Respiratory Review of 2021 Critical Care

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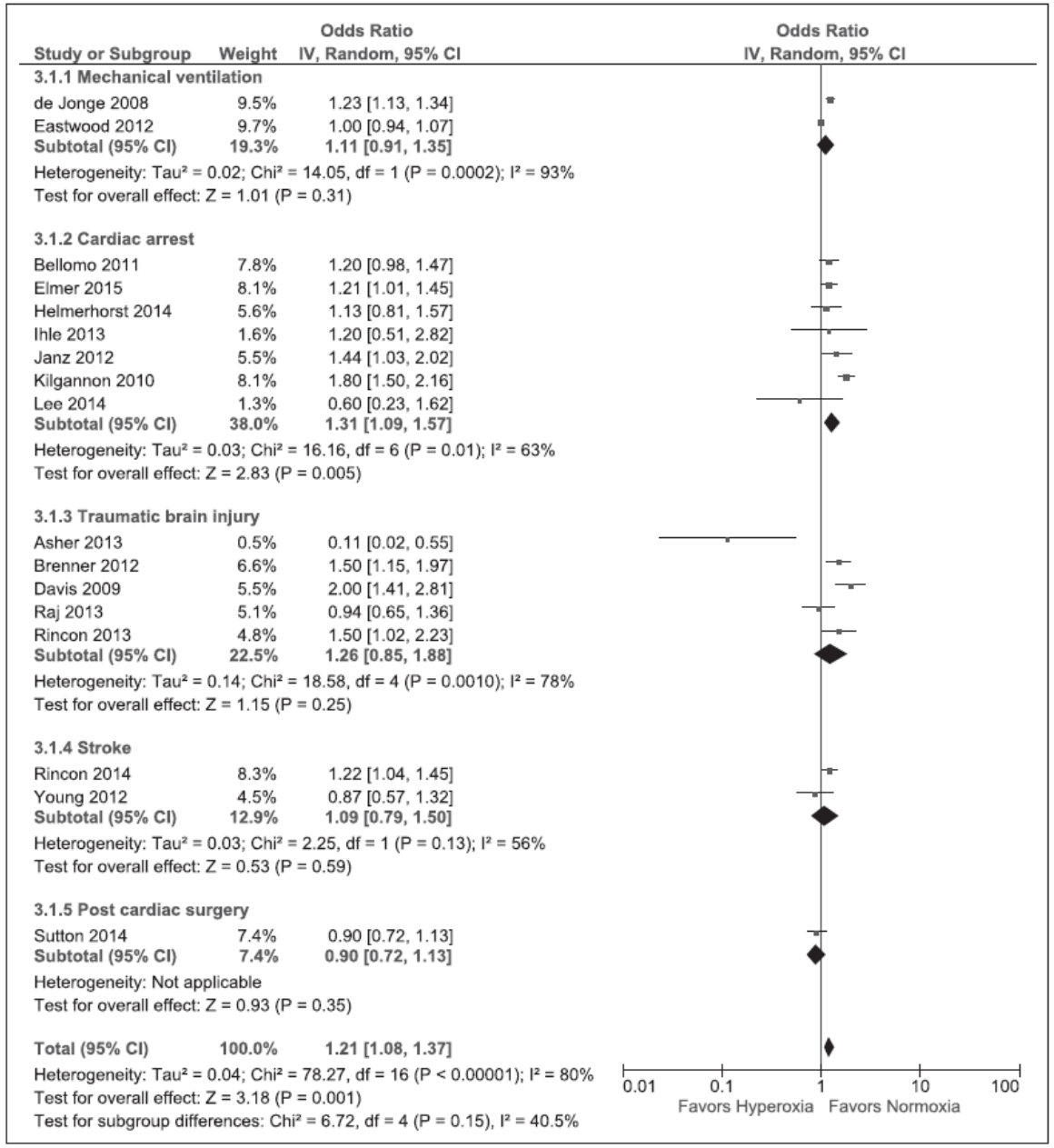
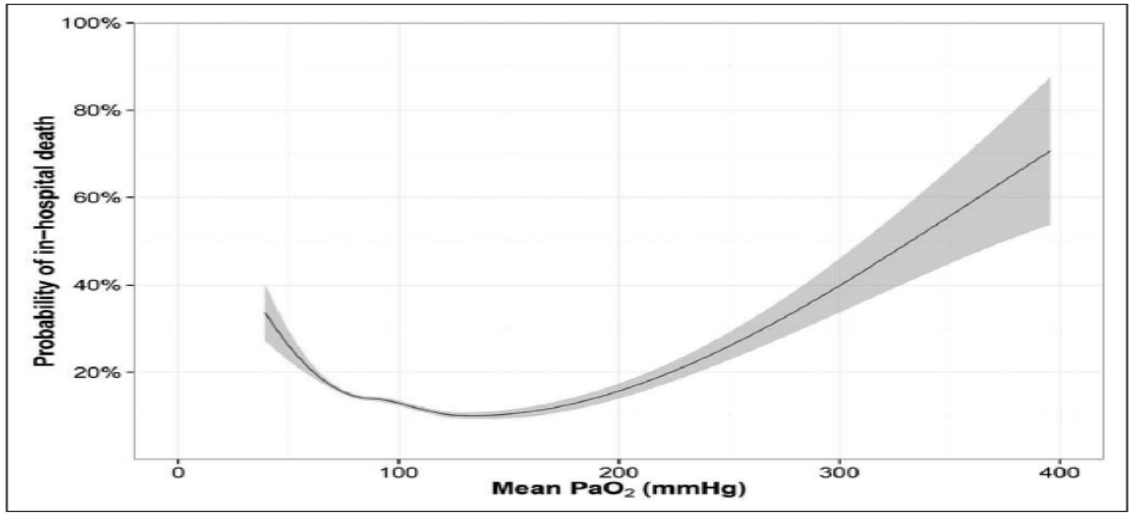
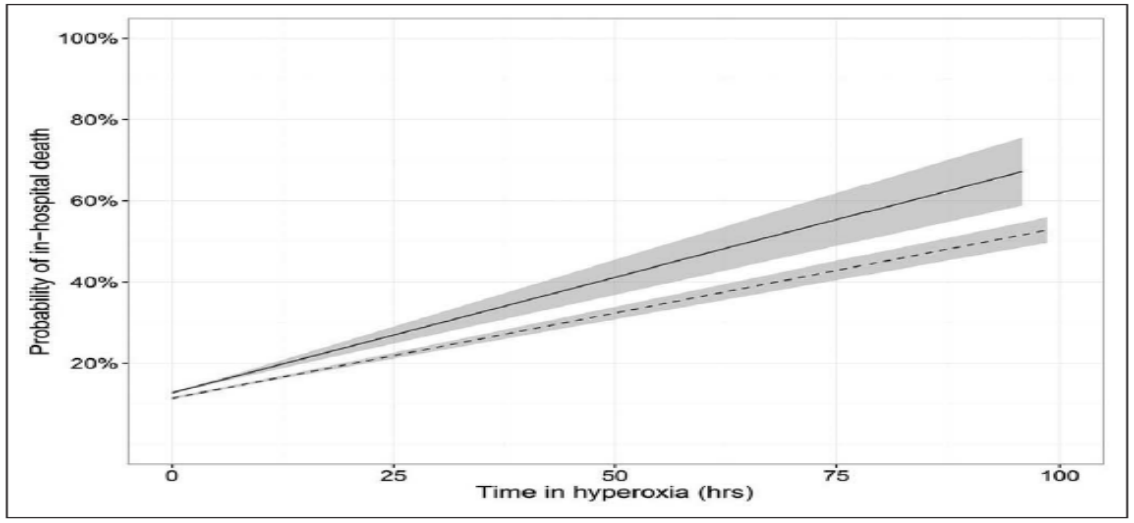
1. Oxygenation strategies in ICU
2. Mechanical ventilation
3. Sepsis and vitamin
4. ARDS

Oxygenation strategies in ICU

- **N Engl J Med . 2020 Mar 12;382(11):999-1008.**
- **N Engl J Med. 2020 Mar 12;382(11):989-998.**
- **N Engl J Med . 2021 Jan 20. oi: 10.1056/NEJMoa2032510.**



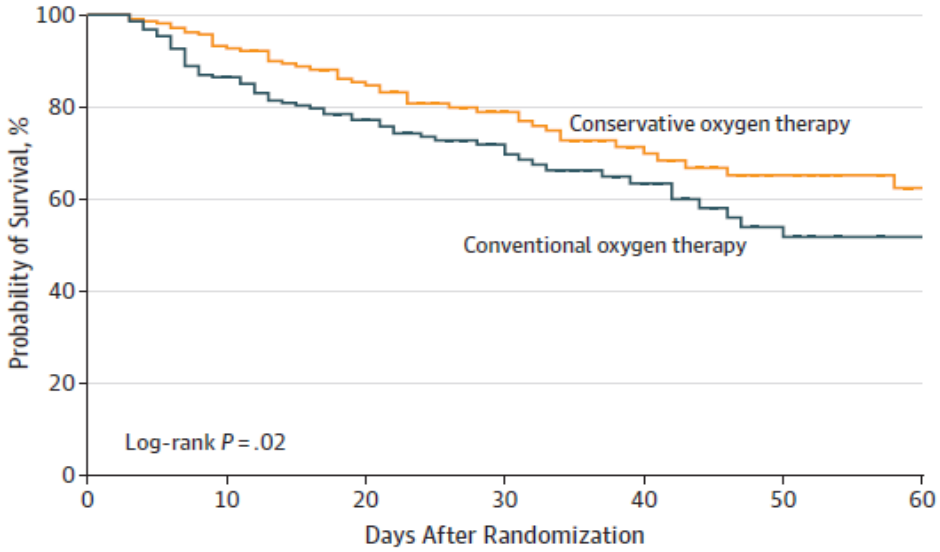




Crit Care Med . 2015 Jul;43(7):1508-19.

Crit Care Med . 2017 Feb;45(2):187-195.

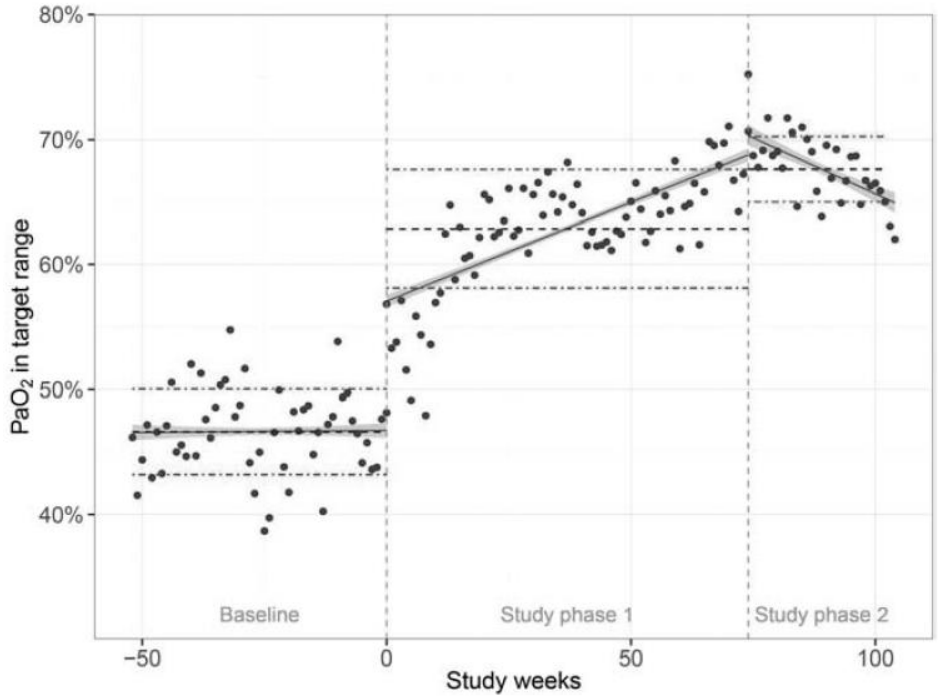
	Oxygen Therapy, No. (%)			
	Conservative (n = 216)	Conventional (n = 218)	Absolute Risk Difference (95% CI)	*P* Value
Primary outcome				
ICU mortality	25 (11.6)	44 (20.2)	0.086 (0.017 to 0.150)	.01
Secondary outcomes				
Hospital mortality	52 (24.2)	74 (33.9)	0.099 (0.013 to 0.182)	.03
New organ failure during ICU stay	41 (19.0)	56 (25.7)	0.067 (−0.012 to 0.145)	.09
Respiratory failure	14 (6.5)	14 (6.4)	−0.126 (−0.189 to −0.064)	.98
Shock	8 (3.7)	23 (10.6)	0.068 (0.020 to 0.120)	.006
Liver failure	4 (1.9)	14 (6.4)	0.046 (0.008 to 0.088)	.02
Renal failure	26 (12.0)	21 (9.6)	−0.024 (−0.084 to 0.035)	.42
New infections during ICU stay	39 (18.1)	50 (22.9)	0.049 (−0.027 to 0.124)	.21
Respiratory	30 (13.9)	37 (17.0)	0.031 (−0.038 to 0.099)	.37
Bacteremia	11 (5.1)	22 (10.1)	0.050 (0.000 to 0.090)	.049
Surgical site[a]	10 (7.2)	12 (9.1)	0.019 (−0.048 to 0.088)	.68
Surgical revision[a]	18 (12.9)	16 (12.1)	−0.008 (−0.088 to 0.073)	.84
Mechanical ventilation-free hours, median (IQR)	72 (35 to 110)	48 (24 to 96)	24 (0 to 46)	.02
ICU length of stay, median (IQR), d	6 (4 to 10)	6 (4 to 11)	0 (0 to 2)	.33
Hospital length of stay, median (IQR), d	21 (13 to 38)	21 (12 to 34)	0 (−5 to 1)	.21



No. at risk							
Conservative	216	201	188	181	173	170	169
Conventional	218	189	172	163	158	152	152

JAMA . 2016 Oct 18;316(15):1583-1589.

Baseline: lower limit of 75
Phase 1 & 2
: Pao2, 55–86 mm Hg
Spo2, 92–95%



Clinical Outcome	Study Phase 1		Study Phase 2	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Mean difference (95% CI)				
Ventilator-free days and alive at day 28[a]	0.38 (0–0.76)	0.55 (0.25–0.84)[d]	0.39 (−0.08 to 0.87)	0.48 (0.11–0.86)[d]
ICU-free days and alive at day 28[b]	0.16 (−0.17 to 0.50)	0.16 (−0.11 to 0.42)	0.08 (−0.34 to 0.50)	0.10 (−0.23 to 0.43)
OR (95% CI)				
ICU mortality[c]	1.02 (0.91–1.16)	1.09 (0.93–1.27)	1.04 (0.89–1.21)	1.09 (0.90–1.32)
Hospital mortality[c]	0.87 (0.79–0.97)[d]	0.84 (0.74–0.96)[d]	0.88 (0.77–1.00)	0.82 (0.69–0.96)[d]

Crit Care Med . 2016 Mar;44(3):554-63.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Liberal or Conservative Oxygen Therapy for Acute Respiratory Distress Syndrome

Loic Barrot, M.D., Pierre Asfar, M.D., Ph.D., Frederic Mauny, M.D., Ph.D., Hadrien Winiszewski, M.D., Florent Montini, M.D., Julio Badie, M.D., Jean-Pierre Quenot, M.D., Ph.D., Sebastien Pili-Floury, M.D., Ph.D., Belaid Bouhemad, M.D., Ph.D., Guillaume Louis, M.D., Bertrand Souweine, M.D., Ph.D., Olivier Collange, M.D., Ph.D., Julien Pottecher, M.D., Ph.D., Bruno Levy, M.D., Ph.D., Marc Puyraveau, M.Sc., Lucie Vettoretti, Ph.D., Jean-Michel Constantin, M.D., Ph.D., and Gilles Capellier, M.D., Ph.D., for the $LOCO_2$ Investigators and REVA Research Network*

- **Liberal Oxygenation versus Conservative Oxygenation in Acute Respiratory Distress Syndrome Trial ($LOCO_2$)**

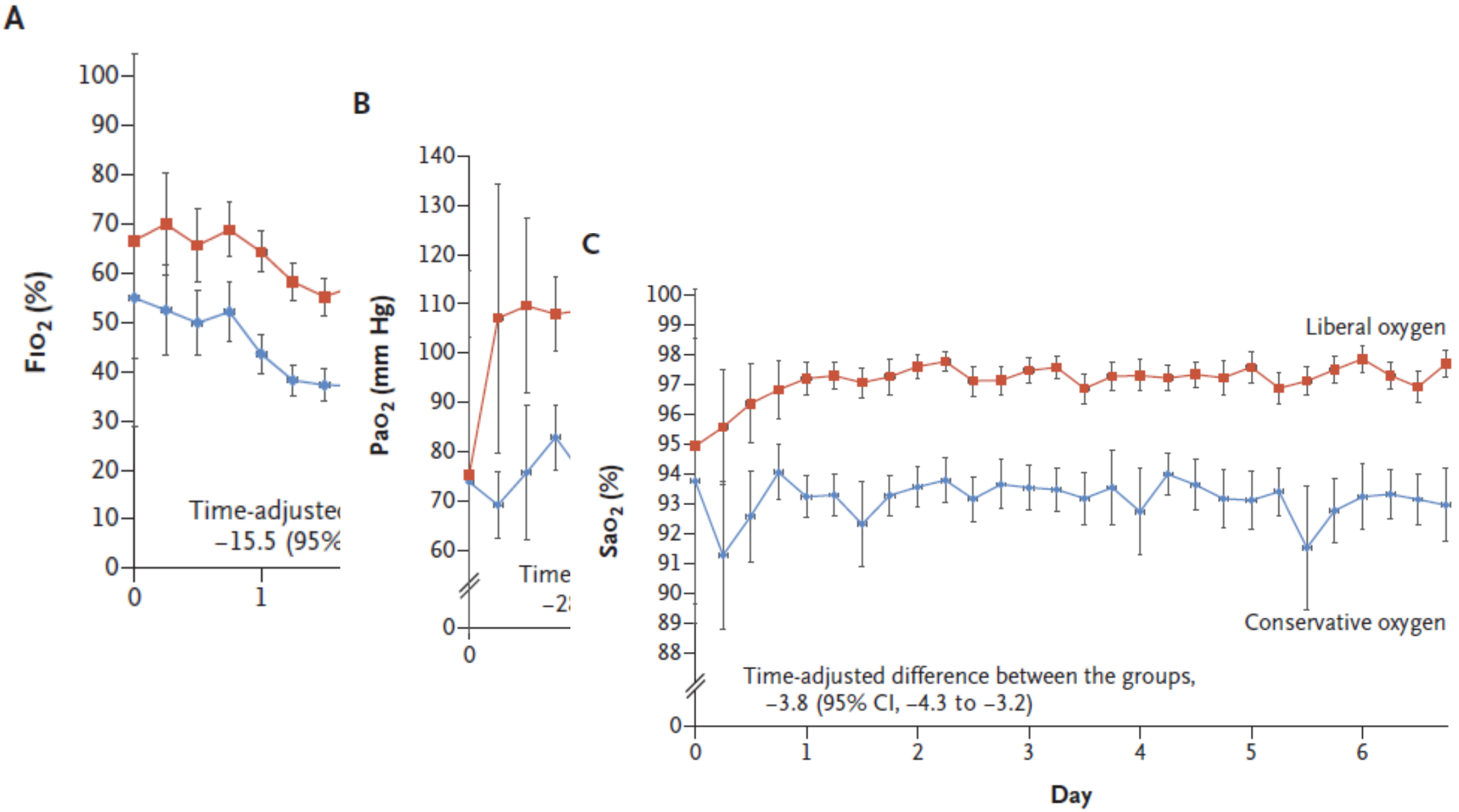
N Engl J Med 2020;382:999-1008

- Conservative oxygenation vs. Liberal oxygenation strategy
- Prospective, multicenter, randomized, open-label trial

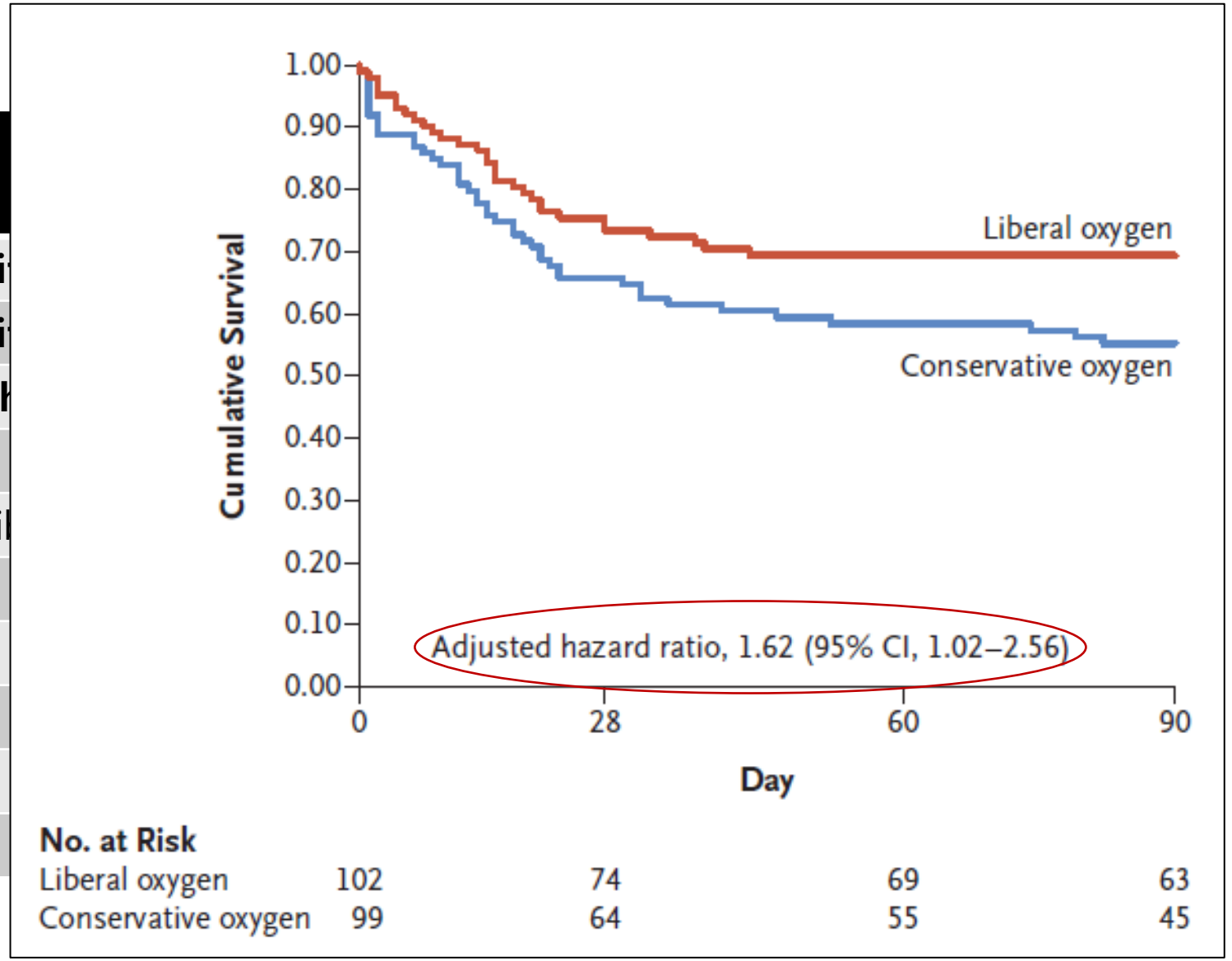
- **Liberal oxygen group** (n=102): Pao2 target between **90 and 105 mm Hg, SpO2: at least 96%)**
- **Conservative-oxygen group** (n=99): Pao2 target between **55 and 70 mm Hg, SpO2: at least 88-92%)**
- Over the first 7 days of invasive mechanical ventilation or until extubation

- VCV was recommendation, TV ≤6ml/predicted body weight, PEEP (5-10cmH2O)

	Conservative (N=99)	Liberal (N=102)
Age	63.0±15.5	63.5±14.5
Tidal volume	6.0±0.3	6.2±0.5
PEEP	6.2±2.7	6.4±3.5
Pao2:Fio2	116.8±47.4	120.1±53.6
Pao2:Fio2 ≤ 150 mmHg	75.8%	76.5%
SOFA score‖	9.3±3.68	8.9±3.6


A
B
C
FIO_2 (%)
PaO_2 (mm Hg)
SaO_2 (%)
Liberal oxygen
Conservative oxygen
Time-adjusted difference between the groups,
−3.8 (95% CI, −4.3 to −3.2)
Day

28 day mortali	
90 day mortali	
Mesenteric isch	
Arrhythmia	
New-onset A-fil	
Day 28 MV	
VAP	
Seizure	
Stroke	
Delirium	



Mortality was adjusted for age, Pao2:Fio2, and Simplified Acute Physiology Score III.

The NEW ENGLAND JOURNAL of MEDICINE

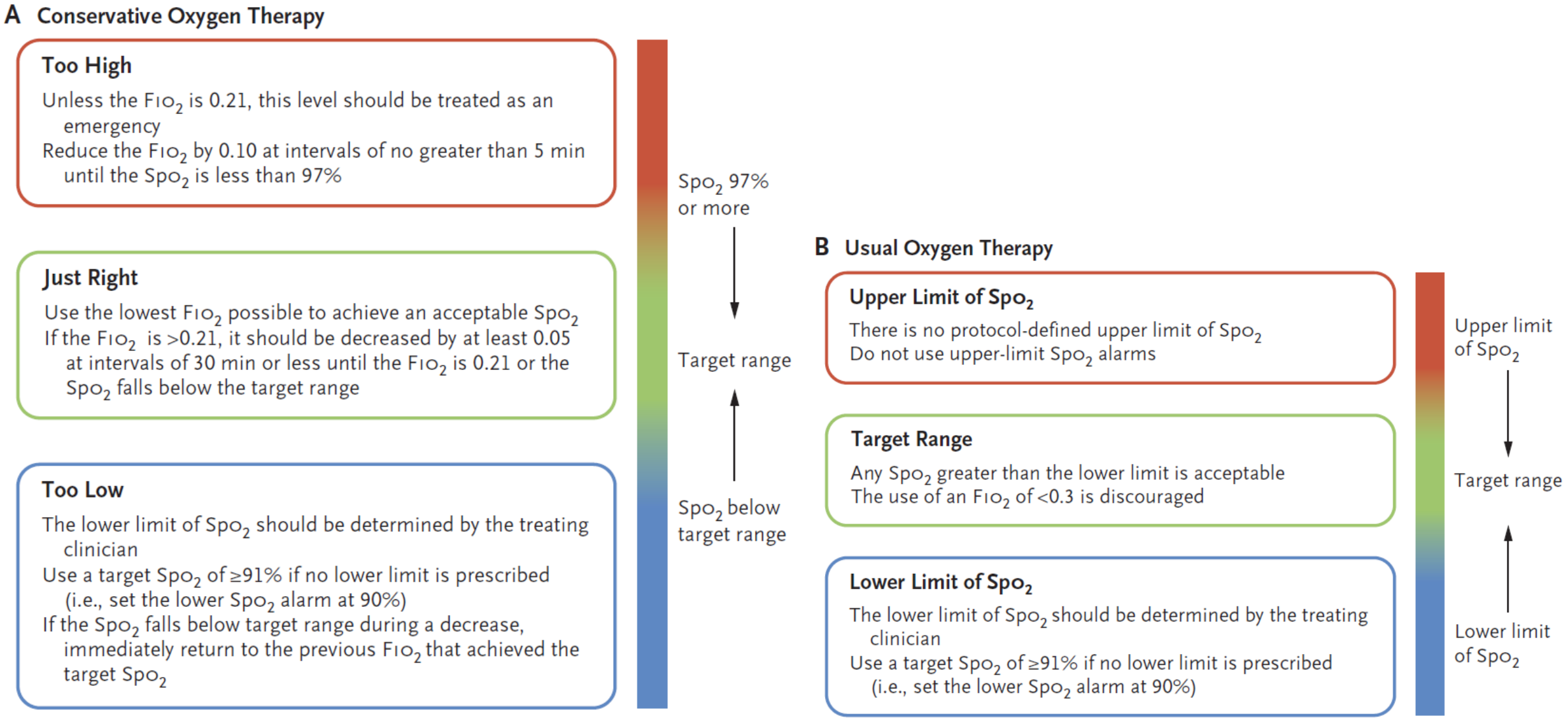
ESTABLISHED IN 1812 MARCH 12, 2020 VOL. 382 NO. 11

Conservative Oxygen Therapy during Mechanical Ventilation in the ICU

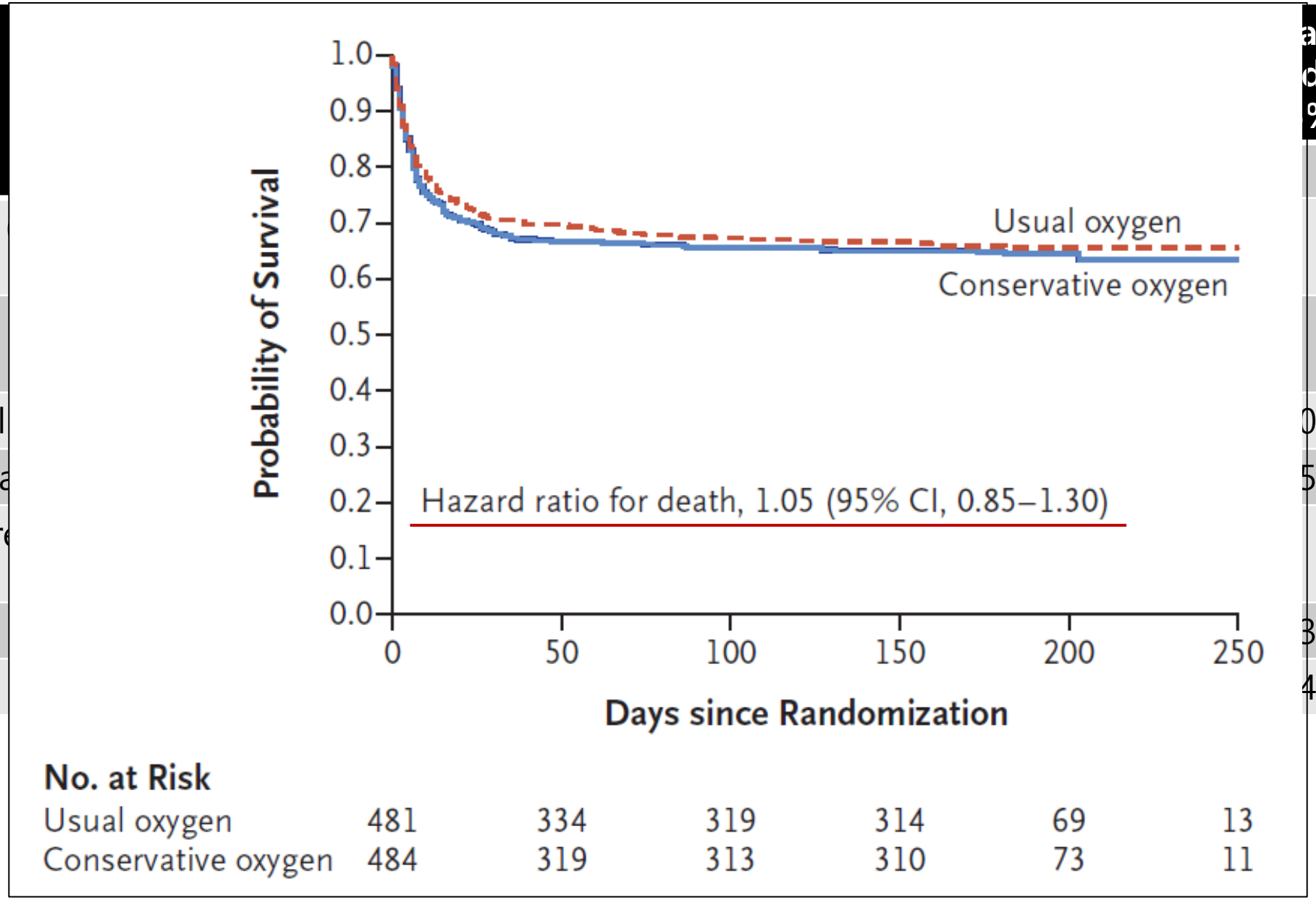
The ICU-ROX Investigators and the Australian and New Zealand Intensive Care Society Clinical Trials Group*

- Conservative Oxygen (n=484) vs. Usual oxygen group (n=481)
- Prospective, investigator-initiated, parallel group, randomized clinical trial.
- The primary outcome was the number of **ventilator free days** from randomization until day 28.

N Engl J Med 2020;382:989-98


A Conservative Oxygen Therapy
Too High
Unless the FIO_2 is 0.21, this level should be treated as an emergency
Reduce the FIO_2 by 0.10 at intervals of no greater than 5 min until the SpO_2 is less than 97%
Just Right
Use the lowest FIO_2 possible to achieve an acceptable SpO_2
If the FIO_2 is >0.21, it should be decreased by at least 0.05 at intervals of 30 min or less until the FIO_2 is 0.21 or the SpO_2 falls below the target range
Too Low
The lower limit of SpO_2 should be determined by the treating clinician
Use a target SpO_2 of ≥91% if no lower limit is prescribed (i.e., set the lower SpO_2 alarm at 90%)
If the SpO_2 falls below target range during a decrease, immediately return to the previous FIO_2 that achieved the target SpO_2
SpO_2 97% or more
Target range
SpO_2 below target range
B Usual Oxygen Therapy
Upper Limit of SpO_2
There is no protocol-defined upper limit of SpO_2
Do not use upper-limit SpO_2 alarms
Target Range
Any SpO_2 greater than the lower limit is acceptable
The use of an FIO_2 of <0.3 is discouraged
Lower Limit of SpO_2
The lower limit of SpO_2 should be determined by the treating clinician
Use a target SpO_2 of ≥91% if no lower limit is prescribed (i.e., set the lower SpO_2 alarm at 90%)
Upper limit of SpO_2
Target range
Lower limit of SpO_2

		adjusted ds Ratio % CI)
VFD, median		
VFD among survivor		
90 day mortal		0 (0.84 to 1.44)
180 day morta		5 (0.81 to 1.37)
vasopressor-fr days		
RRT in ICU		3 (0.61 to 1.14)
tracheostomy		4 (0.56 to 1.26)



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Lower or Higher Oxygenation Targets for Acute Hypoxemic Respiratory Failure

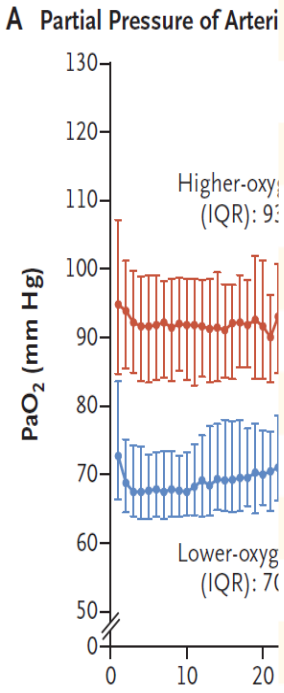
O.L. Schjørring, T.L. Klitgaard, A. Perner, J. Wetterslev, T. Lange, M. Siegemund, M. Bäcklund, F. Keus, J.H. Laake, M. Morgan, K.M. Thormar, S.A. Rosborg, J. Bisgaard, A.E.S. Erntgaard, A.-S.H. Lynnerup, R.L. Pedersen, E. Crescioli, T.C. Gielstrup, M.T. Behzadi, L.M. Poulsen, S. Estrup, J.P. Laigaard, C. Andersen, C.B. Mortensen, B.A. Brand, J. White, I.-L. Jarnvig, M.H. Møller, L. Quist, M.H. Bestle, M. Schønemann-Lund, M.K. Kamper, M. Hindborg, A. Hollinger, C.E. Gebhard, N. Zellweger, C.S. Meyhoff, M. Hjort, L.K. Bech, T. Grøfte, H. Bundgaard, L.H.M. Østergaard, M.A. Thyø, T. Hildebrandt, B. Uslu, C.G. Sølling, N. Møller-Nielsen, A.C. Brøchner, M. Borup, M. Okkonen, W. Dieperink, U.G. Pedersen, A.S. Andreasen, L. Buus, T.N. Aslam, R.R. Winding, J.C. Schefold, S.B. Thorup, S.A. Iversen, J. Engstrøm, M.-B.N. Kjær, and B.S. Rasmussen, for the HOT-ICU Investigators*

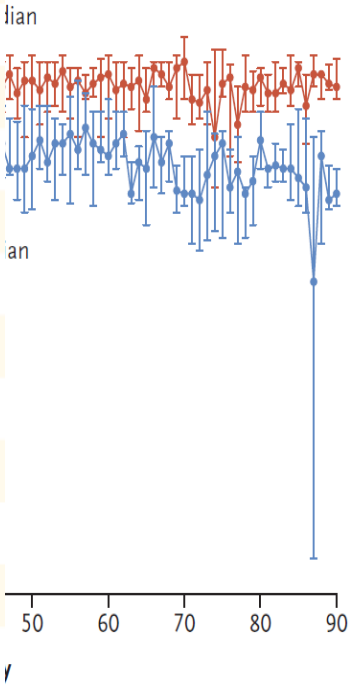
N Engl J Med . 2021 Jan 20

- Hypothe sing a higher target
- Multicer
- At least
- **Lower-(90 mm Hg)**

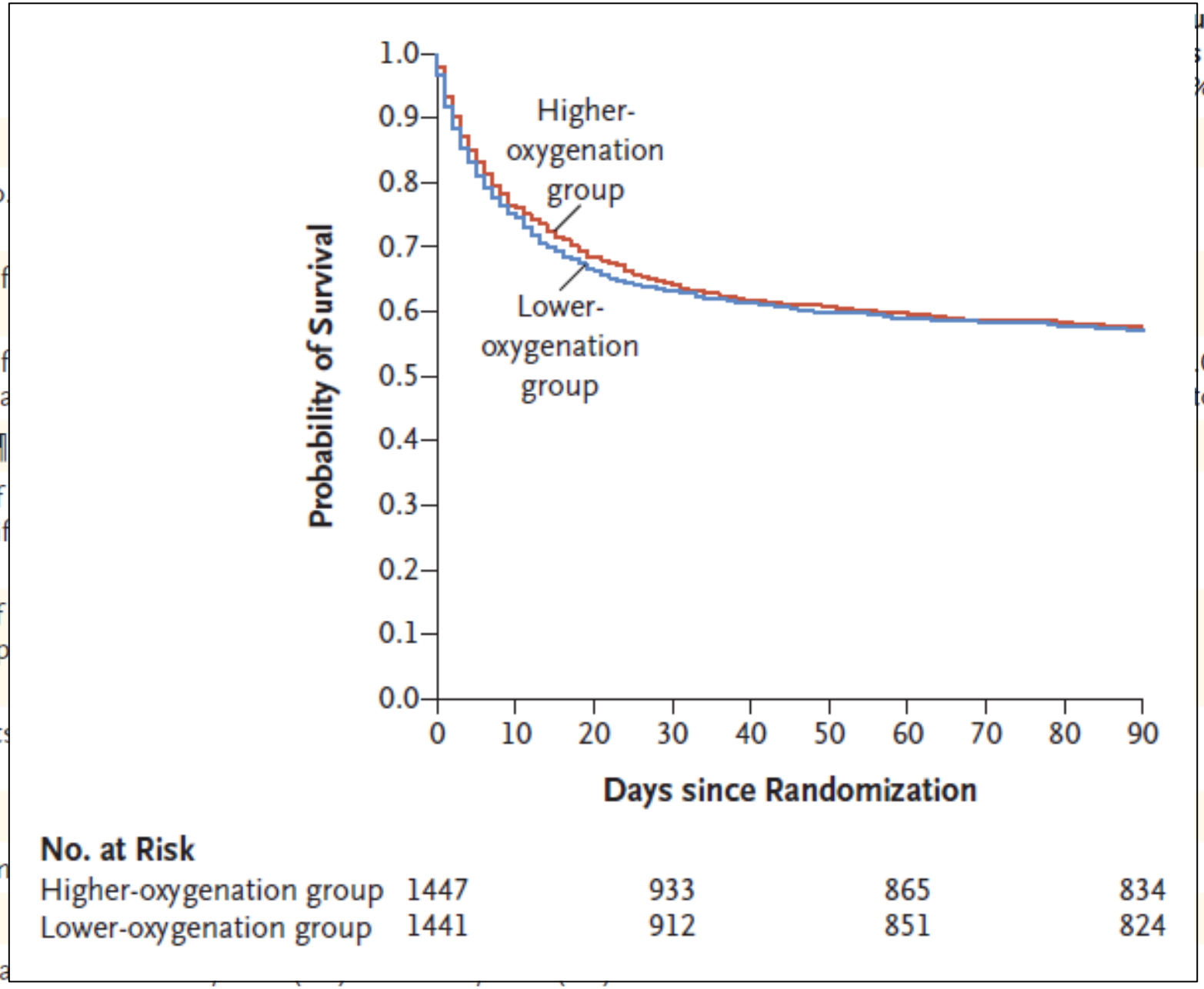
Table 1. Characteristics of the Patients at Baseline.*

Characteristic	Lower-Oxygenation Group (N = 1453)	Higher-Oxygenation Group (N = 1457)
Median age (IQR) — yr	70 (60–77)	70 (60–77)
Male sex — no. (%)	925 (63.7)	946 (64.9)
Median interval between hospital admission and randomization (IQR) — days	1 (0–5)	1 (0–5)
Median interval between ICU admission and randomization (IQR) — hr	4 (2–7)	4 (2–7)
Coexisting illness — no. (%)		
Ischemic heart disease	205 (14.1)	205 (14.1)
Chronic heart failure	140 (9.6)	146 (10.0)
Active metastatic cancer	65 (4.5)	61 (4.2)
Long-term dialysis	19 (1.3)	28 (1.9)
Chronic obstructive pulmonary disease	277 (19.1)	286 (19.6)
Active hematologic cancer	82 (5.6)	86 (5.9)
Type of admission — no. (%)		
Medical	1248 (85.9)	1240 (85.1)
Elective surgery	18 (1.2)	21 (1.4)
Emergency surgery	187 (12.9)	196 (12.9)
Acute illness — no. (%)		
Pneumonia	838 (57.7)	836 (57.4)
Multiple trauma	24 (1.7)	29 (2.0)
Hemorrhagic or ischemic stroke	25 (1.7)	22 (1.5)





Outcome	usted Ratio % CI)	P Value
Primary outcome†		
Death by day 90 — no. no. (%)		
Adjusted for stratif variables‡		0.64
Adjusted for stratif and baseline va	.06 to 1.24)	0.50
Secondary outcomes¶		
Median percentage of alive without lif port (IQR)		0.10
Median percentage of alive after hosp charge (IQR)		0.67
Serious adverse event total no. (%)		0.24
Shock		
Myocardial ischem		
Ischemic stroke		
Intestinal ischemia		



Mechanical ventilation

- **JAMA . 2020 Feb 18;323(7):616-626.**
- **N Engl J Med . 2021 Feb 2. doi: 10.1056/NEJMoa2024922**

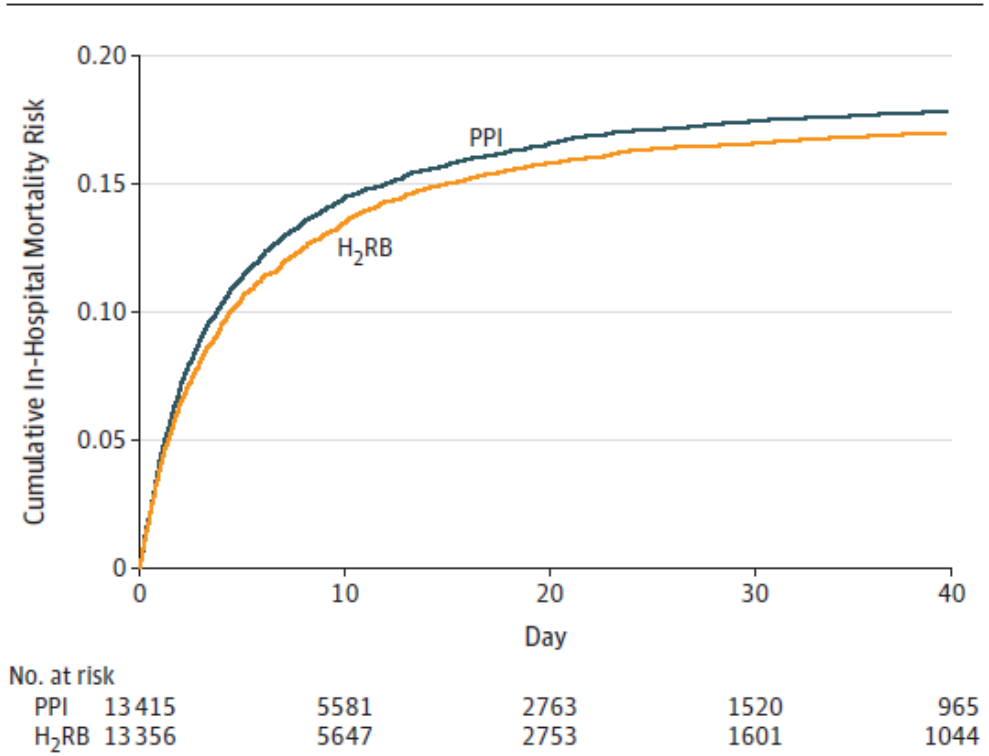
JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Stress Ulcer Prophylaxis With Proton Pump Inhibitors vs Histamine-2 Receptor Blockers on In-Hospital Mortality Among ICU Patients Receiving Invasive Mechanical Ventilation
The PEPTIC Randomized Clinical Trial

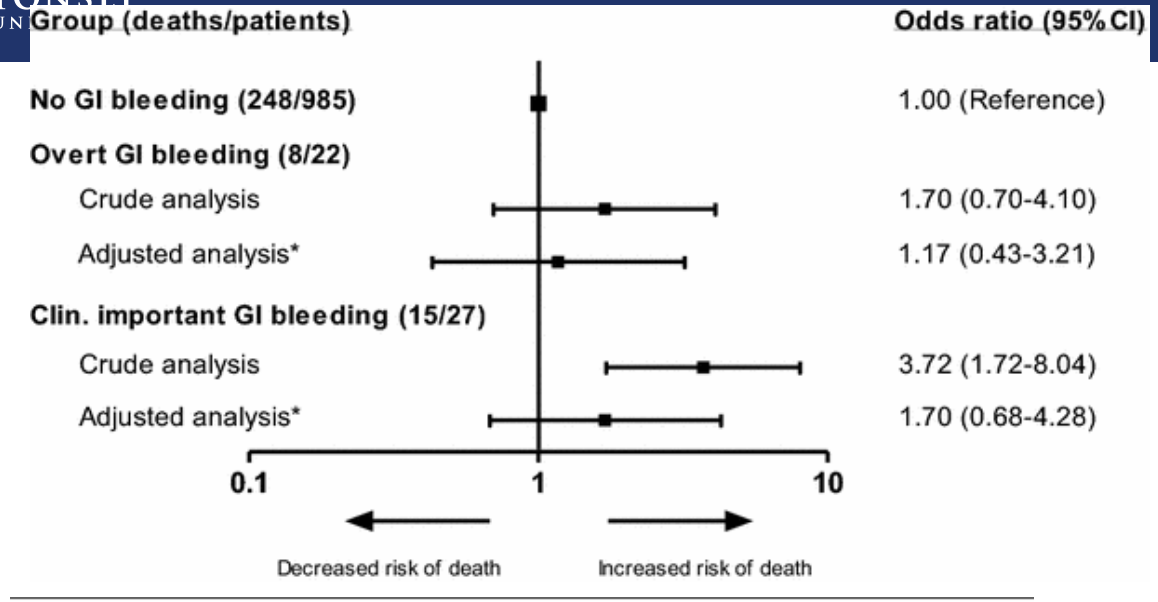
The PEPTIC Investigators for the Australian and New Zealand Intensive Care Society Clinical Trials Group, Alberta Health Services Critical Care Strategic Clinical Network, and the Irish Critical Care Trials Group

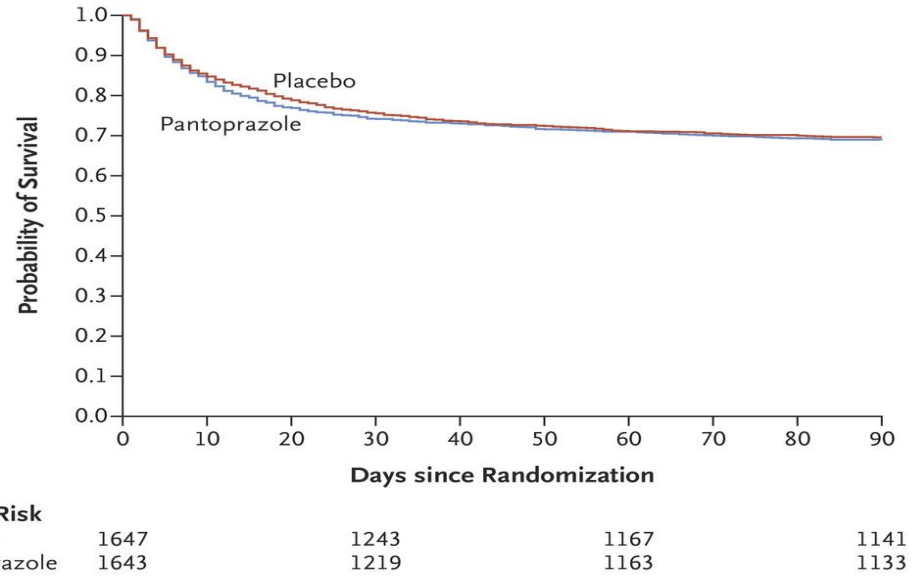
- Cluster crossover randomized clinical trial
- 26828 were analyzed
- 13415 patients randomized by site to PPIs
- 13356 randomized by site to H2RBs

	PPI	H2 blocker	P value
90 d mortality	2459/13415 (18.3)	2333/13356 (17.5)	0.054
UGI bleeding	172/13436 (1.3)	239/13392 (1.8)	0.009
CDI	40/13436 (0.30)	57/13392 (0.43)	0.13
Ventilator asso condition	143/2217 (6.5)	124/2148 (5.8)	0.28



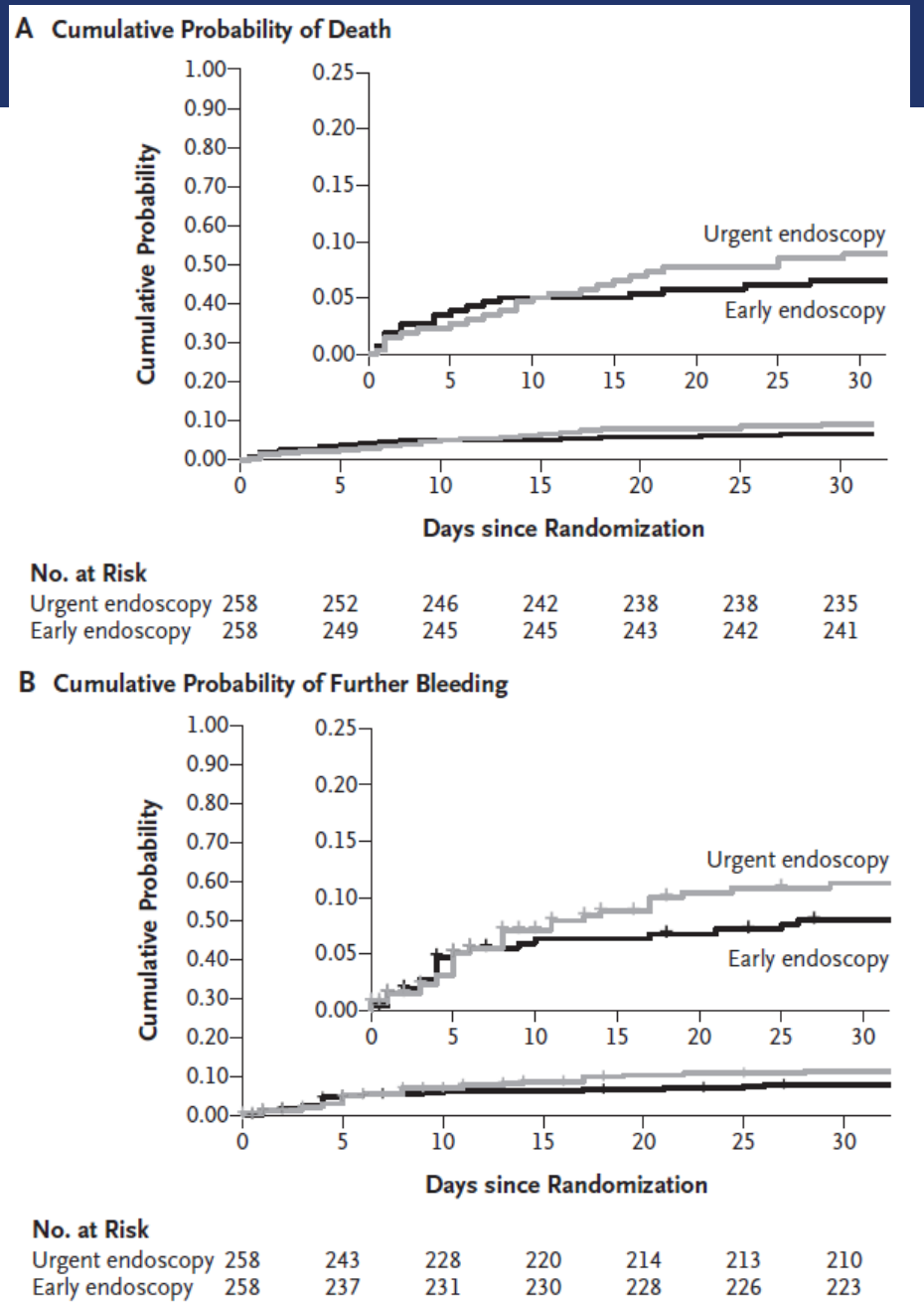
JAMA . 2020 Feb 18;323(7):616-626





Intensive Care Med . 2015 May;41(5):833-45

N Engl J Med . 2018 Dec 6;379(23):2199-2208.



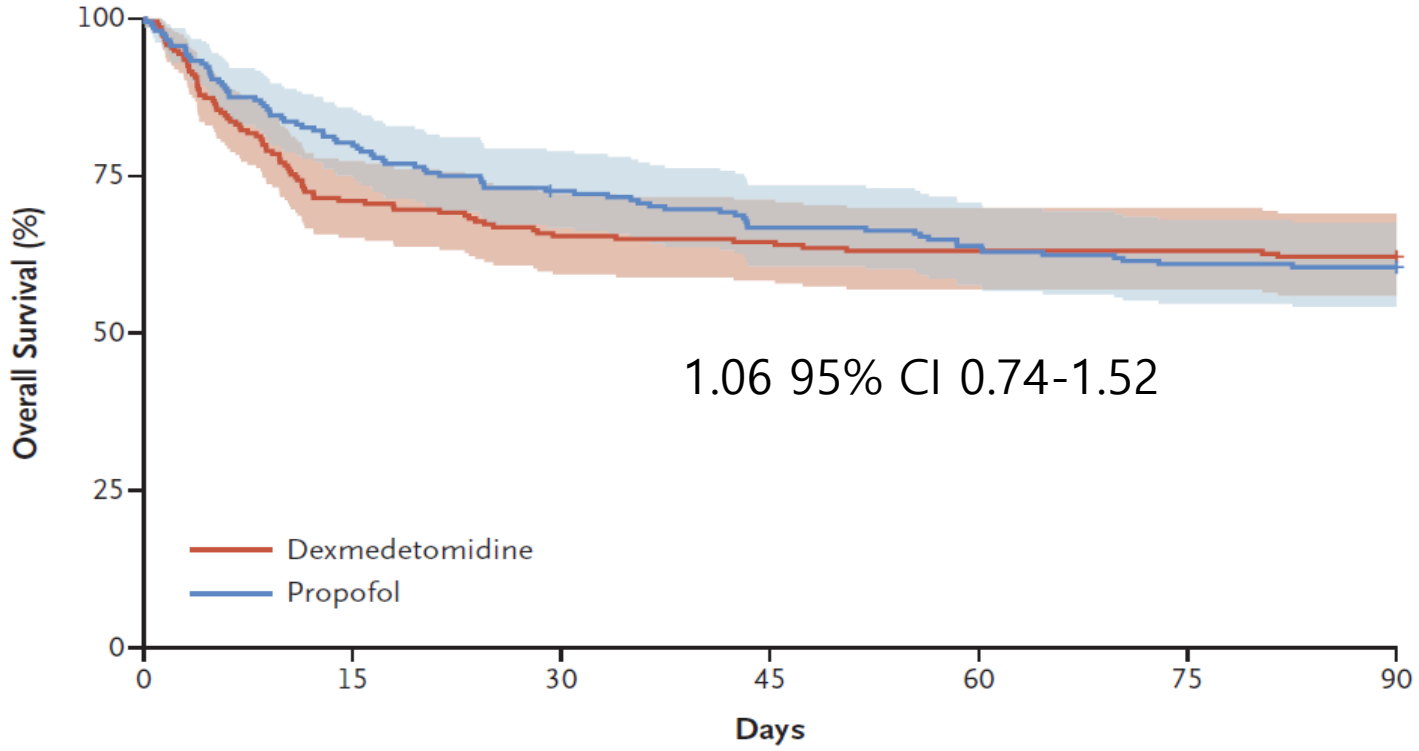
N Engl J Med . 2020 Apr 2;382(14):1299-1308.

ORIGINAL ARTICLE

Dexmedetomidine or Propofol for Sedation in Mechanically Ventilated Adults with Sepsis

C.G. Hughes, P.T. Mailloux, J.W. Devlin, J.T. Swan, R.D. Sanders, A. Anzueto, J.C. Jackson, A.S. Hoskins, B.T. Pun, O.M. Orun, R. Raman, J.L. Stollings, A.L. Kiehl, M.S. Duprey, L.N. Bui, H.R. O'Neal, Jr., A. Snyder, M.A. Gropper, K.K. Guntupalli, G.J. Stashenko, M.B. Patel, N.E. Brummel, T.D. Girard, R.S. Dittus, G.R. Bernard, E.W. Ely, and P.P. Pandharipande, for the MENDS2 Study Investigators*

	Dexmedetomidine N = 214	Propofol N = 208
Days alive without delirium or coma at 14 days		
Unadjusted no. of days — median (IQR)	8.0 (1.0–12.8)	7.5 (1.8–11.2)
Adjusted no. of days — median (95% CI)	10.7 (8.5–12.5)	10.8 (8.7–12.6)
Adjusted odds ratio (95% CI)	0.96 (0.74–1.26)	Reference
VFD at 28 days, Adjusted odds ratio (95% CI)	0.98 (0.63–1.51)	Reference
Death at 90 days, Adjusted odds ratio (95% CI)	1.06 (0.74–1.52)	Reference



No. at Risk (Cumulative No. of Deaths)							
Dexmedetomidine	214 (0)	152 (62)	140 (74)	138 (76)	135 (79)	135 (79)	133 (81)
Propofol	208 (0)	167 (41)	150 (57)	138 (69)	132 (75)	126 (81)	125 (82)

	Dexmedetomidine N = 214	Propofol N = 208
TICS-T score at 6 month		
Unadjusted score — median (IQR)	39 (28–48)	38 (30–46)
Adjusted score — median (95% CI)	40.9 (33.6–47.1)	41.4 (34.0–47.3)
Adjusted odds ratio (95% CI)	0.94 (0.66–1.33)	Reference

Sepsis

Fluid:

- Am J Respir Crit Care Med . 2019 Dec 15;200(12):1487-1495.
- Crit Care Med . 2021 Jan 1;49(1):79-90.

Vitamin

- Intensive Care Med. 2020 Aug 11 : 1–11.
- JAMA. 2020 Feb 4; 323(5): 423–431.
- JAMA . 2021 Feb 23;325(8):742-750.
- N Engl J Med. 2019 Dec 26; 381(26): 2529–2540.

Balanced Crystalloids versus Saline in Sepsis

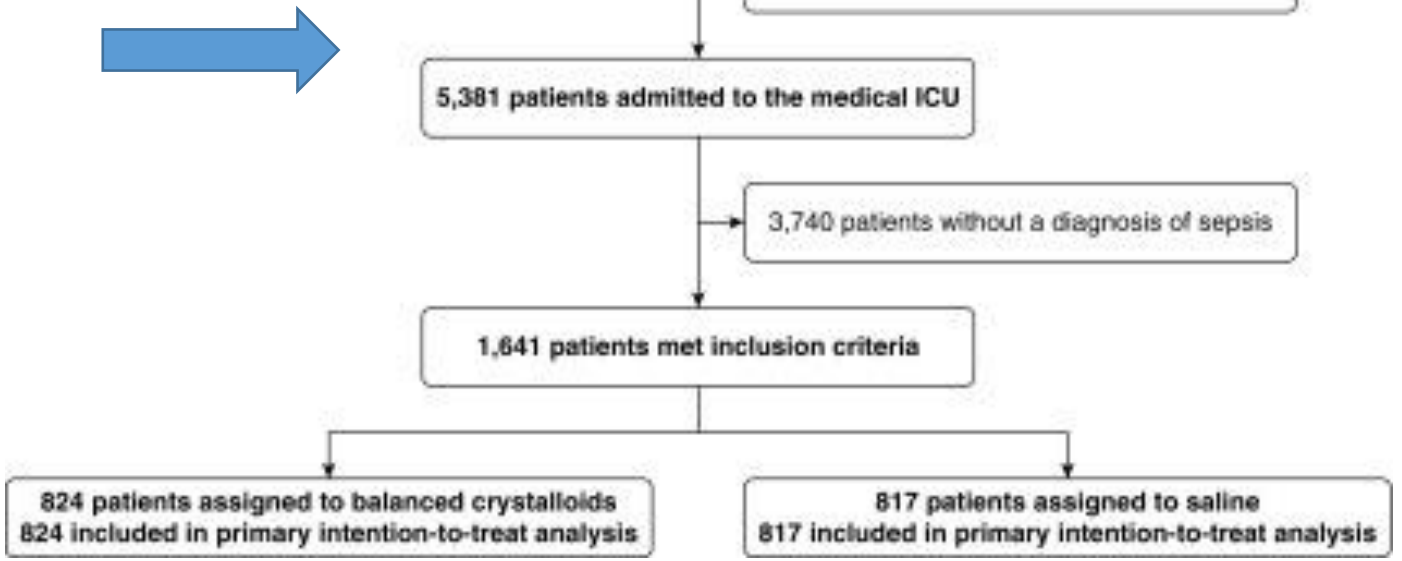
A Secondary Analysis of the SMART Clinical Trial

Ryan M. Brown[1], Li Wang[2], Taylor D. Coston[3], Nathan I. Krishnan[3], Jonathan D. Casey[1], Jonathan P. Wanderer[4,5], Jesse M. Ehrenfeld[4,5,6,7], Daniel W. Byrne[2], Joanna L. Stollings[8], Edward D. Siew[9], Gordon R. Bernard[1], Wesley H. Self[10], Todd W. Rice[1], and Matthew W. Semler[1]; for the SMART Investigators* and the Pragmatic Critical Care Research Group

ORIGINAL ARTICLE

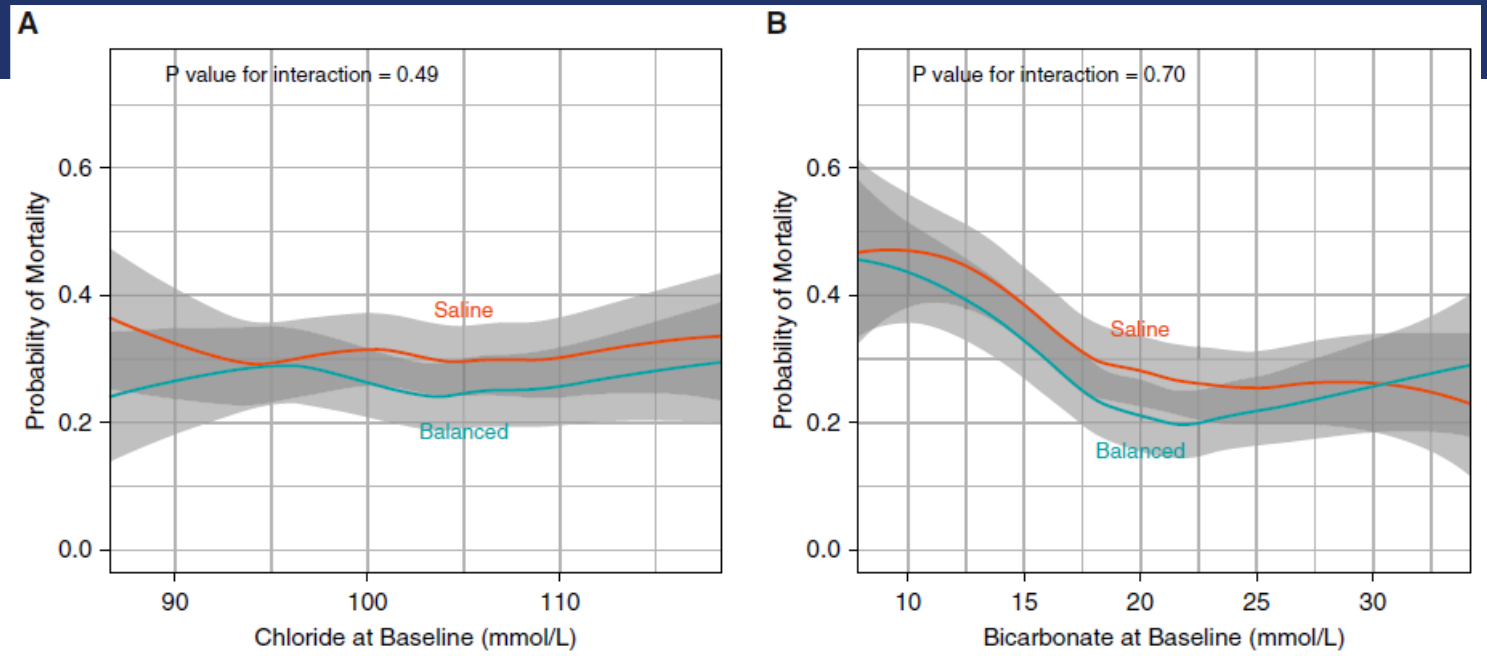
Balanced Crystalloids versus Saline in Critically Ill Adults

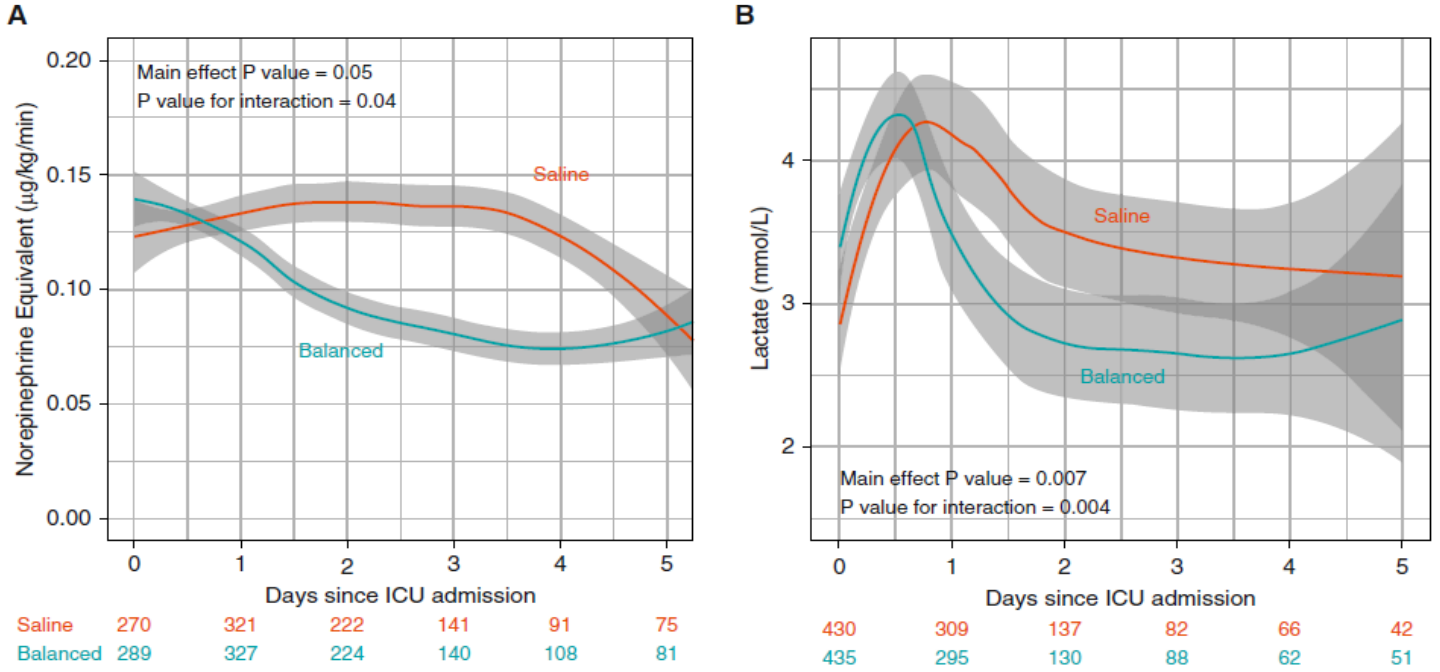
N Engl J Med . 2018 Mar 1;378(9):829-839.



Am J Respir Crit Care Med . 2019 Dec 15;200(12):1487-1495.

Outcome*	*n*	Balanced Crystalloids (*n* = *824*)	Saline (*n* = *817*)	Adjusted OR (95% CI)†
Primary outcome				
30-d in-hospital mortality, *n* (%)	1,641	217 (26.3)	255 (31.2)	0.74 (0.59 to 0.93)
Additional clinical outcomes				
60-d in-hospital mortality, *n* (%)	1,641	241 (29.2)	269 (32.9)	0.80 (0.64 to 1.01)
ICU-free days‡, median (IQR)	1,641	23 (0 to 26)	23 (0 to 26)	1.15 (0.97 to 1.38)
Mean ± SD	—	17 ± 11	16 ± 12	—
Ventilator-free days‡, median (IQR)	1,641	27 (0 to 28)	26 (0 to 28)	1.37 (1.12 to 1.68)
Mean ± SD	—	19 ± 12	18 ± 13	—
Vasopressor-free days‡, median (IQR)	1,641	27 (0 to 28)	27 (0 to 28)	1.25 (1.02 to 1.54)
Mean ± SD	—	20 ± 12	19 ± 13	—
Renal replacement therapy–free days‡, median (IQR)	1,641	28 (0 to 28)	28 (0 to 28)	1.35 (1.08 to 1.69)
Mean ± SD	—	20 ± 12	19 ± 13	—
Additional renal outcomes§				
Major adverse kidney event within 30 d, *n* (%)‖	1,641	292 (35.4)	328 (40.1)	0.78 (0.63 to 0.97)
Receipt of new renal replacement therapy, *n* (%)§	1,458	54 (7.4)	75 (10.3)	0.71 (0.48 to 1.04)
Final creatinine ⩾200% of baseline, *n* (%)	1,458	164 (22.4)	162 (22.3)	0.99 (0.76 to 1.28)
Stage II or greater AKI developing after ICU admission, *n* (%)¶	1,458	201 (27.4)	231 (31.9)	0.79 (0.63 to 1.00)
Creatinine**, mg/dl	1,458			
Highest before discharge or 30 d	—	1.58 (0.87 to 3.00)	1.59 (0.93 to 2.97)	0.95 (0.79 to 1.13)
Change from baseline to highest value	—	0.18 (−0.07 to 1.13)	0.23 (−0.07 to 1.20)	0.99 (0.82 to 1.18)
Final value before discharge or 30 d	—	0.94 (0.69 to 1.77)	0.95 (0.71 to 1.80)	0.97 (0.81 to 1.16)

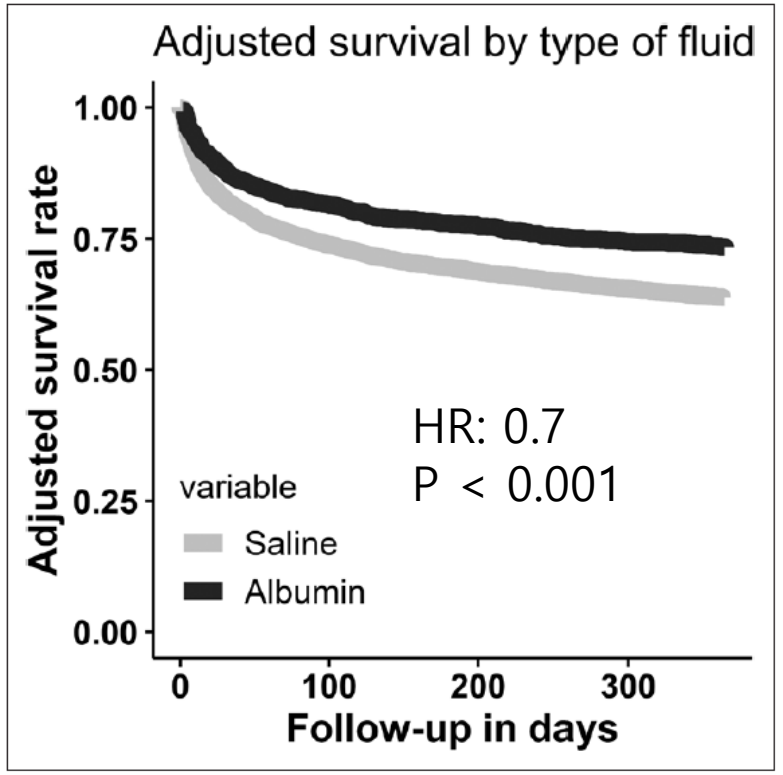

A
P value for interaction = 0.49
Probability of Mortality
0.0
0.2
0.4
0.6
Saline
Balanced
90
100
110
Chloride at Baseline (mmol/L)
B
P value for interaction = 0.70
Probability of Mortality
0.0
0.2
0.4
0.6
Saline
Balanced
10
15
20
25
30
Bicarbonate at Baseline (mmol/L)


A
Main effect P value = 0.05
P value for interaction = 0.04
Norepinephrine Equivalent (µg/kg/min)
0.00
0.05
0.10
0.15
0.20
Saline
Balanced
0
1
2
3
4
5
Days since ICU admission
Saline 270 321 222 141 91 75
Balanced 289 327 224 140 108 81
B
Lactate (mmol/L)
2
3
4
Saline
Balanced
Main effect P value = 0.007
P value for interaction = 0.004
0
1
2
3
4
5
Days since ICU admission
430 309 137 82 66 42
435 295 130 88 62 51

Effects of 5% Albumin Plus Saline Versus Saline Alone on Outcomes From Large-Volume Resuscitation in Critically Ill Patients

- Retrospective cohort study
- 13 ICU, 18629 critical ill patients requiring large-volume resuscitation (≥60ml/kg during 24 hr)
- 5% albumin + 0.9% saline (albumin group) vs. 0.9% saline (saline group)

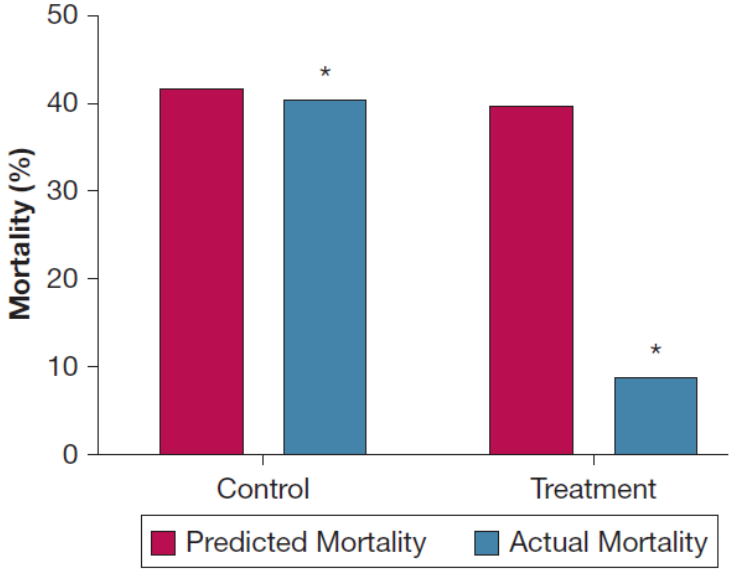
Cohort	Outcome	Pair (*n*)	Adjusted by	Conditional Odds	95% CI	*p*
HiDenIC-08	Mortality at 30 days	537	Unadjusted	0.6	0.4–0.8	< 0.001
			Total fluid intake[a]	0.54	0.4–0.7	< 0.001
	Severe AKI	461	Unadjusted	1.6	1.2–2.0	< 0.001
			Total fluid intake	1.4	1.1–1.9	0.01
HiDenIC-15	Mortality at 30 days	1,814	Unadjusted	0.6	0.5–0.7	< 0.001
			Total fluid intake	0.6	0.5–0.7	< 0.001
	Severe AKI	1,814	Unadjusted	1.7	1.5–2.0	< 0.001
			Total fluid intake	1.8	1.6–2.1	< 0.001

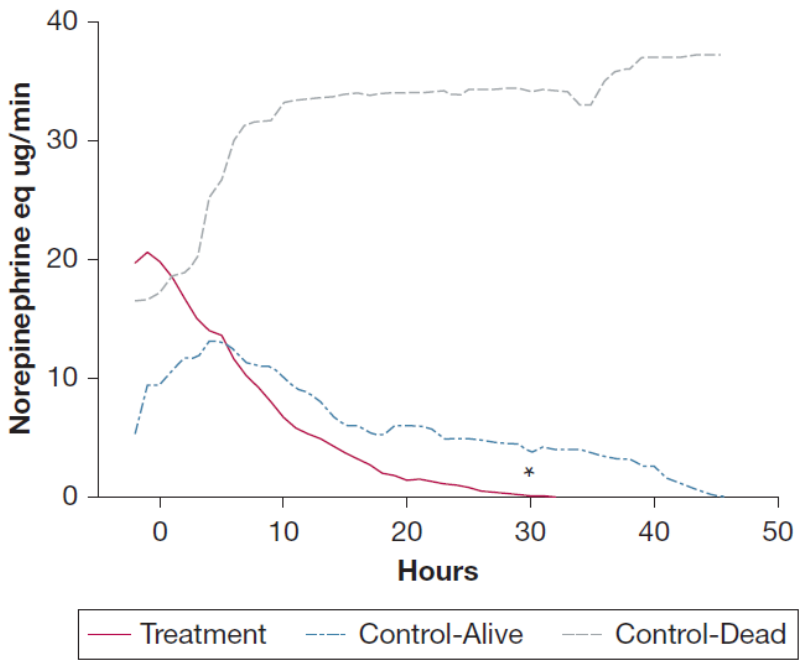


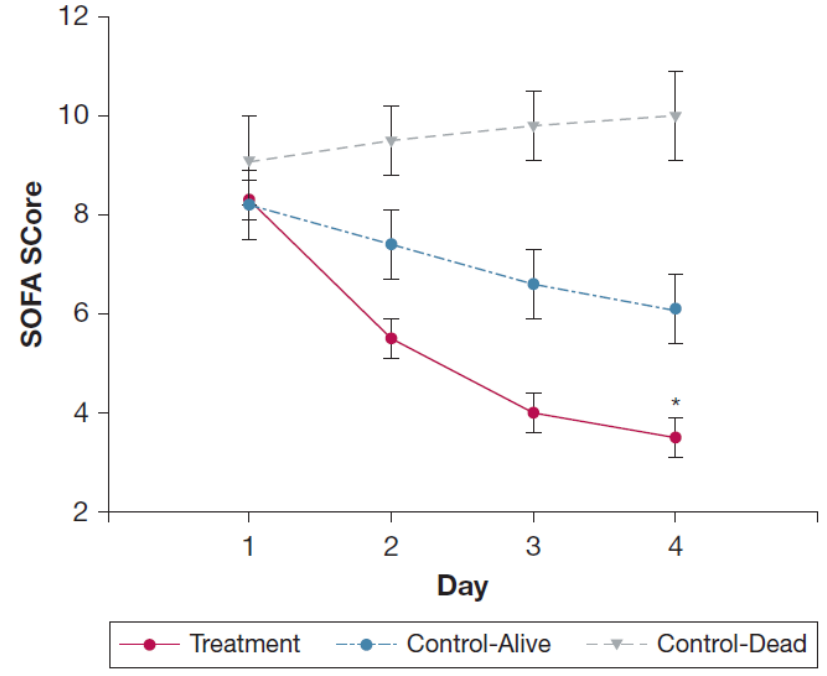
Crit Care Med . 2021 Jan 1;49(1):79-90.

[Original Research **Critical Care**]

CHEST







Paul E. Marik, MD, FCCP; Vikramjit Kh
and John Catravas, PhD, FCCP

CHEST 2017; 151(6):1229-1238

JAMA | Preliminary Communication | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Vitamin C, Hydrocortisone, and Thiamine vs Hydrocortisone Alone on Time Alive and Free of Vasopressor Support Among Patients With Septic Shock

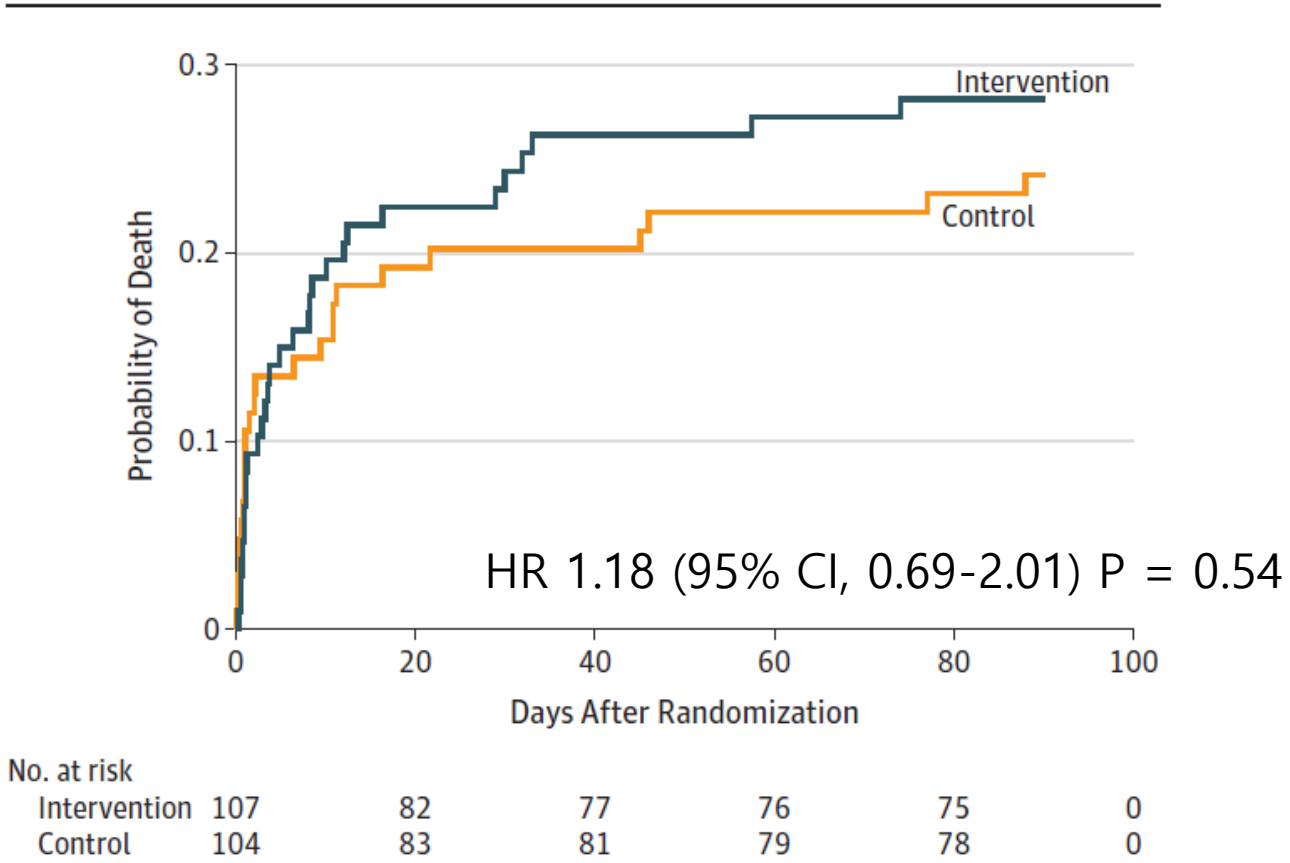
The VITAMINS Randomized Clinical Trial

Tomoko Fujii, MD, PhD; Nora Luethi, MD; Paul J. Young, MBChB, PhD; Daniel R. Frei, BSc, MBChB; Glenn M. Eastwood, PhD; Craig J. French, MB, BS; Adam M. Deane, MB, BS, PhD; Yahya Shehabi, MB, BS, PhD; Ludhmila A. Hajjar, MD, PhD; Gisele Oliveira, MD; Andrew A. Udy, MBChB, PhD; Neil Orford, MB, BS, PhD; Samantha J. Edney, BSN; Anna L. Hunt, BN, PGDipHSM, PGDipClinRes; Harriet L. Judd, BSN, PGDipHC; Laurent Bitker, MD; Luca Cioccari, MD; Thummaporn Naorungroj, MD; Fumitaka Yanase, MD; Samantha Bates, BN, PGDipCritCare; Forbes McGain, MB, BS, PhD; Elizabeth P. Hudson, MD; Wisam Al-Bassam, MBChB; Dhiraj Bhatia Dwivedi, BScNsg, MBA; Chloe Peppin, BN, PGDipCritCare; Phoebe McCracken, MPH; Judit Orosz, MD; Michael Bailey, PhD; Rinaldo Bellomo, MD, PhD; for the VITAMINS Trial Investigators

- Multi-center, open-label, randomized clinical trial
- A total of 216 septic shock
- Intervention group (n=107): IV vitamin C (1.5 g, q6), hydrocortisone (50mg, q6), thiamine (200mg q12)
- control group (n = 104): IV hydrocortisone (50mg q6)
- Until shock resolution or up to 10 days.

JAMA. 2020 Feb 4; 323(5): 423–431.

	Intervention (n = 107)	Control (n = 104)	P Value
Time alive and free of vasopressors, median (IQR), h	122.1 (76.3 to 145.4)	124.6 (82.1 to 147.0)	0.83
28 day mortality	24 (22.6)	21 (20.4)	0.69
ICU mortality	21 (19.6)	19 (18.3)	0.80
Change in SOFA score at day 3,median (IQR)	–2 (–4 to 0) [n = 82]	–1 (–3 to 0) [n = 75]	.02

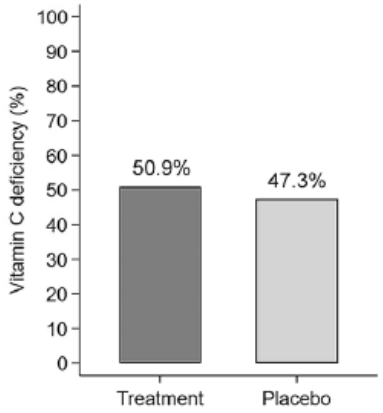


ORIGINAL

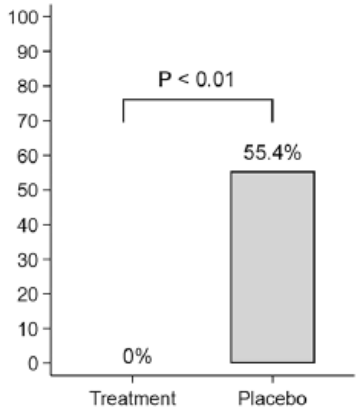
Combination therapy of vitamin C and thiamine for septic shock: a multi-centre, double-blinded randomized, controlled study

Sung Yeon Hwang[1], Seung Mok Ryoo[2], Jong Eun Park[1], You Hwan Jo[3,4], Dong-Hyun Jang[3,4], Gil Joon Suh[4], Taegyun Kim[4], Youn-Jung Kim[2], Seonwoo Kim[5], Hyun Cho[5], Ik Joon Jo[1], Sung Phil Chung[6], Sung-Hyuk Choi[7], Tae Gun Shin[1*], Won Young Kim[2*] and Korean Shock Society (KoSS)

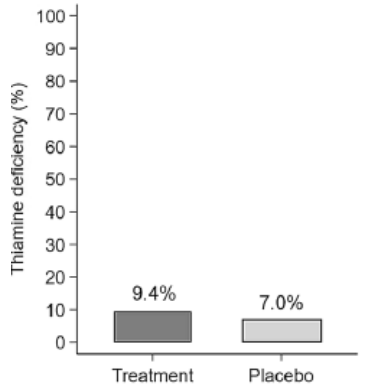
- Multi-center, double-blind, RCT in adult patients with septic shock
- A total of 111 patients (53 treatment group vs. 58 placebo group
- 53 treatment group (IV vitamin C 50mg/kg [max 3g bid], + thiamine 200mg q12 during 48 hr)



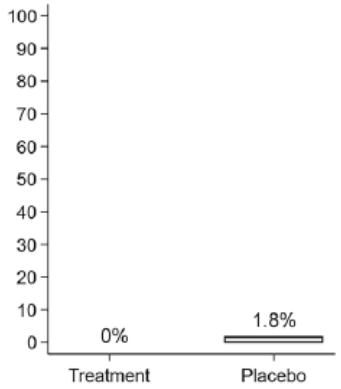
At enrolment



At 72 h from enrolment

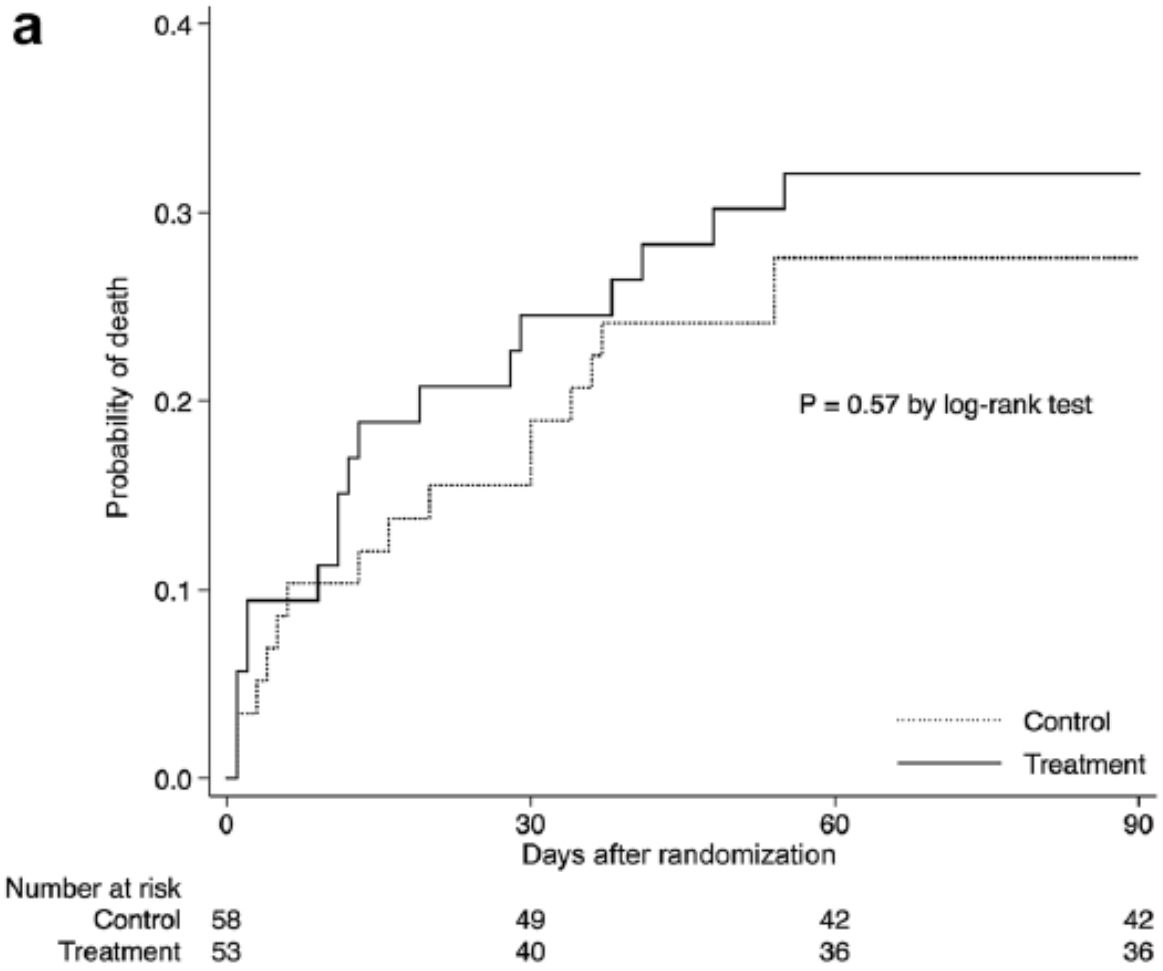


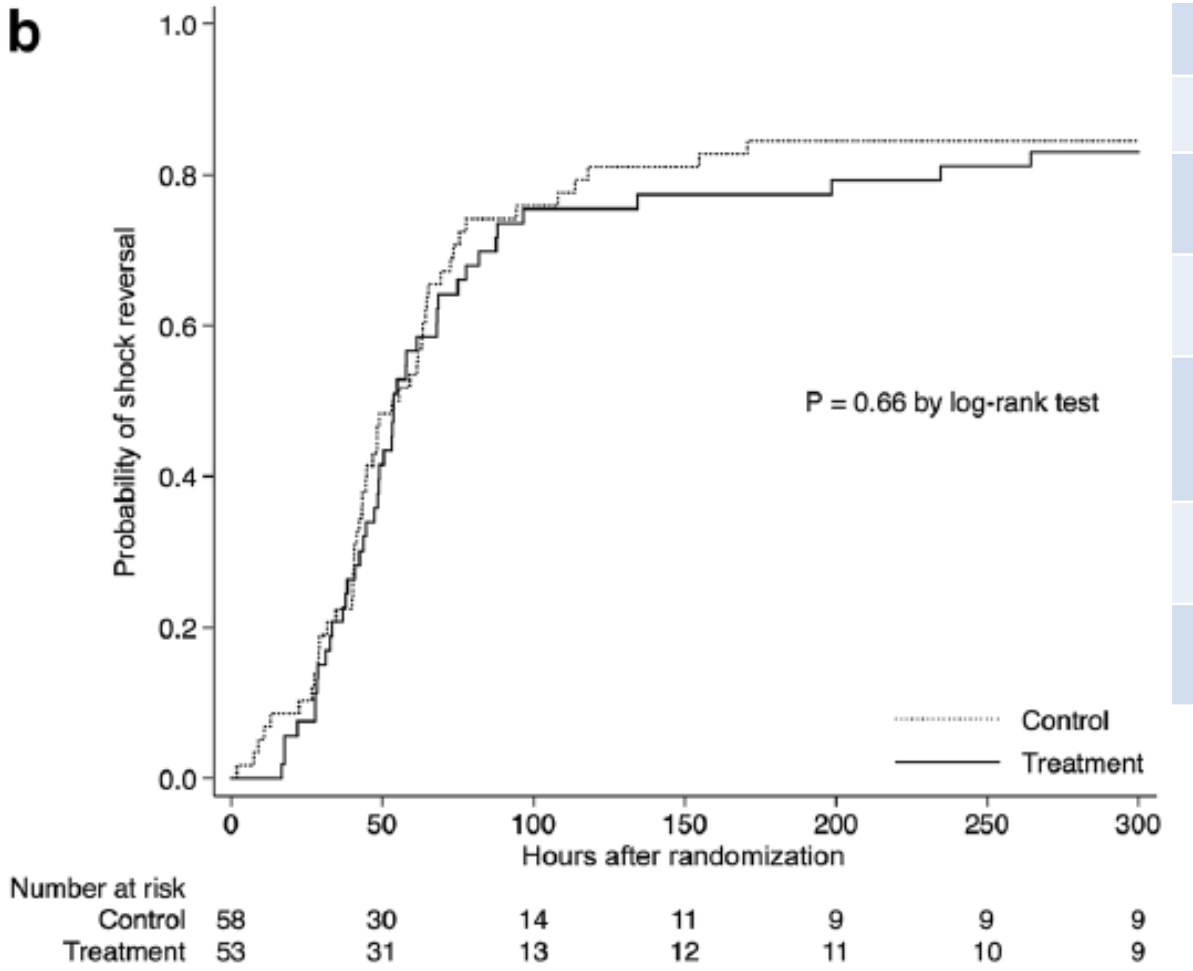
At enrolment



At 72 h from enrolment

	Treatment (n = 53)	Placebo (n = 58)	p value





JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Vitamin C, Thiamine, and Hydrocortisone on Ventilator- and Vasopressor-Free Days in Patients With Sepsis
The VICTAS Randomized Clinical Trial

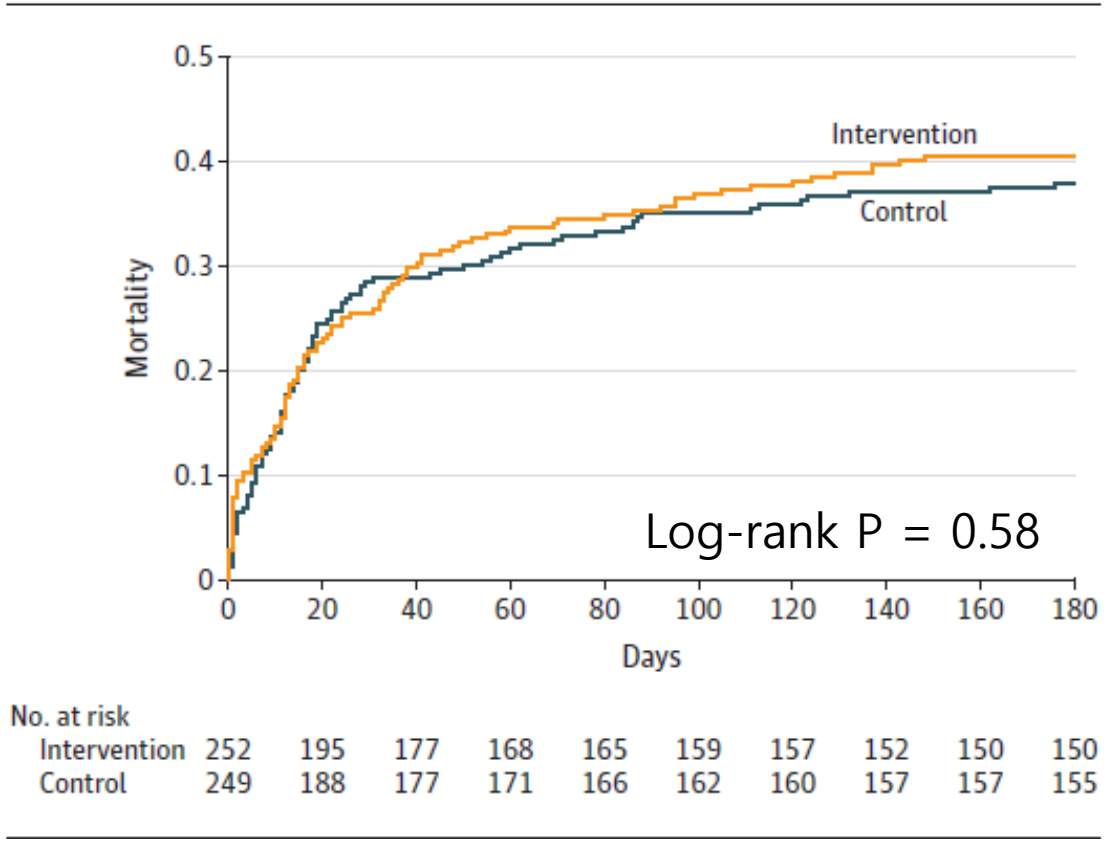
Jonathan E. Sevransky, MD, MHS; Richard E. Rothman, MD, PhD; David N. Hager, MD, PhD; Gordon R. Bernard, MD; Samuel M. Brown, MD; Timothy G. Buchman, PhD, MD; Laurence W. Busse, MD, MBA; Craig M. Coopersmith, MD; Christine DeWilde, PhD; E. Wesley Ely, MD, PhD; Lindsay M. Eyzaguirre, MS; Alpha A. Fowler, MD; David F. Gaieski, MD; Michelle N. Gong, MD; Alex Hall, DHSc, MS; Jeremiah S. Hinson, MD, PhD; Michael H. Hooper, MD; Gabor D. Kelen, MD; Akram Khan, MD; Mark A. Levine, MD; Roger J. Lewis, MD, PhD; Chris J. Lindsell, PhD; Jessica S. Marlin, CCRP; Anna McGlothlin, PhD; Brooks L. Moore, MD; Katherine L. Nugent, MD; Samuel Nwosu, MS; Carmen C. Polito, MD, MSc; Todd W. Rice, MD, MSc; Erin P. Ricketts, MSPH; Caroline C. Rudolph, MBA; Fred Sanfilippo, MD, PhD; Kert Viele, PhD; Greg S. Martin, MD, MSc; David W. Wright, MD; for the VICTAS Investigators

- Multicenter, randomized, double-blind, adaptive-sample-size, placebo-controlled trial
- sepsis-induced respiratory and/or cardiovascular dysfunction
- intervention group (n=252): IV vitamin C (1.5 g q6), hydrocortisone (50mg q6 hours), thiamine (100mg q6)
- control group (n = 249): placebo ± IV hydrocortisone (< 200mg)

JAMA . 2021 Feb 23;325(8):742-750.

	Intervention (n = 252)	Control (n = 249)	P Value
ICU mortality	52 (20.6)	49 (19.7)	0.79
Change in SOFA score, median (IQR)	5 (3-7)	5 (2-7)	0.1
RRT–free days, median (IQR)	30 (0-30)	30 (0-30) [n = 247]	0.58
Coma-/delirium-free days, median (IQR)	4 (2-5) [n = 237]	4 (2-5) [n = 241]	0.45
ventilator-vasopressor free days	25 days (0-29 days)	26 days (0-28)	0.085

Survival in the Intervention and Control Groups at 180 Days



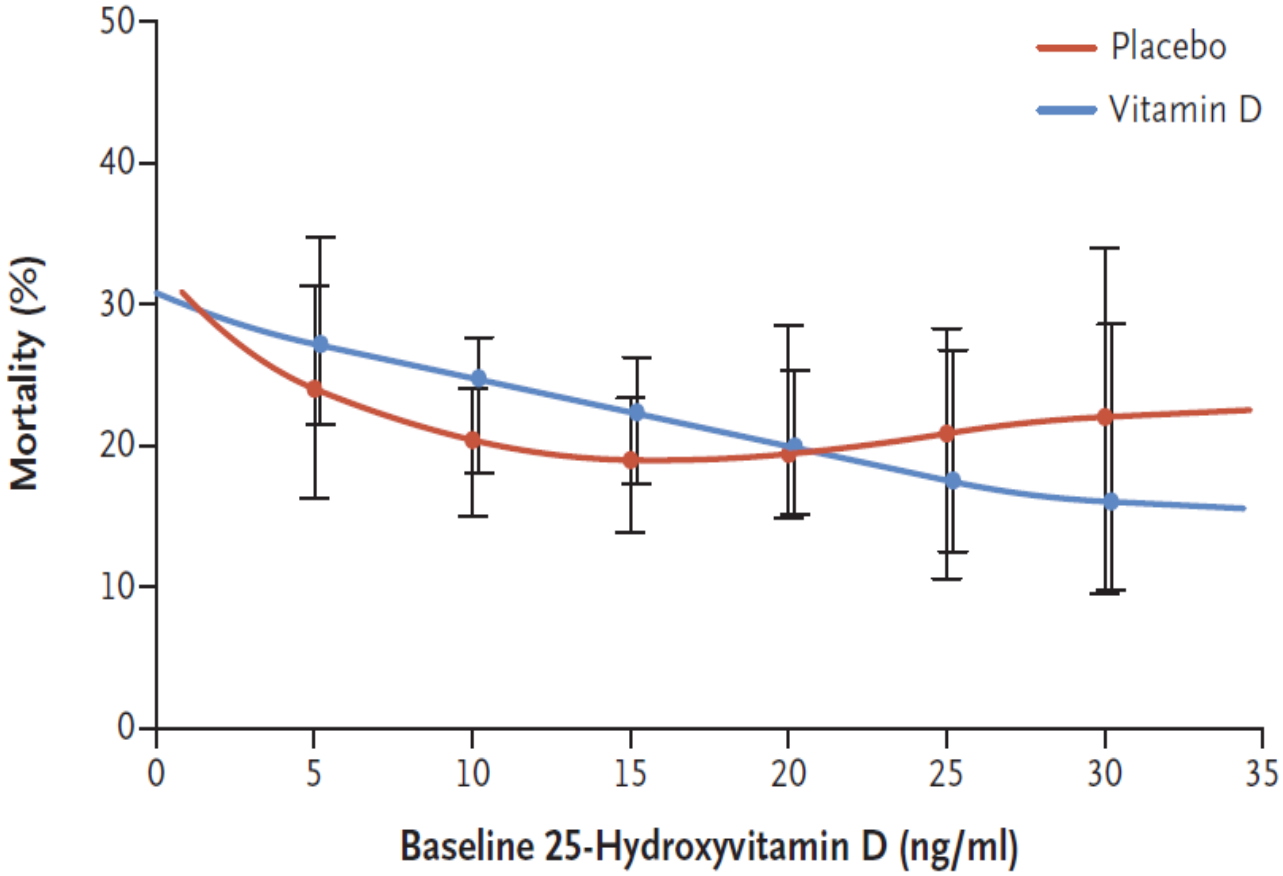
ORIGINAL ARTICLE

Early High-Dose Vitamin D, for Critically Ill, Vitamin D–I

The National Heart, Lung, and Bloc

- Multi-center, double-blind, randomized, placeb
- A total of 1360 vitamin D deficiency
- 531 vitamin D (single enteral dose of 540,000

	Vitamin D (N = 538)	Placebo (N = 540
90 day mortality	125 (23.5)	109 (20.6
28 day mortality	92 (17.3)	69 (13.1)
Mean ±SD VFD to day 28	21.3±11.3	22.1±10.5
New RRT to day 7 — no. (%)	20 (4.1)	18 (3.6)



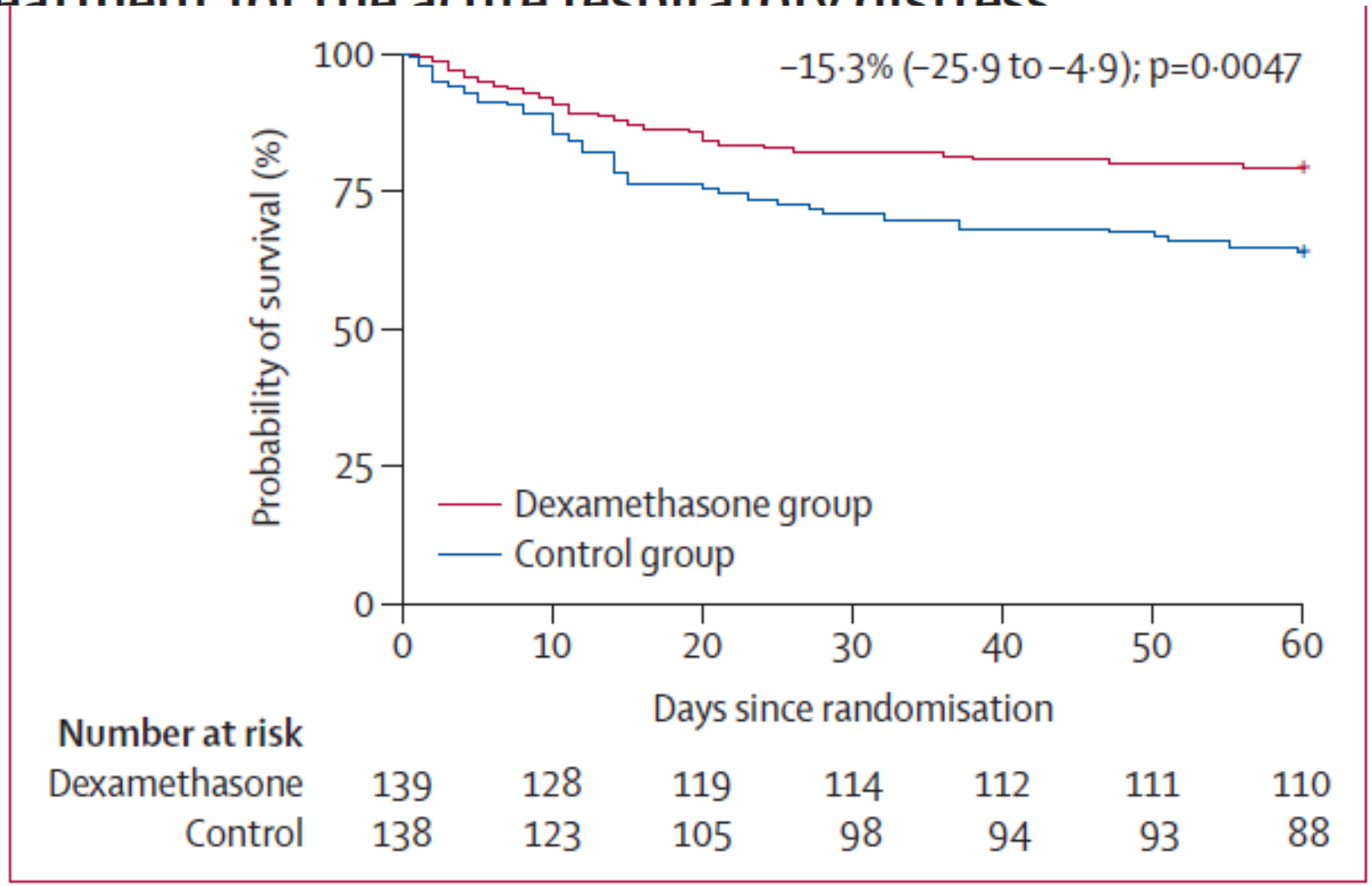
N Engl J Med. 2019 Dec 26; 381(26): 2529–2540

ARDS

- Lancet Respir Med 2020;8: 267–76
- Lancet Respir Med 2020; 8: 905–1
- Ann Am Thorac Soc . 2020 May;17(5):596-604.
- Respir Care . 2020 May;65(5):583-589
- JAMA . 2020 Jul 7;324(1):57-67.
- Intensive Care Med. 2020 Oct 6 : 1–10.
- Lancet Respir Med . 2019 Feb;7(2):163-172.

Dexamethasone treatment for the acute respiratory distress syndrome: a multi

Ventilator-free days at 28 days
All-cause mortality at day 60
ICU mortality
Hospital mortality
Actual duration of mechanical ventilation in ICU survivors, days
Actual duration of mechanical ventilation in survivors at day 60,
Hyperglycemia
New infections
Barotrauma



the dexamethasone group: 20 mg once daily from day 1 to day 5, → 10 mg once daily from day 6 to day 10 (no later than 30 h after moderate-to-severe ARDS onset)

Lancet Respir Med 2020;8: 267–76

SPECIAL ARTICLE

Driving Pressure and Survival in the Acute Respiratory Distress Syndrome

N Engl J Med . 2015 Feb 19;372(8):747-55.

ORIGINAL

Mechanical power of ventilation is associated with mortality in critically ill patients: an analysis of patients in two observational cohorts

Intensive Care Med . 2018 Nov;44(11):1914-1922.

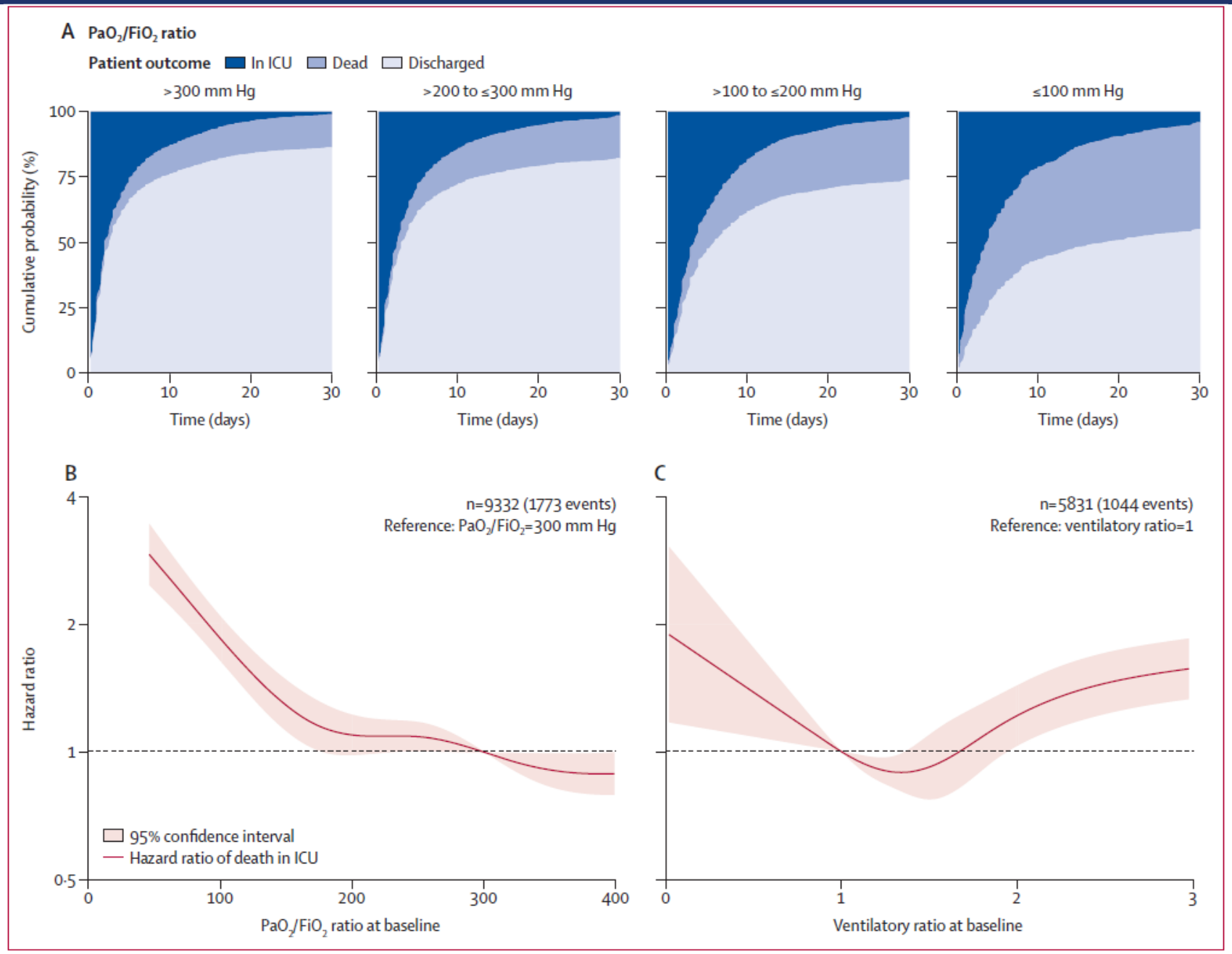
Time-varying intensity of mechanical ventilation and mortality in patients with acute respiratory failure: a registry-based, prospective cohort study

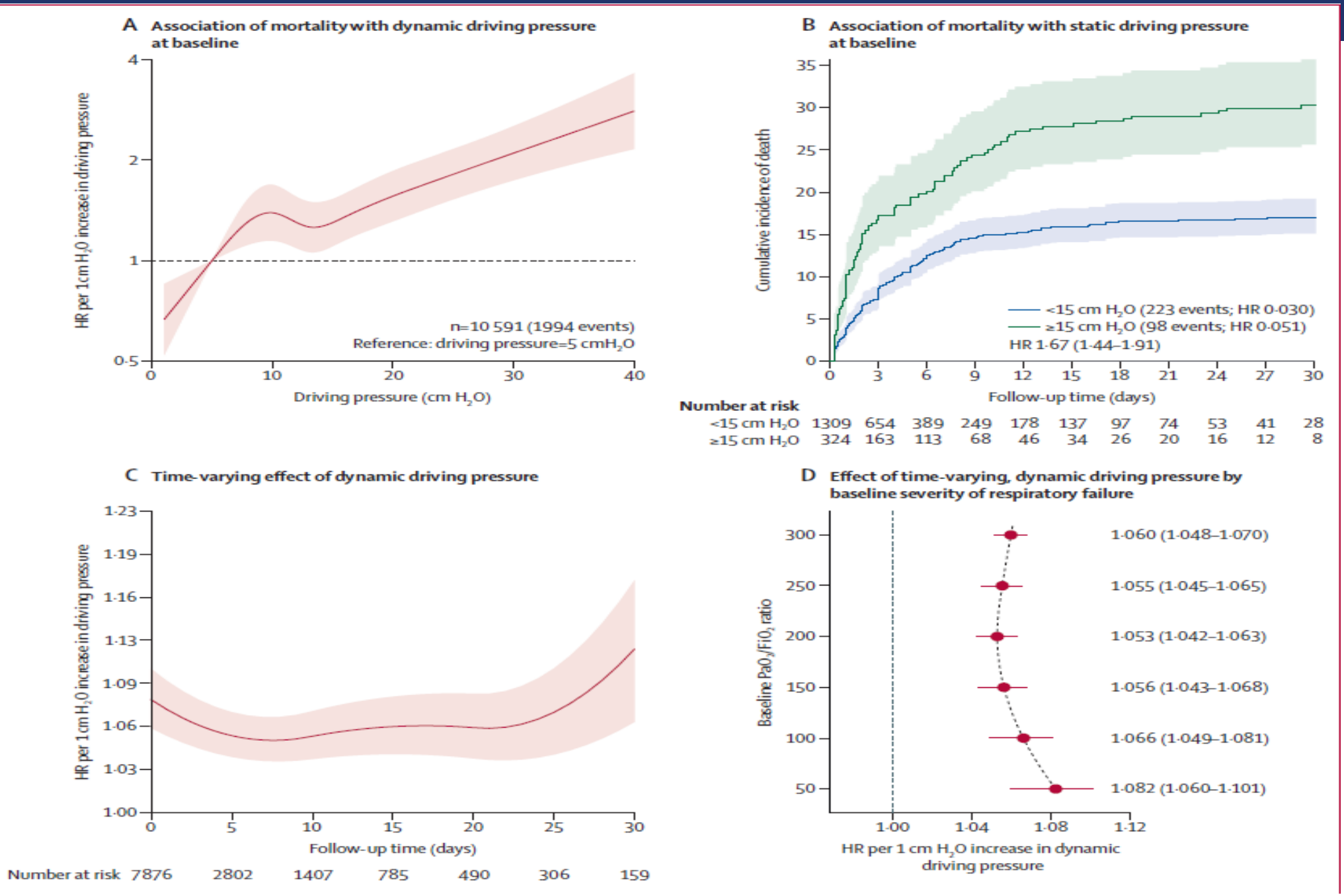
Martin Urner, Peter Jüni, Bettina Hansen, Marian S Wettstein, Niall D Ferguson, Eddy Fan

- **To estimate the association between exposure to different intensities of mechanical ventilation over time and intensive care unit (ICU) mortality in patients with acute respiratory failure (dynamic driving pressure or mechanical power)**
- Registry-based (Toronto Intensive Care Observational Registry), prospective cohort study,
- Patients receiving mechanical ventilation for 4 h or more in nine ICUs
- 13408 patients included in descriptive analysis → 7876 patients included in joint model analyses

Lancet Respir Med 2020; 8: 905–1

	All patients (n=13 408)	Stratification by PaO_2/FiO_2 ratio*			
		>300 mm Hg (n=3349)	>200 to ≤300 mm Hg (n=2753)	>100 to ≤200 mm Hg (n=2463)	≤100 mm Hg (n=767)
FiO_2 (%)	40 (35–50)	40 (30–41)	40 (37–50)	50 (50–70)	100 (80–100)
Set respiratory rate, min^{-1}	20 (18–24)	18 (16–22)	20 (18–24)	22 (18–26)	24 (20–30)
Measured respiratory rate, min^{-1}	20 (17–25)	19 (16–24)	20 (18–25)	22 (18–28)	25 (20–30)
Tidal volume per predicted bodyweight, mL/kg	6·9 (6·1–8·1)	6·9 (6·1–8·1)	6·9 (6·1–8·1)	6·9 (6·0–8·0)	6·7 (6·0–7·9)
Positive end-expiratory pressure, cm H_2O	5 (5–8)	5 (5–6)	5 (5–8)	8 (5–10)	10 (8–12)
Peak inspiratory pressure, cm H_2O	20 (15–25)	18 (15–22)	20 (16–25)	24 (19–29)	28 (23–33)
Static driving pressure, cm H_2O†	11 (8–14)	10 (8–12)	11 (8–14)	12 (9–15)	12 (8–15)
Dynamic driving pressure, cm H_2O	13 (9–17)	12 (9–16)	14 (10–17)	15 (11–19)	17 (13–22)
Static mechanical power, J/min†	17 (13–24)	15 (11–19)	17 (13–23)	21 (15–29)	27 (19–37)
Dynamic mechanical power, J/min	11 (8–16)	10 (7–13)	11 (8–16)	15 (10–20)	19 (13–25)
Gas exchange*					
Arterial pH	7·35 (7·29–7·41)	7·37 (7·32–7·42)	7·36 (7·30–7·41)	7·33 (7·26–7·40)	7·29 (7·18–7·37)
$PaCO_2$	40 (35–46)	38 (34–43)	40 (35–45)	42 (36–49)	46 (39–56)
PaO_2	104 (82–135)	136 (114–166)	104 (87–122)	82 (71–98)	67 (55–80)
SaO_2 or SpO_2	98 (96–99)	99 (98–100)	98 (96–99)	96 (94–98)	94 (90–96)


A
PaO2/FiO2 ratio
Patient outcome
In ICU
Dead
Discharged
>300 mm Hg
>200 to ≤300 mm Hg
>100 to ≤200 mm Hg
≤100 mm Hg
Cumulative probability (%)
100
75
50
25
0
0
10
20
30
Time (days)
B
n=9332 (1773 events)
Reference: PaO2/FiO2=300 mm Hg
Hazard ratio
4
2
1
0·5
95% confidence interval
Hazard ratio of death in ICU
0
100
200
300
400
PaO2/FiO2 ratio at baseline
C
n=5831 (1044 events)
Reference: ventilatory ratio=1
0
1
2
3
Ventilatory ratio at baseline


A Association of mortality with dynamic driving pressure at baseline
HR per 1 cm H2O increase in driving pressure
4
2
1
0·5
0
10
20
30
40
Driving pressure (cm H2O)
n=10 591 (1994 events)
Reference: driving pressure=5 cmH2O
B Association of mortality with static driving pressure at baseline
Cumulative incidence of death
35
30
25
20
15
10
5
0
0
3
6
9
12
15
18
21
24
27
30
Follow-up time (days)
<15 cm H2O (223 events; HR 0·030)
≥15 cm H2O (98 events; HR 0·051)
HR 1·67 (1·44–1·91)
Number at risk
<15 cm H2O 1309 654 389 249 178 137 97 74 53 41 28
≥15 cm H2O 324 163 113 68 46 34 26 20 16 12 8
C Time-varying effect of dynamic driving pressure
HR per 1 cm H2O increase in driving pressure
1·23
1·19
1·16
1·13
1·09
1·06
1·03
1·00
0
5
10
15
20
25
30
Follow-up time (days)
Number at risk 7876 2802 1407 785 490 306 159
D Effect of time-varying, dynamic driving pressure by baseline severity of respiratory failure
Baseline PaO2/FiO2 ratio
300
250
200
150
100
50
1·060 (1·048–1·070)
1·055 (1·045–1·065)
1·053 (1·042–1·063)
1·056 (1·043–1·068)
1·066 (1·049–1·081)
1·082 (1·060–1·101)
1·00
1·04
1·08
1·12
HR per 1 cm H2O increase in dynamic driving pressure

	Exposure to high driving pressure		Exposure to high mechanical power	
	HR estimate (95% CrI)	p value	HR estimate (95% CrI)	p value
Baseline variables				
PaO_2/FiO_2, mm Hg	0·945 (0·896–0·994)	0·026	0·977 (0·930–1·031)	0·38
Age, years	1·108 (1·048–1·160)	<0·0001	1·128 (1·080–1·182)	<0·0001
APACHE III score	1·602 (1·526–1·680)	<0·0001	1·591 (1·524–1·669)	<0·0001
APACHE pH	0·832 (0·809–0·859)	<0·0001	0·840 (0·820–0·864)	<0·0001
Time-varying variables				
Days with driving pressure ≥15 cm H_2O	1·049 (1·023–1·076)	<0·0001	..	..
Days with mechanical power ≥17 J/min	..	..	1·069 (1·047–1·092)	<0·0001

1622 (20·6%) of 7876 patients died; 64 281 daily observations were recorded. HRs were the adjusted HRs associated with a 1-SD increment in the given variable. Values higher than 1 indicate increased mortality. The values used for SDs were as follows: PaO_2/FiO_2 ratio 119; pH 0·11; age 17 years; and APACHE III score 29. The effects of the number of days with either driving pressure greater than or equal to 15 cm H_2O or mechanical power greater than or equal to 17 J/min were estimated using Quasi-Poisson models in the joint model analyses. HR=hazard ratio. CrI=credible interval. PaO_2=partial pressure of oxygen. FiO_2=fraction of inspired oxygen. APACHE=Acute Physiology and Chronic Health Evaluation.

ORIGINAL RESEARCH

Driving Pressure–limited Strategy for Patients with Acute Respiratory Distress Syndrome

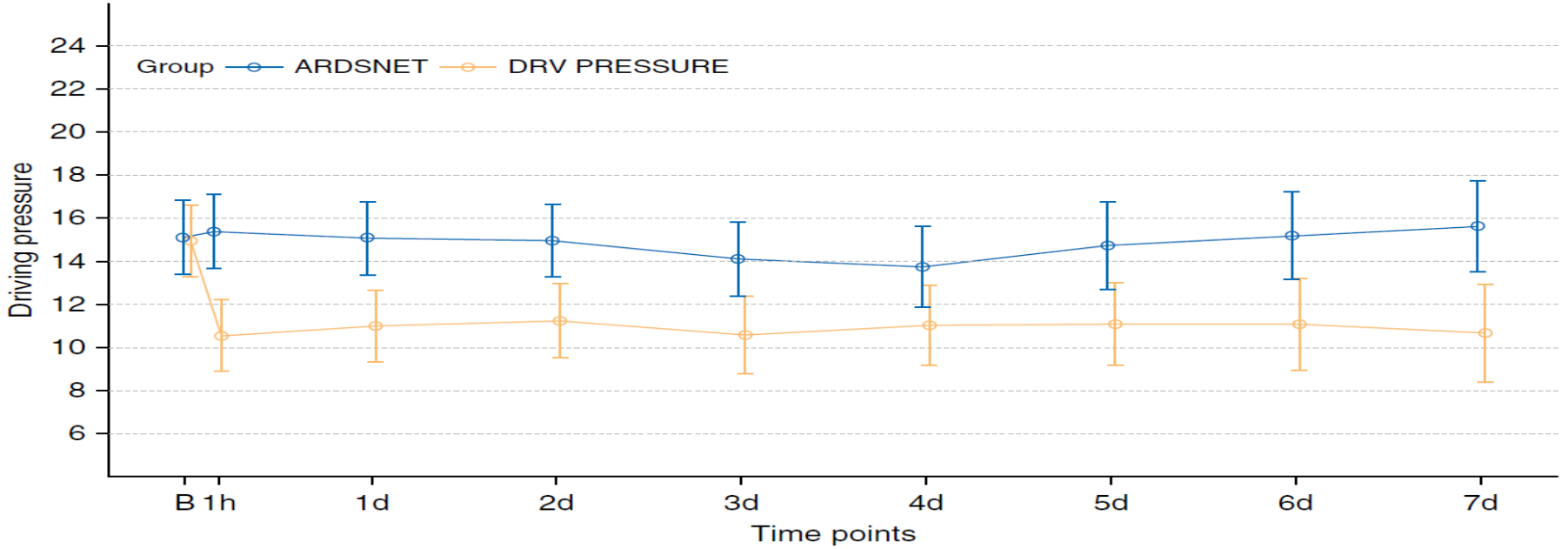
A Pilot Randomized Clinical Trial

Marcelo Luz Pereira Romano[1,2], Israel Silva Maia[3], Ligia Nasi Laranjeira[1], Lucas Petri Damiani[1], Denise de Moraes Paisani[1], Marcos de Carvalho Borges[4], Bruno Guimarães Dantas[4], Eliana Bernadete Caser[5], Josué Almeida Victorino[6], Wilson de Oliveira Filho[7], Marcelo Britto Passos Amato[8], and Alexandre Biasi Cavalcanti[1,2]

- **To evaluate the feasibility of testing a driving pressure–limited strategy in comparison with a conventional lung protective ventilation strategy in patients with ARDS and a baseline driving pressure of ≥13 cm H2O.**
- Randomized, controlled, non-blinded trial
- 31 patients with ARDS, driving pressure ≥13 cmH2O
- Ventilation parameter -> PEEP 10, FiO2 100% for 30min: PaO2/FiO2 ≤300, driving pressure ≥ 13
- Tidal volume titrated to 4–8 ml/kg of predicted body weight (PBW)
- Driving pressure limited (n=16): initial driving pr. 10 cmH2O→ if TV <4ml → driving pr >10cmH20
- Control (n=15): TV 6ml/kg, plateau pre ≤30 cmH2O → plateau pr > 30cmH20 → TV 5-4 ml/kg

Ann Am Thorac Soc . 2020 May;17(5):596-604

	Driving Pressure (n=16)	Conventional (n=15)	Total (N= 31)
Age, mean (SD)	45.1 (18.4)	51.9 (14.9)	48.4 (16.9)
SAPS3 score, mean (SD)	53.5 (12.0)	58.5 (12.9)	55.9 (12.5)
Septic shock, n (%)	9 (56.2)	6 (40)	15 (48.4)
PaO2/FIO2, mean (SD)	218.5 (121.8)	210.6 (57.1)	214.7 (94.6)
Plateau pressure, mean (SD)	24.2 (3.0)	25 (3.0)	24.6 (3.0)
PEEP, mean (SD)	9.3 (1.9)	9.9 (2.2)	9.6 (2.0)
Driving pressure, mean (SD)	14.9 (2.7)	15.1 (2.5)	15 (2.6)
Tidal volume, mean (SD)	5.9 (0.4)	5.7 (0.6)	5.8 (0.5)



	Driving Pressure (n=16)	Conventional (n=15)	Total (N= 31)
28 day mortality	7 (43.8)	5 (33.3)	0.72
In hospital mortality	7 (43.8)	8 (53.3)	0.72
Barotrauma in the first 7 d	1 (6.2)	0 (0)	>0.99
Severe acidosis within 1hr (pH,7.1)	2 (12.5)	0 (0)	0.49
Severe acidosis within 7 d (pH,7.1)	3 (18.8)	1 (6.7)	0.60
Reintubation in 28 d	3/11 (27.3)	1/7 (14.3)	>0.99
LOS in ICU	11.4 (7.8–18)	15.3 (7.7–29.3)	0.45
LOS of Hospital	19.3 (10.9–29.2)	21.4 (12.3–37.2)	0.55
VF 28d	9.5 (5.2–11.5)	11 (6–27)	0.28

PEEP Titration to Minimize Driving Pressure in Subjects With ARDS: A Prospective Physiological Study

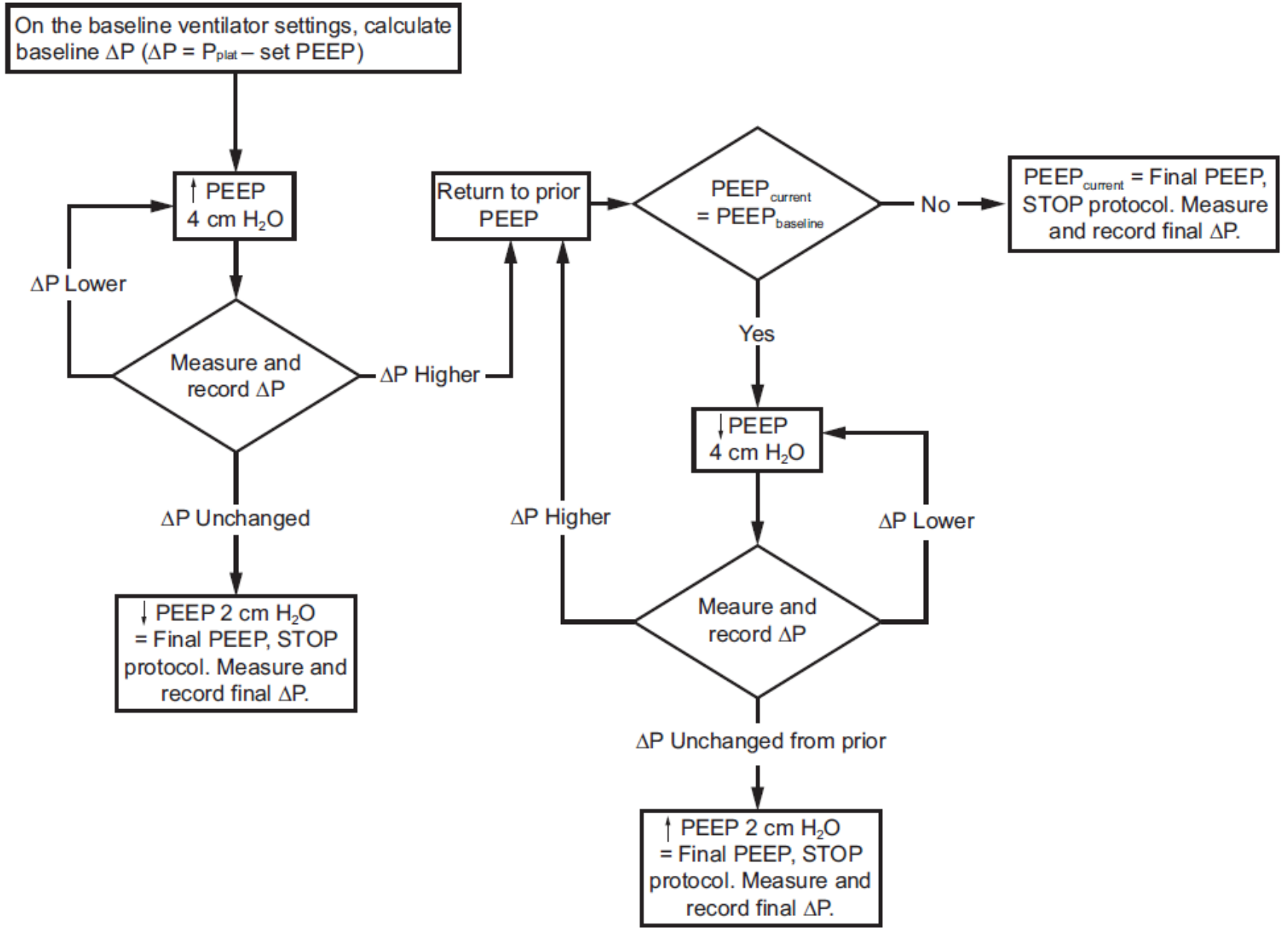
Sarina K Sahetya, David N Hager, R Scott Stephens, Dale M Needham, and Roy G Brower

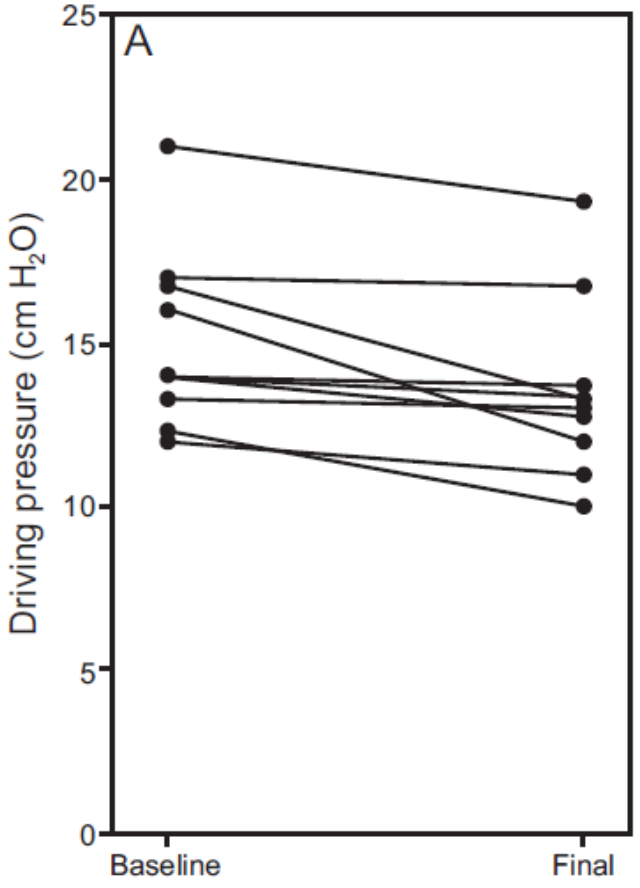
- **The primary objective of this study was to characterize reductions in driving pressure that could be achieved through changes in PEEP**
- **Prospective physiological pilot study**
- 10 subjects with ARDS were placed on PEEP according to the ARDS Network Lower PEEP/FIO2 Table.

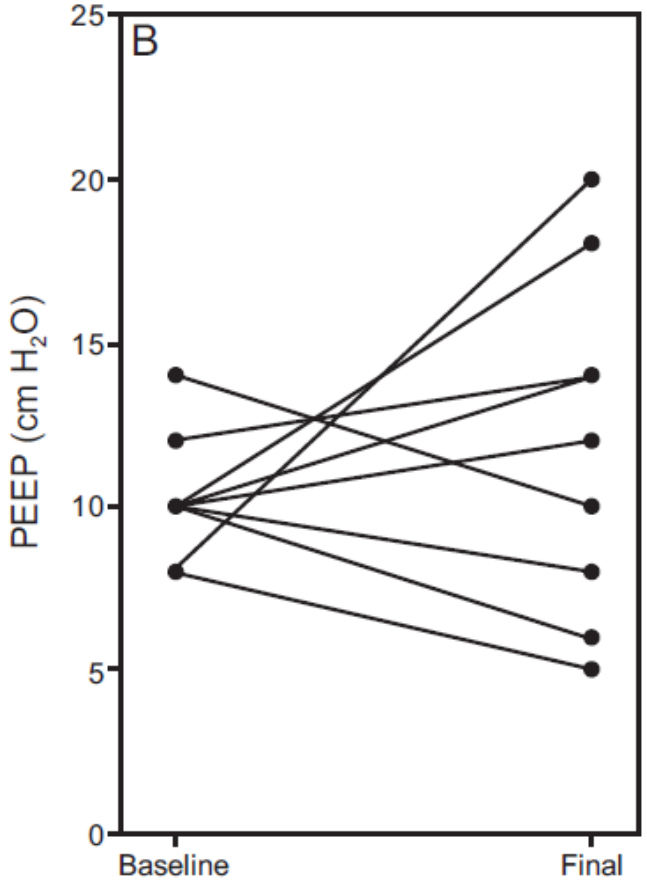
Age	45 (27–54)
Male, n (%)	6 (60)
Body mass index, kg/m2	38 (29–40)
Pneumonia	8 (80)
APACHE II	33 (31–37)
PaO2/FIO2	116 (98–132)

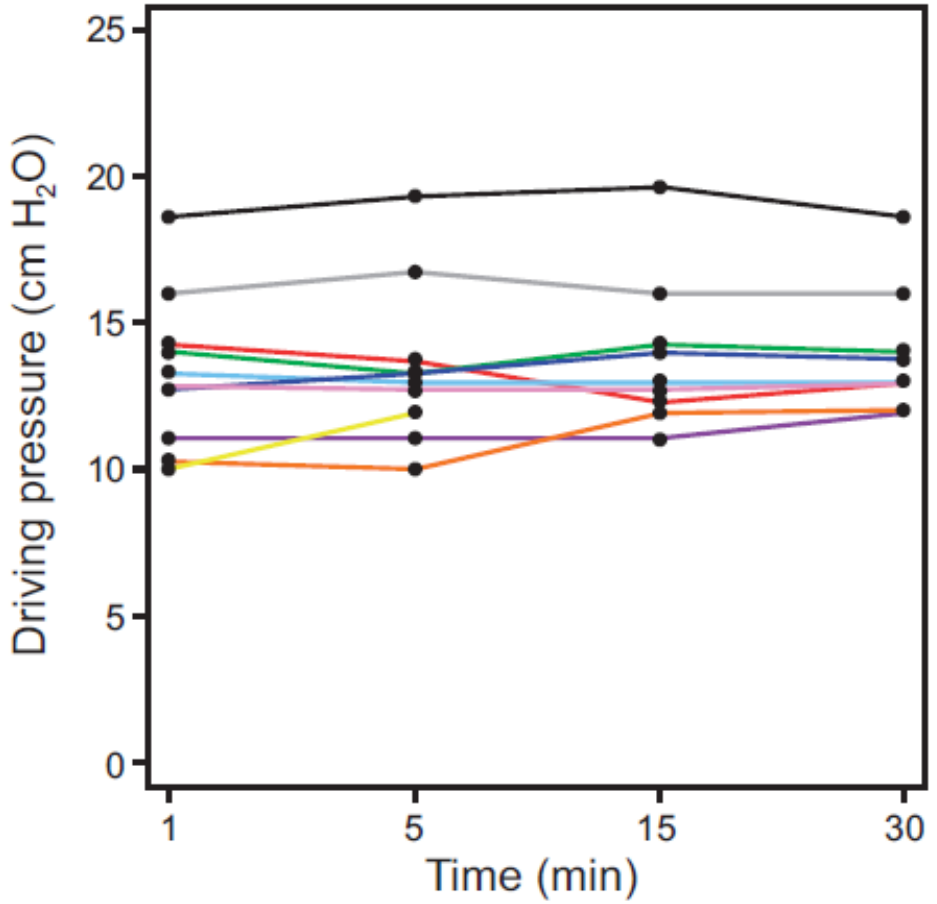
Tidal volume, mL/kg PBW	5.8 (5.0–6.0)
PEEP, cm H2O	10 (10–10)
Plateau pressure, cm H2O	24 (24–27)
Driving pressure, cm H2O	14 (13–17)
NM blockade, n (%)	2 (20)
PaO2/FIO2	116 (98–132)
Duration of MV	2 (0–3)
PEEP, cm H2O	10 (10–10)
Mortality, n (%)	1 (10)

Respir Care . 2020 May;65(5):583-589


On the baseline ventilator settings, calculate baseline ΔP (ΔP = Pplat – set PEEP)
↑ PEEP 4 cm H2O
ΔP Lower
Measure and record ΔP
ΔP Higher
ΔP Unchanged
↓ PEEP 2 cm H2O = Final PEEP, STOP protocol. Measure and record final ΔP.
Return to prior PEEP
PEEPcurrent = PEEPbaseline
No
PEEPcurrent = Final PEEP, STOP protocol. Measure and record final ΔP.
Yes
↓ PEEP 4 cm H2O
ΔP Higher
ΔP Lower
Meaure and record ΔP
ΔP Unchanged from prior
↑ PEEP 2 cm H2O = Final PEEP, STOP protocol. Measure and record final ΔP.


A
25
20
15
10
5
0
Driving pressure (cm H_2O)
Baseline
Final


B
25
20
15
10
5
0
PEEP (cm H_2O)
Baseline
Final


25
20
15
10
5
0
Driving pressure (cm H_2O)
1
5
15
30
Time (min)

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Association of Noninvasive Oxygenation Strategies With All-Cause Mortality in Adults With Acute Hypoxemic Respiratory Failure

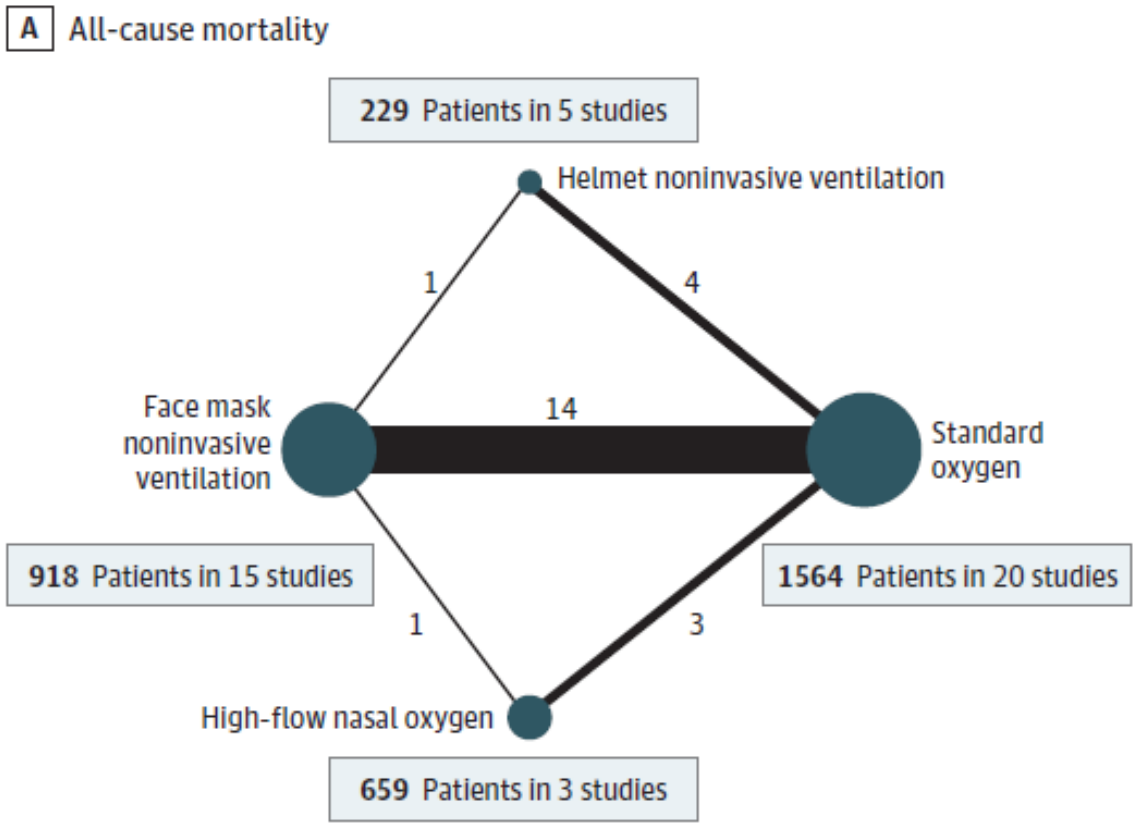
A Systematic Review and Meta-analysis

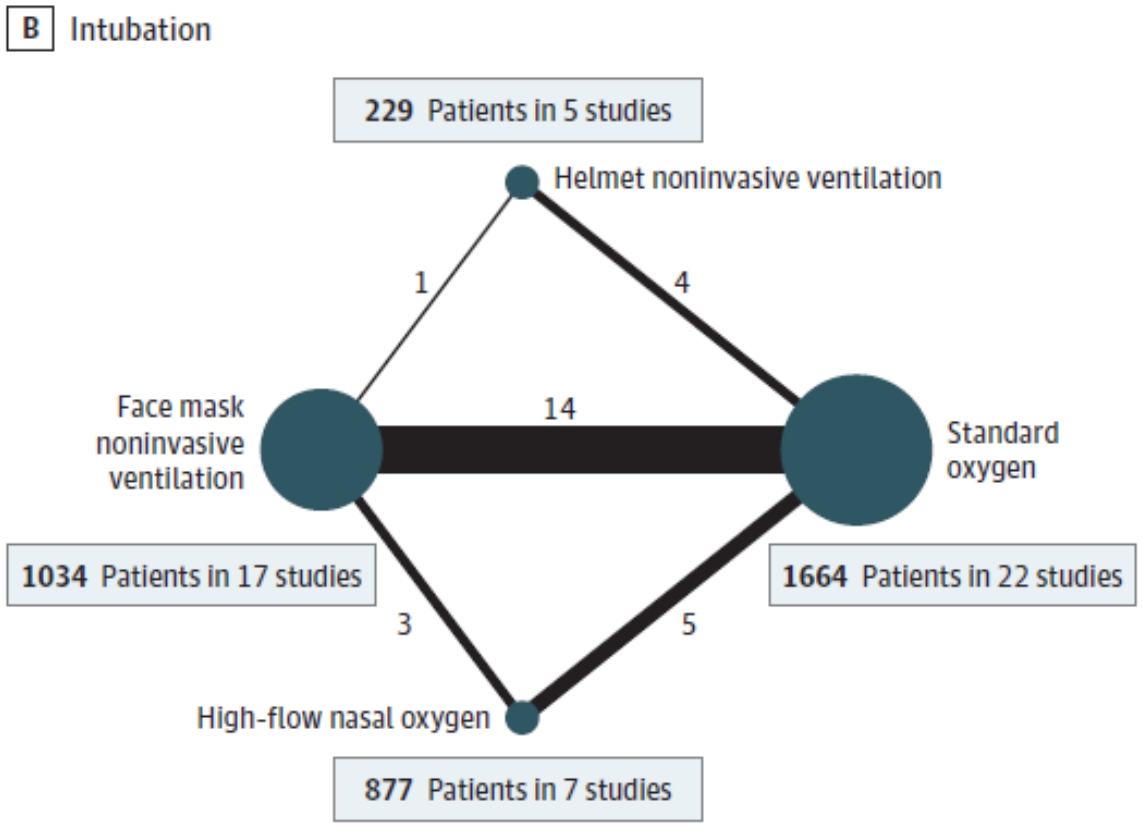
Bruno L. Ferreyro, MD; Federico Angriman, MD, MPH; Laveena Munshi, MD, MSc; Lorenzo Del Sorbo, MD; Niall D. Ferguson, MD, MSc; Bram Rochwerg, MD, MSc; Michelle J. Ryu, MLIS; Refik Saskin, MSc; Hannah Wunsch, MD, MSc; Bruno R. da Costa, MSc, PhD; Damon C. Scales, MD, PhD

- To compare the association of noninvasive oxygenation strategies with mortality and endotracheal intubation in adults with acute hypoxemic respiratory failure.
- Until April 2020:MEDLINE, Embase, PubMed, Cochrane Central Register of Controlled Trials, CINAHL,Web of Science, and LILACS
- Randomized clinical trials enrolling: high-flow nasal oxygen, face mask noninvasive ventilation, helmet noninvasive ventilation, or standard oxygen therapy.

25	Randomized clinical trials included (3804 participants)
13	Face mask vs standard oxygen (1521 participants)
4	High-flow vs standard oxygen (1279 participants)
4	Helmet vs standard oxygen (377 participants)
2	Face mask vs high-flow (234 participants)
1	High-flow vs face mask vs standard oxygen (310 participants)
1	Helmet vs face mask (83 participants)

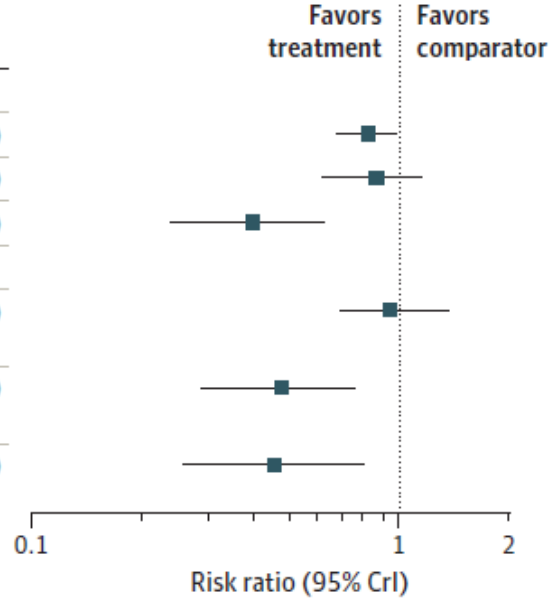
JAMA . 2020 Jul 7;324(1):57-67


A All-cause mortality
229 Patients in 5 studies
Helmet noninvasive ventilation
1
4
Face mask noninvasive ventilation
14
Standard oxygen
918 Patients in 15 studies
1564 Patients in 20 studies
1
3
High-flow nasal oxygen
659 Patients in 3 studies


B Intubation
229 Patients in 5 studies
Helmet noninvasive ventilation
1
4
Face mask noninvasive ventilation
14
Standard oxygen
1034 Patients in 17 studies
1664 Patients in 22 studies
3
5
High-flow nasal oxygen
877 Patients in 7 studies

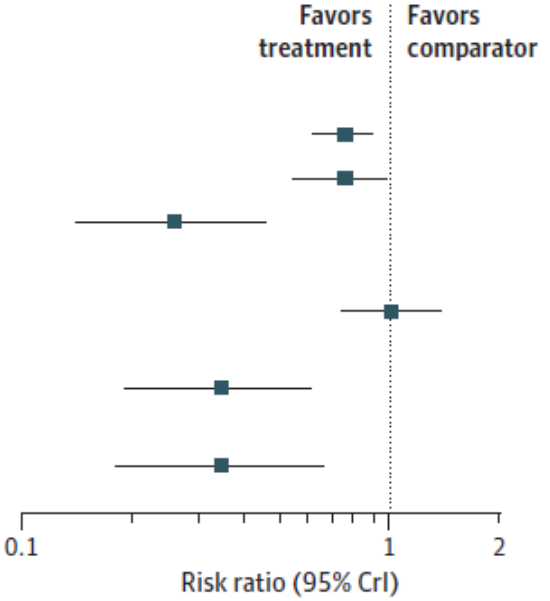
A All-cause mortality

	No. of patients	No. of trials	Quality	Absolute risk difference (95% CrI)	Network risk ratio (95% CrI)
Compared with standard oxygen					
Face mask noninvasive ventilation	1725	14	Moderate	-0.06 (-0.15 to -0.01)	0.83 (0.68-0.99)
High-flow nasal oxygen	1279	3	Moderate	-0.04 (-0.15 to 0.04)	0.87 (0.62-1.15)
Helmet noninvasive ventilation	330	3	Low	-0.19 (-0.37 to -0.09)	0.40 (0.24-0.63)
Additional comparisons					
Face mask noninvasive ventilation vs high-flow nasal oxygen	216	1	Low	-0.02 (-0.14 to 0.07)	0.95 (0.69-1.37)
Helmet noninvasive ventilation vs face mask noninvasive ventilation	83	1	Low	-0.13 (-0.27 to -0.05)	0.48 (0.29-0.76)
Helmet noninvasive ventilation vs high-flow nasal oxygen	0	0	Low	-0.15 (-0.34 to -0.05)	0.46 (0.26-0.80)



B Intubation

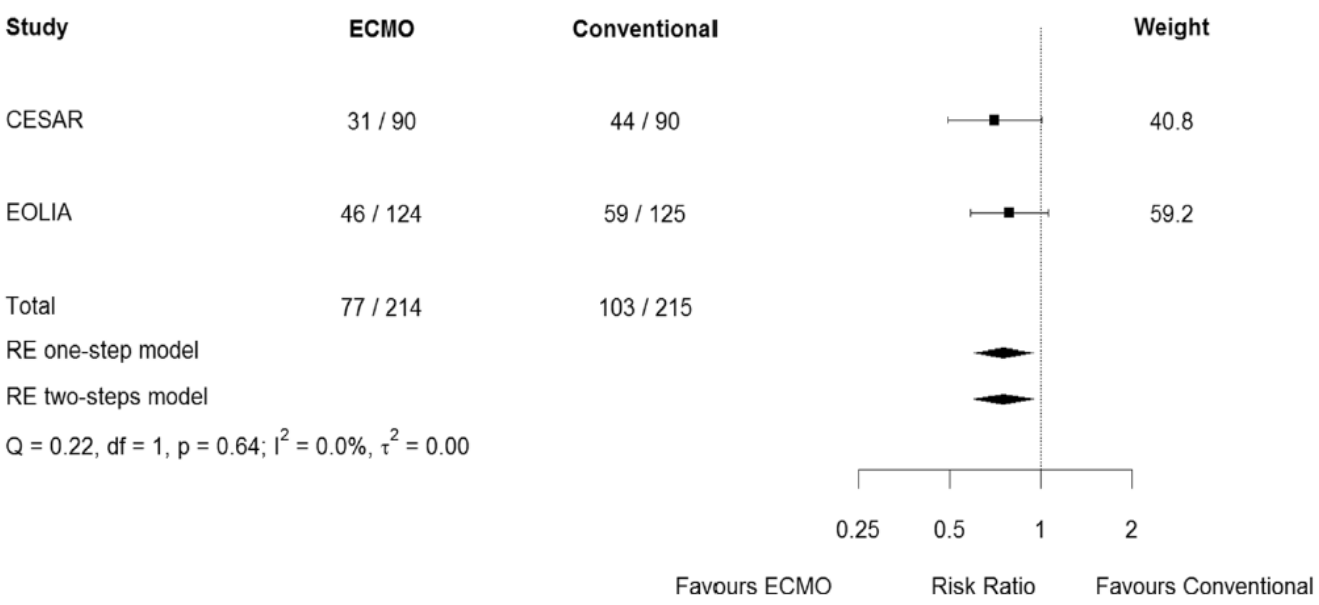
	No. of patients	No. of trials	Quality	Absolute risk difference (95% CrI)	Network risk ratio (95% CrI)
Compared with standard oxygen					
Face mask noninvasive ventilation	1725	14	Moderate	-0.12 (-0.25 to -0.05)	0.76 (0.62-0.90)
High-flow nasal oxygen	1479	5	Moderate	-0.11 (-0.27 to -0.01)	0.76 (0.55-0.99)
Helmet noninvasive ventilation	330	3	Low	-0.32 (-0.60 to -0.16)	0.26 (0.14-0.46)
Additional comparisons					
Face mask noninvasive ventilation vs high-flow nasal oxygen	450	3	Low	0.00 (-0.13 to 0.10)	1.01 (0.74-1.38)
Helmet noninvasive ventilation vs face mask noninvasive ventilation	83	1	Low	-0.20 (-0.40 to -0.09)	0.35 (0.19-0.61)
Helmet noninvasive ventilation vs high-flow nasal oxygen	0	0	Low	-0.20 (-0.43 to -0.08)	0.35 (0.18-0.66)

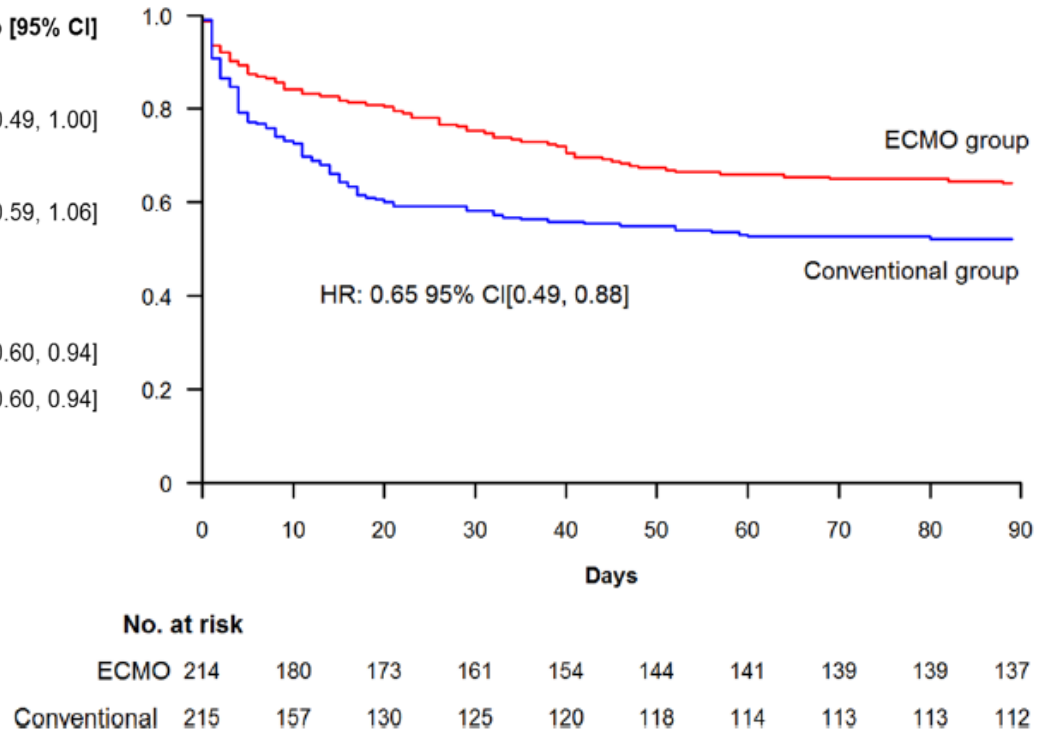


ORIGINAL

ECMO for severe ARDS: systematic review and individual patient data meta-analysis

Alain Combes[1,2*], Giles J. Peek[3], David Hajage[4], Pollyanna Hardy[5], Darryl Abrams[6,7], Matthieu Schmidt[1,2], Agnès Dechartres[4] and Diana Elbourne[8]



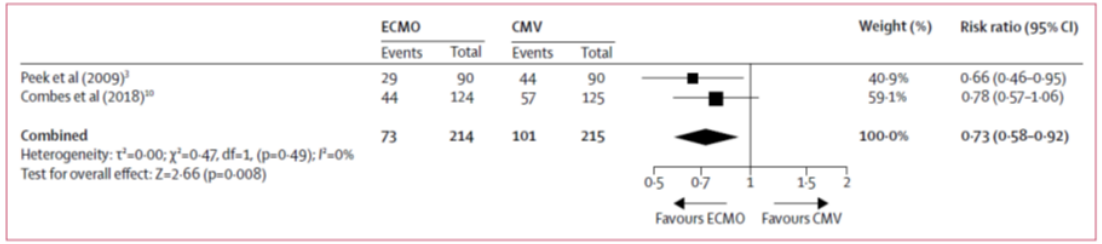


Intensive Care Med. 2020 Oct 6 : 1–10.

Venovenous extracorporeal membrane oxygenation for acute respiratory distress syndrome: a systematic review and meta-analysis

Laveena Munshi, Allan Walkey, Ewan Goligher, Tai Pham, Elizabeth M Uleryk, Eddy Fan

60 days mortality

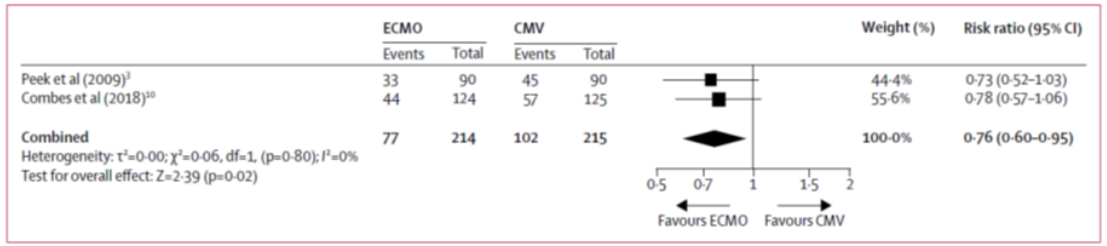


	ECMO Events	ECMO Total	CMV Events	CMV Total	Weight (%)	Risk ratio (95% CI)
Peek et al (2009)[3]	29	90	44	90	40·9%	0·66 (0·46–0·95)
Combes et al (2018)[10]	44	124	57	125	59·1%	0·78 (0·57–1·06)
Combined	**73**	**214**	**101**	**215**	**100·0%**	**0·73 (0·58–0·92)**

Heterogeneity: τ^2=0·00; χ^2=0·47, df=1, (p=0·49); I^2=0%
Test for overall effect: Z=2·66 (p=0·008)

0·5 0·7 1 1·5 2
Favours ECMO Favours CMV

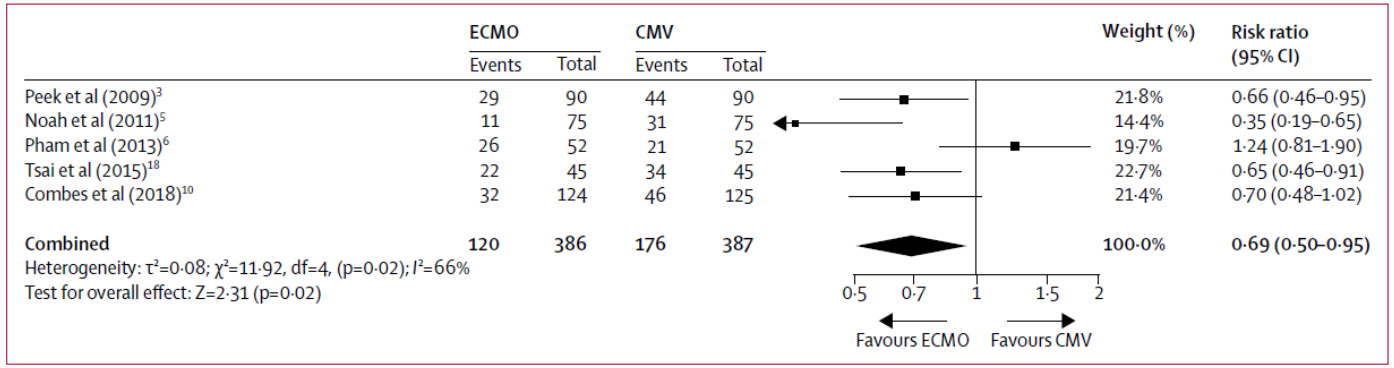
60 month mortality



	ECMO Events	ECMO Total	CMV Events	CMV Total	Weight (%)	Risk ratio (95% CI)
Peek et al (2009)[3]	33	90	45	90	44·4%	0·73 (0·52–1·03)
Combes et al (2018)[10]	44	124	57	125	55·6%	0·78 (0·57–1·06)
Combined	**77**	**214**	**102**	**215**	**100·0%**	**0·76 (0·60–0·95)**

Heterogeneity: τ^2=0·00; χ^2=0·06, df=1, (p=0·80); I^2=0%
Test for overall effect: Z=2·39 (p=0·02)

0·5 0·7 1 1·5 2
Favours ECMO Favours CMV



	ECMO Events	ECMO Total	CMV Events	CMV Total	Weight (%)	Risk ratio (95% CI)
Peek et al (2009)[3]	29	90	44	90	21·8%	0·66 (0·46–0·95)
Noah et al (2011)[5]	11	75	31	75	14·4%	0·35 (0·19–0·65)
Pham et al (2013)[6]	26	52	21	52	19·7%	1·24 (0·81–1·90)
Tsai et al (2015)[18]	22	45	34	45	22·7%	0·65 (0·46–0·91)
Combes et al (2018)[10]	32	124	46	125	21·4%	0·70 (0·48–1·02)
Combined	**120**	**386**	**176**	**387**	**100·0%**	**0·69 (0·50–0·95)**

Heterogeneity: τ^2=0·08; χ^2=11·92, df=4, (p=0·02); I^2=66%
Test for overall effect: Z=2·31 (p=0·02)

0·5 0·7 1 1·5 2
Favours ECMO Favours CMV

Lancet Respir Med . 2019 Feb;7(2):163-172.

1. Oxygenation strategies in ICU

- Caution of conservative oxygenation strategies

2. Mechanical ventilation

-PPI ≥ H2block

-light sedation -> dex vs. profopol

3. Sepsis

-Balanced fluid > 0.9% saline

-The role of vitamins in sepsis has not been proven.

4. ARDS

-Importance and efficiency of driving pressure

-Noninvasive oxygenation strategies vs. standard oxygen therapy

-ECMO in ARDS

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Thank you for your time and your attention !!!