



KARIM

1.LF UK A VFN V PRAZE

Pandemie COVID-19 už se můžeme ohlédnout?

AKUTNĚ 2025

MUDr. Michal Otáhal, Ph.D.

Klinika anesteziologie, resuscitace a intenzivní medicíny
1. lékařská fakulta UK a Všeobecná fakultní nemocnice v Praze
U nemocnice 2, Praha 2



VŠEOBECNÁ FAKULTNÍ
NEMOCNICE V PRAZE



1. LÉKAŘSKÁ
FAKULTA
Univerzita Karlova

Konflikt zájmů?



ČESKÁ SPOLEČNOST INTENZIVNÍ MEDICÍNY

Předseda
prof. MUDr. Šrámek Vladimír, Ph.D.

Anesteziologicko-resuscitační klinika,
Fakultní nemocnice u svaté Anny v Brně,
Pekářská 53, 656 91 Brno
☎ 543 182 553, vladimir.sramek@fnusa.cz

Místopředseda
prof. MUDr. Matějovič, Ph.D.

I. interní klinika, Fakultní nemocnice Plzeň
Alej Svobody 80, 304 60 Plzeň
☎ 377 103 501, matejovic@fnplzen.cz

Vědecký sekretář
doc. MUDr. Balík Martin, Ph.D., EDIC

Klinika Anesteziologie, Resuscitace a Intenzivní
mediciny 1. LF UK v Praze a VFN,
U Nemocnice 2, 128 08 Praha 2
☎ 224 963 366, martin.balik@vfn.cz



Předseda
prof. MUDr. Šrámek Vladimír, Ph.D.

Anesteziologicko-resuscitační klinika,
Fakultní nemocnice u svaté Anny v Brně,
Pekářská 53, 656 91 Brno
☎ 543 182 553, vladimir.sramek@fnusa.cz

Místopředseda
prof. MUDr. Matějovič, Ph.D.

I. interní klinika, Fakultní nemocnice Plzeň
Alej Svobody 80, 304 60 Plzeň
☎ 377 103 501, matejovic@fnplzen.cz

Vědecký sekretář
doc. MUDr. Balík Martin, Ph.D., EDIC

Klinika Anesteziologie, Resuscitace a Intenzivní
mediciny 1. LF UK v Praze a VFN,
U Nemocnice 2, 128 08 Praha 2
☎ 224 963 366, martin.balik@vfn.cz

Věc: žádost o podporu projektu na zajištění péče o nemocné s těžkou formou ARDS v rámci probíhající COVID-19 pandemie.

Vážený pane ministře,

v této nelehké době si dovoluujeme se na Vás obrátit jako zástupci vedení resuscitačních oddělení a ECMO center vybraných fakultních nemocnic. V souvislosti s léčbou nejtěžších pacientů Covid-19 bychom rádi touto cestou významně podpořili aktuálně probíhající jednání mezi MZČR, MPO a vládou České republiky o zajištění diagnosticko-terapeutické technologie ALT-EIT pro naše instituce a ECMO centra:

- VFN v Praze, Klinika anesteziologie, resuscitace a intenzivní medicíny
- FN Hradec Králové, Klinika anesteziologie, resuscitace a intenzivní medicíny
- FN u svaté Anny v Brně, Anesteziologicko-resuscitační klinika
- FN Ostrava, Klinika anesteziologie, resuscitace a intenzivní medicíny

ALT-EIT je spojením metod pro individualizovanou ventilační péči obzvláště vhodnou pro pacienty s těžkým respiračním postižením u Covid-19. Hlavně proto, že toto onemocnění probíhá atypicky, může se rozvíjet velmi rychle a může probíhat dvěma zcela odlišnými způsoby, které v sebe mohou v průběhu onemocnění přecházet a které vyžadují odlišné léčebné strategie. Zhruba v polovině případů bývá plicní postižení stranově asymetrické a velmi profituje z řízeného polohování lůžka pacienta. Polohování pacienta má na jeho ventilační parametry překvapivě velký vliv a je zajišťováno pomocí technologie Multicare ALT (Automatická Laterální Terapie), kterou již máme k dispozici.

To, co nám chybí, je zobrazovací metoda EIT (elektrická impedanční tomografie) a její implementace, která dovoluje kontinuální, okamžitě, neinvazivní, bedside monitorování distribuce ventilace. Na jeho základě je pak možno velmi operativně upravovat jak parametry umělé plicní ventilace, tak i polohu pacienta.

Projekt ALT-EIT je běžící výzkumný projekt konsorcia Univerzita Karlova, Všeobecná fakultní nemocnice, Krajská nemocnice Liberec a LINET Group. Projekt je primárně zaměřený na léčbu ARDS. Aktuálně bylo navrženo nasměrování na léčbu respiračního selhání u Covid-19 pozitivních pacientů a rozšíření na další fakultní nemocnice České republiky.

Zajištění technologie je součástí extenze projektu ALT-EIT a zahrnuje i další klíčové aktivity. Především systematický sběr dat a zkušeností o průběhu a léčbě respiračního selhání u COVID-19 pacientů. Dále spolupráci našich špičkových institucí v oblasti individualizace a optimalizace plicní ventilace a z toho plynoucí vytvoření znalostního centra v této oblasti. Projekt ALT-EIT je napojen na naprostou světovou špičku v oblasti umělé plicní ventilace a poskytuje nám příležitost zařadit českou intenzivní medicínu mezi světovou elitu v této oblasti. Jako velmi cenné vidíme i propojení s největším českým výrobcem nemocničních lůžek, společností LINET, pro kterou je projekt unikátní příležitostí k výzkumu a inovacím.

Přikládáme i prezentaci s dalšími informacemi o projektu. Velmi rádi odpovíme i jakékoliv dotazy, které prosíme směřujte na koordinátora klinické části, MUDr. Michala Otáhalu (michal.otahal@vfn.cz, +420 608 214 023)

Děkujeme za Váš čas a přejeme pevné zdraví.

V Brně, 9. dubna 2020

prof. MUDr. Vladimír Šrámek, Ph.D.
předseda ARK, FN u sv. Anny v Brně
předseda České společnosti intenzivní medicíny

prof. MUDr. Pavel Ševčík, CSc.
předseda KARIM, FN Ostrava

doc. MUDr. Pavel Dostál Ph.D., MBA
předseda KARIM, FN Hradec Králové

MUDr. Michal Otáhal, Ph.D.
vedoucí lékař RES-UP KARIM, VFN v Praze



Pandemie COVID-19 - už se můžeme ohlédnou

O čem si budeme povídat:

- Báli jsme se! OTI/PPF/TYVEG
- **Bylo to jiné ARDS?** CARDS H x L typ Byli TLUSTÝ!!!!
- **HFNO** KDY???? přistoupit k OTI aneb kam až ho nechám „l
- Limitace péče nejenom při COVID-19
- **JAK?????** ... „timing“ při OTI aneb kuchařka „jak to nejlépe uo
- Jak ventilovat????? **POLOHOVÁNÍ**
- Je to **V/Q mismatch?** ... optimalizace??
- Co vlastně zabralo????? Dexamethason a Rendesivir? očkov



Zajištění dýchacích cest a COVID 19

Doporučení

Recommendation

5. For healthcare workers performing **endotracheal intubation** on patients with COVID-19, we **suggest** using video-guided laryngoscopy, over direct laryngoscopy, if available.

Weak recommendation, low-quality evidence.

Recommendation

6. For COVID-19 patients requiring **endotracheal intubation**, we **recommend** that endotracheal intubation be performed by the healthcare worker who is most experienced with airway management in order to minimize the number of attempts and risk of transmission.

Best practice statement.

GUIDELINES

Surviving Sepsis Campaign: guidelines on the management of critically ill adults with COVID-19

er Møller^{3,4}, Yaseen M. Arabi⁵, Mark Loeb^{1,2}, Michelle Ng Gong⁶, Eddy Fan⁷,

d the Society of Critical Care Medicine

Intensive Care Med (2020) 46:854–887
<https://doi.org/10.1007/s00134-020-06022-5>

Recommendation

26. In adults with COVID-19 and **acute hypoxemic respiratory failure**, we **suggest** using HFNC over NIPPV.

Weak recommendation, low-quality evidence.

AEROSOL BOXy



<https://www.taiwannews.com.tw/en/news/3902435>



AEROSOL BOXy



The NEW ENGLAND
JOURNAL of MEDICINE

CORRESPONDENCE

Barrier Enclosure during Endotracheal Intubation

N Engl J Med 2020; 382:1957-1958

DOI: 10.1056/NEJMc2007589



- obtížná manipulace - těžké
- není místo pro druhé ruce u desaturací – obtížného zajištění
- nutno potom čistit

AEROSOL BOXy



Intubation

10.1056/NEJMc2007589



- TOHLE NIKDY NECHCI ZAŽÍT!!!!
Nebojte 😊 nezažijete 10ml + výbuch



„L“ x „H“ CARDS

COVID-19 pneumonia: different respiratory treatments for different phenotypes?

Luciano Gattinoni^{1*}, Davide Chiumello², Pietro Caironi^{3,4}, Mattia Busana¹, Federica Romitti¹,

Intensive Care Med (2020) 46:1099–1102

- **Low elastance**
- **Low ventilation-to-perfusion (V/Q) ratio.** Since the gas volume is nearly normal, **hypoxemia may be best explained by the loss of REGULATION of perfusion and by loss of hypoxic vasoconstriction.** The pulmonary artery pressure should be near normal.
- **Low lung weight**
- **Low lung recruitability.** The amount of non-aerated tissue is very low; consequently, the recruitability is low

- **High elastance**
The decrease in gas volume due to increased edema
- **High right-to-left shunt.** This is due to the fraction of cardiac output perfusing the **non-aerated tissue which develops in the DEPENDENT lung regions due to the increased edema and superimposed pressure.**
- **High lung weight**
- **High lung recruitability**
increased amount of non-aerated tissue is associated, as in severe ARDS, with increased recruitability



$\text{PaO}_2/\text{FiO}_2$
95 mmHg

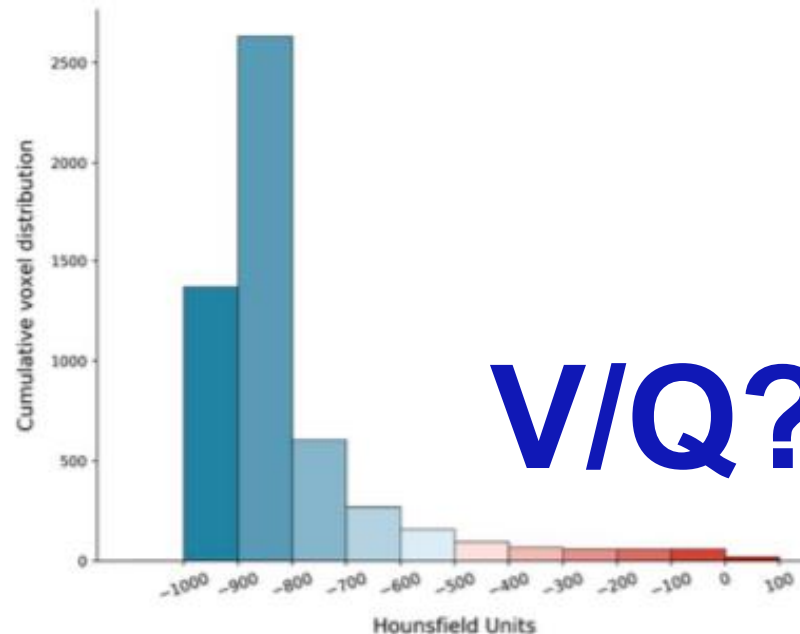
L type

??



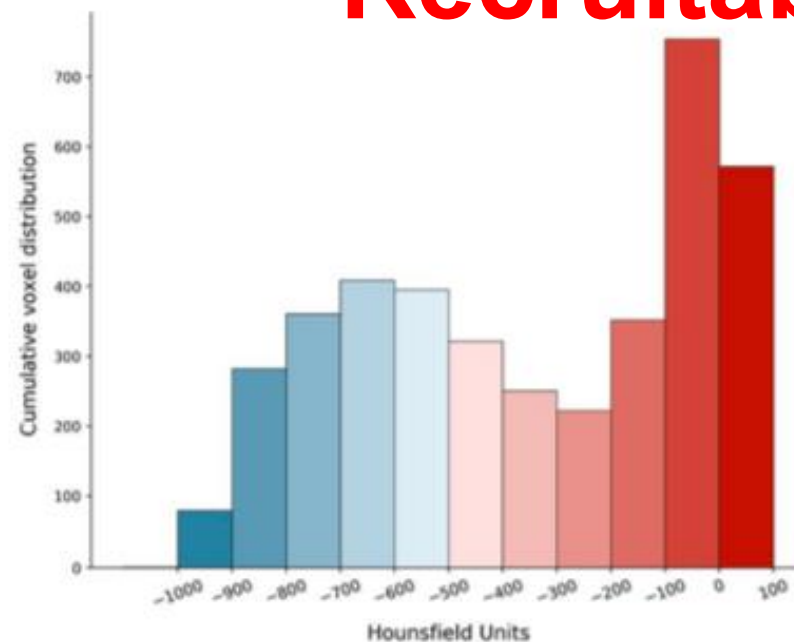
$\text{PaO}_2/\text{FiO}_2$
84 mmHg

H type



V/Q?

Recruitability?



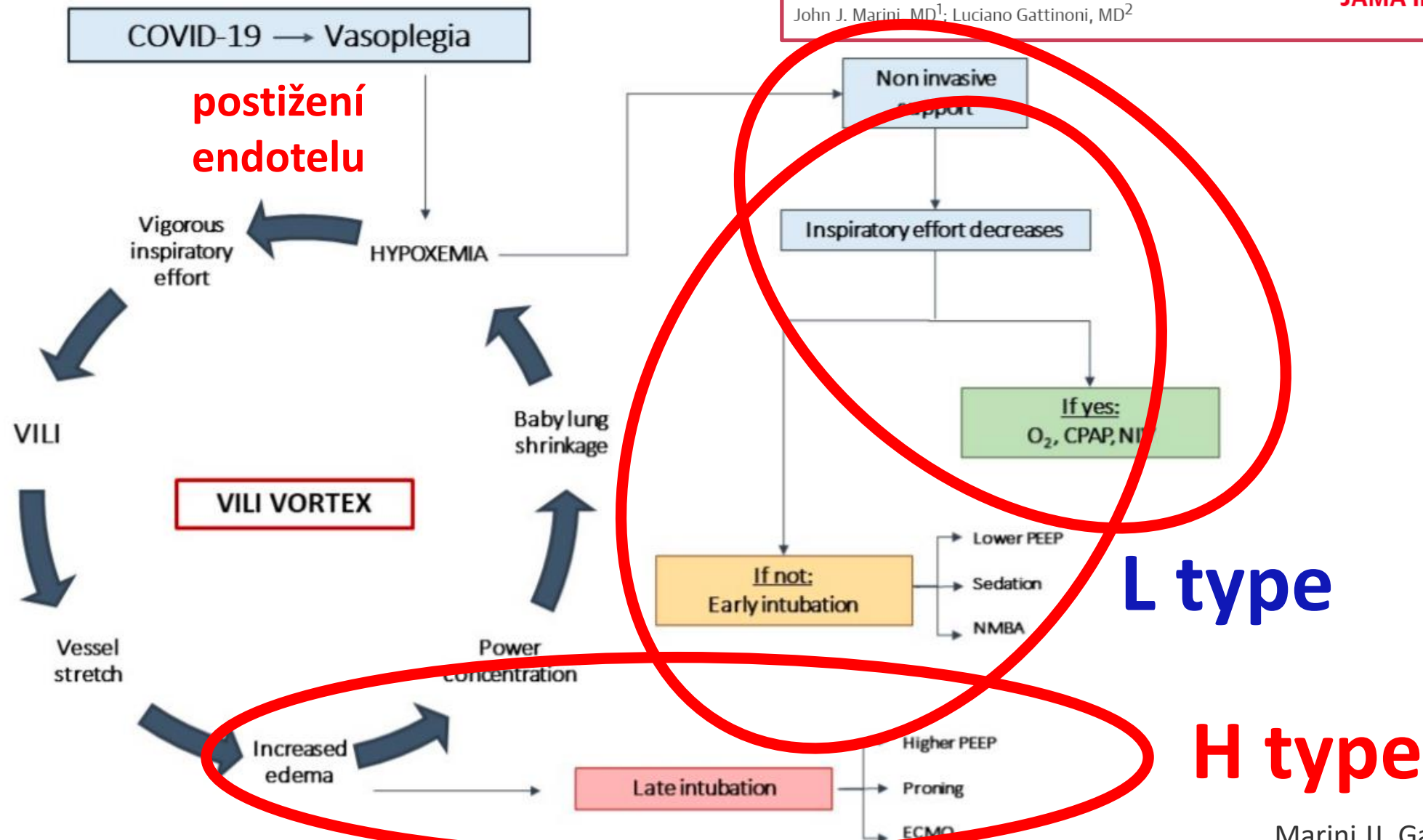
VILI VORTEX – „L“ x „H“ CARS

Management of COVID-19 Respiratory Distress

John J. Marini, MD¹; Luciano Gattinoni, MD²

JAMA Insights | Clinical Update

JAMA. 2020;323(22):2329-2330.



VILI VORTEX – „L“ x „H“ CARS

Management of COVID-19 Respiratory Distress

Insights | Clinical Update
JAMA. 2020;323(22):2329-2330.

Time period	Objective	Respiratory support options	Rationale
Before intubation	Adequate gas exchange Avoid P-SILI	Supplemental oxygen, CPAP, NIV, HFNC Awake prone positioning. Target nonvigorous h	Pe ry effort can cause d vascular stress,
During mechanical ventilation	Avoid pulmonary deterioration and VILI vortex	Minimize P and	ary
After intubation	Min stres Optim Avoid	PEEP (7-0 more li (20)	be unnecessary ve, creates rsely redirects
	Reduce and evenly distribute lung and vascular stresses Optimize O ₂ Avoid VILI vortex	5-7 mL/kg) O ₂ demand plement prone positioning	More closely behaves and responds like typical ARDS

LETTER TO THE EDITOR

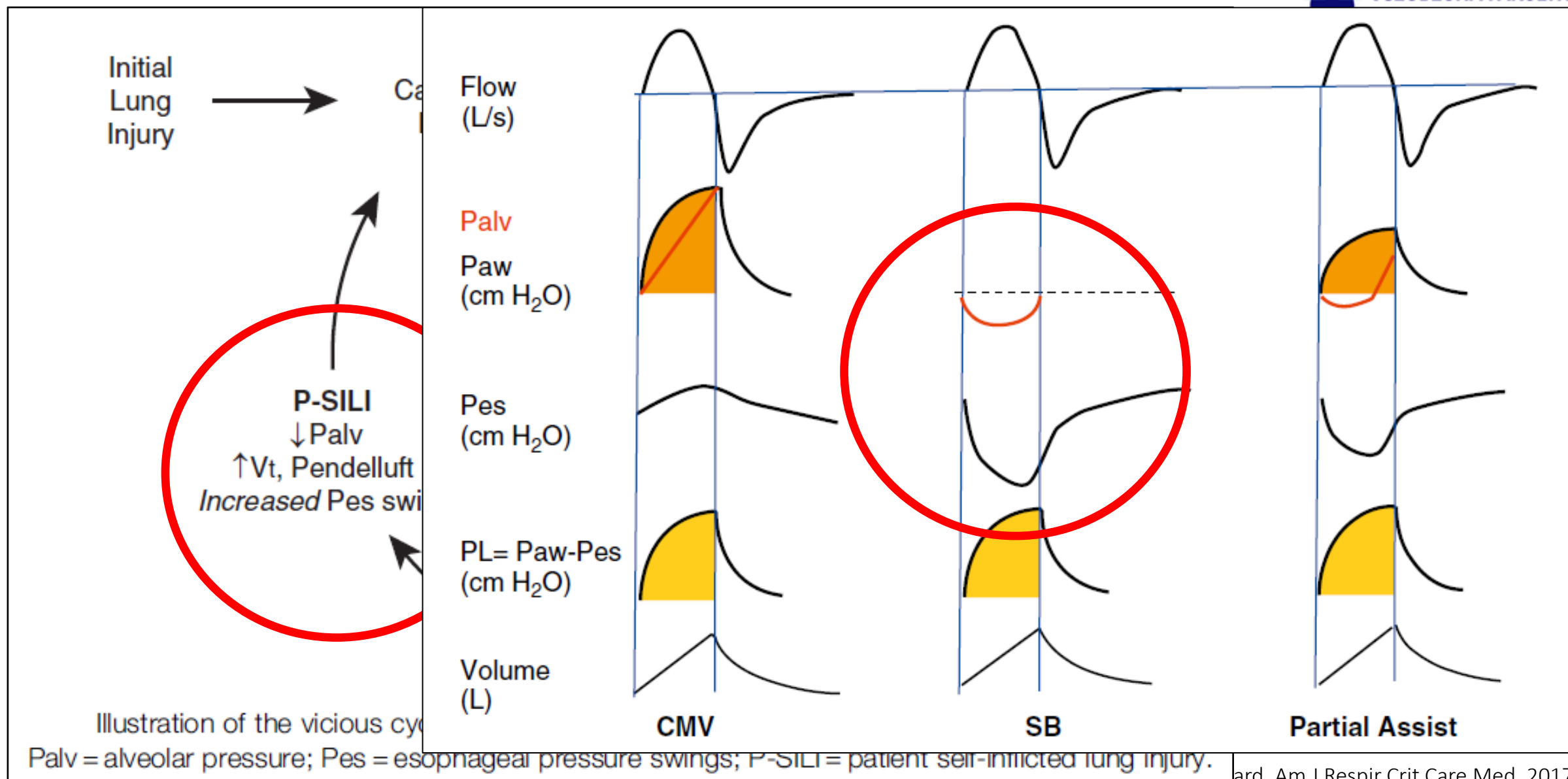
P-SILI is not justification of COVID-19 patients

Tobin et al. Ann. Intensive Care

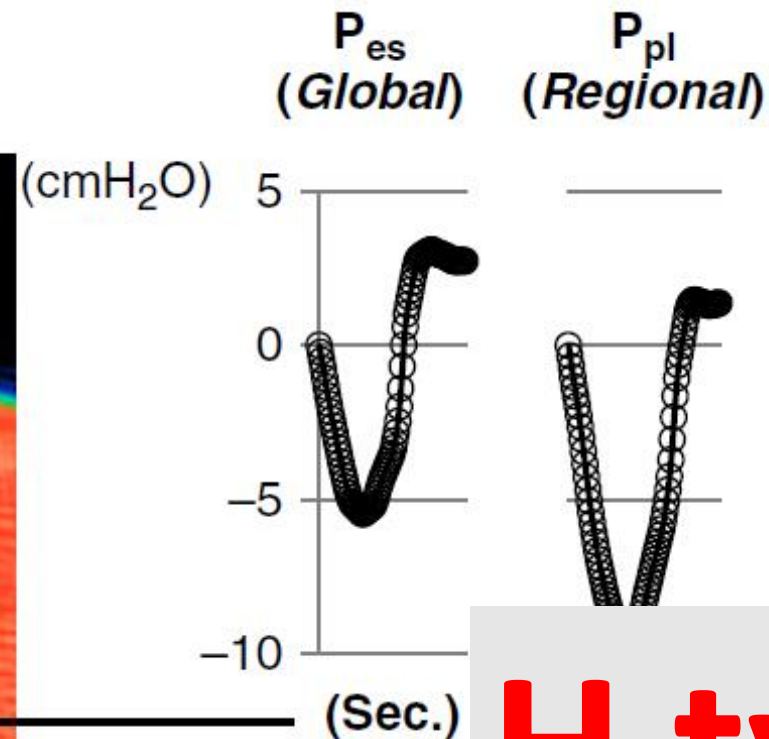
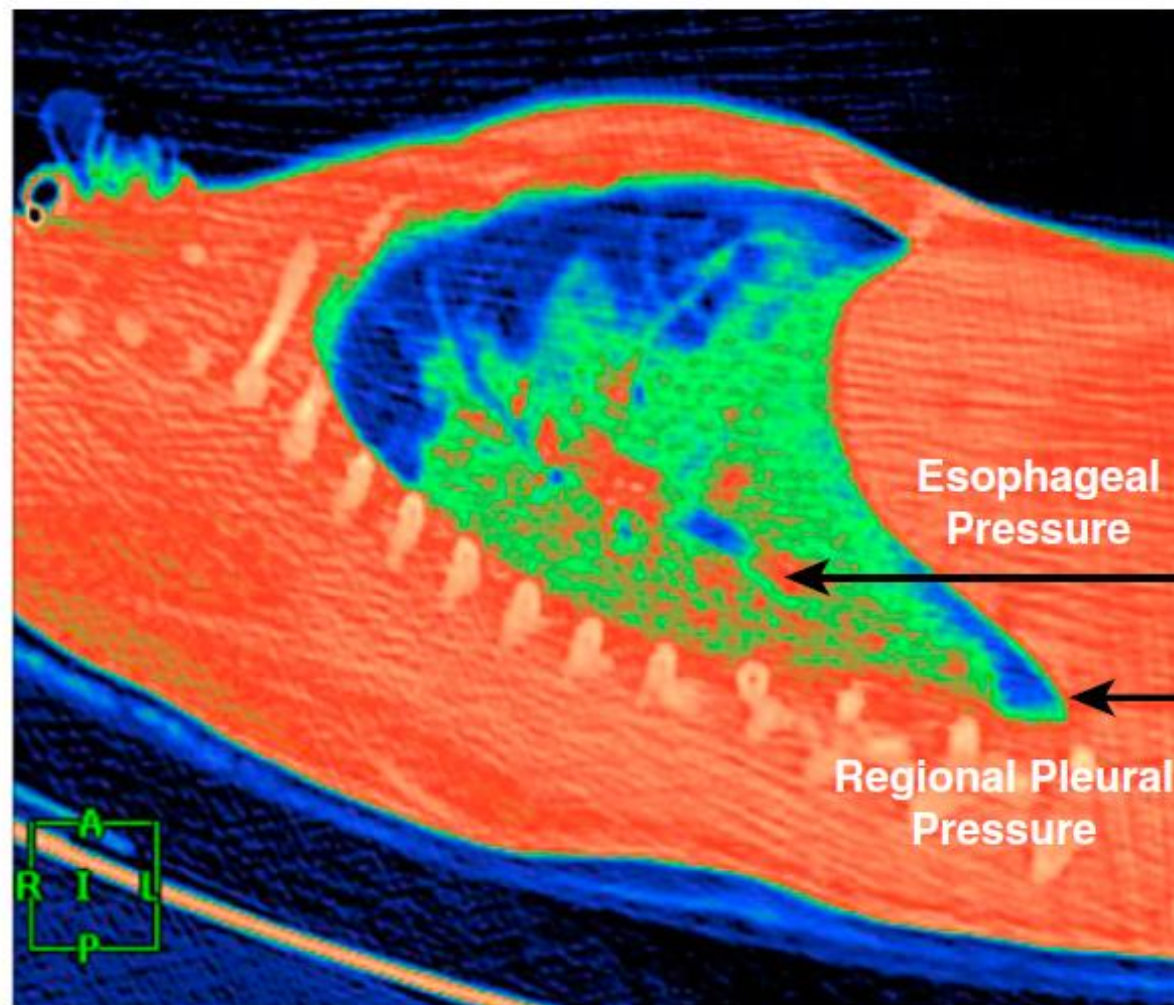
(2020) 10:105

**„intubation should be prioritized“
„avoiding delayed intubation“**

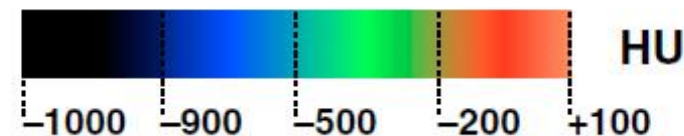
P-SILI = Patient Self-Inflicted Lung Injury



P-SILI = Patient Self-Inflicted Lung Injury



H type?



Ventilation

Kavanagh^{1,2,3}

ber 8 | April 15 2017

EARLY is NOT better?

Effect of timing of intubation on clinical outcomes of critically ill patients with COVID-19: a systematic review and meta-analysis of non-randomized cohort studies

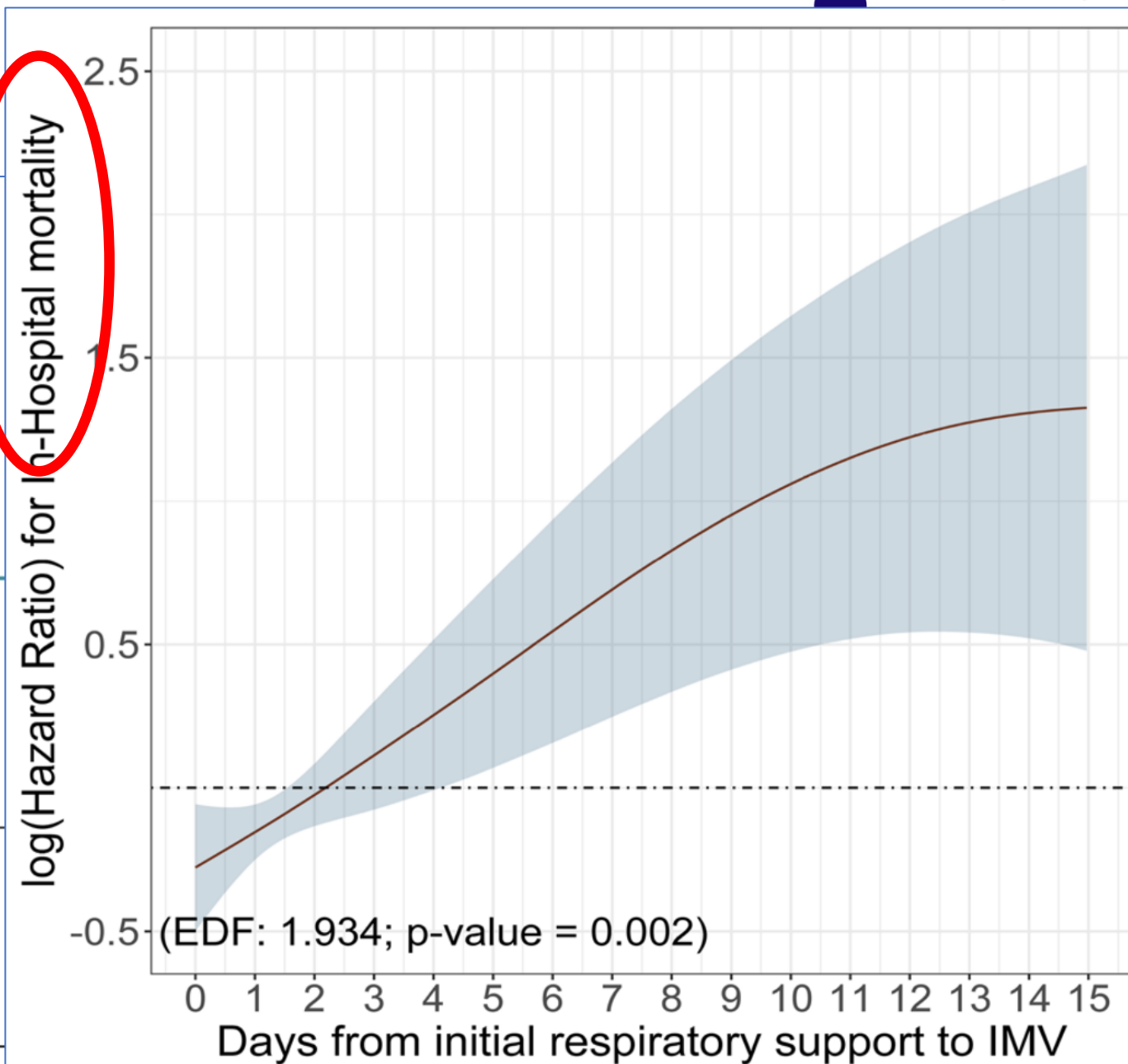
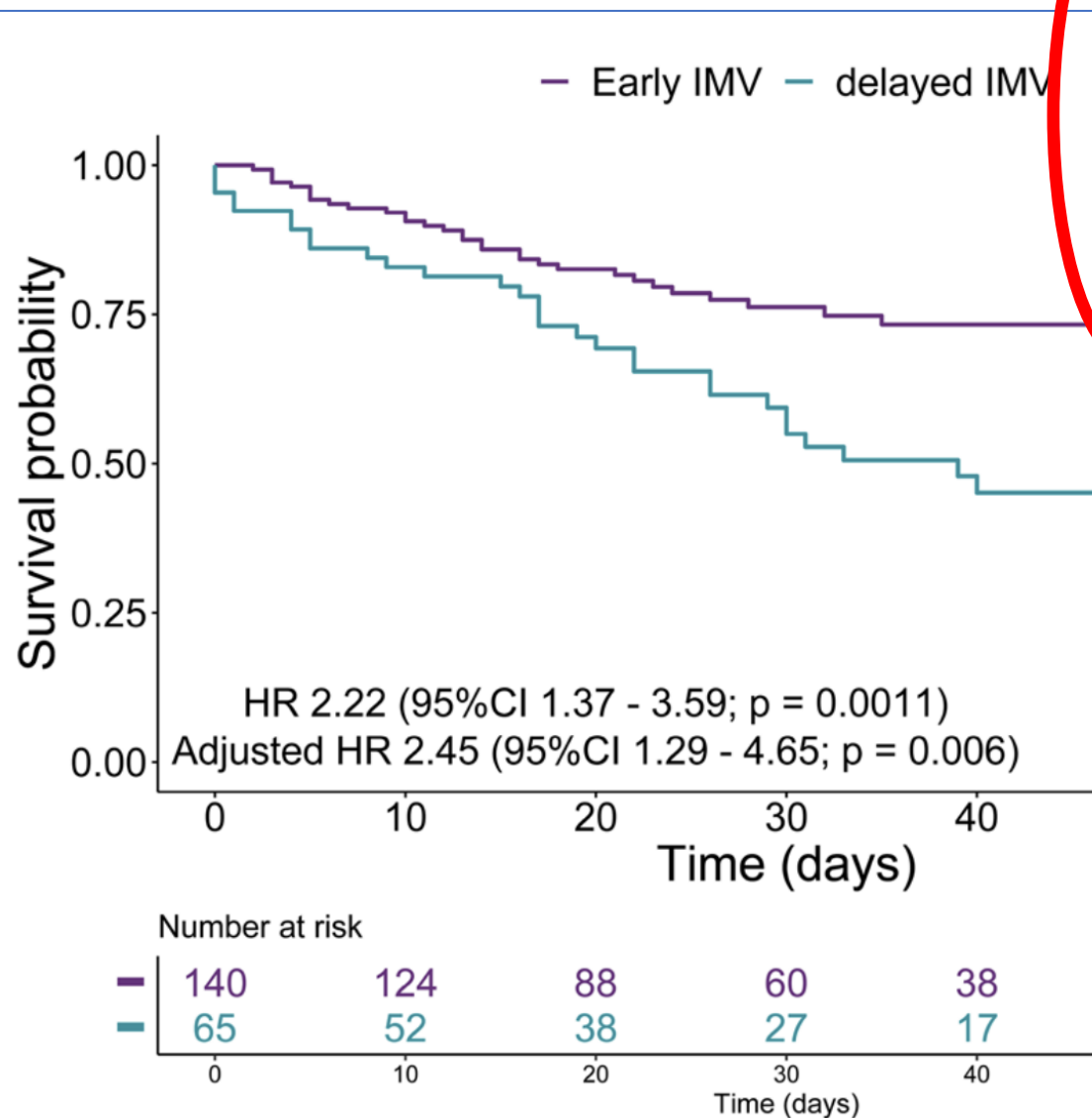
Papoutsi et al. Crit Care (2021) 25:121

- total of **12 studies, involving 8944** critically ill patients with COVID-19, were included.
- **no statistically detectable difference on all-cause mortality** between patients undergoing early versus late intubation (3981 deaths; 45.4% versus 39.1%; RR 1.07, 95% CI 0.99–1.15, $p = 0.08$).
- duration of MV (1892 patients; MD – 0.58 days, 95% CI – 3.06 to 1.89 days, $p = 0.65$).
- **intubation without versus with a prior trial of high-flow** nasal cannula or noninvasive mechanical ventilation **was still not associated with a statistically detectable difference on all-cause mortality** (1128 deaths; 48.9% versus 42.5%; RR 1.11, 95% CI 0.99–1.25, $p = 0.08$).

Conclusions:

- synthesized evidence suggests that **timing of intubation may have no effect on mortality and morbidity of critically ill patients with COVID-19**
- These results might justify a **wait-and-see approach**

EARLY is better?



HFO/NC kdy ANO, kdy už NE?

An Index Combining Respiratory Rate and Oxygenation to Predict Outcome of Nasal High-Flow Therapy

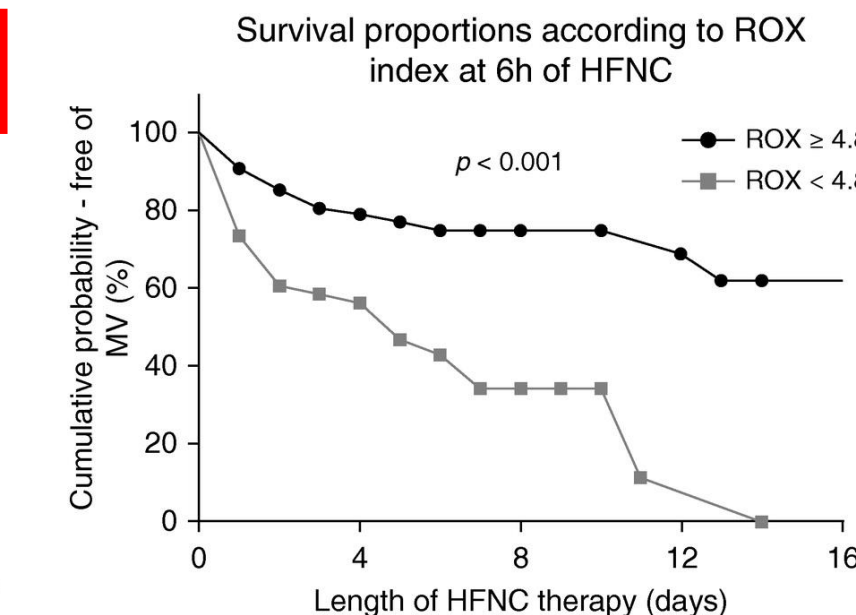
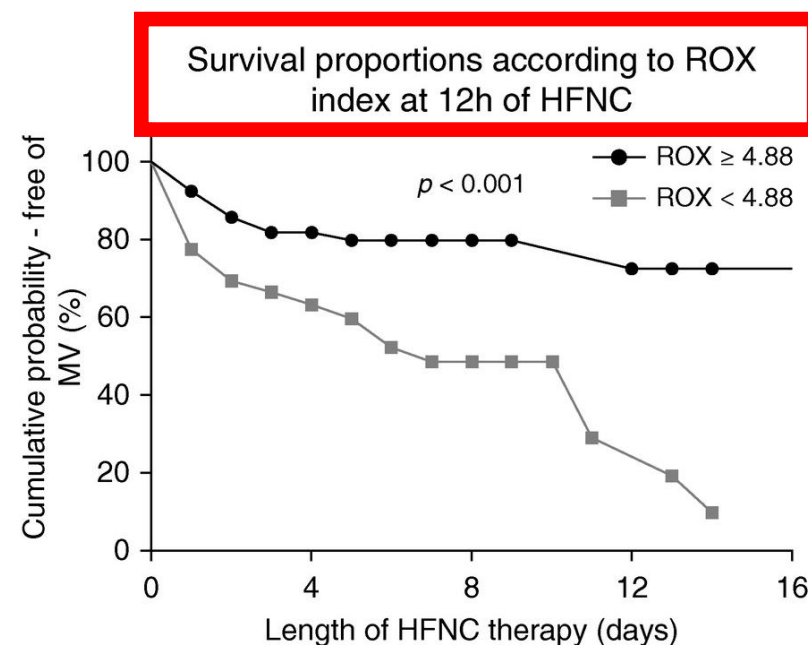
AJRCCM

Oriol Roca ^{1,2}, Berta Caralt ^{1,3}, Jonathan Messika ^{4,5,6}

Volume 199, Issue 11

A

C



Number at risk		0	4	8	12	16
ROX ≥ 4.88	127	53	17	12	3	
ROX < 4.88	49	16	8	1	0	

ROX index
SpO₂%/FiO₂/RR

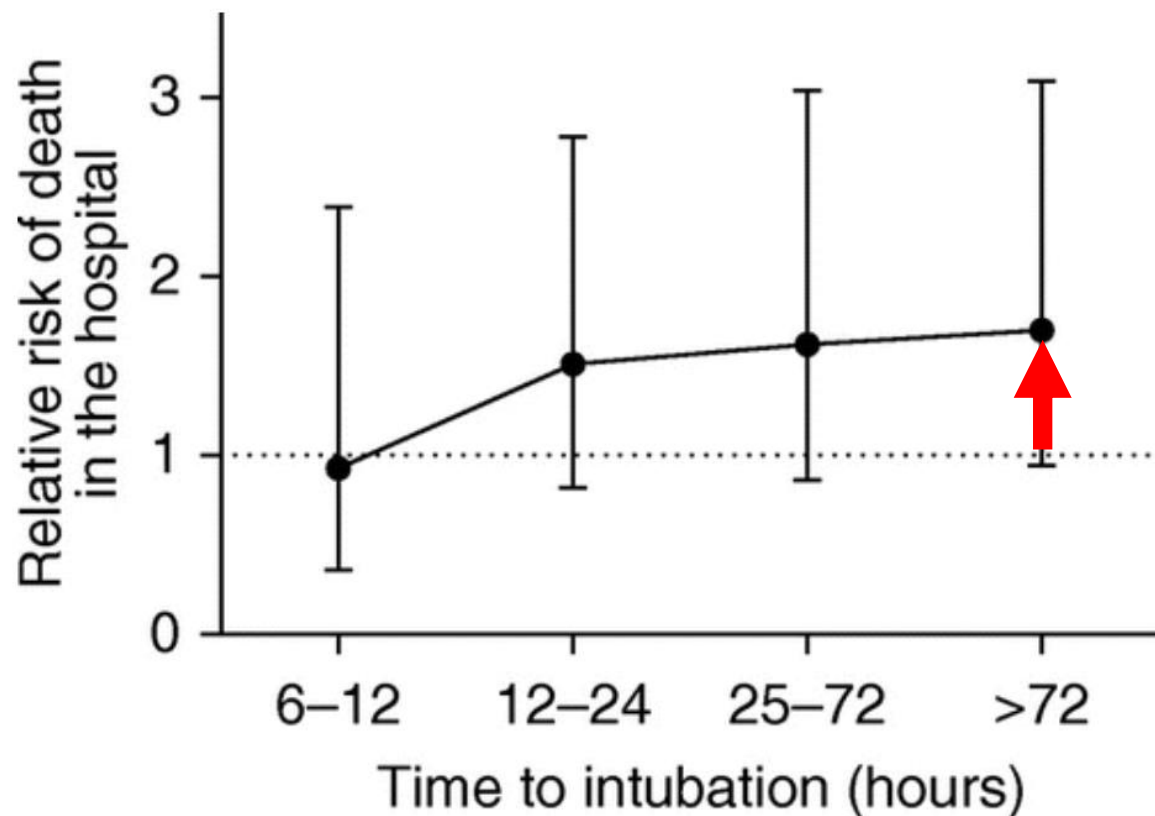
> 4.88
4.88 – 3.85
< 3.85
(2h-2.85, 6h-3.47, 12h-3.85)

HFO/NC kdy ANO, kdy už NE?

An Index Combining Respiratory Rate and Oxygenation to Predict Outcome of Nasal High-Flow Therapy **AJRCCM**

Oriol Roca ^{1,2}, Berta Caralt ^{1,3}, Jonathan Messika ^{4,5,6}

Volume 199, Issue 11



ROX index
SpO₂%/FiO₂/RR

> 4.88

4.88 – 3.85

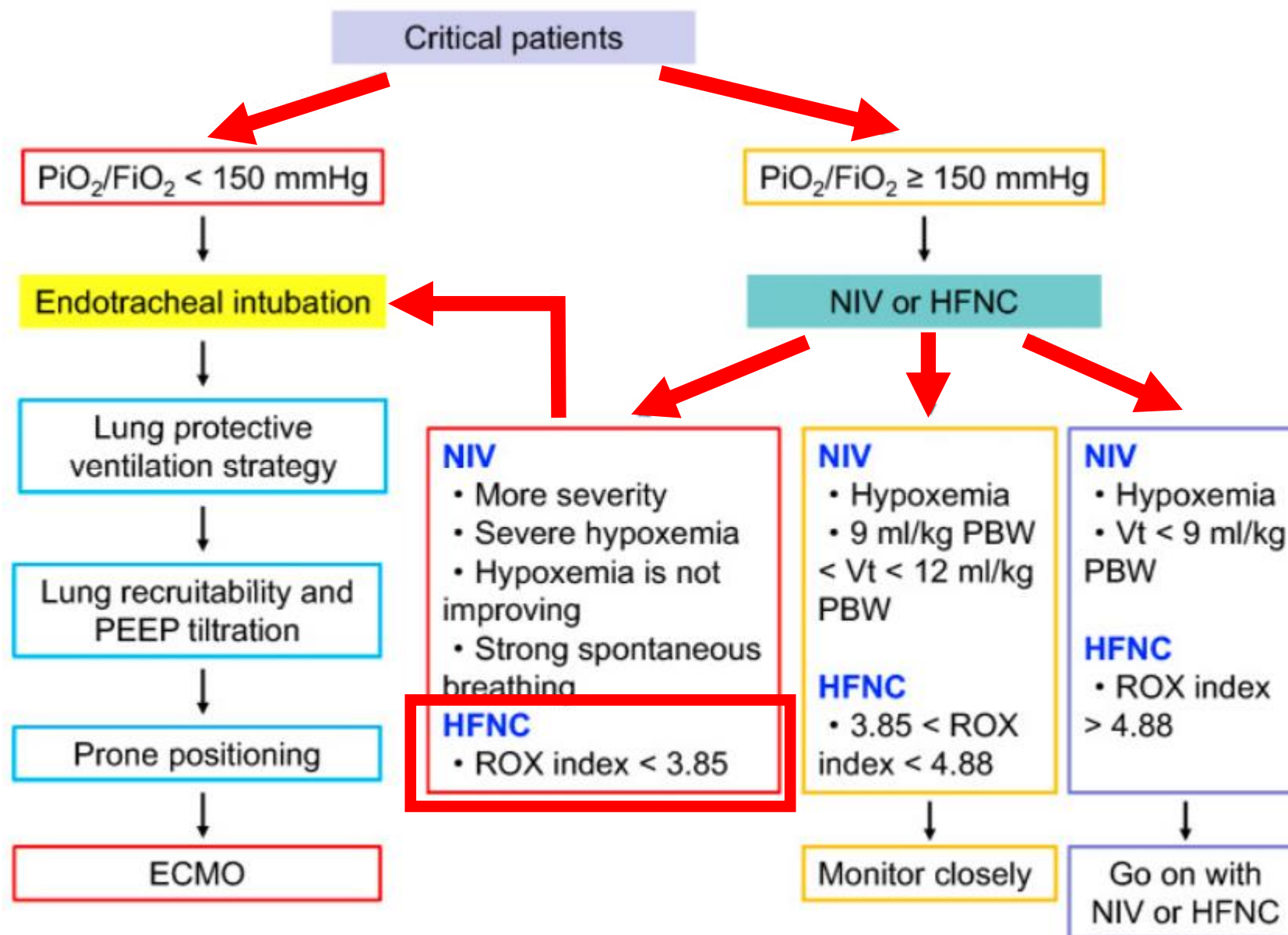
< 3.85

(2h-2.85, 6h-3.47, 12h-3.85)

KDY???? přistoupit k OTI

Very ill patients
Statement from front-line
in Wuhan, China

Shang et al. *Ann. Intensive Care* (2020) 10:73



ROX index
SpO₂%/FiO₂/RR

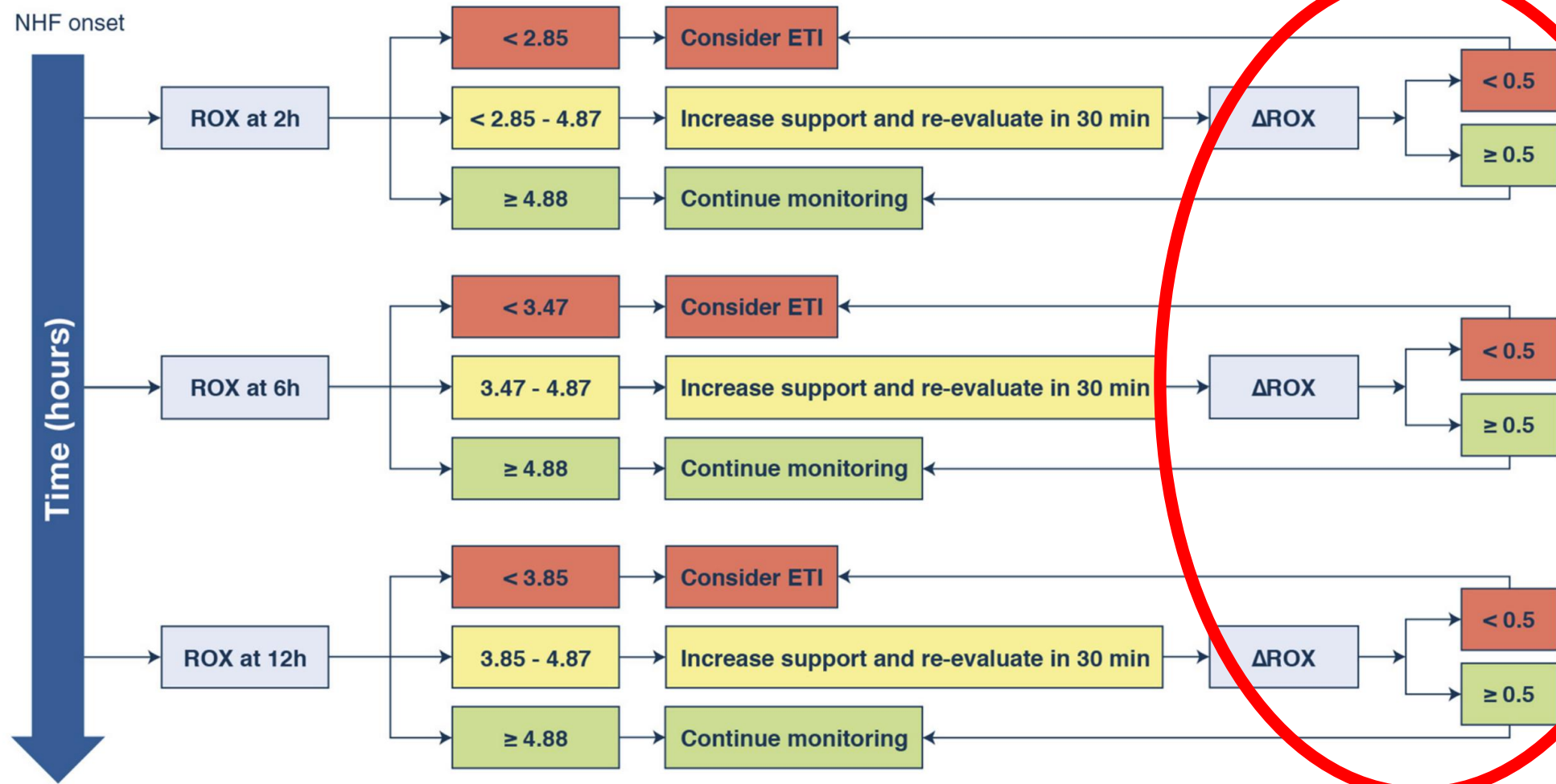
HFO
Refer:
40L/min 60%

OTI:
60L/min 70-80%

HFO

Use of nasal high flow oxygen during acute respiratory failure

Jean-Damien Ricard^{1,2*}, Oriol Roca^{3,4}, Virginie Lemiale⁵, Amanda Corley^{6,7}, Jens Braunlich^{8,9}, Peter Jones^{10,11},
e Med (2020) 46:2238–2247



NIV horší než HFOT?

Implications of early respiratory support strategies on disease progression in critical COVID-19: a matched subanalysis of the prospective RISC-19-ICU cohort

Wendel Garcia et al. Crit Care (2021) 25:175

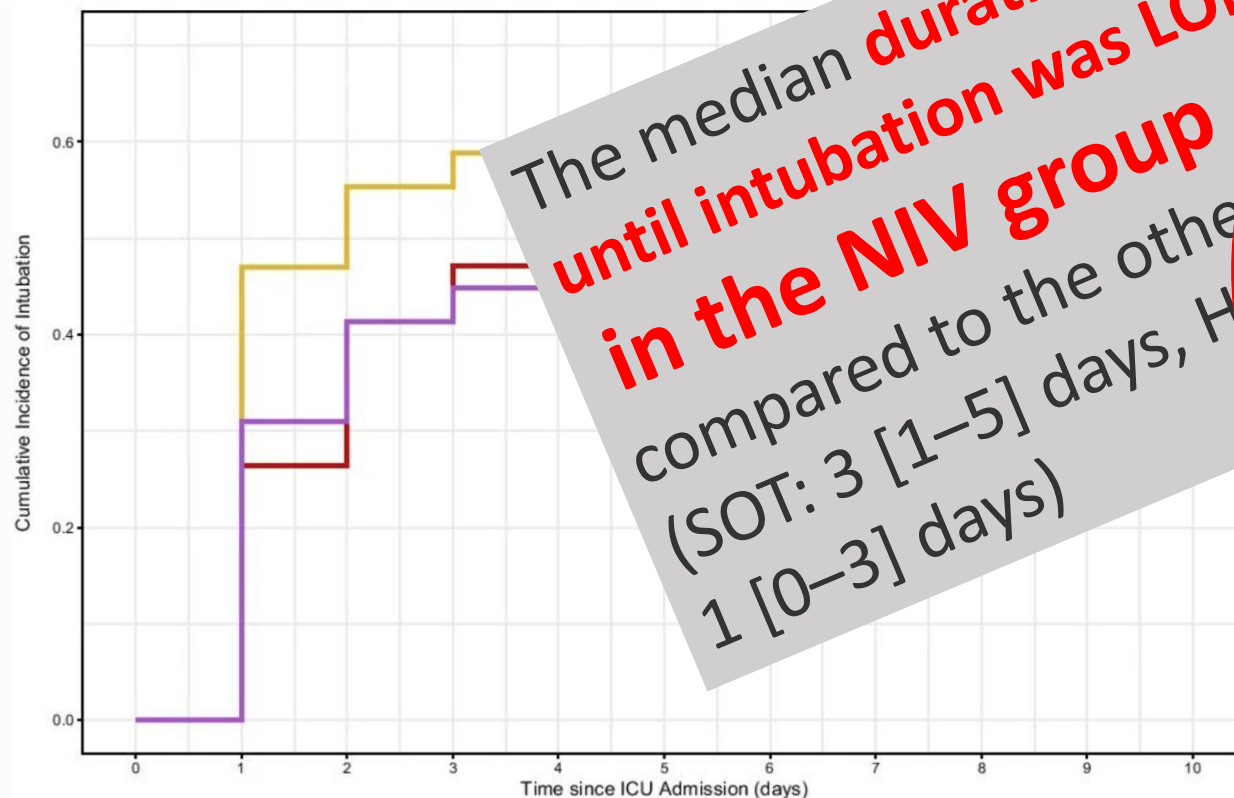
- 351 patients (85 SOT, 87 HFNC, 87 NIV, and 92 IMV) remained eligible for full
- 55% of patients initially receiving noninvasive respiratory support required IMV.
- The **intubation rate was lower in patients initially ventilated with HFNC and NIV** compared to those who received SOT (SOT: 64%, HFNC: 52%, NIV: 49%, $p = 0.025$).
- **NIV was associated with a higher overall ICU mortality**
(SOT: 18%, HFNC: 20%, **NIV: 37%**, IMV: 25%, $p = 0.016$)
- In patients who did not progress toward intubation, the ICU mortality rates were as follows: 10% in the SOT, 7% in the HFNC, and 36% in the NIV group
- The amount of therapy withdrawals was similar between groups ($p = 0.408$).

NIV horší než HFOT?

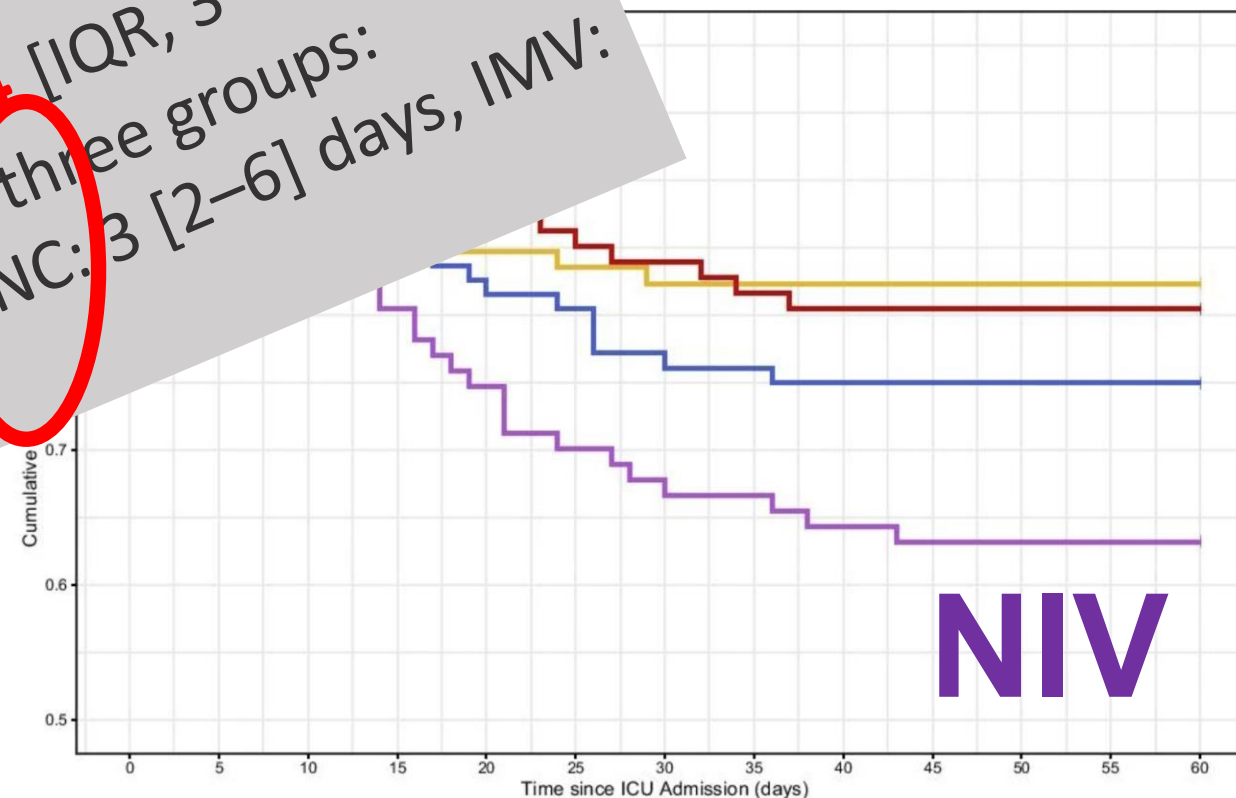
Implications of early respiratory support strategies on disease progression in COVID-19: a matched subanalysis of the RISC-19-ICU cohort

Wendel Garcia et al. Crit Care (2021) 25:175

Respiratory Support at ICU Admission: — Standard Oxygen Therapy — Non-Invasive Ventilation — Invasive Mechanical Ventilation



The median duration of the in-hospital stay until intubation was LONGER ($p < 0.001$) in the NIV group (4 [IQR, 3–7] days) compared to the other three groups: (SOT: 3 [1–5] days, HFNC: 3 [2–6] days, IMV: 1 [0–3] days)



NIV

HYPOXEMIE PŘED??? ... „TIMING“ při OTI

.... když už, tak JAK? to udělat nejlépe

Emergency tracheal intubation in 202 patients with COVID-19 in Wuhan, China: lessons learnt and international expert

BJA

Tracheal intubation with rocuronium using a "modified timing principle"

Min A Kwon, Jaegyok Song,  and Ju-Ri Kim

Korean J Anesthesiol. 2013 Mar; 64(3): 218–222.

Journal of Anaesthesia, 125 (1): e28–e37 (2020)

g^{3,4,†}, Feng Gao¹, Li Wang², Hongbo Zheng¹,

Relativně vysoký počet srdečních zástav při COVID 19 intubacích hypoxemie a hypotenze

- **Prevence hypotenze: mít připravené katecholaminy** – minimalizace hypotenze (profylaktické podání?)
- **Prevence prohloubení hypoxemie** – RSI

Koncept „**TIMING**“ / priming podání nedepol. relaxace (rocuronium)

NEJDŘÍVE ROCURONIUM (1.2 mg kg⁻¹) potom propofol rocu (38.5)
x succinylcholine group (100.7 sec)

NIKDY!!!! kdy „NEINTUBOVAT“ DNI

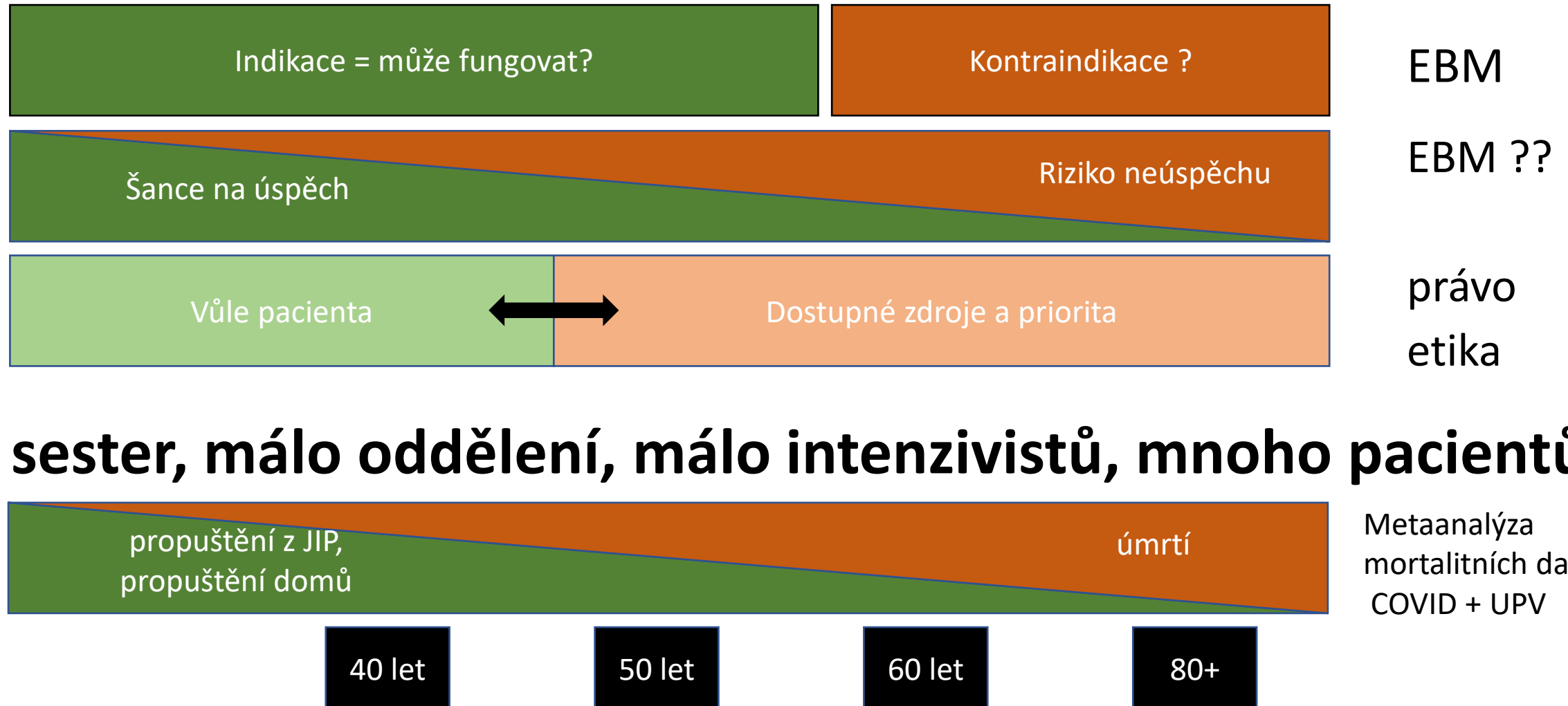
.... aneb limitace péče nejenom při COVID-19 pandemii

- POTŘEBUJE TO?
- ŠANCE NA ÚSPĚCH?
- SOUHLAS / nesouhlas?
- **ZDROJE? „zachránit co nejvíce“ x „first come, first served“**

Case Fatality Rates for COVID-19 Patients Requiring Invasive Mechanical Ventilation: A Meta-analysis

Zheng Jie Lim¹, Ashwin Subramaniam^{2,3}, Mallikarjuna Ponnappa Reddy², Gabriel Blecher^{4,5}, Umesh Kadam^{6,7,8}, Afsana Afroz^{9,10}, Baki Billah⁹, Sushma Ashwin¹¹, Mark Kubicki¹², Federico Bilotta¹³, J Randall Curtis¹⁴, Francesca Rubulotta¹⁵

Indikace – šance – priorita





ČESKÁ SPOLEČNOST ANESTEZIOLOGIE, RESUSCITACE
A INTENZIVNÍ MEDICÍNY ČLS JEP
CZECH SOCIETY OF ANAESTHESIOLOGY
AND INTENSIVE CARE MEDICINE



 **KARIM**
1.LF UK A VFN V PRAZE

 **VŠEOBECNÁ FAKULTNÍ
NEMOCNICE V PRAZE**

STANOVISKO VÝBORU
evidenční číslo: 12/2020

DOPORUČENÍ PŘEDSTAVENSTVA ČLK č. 1/2010

Článek 5

Základní principy pro postup při rozhodování o změně léčby intenzivní na léčbu paliativní u pacientů terminálně nemocných

c) Zahájení nebo pokračování jakéhokoliv léčebného postupu, který není odborně odůvodněný, kde neexistuje racionální předpoklad jeho příznivého účinku na celkový průběh onemocnění a kde rizika komplikací, strádání, útrap a bolesti převažují nad reálným klinickým přínosem zvoleného postupu, je v rozporu s etickými principy medicíny a Chartou prav umírajících. Neexistuje povinnost zahajovat marnou a neúčelnou léčbu nebo v ní pokračovat, pokud je probíhající léčba odůvodněně za takovou označena.

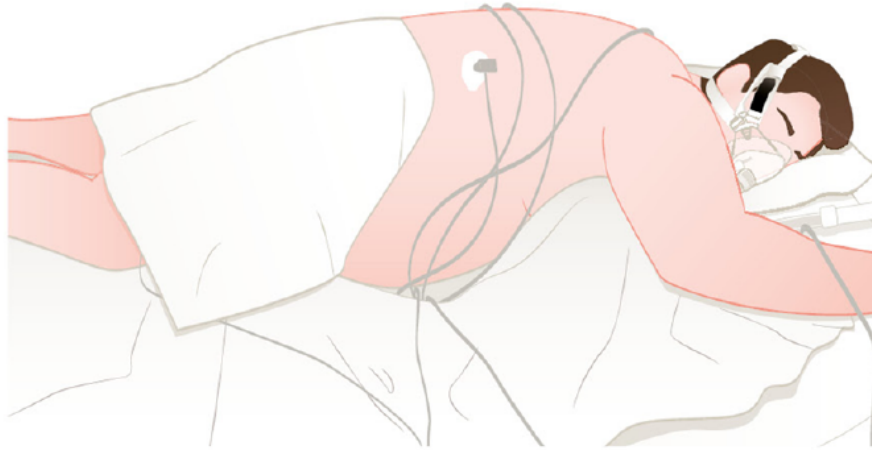
pacienta zbytečně zatezující) není „de lege artis“. Poskytovatel zdravotnických služeb není povinen, ba ani oprávněn, takovou péči poskytovat

Obezita a požadavky na ICU péči

PRONE POSITIONING OF ARDS PATIENTS WITH OBESITY

MECHANISM OF ACTION

- Recruitment of more tissue in the dorsal region than can be derecruited in ventral regions
- Lung inflation is more homogeneously distributed along the dorsoventral axis of the lung with a decrease in ventilation perfusion inequalities

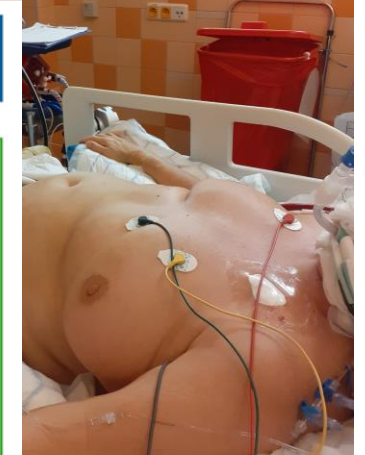


CLINICAL EFFECTS

- Allows improvement in PaO_2/FiO_2 ratio
- Feasible and safe without increased complications compared to patients without obesity when performed by a trained team
- May help to reduce mortality in ARDS

CAUTION

- Careful abdominal positioning to avoid increased intra-abdominal pressure and organ compression
- Use reverse Trendelenburg position if possible



Covid-19 VFN Praha 2020-22

ICNARC 2021: **48% s BMI > 30**

2020-2022:

292 středně + těžkých ARDS:

58,3% s BMI > 30

64% z 117 ECMO pacientů s BMI > 30

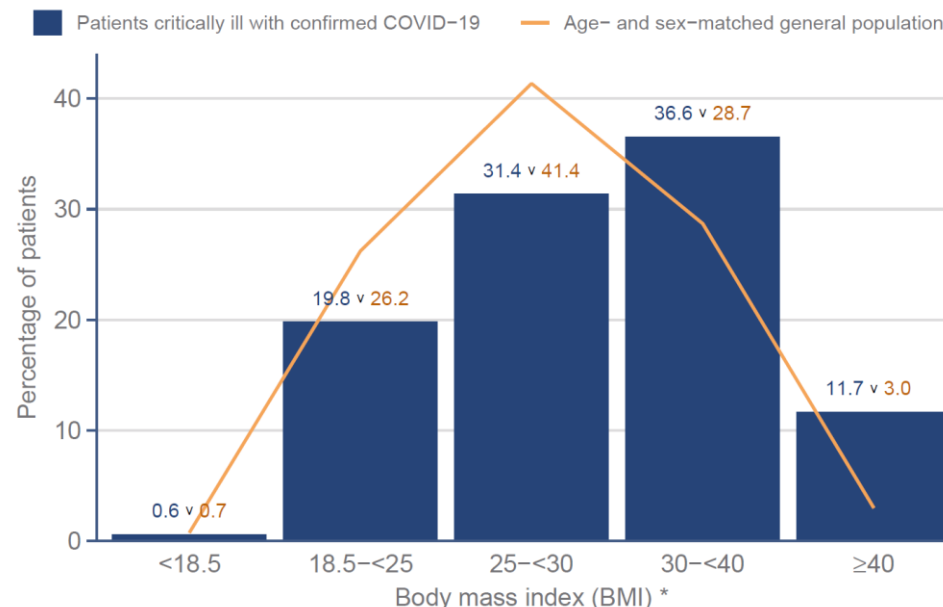
18% z ECMO with BMI > 40

292 pacientů, 173 non ECMO

119 (40.8%) ECMO

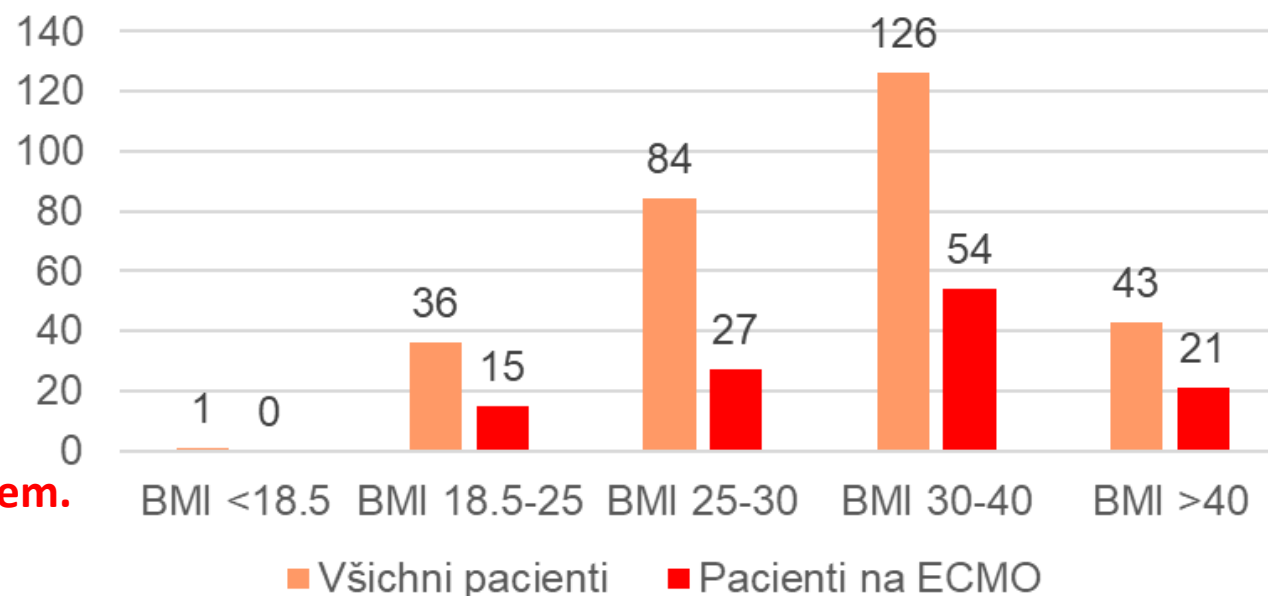
87 (73%) bylo were rescued kanylováno v **46 jiných nem.**

32 (27%) pac. bylo kanylováno ve VFN



© ICNARC 2021

Počty pacientů/Pacienti na ECMO



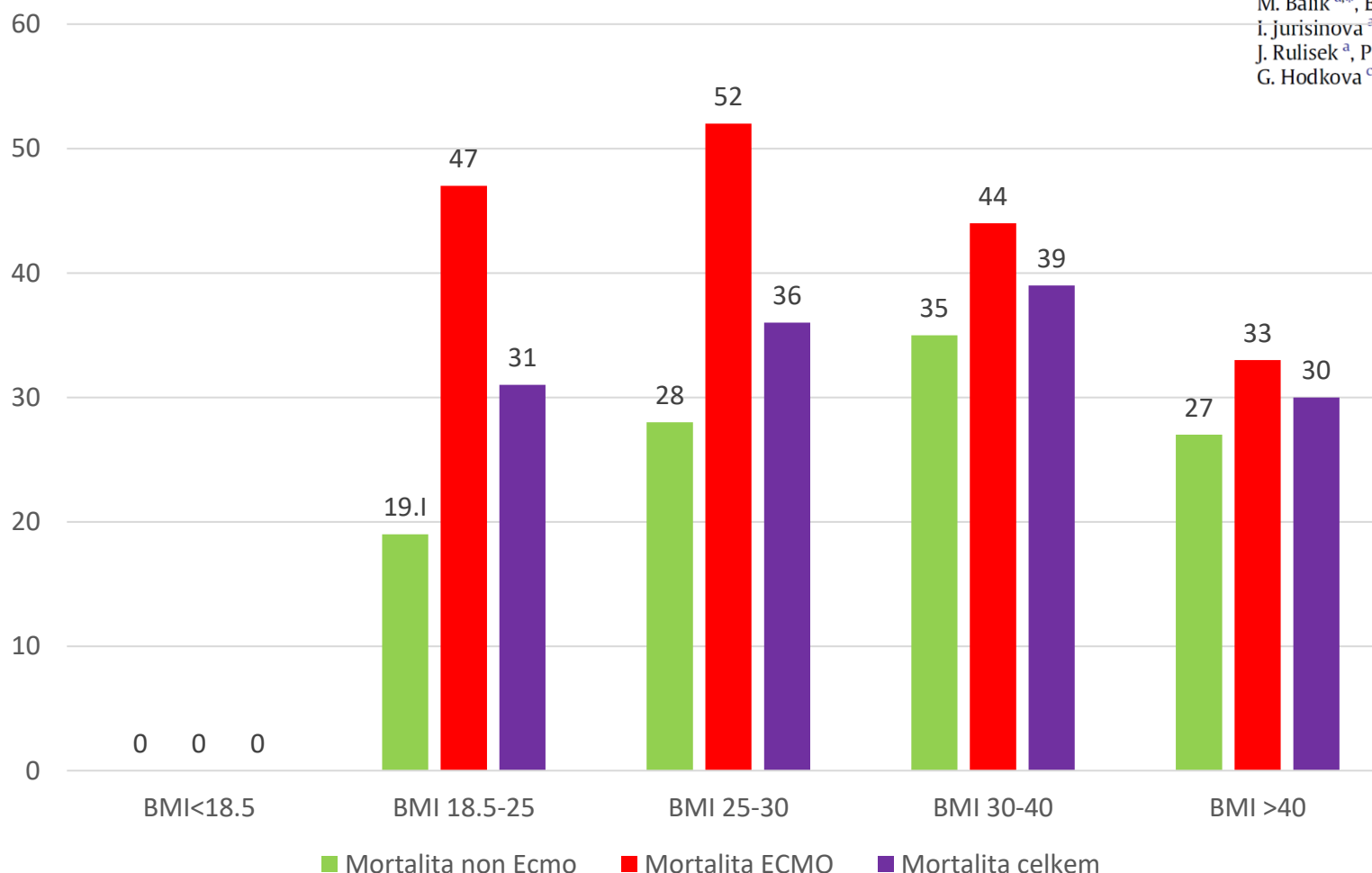
COVID 19

VFN Praha 3/20-3/22



The impact of obesity on the outcome of severe SARS-CoV-2 ARDS in a high volume ECMO centre: ECMO and corticosteroids support the obesity paradox

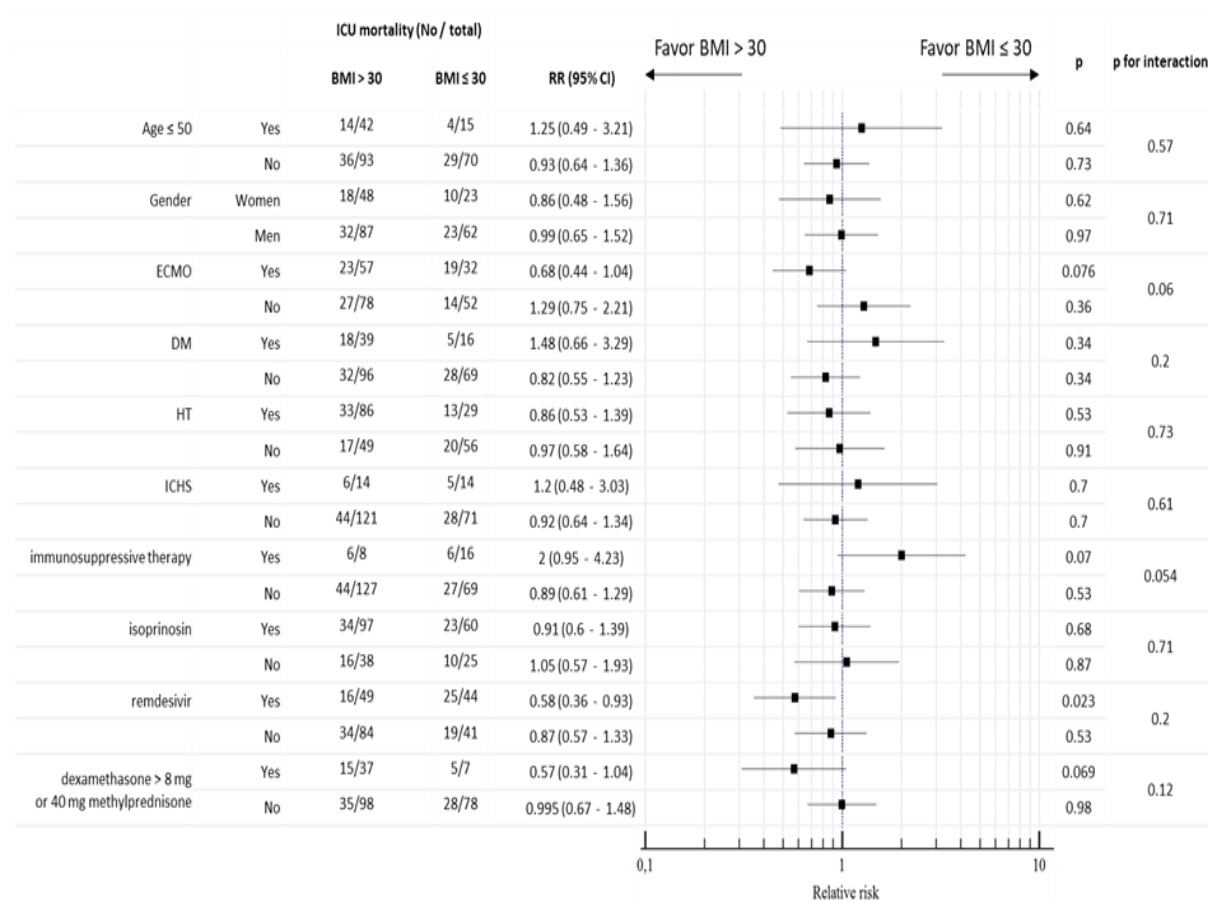
M. Balik ^{a,*}, E. Svobodova ^a, M. Porizka ^a, M. Maly ^a, P. Brestovansky ^a, L. Volny ^a, T. Brozek ^a, T. Bartosova ^a, I. Jurisinova ^a, Z. Mevaldova ^a, O. Misovic ^a, A. Novotny ^a, J. Horejsek ^a, M. Otahal ^a, M. Flaksa ^a, Z. Stach ^a, J. Rulisek ^a, P. Trachta ^a, J. Kolman ^a, R. Sachl ^a, J. Kunstir ^a, P. Kopecky ^a, S. Romaniv ^a, M. Hupnych ^b, M. Svarc ^c, G. Hodkova ^c, J. Fichtl ^c, F. Mlejnsky ^c, T. Grus ^d, J. Belohlavek ^e, M. Lips ^a, J. Blaha ^a



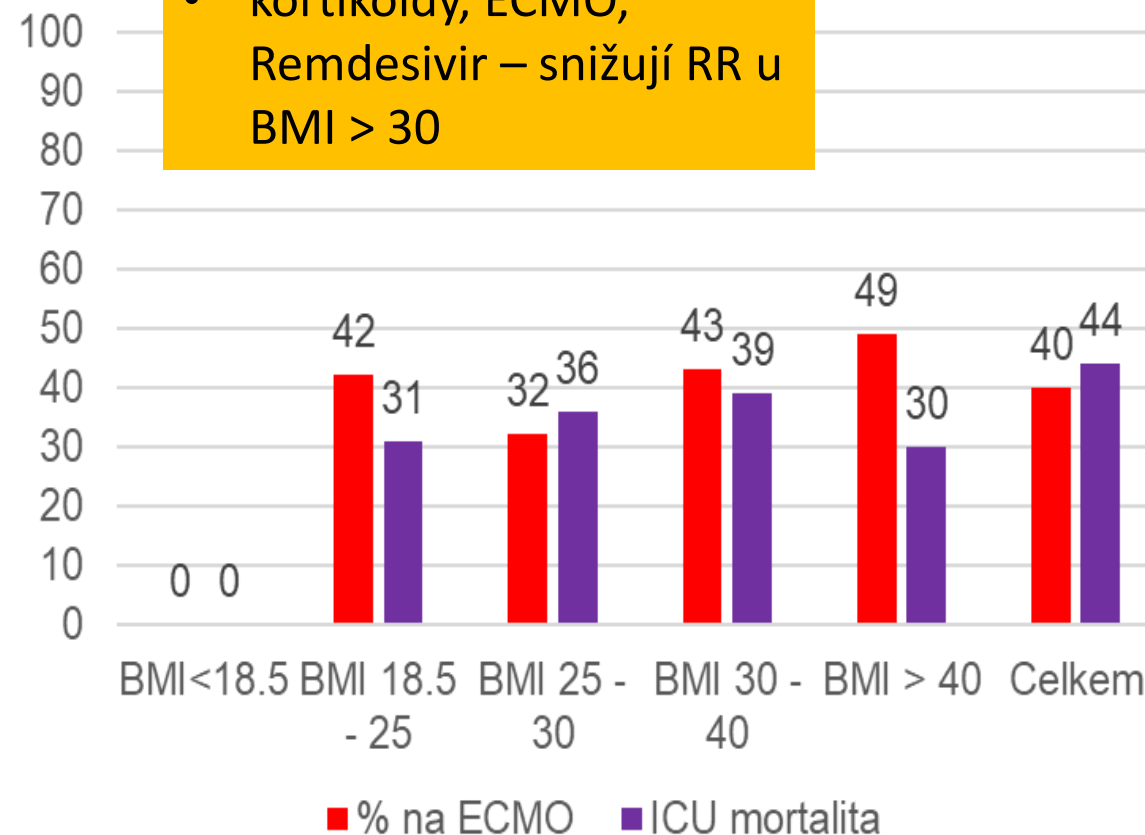
- 292 pacientů
- ICU mortalita 35,5%
- ICU LOS 13 dní
- ICU mortality:
- BMI < 30 (121) 33,9%
- BMI > 30 (169) 36,8%
- Počet ECMO:
- BMI < 30 34,7%
- BMI > 30 45%

COVID 19 VFN Praha 3/20-3/22

- ECMO: 117 (40,3%), 64% s BMI >30, 9 awake ECMO



- kortikoidy, ECMO, Remdesivir – snižují RR u BMI > 30

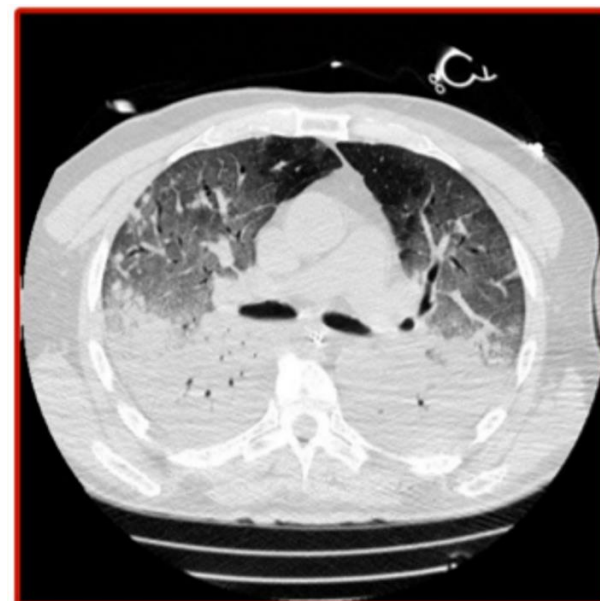


- Předpoklad J/U shape obesity paradox
- Morbidní obezita – horší prognosa?

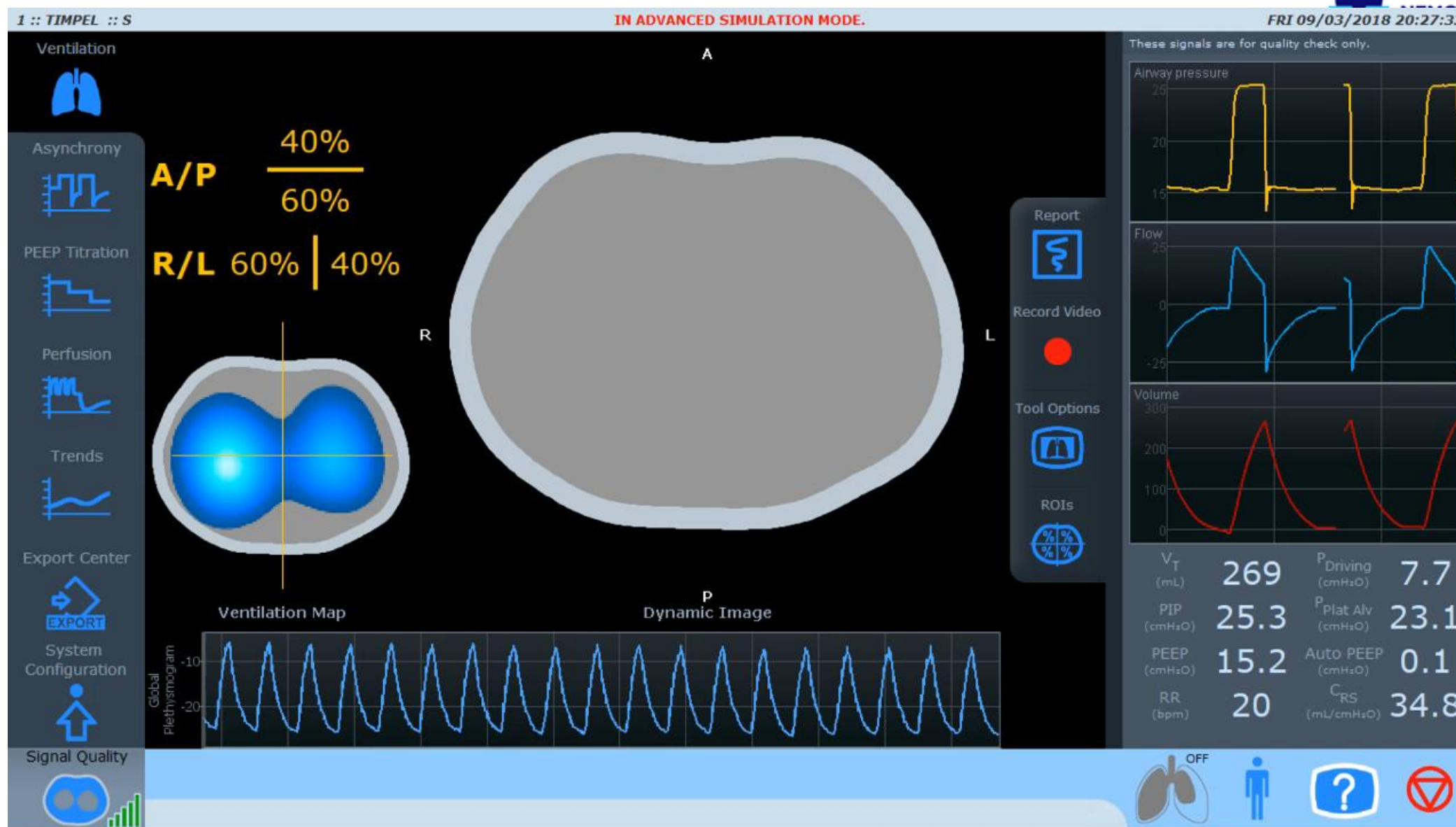


A zase to POLOHOVÁNÍ!!!

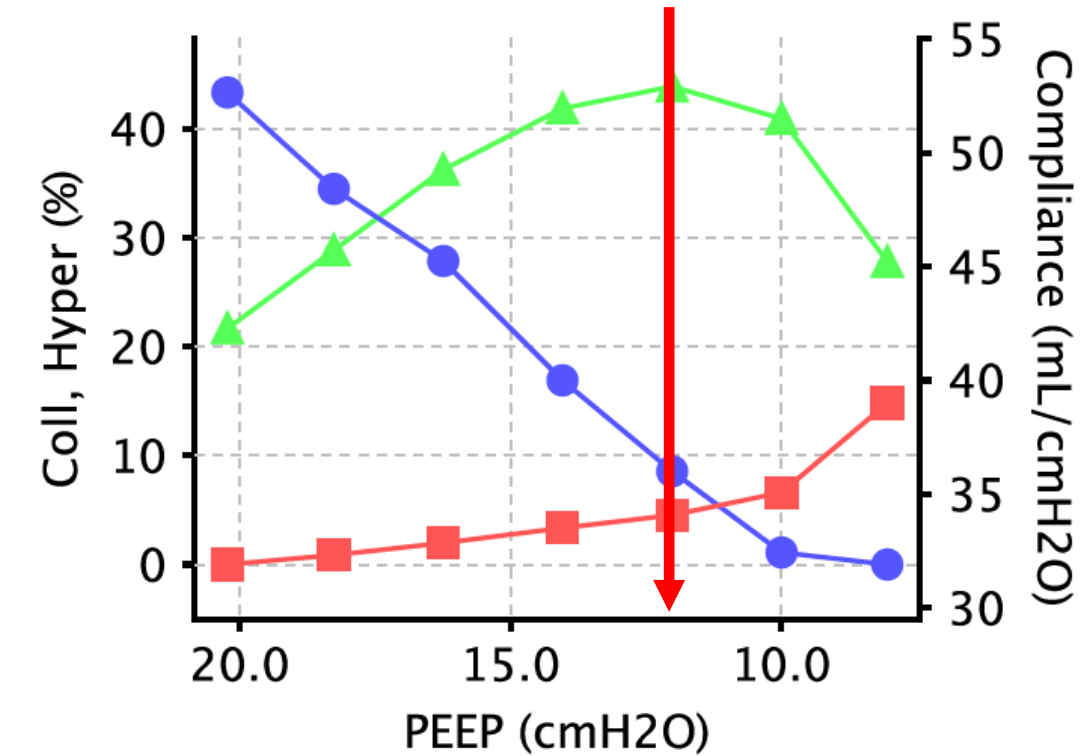
..... „Taky je jenom GRILUJETE“



Electrical Impedance Tomography



PEEP titrace – GLOBÁLNÍ parametry



■ Collapse ● Hyperdistension ▲ Compliance

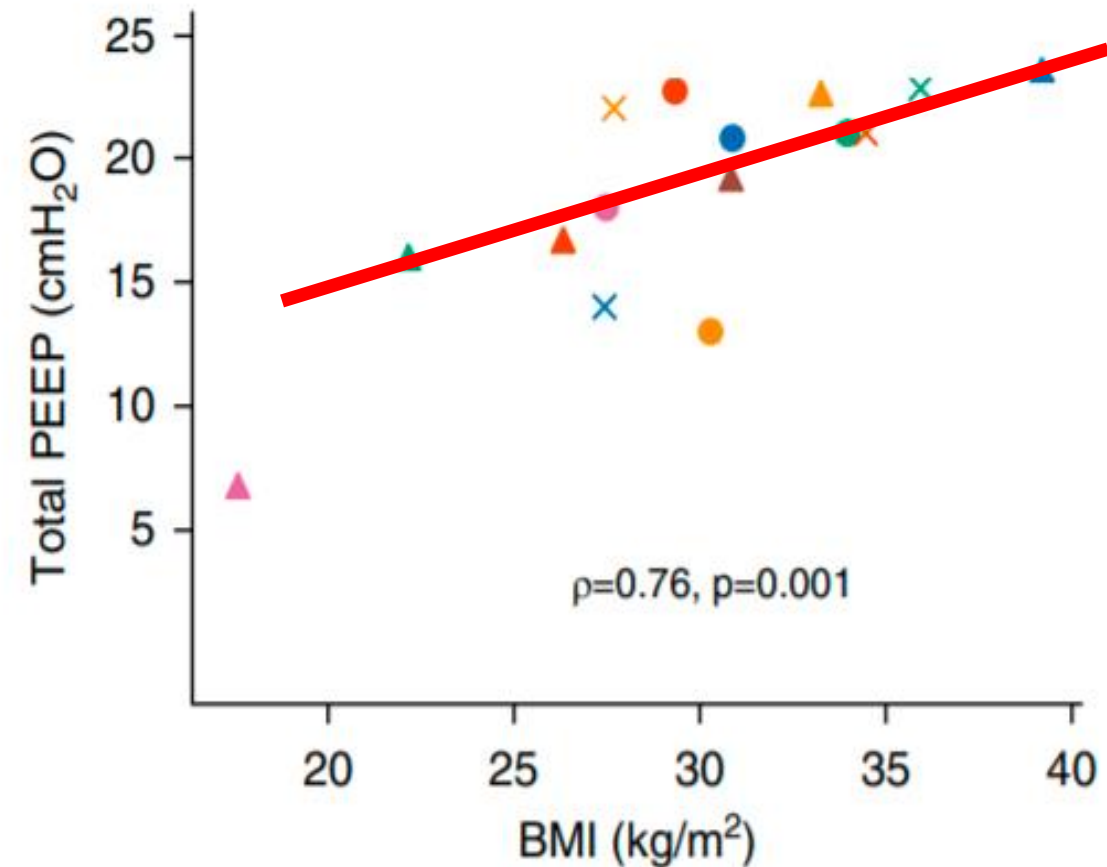
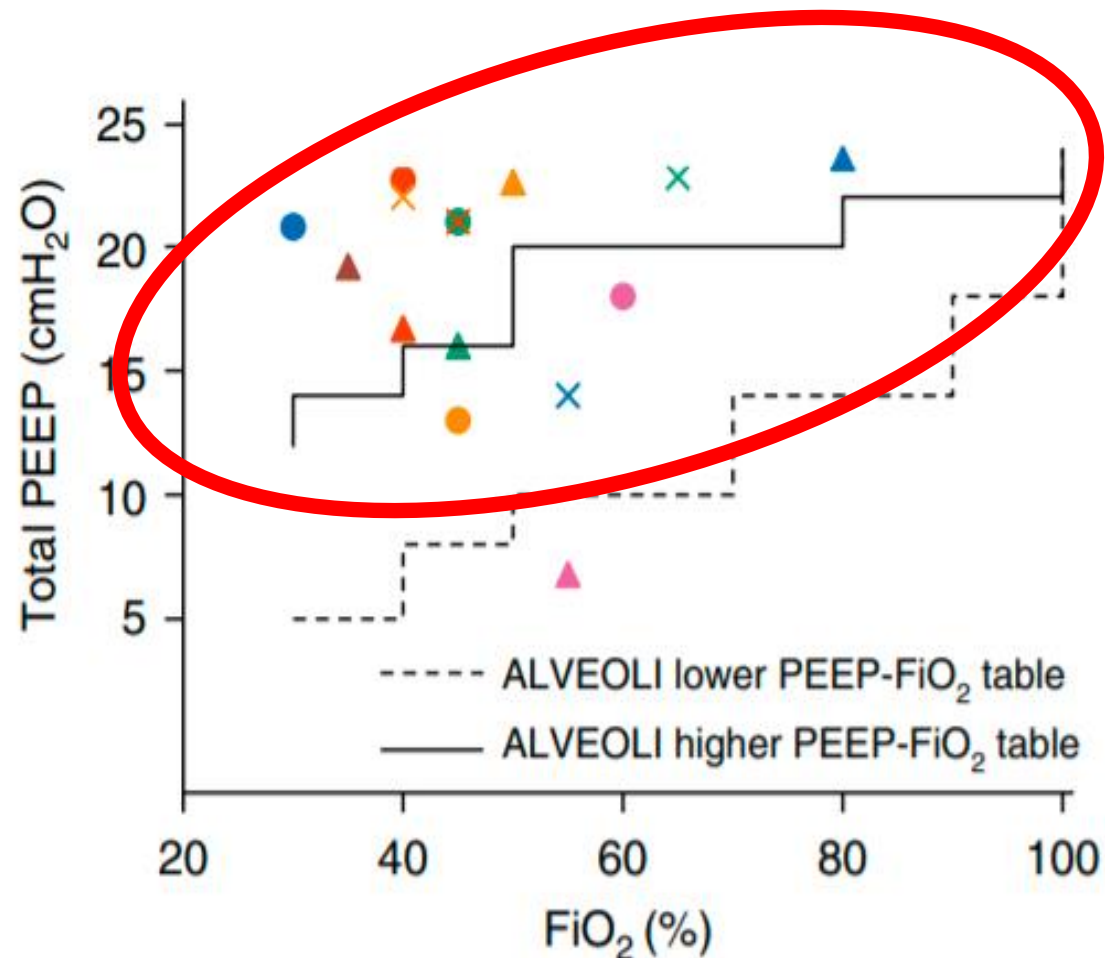
PEEP (cmH ₂ O)	Compliance (mL/cmH ₂ O)	Hyperdist. (%)	Collapse (%)
20.2	42	43.3	0.0
18.3	46	34.5	0.9
16.2	49	27.9	2.0
14.0	52	16.9	3.4
12.0	53	8.6	4.5
10.0	51	1.1	6.6
8.0	45	0.0	14.8

COVID19 ... EIT PEEP titrace

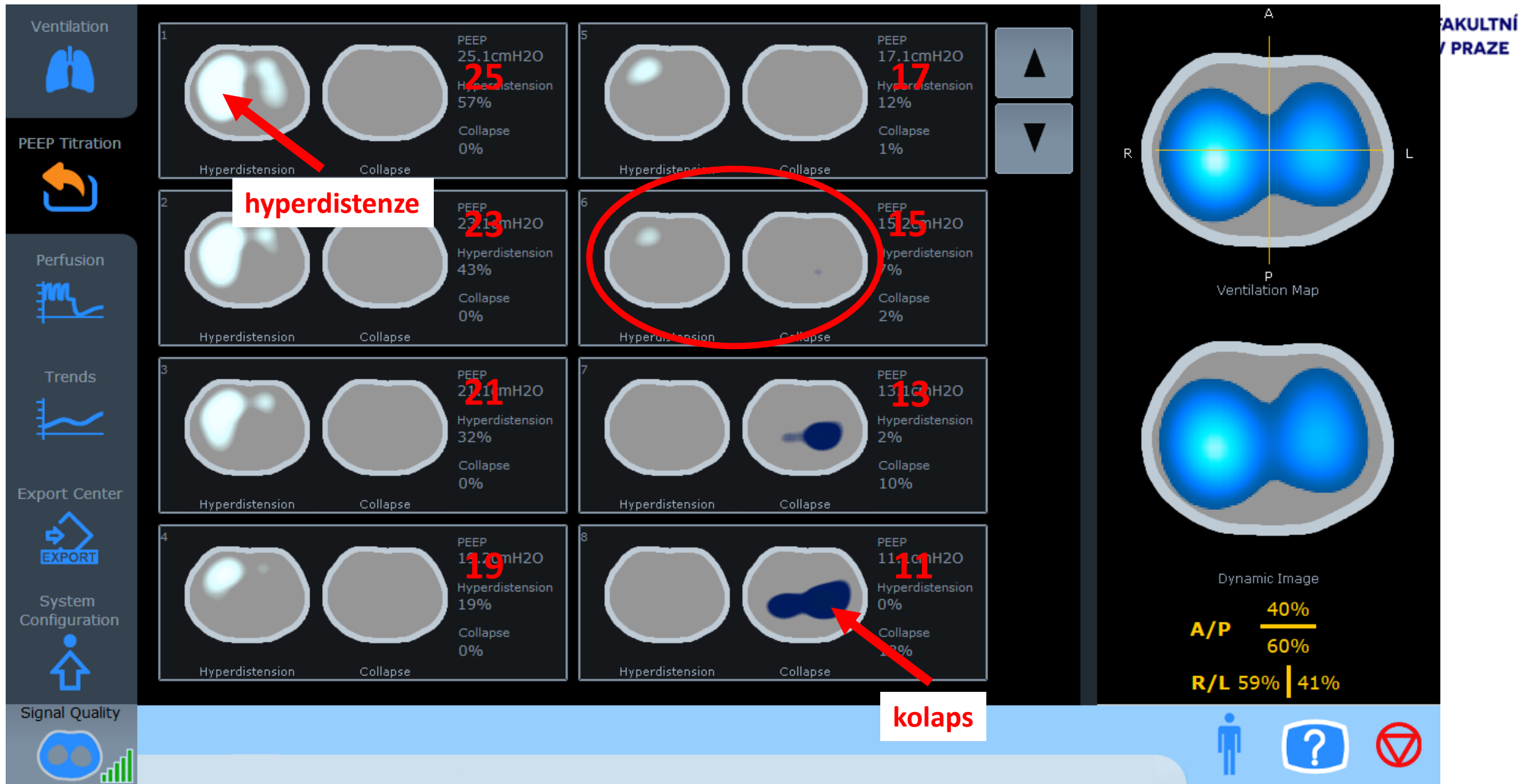
Electrical Impedance Tomography for Positive End-Expiratory Pressure Titration in COVID-19-related Acute Respiratory Distress Syndrome

Philip van der Zee ^{1*†}, Peter Somhorst ^{1*}, Henrik Endeman ¹, and Diederik Gommers ¹

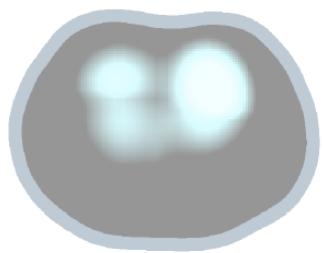
AJRCCM



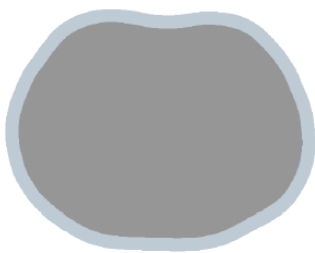
EIT - PEEP titrace – REGIONÁLNÍ distribuce



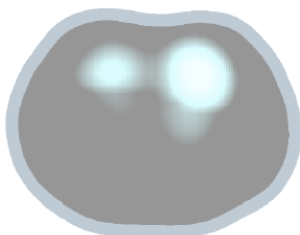
PEEP titrace pomocí EIT



Hyperdistension



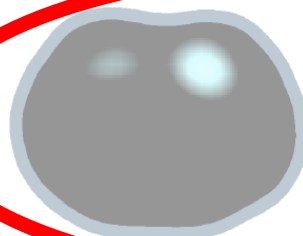
PEEP: 18.4 cmH₂O
Hyperdistension: 27.8% **18**
Collapse: 0.1%
Compliance: 32.2 mL/cmH₂O



Hyperdistension



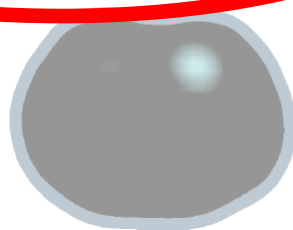
PEEP: 16.2 cmH₂O
Hyperdistension: 20.1% **16**
Collapse: 0.1%
Compliance: 35.9 mL/cmH₂O



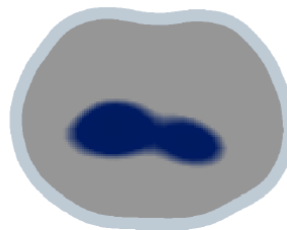
Hyperdistension



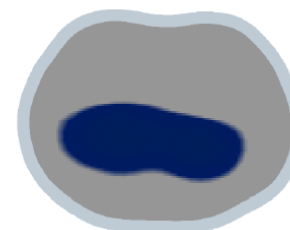
PEEP: **14.2** cmH₂O
Hyperdistension: 9.7% **14**
Collapse: 0.3%
Compliance: 40.2 mL/cmH₂O



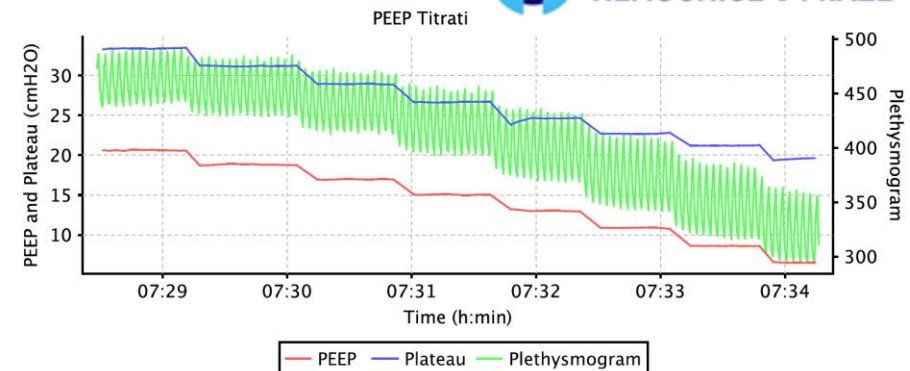
Hyperdistension



PEEP: 12.1 cmH₂O
Hyperdistension: 7.5% **12**
Collapse: 9.6%
Compliance: 41.0 mL/cmH₂O

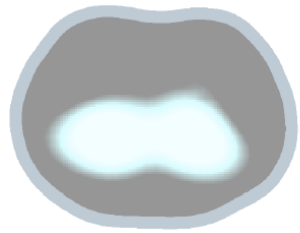


PEEP: 10.1 cmH₂O
Hyperdistension: 3.4% **10**
Collapse: 17.5%
Compliance: 38.7 mL/cmH₂O

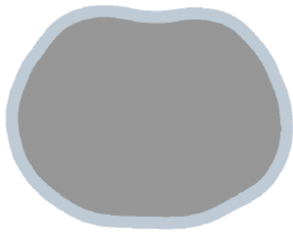


Optimal PEEP:
Minimální hyperdistenze
Minimální kolaps (do 5%)

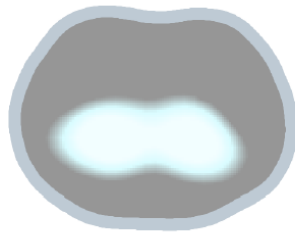
PEEP titrace pomocí EIT **tentýž pacient**



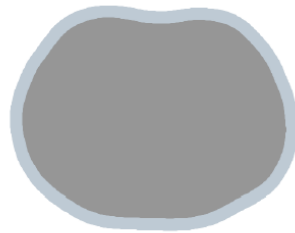
Hyperdistension



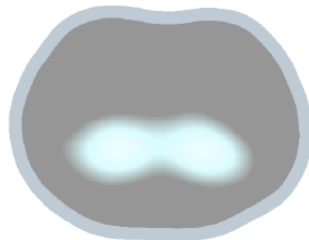
PEEP: 18.2 cmH₂O
Hyperdistension: 36.9% **18**
Collapse: 1.0%
Compliance: 28.8 mL/cmH₂O



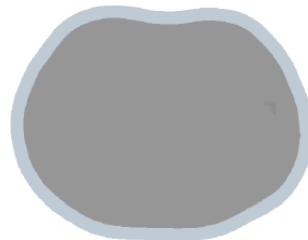
Hyperdistension



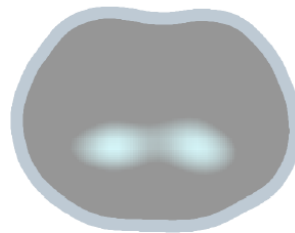
PEEP: 16.2 cmH₂O
Hyperdistension: 31.6% **16**
Collapse: 1.5%
Compliance: 32.3 mL/cmH₂O



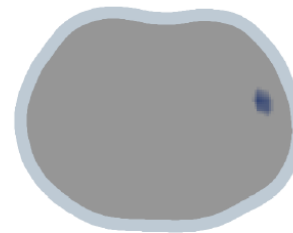
Hyperdistension



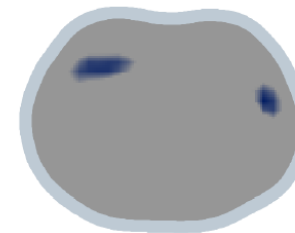
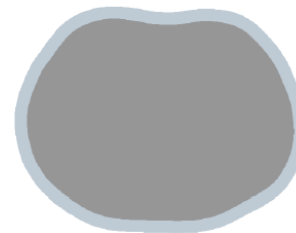
PEEP: 14.3 cmH₂O
Hyperdistension: 19.5% **14**
Collapse: 2.3%
Compliance: 36.5 mL/cmH₂O



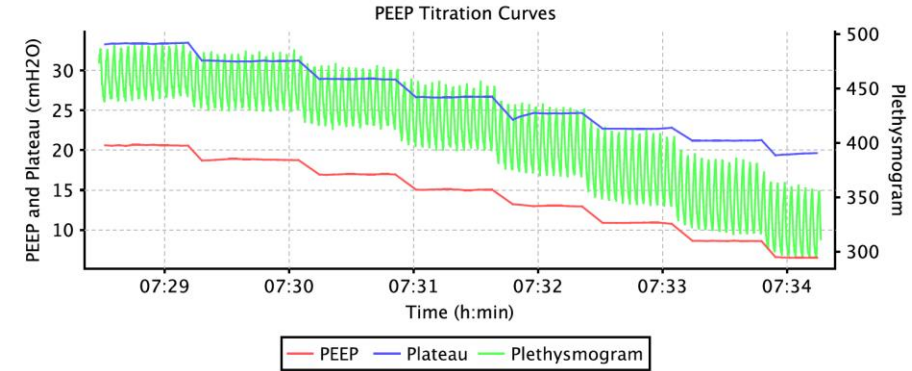
Hyperdistension



PEEP: 12.4 cmH₂O
Hyperdistension: 13.0% **12**
Collapse: 3.7%
Compliance: 38.5 mL/cmH₂O

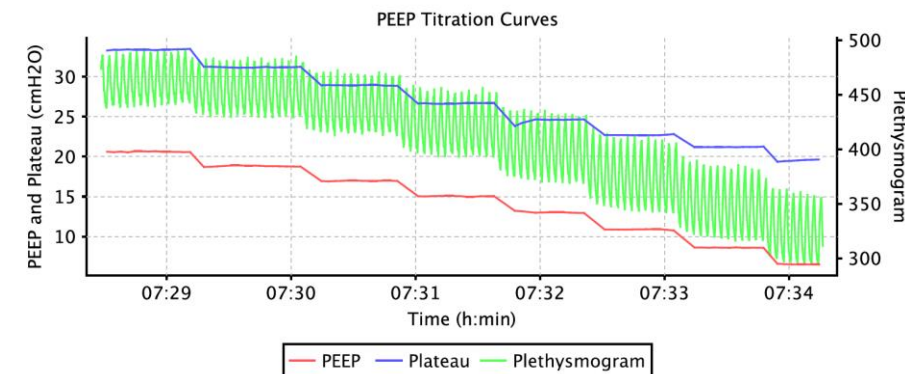


PEEP: 10.6 cmH₂O
Hyperdistension: 6.2% **10**
Collapse: 5.7%
Compliance: 42.1 mL/cmH₂O



Homogenizace
PRONACÍ

PEEP titrace pomocí EIT



PEEP: 16.0 cmH₂O
Hyperdistension: 15.5% **16**
Collapse: 0.0%
Compliance: 42.4 mL/cmH₂O

PEEP: 14.1 cmH₂O
Hyperdistension: 14.2% **14**
Collapse: 1.4%
Compliance: 41.8 mL/cmH₂O

PEEP: **11.9 cmH₂O**
Hyperdistension: 14.2% **12**
Collapse: 8.8%
Compliance: 40.7 mL/cmH₂O

PEEP: 10.3 cmH₂O
Hyperdistension: 13.2% **10**
Collapse: 10.7%
Compliance: 109.7 mL/cmH₂O

PEEP: 8.1 cmH₂O
Hyperdistension: 12.9% **8**
Collapse: 17.3%
Compliance: 37.7 mL/cmH₂O



Hyperdistension

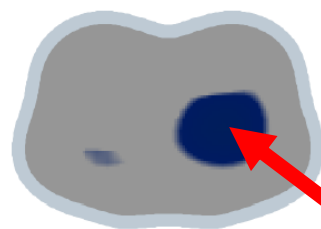


Hyperdistensic

hyperdistenze



Hyperdistension



kolaps



Hyperdistension



Hyperdistension



Cumulative Collapse

Optimal PEEP:
Nejmíň hyperdistenze
Nejmíň kolapsu (do 5%)

PEEP titrace pomocí ELT tentýž pacient



Hyperdistension



PEEP: 16.0 cmH₂O
Hyperdistension: 12.2% **16**
Collapse: 0.5%
Compliance: 42.7 mL/cmH₂O



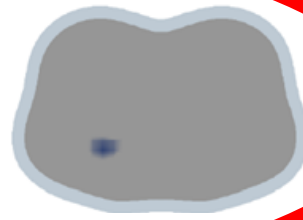
Hyperdistensio



PEEP: 14.0 cmH₂O
Hyperdistension: 9.6% **14**
Collapse: 1.9%
Compliance: 40.6 mL/cmH₂O



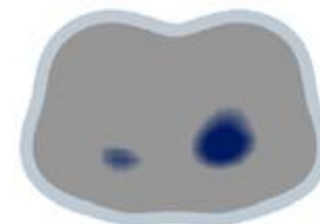
Hyperdistension



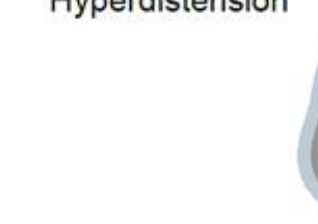
PEEP: 12.1 cmH₂O
Hyperdistension: 4.4%
Collapse: 4.3% **12**
Compliance: 41.4 mL/cmH₂O



Hyperdistension



PEEP: 9.9 cmH₂O
Hyperdistension: 4.1% **10**
Collapse: 6.5%
Compliance: 40.3 mL/cmH₂O

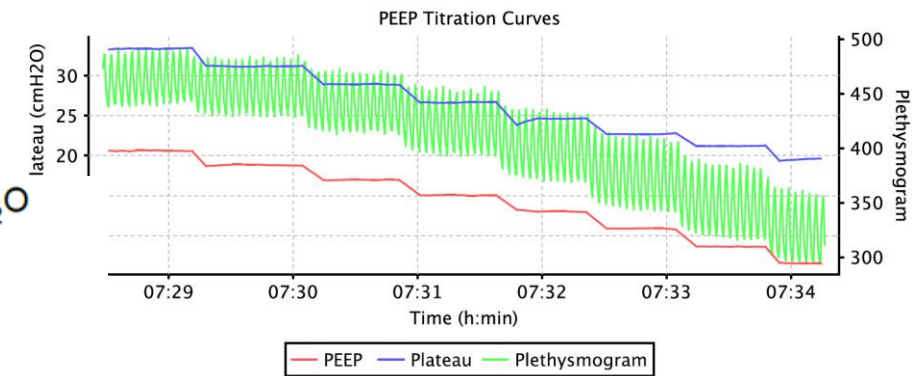


Hyperdistension



Cumulative Collapse

PEEP: 8.1 cmH₂O
Hyperdistension: 0.1% **8**
Collapse: 13.2%
Compliance: 41.4 mL/cmH₂O



**Homogenizace
pomocí ALT**

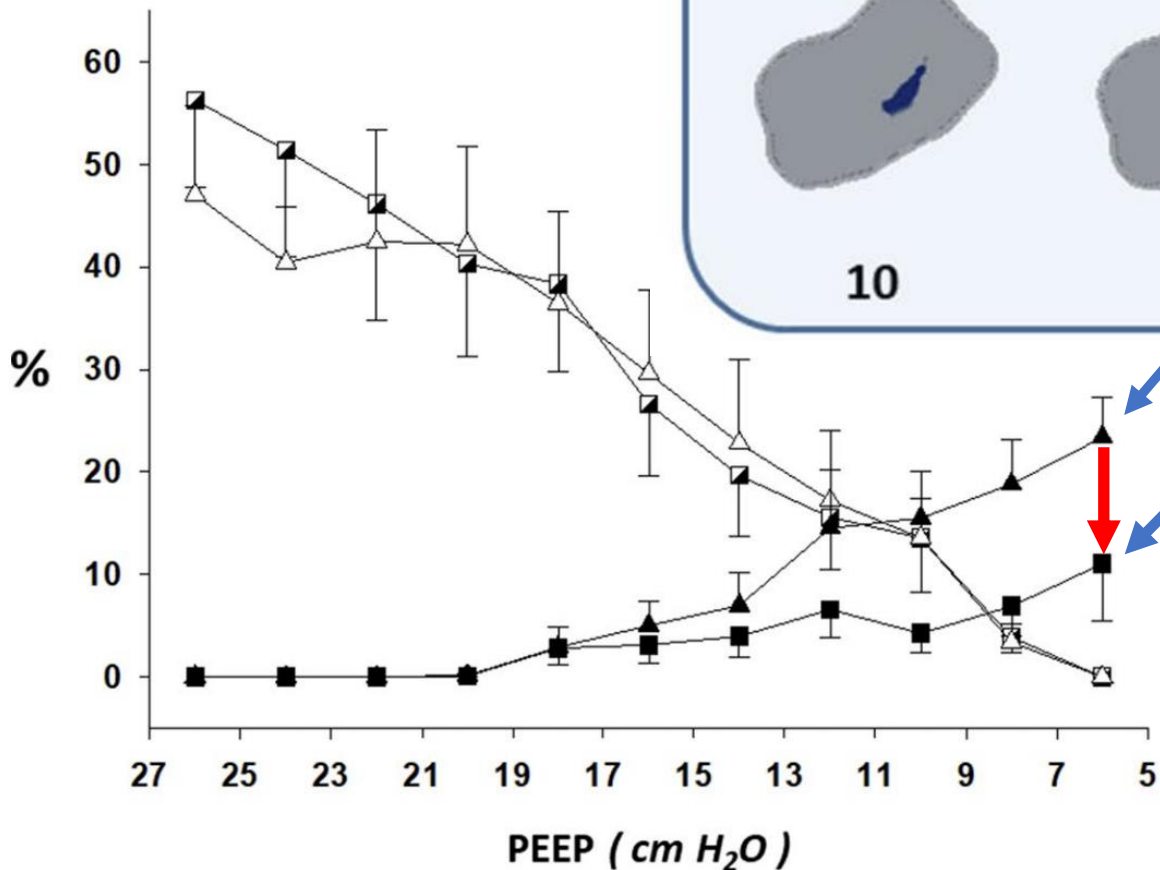
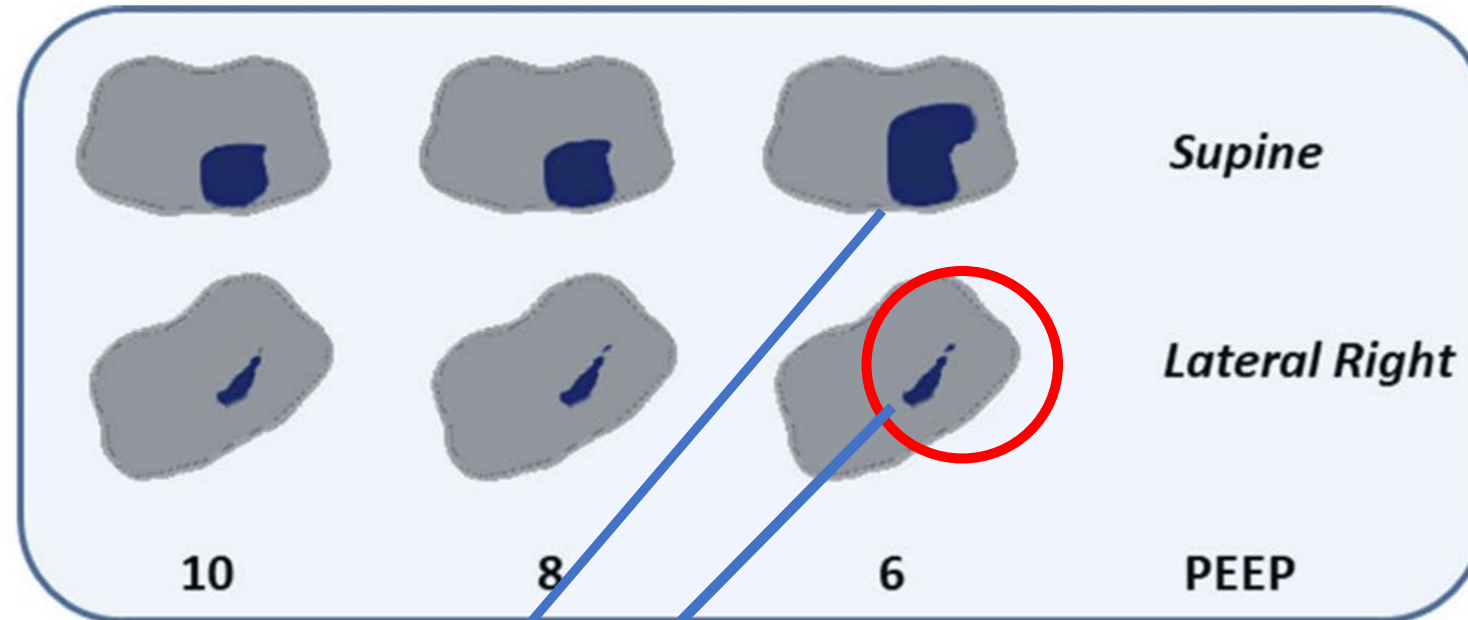
ALT – Automatic Lateral Therapy



Cílené POLOHOVÁNÍ – ALT

g decreases
ension
DS

le Cristina Alcala³.
to³ and Otomar Kittnar¹
l. BMC Pulm Med (2021) 21:133

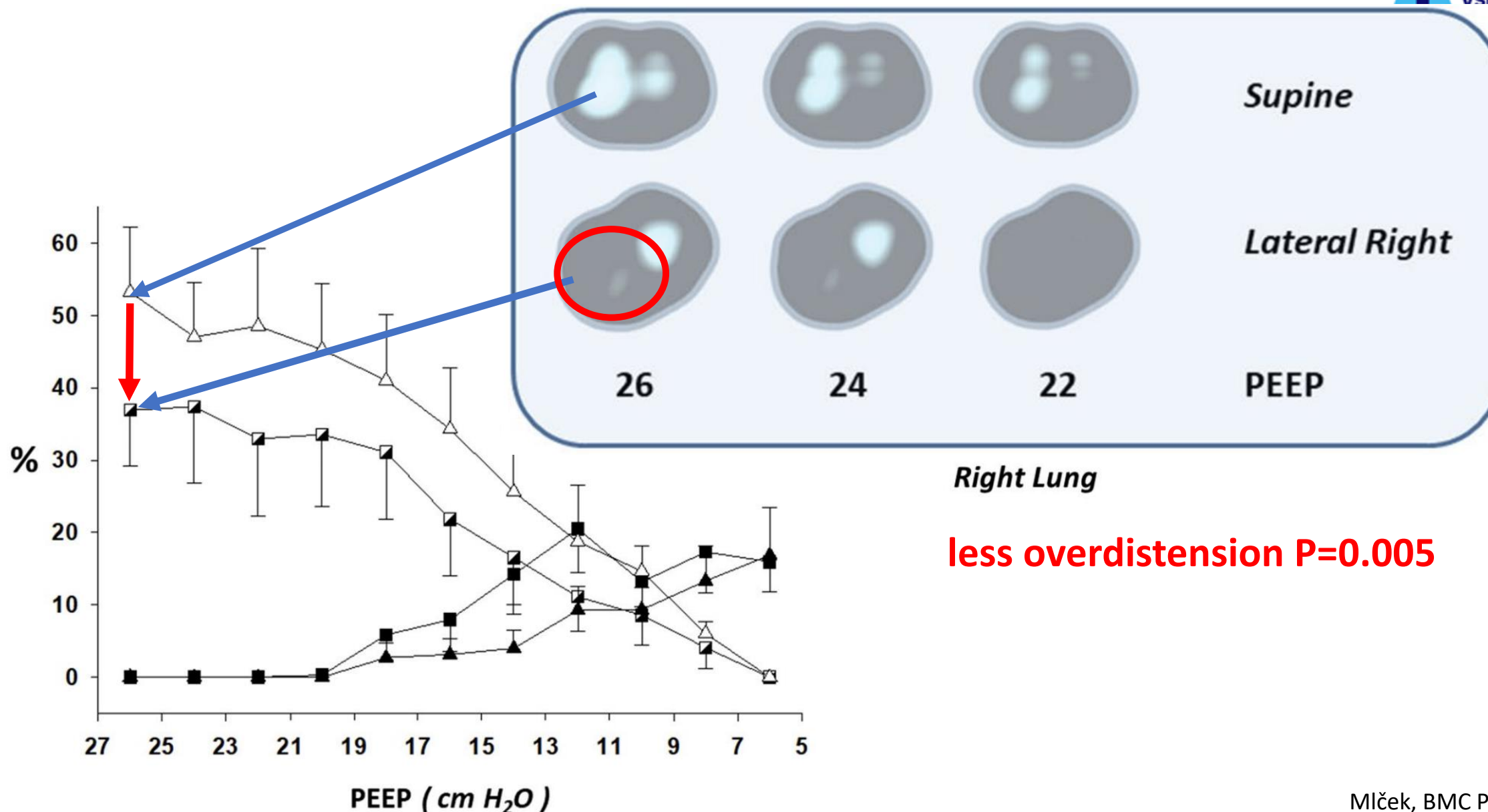


Left Lung
less collapse P=0.014

Cílené POLOHOVÁNÍ – ALT

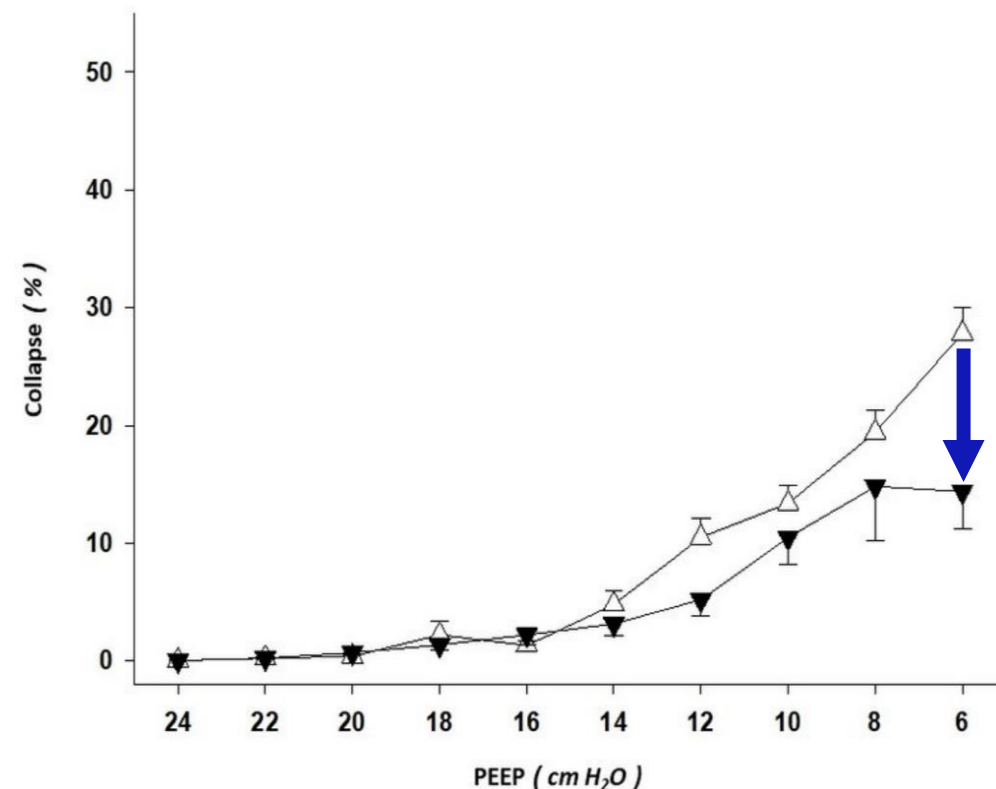
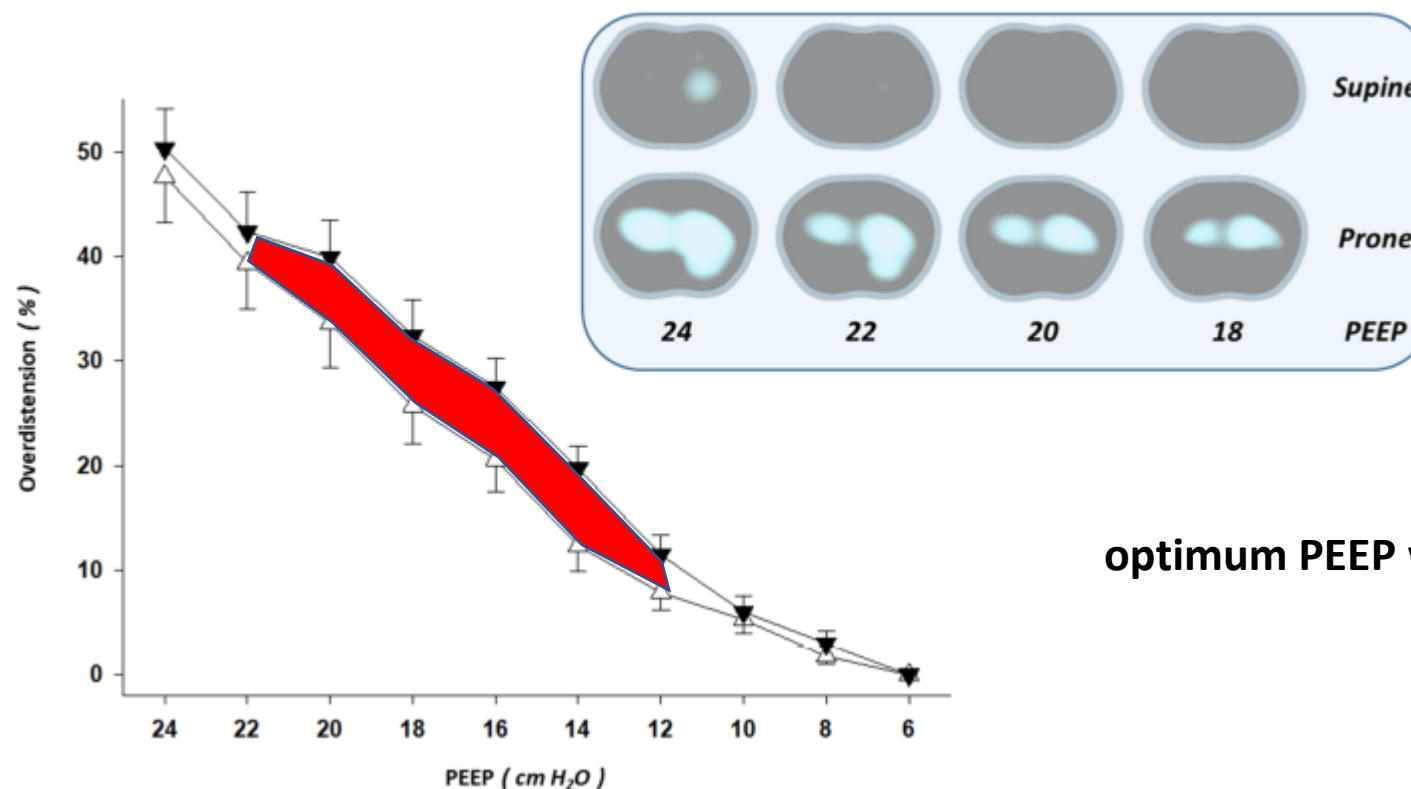
decreases
in

Alcala³.
Otomar Kittnar¹
Intensive Care Med (2021) 21:133



Pronace / EIT optimalizace

prone body position, when compared with supine body position, **decreased lung collapse** at low PEEP levels, but **increased lung overdistension at PEEP levels greater than 10 cm H₂O**, ($P = 0.042$)

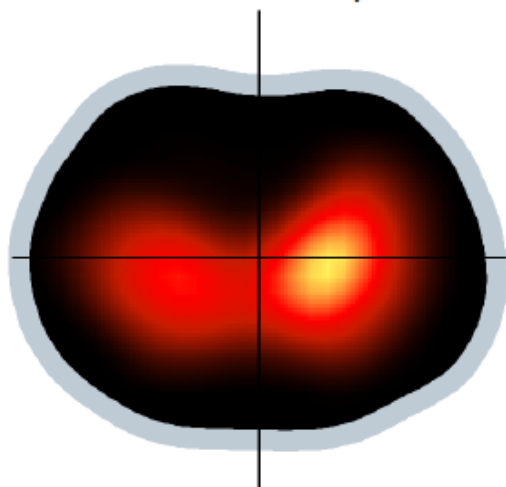


optimum PEEP was **13.7** $\pm$ 4.5 cmH₂O in **supine** position and **10.8** $\pm$ 4.3 cmH₂O in **prone**

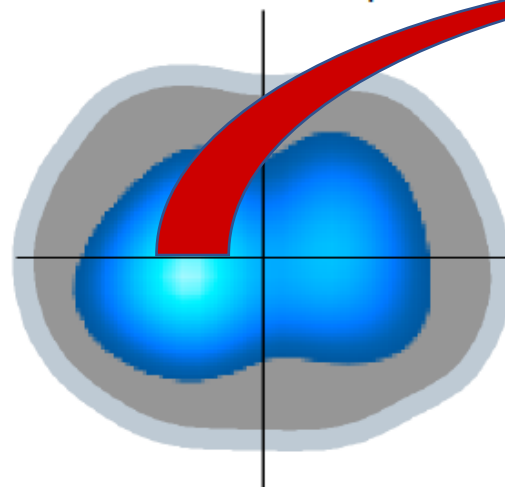
SUPINACE

PRONACE

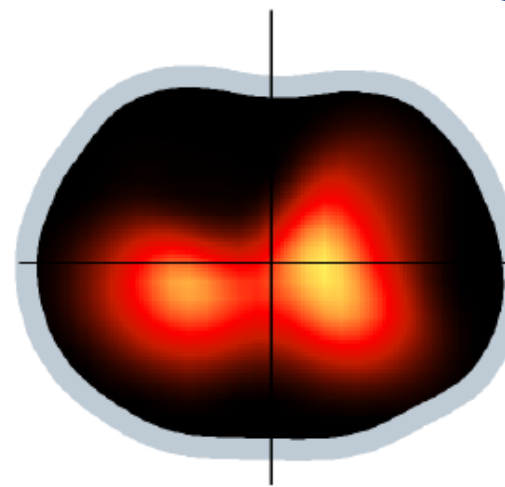
Perfusion map:



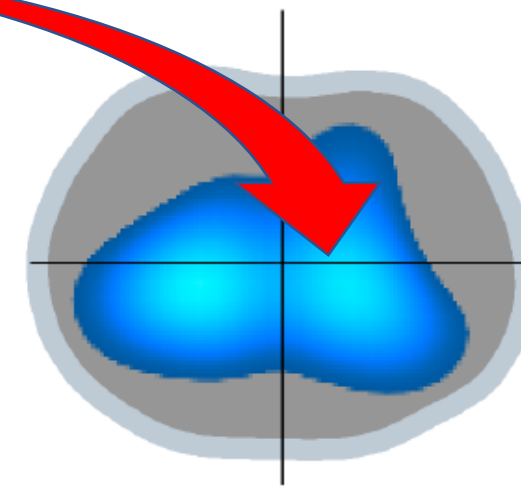
Ventilation map:



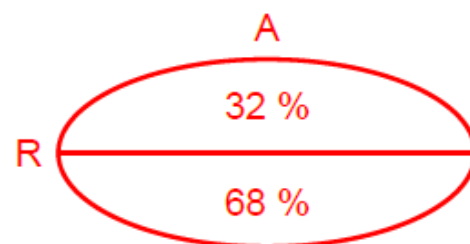
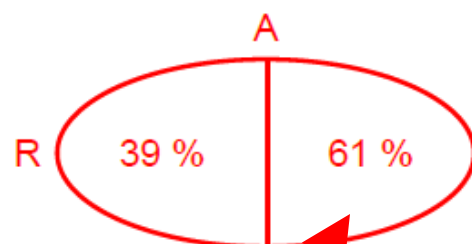
Perfusion map:



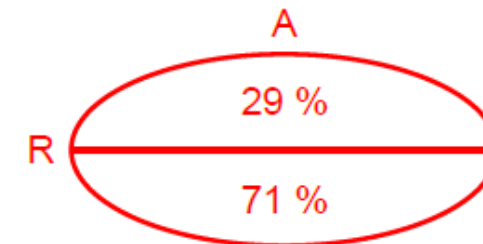
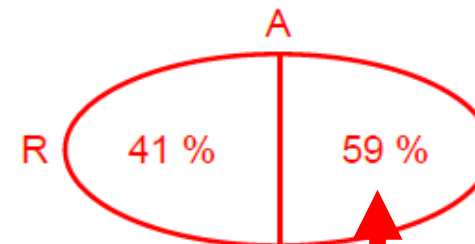
Ventilation map:



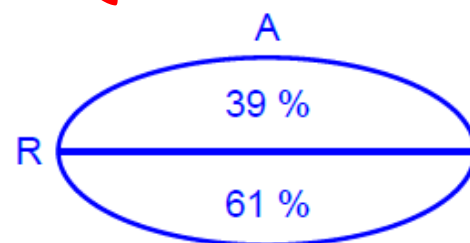
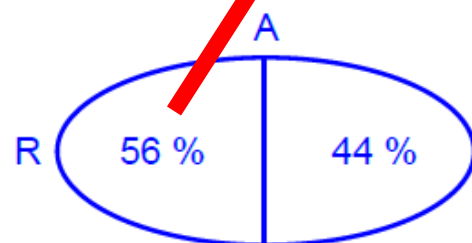
Perfusion distributions:



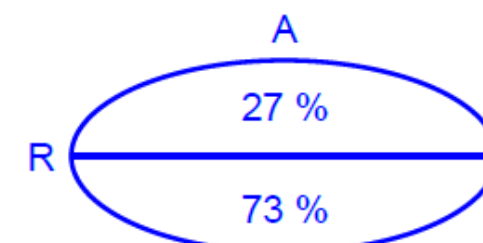
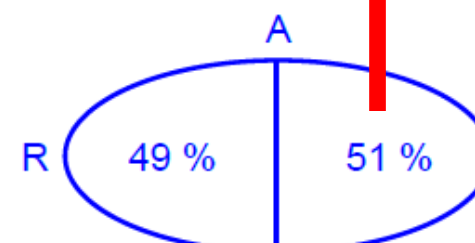
Perfusion distributions:



Ventilation distributions:



Ventilation distributions:



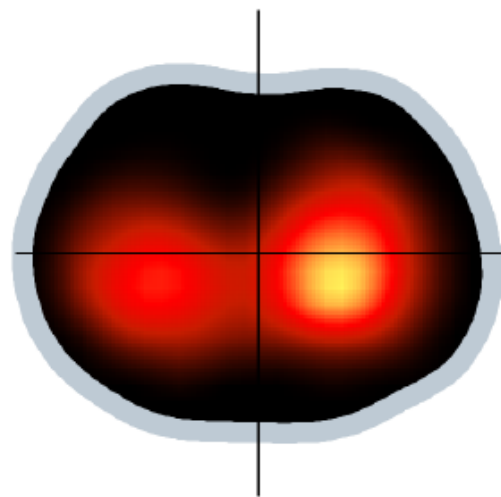
$V \neq Q$

$V \approx Q$

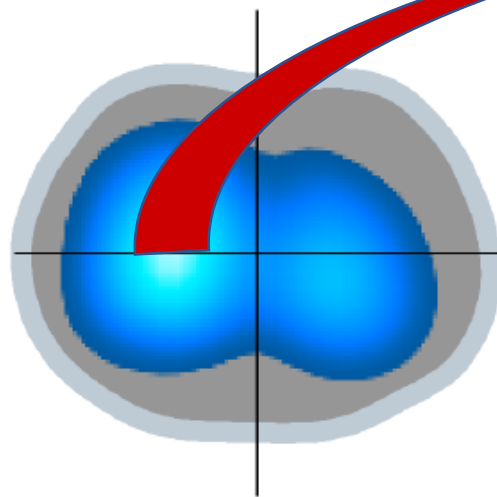
SUPINACE

R – LAT 30°

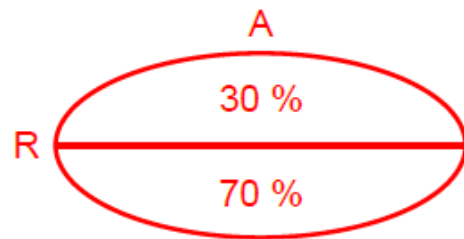
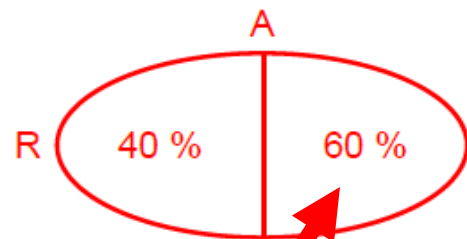
Perfusion map:



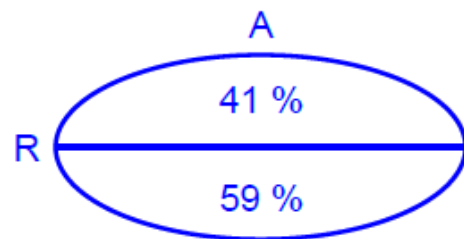
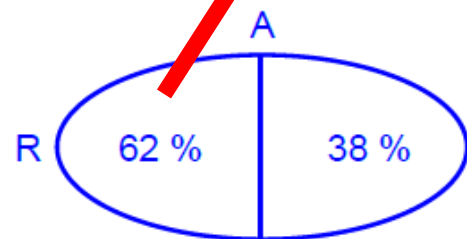
Ventilation map:



Perfusion distributions:

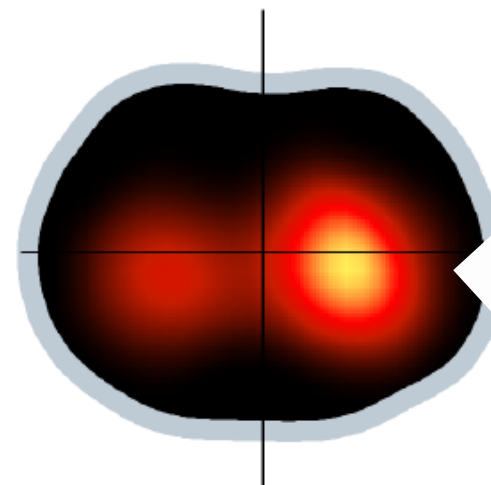


Ventilation distributions:

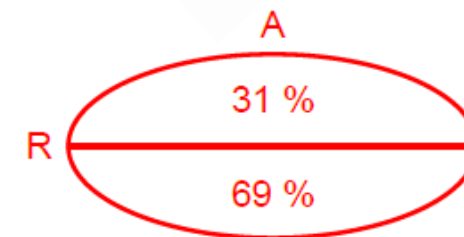
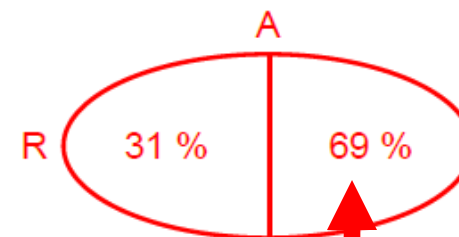


$V \neq Q$

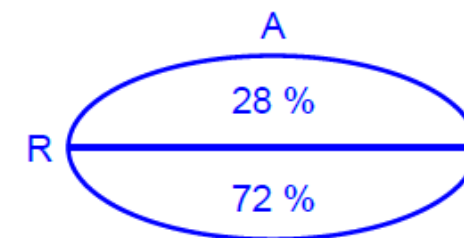
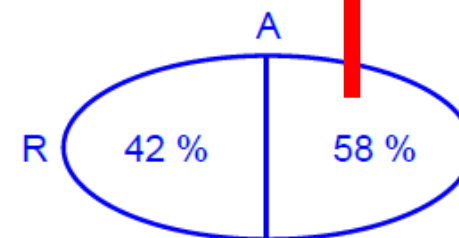
Perfusion map:



Perfusion distributions:



Ventilation distributions:



$V \approx Q$

„Cytokine storm“ in severe Covid-19 are of the lowest across intensive care patients

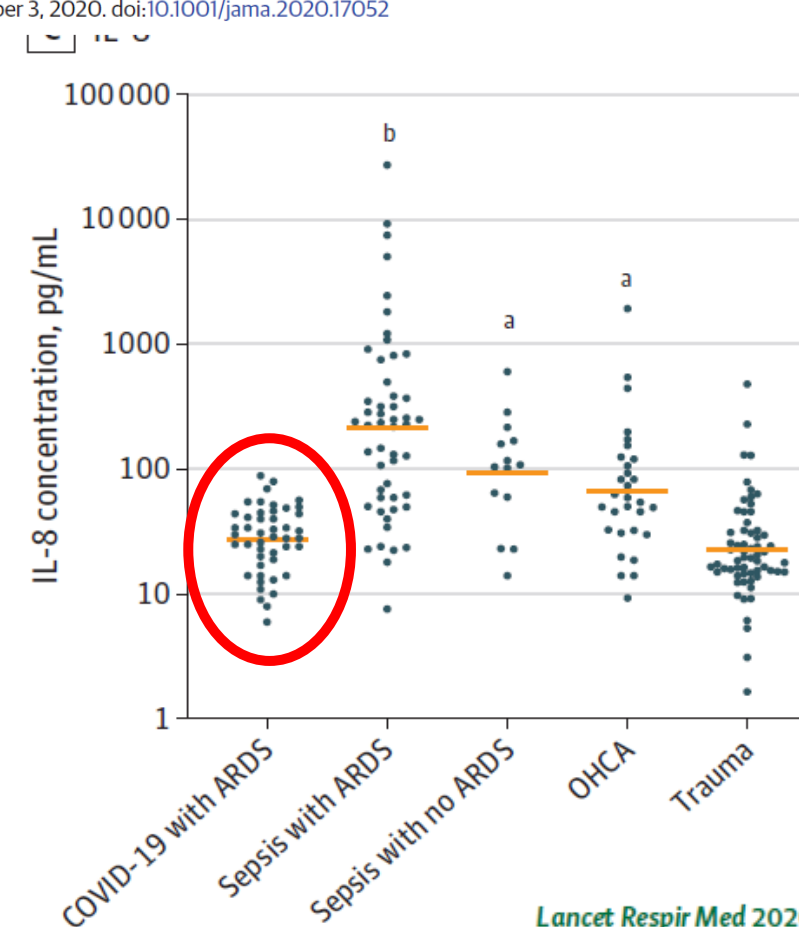
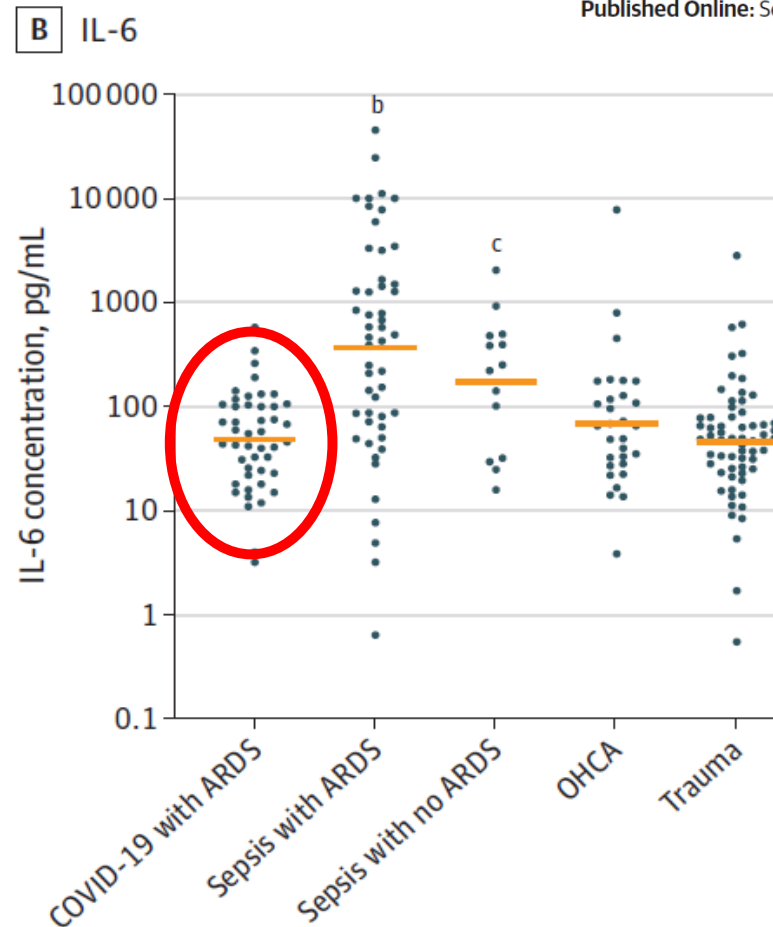
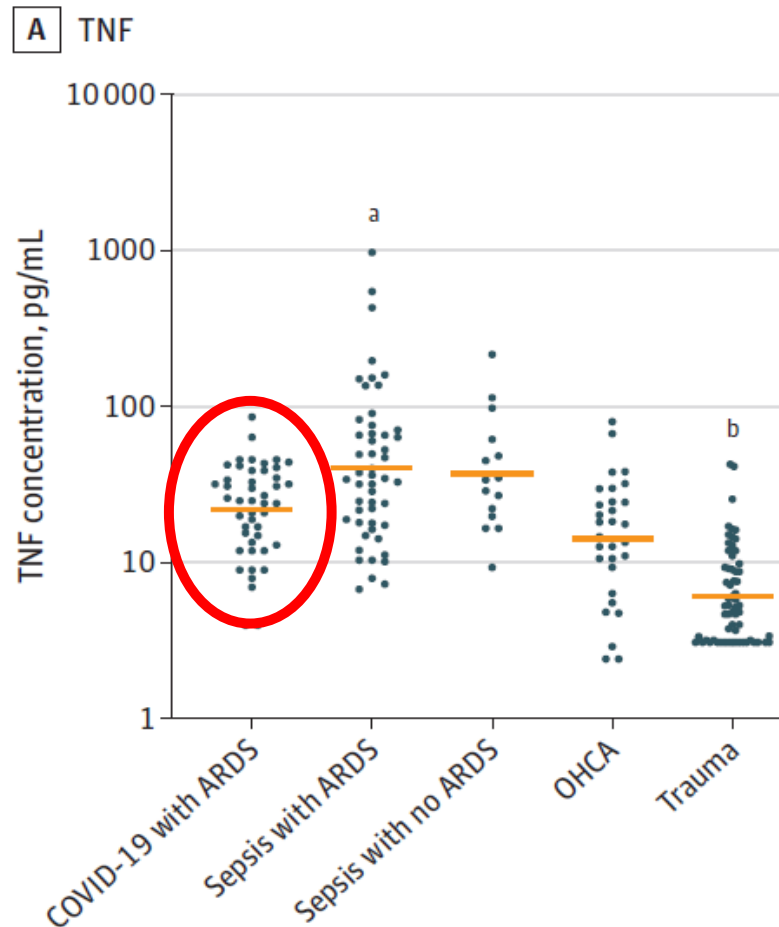
EDITORIAL

RESEARCH LETTER

Is a “Cytokine Storm” Relevant to COVID-19?

Cytokine Levels in Critically Ill Patients With COVID-19 and Other Conditions

Published Online: September 3, 2020. doi:10.1001/jama.2020.17052



Risk associated with cytokine blockers „....against alleged cytokine storm“

- Tocilizumab and Anakinra
- **increased evidence of opportunistic infections (23 vs 8%, $p=0.01$),**
- **prolonged ICU stay and mortality (39 vs 23%, $p=0.03$)**

Natasha Pettit ORCID iD: 0000-0002-8937-8039

Commentary

Critical Care
Explorations

OPEN

Less Can Be More When Targeting Interleukin-6-Mediated Cytokine Release Syndrome in Coronavirus Disease 2019

Brian C. Betts, MD¹; James W. Young, MD²⁻⁴

Late Onset Infectious Complications and Safety of Tocilizumab in the Management of COVID-19

Hofmaenner et al. *Crit Care* (2021) 25:262
<https://doi.org/10.1186/s13054-021-03696-1>

Critical Care

RESEARCH LETTER

Open Access

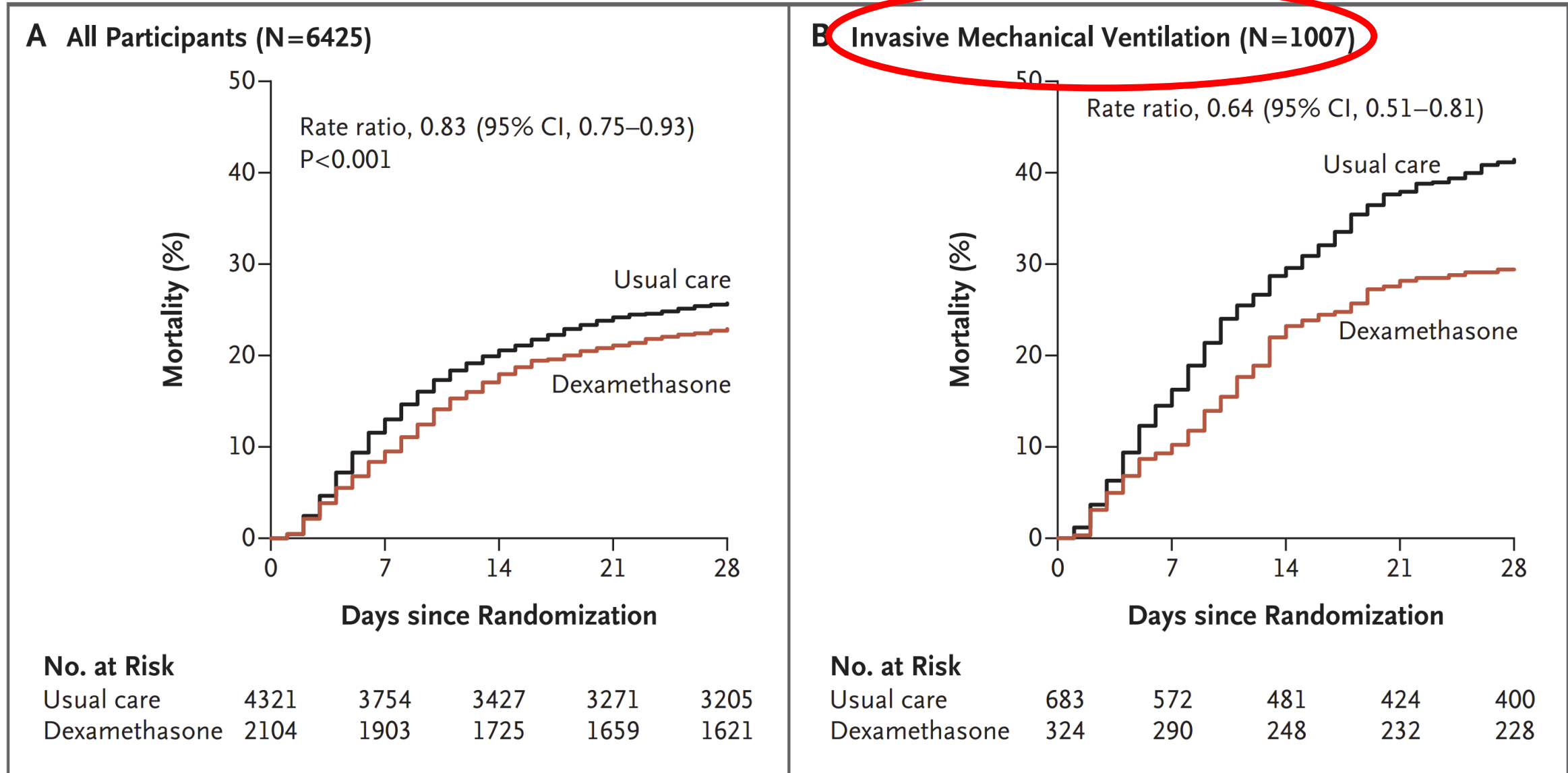
What every intensivist should know about Tocilizumab

Daniel Andrea Hofmaenner¹, Pedro David Wendel Garcia¹, Christoph Camille Ganter¹, Silvio D. Brugger²,
Philipp Karl Buehler¹ and Sascha David^{1*} 





Dexamethason RECOVERY trial



Dexamethason RECOVERY trial



VŠEOBECNÁ FAKULTNÍ
NEMOCNICE V PRAZE

KARIM
1.LF UK A VFN V PRAZE

ORIGINAL ARTICLE

The NEW ENGLAND JOURNAL of MEDICINE

Dexamethasone in Hospitalized Patients with Covid-19 — Preliminary Report

The RECOVERY Collaborative Group*

Respiratory Support at Randomization

Dexamethasone

Usual Care

no. of events/total no. (%)

Invasive mechanical
ventilation

95/324 (29.3)

283/683 (41.4)

Oxygen only

298/1279 (23.3)

682/2604 (26.2)

No oxygen received

89/501 (17.8)

145/1034 (14.0)

All Patients

482/2104 (22.9)

1110/4321 (25.7)

Rate Ratio (95% CI)

0.64 (0.51–0.81)

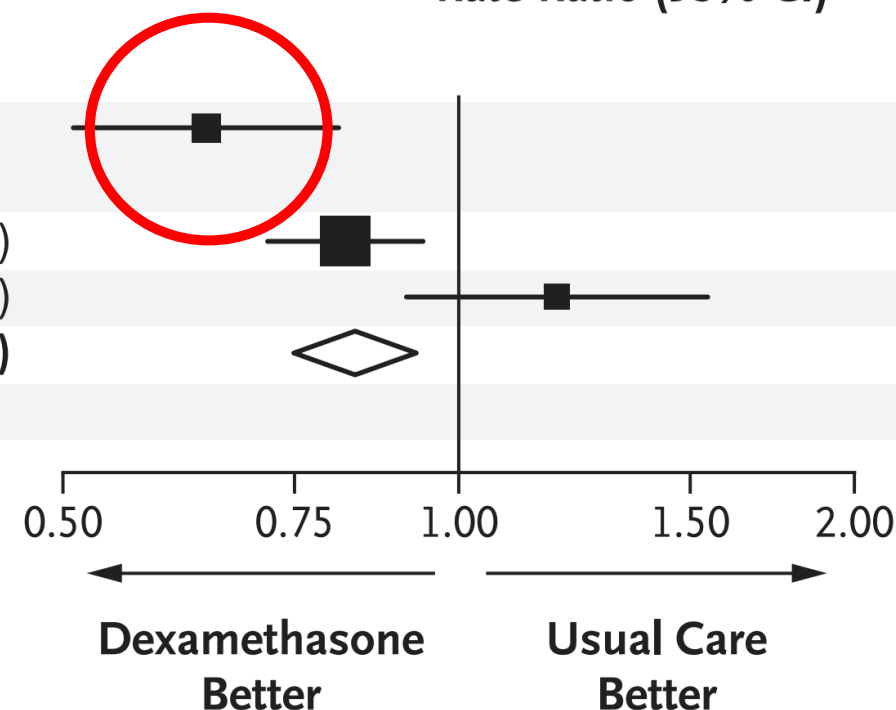
0.82 (0.72–0.94)

1.19 (0.91–1.55)

0.83 (0.75–0.93)

P<0.001

Chi-square trend across three categories: 11.5



Dexamethason CoDEX trial



VŠEOBECNÁ FAKULTNÍ
NEMOCNICE V PRAZE

KARIM
1.LF UK A VFN V PRAZE

QUESTION In patients with COVID-19 and moderate or severe ARDS, does intravenous (IV) dexamethasone plus standard care compared with standard care alone increase the number of days patients remained alive and free from mechanical ventilation?

CONCLUSION This clinical trial found that IV dexamethasone plus standard care, compared with standard care alone, resulted in a statistically significant increase in the number of days patients remained alive and free of mechanical ventilation over 28 days.

POPULATION

187 Men
112 Women



Adults with confirmed
or suspected COVID-19 and
moderate to severe ARDS

Mean age: 61 years

LOCATIONS

41
ICUs in Brazil



INTERVENTION



299 Patients randomized

151

Dexamethasone

IV dexamethasone, 20 mg/d
for 5 days, then 10 mg/d for 5 days
or to discharge, plus standard care

148

Standard care

PRIMARY OUTCOME

Ventilator-free days during first 28 days

FINDINGS

© AMA

Mean ventilator-free days to day 28

Dexamethasone

6.6 Ventilator-free days (95% CI, 5.0 to 8.2)



Standard care

4.0 Ventilator-free days (95% CI, 2.9 to 5.4)



The between-group difference was significant:

2.26 days (95% CI, 0.2 to 4.4); $P = .04$

Dexamethason CoDEX trial

Effect of Dexamethasone on Days Alive and Ventilator-Free in Patients With Moderate or Severe Acute Respiratory Distress Syndrome and COVID-19

JAMA Network

The CoDEX Randomized Clinical Trial

Bruno M. Tomazini, MD^{1,2}; Israel S. Maia, MD, MSc^{3,4}; Alexandre B. Cavalcanti, MD, PhD^{3,4};

Table 3. Adverse Events

	No. (%) of patients	
	Dexamethasone (n = 151)	Standard care (n = 148)
Serious adverse events ^a	5 (3.3)	9 (6.1)
New diagnosis of infection until day 28 ^b	33 (21.9)	43 (29.1)
Ventilator-associated pneumonia	19 (12.6)	29 (19.6)
Catheter-related bloodstream infection	10 (6.6)	8 (5.4)
Catheter-associated urinary tract infections	1 (0.7)	0
Other	6 (4)	7 (4.7)
Bacteremia ^c	12 (7.9)	14 (9.5)
Insulin use for hyperglycemia ^d	47 (31.1)	42 (28.4)

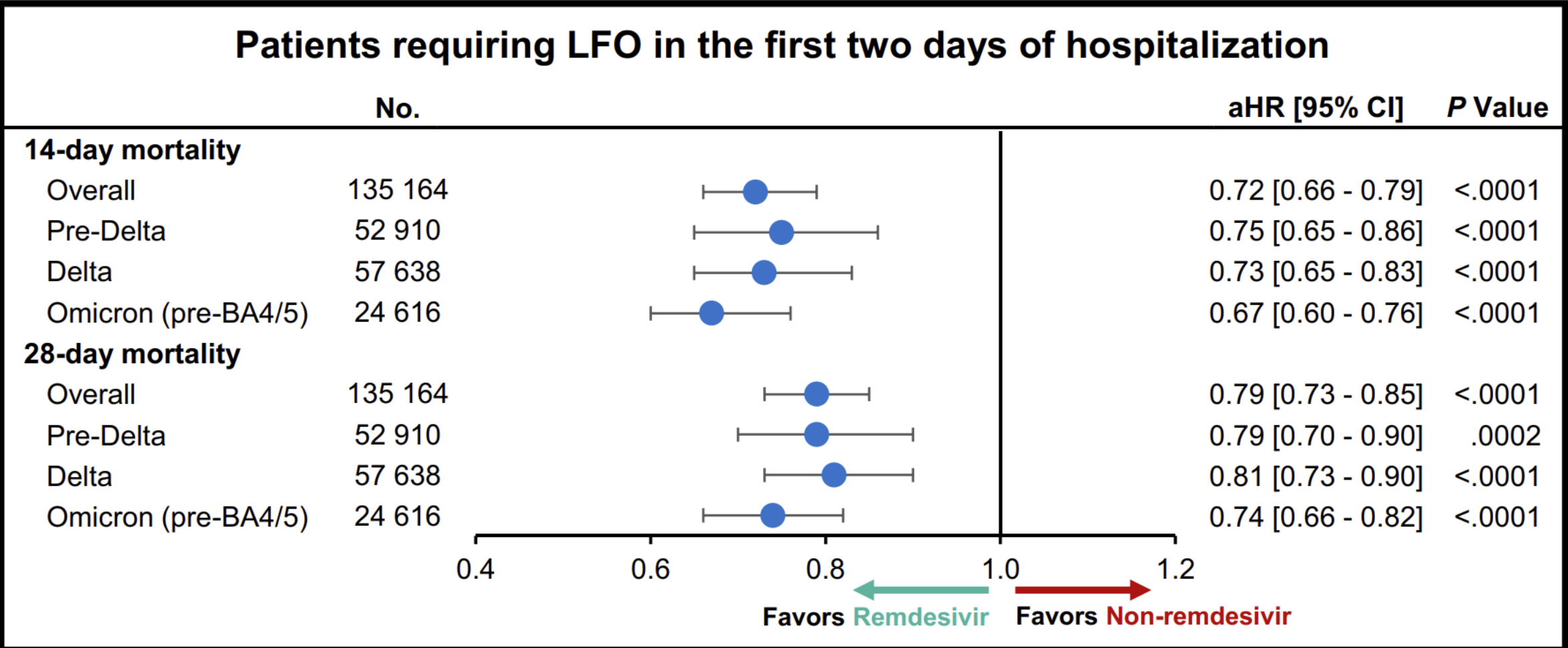
Remdesivir

remdesivir (67 582 LFO, 34 857 HFO/NIV, and 4164 IMV/ECMO) were matched to non-remdesivir patients

Remdesivir Is Associated With Reduced Mortality in COVID-19 Patients Requiring Supplemental Oxygen Including Invasive Mechanical Ventilation Across SARS-CoV-2 Variants



Essy Mozaffari,¹ Aastha Chandak,^{2,3} Robert L. Gottlieb,^{3,4,5,6} Chidinma Chima-Melton,⁷ Stephanie H. Read,⁸ Rikisha Gupta,¹ Mark Berry,¹ Stijn Hollemaersch,¹ and Andre C. Kalij⁹



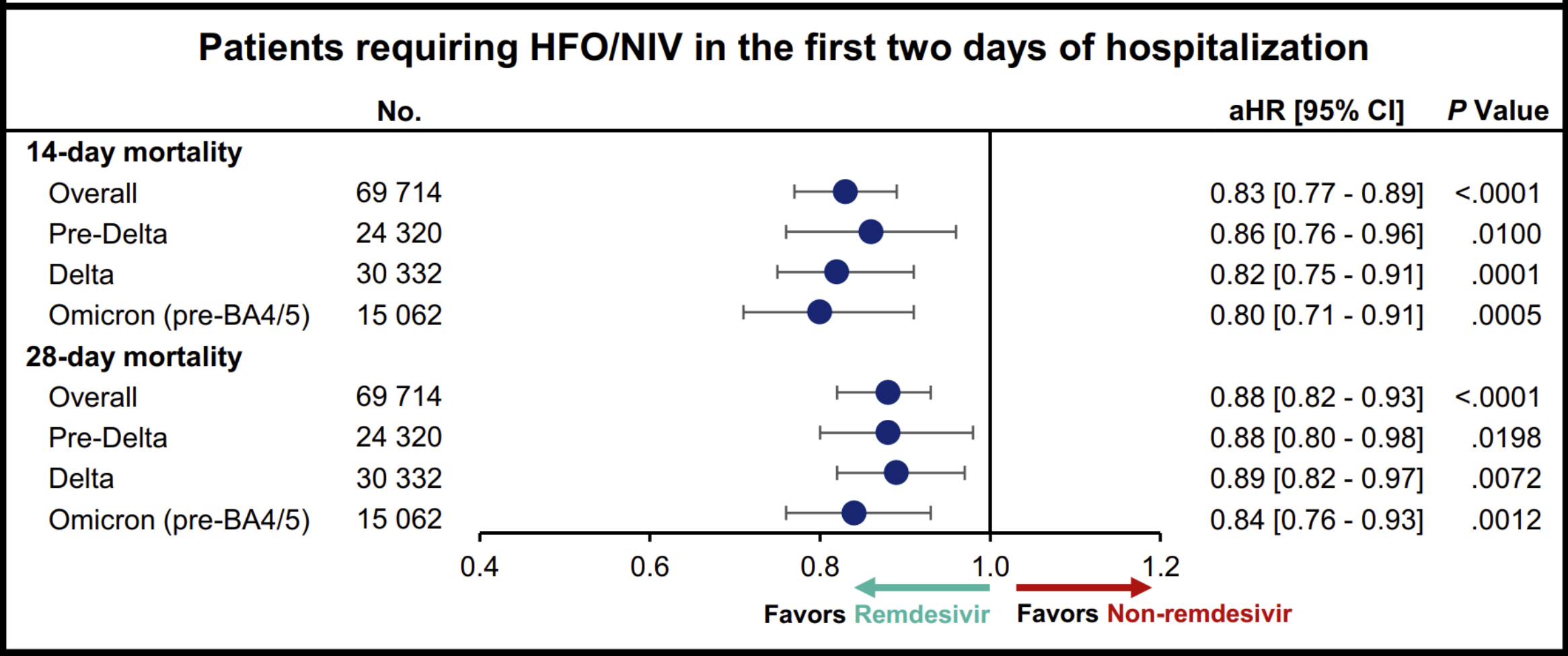
Remdesivir

remdesivir (67 582 LFO, 34 857 HFO/NIV, and 4164 IMV/ECMO) were matched to non-remdesivir patients

Remdesivir Is Associated With Reduced Mortality in COVID-19 Patients Requiring Supplemental Oxygen Including Invasive Mechanical Ventilation Across SARS-CoV-2 Variants



Essy Mozaffari,¹ Aastha Chandak,^{2,3} Robert L. Gottlieb,^{3,4,5,6,7} Chidinma Chima-Melton,⁷ Stephanie H. Read,⁸ Rikisha Gupta,¹ Mark Berry,¹ Stijn Hollemaersch,¹ and Andre C. Kalij⁹



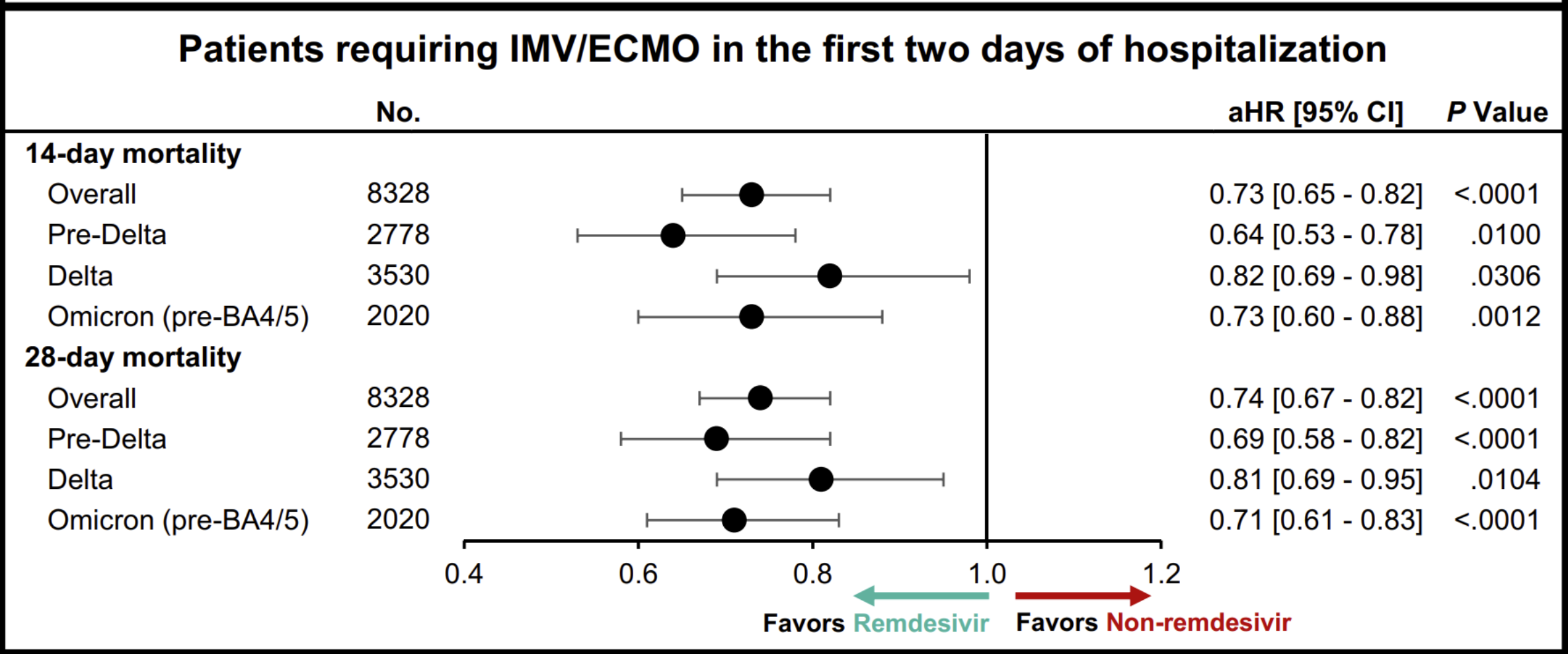
Remdesivir

remdesivir (67 582 LFO, 34 857 HFO/NIV, and 4164 IMV/ECMO) were matched to non-remdesivir patients

Remdesivir Is Associated With Reduced Mortality in COVID-19 Patients Requiring Supplemental Oxygen Including Invasive Mechanical Ventilation Across SARS-CoV-2 Variants



Essy Mozaffari,¹ Aastha Chandak,^{2,3} Robert L. Gottlieb,^{3,4,5,6,7} Chidinma Chima-Melton,⁷ Stephanie H. Read,⁸ Rikisha Gupta,¹ Mark Berry,¹ Stijn Hollemaersch,¹ and Andre C. Kalij⁹

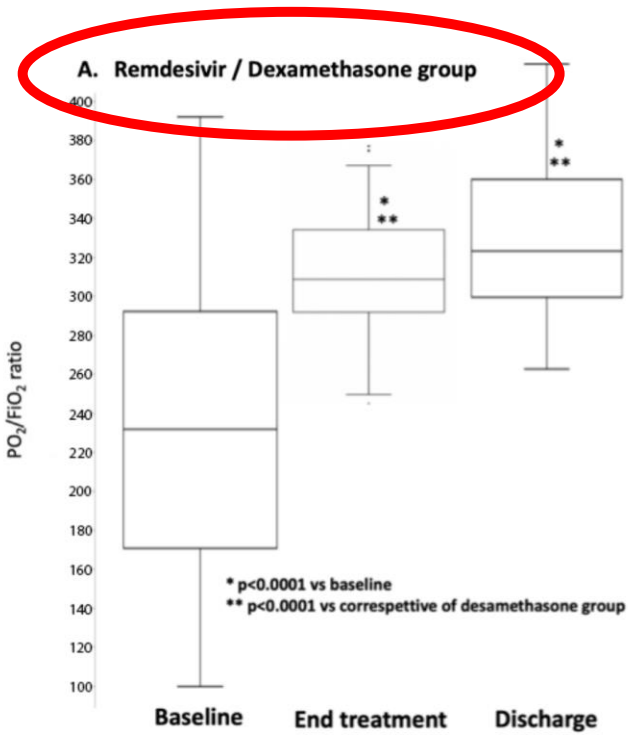


Rendesivir + DEX

Lower Mortality Risk Associated With Remdesivir + Dexamethasone Versus Dexamethasone Alone for the Treatment of Patients Hospitalized for COVID-19

Remdesivir plus dexamethasone treatment of COVID-19 patients prospective controlled non-randomized

Aldo Marrone¹, Riccardo Nevola¹, Ausilia Sellitti



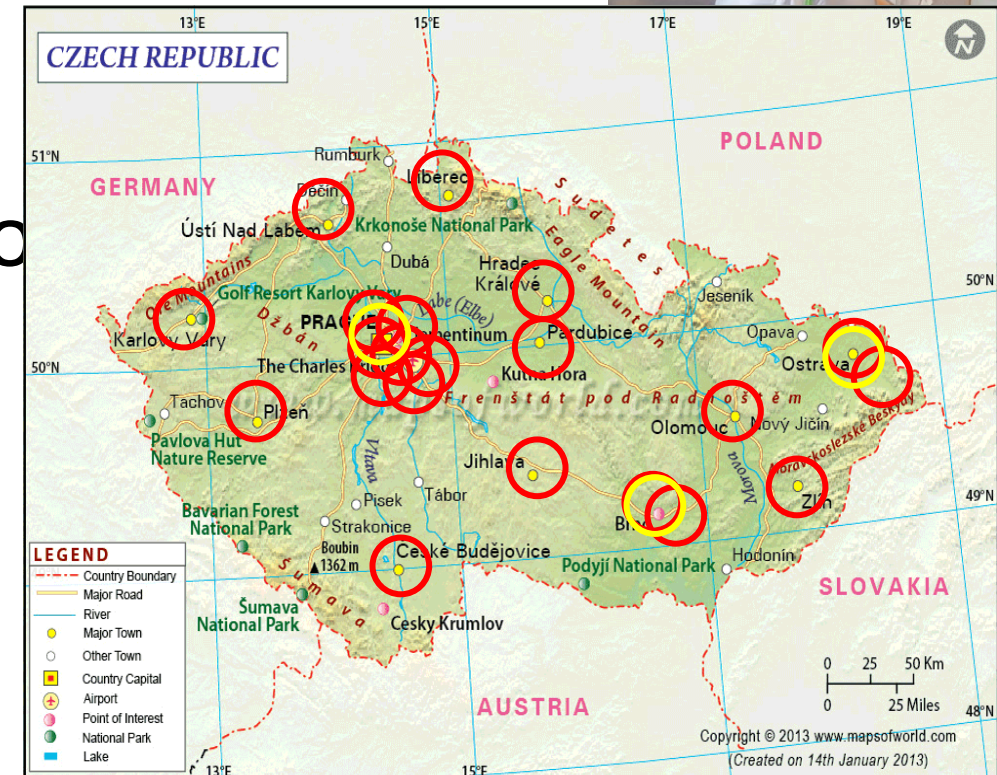
	N		aHR [95% CI]	P value
14-day mortality				
Overall	66,074		0.74 [0.69 - 0.78]	<.0001
NSOc	29,508		0.79 [0.72 - 0.87]	<.0001
LFO	24,412		0.70 [0.64 - 0.77]	<.0001
HFO/NIV	10,656		0.69 [0.62 - 0.76]	<.0001
IMV/ECMO	1,498		0.78 [0.64 - 0.94]	0.0102
28-day mortality				
Overall	66,074		0.76 [0.72 - 0.81]	<.0001
NSOc	29,508		0.80 [0.74 - 0.88]	<.0001
LFO	24,412		0.74 [0.68 - 0.81]	<.0001
HFO/NIV	10,656		0.71 [0.65 - 0.78]	<.0001
IMV/ECMO	1,498		0.81 [0.69 - 0.97]	0.0182

0.60 0.80 1.00 1.20

Favors RDV+DEX **Favors DEX mono**

Pandemie COVID INDIVIDUALIZACE péče

- EBM se zpožděním
- prioritizace
- **HFNO**
- **P-SILI** při spontánní ventilaci při o
- **Individual. UPV / EIT**
- **POLOHOVÁNÍ / PRONACE**
- **rozšíření ECMO**

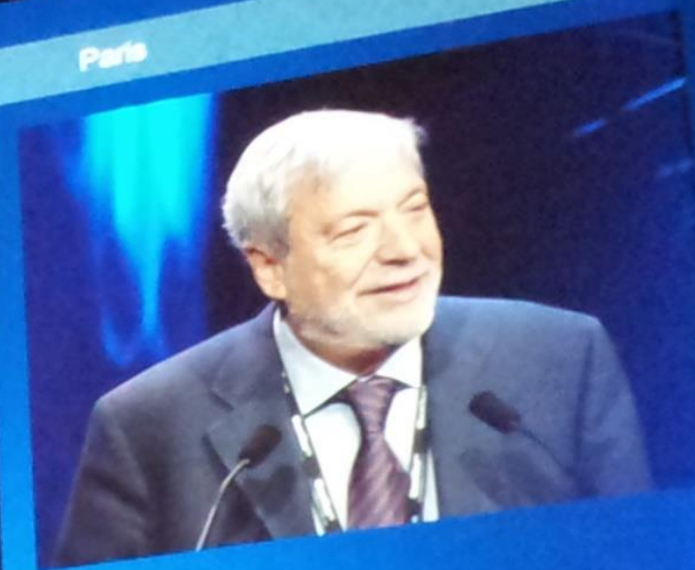




00:00

Evidence based medicine
should not kill the medical
reasoning.

How many patients died
waiting for evidence?



Luciano GATTINONI
(Milan - Italy)



ESICM 26TH ANNUAL
LIVES CONGRESS
2013 OCTOBER 5-9
PARIS

www.esicm.org

www.esicm.org