Gestion de la ventilation avant intubation

COVID-19 et autres SDRA

Dr Damien VIGLINO, CHU Grenoble-Alpes

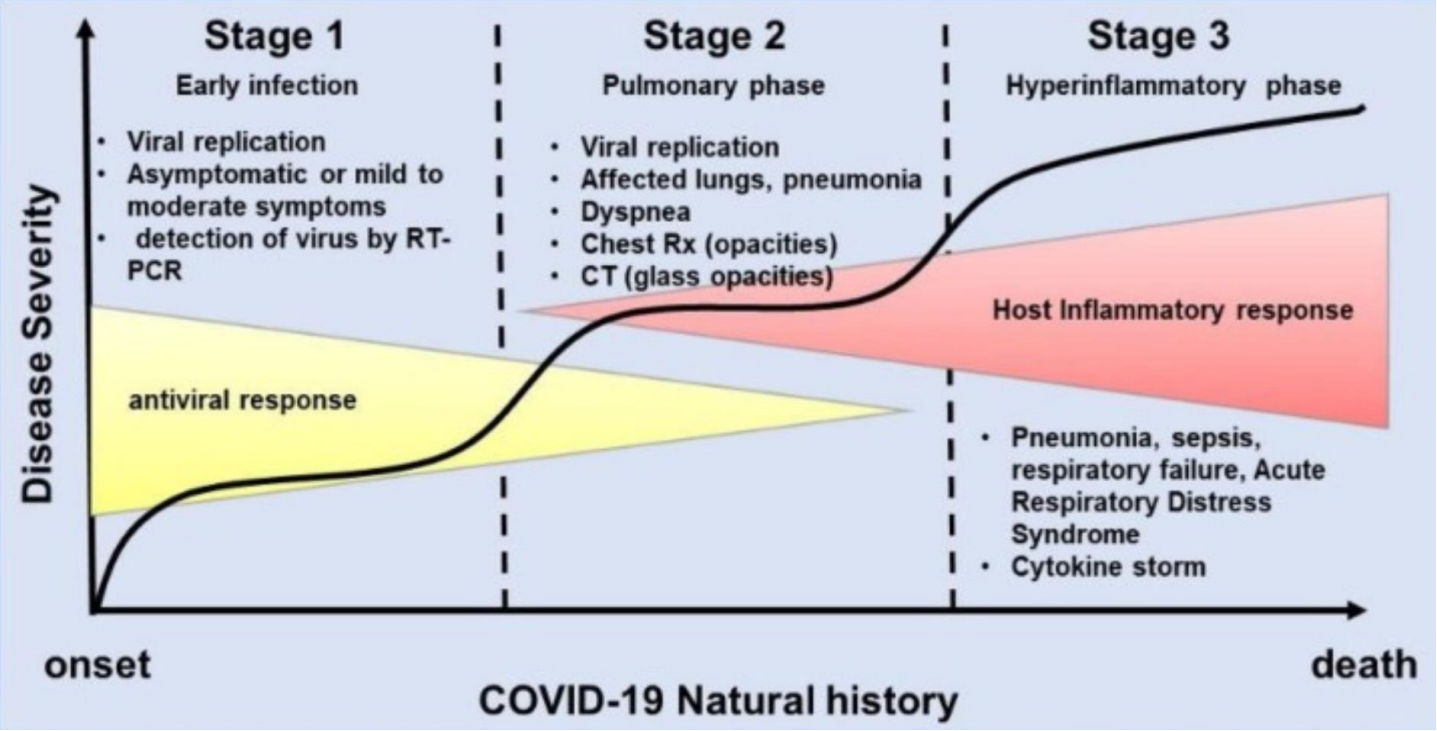
Les ENJEUX

Spécifique COVID ou non (SDRA)

- **Oxygénation / éviter l'intubation ?**
- **Risque infectieux**
- **Pré-oxygénation avant intubation**

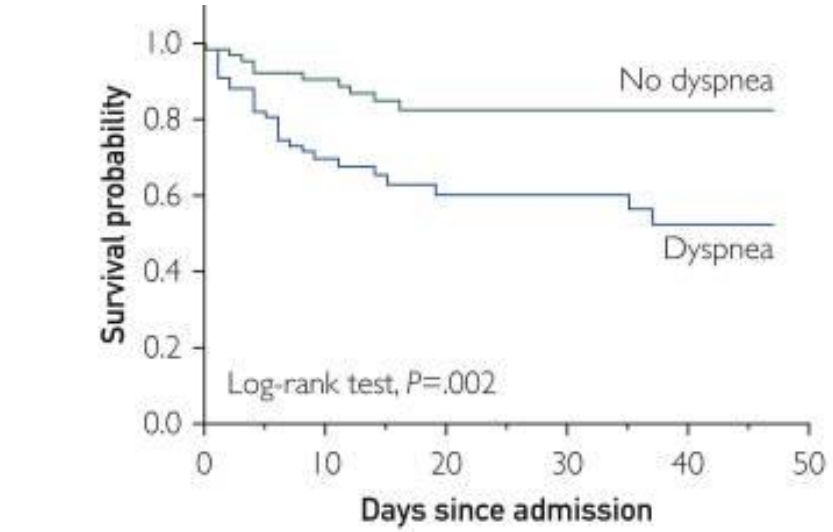
Oxygénation

Patients COVID à oxygéno-requerrance d'évolution rapide
Signe d'atteinte immunologique à J7 « tempête cytokinique », à compliance conservée
→ Longtemps bien toléré



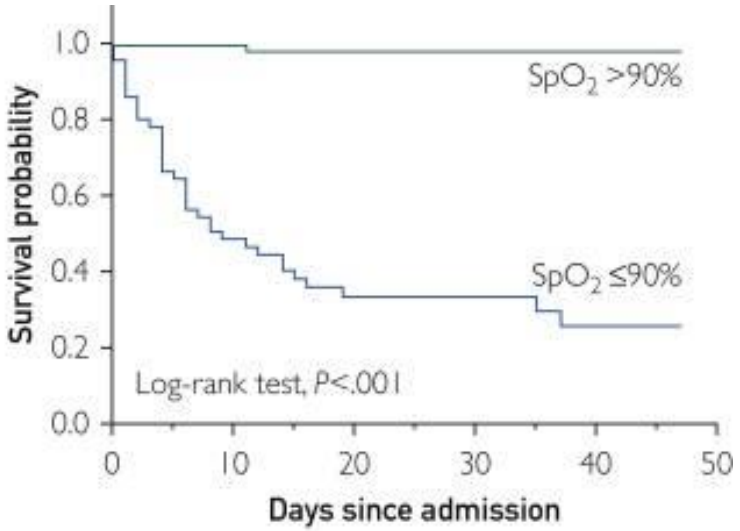
Gouvea Dos Santos et al., biomed pharmacother 2020

Oxygénation



No. at risk						
No dyspnea	71	50	27	17	12	4
Dyspnea	69	38	21	17	12	3

A



No. at risk						
SpO_2 >90%	89	64	35	23	17	5
SpO_2 ≤90%	51	25	13	11	7	2

B

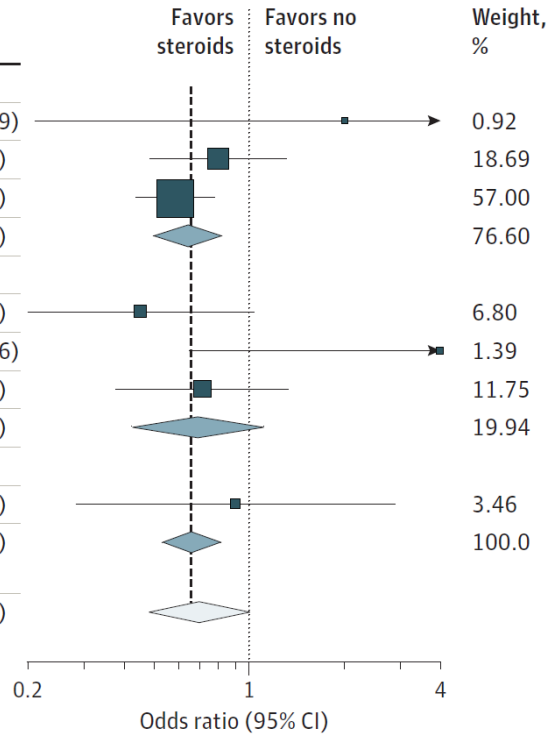
Xie et al., Mayo clin Proc 2020

Oxygénation

Dexamethasone et corticothérapie
6 mg/j dès oxygénodépendance

Figure 2. Association Between Corticosteroids and 28-Day All-Cause Mortality in Each Trial, Overall, and According to Corticosteroid Drug

Drug and trial	ClinicalTrials.gov identifier	Initial dose and administration	No. of deaths/total No. of patients: Steroids	No. of deaths/total No. of patients: No steroids	Odds ratio (95% CI)
Dexamethasone					
DEXA-COVID 19	NCT04325061	High: 20 mg/d intravenously	2/7	2/12	2.00 (0.21-18.69)
CoDEX	NCT04327401	High: 20 mg/d intravenously	69/128	76/128	0.80 (0.49-1.31)
RECOVERY	NCT04381936	Low: 6 mg/d orally or intravenously	95/324	283/683	0.59 (0.44-0.78)
Subgroup fixed effect			166/459	361/823	0.64 (0.50-0.82)
Hydrocortisone					
CAPE COVID	NCT02517489	Low: 200 mg/d intravenously	11/75	20/73	0.46 (0.20-1.04)
COVID STEROID	NCT04348305	Low: 200 mg/d intravenously	6/15	2/14	4.00 (0.65-24.66)
REMAP-CAP	NCT02735707	Low: 50 mg every 6 h intravenously	26/105	29/92	0.71 (0.38-1.33)
Subgroup fixed effect			43/195	51/179	0.69 (0.43-1.12)
Methylprednisolone					
Steroids-SARI	NCT04244591	High: 40 mg every 12 h intravenously	13/24	13/23	0.91 (0.29-2.87)
Overall (fixed effect) $P = .31$ for heterogeneity; $I^2 = 15.6\%$			222/678	425/1025	0.66 (0.53-0.82)
Overall (random effects[a])			222/678	425/1025	0.70 (0.48-1.01)



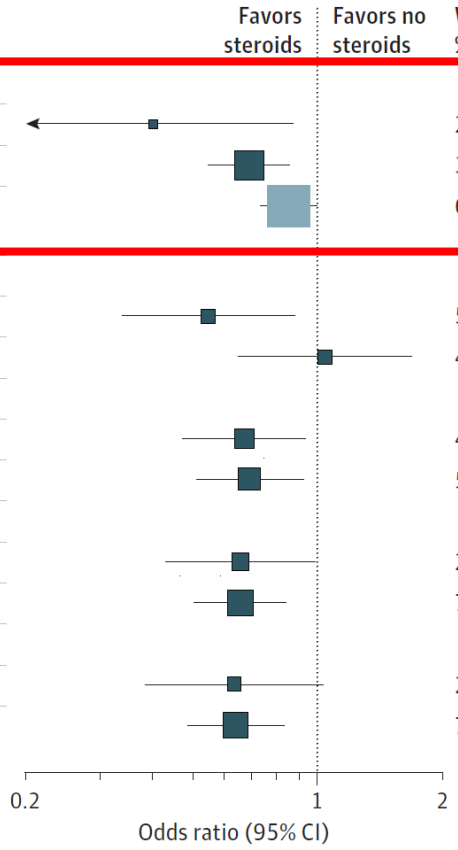
WHO REACT group., JAMA 2020

Oxygénation

Corticothérapie et sévérité

Figure 3. Association Between Corticosteroids and 28-Day All-Cause Mortality Within Subgroups Defined by Patient Characteristics at the Time of Randomization

Subgroup	No. of deaths/total No. of patients: Steroids	No. of deaths/total No. of patients: No steroids	Odds ratio (95% CI)	Weight, %
Invasive mechanical ventilation (IMV)				
No (I^2 = 0%)	14/70	28/74	0.41 (0.19-0.88)	2.7
Yes (I^2 = 44.1%)	208/608	397/951	0.69 (0.55-0.86)	31.7
Oxygen treatment without IMV (RECOVERY)	298/1279	682/2604	0.86 (0.73-1.00)	65.6
Taking vasoactive medication				
No (I^2 = 0%)	51/184	68/184	0.55 (0.34-0.88)	50.2
Yes (I^2 = 0%)	76/169	74/158	1.05 (0.65-1.69)	49.8
Age, y				
≤60 (I^2 = 0%)	72/338	141/483	0.67 (0.48-0.94)	42.7
>60 (I^2 = 49.7%)	150/339	284/541	0.69 (0.51-0.93)	57.3
Sex				
Female (I^2 = 0%)	60/202	106/286	0.66 (0.43-0.99)	27.4
Male (I^2 = 14.7%)	162/476	319/739	0.66 (0.51-0.84)	72.6
Symptomatic, d				
≤7 (I^2 = 69.1%)	51/130	99/211	0.63 (0.39-1.04)	22.4
>7 (I^2 = 0%)	139/418	293/693	0.64 (0.49-0.83)	77.6

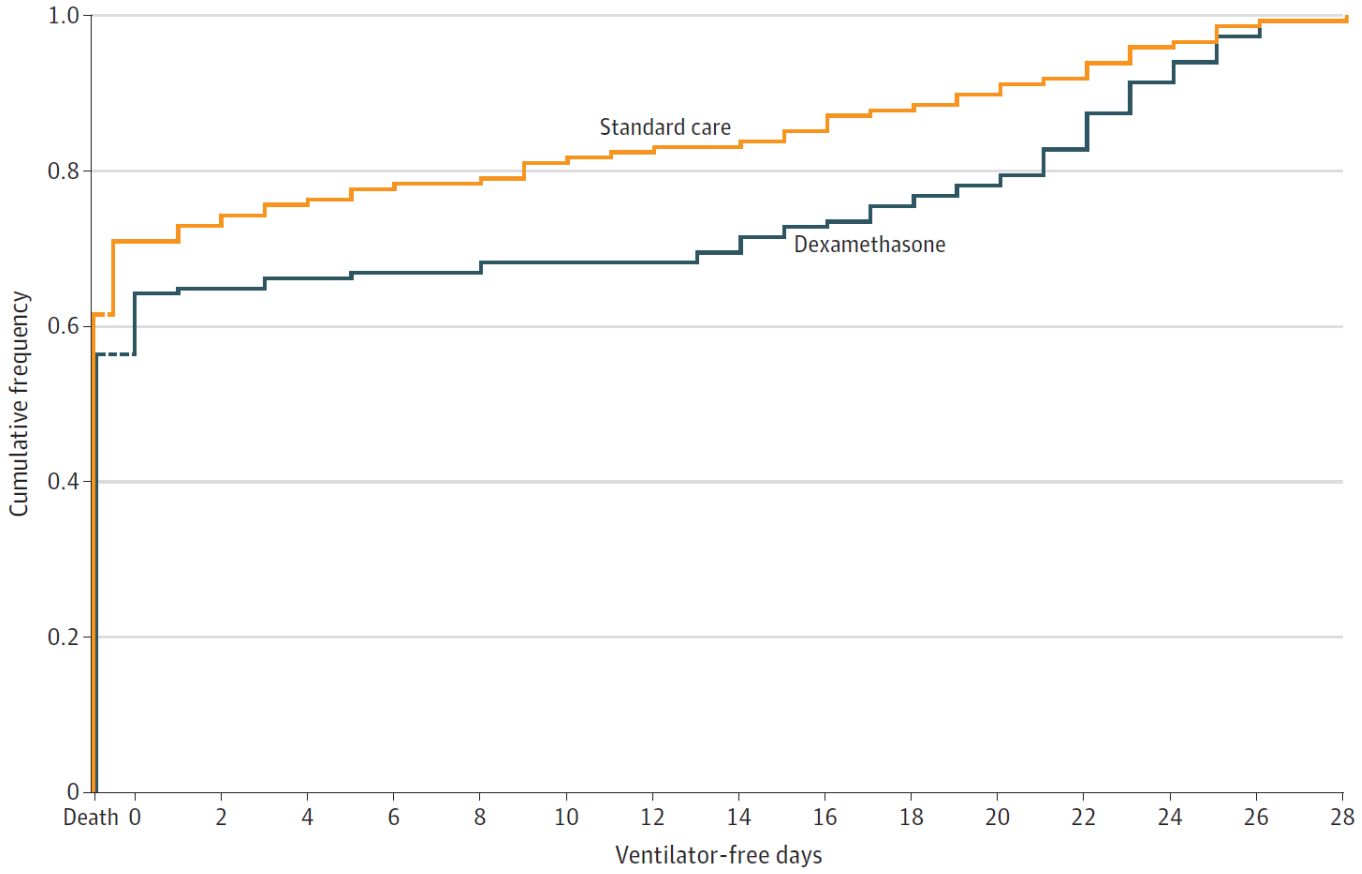


WHO REACT group., JAMA 2020

Oxygénation

Effet à relativiser

Figure 2. Ventilator-Free Days at 28 Days



299 SDRA modérés/séveres
Dexamethasone vs standard

4.0 vs. 6.6 ventilator-free days (à 28 j)

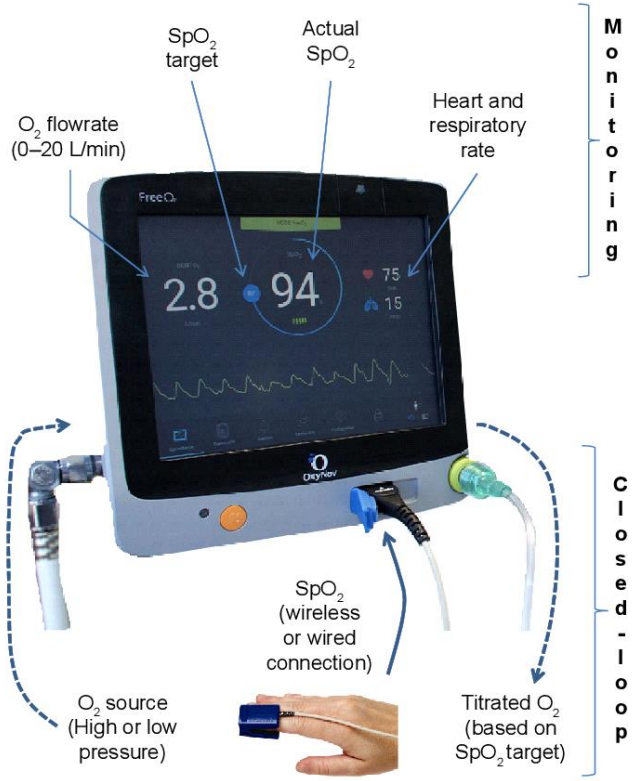
Pas de différence de mortalité
Moins de complications infectieuses

Tomazini et al., JAMA 2020

Oxygénation

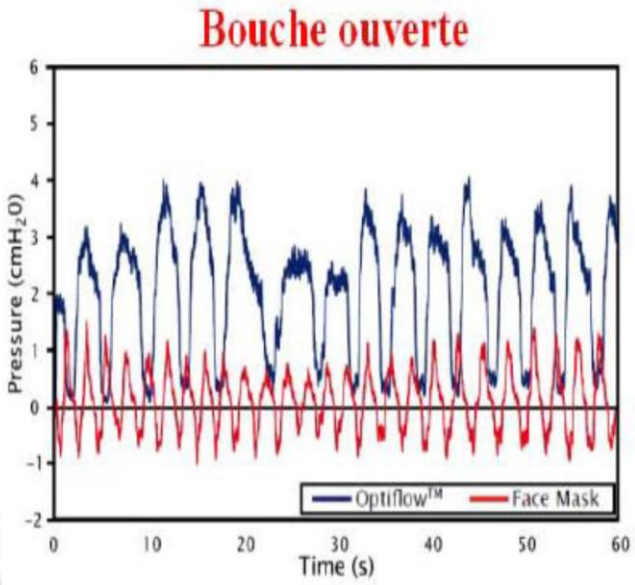
Oxygénation automatisée : nouvel intérêt

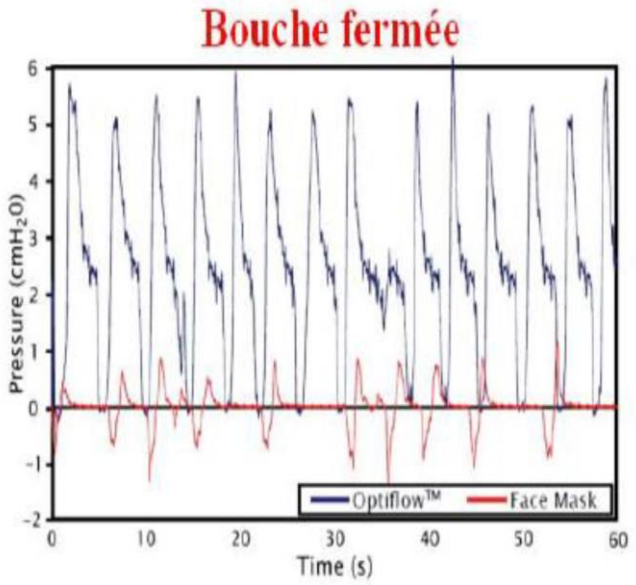
- **Adaptation temps réel, sevrage**
- **Limitation effets indésirables (stress ox / inflammatoire/ BPCO)**
- **Limitation manipulations (risque infectieux)**

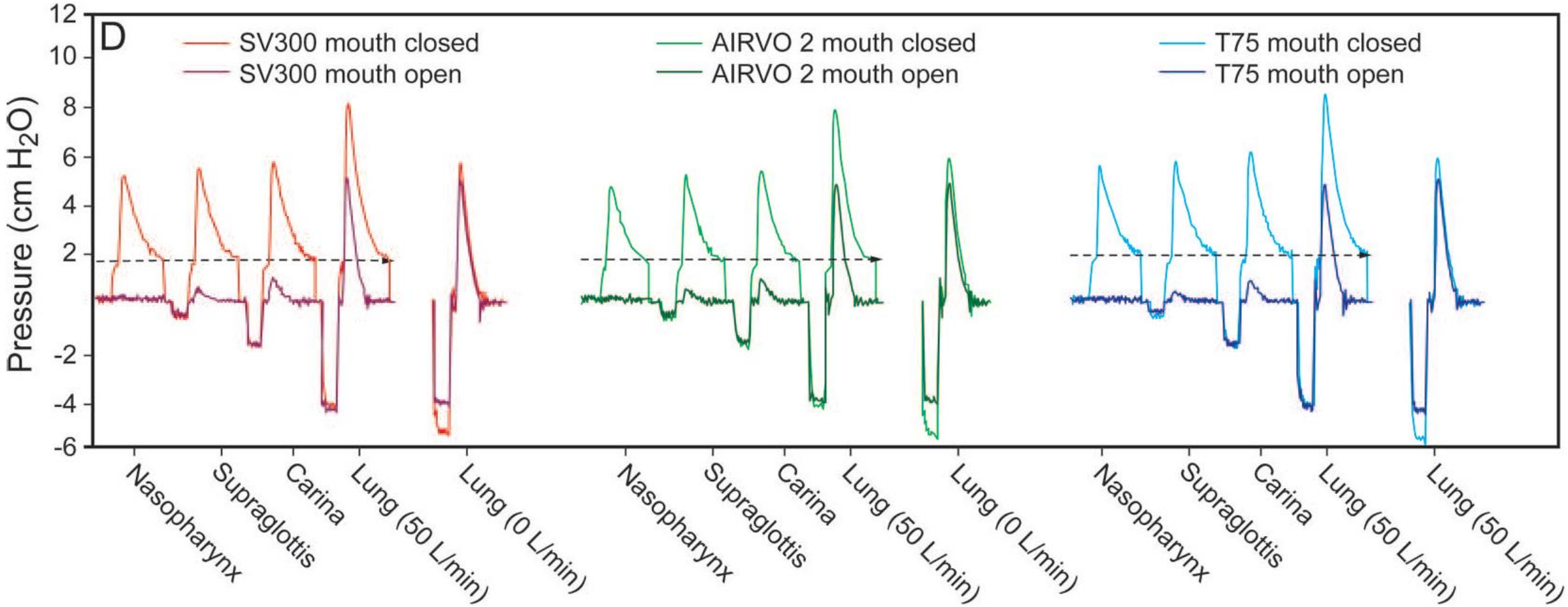


Oxygénation

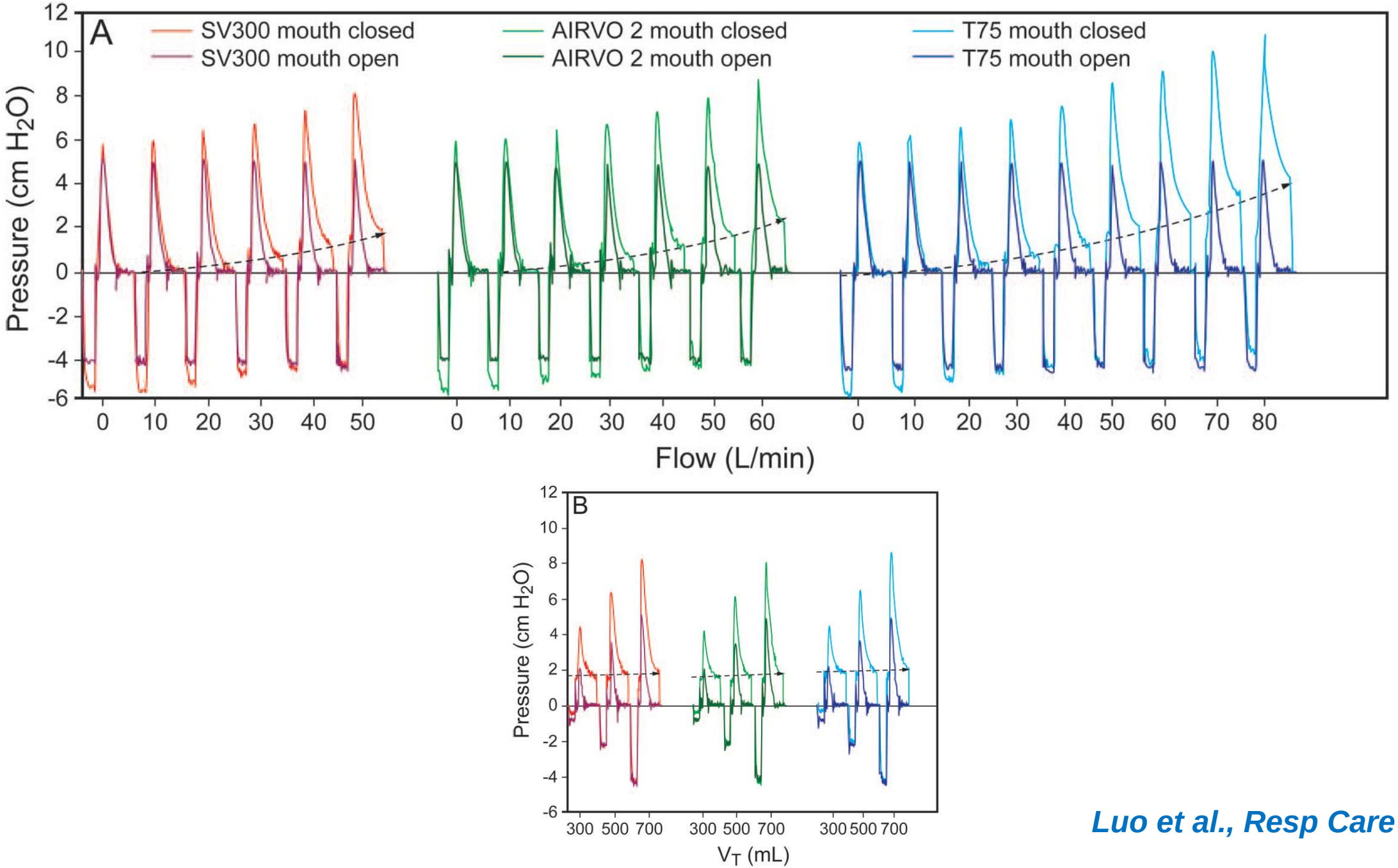
HFNC / Optiflow / AIRVO 2
= MODE D'OXYGENATION >>>> de VENTILATION
Objectif FIO2 100% et tolérance







Luo et al., Resp Care 2017



Luo et al., Resp Care 2017

Oxygénation

HFNC et COVID-19

Hu *et al. BMC Pulm Med* (2020) 20:324
https://doi.org/10.1186/s12890-020-01354-w

BMC Pulmonary Medicine

RESEARCH ARTICLE Open Access

Application of high-flow nasal cannula in hypoxemic patients with COVID-19: a retrospective cohort study

Ming Hu[1†], Qiang Zhou[2†], Ruiqiang Zheng[3], Xuyan Li[4], Jianmin Ling[5], Yumei Chen[1], Jing Jia[5] and Cuihong Xie[5*]

105 patients, rétrospectif

SpO2 ≤92% ou RR≥22 sous MHC >10L/min

65 (61,9%) sevrés avec succès

Oxygénation

HFNC et COVID-19

Table 1 Characteristics of patients with severe COVID-19 treated with HFNC

Characteristics	All patients ($n=105$)	Outcome of HFNC treatment		p value
		Success ($n=65$)	Failure ($n=40$)	
Baseline characteristics				
Age (years)	64.0±11.3	59.5±10.9	71.3±7.6	<0.001
Sex, male	51 (48.6%)	26 (40.0%)	25 (62.5%)	0.025
Smoking	11 (10.5%)	7 (10.8%)	4 (10.0%)	0.901
Comorbidities	60 (57.1%)	35 (53.8%)	25 (62.5%)	0.384
Lab tests at admission				
LYM ($\times 10^9$/L; normal range 1.1–3.2)	0.63 (0.43–0.80)	0.62 (0.49–0.79)	0.70 (0.36–0.80)	0.777
D–D (ug/ml; normal range 0.0–0.5)	0.67 (0.42–4.19)	0.62 (0.42–1.78)	1.04 (0.46–5.00)	0.056
CRP (mg/L; normal range 0.0–5.0)	46.8 (28.2–83.5)	45.6 (30.4–83.5)	39.3 (23.4–85.4)	0.946
Time from onset of symptom to hospital admission (days)	10.0 (7.0–12.0)	10.0 (7.0–12.0)	9.0 (5.0–12.0)	0.373
Time from admission to HFNC application (days)	1.0 (0.0–2.0)	1.0 (0.0–2.0)	1.0 (1.0–2.0)	0.129
PaO_2/FiO_2 at HFNC application	116.0 (102.1–132.0)	116.0 (102.7–128.0)	112.8 (100.5–138.5)	0.722
PSI	76.0 (54.0–82.5)	62.0 (49.0–80.0)	81.5 (78.0–97.5)	<0.001
APACHE II of 24h admission	8.0 (6.5–10.0)	8.0 (5.0–10.0)	9.0 (8.0–10.8)	0.006
SOFA admission	3.0 (3.0–4.0)	3.0 (3.0–3.0)	4.0 (3.0–5.0)	<0.001
Length of HFNC (days)	5.0 (2.5–9.0)	6.0 (3.5–8.5)	3.0 (2.0–11.0)	0.115
Length of hospital stay (days)	14.0 (10.5–19.0)	14.0 (12.0–20.0)	11.5 (7.0–14.0)	0.001

Each parameter is expressed as number (percentage) or median (interquartile range). Parameters in each group were compared using Fisher's exact test or the Mann–Whitney U test. HFNC, high-flow nasal cannula oxygen therapy; LYM, lymphocyte number; D-D, D-dimer; CRP, C-reaction protein

Hu et al., BMC Pulm Med 2020

Oxygénation

HFNC et COVID-19

Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Use of high-flow nasal cannula and noninvasive ventilation in patients with COVID-19: A multicenter observational study

Jun Duan [a,*,1], Baixu Chen [b,1], Xiaoyi Liu [c,1], Weiwei Shu [d], Wei Zhao [e], Ji Li [f], Yishi Li [a], Yueling Hong [a], Longfang Pan [a], Ke Wang [g,**]

23 HFNC première ligne → 10 « échecs » → VNI [IOT 17%]
10 MHC première ligne → 1 « echec » → HFNC [IOT 15%]

Médiane à l'intubation : 8.4 jours (IQR: 4.4–18.5)

Oxygénation

HFNC et COVID-19

RESPIRATORY CARE

Research Article | *Original Research*

High-flow nasal cannula in COVID-19: Outcomes of application and examination of the ROX index to predict success

https://doi.org/10.4187/respcare.08631

Cite as: RESPCARE 2020; 10.4187/respcare.08631

Received: 7 December 2020
Accepted: 7 December 2020

$$\text{ROX Index} = \frac{SPO_2/FIO_2}{\text{Respiratory Rate}}$$

Respiratory rate - OXygenation

272 patients sous HFNC

164 (60.3%) sevrés « avec succès »

61 échecs <48h
47 échecs >48h

Mortalité 45.4% après « échec » d'HFNC

ROX index >3.0 at 2, 6, 12 h 85.3% sensibilité de "succès"

→ CQFD : - les patients les plus oxygéno-dépendants sont ceux chez qui l'HFNC ne suffit pas
- l' «effet AI/PEP» sous IOT et soins REA peut « sauver » 50% des plus oxygéno-dépendants

Oxygénation

HFNC et COVID-19

<u>Nous attendons des études solides :</u>

-HFNC vs VNI FiO2 100% vs IOT en première ligne chez patients avec SpO2 ≤ 92% sous MHC 15L/min

<u>En attendant :</u>

-économie de respirateurs / journées de REA / Complications liés à la VM
-Peut permettre d'éviter une part des IOT pour les patients « borderline » de l'IOT (oxygénodépendance)
-Attention aux patients arrivant avec épuisement ventilatoire, âgés, respiratoires chroniques

Oxygénation

Oxygénothérapie hyperbare

practice

Hyperbaric oxygen therapy in preventing mechanical ventilation in COVID-19 patients: a retrospective case series

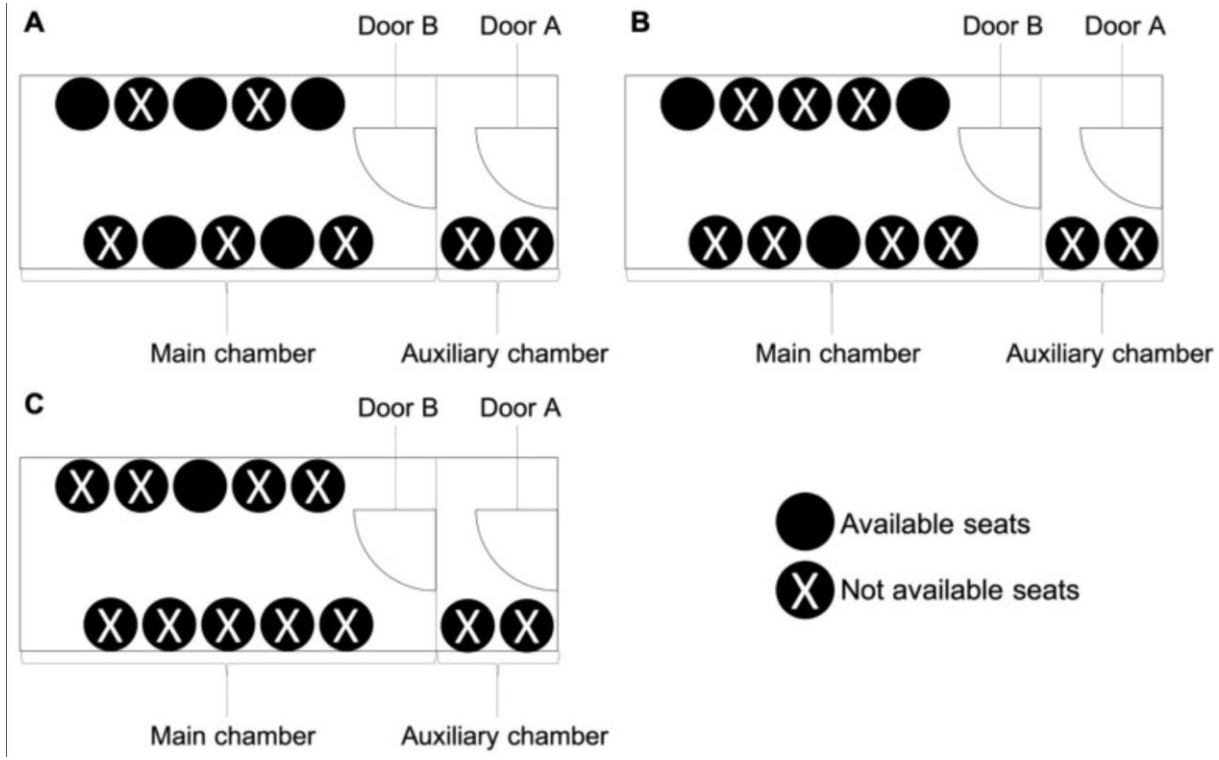
5 patients, 2 ATM 90 minutes
1 à 6 scéances
« dramatic improvement with HBOT »
Aucun IOT
Baisse marqueurs inflammatoires

→ Peu sérieux en termes de disponibilité pandémique et de risques si dégradation
→ Mais logique en terme d'oxygénation, comme l'ECMO…

Thibodeaux et al., J Wound Care 2020

Oxygénation

Caisson hyperbare et risque infectieux !

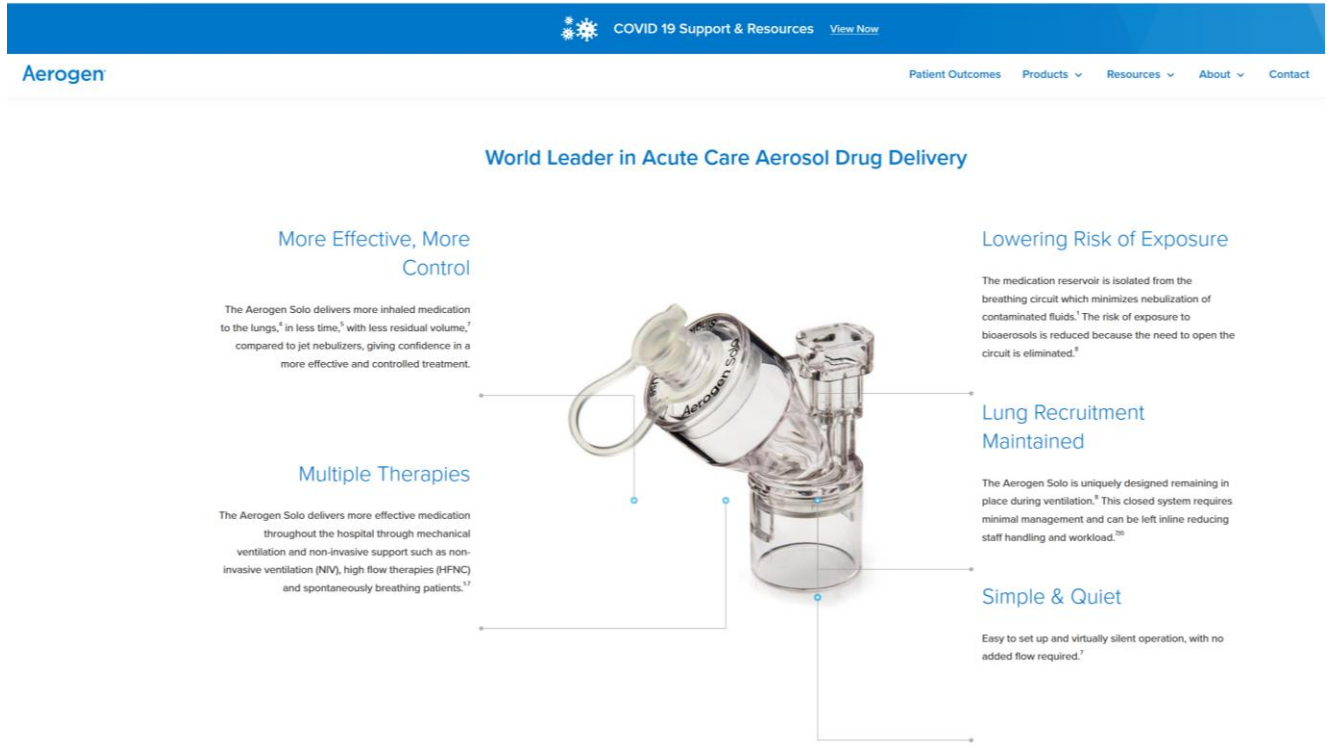


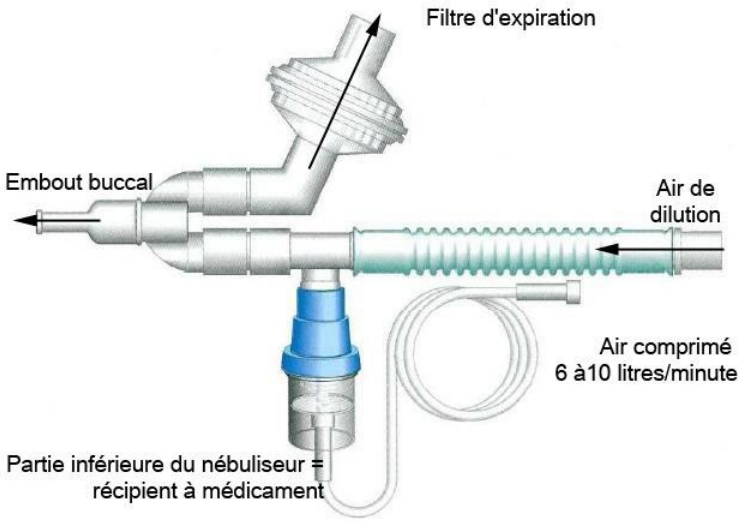
Lo et al., Medicina 2020

Oxygénation

COVID et risque infectieux !

- **Protections passives +++ : Masques FFP2, lunettes, « tentes de brancard » ou autres paravents…**
- **Pièces hospitalières : ventilation normée (3-4 ren. / H) : sens du flux ?**
- **Protocole de distanciation : IOT au vidéo-laryngoscope**
- **Aérosols en circuit fermé sur filtre (patient compliant) ou sur VNI**

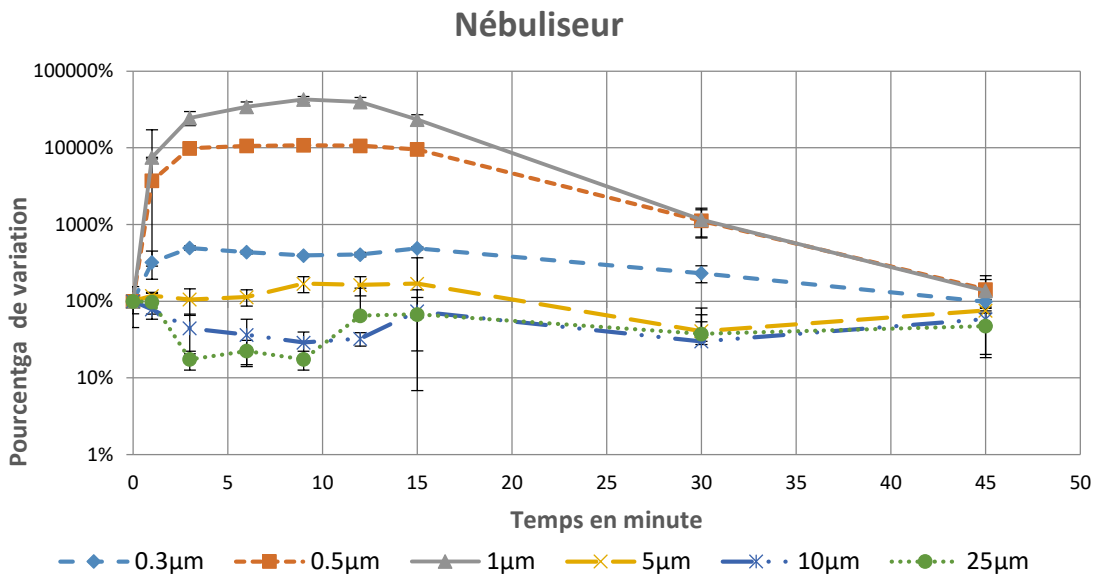


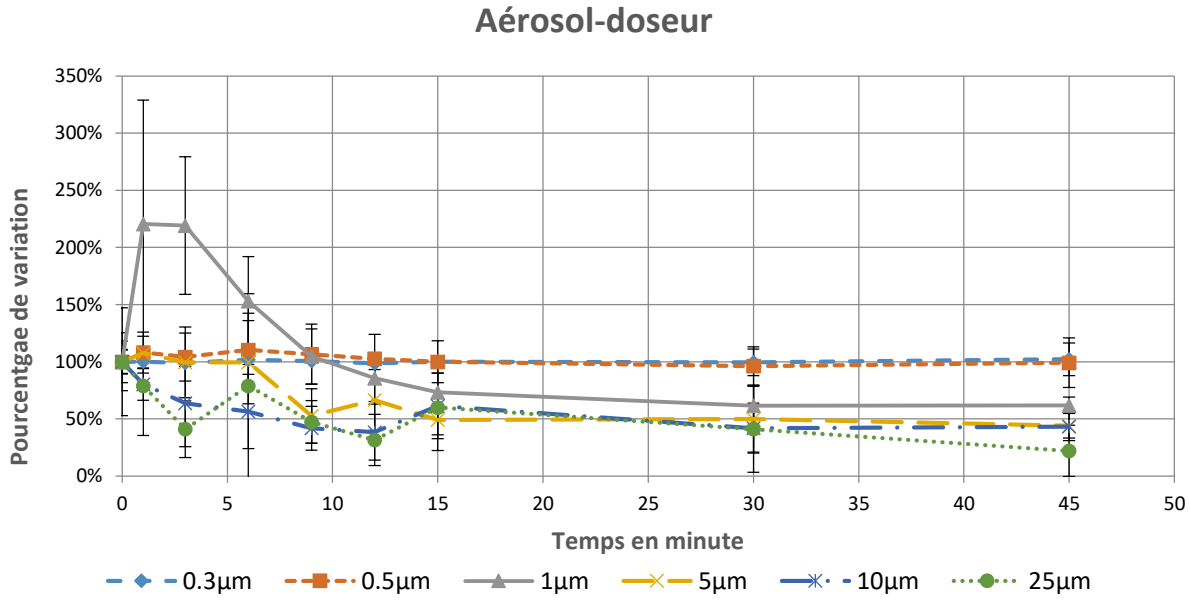


Oxygénation

COVID et risque infectieux !

- **Protections passives +++ : Masques FFP2, lunettes, « tentes de brancard » ou autres paravents…**
- **Pièces hospitalières : ventilation normée (3-4 ren. / H) : sens du flux ?**
- **Protocole de distanciation : IOT au vidéo-laryngoscope**
- **Aérosols en circuit fermé sur filtre (patient compliant) ou sur VNI**



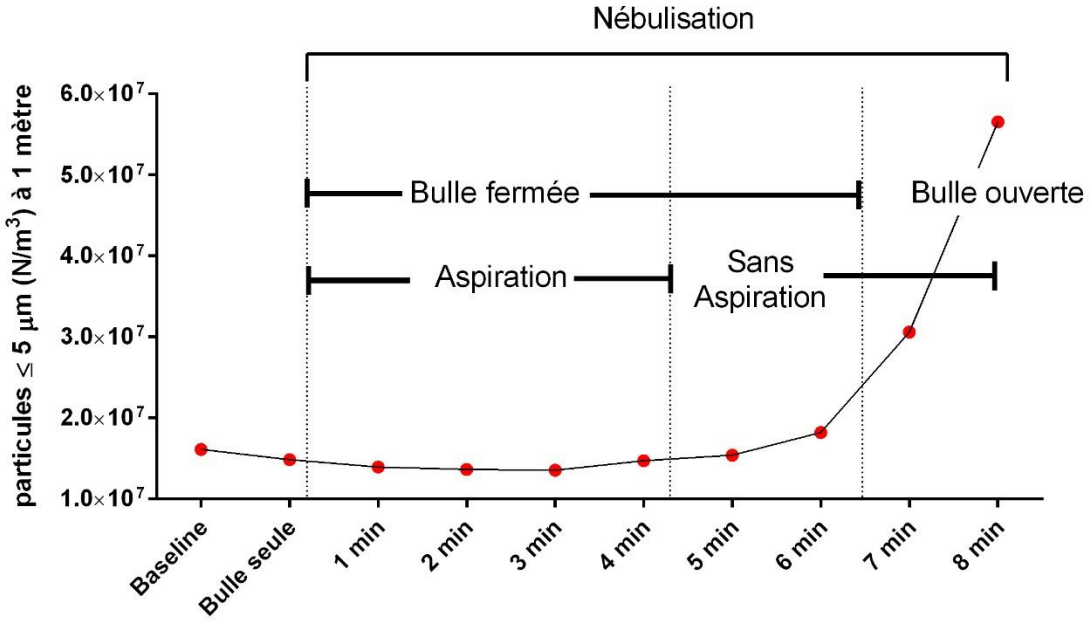


Données personnelles (D VIGLINO, M MAIGNAN, A PETITJEAN)

Oxygénation

COVID et risque infectieux !

« Bulle » avec aspiration filtrée active et transportable
Soins stationnaires possibles (O_2, VNI, Nébu, HFNC, VM après IOT…)
Transports extra/intra-hospitaliers, SMUR, héliporté…



infos: Dviglino@chu-grenoble.fr

Pré-oxygénation

Intensive Care Med (2016) 42:1877–1887
DOI 10.1007/s00134-016-4588-9

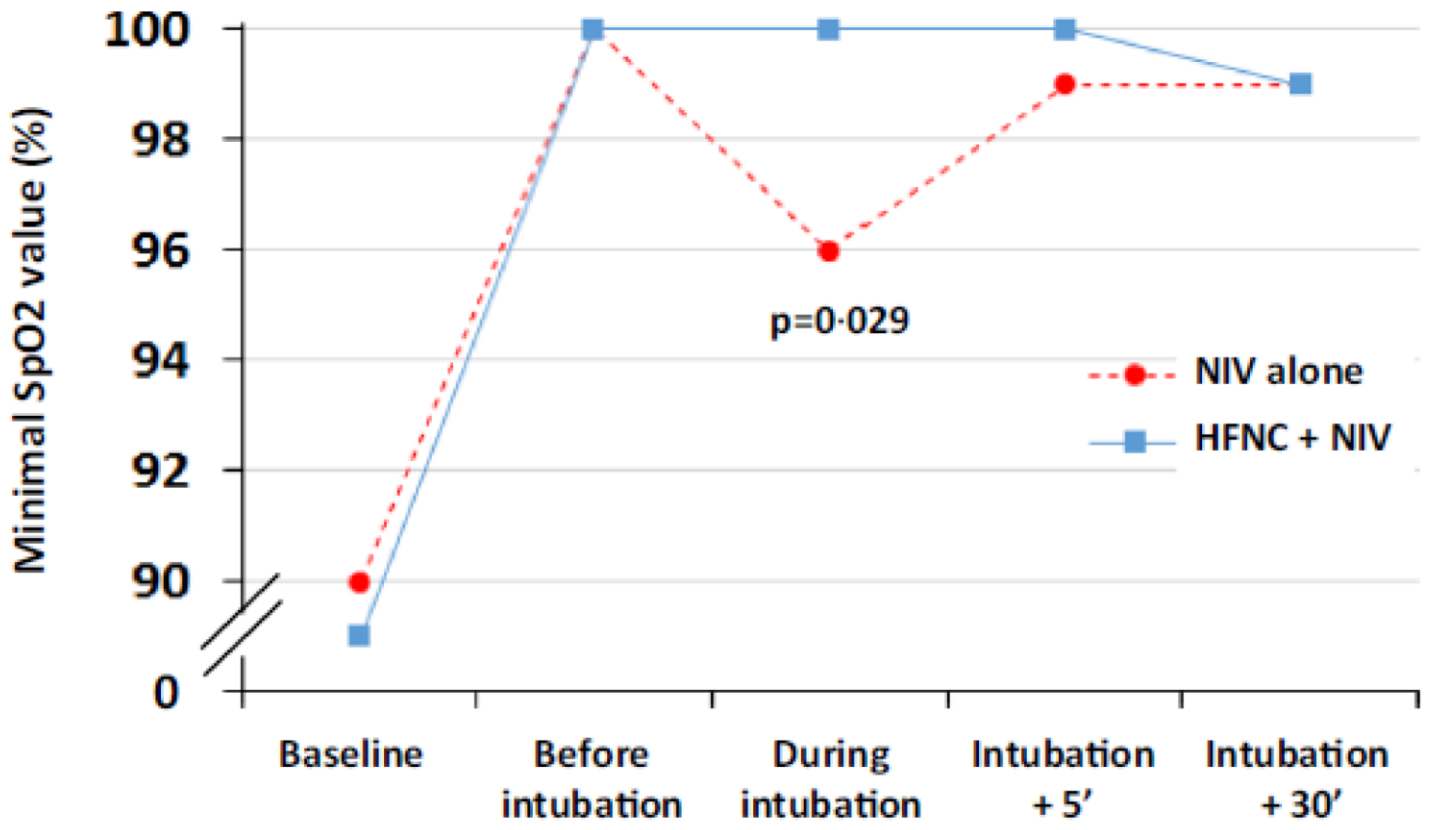
SEVEN-DAY PROFILE PUBLICATION

Apnoeic oxygenation via high-flow nasal cannula oxygen combined with non-invasive ventilation preoxygenation for intubation in hypoxaemic patients in the intensive care unit: the single-centre, blinded, randomised controlled OPTINIV trial

Samir Jaber[1,2*], Marion Monnin[1], Mehdi Girard[1], Matthieu Conseil[1], Moussa Cisse[1], Julie Carr[1], Martin Mahul[1], Jean Marc Delay[1], Fouad Belafia[1], Gérald Chanques[1,2], Nicolas Molinari[3] and Audrey De Jong[1,2]

25 avec VNI + HFNC vs. **24 VNI et Sham HFNC**

Pré-oxygénation



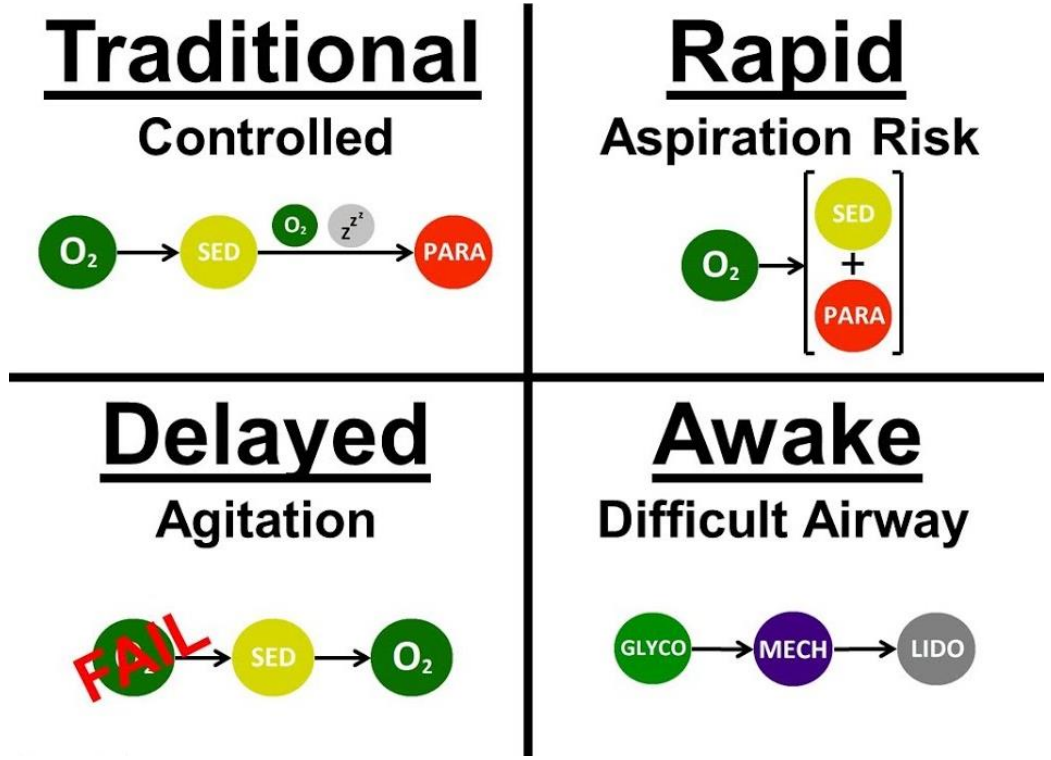
Jaber et al., ICM 2016

Pré-oxygénation

Delayed Sequence Intubation (IOT en séquence retardée)

Une sédation-analgésie procédurale

Dont l'oxygénation EST la procédure



Pré-oxygénation

Delayed Sequence Intubation (IOT en séquence retardée)

AIRWAY/ORIGINAL RESEARCH

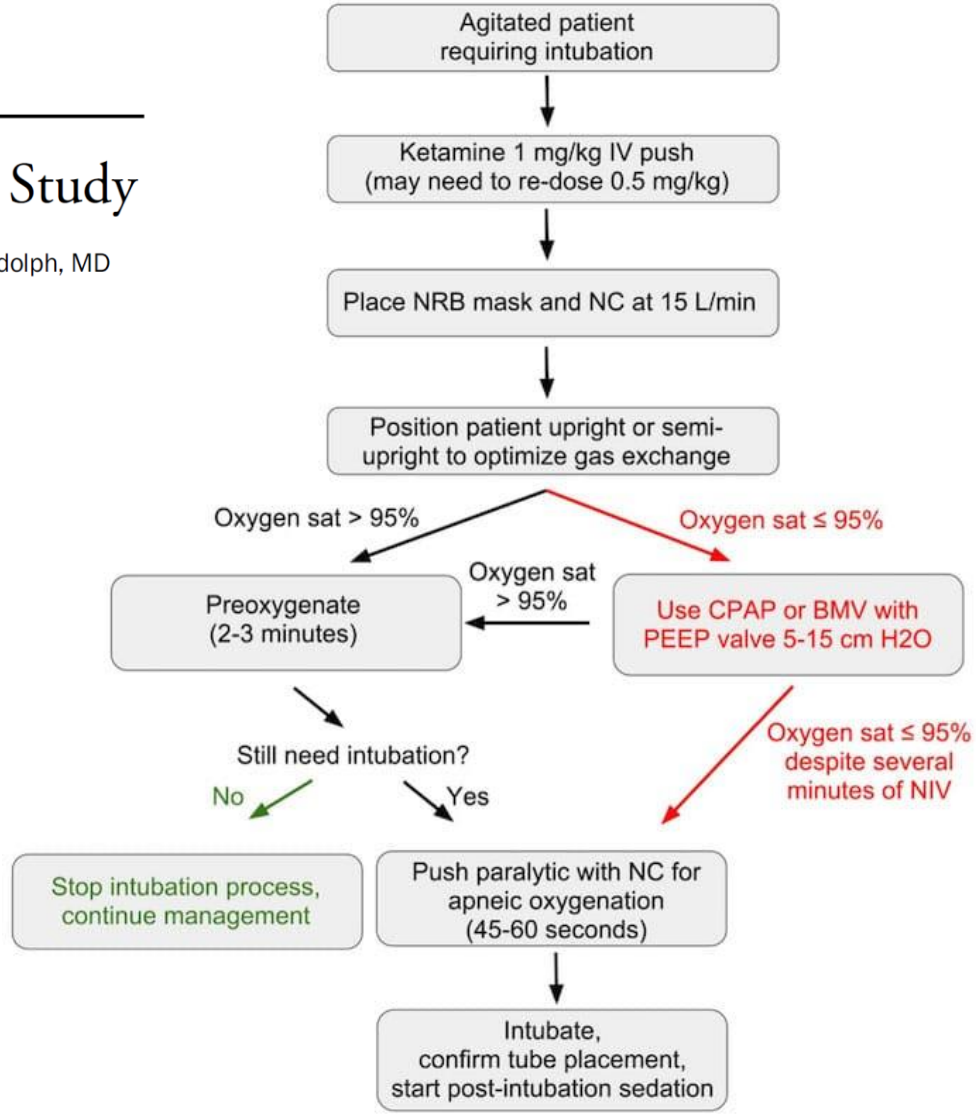
Delayed Sequence Intubation: A Prospective Observational Study

Scott D. Weingart, MD*; N. Seth Trueger, MD, MPH; Nelson Wong, MD; Joseph Scofi, MD; Neil Singh, MD; Soren S. Rudolph, MD

*Corresponding Author. E-mail: scottweingart@gmail.com, Twitter: @emcrit.

Annals of Emergency Medicine, 2015

62 patients AGITES (39 pour VNI, 19 pour MHC, 4 SNG)
SpO_2 moyenne 89% → 98,8 %
Dont 32 avec SpO_2 instable / ≤ 93%



Pré-oxygénation

Delayed Sequence Intubation (IOT en séquence retardée)

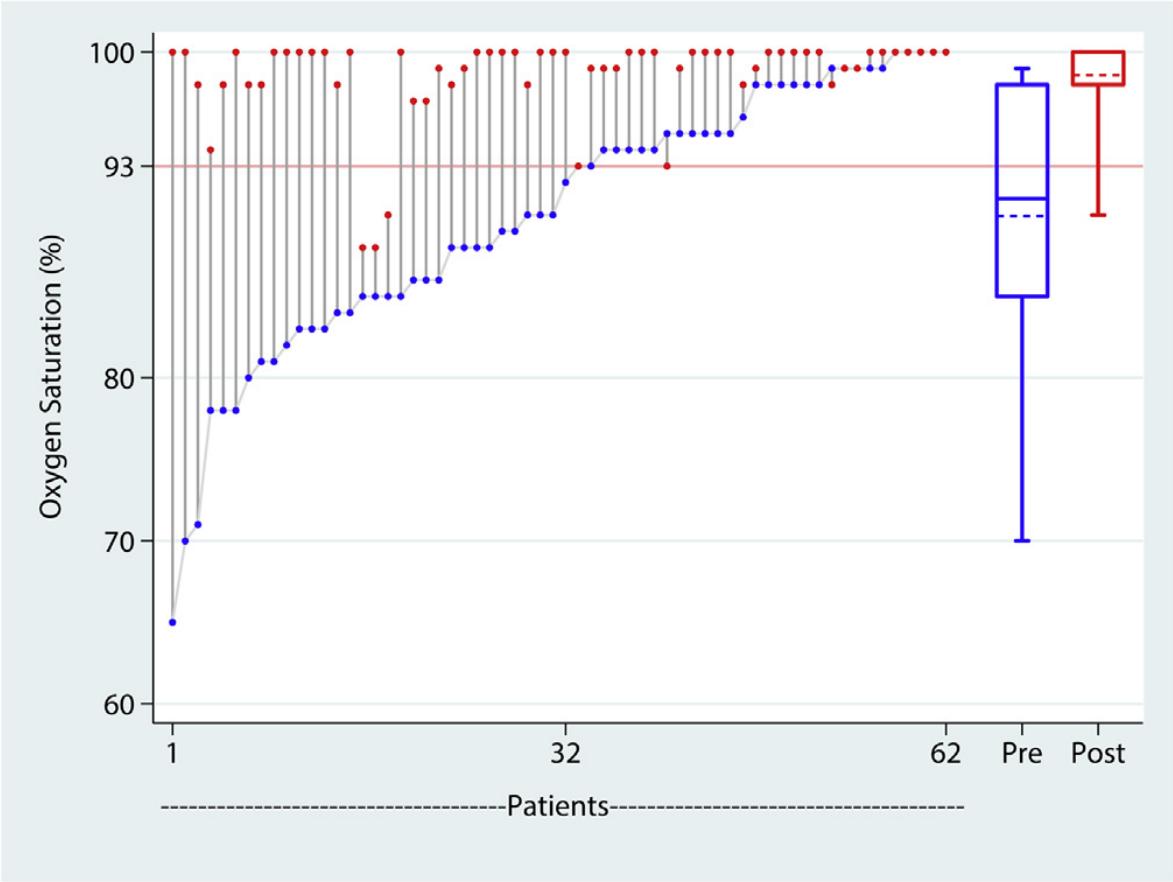


Table. Characteristics of study patients.

Characteristics	All Patients (N = 62)
Age, mean, y	54
Range, y	18–79
Female, %	33
Location of intubation, Pts	
ED	55
Critical care unit	7
Condition leading to need for intubation, Pts	
Pneumonia	20
Asthma	7
Acute pulmonary edema	3
Chronic obstructive pulmonary disease	1
Acute lung injury	8
Anaphylaxis	2
Smoke inhalation	2
Sepsis encephalopathy	2
Hepatic encephalopathy	8
UGIB	6
Cardiogenic shock	1
Trauma	2
Primary reason for intubation, Pts (%)	
Oxygenation (type I) failure	42 (68)
Ventilatory (type II) failure	2 (3)
Airway protection	18 (29)
Reason for DSI, Pts (%)	
Intolerance of nonrebreather mask	19 (31)
Intolerance of NIPPV	39 (63)
Intolerance of nasogastric tube placement for UGIB	4 (6)

Pts, Patients; *UGIB*, upper gastrointestinal bleeding; *DSI*, delayed sequence intubation.

Weingart et al., Ann. Em. Med. 2015

Merci de votre visio-attention !

Dviglino@chu-grenoble.fr