Désaturation aigue en préhospitalier

Titouan Rosec
Infirmier d'Urgence

Jean-Baptiste Bouillon-Minois
Médecin Urgentiste

Titouan Rosec
Infirmier d’Urgence

Pas de conflit d’intérêt à déclarer

Jean-Baptiste Bouillon-Minois

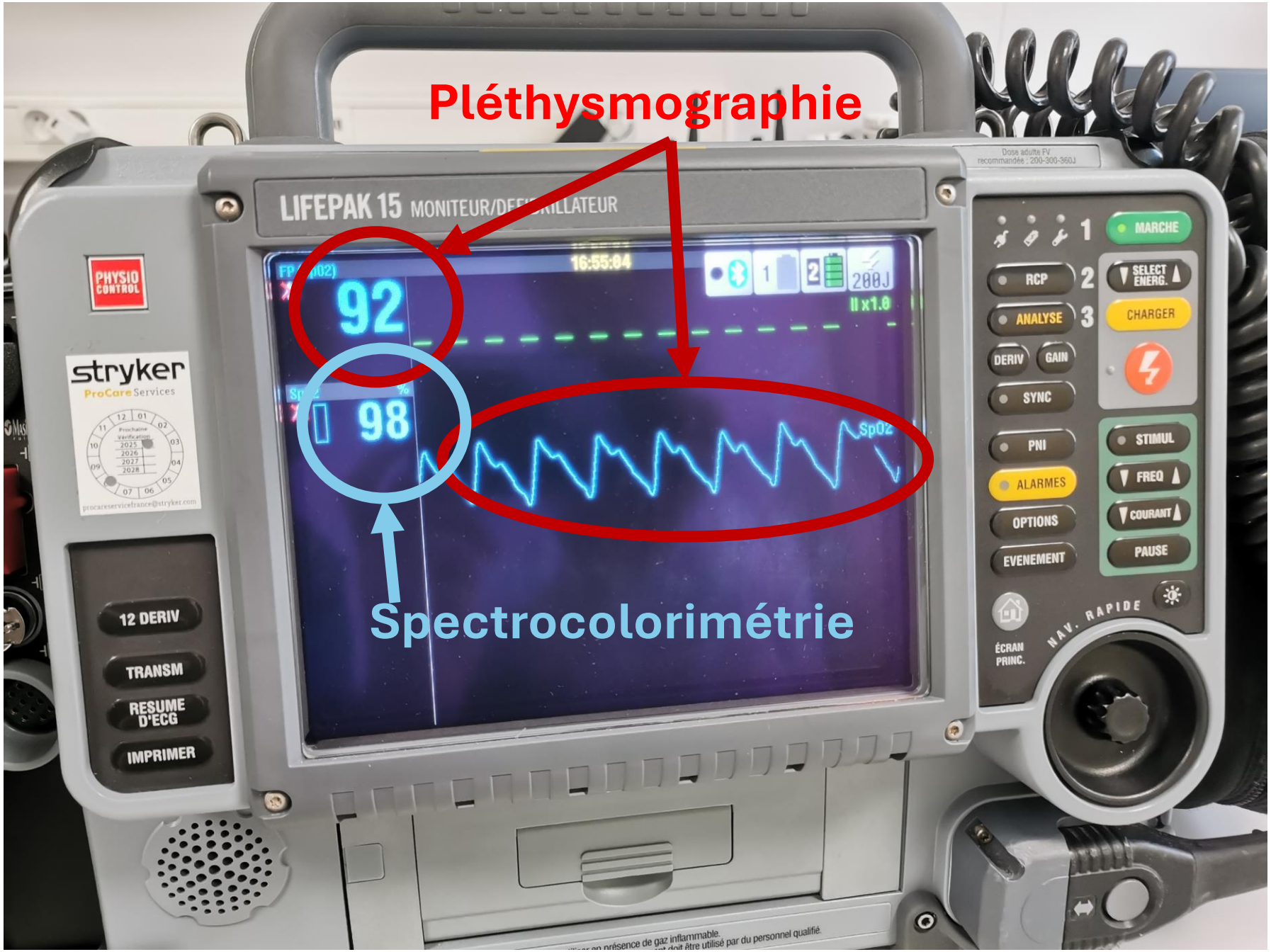
Médecin Urgentiste

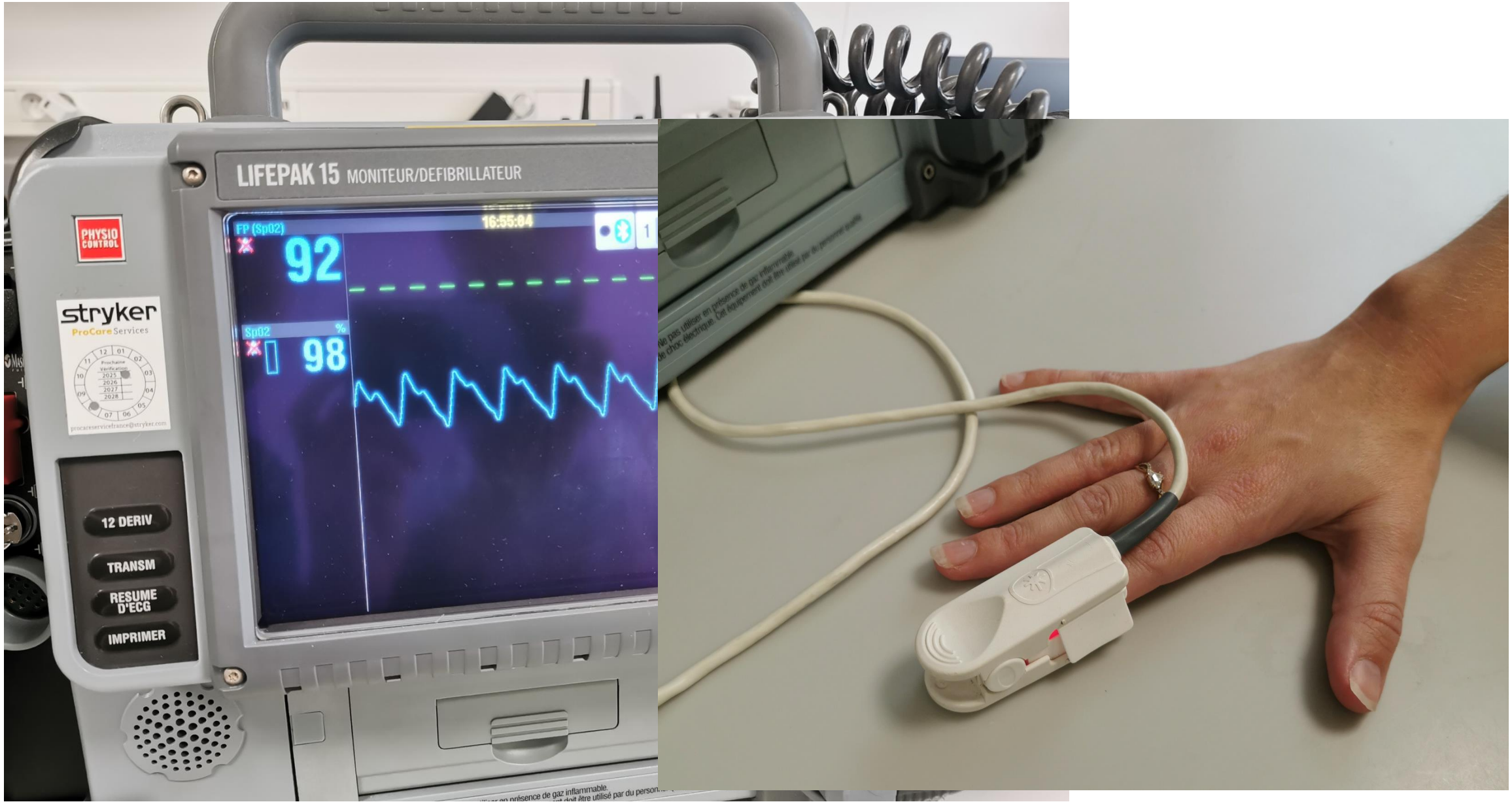
SANOFI AVENTIS FRANCE	avantage	18 mars 2015	Autre	20€
SANOFI AVENTIS FRANCE	avantage	24 mars 2015	Autre	19€
SANOFI AVENTIS FRANCE	avantage	22 avril 2015	Autre	19€
SANOFI AVENTIS FRANCE	avantage	12 octobre 2017	Autre	40€
PFIZER SAS	avantage	12 décembre 2017	Autre	35€
ASTRAZENECA	convention	6 mai 2019	Hospitalité	57€

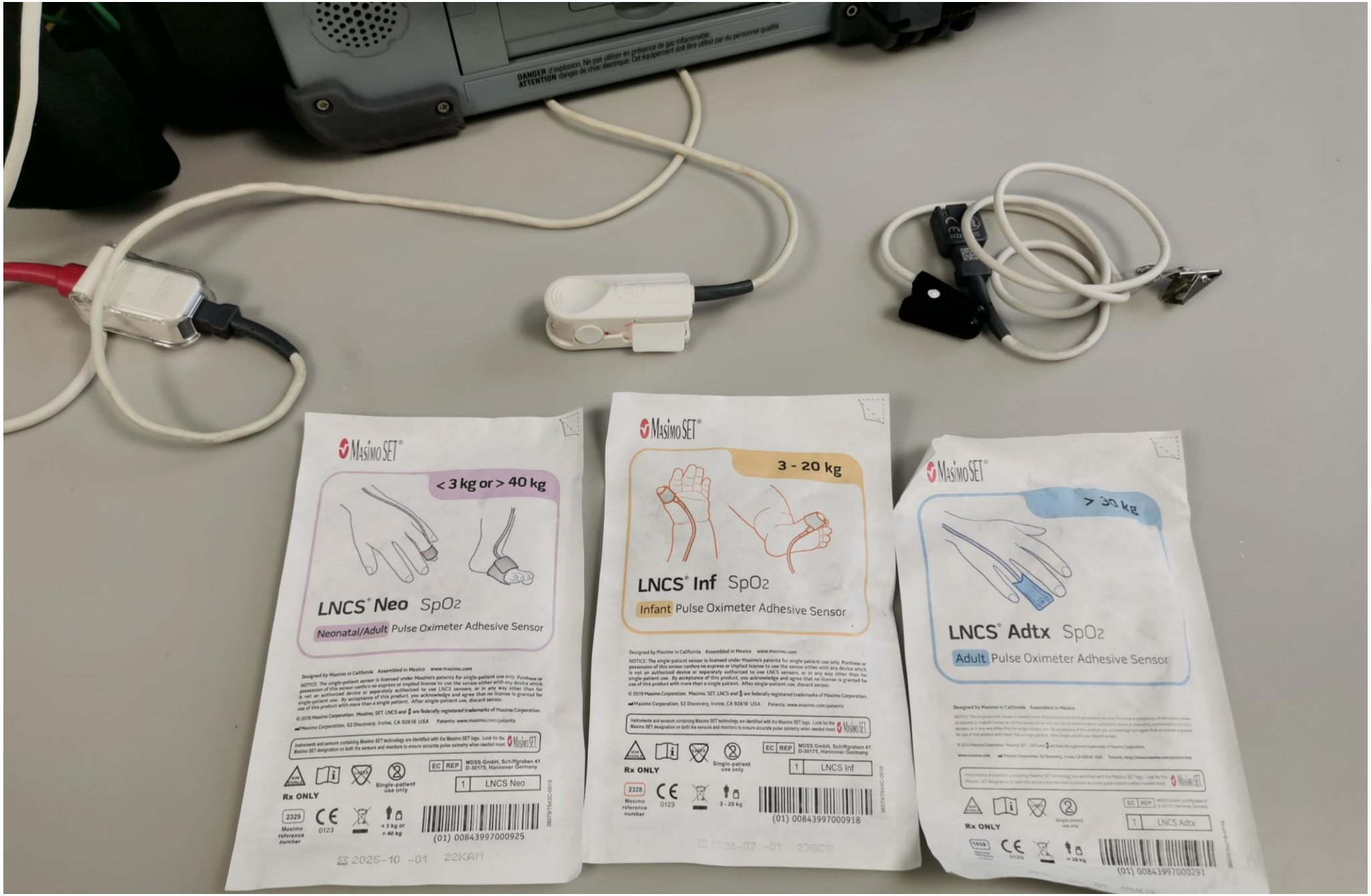
Internat

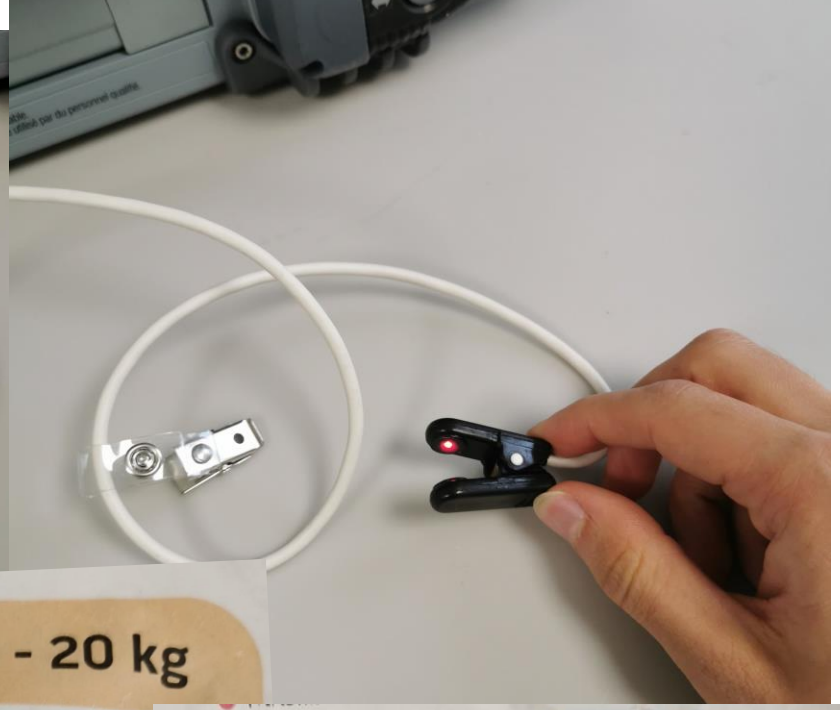
Erreur de praticien en cours de correction

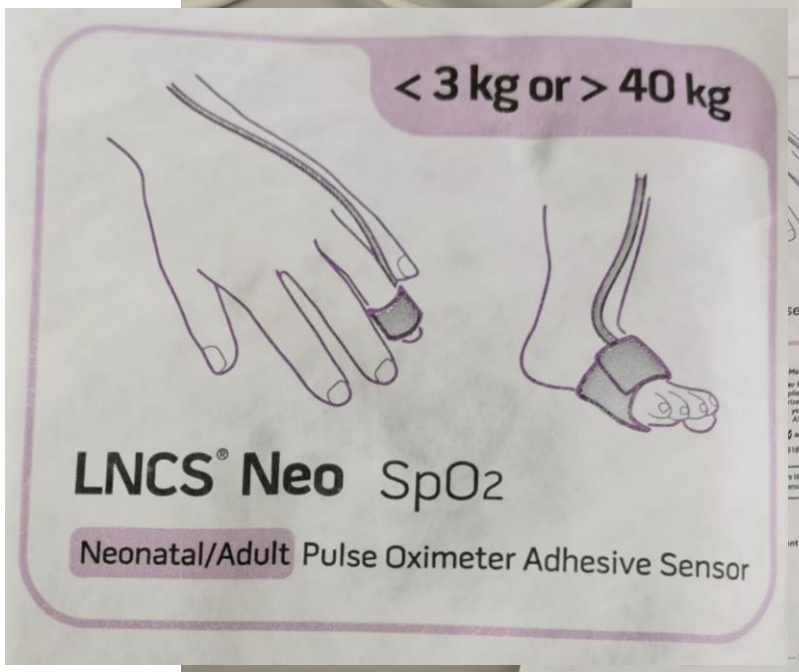

LIFEPAK 15 MONITEUR/DEFIBRILLATEUR
Dose adulte FV recommandée : 200-300-360J
PHYSIO CONTROL
stryker
ProCare Services
FP (SpO2)
92
16:55:04
200J
x1.0
SpO2
%
98
SpO2
12 DERIV
TRANSM
RESUME D'ECG
IMPRIMER
MARCHE
RCP
ANALYSE
DERIV
GAIN
SYNC
PNI
ALARMES
OPTIONS
EVENEMENT
SELECT ENERG.
CHARGER
STIMUL
FREQ
COURANT
PAUSE
ÉCRAN PRINC.
NAV. RAPIDE

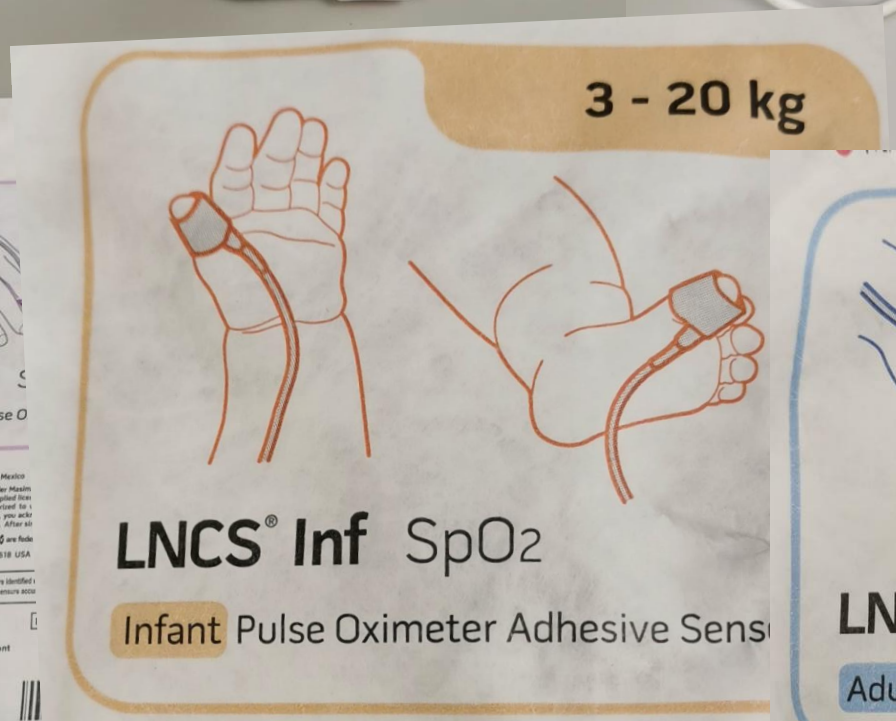

Pléthysmographie
Spectrocolorimétrie
LIFEPAK 15 MONITEUR/DEFIBRILLATEUR
92
98
16:55:04
200J
SpO2
MARCHE
RCP
ANALYSE
DERIV
GAIN
SYNC
PNI
ALARMES
OPTIONS
EVENEMENT
SELECT ENERG.
CHARGER
STIMUL
FREQ
COURANT
PAUSE
NAV. RAPIDE
ÉCRAN PRINC.
12 DERIV
TRANSM
RESUME D'ECG
IMPRIMER
PHYSIO CONTROL
stryker
ProCare Services


LIFEPAK 15 MONITEUR/DEFIBRILLATEUR
PHYSIO CONTROL
stryker
ProCare Services
FP (SpO2)
16:55:04
92
SpO2
%
98
12 DERIV
TRANSM
RESUME D'ECG
IMPRIMER

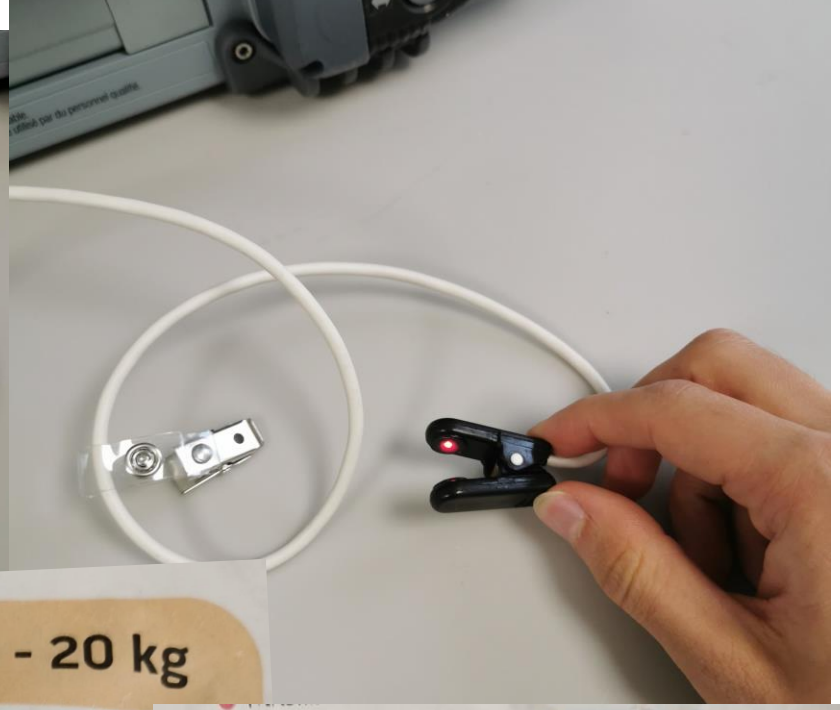

DANGER d'explosion. Ne pas utiliser en présence de gaz inflammable.
ATTENTION danger de choc électrique. Cet équipement doit être utilisé par du personnel qualifié
Masimo SET®
< 3 kg or > 40 kg
LNCS® Neo SpO2
Neonatal/Adult Pulse Oximeter Adhesive Sensor
Rx ONLY
Single-patient use only
EC REP MDSS GmbH, Schiffgraben 41 D-30175, Hannover Germany
1 LNCS Neo
2329
0123
< 3 kg or > 40 kg
(01) 00843997000925
2025-10 -01 22KAM
Masimo SET®
3 - 20 kg
LNCS® Inf SpO2
Infant Pulse Oximeter Adhesive Sensor
Rx ONLY
Single-patient use only
EC REP MDSS GmbH, Schiffgraben 41 D-30175, Hannover Germany
1 LNCS Inf
2328
0123
3 - 20 kg
(01) 00843997000918
Masimo SET®
> 30 kg
LNCS® Adtx SpO2
Adult Pulse Oximeter Adhesive Sensor
Rx ONLY
EC REP
1 LNCS Adtx
(01) 00843997000291




< 3 kg or > 40 kg
LNCS® Neo SpO2
Neonatal/Adult Pulse Oximeter Adhesive Sensor


3 - 20 kg
LNCS® Inf SpO2
Infant Pulse Oximeter Adhesive Sens


> 30 kg
LNCS® Adtx SpO2
Adult Pulse Oximeter Adhesive Sensor




< 3 kg or > 40 kg
LNCS® Neo SpO2
Neonatal/Adult Pulse Oximeter Adhesive Sensor
3 - 20 kg
LNCS® Inf SpO2
Infant Pulse Oximeter Adhesive Sens
> 30 kg
LNCS® Adtx SpO2
Adult Pulse Oximeter Adhesive Sensor

Différence hypoxie-hypoxémie

Hypoxie= tissu manquant d'oxygène

Hypoxémie= quantité d'oxygène dans le sang diminuée

Détresse respiratoire aigue= incapacité soudaine du système respiratoire à fournir une hématose suffisante

Antalgie +++

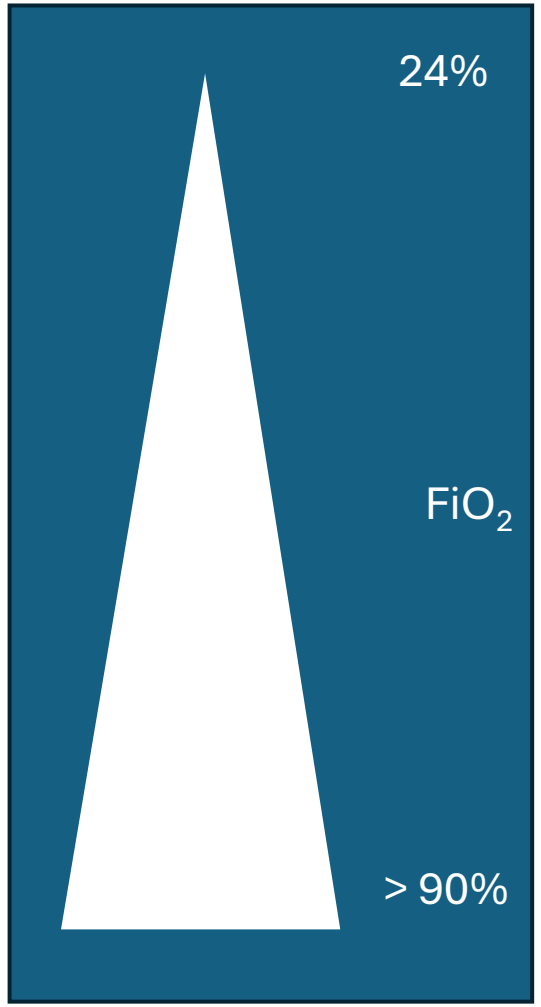
Installation

Dispositif d’oxygénothérapie

Lunettes à O_2 de 1L à 4L/min

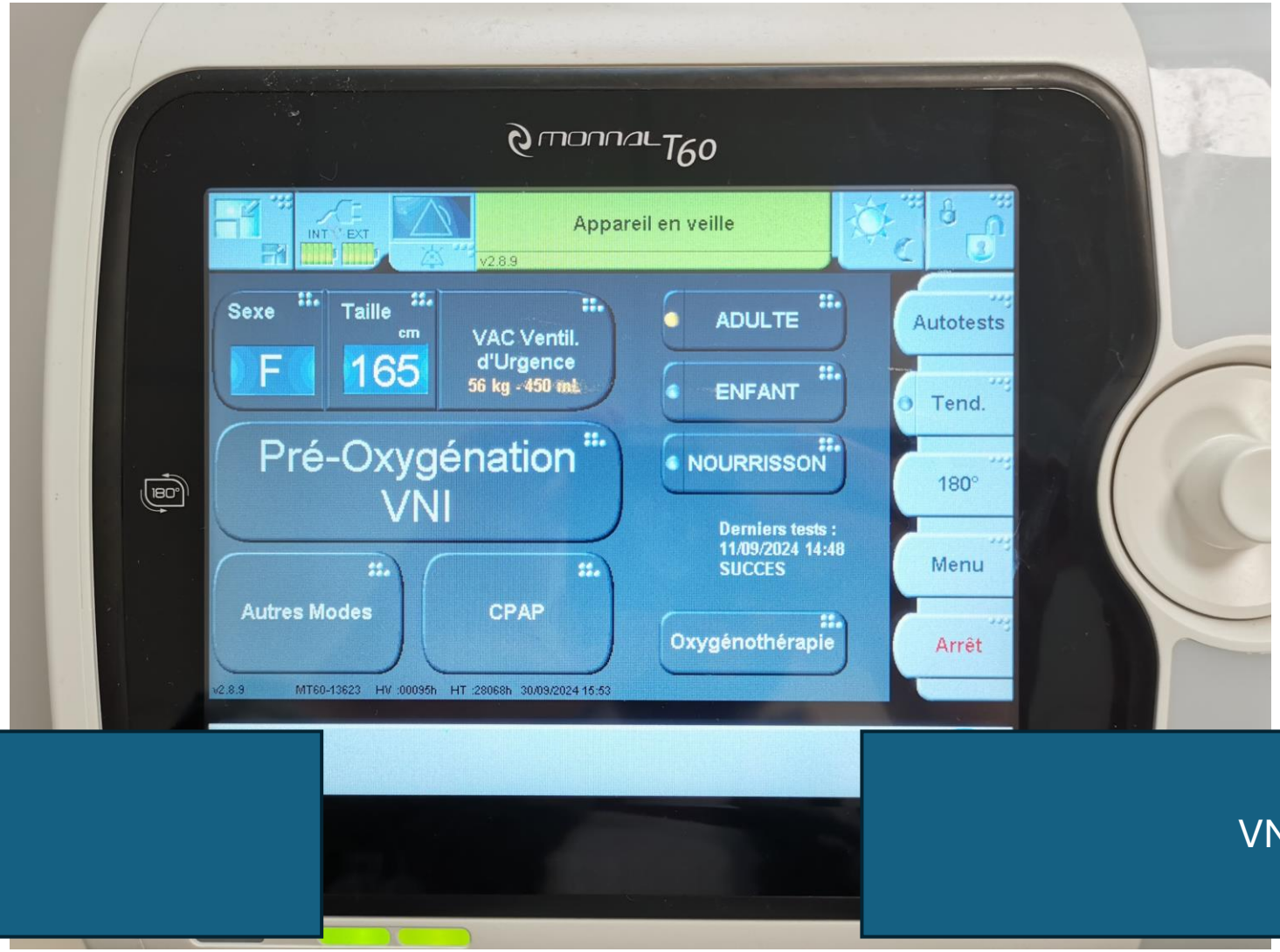
Masque moyenne concentration de 4L à 9L/min

Masque haute concentration de 9L à 15L/min



Dispositif d’oxygénothérapie

Dispositif d’oxygénothérapie

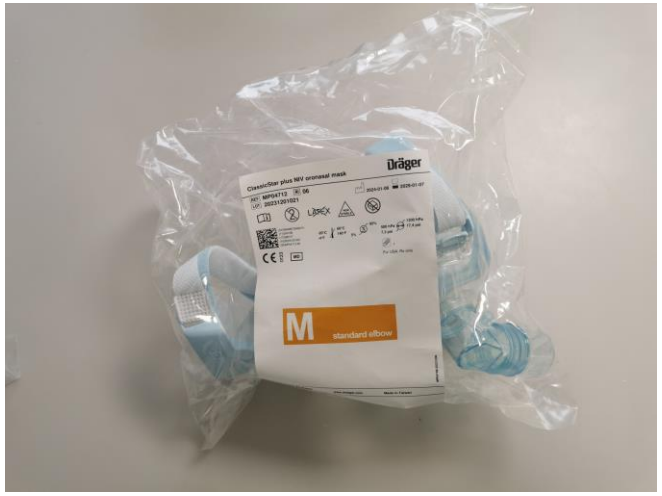


ONHD

VNI

Dispositif d’oxygénothérapie

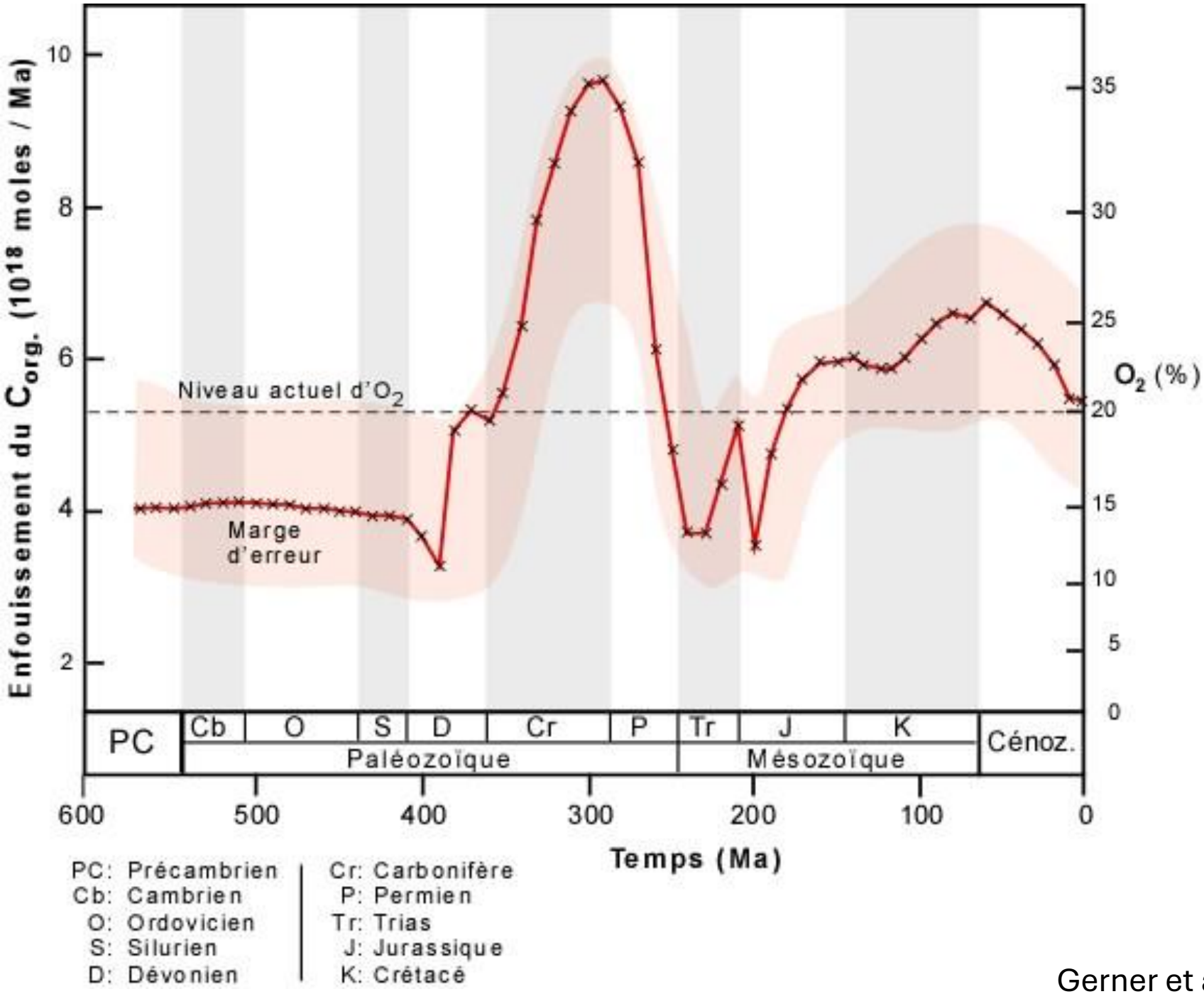
VNI



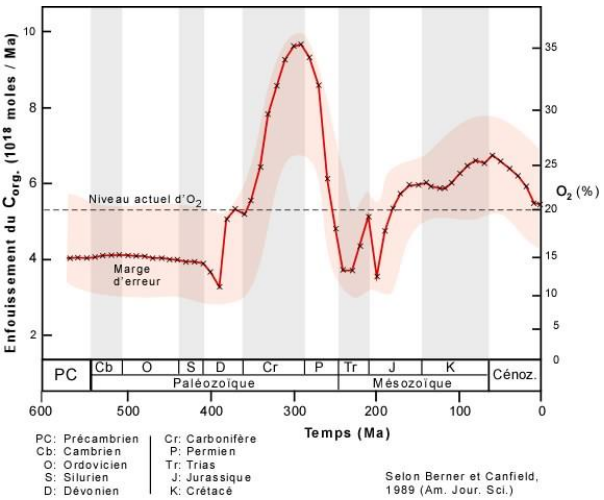
⚠Ne pas oublier les bonnes pratiques de mise en place⚠

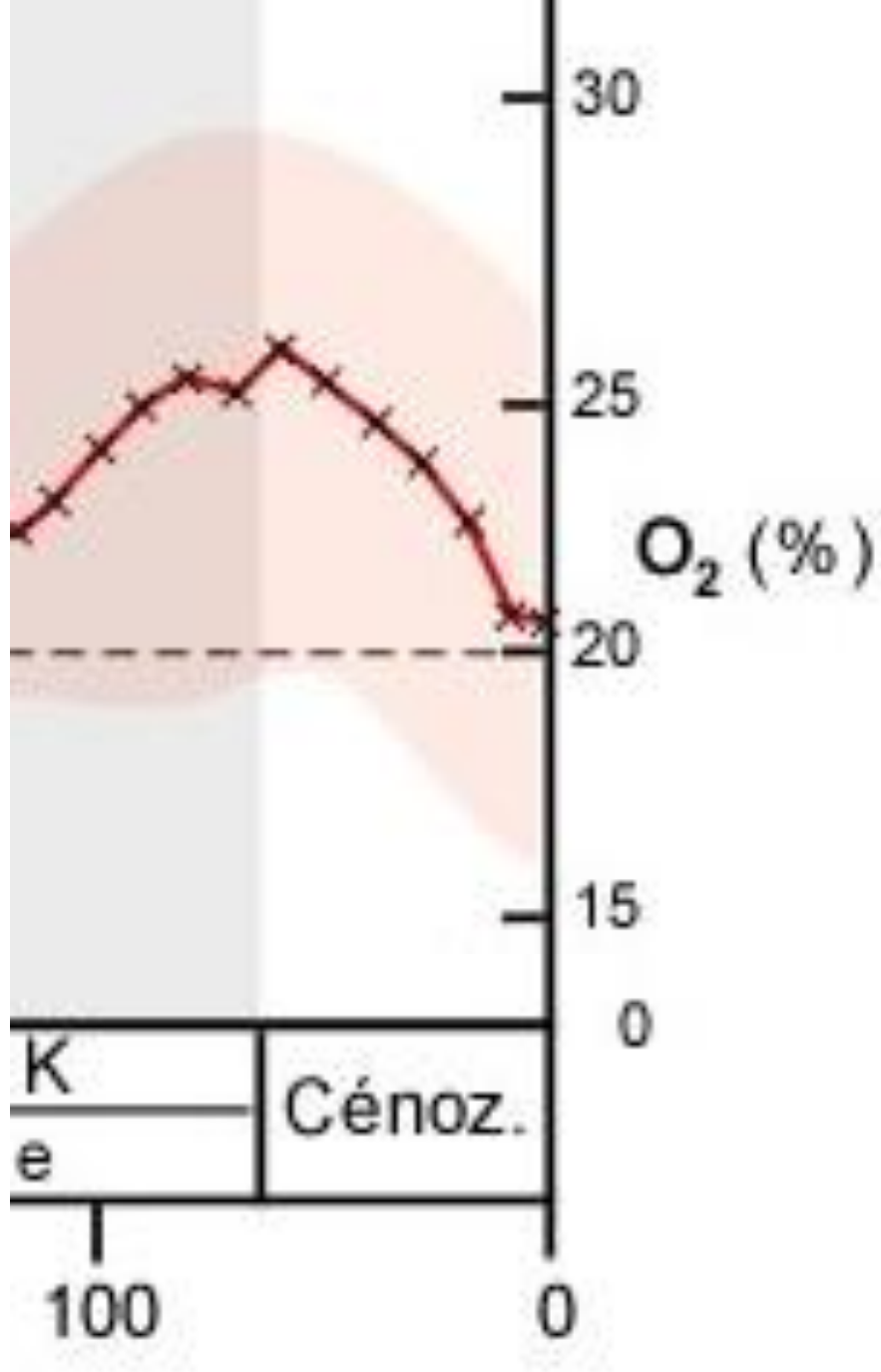
Dispositif d’oxygénothérapie

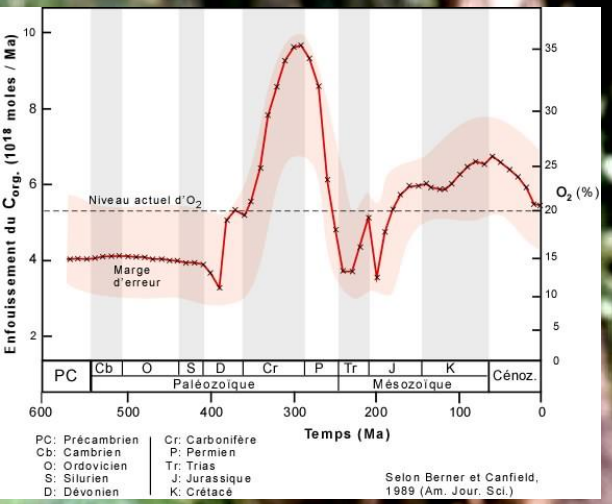
IOT



Gerner et al. Am Jour Sci 1989


Enfouissement du $C_{org.}$ (10^{18} moles / Ma)
O_2 (%)
Niveau actuel d'O_2
Marge d'erreur
PC
Cb
O
S
D
Cr
P
Tr
J
K
Cénoz.
Paléozoïque
Mésozoïque
600
500
400
300
200
100
0
Temps (Ma)
PC: Précambrien
Cb: Cambrien
O: Ordovicien
S: Silurien
D: Dévonien
Cr: Carbonifère
P: Permien
Tr: Trias
J: Jurassique
K: Crétacé
Selon Berner et Canfield, 1989 (Am. Jour. Sci.)


30
25
O_2 (%)
20
15
0
K
e
Cénoz.
100
0



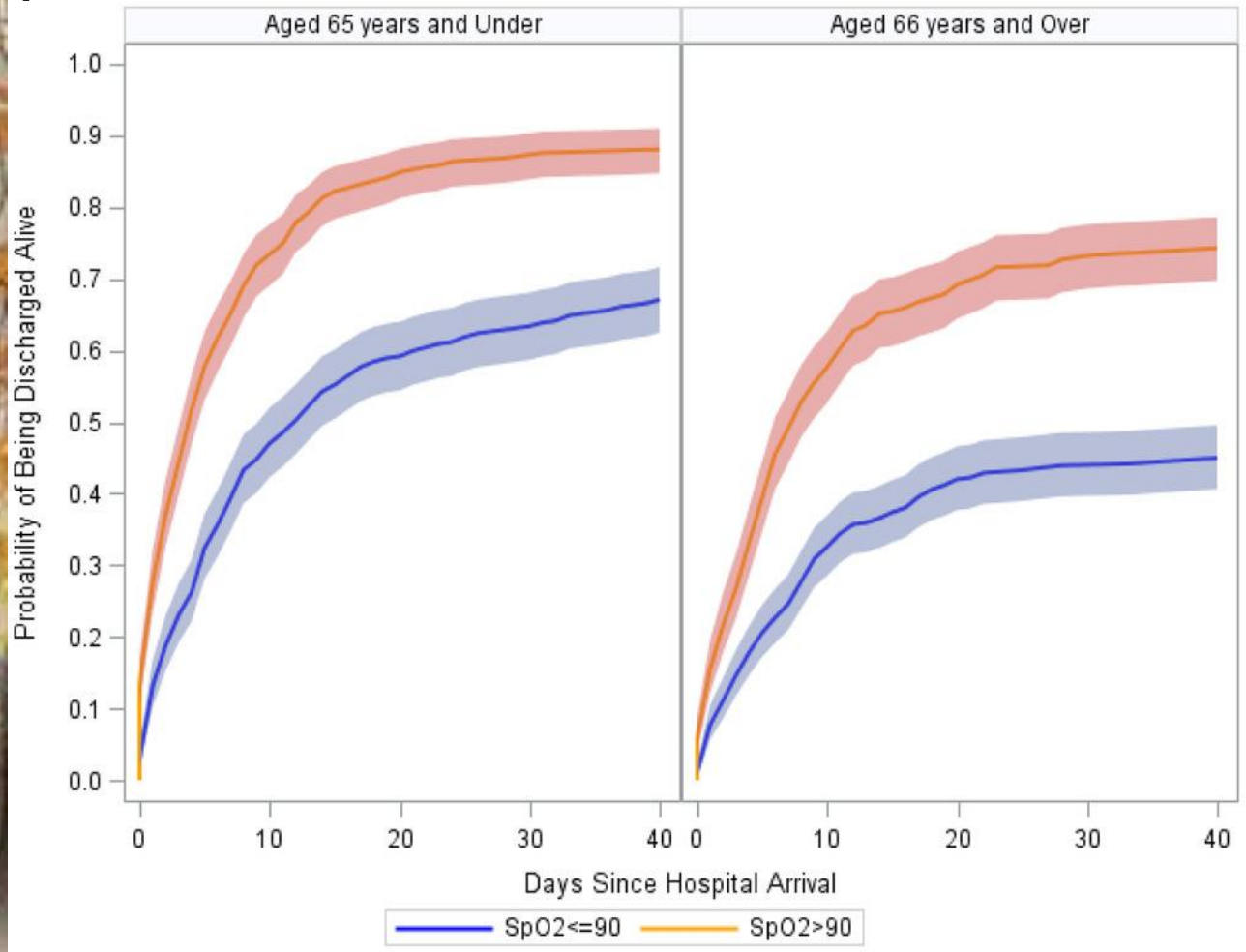
J'adore l'oxygène, dans 20 ans il n'y en aura plus
JCVD

Hypoxie

JACEP OPEN
JOURNAL OF THE AMERICAN COLLEGE OF EMERGENCY PHYSICIANS OPEN
Open Access
A GLOBAL JOURNAL OF EMERGENCY MEDICINE
American College of Emergency Physicians
ADVANCING EMERGENCY CARE

ORIGINAL RESEARCH | Open Access

Prehospital hypoxemia, measured by pulse oximetry, predicts hospital outcomes during the New York City COVID-19 pandemic



Lancet et al. ACEP Open 2021

Hypoxie

Focus on Trauma

Interactive Effect between On-Scene Hypoxia and Hypotension on Hospital Mortality and Disability in Severe Trauma

PREHOSPITAL EMERGENCY CARE

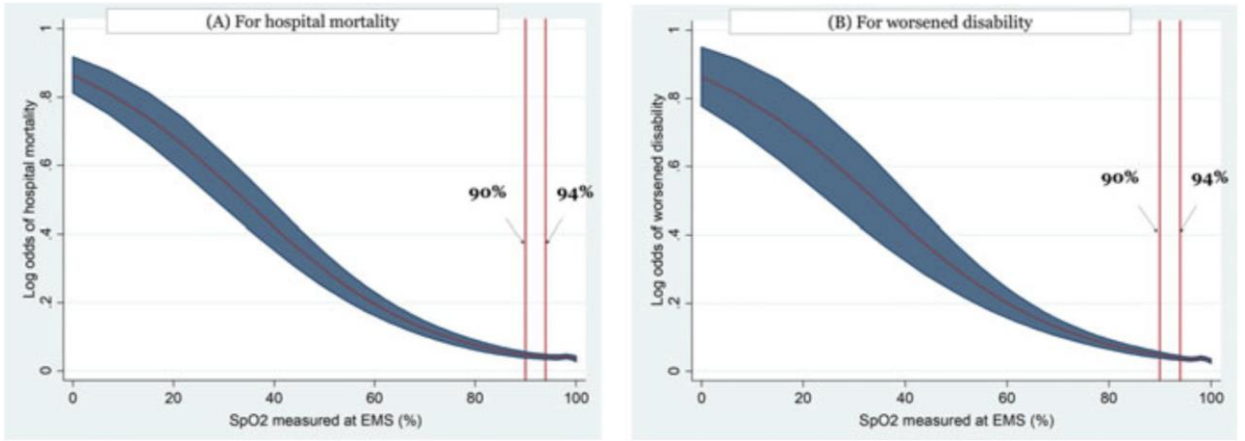


TABLE 3. Multivariable logistic regression analysis by hypoxia and hypotension for in-hospital mortality and disability

Outcomes	Exposure	Total N	Outcome (+) N	Outcome (+) %	Adjusted model* AOR	95% CI	
Mortality	Total	17,406	2,598	14.9			
	Hypoxia						
	No	14,484	1,554	10.7	1.00		
	Yes	2,922	1,044	35.7	2.15	1.92	2.40
	Hypotension						
	No	15,393	1,909	12.4	1.00		
	Yes	2,013	689	34.2	2.89	2.54	3.29
Disability	Total	16,455	3,542	21.5			
	Hypoxia						
	No	13,850	2,207	15.9	1.00		
	Yes	2,605	1,335	51.2	1.97	1.75	2.21
	Hypotension						
	No	14,550	2,761	19.0	1.00		
	Yes	1,905	781	41.0	2.15	1.86	2.49

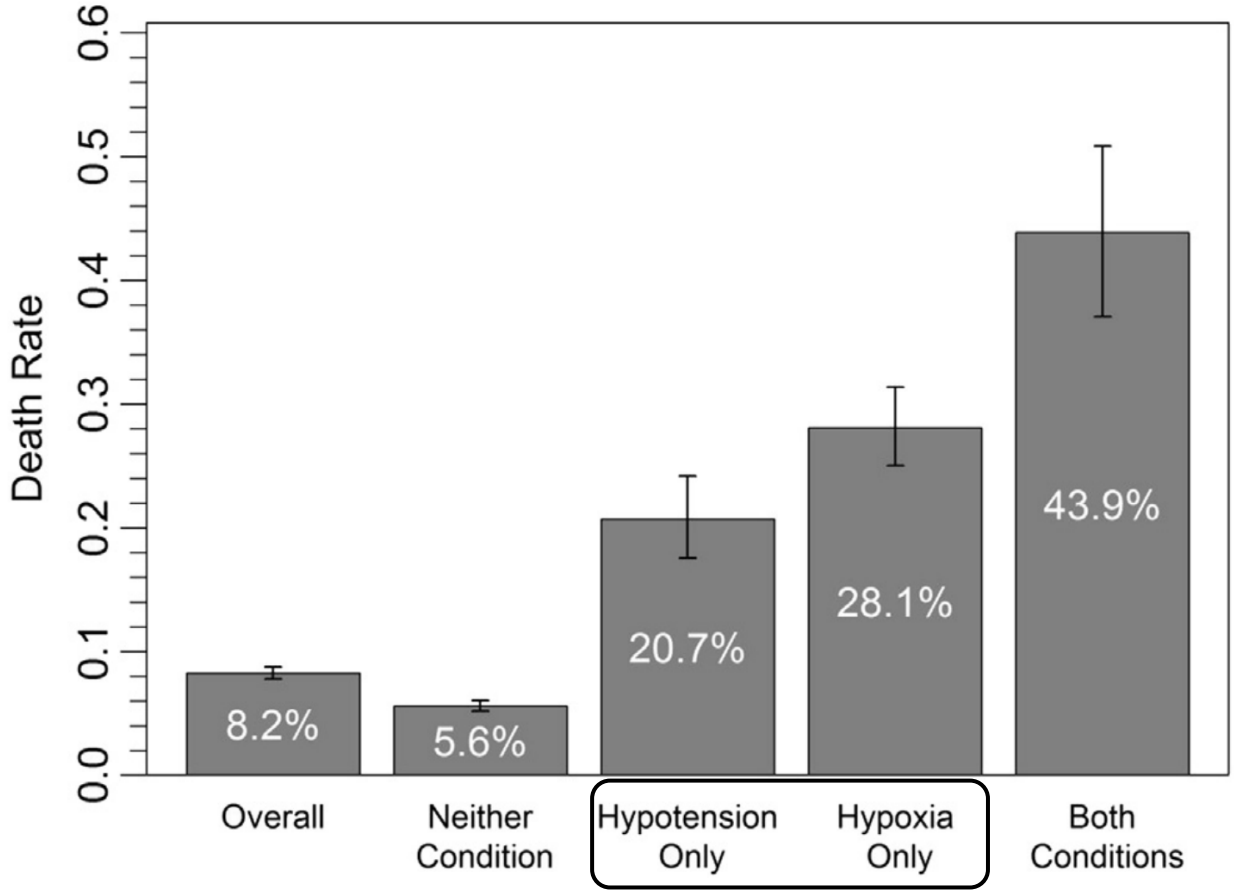
*Adjusted for age, gender, mechanism of injury, Charlson comorbidity index, response time interval, prehospital mental status, prehospital airway management, and new injury severity score.
AOR = *adjusted odds ratio*; 95%CI = *95% confidence interval*.

Kim et al. Prehosp Emerg Care 2018

Hypoxie

EMERGENCY MEDICAL SERVICES/ORIGINAL RESEARCH · Volume 69, Issue 1, P62-72, January 2017

The Effect of Combined Out-of-Hospital Hypotension and Hypoxia on Mortality in Major Traumatic Brain Injury



Spaite et al. Annals of Emergency Medicine 2016

Hypoxie

The American Journal of Emergency Medicine
Volume 37, Issue 9, September 2019, Pages 1709-1715

Original Contribution

Effect of hypoxia on mortality and disability in traumatic brain injury according to shock status: A cross-sectional analysis

Interaction effect of shock with hypoxia status on outcomes in traumatic brain injury.

Outcomes	Shock status	Hypoxia					
		Mild			Severe		
		AOR	95% CI		AOR	95% CI	
Disability							
	Shock	1.35	0.73	2.52	1.49	0.88	2.51
	Normal	1.22	0.88	1.69	1.58	1.20	2.09
Mortality							
	Shock	1.26	0.68	2.32	1.31	0.79	2.20
	Normal	1.20	0.87	1.66	1.33	1.01	1.76

AOR, adjusted odds ratio.
95% CI, 95% confidence interval.
AORs and 95% CIs were calculated from models with adjustment for shock status, gender, age, injury mechanism and intent, event time - season, weekday, and hour - and response time interval.

Eun Seo et al. Am Jour Emergency Medicine 2019

Damiani *et al. Critical Care* (2014) 18:711
DOI 10.1186/s13054-014-0711-x

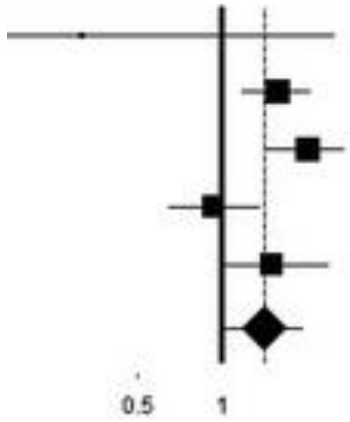
CRITICAL CARE

RESEARCH Open Access

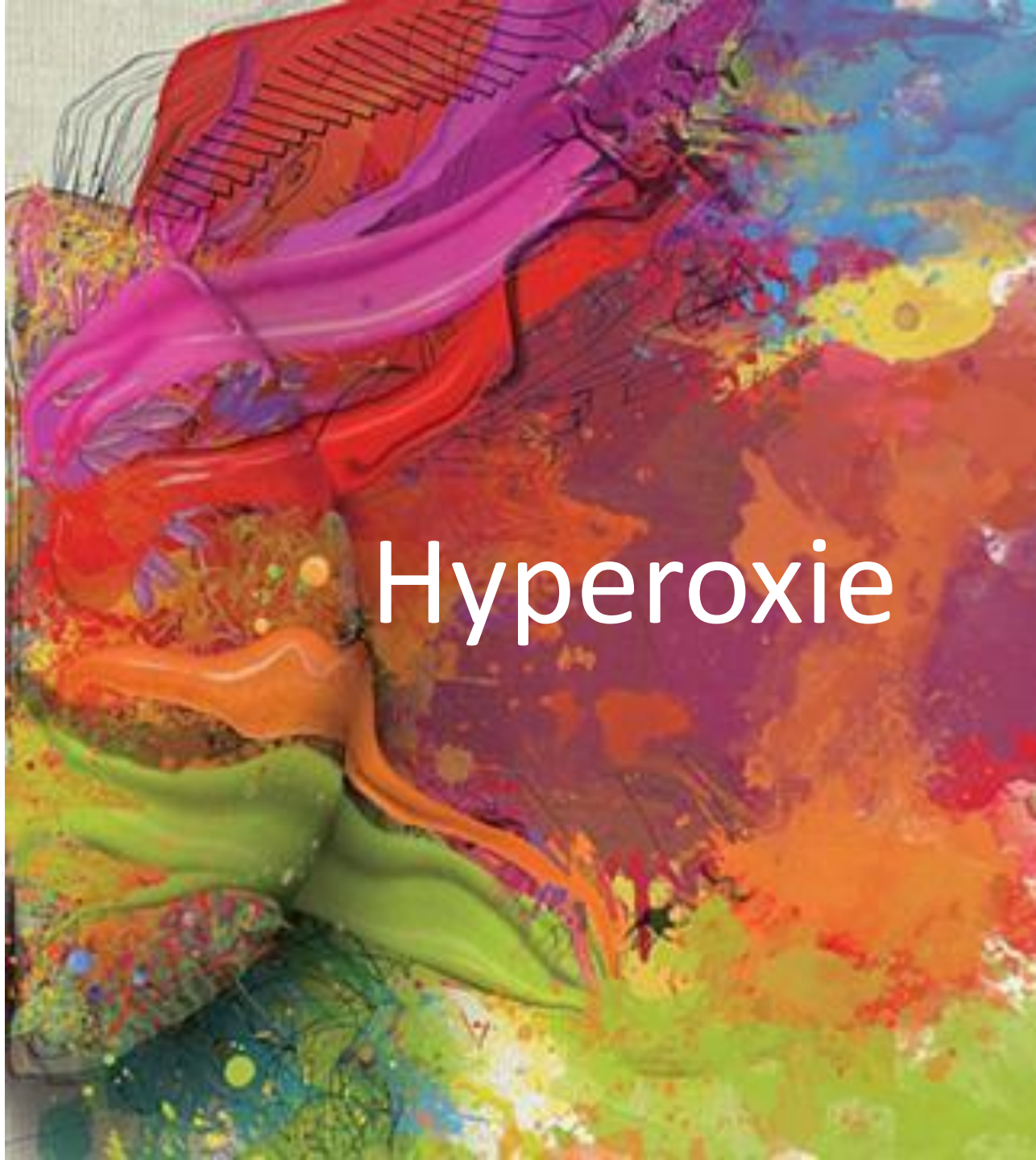
Arterial hyperoxia and mortality in critically ill patients: a systematic review and meta-analysis

41% (3 à 94)

	ES	95% CI	W	Sig.
Asher 2013	0.32	0.04 , 2.50	2.19%	0.280
Brenner 2012	1.56	1.18 , 2.07	27.41%	0.002
Davis 2009	2.00	1.40 , 2.70	25.40%	0.000
Raj 2013	0.94	0.65 , 1.36	23.68%	0.743
Rincon (b) 2014	1.50	1.02 , 2.40	21.32%	0.063
Overall (random-effects model)	1.41	1.03 , 1.94	100.00%	0.032



Damiani et al. Crit Care. 2014



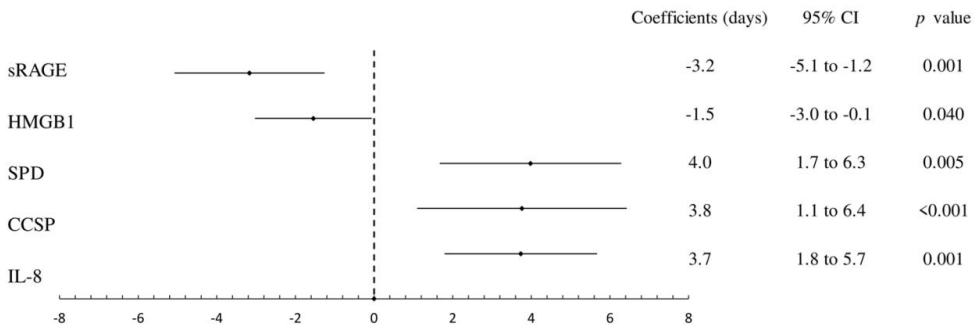
Yamamoto *et al. World Journal of Emergency Surgery* (2021) 16:19
https://doi.org/10.1186/s13017-021-00363-2

World Journal of Emergency Surgery

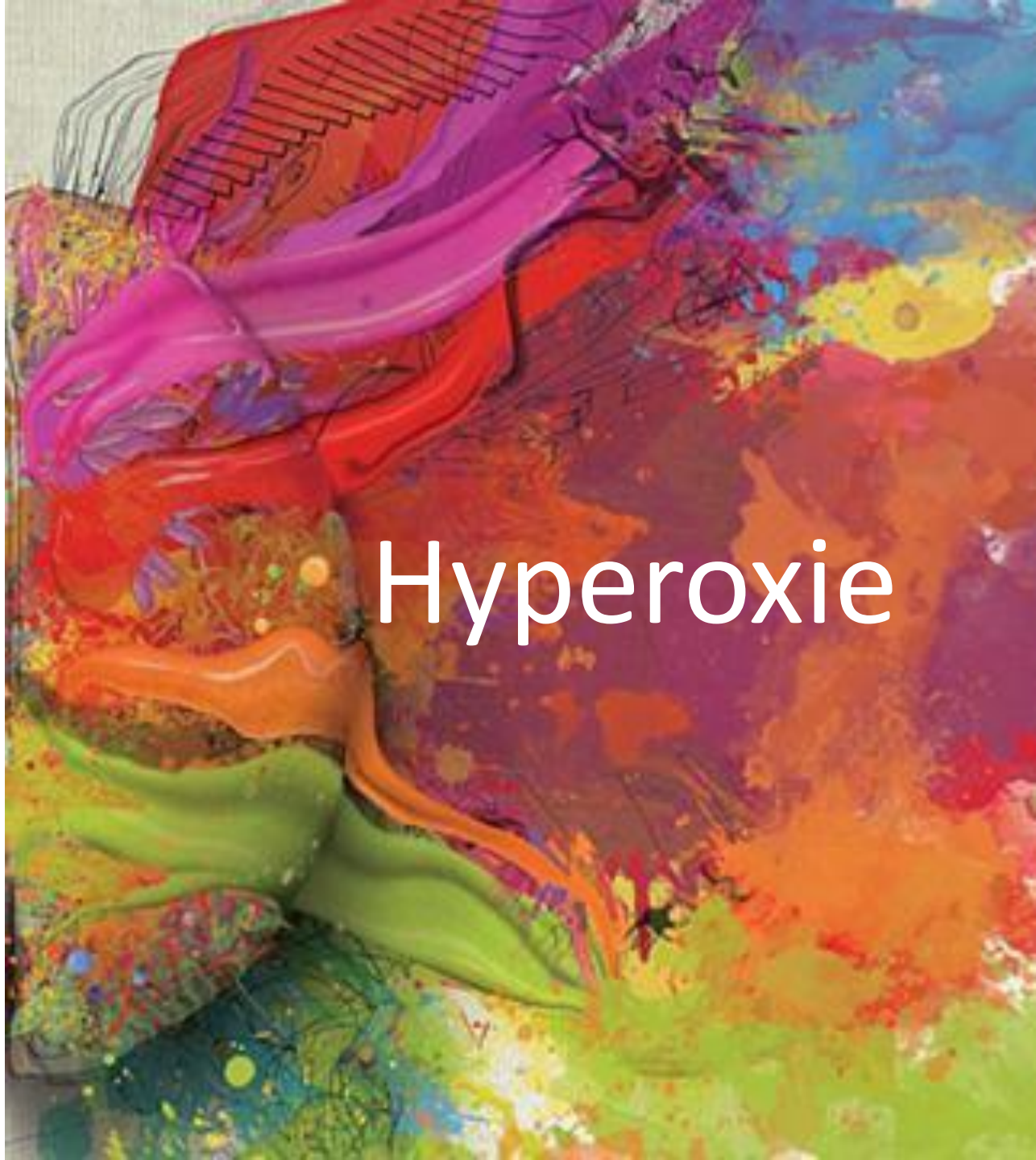
RESEARCH ARTICLE Open Access

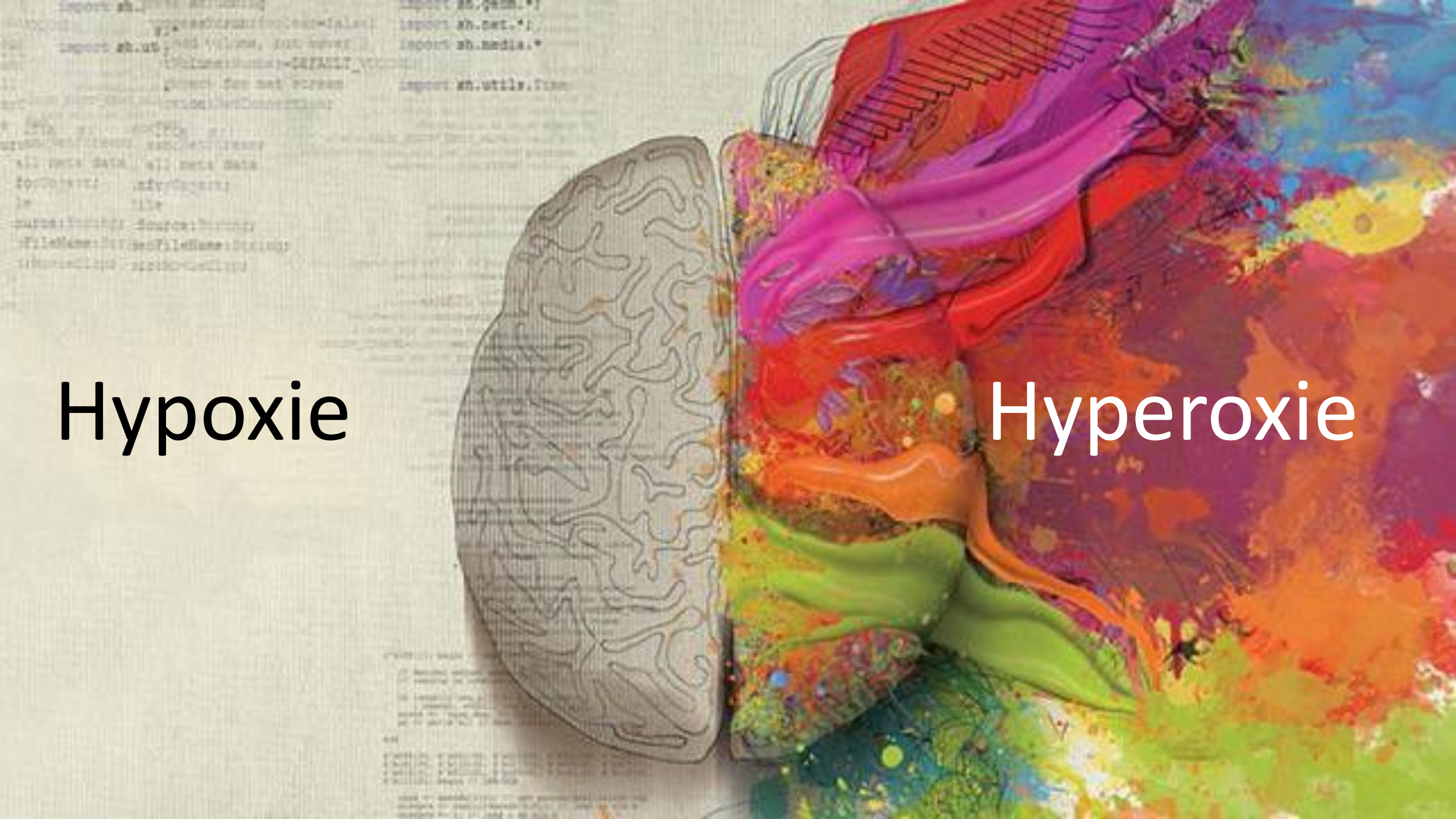
Hyperoxemia during resuscitation of trauma patients and increased intensive care unit length of stay: inverse probability of treatment weighting analysis

	Hyperoxemia	Non-hyperoxemia	Difference	95% CI	*P* value
Unadjusted analyses					
ICU-free days until day 28, median (IQR)	17 (10–21)	23 (16–26)	− 4	− 2 to − 7	**< 0.001**
- Intubated at ED	17 (11–20)	15 (8–23)	0	− 3 to 4	0.832
- Not intubated at ED	22 (10–28)	24 (21–27)	− 2	− 9 to 2	0.356
IPW[a]					
ICU-free days until day 28, median (IQR)	16 (10–22)	19 (12–24)	− 2	− 4 to 0	0.123
- Intubated at ED	18 (9–20)	15 (8–23)	0	− 3 to 3	0.777
- Not intubated at ED	16 (12–22)	23 (19–26)	− 5	−3 to − 10	**0.004**
Ventilator-free days until day 28, median (IQR)	19 (10–26)	22 (7–27)	− 1	− 3 to 0	0.123
- Intubated at ED	18 (0–20)	18 (4–25)	0	− 4 to 0	0.265
- Not intubated at ED	25 (15–26)	28 (23–28)	− 2	− 3 to 0	**0.014**
Survival rate	85.2%	82.7%	OR = 1.21	0.62 to 2.35	0.590



Yamamoto et al. World Journal of Emergency Surgery 2021



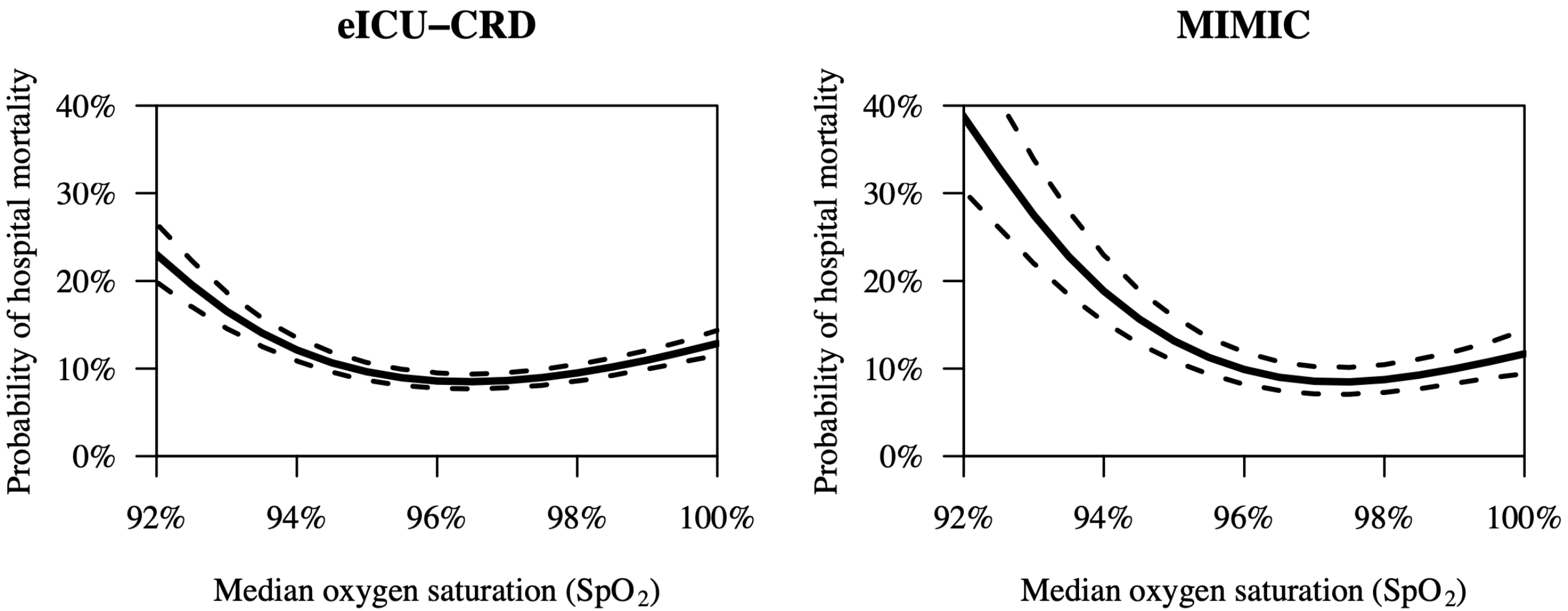

Hypoxie
Hyperoxie

CHEST
OFFICIAL PUBLICATION OF THE AMERICAN COLLEGE OF CHEST PHYSICIANS
Volume 157 #3 • March 2020

CRITICAL CARE: ORIGINAL RESEARCH · Volume 157, Issue 3, P566-573, March 2020

The Search for Optimal Oxygen Saturation Targets in Critically Ill Patients

Observational Data From Large ICU Databases



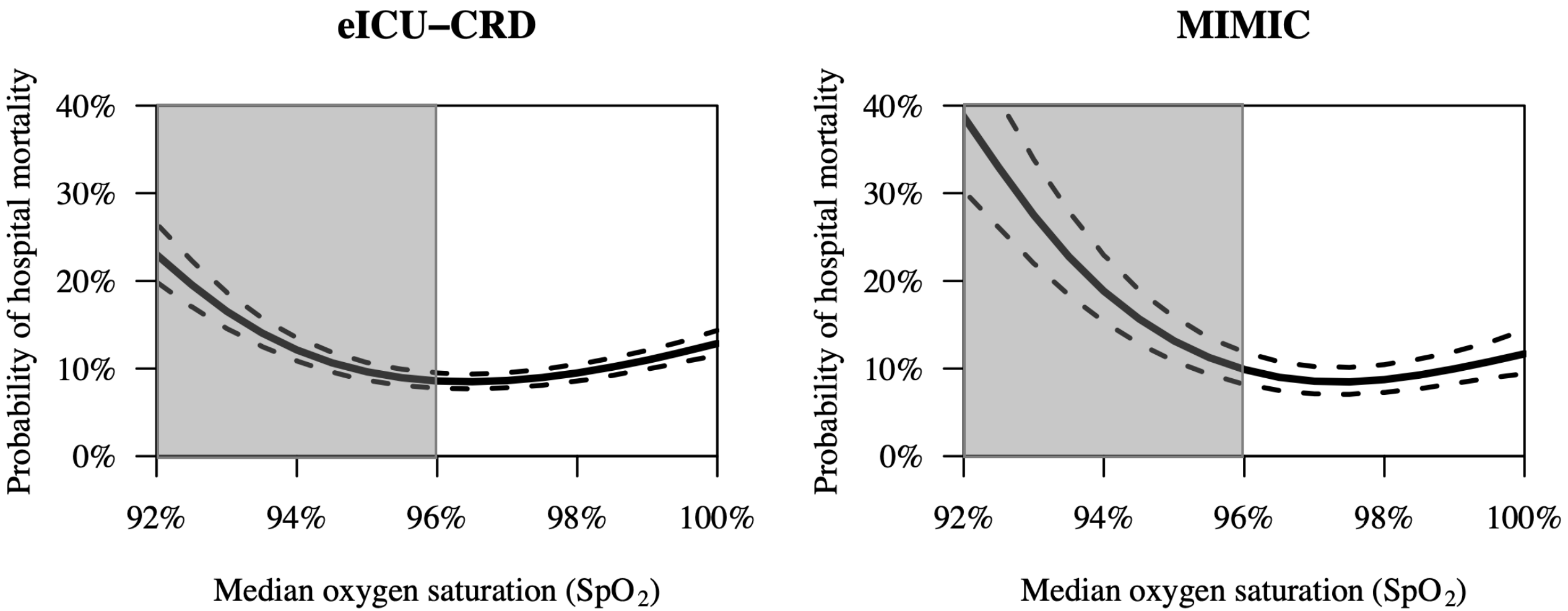
van den Boom. Chest 2019

CHEST
OFFICIAL PUBLICATION OF THE AMERICAN COLLEGE OF CHEST PHYSICIANS
Volume 157 #3 • March 2020

CRITICAL CARE: ORIGINAL RESEARCH · Volume 157, Issue 3, P566-573, March 2020

The Search for Optimal Oxygen Saturation Targets in Critically Ill Patients

Observational Data From Large ICU Databases



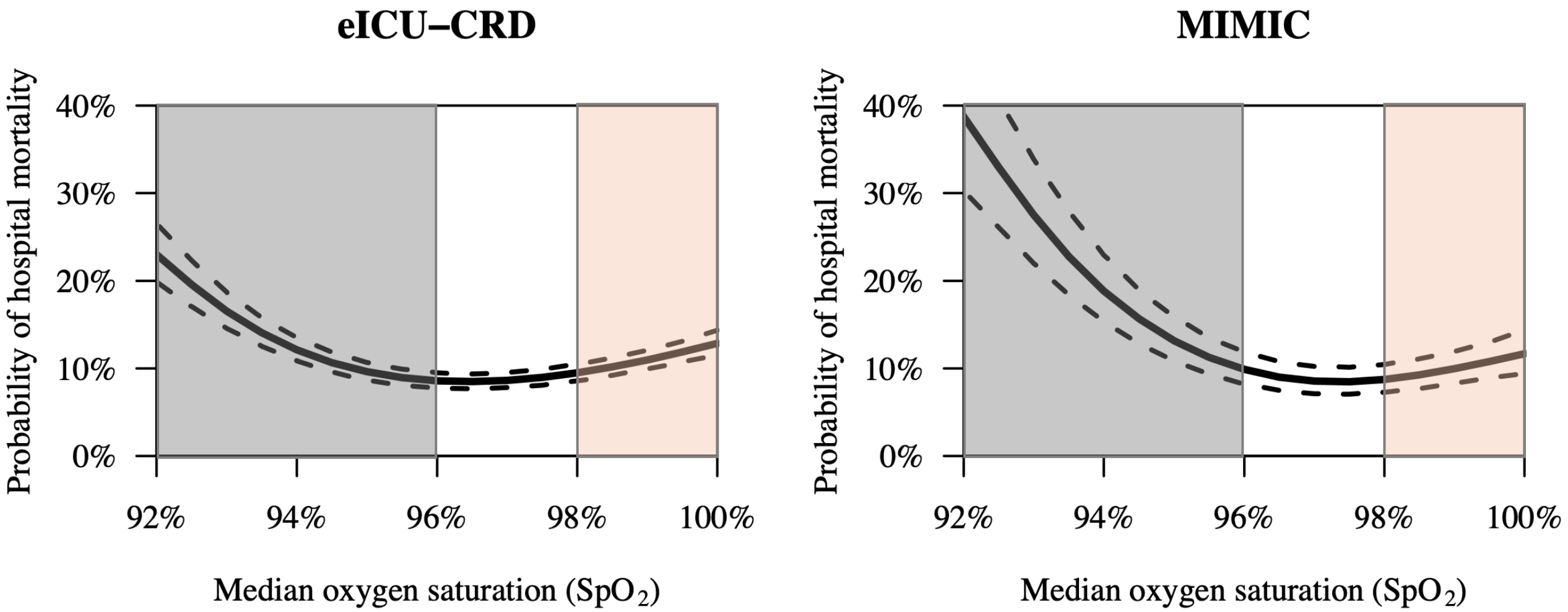
van den Boom. Chest 2019

CHEST
OFFICIAL PUBLICATION OF THE AMERICAN COLLEGE OF CHEST PHYSICIANS
Volume 157 #3 • March 2020

CRITICAL CARE: ORIGINAL RESEARCH · Volume 157, Issue 3, P566-573, March 2020

The Search for Optimal Oxygen Saturation Targets in Critically Ill Patients

Observational Data From Large ICU Databases



van den Boom. Chest 2019

Helms *et al. Annals of Intensive Care* (2024) 14:140
https://doi.org/10.1186/s13613-024-01367-2

Annals of Intensive Care

RESEARCH Open Access

Oxygen therapy in acute hypoxemic respiratory failure: guidelines from the SRLF-SFMU consensus conference

Helms *et al. Annals of Intensive Care* (2024) 14:140
https://doi.org/10.1186/s13613-024-01367-2

Annals of Intensive Care

RESEARCH Open Access

Oxygen therapy in acute hypoxemic respiratory failure: guidelines from the SRLF-SFMU consensus conference

The panel suggests initiating oxygen therapy in the event of **acute hypoxemic respiratory failure**

Helms *et al. Annals of Intensive Care* (2024) 14:140
https://doi.org/10.1186/s13613-024-01367-2

Annals of Intensive Care

RESEARCH Open Access

Oxygen therapy in acute hypoxemic respiratory failure: guidelines from the SRLF-SFMU consensus conference

The panel suggests initiating oxygen therapy in the event of **acute hypoxemic respiratory failure**

The panel makes **no recommendation** on the initiation of oxygen therapy in patients with respiratory distress **without hypoxemia**

Helms *et al. Annals of Intensive Care* (2024) 14:140
https://doi.org/10.1186/s13613-024-01367-2

RESEARCH Open Access

Oxygen therapy in acute hypoxemic respiratory failure: guidelines from the SRLF-SFMU consensus conference

The panel suggests initiating oxygen therapy in the event of **acute hypoxemic respiratory failure**

The panel makes **no recommendation** on the initiation of oxygen therapy in patients with respiratory distress **without hypoxemia**

Oxygen flow or FiO_2 should probably be adjusted according to **pulse oximetry** values, to achieve:

SpO_2 94 to 98% for patients with **no risk** of oxygen-induced hypercapnia

SpO_2 88 to 92% for patients **at risk** of oxygen-induced hypercapnia

Helms *et al. Annals of Intensive Care* (2024) 14:140
https://doi.org/10.1186/s13613-024-01367-2

Annals of Intensive Care

RESEARCH Open Access

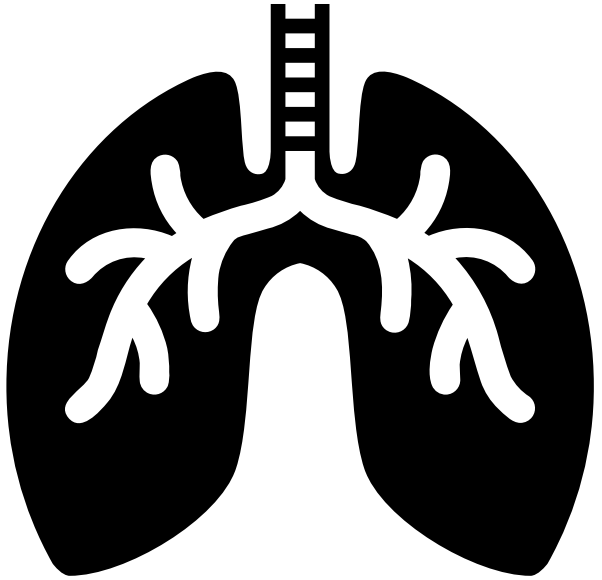
Oxygen therapy in acute hypoxemic respiratory failure: guidelines from the SRLF-SFMU consensus conference

Indications strictes d'intubation

Arrêt cardiaque
Arrêt respiratoire
SpO2 < 88% malgré oxygénothérapie maximale

Indications probables d'intubation

Choc nécessitant le recours aux amines vasopressives
Troubles de la conscience
SpO2 < 92% malgré oxygénothérapie maximale
Tachypnée > 30/minute malgré oxygénothérapie maximale
Agitation
Intolérance au masque de ventilation



Helms *et al. Annals of Intensive Care* (2024) 14:140
https://doi.org/10.1186/s13613-024-01367-2

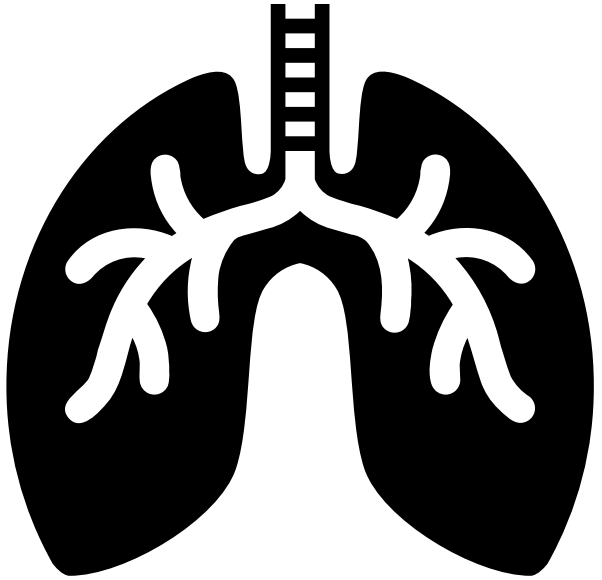
Annals of Intensive Care

RESEARCH Open Access

Oxygen therapy in acute hypoxemic respiratory failure: guidelines from the SRLF-SFMU consensus conference

Indications strictes d'intubation

Arrêt cardiaque
Arrêt respiratoire
SpO2 < 88% malgré oxygénothérapie maximale



IOT et TC grave

Pas de diff significative IOT pré hosp vs intra hosp vs pas d'IOT

Hypocapnie = surmortalité

Hypotension = surmortalité

Bénéfice fonctionnel neurologique de l'intubation préhospitalière > si associé à un traumatisme thoracique (p=0,009) ou abdominal (p=0,02)

Gravesteijn et al. Br J Anaesth. 2020

IOT et TC grave

Pas de diff significative IOT pré hosp vs intra hosp vs pas d'IOT

Hypocapnie = surmortalité

Hypotension = surmortalité

Bénéfice fonctionnel neurologique de l'intubation préhospitalière > si associé à un traumatisme thoracique (p=0,009) ou abdominal (p=0,02)

Les experts recommandent d'intuber les patients pris en charge pour un traumatisme crânien grave afin de réduire la morbi-mortalité.

Gravesteijn et al. Br J Anaesth. 2020

IOT et TC grave

Pas de diff significative IOT pré hosp vs intra hosp vs pas d'IOT

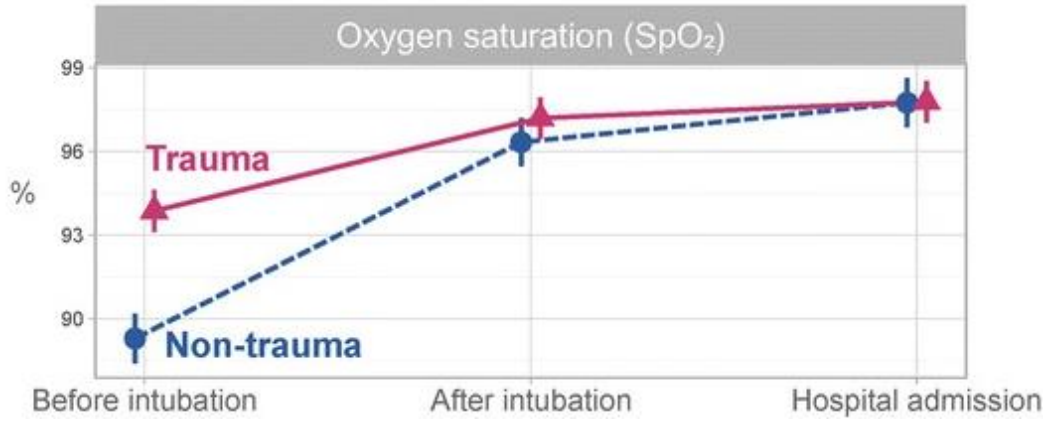
Hypocapnie = surmortalité

Hypotension = surmortalité

Bénéfice fonctionnel neurologique de l'intubation préhospitalière > si associé à un traumatisme thoracique (p=0,009) ou abdominal (p=0,02)

Les experts recommandent d'intuber les patients pris en charge pour un traumatisme crânien grave afin de réduire la morbi-mortalité.

Amélioration de la saturation après intubation à l'arrivée à l'hôpital



Sunde et al. BMC Emergency Medicine 2017

IOT et TC grave

Pas de diff significative IOT pré hosp vs intra hosp vs pas d'IOT

Hypocapnie = surmortalité

Hypotension = surmortalité

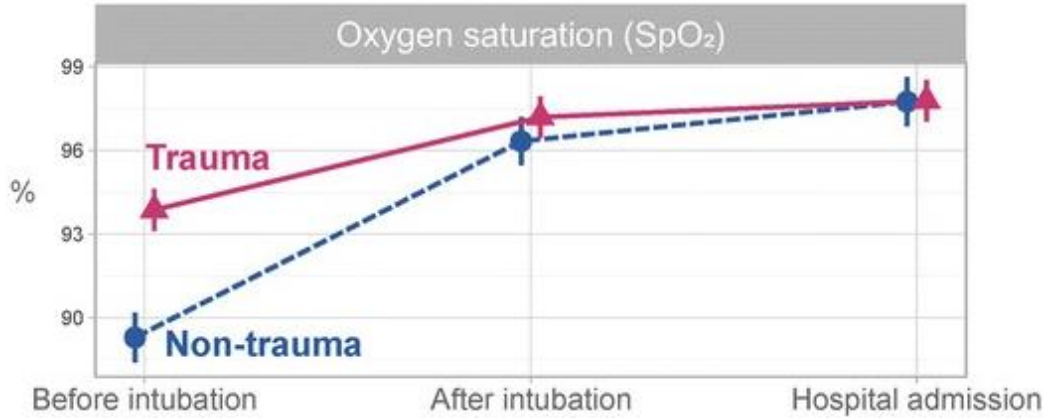
Bénéfice fonctionnel neurologique de l'intubation préhospitalière > si associé à un traumatisme thoracique (p=0,009) ou abdominal (p=0,02)

Les experts recommandent d'intuber les patients pris en charge pour un traumatisme crânien grave afin de réduire la morbi-mortalité.

Amélioration de la saturation après intubation à l'arrivée à l'hôpital

IOT et Trauma thoracique

Après élimination d'un pneumothorax



Sunde et al. BMC Emergency Medicine 2017

IOT et TC grave

Pas de diff significative IOT pré hosp vs intra hosp vs pas d'IOT

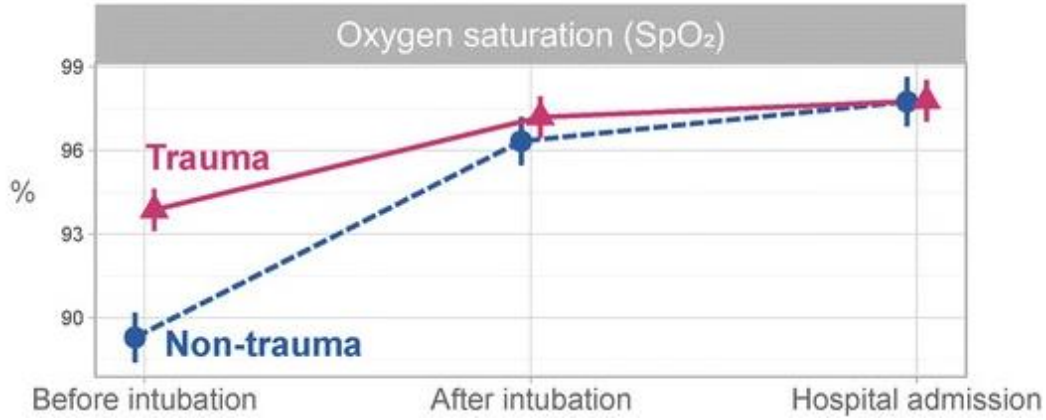
Hypocapnie = surmortalité

Hypotension = surmortalité

Bénéfice fonctionnel neurologique de l'intubation préhospitalière > si associé à un traumatisme thoracique (p=0,009) ou abdominal (p=0,02)

Les experts recommandent d'intuber les patients pris en charge pour un traumatisme crânien grave afin de réduire la morbi-mortalité.

Amélioration de la saturation après intubation à l'arrivée à l'hôpital



Sunde et al. BMC Emergency Medicine 2017

IOT et Trauma thoracique

Après élimination d'un pneumothorax

IOT et choc hémorragique

Que si troubles de la conscience ET après correction de l'hémodynamique

Take Home Message

Beaucoup de matériel disponible

Nécessité de connaître les indications et les limites de chaque système

Take Home Message

Beaucoup de matériel disponible

Nécessité de connaître les indications et les limites de chaque système

L’hypoxie augmente rapidement la mortalité donc oxygénothérapie « large et précoce »

Objectif SpO_2 94 à 98 si pas de risque d’hypercapnie

Objectif SpO_2 88 à 92 si risque d’hypercapnie

Take Home Message

Beaucoup de matériel disponible

Nécessité de connaître les indications et les limites de chaque système

L’hypoxie augmente rapidement la mortalité donc oxygénothérapie « large et précoce »

Objectif SpO_2 94 à 98 si pas de risque d’hypercapnie

Objectif SpO_2 88 à 92 si risque d’hypercapnie

MAIS l’hyperoxie prolongée augmente aussi la mortalité

Titration inversée pour les objectifs de SpO_2 prédéfinis

Désaturation aigue en préhospitalier

Titouan Rosec
Infirmier d'Urgence

Jean-Baptiste Bouillon-Minois
Médecin Urgentiste