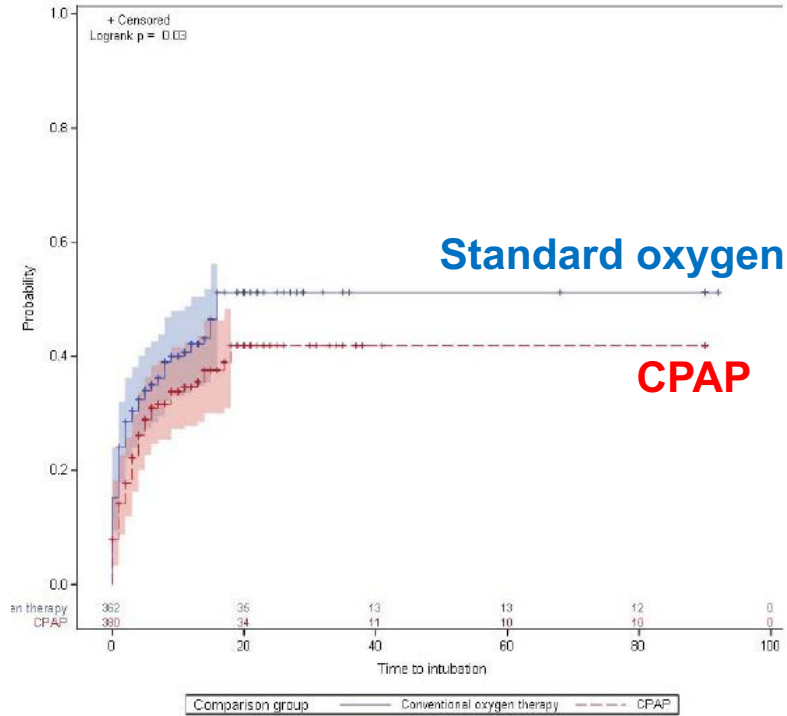
The RECOVERY-RS Randomized Clinical Trial

Gavin D. Perkins, MD; Chen Ji, PhD; Bronwen A. Connolly, PhD; Keith Couper, PhD; Ranjit Lall, PhD; J. Kenneth Baillie, PhD; Judy M. Bradley, PhD; Paul Dark, PhD; Chirag Dave, MD; Anthony De Souza, PhD; Anna V. Dennis, MBBS; Anne Devrell, BPhil; Sara Fairbairn, MB, BCh; Hakim Ghani, MSc; Ellen A. Gorman, MB, BCh; Christopher A. Green, DPhil; Nicholas Hart, PhD; Siew Wan Hee, PhD; Zoe Kimbley, MB, ChB; Shyam Madathil, MD; Nicola McGowan, MRes; Benjamin Messer, MA; Jay Naisbitt, MB, ChB; Chloe Norman, PGCE; Dhruv Parekh, PhD; Emma M. Parkin, MSc; Jaimin Patel, PhD; Scott E. Regan, BA; Clare Ross, MBBS; Anthony J. Rostron, PhD; Mohammad Saim, MBBS; Anita K. Simonds, MD; Emma Skilton, BSc; Nigel Stallard, PhD; Michael Steiner, MD; Rama Vancheeswaran, PhD; Joyce Yeung, PhD; Daniel F. McAuley, MD; for the RECOVERY-RS Collaborators

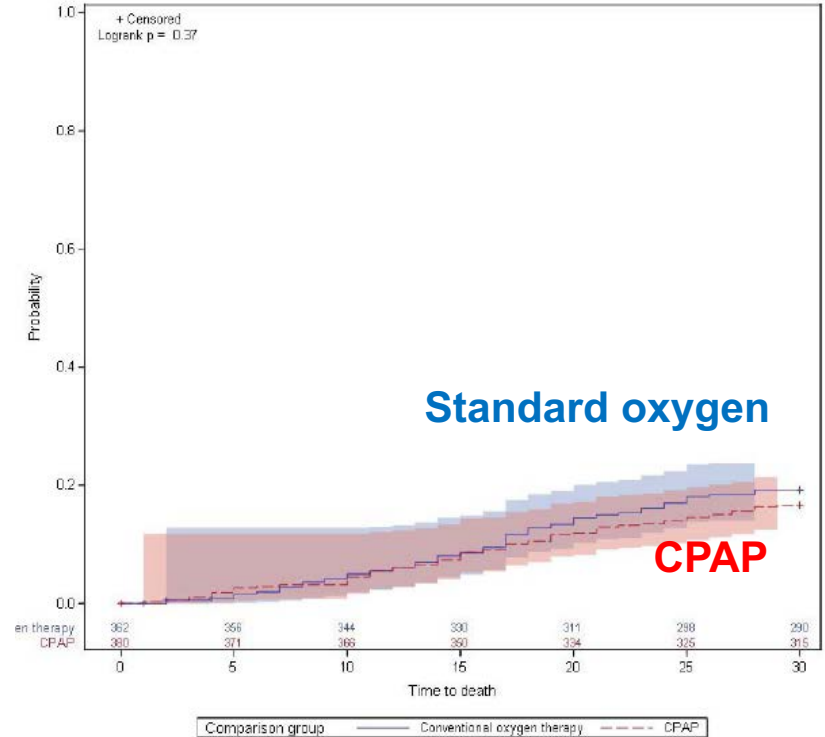
- **1273 adults**
- **COVID-19 and $SpO_2 \leq 94\%$ despite $FiO_2 \geq 40\%$**
- **CPAP (n=380) vs. standard oxygen (n=475)**
 - Procedures were not standardized
 - Cross over was allowed
- **Primary outcome: intubation or mortality within 30 days**

CPAP in COVID-19

Intubation



Mortality



Take home messages

Prise en charge non invasive du SDRA

- ***En dehors du COVID***
 - Le haut débit humidifié est recommandé
 - La VNI n'est pas recommandée (mais pas interdite) *prudence*
- ***Dans le COVID***
 - Le haut débit humidifié semble bénéfique
 - Et le helmet ?
- **Evaluons la CPAP !**
- **Il faut une surveillance rapprochée *FR, VT, SpO2***
- **Ne pas retarder l'intubation**

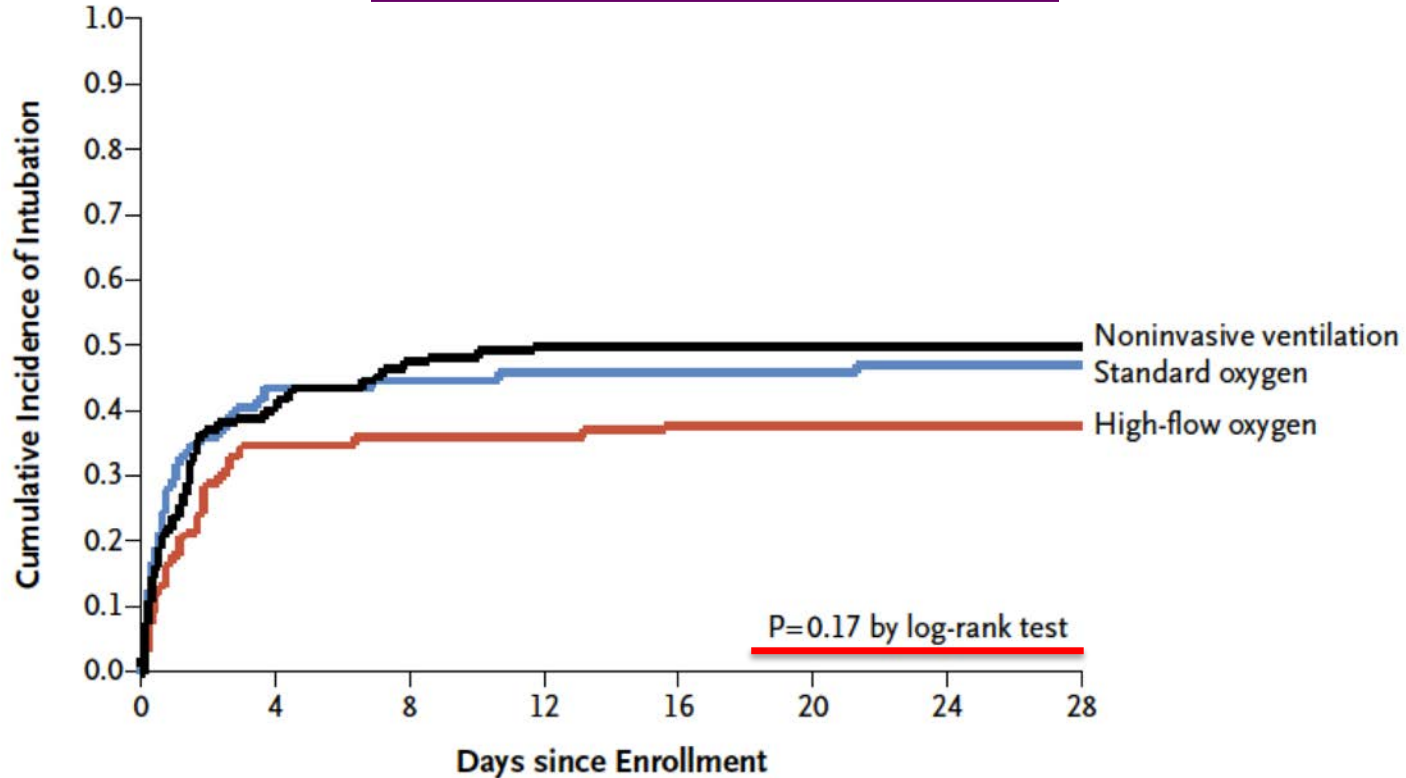
Merci de votre attention



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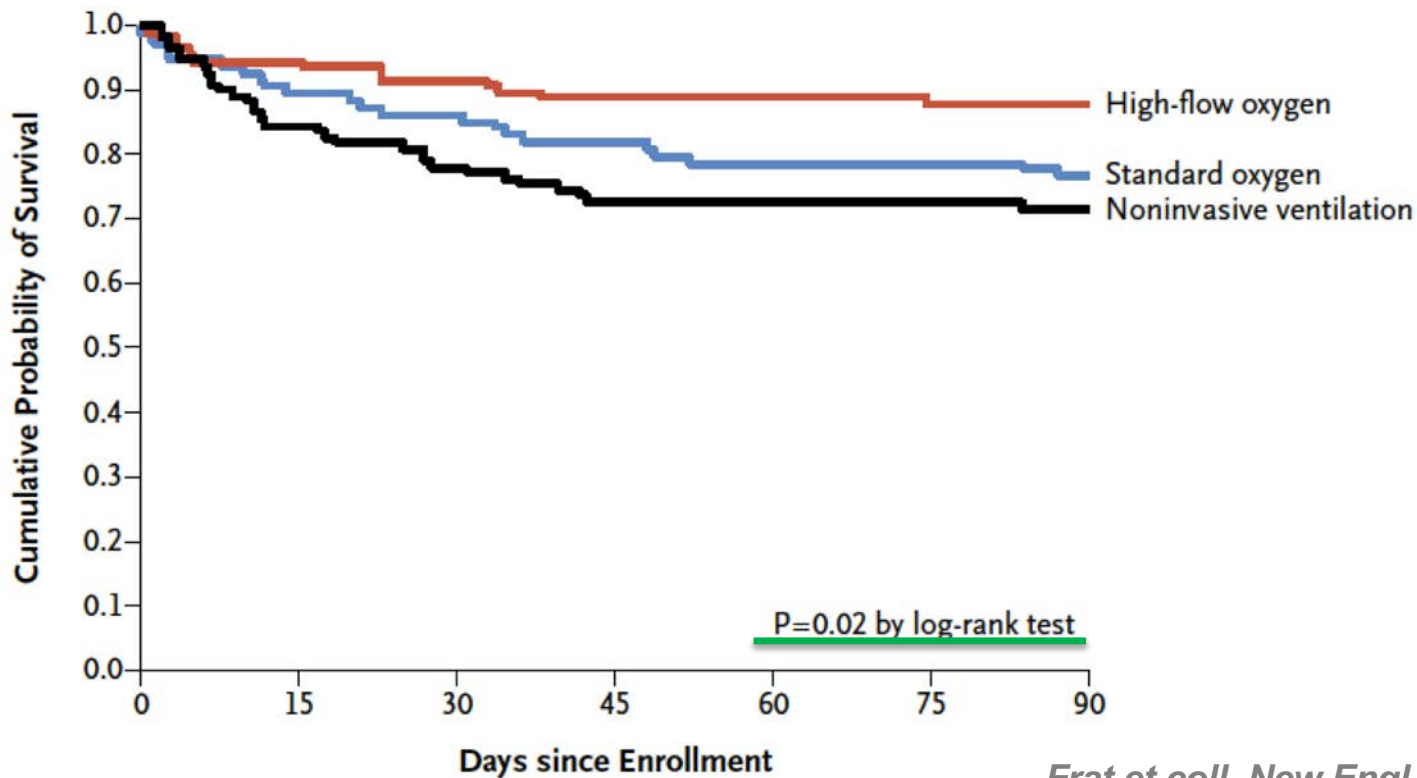
Essai FLORALI

Incidence cumulée IET



Essai FLORALI

Mortalité



Effect of High-Flow Nasal Cannula Oxygen vs Standard Oxygen Therapy on Mortality in Patients With Respiratory Failure Due to COVID-19

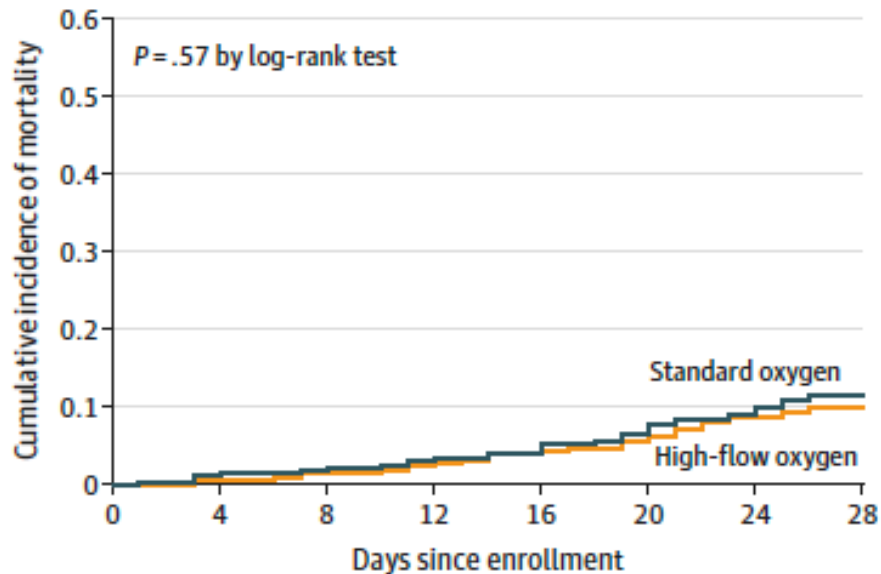
The SOHO-COVID Randomized Clinical Trial

Jean-Pierre Frat, MD, PhD; Jean-Pierre Quenot, MD, PhD; Julio Badie, MD; Rémi Coudroy, MD, PhD; Christophe Guitton, MD, PhD; Stephan Ehrmann, MD, PhD; Arnaud Gacouin, MD; Hamid Merdji, MD; Johann Auchabie, MD; Cédric Daubin, MD; Anne-Florence Dureau, MD; Laure Thibault, MD; Nicholas Sedillot, MD; Jean-Philippe Rigaud, MD, PhD; Alexandre Demoule, MD, PhD; Abdelhamid Fatah, MD; Nicolas Terzi, MD, PhD; Marine Simonin, MD; William Danjou, MD; Guillaume Carteaux, MD, PhD; Charlotte Guesdon, MD; Gaël Pradel, MD; Marie-Catherine Besse, MD; Jean Reignier, MD, PhD; François Beloncle, MD, PhD; Béatrice La Combe, MD; Gwénaél Prat, MD; Mai-Anh Nay, MD; Joe de Keizer, MSc; Stéphanie Ragot, PharmD, PhD; Arnaud W. Thille, MD, PhD; for the SOHO-COVID Study Group and the REVA Network

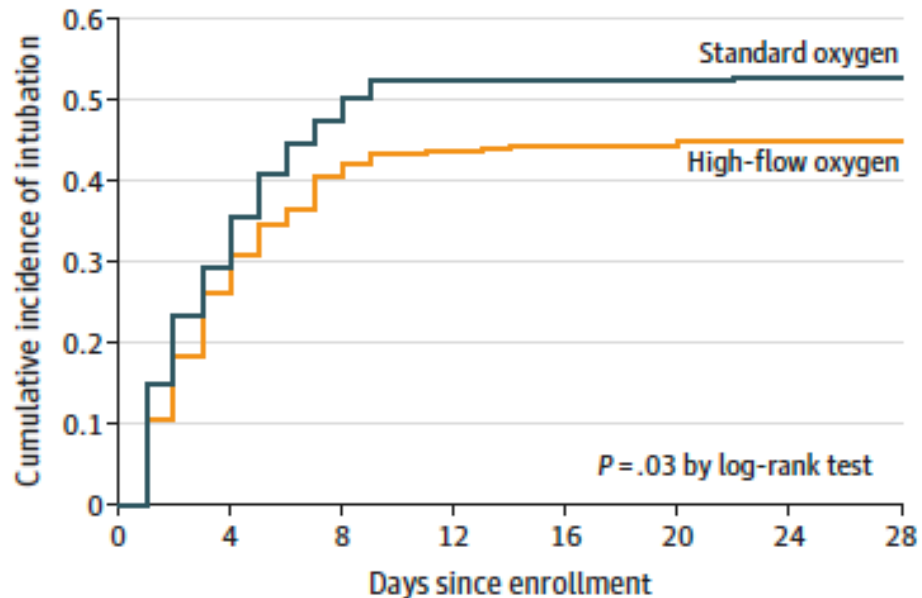
- **782 adults**
- **COVID-19 and $\text{PaO}_2/\text{FiO}_2 < 200$ mmHg**
- **HFNC vs. Standard O_2**
- **Primary outcome : mortalité à J-28**

OHD COVID-19 – SOHO-COVID

Mortalité



Intubation





ESICM guidelines on acute respiratory distress syndrome: definition, phenotyping and respiratory support strategies

Recommendation 4.1

We **suggest** the use of CPAP over conventional oxygen therapy to reduce the risk of intubation in patients with acute hypoxemic respiratory failure due to COVID-19.

Weak recommendation; low level of evidence in favor.

In this population, we are **unable to make a recommendation** for or against the use of CPAP over conventional oxygen therapy to reduce mortality.

No recommendation; moderate level of evidence of no effect.