THE LANCET
Respiratory Medicine

Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Reddy MP, Subramaniam A, Chua C, et al. Respiratory system mechanics, gas exchange, and outcomes in mechanically ventilated patients with COVID-19-related acute respiratory distress syndrome: a systematic review and meta-analysis. *Lancet Respir Med* 2022; published online Nov 3. https://doi.org/10.1016/S2213-2600(22)00393-9.

A systematic review and meta-analysis of respiratory system mechanics, gas exchange and outcomes in mechanically ventilated patients with COVID-19 related acute respiratory distress syndrome

Mallikarjuna PONNAPA REDDY, Ashwin SUBRAMANIAM, Clara CHUA, Ryan Ruiyang LING, Christopher ANSTEY, Kollengode RAMANATHAN, Arthur S. SLUTSKY, Kiran SHEKAR

Supplementary Material

Figure S1: Preferred reporting items for systematic reviews and meta-analyses checklist

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 5
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 6
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 5
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Page 5 Table S1
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Page 6
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Page 6
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Page 6
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Page 6
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 6
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Page 6, 7
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	N/A
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Page 7
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 7
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Page 7
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Page 7
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Page 7
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Page 7
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Page 7
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Page 8
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Page 8, Figure S2
Study characteristics	17	Cite each included study and present its characteristics.	Page 8 Table 1, S4
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Page 8 Table S2
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	N/A
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Page 8
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Page 8
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Page 8
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Page 10
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Page 10
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Page 10 TableS3
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 10
	23b	Discuss any limitations of the evidence included in the review.	Page 13
	23c	Discuss any limitations of the review processes used.	Page 13
	23d	Discuss implications of the results for practice, policy, and future research.	Page 14
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 1,3
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 1,3
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Page 7,9

Section and Topic	Item #	Checklist item	Location where item is reported
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Page 15
Competing interests	26	Declare any competing interests of review authors.	Page 15
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Page 15

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

Figure S2: Box-Whisker plot for (A) compliance; (B) $PaCO_2$, (C) Tidal volume and (D) positive end-expiratory pressure.

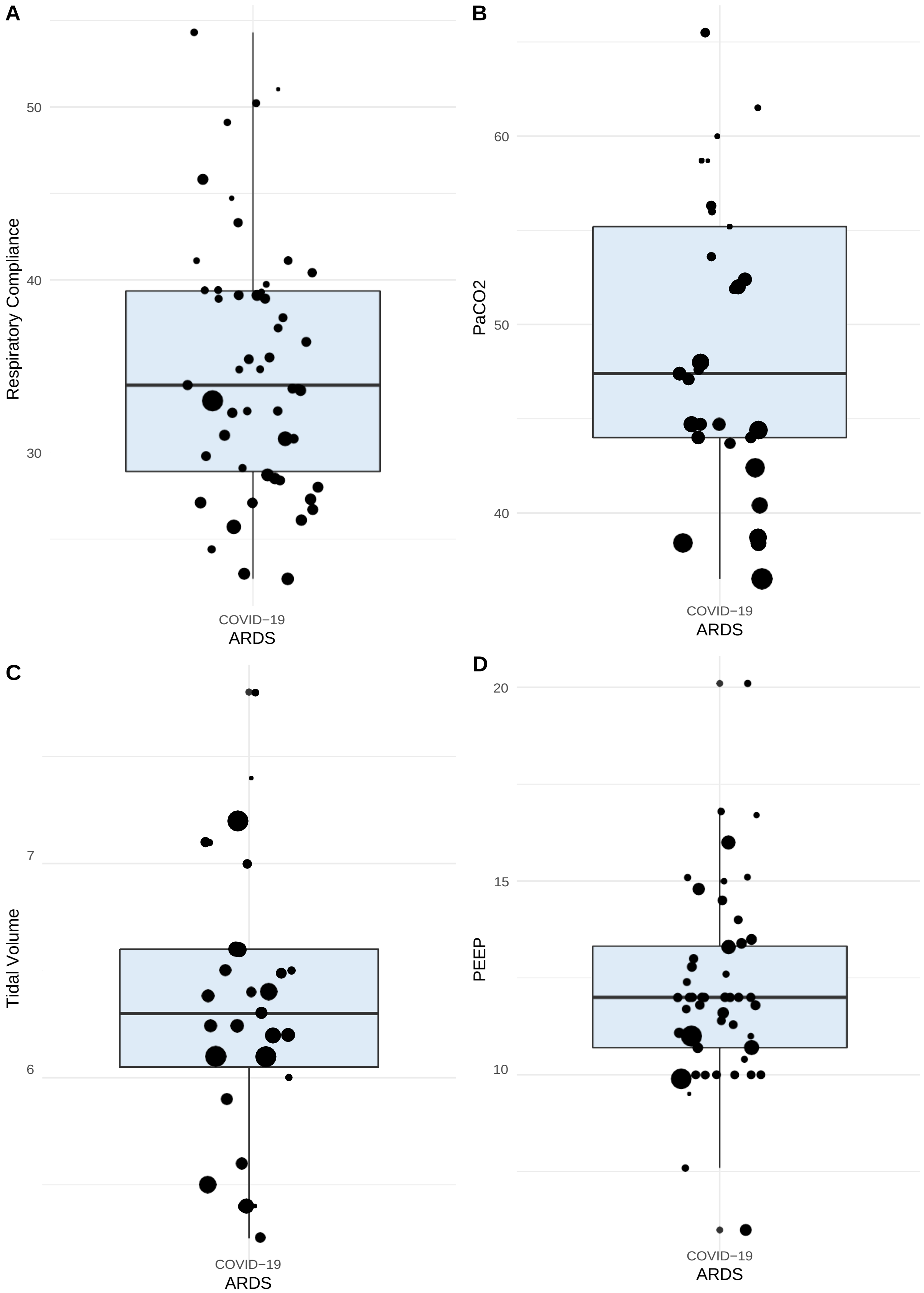


Figure S3: Forest plot demonstrating pooled compliance in all patients with coronavirus disease 2019 acute respiratory distress syndrome.

Study	Patients	Compliance	Mean	95% CI	Weight
Diaz 2021	85		22.7	[21.1; 24.3]	2.1%
Pan 2021	20		23.0	[19.5; 26.5]	2.0%
Jozwiak 2020	11		24.4	[16.4; 32.4]	1.6%
Laghlam 2021	12		25.7	[22.2; 29.2]	2.0%
Li 2020	43		26.1	[23.5; 28.6]	2.1%
Chaudhary 2020	61		26.7	[24.4; 29.0]	2.1%
Bell 2022	125		27.1	[25.6; 28.6]	2.1%
Fanelli 2022	308		27.1	[26.0; 28.2]	2.1%
Park 2021	23		27.3	[23.8; 30.8]	2.0%
Lemmers 2020	169		28.0	[26.6; 29.4]	2.1%
Cummings 2020	203		28.4	[27.0; 29.8]	2.1%
Roldan 2022	15		28.5	[24.2; 32.8]	1.9%
Mahida 2020	111		28.7	[27.3; 30.1]	2.1%
Bagate 2020	10		29.1	[20.1; 38.1]	1.5%
Schenck 2020	267		29.8	[28.5; 31.1]	2.1%
Chew 2020	13		30.8	[27.4; 34.2]	2.0%
Yildirim 2021	58		30.8	[27.8; 33.8]	2.1%
Ibarra−Estrada 2021	90		31.0	[29.1; 32.9]	2.1%
Baedorf Kassis 2021	40		32.3	[29.0; 35.6]	2.0%
Caravita 2020	21		32.4	[26.3; 38.5]	1.8%
Ferreira 2021	984		32.4	[31.6; 33.2]	2.2%
Giraud 2020	10		33.0	[30.5; 35.5]	2.1%
Lemyze 2020	44		33.6	[30.9; 36.3]	2.1%
Schmidt 2020	2635		33.7	[33.2; 34.2]	2.2%
Weiss 2020	42		33.7	[30.3; 37.1]	2.0%
Schavemaker 2021	1099		33.9	[33.3; 34.5]	2.2%
Bain 2021	27		34.8	[28.8; 40.8]	1.8%
Bavishi 2021	54		34.8	[30.6; 39.0]	2.0%
Beloncle 2021	112		35.4	[33.3; 37.5]	2.1%
Wolf 2021	249		35.5	[34.1; 36.9]	2.1%
Estenssoro 2021	1909		36.4	[35.9; 36.9]	2.2%
Puah 2021	102		37.2	[34.6; 39.8]	2.1%
Carboni Bisso 2020	114		37.8	[35.5; 40.1]	2.1%
Torres 2021	1118		38.9	[38.0; 39.8]	2.2%
Wiles 2020	11		38.9	[32.6; 45.2]	1.7%
Diehl 2020	22		39.1	[35.3; 42.9]	2.0%
Gamberini 2020	240		39.1	[37.7; 40.5]	2.1%
Dupuis 2021	117		39.3	[35.8; 42.8]	2.0%
Blot 2020	14		39.4	[31.4; 47.4]	1.6%
Dreher 2020	24		39.4	[33.4; 45.4]	1.8%
Zorbas 2021	25		39.7	[32.9; 46.6]	1.7%
Gibot 2021	17		40.4	[35.0; 45.8]	1.8%
Abu Sayf 2021	192		41.1	[38.6; 43.6]	2.1%
Langer 2021	892		41.1	[40.3; 41.9]	2.2%
Bastos 2020	18		43.3	[38.0; 48.6]	1.9%
Lenka 2020	23		44.7	[35.0; 54.4]	1.4%
Fogagnolo 2021	15		45.8	[41.2; 50.4]	1.9%
Boscolo 2021	241		49.1	[47.1; 51.1]	2.1%
Gattinoni 2020	16		50.2	[43.2; 57.2]	1.7%
Lang 2021	34		51.0	[41.6; 60.4]	1.4%
Mittermaier 2020	10		54.3	[44.9; 63.7]	1.4%
Random effects model	**12095**		**34.7**	**[32.8; 36.6]**	**100.0%**

Heterogeneity: I^2 = 97%, 43.6226 = $^2\tau$

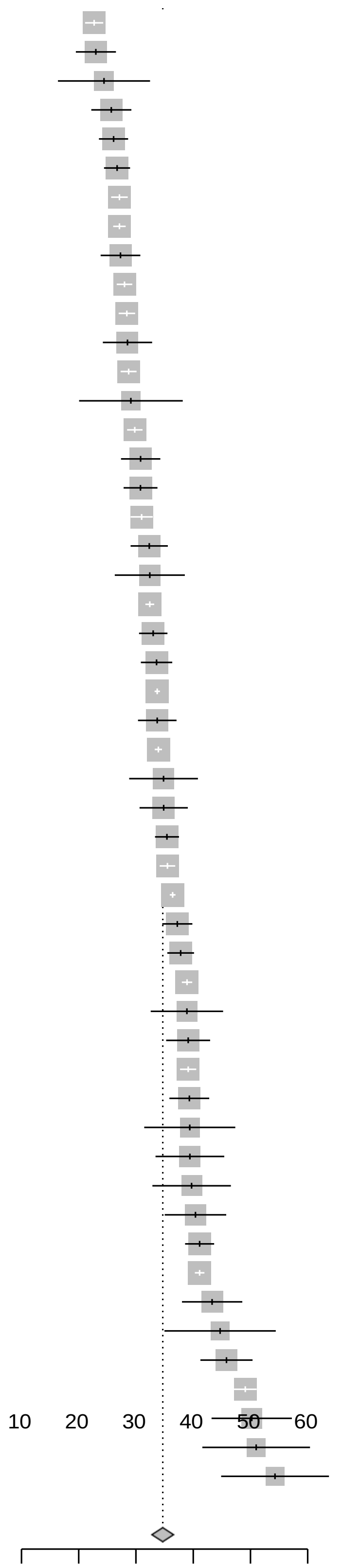


Figure S4: Funnel plot for the primary analysis pooling the compliance among all studies.

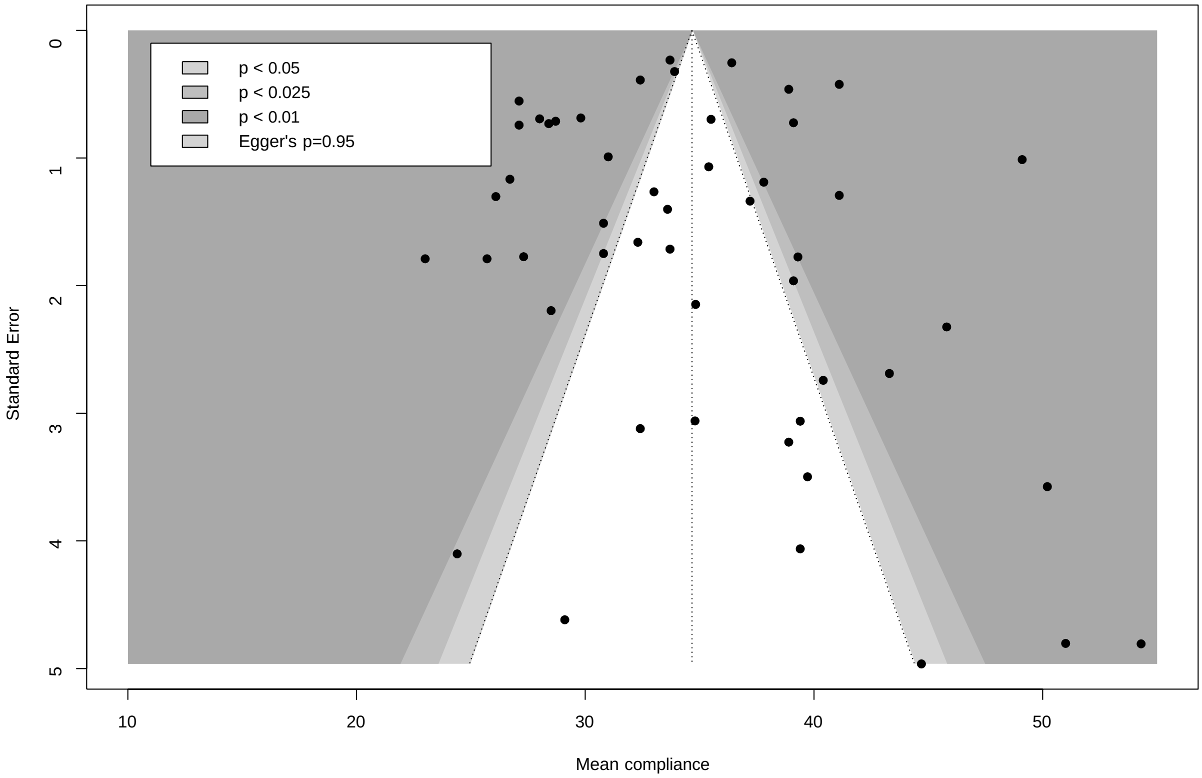


Figure S5: Forest plot comparing compliance with $PaCO_2$

Study	Patients	Mean	95% CI	Weight
PaCO2 = <45				
Abu Sayf 2021	192	41.1	[38.6; 43.6]	3.6%
Beloncle 2021	112	35.4	[33.3; 37.5]	3.6%
Blot 2020	14	39.4	[31.4; 47.4]	2.8%
Boscolo 2021	241	49.1	[47.1; 51.1]	3.6%
Dupuis 2021	117	39.3	[35.8; 42.8]	3.5%
Ferreira 2021	984	32.4	[31.6; 33.2]	3.7%
Langer 2021	892	41.1	[40.3; 41.9]	3.7%
Lemyze 2020	44	33.6	[30.9; 36.3]	3.6%
Park 2021	23	27.3	[23.8; 30.8]	3.5%
Schavemaker 2021	1099	33.9	[33.3; 34.5]	3.7%
Schenck 2020	267	29.8	[28.5; 31.1]	3.7%
Schmidt 2020	2635	33.7	[33.2; 34.2]	3.7%
Torres 2021	1118	38.9	[38.0; 39.8]	3.7%
Random effects model	**7738**	**36.5**	**[33.3; 39.6]**	**46.4%**
Heterogeneity: I^2 = 98%, 31.6586 = $^2\tau$				
PaCO2 = >45				
Baedorf Kassis 2021	40	32.3	[29.0; 35.6]	3.5%
Bagate 2020	10	29.1	[20.1; 38.1]	2.6%
Bell 2022	125	27.1	[25.6; 28.6]	3.7%
Caravita 2020	21	32.4	[26.3; 38.5]	3.1%
Diaz 2021	85	22.7	[21.1; 24.3]	3.7%
Diehl 2020	22	39.1	[35.3; 42.9]	3.4%
Estenssoro 2021	1909	36.4	[35.9; 36.9]	3.7%
Fanelli 2022	308	27.1	[26.0; 28.2]	3.7%
Fogagnolo 2021	15	45.8	[41.2; 50.4]	3.3%
Jozwiak 2020	11	24.4	[16.4; 32.4]	2.8%
Laghlam 2021	12	25.7	[22.2; 29.2]	3.5%
Lemmers 2020	169	28.0	[26.6; 29.4]	3.7%
Mittermaier 2020	10	54.3	[44.9; 63.7]	2.5%
Pan 2021	20	23.0	[19.5; 26.5]	3.5%
Roldan 2022	15	28.5	[24.2; 32.8]	3.4%
Weiss 2020	42	33.7	[30.3; 37.1]	3.5%
Random effects model	**2814**	**31.5**	**[27.7; 35.4]**	**53.6%**
Heterogeneity: I^2 = 98%, 56.6445 = $^2\tau$				
Random effects model	**10552**	**33.8**	**[31.2; 36.5]**	**100.0%**
Heterogeneity: I^2 = 98%, 49.5405 = $^2\tau$				
Test for subgroup differences: $3_1 79$ = $^2\chi$, df = 1 (p = 0.05)				

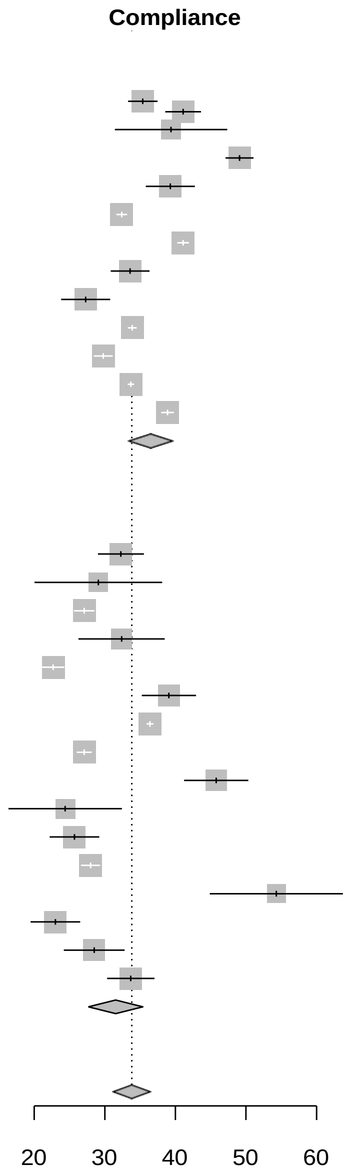
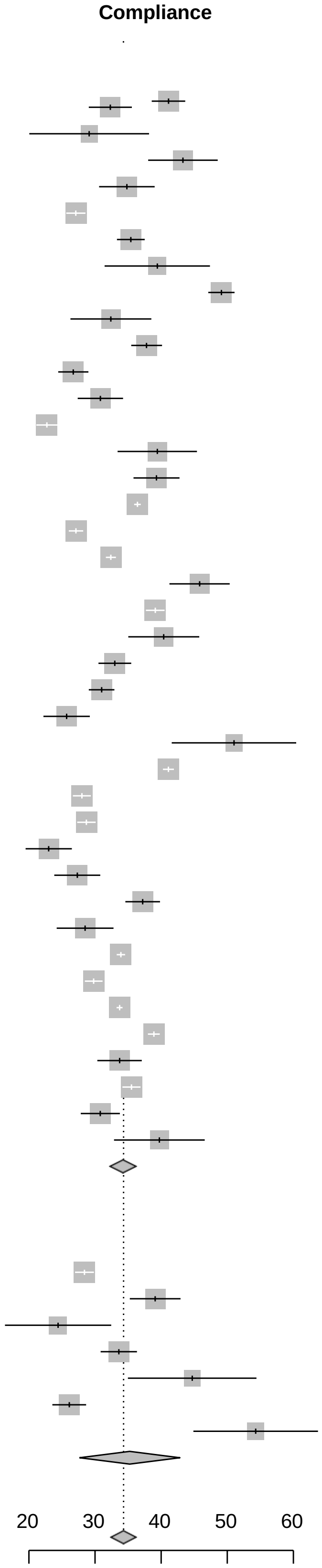


Figure S6: Forest plot comparing compliance with PEEP



Study	Patients	Mean	95% CI	Weight
PEEP = <15	192	41.1	[38.6; 43.6]	2.2%
Abu Sayf 2021	40	32.3	[29.0; 35.6]	2.1%
Baedorf Kassis 2021	10	29.1	[20.1; 38.1]	1.5%
Bagate 2020	18	43.3	[38.0; 48.6]	2.0%
Bastos 2020	54	34.8	[30.6; 39.0]	2.1%
Bavishi 2021	125	27.1	[25.6; 28.6]	2.3%
Bell 2022	112	35.4	[33.3; 37.5]	2.2%
Beloncle 2021	14	39.4	[31.4; 47.4]	1.6%
Blot 2020	241	49.1	[47.1; 51.1]	2.2%
Boscolo 2021	21	32.4	[26.3; 38.5]	1.9%
Caravita 2020	114	37.8	[35.5; 40.1]	2.2%
Carboni Bisso 2020	61	26.7	[24.4; 29.0]	2.2%
Chaudhary 2020	13	30.8	[27.4; 34.2]	2.1%
Chew 2020	85	22.7	[21.1; 24.3]	2.3%
Diaz 2021	24	39.4	[33.4; 45.4]	1.9%
Dreher 2020	117	39.3	[35.8; 42.8]	2.1%
Dupuis 2021	1909	36.4	[35.9; 36.9]	2.3%
Estenssoro 2021	308	27.1	[26.0; 28.2]	2.3%
Fanelli 2022	984	32.4	[31.6; 33.2]	2.3%
Ferreira 2021	15	45.8	[41.2; 50.4]	2.0%
Fogagnolo 2021	240	39.1	[37.7; 40.5]	2.3%
Gamberini 2020	17	40.4	[35.0; 45.8]	1.9%
Gibot 2021	10	33.0	[30.5; 35.5]	2.2%
Giraud 2020	90	31.0	[29.1; 32.9]	2.2%
Ibarra−Estrada 2021	12	25.7	[22.2; 29.2]	2.1%
Laghlam 2021	34	51.0	[41.6; 60.4]	1.5%
Lang 2021	892	41.1	[40.3; 41.9]	2.3%
Langer 2021	169	28.0	[26.6; 29.4]	2.3%
Lemmers 2020	111	28.7	[27.3; 30.1]	2.3%
Mahida 2020	20	23.0	[19.5; 26.5]	2.1%
Pan 2021	23	27.3	[23.8; 30.8]	2.1%
Park 2021	102	37.2	[34.6; 39.8]	2.2%
Puah 2021	15	28.5	[24.2; 32.8]	2.1%
Roldan 2022	1099	33.9	[33.3; 34.5]	2.3%
Schavemaker 2021	267	29.8	[28.5; 31.1]	2.3%
Schenck 2020	2635	33.7	[33.2; 34.2]	2.3%
Schmidt 2020	1118	38.9	[38.0; 39.8]	2.3%
Torres 2021	42	33.7	[30.3; 37.1]	2.1%
Weiss 2020	249	35.5	[34.1; 36.9]	2.3%
Wolf 2021	58	30.8	[27.8; 33.8]	2.2%
Yildirim 2021	25	39.7	[32.9; 46.6]	1.8%
Zorbas 2021				
Random effects model	**11685**	**34.2**	**[32.3; 36.2]**	**86.7%**
Heterogeneity: I^2 = 98%, 37.9114 = $^2\tau$				
PEEP = >15	203	28.4	[27.0; 29.8]	2.3%
Cummings 2020	22	39.1	[35.3; 42.9]	2.1%
Diehl 2020	11	24.4	[16.4; 32.4]	1.6%
Jozwiak 2020	44	33.6	[30.9; 36.3]	2.2%
Lemyze 2020	23	44.7	[35.0; 54.4]	1.4%
Lenka 2020	43	26.1	[23.5; 28.6]	2.2%
Li 2020	10	54.3	[44.9; 63.7]	1.5%
Mittermaier 2020				
Random effects model	**356**	**35.2**	**[27.6; 42.8]**	**13.3%**
Heterogeneity: I^2 = 92%, 95.4672 = $^2\tau$				
Random effects model	**12041**	**34.3**	**[32.4; 36.2]**	**100.0%**

Heterogeneity: I^2 = 97%, 41.8705 = $^2\tau$

Test for subgroup differences: 0_1.06 = $^2\chi$, df = 1 (p = 0.80)

Figure S7: Univariable Meta-regression Analysis for COVID-19-ARDS studies by (A) PaO_2 /FiO_2 (B) tidal volume (C) PEEP (D) Driving pressure (E) $PaCO_2$ (F) Body Mass Index

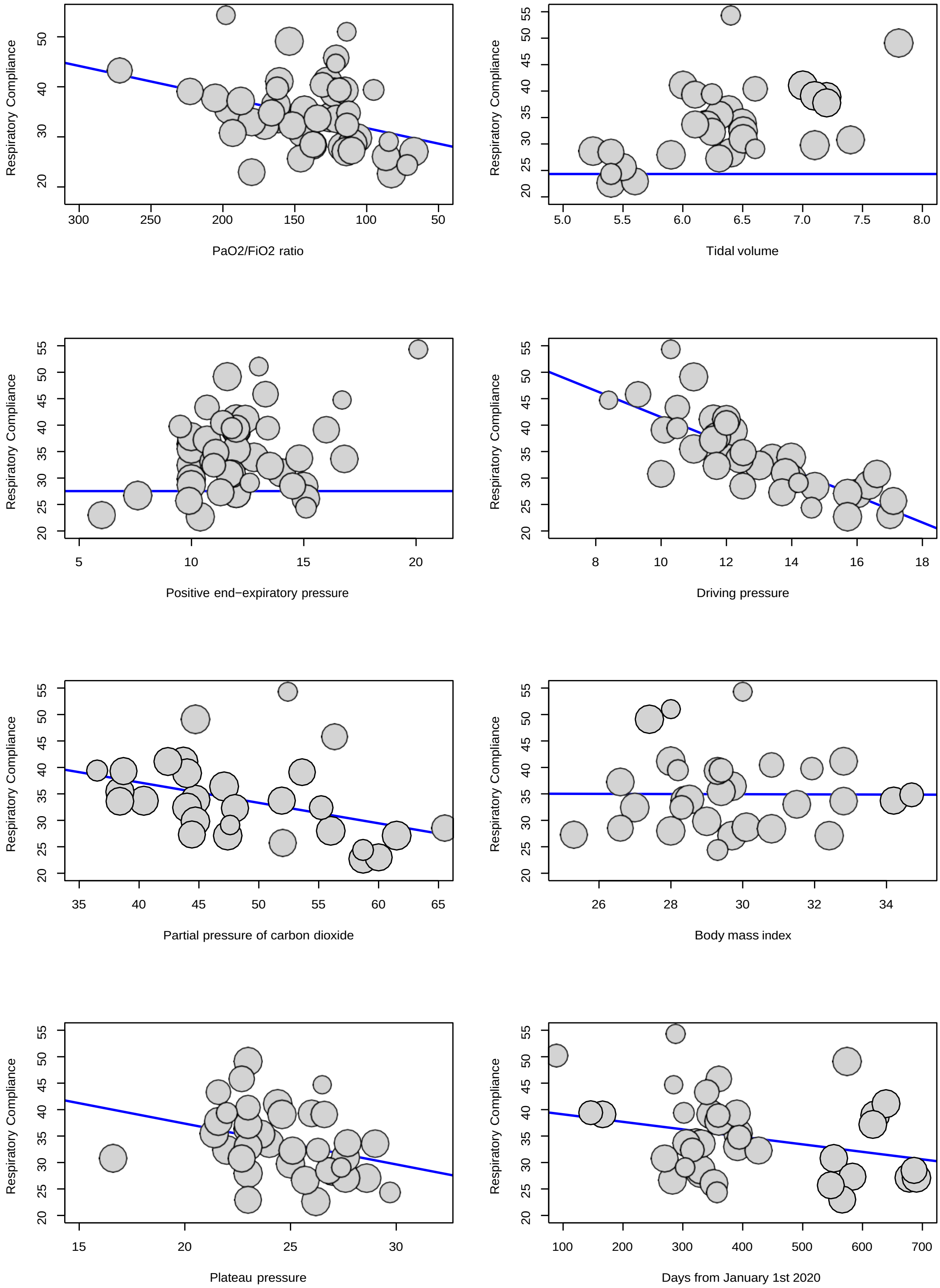


Figure S8: Post hoc analysis: Sensitivity analysis using fixed effect model

Study	Patients	Mean	95% CI	Weight
Diaz 2021	85	22.7	[21.1; 24.3]	1.7%
Pan 2021	20	23.0	[19.5; 26.5]	0.3%
Jozwiak 2020	11	24.4	[16.4; 32.4]	0.1%
Laghlam 2021	12	25.7	[22.2; 29.2]	0.3%
Li 2020	43	26.1	[23.5; 28.6]	0.6%
Chaudhary 2020	61	26.7	[24.4; 29.0]	0.8%
Bell 2022	125	27.1	[25.6; 28.6]	2.0%
Fanelli 2022	308	27.1	[26.0; 28.2]	3.6%
Park 2021	23	27.3	[23.8; 30.8]	0.3%
Lemmers 2020	169	28.0	[26.6; 29.4]	2.3%
Cummings 2020	203	28.4	[27.0; 29.8]	2.1%
Roldan 2022	15	28.5	[24.2; 32.8]	0.2%
Mahida 2020	111	28.7	[27.3; 30.1]	2.2%
Bagate 2020	10	29.1	[20.1; 38.1]	0.1%
Schenck 2020	267	29.8	[28.5; 31.1]	2.3%
Chew 2020	13	30.8	[27.4; 34.2]	0.4%
Yildirim 2021	58	30.8	[27.8; 33.8]	0.5%
Ibarra−Estrada 2021	90	31.0	[29.1; 32.9]	1.1%
Baedorf Kassis 2021	40	32.3	[29.0; 35.6]	0.4%
Caravita 2020	21	32.4	[26.3; 38.5]	0.1%
Ferreira 2021	984	32.4	[31.6; 33.2]	7.2%
Giraud 2020	10	33.0	[30.5; 35.5]	0.7%
Lemyze 2020	44	33.6	[30.9; 36.3]	0.6%
Schmidt 2020	2635	33.7	[33.2; 34.2]	20.4%
Weiss 2020	42	33.7	[30.3; 37.1]	0.4%
Schavemaker 2021	1099	33.9	[33.3; 34.5]	10.5%
Bain 2021	27	34.8	[28.8; 40.8]	0.1%
Bavishi 2021	54	34.8	[30.6; 39.0]	0.2%
Beloncle 2021	112	35.4	[33.3; 37.5]	1.0%
Wolf 2021	249	35.5	[34.1; 36.9]	2.3%
Estenssoro 2021	1909	36.4	[35.9; 36.9]	17.0%
Puah 2021	102	37.2	[34.6; 39.8]	0.6%
Carboni Bisso 2020	114	37.8	[35.5; 40.1]	0.8%
Torres 2021	1118	38.9	[38.0; 39.8]	5.2%
Wiles 2020	11	38.9	[32.6; 45.2]	0.1%
Diehl 2020	22	39.1	[35.3; 42.9]	0.3%
Gamberini 2020	240	39.1	[37.7; 40.5]	2.1%
Dupuis 2021	117	39.3	[35.8; 42.8]	0.3%
Blot 2020	14	39.4	[31.4; 47.4]	0.1%
Dreher 2020	24	39.4	[33.4; 45.4]	0.1%
Zorbas 2021	25	39.7	[32.9; 46.6]	0.1%
Gibot 2021	17	40.4	[35.0; 45.8]	0.1%
Abu Sayf 2021	192	41.1	[38.6; 43.6]	0.7%
Langer 2021	892	41.1	[40.3; 41.9]	6.2%
Bastos 2020	18	43.3	[38.0; 48.6]	0.2%
Lenka 2020	23	44.7	[35.0; 54.4]	0.0%
Fogagnolo 2021	15	45.8	[41.2; 50.4]	0.2%
Boscolo 2021	241	49.1	[47.1; 51.1]	1.1%
Gattinoni 2020	16	50.2	[43.2; 57.2]	0.1%
Lang 2021	34	51.0	[41.6; 60.4]	0.0%
Mittermaier 2020	10	54.3	[44.9; 63.7]	0.0%
Common effect model	**12095**	**34.1**	**[33.9; 34.3]**	**100.0%**

Heterogeneity: $I^2 = 97\%$, 43.6226 = $^2\tau$

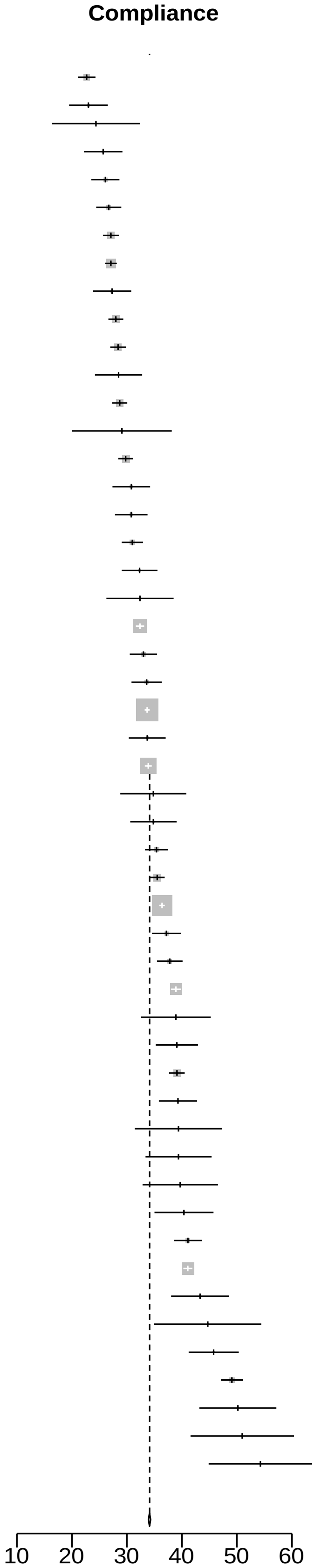


Table S1: Search terms for C-ARDS SRMA

	Concept 1	Concept 2	Concept 3
Key concepts	**COVID Patients**	**ARDS patients**	**Intervention**
Controlled vocabulary terms / Subject terms **(MeSH terms, Entree terms)**	"coronavirus"[MH] OR "coronavirus infections"[MH] OR "coronavirus"[TW] OR "corona virus"[TW] OR "HCoV"[TW] OR "nCov"[TW] OR "covid"[TW] OR "covid19"[TW] OR "Severe Acute Respiratory Syndrome Coronavirus 2"[TW] OR "SARS-CoV2"[TW] OR "SARS-CoV 2"[TW] OR "SARS Coronavirus 2"[TW] OR "MERS-CoV"[TW]) EMBASE: (SARS coronavirus/ or middle east respiratory syndrome/ or severe acute respiratory syndrome/ or (coronavirus* or corona virus* or HCoV* or ncov* or covid or covid19 or sars-cov* or sarscov* or Sars-coronavirus* or Severe Acute Respiratory Syndrome Coronavirus*).mp.) and 20191201:20220314. (dc) MEDLINE: ("severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "COVID-19" [Supplementary Concept] OR "coronavirus" OR "corona virus" OR "HCoV" OR "nCoV" OR "2019 CoV" OR "covid" OR "covid19" OR "Severe Acute Respiratory Syndrome Coronavirus 2" OR "SARS-CoV2" OR "SARS-CoV 2" OR "SARS Coronavirus 2") AND (2019/11/01:2022/03/14	ARDS OR acute respiratory distress syndrome	Intubate OR Intubated OR Mechanical ventilation OR Invasive ventilation

Table S2: Data collection template

Study characteristics:	Author	
	Date of publication	
	Study star and end dates	
	Country	
Baseline demographics:	Age	
	Sex	
	Comorbidities	COPD
		HTN
		CCF/IHD
		BMI
		DM
		CKD
Clinical characteristics:	Ventilator parameters	FiO_2
		PEEP
		Respiratory rate
		Tidal volume
		Peak pressure
		plateau pressure
		Driving pressure
	Lung compliance	Static compliance
	Gas exchange parameters	PaO_2/FiO_2 ratio
		SpO_2
		$PaCO_2$
Interventions	Pharmacological	Paralysis
		Inhaled pulmonary vasodilators
		Steroids
		Novel antiviral therapies
	Non-Pharmacological	ECMO
		Prone position
		CRRT
		Tracheostomy
Outcomes:	mortality	ICU mortality
		Hospital mortality
		28-day mortality
		60-day mortality
		90-day mortality
	Complications	Pneumothorax
		VAP
		VTE
		Cardiac arrest·
	Time periods	Duration of ventilation
		ICU length of stay
		Hospital length of stay

COPD: Chronic Obstructive Pulmonary Disease HT: Hypertension CCF: Congestive Cardiac Failure BMI: Body Mass Index DM: Diabetes Mellitus CKD: Chronic kidney disease	AKI: Acute Kidney Injury VAP: Ventilator-Acquired Pneumonia VTE: Venous Thromboembolism PEEP: Positive End Expiratory Pressure CRRT: Continuous renal replacement therapy ECMO: Extracorporeal membrane oxygenation

Table S3: Modified Newcastle Ottawa scores (mNOS) for all the COVID-19-ARDS studies

First Author	Sample representativeness	Sample size	Non-respondents	Ascertainment of compliance	Quality of descriptive statistics reporting	Total Modified NOS
Abu Sayf[1]	1	1	1	1	1	5
Baedorf Kassis[2]	0	0	0	1	1	2
Bagate[3]	0	0	1	1	1	3
Bain[4]	1	0	0	1	1	3
Bell[5]	1	0	1	1	1	4
Boscolo[6]	1	1	0	1	1	4
Bastos[7]	0	0	0	1	1	2
Bavishi[8]	0	0	1	1	1	3
Beloncle[9]	1	0	1	1	1	4
Blot[10]	0	0	1	1	1	3
Caravita[11]	1	0	1	1	1	4
Carboni Bisso[12]	0	0	1	1	1	3
Chaudhary[13]	0	0	0	1	1	2
Chew[14]	0	0	1	1	1	3
Cummings[15]	1	1	1	1	1	5
Diaz[16]	0	0	1	1	1	3
Diehl[17]	0	0	1	1	1	3
Dreher[18]	0	0	1	1	1	3
Dupuis[19]	0	1	1	1	1	4
Estenssoro[20]	1	1	1	1	1	5
Fanelli[21]	1	1	1	1	1	5
Ferreira[22]	0	1	1	1	1	4
Fogagnolo[23]	0	0	1	1	1	3
Gamberini[24]	1	1	1	1	1	5
Gattinoni[25]	0	0	0	1	1	2
Gibot[26]	0	0	0	1	1	2
Giraud[27]	0	0	1	1	1	3
Ibarra-Estrada[28]	0	0	1	1	1	3
Jozwiak[29]	0	0	0	1	1	2
Laghlam[30]	0	0	1	1	1	3
Lang[31]	0	0	0	1	1	2
Langer[32]	1	1	1	1	1	5
Lemmers[33]	0	0	1	1	1	3
Lemyze[34]	0	0	1	1	1	3
Lenka[35]	0	0	0	1	1	2
Li[36]	0	0	1	1	1	3
Mahida[37]	0	0	1	1	1	3
Mittermaier[38]	0	0	1	1	1	3
Pan[39]	1	0	1	1	1	4
Park[40]	0	0	1	1	1	3
Puah[41]	1	0	1	1	1	4
Roldan[42]	0	0	1	1	1	3
Schavemaker[43]	1	1	1	1	1	5
Schenck[44]	0	1	1	1	1	4
Schmidt[45]	1	1	0	1	1	4
Torres[46]	1	1	1	1	1	5
Weiss[47]	1	0	0	1	1	3
Wiles[48]	0	0	1	1	0	2
Wolf[49]	0	1	0	1	1	3
Yildirim[50]	0	0	1	1	1	3
Zorbas[51]	1	0	1	1	1	4

Table S4: GRADE

Number of studies	Certainty assessment						Effect			Certainty	Importance
	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Number of events	Number of individuals	Rate (95% CI)		
Compliance in only unselected patients (assessed with cm H2O)											
37	observational studies	not serious [a]	not serious [b]	not serious	not serious	none	-	11,356	mean 35·8 (33·9 to 37·8)	⊕⊕⊕⊕ HIGH	CRITICAL
Compliance in all stuides (assessed with cm H2O)											
51	observational studies	not serious [a]	not serious [b]	not serious	not serious	none	-	12,095	mean 34·7 (32·8 to 36·6)	⊕⊕⊕⊕ HIGH	CRITICAL
28-day mortality (assessed with %)											
13	observational studies	not serious	serious [c,d]	not serious	not serious	none	3,343	8,540	event rate 43·2 per 100 (32·6 to 54·1)	⊕⊕⊕◯ MODERATE	CRITICAL
Intensive care unit mortality (assessed with %)											
27	observational studies	not serious	serious [c,d]	not serious	not serious	none	3,601	9,362	event rate 35·7 per 100 (29·4 to 42·2)	⊕⊕⊕◯ MODERATE	CRITICAL
In-hospital mortality (assessed with: %)											
14	observational studies	not serious	serious [c,d]	not serious	not serious	none	2,916	7,160	event rate 39·1 per 100 (32·6 to 45·8)	⊕⊕⊕◯ MODERATE	CRITICAL
Intensive care unit length of stay (assessed with: days)											
25	observational studies	not serious	not serious [c,e]	not serious	not serious	none	-	10,832	mean 19 days (15 to 22)	⊕⊕⊕⊕ HIGH	IMPORTANT
Hospital length of stay (assessed with: days)											

Number of studies	Certainty assessment						Effect			Certainty	Importance
	Study design	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Number of events**	**Number of individuals**	**Rate (95% CI)**		
17	observational studies	not serious	not serious [c,e]	not serious	not serious	none	-	8,902	mean 28 days (23 to 34)	⊕⊕⊕⊕ HIGH	IMPORTANT
Ventilator free days (assessed with: days)											
7	observational studies	not serious	not serious [c,e]	not serious	serious [f]	none	-	1,562	mean 5 days (2.9 to 7.6)	⊕⊕⊕◯ MODERATE	IMPORTANT

Explanations

a· Some studies were rated as having a higher risk of bias (mNOS<3)· Trim-and-fill analysis found that the pooled estimate remained similar after excluding these studies (34·4), suggesting that the effect of bias on the pooled estimate was likely minimal

b· There was a high I2 value (96·8%), and a wide range of the point estimates· However, several important sources of heterogeneity were found, and include the PaO2/FiO2 ratio, PEEP, Tidal volume, Driving pressure, and the presence of obesity (BMI>30)· These were likely to have contributed to the heterogeneity, and hence we did not downgrade for inconsistency

c· There was a high I2 value (>90%)

d· Visual inspection of the forest plot showed significant variability between the point estimates and only occasional overlapping of the confidence intervals

e· However, visual inspection of the forest plot showed some variability and significant overlapping of the confidence intervals

f· The recommended optimal information size (>2000) was reached· However, the confidence intervals are wide compared to the pooled estimate (100% of the pooled estimate)· This was a borderline decision to rate down for imprecision·

Table S5: References for the studies included in this systematic review·

1.	Abu Sayf A, Ouellette D, Fadel R· Mechanical ventilation and COVID-19: A case-control analysis of clinical characteristics, lung mechanics, and mortality· Chest 2021; 160(4): A1012-A·
2.	Baedorf Kassis E, Schaefer MS, Maley JH, et al· Transpulmonary pressure measurements and lung mechanics in patients with early ARDS and SARS-CoV-2· J Crit Care 2021; 63: 106-12·
3.	Bagate F, Tuffet S, Masi P, et al· Rescue therapy with inhaled nitric oxide and almitrine in COVID-19 patients with severe acute respiratory distress syndrome· Ann Intensive Care 2020; 10(1): 151·
4.	Bain W, Yang H, Shah FA, et al· COVID-19 versus Non-COVID-19 Acute Respiratory Distress Syndrome: Comparison of Demographics, Physiologic Parameters, Inflammatory Biomarkers, and Clinical Outcomes· Ann Am Thorac Soc 2021; 18(7): 1202-10·
5.	Bell J, William Pike C, Kreisel C, Sonti R, Cobb N· Predicting Impact of Prone Position on Oxygenation in Mechanically Ventilated Patients with COVID-19· Journal of Intensive Care Medicine 2022: 08850666221081757·
6.	Boscolo A, Sella N, Lorenzoni G, et al· Static compliance and driving pressure are associated with ICU mortality in intubated COVID-19 ARDS· Critical Care 2021; 25(1): 263·
7.	Bastos GAN, Azambuja AZ, Polanczyk CA, et al· Clinical characteristics and predictors of mechanical ventilation in patients with COVID-19 hospitalized in Southern Brazil· Rev Bras Ter Intensiva 2020; 32(4): 487-92·
8.	Bavishi AA, Mylvaganam RJ, Agarwal R, Avery RJ, Cuttica MJ· Timing of Intubation in Coronavirus Disease 2019: A Study of Ventilator Mechanics, Imaging, Findings, and Outcomes· Crit Care Explor 2021; 3(5): e0415·
9.	Beloncle F, Studer A, Seegers V, et al· Longitudinal changes in compliance, oxygenation and ventilatory ratio in COVID-19 versus non-COVID-19 pulmonary acute respiratory distress syndrome· Crit Care 2021; 25(1): 248·
10.	Blot M, Jacquier M, Aho Glele LS, et al· CXCL10 could drive longer duration of mechanical ventilation during COVID-19 ARDS· Crit Care 2020; 24(1): 632·
11.	Caravita S, Baratto C, Di Marco F, et al· Haemodynamic characteristics of COVID-19 patients with acute respiratory distress syndrome requiring mechanical ventilation· An invasive assessment using right heart catheterization· Eur J Heart Fail 2020; 22(12): 2228-37·
12.	Carboni Bisso I, Huespe I, Lockhart C, et al· Clinical characteristics of critically ill patients with COVID-19· Medicina (B Aires) 2021; 81(4): 527-35·
13.	Chaudhary S, Lo KB, Matta A, Azmaiparashvili Z, Benzaquen S, Patarroyo-Aponte G· Ventilator mechanics and outcomes in critically ill patients with COVID-19 infection· CHEST 2020; 158(4): A627·
14.	Chew SY, Lee YS, Ghimiray D, Tan CK, Chua GS· Characteristics and Outcomes of COVID-19 Patients with Respiratory Failure Admitted to a "Pandemic Ready" Intensive Care Unit - Lessons from Singapore· Ann Acad Med Singap 2020; 49(7): 434-48·
15.	Cummings MJ, Baldwin MR, Abrams D, et al· Epidemiology, clinical course, and outcomes of critically ill adults with COVID-19 in New York City: a prospective cohort study· Lancet 2020; 395(10239): 1763-70·
16.	Diaz RA, Graf J, Zambrano JM, et al· Extracorporeal Membrane Oxygenation for COVID-19-associated Severe Acute Respiratory Distress Syndrome in Chile: A Nationwide Incidence and Cohort Study· Am J Respir Crit Care Med 2021; 204(1): 34-43·
17.	Diehl JL, Peron N, Chocron R, et al· Respiratory mechanics and gas exchanges in the early course of COVID-19 ARDS: a hypothesis-generating study· Ann Intensive Care 2020; 10(1): 95·
18.	Dreher M, Kersten A, Bickenbach J, et al· The Characteristics of 50 Hospitalized COVID-19 Patients With and Without ARDS· Dtsch Arztebl Int 2020; 117(16): 271-8·
19.	Dupuis C, Bouadma L, de Montmollin E, et al· Association Between Early Invasive Mechanical Ventilation and Day-60 Mortality in Acute Hypoxemic Respiratory Failure Related to Coronavirus Disease-2019 Pneumonia· Crit Care Explor 2021; 3(1): e0329·
20.	Estenssoro E, Loudet CI, Ríos FG, et al· Clinical characteristics and outcomes of invasively ventilated patients with COVID-19 in Argentina (SATICOVID): a prospective, multicentre cohort study· Lancet Respir Med 2021; 9(9): 989-98·
21.	Fanelli V, Giani M, Grasselli G, et al· Extracorporeal membrane oxygenation for COVID-19 and influenza H1N1 associated acute respiratory distress syndrome: a multicenter retrospective cohort study· Critical Care 2022; 26(1): 34·
22.	Ferreira JC, Ho YL, Besen B, et al· Protective ventilation and outcomes of critically ill patients with COVID-19: a cohort study· Ann Intensive Care 2021; 11(1): 92·
23.	Fogagnolo A, Grasso S, Dres M, et al· Focus on renal blood flow in mechanically ventilated patients with SARS-CoV-2: a prospective pilot study· J Clin Monit Comput 2021: 1-7·
24.	Gamberini L, Tonetti T, Spadaro S, et al· Factors influencing liberation from mechanical ventilation in coronavirus disease 2019: multicenter observational study in fifteen Italian ICUs· J Intensive Care 2020; 8: 80·
25.	Gattinoni L, Coppola S, Cressoni M, Busana M, Rossi S, Chiumello D· COVID-19 Does Not Lead to a "Typical" Acute Respiratory Distress Syndrome· Am J Respir Crit Care Med 2020; 201(10): 1299-300·

26.	Gibot S, Conrad M, Courte G, Cravoisy A· Positive End-Expiratory Pressure Setting in COVID-19-Related Acute Respiratory Distress Syndrome: Comparison Between Electrical Impedance Tomography, PEEP/FiO2 Tables, and Transpulmonary Pressure· Frontiers in Medicine 2021; 8·
27.	Giraud R, Legouis D, Assouline B, et al· Timing of VV-ECMO therapy implementation influences prognosis of COVID-19 patients· Physiol Rep 2021; 9(3): e14715·
28.	Ibarra-Estrada M, García-Salas Y, Mireles-Cabodevila E, et al· Use of Airway Pressure Release Ventilation in Patients With Acute Respiratory Failure Due to Coronavirus Disease 2019: Results of a Single-Center Randomized Controlled Trial· Crit Care Med 2021·
29.	Jozwiak M, Chiche JD, Charpentier J, et al· Use of Venovenous Extracorporeal Membrane Oxygenation in Critically-Ill Patients With COVID-19· Front Med (Lausanne) 2020; 7: 614569·
30.	Laghlam D, Rahoual G, Malvy J, Estagnasié P, Brusset A, Squara P· Use of Almitrine and Inhaled Nitric Oxide in ARDS Due to COVID-19· Frontiers in Medicine 2021; 8·
31.	Lang CN, Zotzmann V, Schmid B, et al· Intensive Care Resources and 60-Day Survival of Critically-Ill COVID-19 Patients· Cureus 2021; 13(2): e13210·
32.	Langer T, Brioni M, Guzzardella A, et al· Prone position in intubated, mechanically ventilated patients with COVID-19: a multi-centric study of more than 1000 patients· Critical Care 2021; 25(1): 128·
33.	Lemmers DHL, Abu Hilal M, Bnà C, et al· Pneumomediastinum and subcutaneous emphysema in COVID-19: barotrauma or lung frailty? ERJ Open Res 2020; 6(4)·
34.	Lemyze M, Courageux N, Maladobry T, et al· Implications of Obesity for the Management of Severe Coronavirus Disease 2019 Pneumonia· Crit Care Med 2020; 48(9): e761-e7·
35.	Lenka J, Chhabria MS, Sharma N, et al· Clinical characteristics and outcomes of critically ill patients with COVID-19 in a tertiary community hospital in upstate New York· J Community Hosp Intern Med Perspect 2020; 10(6): 491-500·
36.	Li J, Fink JB, Augustynovich AE, Mirza S, Kallet RH, Dhand R· Effects of Inhaled Epoprostenol and Prone Positioning in Intubated Coronavirus Disease 2019 Patients With Refractory Hypoxemia· Crit Care Explor 2020; 2(12): e0307·
37.	Mahida RY, Chotalia M, Alderman J, et al· Characterisation and outcomes of ARDS secondary to pneumonia in patients with and without SARS-CoV-2: a single-centre experience· BMJ Open Respir Res 2020; 7(1)·
38.	Mittermaier M, Pickerodt P, Kurth F, et al· Evaluation of PEEP and prone positioning in early COVID-19 ARDS· EClinicalMedicine 2020; 28: 100579·
39.	Pan C, Lu C, She X, et al· Evaluation of Positive End-Expiratory Pressure Strategies in Patients With Coronavirus Disease 2019-Induced Acute Respiratory Distress Syndrome· Front Med (Lausanne) 2021; 8: 637747·
40.	Park J, Lee HY, Lee J, Lee SM· Effect of prone positioning on oxygenation and static respiratory system compliance in COVID-19 ARDS vs· non-COVID ARDS· Respir Res 2021; 22(1): 220·
41.	Puah SH, Cove ME, Phua J, et al· Association between lung compliance phenotypes and mortality in COVID-19 patients with acute respiratory distress syndrome· Ann Acad Med Singap 2021; 50(9): 686-94·
42.	Roldán R, Rodriguez S, Barriga F, et al· Sequential lateral positioning as a new lung recruitment maneuver: an exploratory study in early mechanically ventilated Covid-19 ARDS patients· Ann Intensive Care 2022; 12(1): 13·
43.	Schavemaker R, Schultz MJ, Lagrand WK, van Slobbe-Bijlsma ER, Serpa Neto A, Paulus F· Associations of Body Mass Index with Ventilation Management and Clinical Outcomes in Invasively Ventilated Patients with ARDS Related to COVID-19-Insights from the PRoVENT-COVID Study· J Clin Med 2021; 10(6)·
44.	Schenck EJ, Hoffman K, Goyal P, et al· Respiratory Mechanics and Gas Exchange in COVID-19-associated Respiratory Failure· Ann Am Thorac Soc 2020; 17(9): 1158-61·
45.	Clinical characteristics and day-90 outcomes of 4244 critically ill adults with COVID-19: a prospective cohort study· Intensive Care Med 2021; 47(1): 60-73·
46.	Torres A, Motos A, Riera J, et al· The evolution of the ventilatory ratio is a prognostic factor in mechanically ventilated COVID-19 ARDS patients· Crit Care 2021; 25(1): 331·
47.	Weiss TT, Cerda F, Scott JB, et al· Prone positioning for patients intubated for severe acute respiratory distress syndrome (ARDS) secondary to COVID-19: a retrospective observational cohort study· Br J Anaesth 2021; 126(1): 48-55·
48.	Wiles S, Mireles-Cabodevila E, Neuhofs S, Mukhopadhyay S, Reynolds JP, Hatipoğlu U· Endotracheal Tube Obstruction Among Patients Mechanically Ventilated for ARDS Due to COVID-19: A Case Series· J Intensive Care Med 2021; 36(5): 604-11·
49.	Wolf M, Alladina J, Navarrete-Welton A, et al· Obesity and Critical Illness in COVID-19: Respiratory Pathophysiology· Obesity (Silver Spring) 2021; 29(5): 870-8·
50.	ESICM LIVES 2021: Part 1· Intensive Care Medicine Experimental 2021; 9(1): 51·
51.	Zorbas JS, Ho KM, Litton E, Wibrow B, Fysh E, Anstey MH· Airway pressure release ventilation in mechanically ventilated patients with COVID-19: a multicenter observational study· Acute Crit Care 2021; 36(2): 143-50·

Table S6a: Demographic data for patients with COVID-19-ARDS– Unselected population·

First author	Country	Date of publication	Patients receiving IMV	Age (years) Mean (SD)	Number of males	BMI (kg/m²)	Illness Severity scores
Abu Sayf[80]	USA	1-Oct-21	192	66·9 (14·2)	120	32·8 (8·2)	-
Baedorf Kassis[103]	USA	7-Mar-21	40	56·6 (16·0)	21	-	APACHE IV 110·1 (26) SOFA 12 (1·5)
Bain[38]	USA	5-Feb-21	27	65·1 (12·5)	14	34·7 (8·1)	Modified SOFA: 6·3 (3·1)
Bastos[29]	Brazil	11-Dec-20	18	-	-	-	-
Bavishi[39]	USA	-	54	58·0 (18·5)	37	-	SOFA: 9·2 (3·2)
Beloncle[62]	France	-	112	61·9 (15·8)	76	29·4 (5·3)	SAPS II: 47·4 (15·8)
Blot[40]	France	3-Nov-20	14	66·6 (5·8)	11	28·2 (38)	SAPS II: 26·5 (9·1) SOFA: 4·4 (0·8)
Boscolo[70]	Italy	28-Jul-21	241	65·6 (11·2)	189	27·4 (3·7)	SOFA: 5·7 (3·0) CCI: 1·4 (0·7)
Caravita[64]	Italy	17-Nov-20	21	65·6 (8·0)	18	28·3 (4·8)	-
Carboni Bisso[41]	Argentina	1-Jan-21	114	67·5 (4·2)	75	-	APACHE II: 12·4 (4·9) SOFA: 3·5 (2·3) CCI: 4·3 (2·5)
Chaudhary[30]	USA	14-Oct-20	61	69·3 (12·1)	30	-	-
Chew[42]	Singapore	1-Oct-20	13	-	-	-	SOFA: 6·6 (2·5) APACHE II: 15·6 (10·8)
Cummings[74]	USA	-	203	61·6 (15·7)	171	30·8 (7·7)	SOFA: 10·6 (3·7)
Diehl[44]	France	17-Jun-20	22	64·3 (14·3)	19	-	SAPS II: 53·6 (15·8) SOFA: 9 (3·2)
Dreher[45]	Germany	27-May-20	24	63·4 (9·5)	15	29·4 (3·9)	SOFA: 7·6 (2·4)
Dupuis[66]	France	1-Feb-21	117	60·6 (12·8)	94	29·3 (5·6)	SAPS II: 40·4 (15·0) CCI: 1·4 (2·3)
Estenssoro[8]	Argentina	-	1909	61·3 (13·4)	1294	29·7 (5·9)	SOFA: 5·4 (3·7) APACHE II: 15 (7·4) CCI: 1·4 (0·7)
Ferreira[67]	Brazil	-	984	60 (15)	895	27·0 (7·0)	SAPS III: 64 (17) SOFA: 14 (4)
Fogagnolo[46]	Italy	1-Jan-21	15	62 (11·5)	13	-	SOFA: 6·7 (4·9)
Gamberini[75]	Italy	18-Dec-20	240	-	-	-	SAPS II: 38·4 (11·2) SOFA: 5 (3·0)

Gattinoni[36]	Italy	15-May-20	16	-	-	-	-
Gibot[35]	France	22-Dec-21	17	66·1 (7·3)	15	30·8 (3·6)	-
Ibarra-Estrada[57]	Mexico	29-Sep-21	90	56 (15)	63	-	APACHE II: 14·8 (4·8)
Langer[76]	Italy	-	892	62·3 (10·4)	831	28 (4·5)	SOFA: 4 (1·5) APACHE II: 10 (4·5)
Lemmers[48]	Italy	1-Dec-20	169	65·3 (9·0)	133	28 (4·5)	-
Lemyze[49]	France	2-Dec-20	44	63 (10)	33	32·8 (6·5)	SAPS II: 43·5 (26·1) CCI: 1·4 (0·8)
Lenka[33]	USA	16-Nov-20	23	-	-	-	qSOFA: 0·6 (0·8)
Mahida[51]	UK	1-Dec-20	111	55·3 (12·0)	84	30·1 (5·3)	APACHE II: 14·7 (4·5) SOFA: 8·4 (2·3)
Pan[71]	China	20-Jul-21	20	64 (7)	12	-	SOFA: 11 (2)
Puah[72]	Singapore	9-Sep-21	102	61·3 (10·5)	75	26·6 (5·6)	APACHE II: 15·4 (9·0) SOFA: 4·4 (3·8)
Schavemaker[79]	Netherlands	-	1099	64·6 (11·3)	802	28·5 (4·6)	-
Schenck[68]	USA	-	267	64·6 (14·9)	193	29 (6·0)	-
Schmidt[61]	France, Belgium Switzerland	23-Nov-20	2635	62·7 (12·6)	3141	28·4 (5·2)	
Torres[73]	Spain	13-Sep-21	1118	64·6 (11·1)	796	-	APACHE II: 12·5 (4·8) SOFA: 6·6 (2·2)
Wolf[54]	USA	3-Feb-21	249	60·4 (17·1)	175	-	Modified SOFA: 6 (3·0)
Yildirim[55]	Turkey	6-Jul-21	58	65·1 (13·4)	40	-	APACHE II: 20·6 (10·9) SAPS II: 51·4 (23·0) SOFA: 6·1 (3·4)
Zorbas[69]	Australia	-	25	71·5 (2·0)	14	31·9 (13·4)	APACHE II: 17·3 (8·8)
APACHE – SOFA, SAPS, qSOFA, CCI							

Table S6b. Demographic data for patients with COVID-19-ARDS – Selected population·

First author	**Country**			**Age (years)**			**Illness Severity scores**

		Date of publication	Patients receiving IMV	Mean (SD)	Number of males	BMI (kg/m²)	
Bagate[37]	France	5-Nov-20	10	61·5 (17·2)	7	-	SAPS II: 38·2 (12·0) SOFA: 5·3 (3·4) CCI: 0·7 (1·7)
Bell[59]	USA	23-Feb-22	125	57 (13)	81	32.4 (7.5)	-
Diaz[43]	Chile	-	85	48 (10·6)	71	-	SOFA: 9·6 (3·8)
Fanelli[102]	Italy	5-Feb-22	146	53.4 (8.2)	124	29.7 (5.9)	-
Giraud[47]	Switzerland	2-Feb-21	10	57 (4)	5	31·5 (5)	SAPS II: 56 (3)
Jozwiak[32]	France	28-Dec-20	11	48·9 (17·8)	7	29·3 (5·1)	SAPS: 66·5 (17·0) SOFA: 11·9 (4·2)
Laghlam[58]	France	1-Jul-21	12	71·8 (8·7)	9	-	-
Lang[82]	Germany	-	34	67 (13)	28	28 (4·6)	SAPS II: 46 (12) SOFA: 8·9 (3·6)
Li[50]	USA	23-Dec-20	43	-	-	-	SOFA: 9·5 (2·3)
Mittermaier[52]	Germany	19-Oct-20	23	66·7 (13·4)	12	30·0 (6·5)	APACHE II: 19·0 (9·0) SOFA: 4·6 (4·0)
Park[56]	South Korea	6-Aug-21	23	68·9 (8·7)	15	25·3 (3·6)	APACHE II: 18·9 (10·3) SAPS II: 44·9 (23·7) SOFA: 8 (4·7)
Roldan[60]	Peru	12-Feb-22	15	55.2 (9.8)	14	26.6 (4.1)	APACHE II: 13.4(4·1)
Weiss[53]	USA	7-Nov-20	42	60·0 (13·4)	29	34·2 (7·5)	SOFA: 6·8 (2·5)
Wiles[34]	USA	30-Dec-20	11	68·5 (14·3)	9	-	APACHE III: 73·6 (17·3)

APACHE – SOFA, SAPS, qSOFA, CCI

Table S7: Ventilator parameters and respiratory variables.

First author	C_{RS} (ml/cmH_2O)	PaO_2/FiO_2 (mmHg)	PEEP (cmH_2O)	Tidal volume	Plateau pressure (cmH_2O)	Driving pressure (cmH_2O)	$PaCO_2$ (mmHg)	FiO2 (%)	RR (per min)	Peak pressure (cmH_2O)
Abu Sayf	41·1 (17·9)	160·8 (89·6)	12·4 (3·7)	6 (1·5) mL/kg	-	12 (4·5)	42·4 (6·7)	-	-	-
Baedorf Kassis	32·3 (10·5)	151·7 (45·4)	13·5 (2·3)	6·24 (0·69) mL/kg	25·1 (2·9)	11·7 (3·2)	48 (7·7)	71·1 (20·7)	24·9 (5·4)	-
Bagate	29·1 (14·6)	84·8 (39·9)	12·6 (4·3)	6·6 (0·6) mL/kg	27·4 (2·58)	14·3 (3·4)	47·6 (12·9)	-	32·6 (4·3)	41·6 (2·58)
Bain	34·8 (15·9)	112·7 (59·1)	-	-	-	-	-	-	-	-
Bastos	43·3 (11·4)	271·8 (131·1)	10·7 (2·4)	-	21·6 (4·62)	10·5(2·8)	-	-	-	-
Bavishi	34·8 (15·8)	166·2 (109·3)	11·1 (2·6)	-	-	12·5 (5·3)	-	-	-	-
Bell	27.1 (8.3)	114.3 (51)	12 (3)	412.9 (75) ml	27.6 (3.8	15.7 (4.5)	77.0 (30.0)	24 -6		
Beloncle	35·4 (11·3)	143·4 (60·8)	12 (3·0)	6·3 (0·8) mL/kg	23·6 (5·3)	-	38·4 (6·8)	53·5 (22·5)	27·4 (3·8)	-
Blot	39·4 (15·2)	95·3 (30·8)	11·8 (2·9)	6·24 (0·74) mL/kg	22 (3·3)	10·5 (3·05)	36·5 (6·2)	-	-	-
Boscolo	49·1 (15·7)	153·9 (85·0)	11·6 (2·2)	7·8 (1·4) mL/kg	23 (4·5)	11(3·0)	44·7 (10·4)	60 (14·9)	16·7 (4·5)	-
Caravita	32·4 (14·3)	113·8 (55·7)	11 (4·8)	448·4 (127·2) mL	26·3 (4·8)	-	55·2 (18·3)	70 (15·9)	24 (6·4)	28·4 (5·6)
Carboni Bisso	37·8 (12·8)	205·3 (90·9)	10·0 (3·0)	7·2 (0·4) mL/kg	21·6 (3·8)	11·7 (3·0)	-	50 (15·0)	-	-
Chaudhary	26·7 (9·1)	-	7·6 (3·8)	-	25·7 (6·1)	-	-	-	-	-
Chew	30·8 (6·6)	193·2 (31·7)	11·7 (3·3)	-	22·7 (3·7)	10 (3·3)	-	45·9 (10·4)	-	-
Cummings	28·4 (10·5)	137·8 (91·8)	15 (4·5)	6·4 (1·0) mL/kg	27·0 (6·0)	14·6 (5·2)	-	-	-	26·6 (6·7)
Diaz	22·7 (7·5)	83·0 (26·8)	10·4 (4·1)	5·4 (1·0) mL/kg	26·2 (5·2)	15·7 (3·0)	58·7 (18·3)	-	-	-
Diehl	39·1 (9·2)	222·8 (103·8)	16 (1·6)	396·6 (54·7) mL	26·6 (2·4)	10·1 (2·2)	53·6 (14·3)	47·9 (14·3)	32·1 (5·2)	-
Dreher	39·4 (15·0)	119·2 (32·3)	13·4 (2·4)	-	-	-	-	67·9 (17·3)	-	-
Dupuis	39·3 (19·2)	115·3 (56·3)	12 (3·0)	6·1 (0·4) mL/kg	26 (4·5)	-	38·7 (7·5)	-	-	-
Estenssoro	36·4 (11·1)	163·2 (79·4)	10 (3·0)	6·4 (0·7) mL/kg	23 (4·5)	12 (3·0)	47·1 (11·1)	62·8 (26·0)	23·3 (4·5)	-

Fanelli	27·1 (9·7)	67·4 (17·9)	12 (2·9)	-	28·6 (3·7)	16 (4·5)	61·5 (17·2)	98·2 (3·7)	25·7 (5·9)	
Ferreira	32·4 (12·2)	171 (74)	10 (3·0)	6·5 (1·3) mL/kg	22 (5)	13 (4)	44 (10)	50 (14·8)	-	-
Fogagnolo	46·1 (9·0)	121·3 (46·6)	13·3 (1·6)	440 (65·4) mL	22·7 (1·6)	9·3 (1·6)	56·3 (13·1)	-	19·5 (3·3)	-
Gamberini	39·1 (11·2)	-	12 (3·0)	7·1 (1·0) mL/kg	24·6 (3·7)	-	-	-	-	-
Gattinoni	50·2 (14·3)									
Gibot	40·4 (11·3)	130·9 (42·0)	11·4 (3·2)	6·6 (0·6) mL/kg	23 (4·9)	12 (3·2)	-	-	24·4 (4·0)	-
Giraud	33 (4)	180 (45)	11 (1)	420 (35) mL/kg	23 (1)	-	-	-	22 (4)	-
Ibarra-Estrada	31 (9·4)	144 (46)	14 (3·0)	6·5 (0·8) mL/kg	27·6 (2·3)	13·8 (4·2)	-	-	-	-
Jozwiak	24·4 (13·6)	72·0 (26·3)	15·1 (4·2)	5·4 (2·0) mL/kg	29·7 (3·4)	14·6 (7·6)	58·7 (18·7)	90·1 (22·9)	26·5 (8·5)	-
Laghlam	25·7 (6·2)	146 (48)	9·9 (1·0)	5·5 (0·5) mL/kg	-	17·1 (4·3)	52 (8·9)	-	24·7 (5·1)	-
Lang	51 (28)	114 (33)	13 (3)	460 (130) mL	-	-	-	66 (19)	-	28 (5)
Langer	41·1 (12·6)	127·4 (63·1)	12 (3·0)	7·0 (1·1) mL/kg	24·4 (3·7)	11·6 (3·7)	43·7 (11·9)	73·5 (22·3)	21·1 (5·2)	-
Lemmers	28 (9·0)	117·0 (50·1)	12 (3·0)	5·9 (0·8) mL/kg	23 (4)	-	56 (16)	-	-	30 (5)
Lemyze	33·9 (9·3)	121 (42)	16·8 (3·8)	6·2 (0·56) mL/kg	29(4)	12·4 (3·8)	38·4 (8·4)	66 (28·4)	-	-
Lenka	44·7 (23·8)	121·6 (85·3)	16·7 (4·7)	-	26·5 (5·9)	8·4 (11·1)	-	66·4 (23·7)	-	-
Li	26·1 (8·5)	86·7 (30·3)	15·1 (3·9)	-	-	-	-	88·7 (19·9)	-	-
Mahida	28·7 (7·5)	109·9 (28·2)	10 (3·0)	5·2 (1·0) mL/kg	-	16·4 (3·8)	-	72·1 (19·5)	-	27 (4·5)
Mittermaier	54·3 (15·2)	197·9 (43)	20·1 (3·9)	6·4 (0·5) mL/kg	-	10·3 (3·1)	52·4 (9·7)	40·0 (10·6)	16·7 (2·4)	30·1 (2·9)
Pan	23 (8)	180 (75)	6 (2)	5·6 (0·8) mL/kg	23 (6)	17 (5)	60 (18)	-	-	-
Park	27·3 (8·5)	110·6 (31·6)	11·3 (3·2)	6·3 (1·1) mL/kg	-	13·7 (3·2)	44·4 (7·1)	-	22·4 (6·3)	-
Puah	37·2 (13·5)	187·6 (82·0)	10·7 (1·5)	-	23(4·5)	11·6 (3·8)	-	-	-	-
Roldan	28.5 (8.5)	137.5 (36.3)	14.5 (2.7)	5.4 (0.6) ml/kg	26.8 (2.9)	12.5 (2.4)	65.5 (13.9)			32.4 (3.1)
Schavemaker	33·9 (10·7)	125·9 (47·3)	12·8 (2·7)	6·5 (0·9) mL/kg	-	14·0 (3·2)	44·7 (8·3)	57·6 (14·5)	21·8 (3·4)	27·9 (4·3)
Schenck	29·8 (11·2)	106·5 (38·8)	10 (3·0)	7·1 (1·5) mL/kg	25 (6·0)	14·1 (4·6)	44·7 (10·4)	-	-	-

Schmidt	33·7 (11·9)	161·4 (86·8)	12 (3·0)	6·2 (0·7) mL/kg	24 (4·5)	13·4 (5·2)	40·4 (8·2)	-	-	-
Torres	38·9 (15·4)	122·6 (67·7)	12(3·0)	7·2 (1·2) mL/kg	-	12·2 (4·0)	44·0 (11·9)	78·5 (29·7)	20·7 (4·5)	31 (5·9)
Weiss	33·7 (11·1)	134·3(54)	14·8 (1·9)	6·1 (0·4) mL/kg	27·7 (4·0)	-	51·9 (12·7)	-	-	-
Wiles	38·9 (10·7)	-	-	-	-	-	-	-	-	-
Wolf	35·5 (11·0)	195·9 (93·4)	10 (3·0)	-	21·4 (3·7)	11·0 (3·0)	-	-	-	-
Yildirim	30·8 (11·5)	145·1 (83·6)	11·8 (2·7)	7·4 (2·0) mL/kg	16·6 (5·9)	16·6 (5·9)	-	-	-	-
Zorbas	39·7 (17·5)	162·3 (97)	9·5 (6·3)	-	-	-	-	-	-	23·8 (5·4)

Table S8: Secondary outcomes for COVID-19-ARDS.

Outcome	Number of studies	Mean (95%-CI)
ICU mortality	27 studies	35·7% (29·4% to 42·2%)
Hospital mortality	14 studies	39·1% (32·6% to 45·8%)
28-day mortality	13 studies	43·2% (32·6% to 54·1%)
Cumulative mortality	43 studies	40·3% (35·1% to 45·6%)
ICU Length of stay	25 studies	19 days (15 to 22)
Hospital Length of stay	17 studies	28 days (23 to 34)
Ventilator-free days	7 studies	5·2 days (2·9 to 7·6)

Table S9: Outcomes of all COVID-19-ARDS studies

First author	Length of stay (days)	Mortality (number)	Complications (number)	Interventions (number)
Abu Sayf	ICU: 12·6 (6·7) Hospital: 14·6 (10·5)	122	-	-
Baedorf Kassis	-	13	-	PP: 19 Tracheostomy: 1
Bagate	-	7	-	NMBA: 7 ECMO: 1
Bain	-	12	-	PP: 19 NMBA: 20 Inhaled vasodilators: 5 ECMO: 7 CRRT: 7 CCS: 7 Hydroxychloroquine: 2 Remdesivir: 15 Convalescent plasma: 10
Bastos	ICU: 21·6 (27·4) Hospital: 21·8 (35·0)	-	-	-
Bavishi	ICU: 12·8 (8·5) Hospital: 17·0 (15·5)	9	PE: 7	Remdesivir: 12 Anti-IL6 15 CCS: 15 Hydroxychloroquine: 5 VP 38 PP: 24 NMBA: 18 iNO: 3 RRT: 10 ECMO: 6 Tracheostomy: 11
Bell	-	-	-	Prone position: 125
Beloncle	-	29	VTE: 23 (PE: 19)	PP: 61 iNO: 14
Blot	-	3	VAP: 10 VTE: 6	Antibiotics: 3 CCS: 5 Hydroxychloroquine: 4 Remdesivir: 1 Prone: 8 ECMO: 0 VP: 9
Boscolo	ICU: 16·4 (11·9) Hospital: 29·6 (17·2)	78	-	-
Caravita	-	11	-	Steroids: 15 Antibiotics: 15 Hydroxychloroquine: 6 Antiretroviral agents: 6 VP: 3
Carboni Bisso	ICU: 19·5 (11·7) Hospital: 26·9 (14·5)	46	VAP: 11 Pneumothorax: 4 PE: 4	NMBA: 84 PP: 41 iNO: 12 ECMO: 6 Tracheostomy: 46 CCS: 99 Antibiotics: 98

				Convalescent plasma: 50 Ritonavir/Lopinavir: 18 Tocilizumab: 2
Chaudhary	-	40	-	PP: 18
Chew	ICU: 20·4 (16·6)	4	Pneumothorax: 1 VAP: 5 AKI: 9 VTE: 2	ECMO: 1 Tracheostomy: 4 RRT: 7 Lopinavir/Ritonavir: 7 B-interferon: 3 Hydroxychloroquine: 3 Tocilizumab: 3 Convalescent plasma: 2
Cummings	-	84	-	NMBA: 51 iNO: 22 PP: 35 ECMO: 6 Tracheostomy: 17 VP: 170 RRT: 79 Hydroxychloroquine: 185 Remdesivir: 23 Antibiotics: 229 CCS: 68 Anti-IL6: 44
Estenssoro	ICU: 17·8 (12·6) Hospital: 23·4 (16·3)	1101	AKI: 997 VAP: 617 VTE: 170	VP: 939 PP: 1176 RRT: 373 CCS: 1612 Convalescent plasma: 605 Tracheostomy: 464
Diaz	ICU: 39·3 (27·1) Hospital: 47·5 (33·9)	33	-	PP: 78 NMBA: 80 ECMO: 82
Diehl	-		-	-
Dreher	-	3	-	PP: 17 RRT: 11 Antibiotics: 20 ECMO: 8
Dupuis	ICU: 15·4 (8·3)	50	HAP-VAP: 49	Lopanavir/Ritonavir: 38 Hydroxychloroquine: 8 Tocilizumab: 9 Anakinra: 9 CCS: 31 PP: 82 iNO: 33 NMBA: 106
Estenssoro	ICU: 17·8 (12·6) Hospital: 23·4 (16·3)	1101	AKI: 997 VAP: 617 VTE: 170	VP: 939 PP: 1176 RRT: 373 CCS: 1612 Convalescent plasma: 605 Tracheostomy: 464
Fanelli	ICU: 47·3 (41·2) Hospital: 54·9 (43·4)	78	-	Prone position: 111 ECMO: 146 iNO: 51
Ferreira	ICU: 11·4 (8·9)	666	VAP: 393	PP: 427

	Hospital: 17·8 (11·1)		VTE: 279	Recruitment: 15 iNO: 2 ECMO: 10 CCS: 246 VP: 1095 RRT: 528 Tracheostomy: 169
Fogagnolo	-	-	AKI: 8	VP: 5 RRT: 4
Gamberini	ICU: 21·8 (14·1)	141	VAP: 251	Tracheostomy: 224 RRT: 76
Gattinoni	-	-	-	-
Gibot	-	-	-	-
Giraud	ICU: 25·9 (11·4) Hospital: 34·7 (10·5)	6	-	ECMO: 10 Tracheostomy: 5 PP: 10
Ibarra-Estrada	ICU: 12·1 (5·3)	62	Barotrauma: 8 VTE: 10	Tracheostomy: 24
Jozwiak	-	6	ECMO-related complications: 9	NMBA: 11 iNO: 3 PP: 11 ECMO: 11
Laghlam	-	6	-	Tracheostomy: 5
Lang	ICU: 21 (19)	17	AKI: 29 VAP: 6 VTE: 5	Therapeutic positioning manoeuvres*: 30 PP: 23 RRT: 12 VP: 28 ECMO: 8
Langer	ICU: 16·4 (11·9) Hospital: 30·8 (21·5)	405	-	PP: 648 CCS: 892
Lemmers	ICU: 11·1 (9·7) Hospital: 16·1 (11·2)	86	Barotrauma: 23	-
Lemyze	-	10	-	NMBA: 34 PP: 33 VP: 36 RRT: 16 Tracheostomy: 18
Lenka	ICU: 10·2 (7·7) Hospital: 14·8 (7·7)	10	VTE: 5	VP: 12 NMBA: 9 IV pulmonary vasodilators: 8 PP: 7 ECMO: 3 Hydroxychloroquine: 19 L/R: 5 Remdesivir: 0 Tocilizumab: 3 Azithromycin: 19 CCS: 15 RRT: 2
Li	-	27	-	ECMO: 3 PP: 43 Inhaled EPO: 43
Mahida	ICU: 17 (10·5)	40	-	RRT: 46 Tracheostomy: 55
Mittermaier	Hospital: 56·3 (32·9)	7	-	PP: 9 ECMO: 3
Pan	-	12	-	-
Park	-	5	-	PP: 23 iNO: 8 RRT: 4 Tracheostomy: 12
Puah	ICU: 13·4 (9·9)	13	AKI: 55	PP: 38

			Barotrauma: 5 VAP: 4 Cardiac complications: 23	NMBA: 50 ECMO: 5 VP: 12 RRT: 30 Tracheostomy: 10
Roldan	-	6	-	Prone position: 15
Schavemaker	ICU: 19·7 (13·7) Hospital: 24·9 (17·3)	358	VTE: 314 AKI: 488	PP: 326 Recruitment manoeuvre: 20 ECMO: 4 NMBA: 297 Tracheostomy: 186 RRT: 201
Schenck	-	49	-	NMBA: 161 PP: 108 RRT: 54 Antibiotics: 240 CCS: 146 Toc: 28 VP: 254 Rem/Placebo: 30 Hydroxychloroquine: 246 IVIG: 6
Schmidt	ICU: 17·8 (14·1) Hospital: 24·8 (20)	820	VTE: 373 VAP: 1209	Tracheotomy: 198 PP: 1556 NMBA: 1966 iNO: 425 CCS: 888 ECMO: 235 RRT: 623
Torres	ICU: 21·1 (15·6) Hospital: 32·5 (21·5)	419	-	-
Weiss	-	11	-	Remdesivir: 1 Toc: 18 Hydroxychloroquine: 40 Azithromycin: 37 CCS 35 ECMO: 5 PP: 42
Wiles	-	-	AKI: 11 VTE: 2	RRT: 7 Tracheostomy: 1
Wolf	ICU: 16·6 (11·2)	72	-	PP: 136 NMBA: 65 iNO: 48 RRT: 24 VP: 240 ECMO: 4 Tracheostomy: 71
Yildirim	-	-	-	-
Zorbas	ICU: 14·2 (12·0) Hospital: 24·0 (22·2)	6	-	Tracheostomy: 3 Hydroxychloroquine: 2 Azithromycin: 21 L/R: 2 CCS: 7 PP: 6 iNO: 6 iProstacyclin: 3

AKI: Acute Kidney Injury, PE: Pulmonary Embolism, VAP: Ventilator-Acquired Pneumonia, VTE: Venous Thromboembolism, ECMO: Extracorporeal Membrane Oxygenation, iEPO: Inhaled Epoprostenol, iNO: Inhaled Nitric Oxide, iProstacyclin: Inhaled Prostacyclin, NMBA: Neuromuscular Blocking Agents, RM: Recruitment manoeuvre, RRT: renal replacement therapy, PP: Prone position
*Therapeutic positioning manoeuvres included complete proning, incomplete proning (135°), pilot´s seat positioning or the use of a rotational bed

Table S10: Sensitivity analysis based on sample size

Sample size in the study	Number of studies	Sample size	C_{RS} (95%-CI) ml/cmH$_2$O	p-value
>100	20	11,187	35·0 (32·4 to 37·5)	0·53
≤100	31	908	34·6 (31·8 to 37·3)	

Table S11: Landmark ARDS clinical trials from the pre-COVID period

First Author	Control / Intervention arm	Subgroups (n)	Mean C_{RS}	Inclusion criteria for PaO_2/FiO_2	Mean (SD) PaO_2/FiO_2 ratio	Mean (SD) Tidal volume (mL)	Mean (SD) PEEP
Brower RG[52]	Control	273	31 (15)	<300	168 (66)	6·1 (0·8)	8·9 (3·5)
	Intervention	276	39 (34)		220 (89)	6·0 (0·9)	14·7 (3·5)
Cavalcant A[53]	Control	509	30·3 (14·4)	<200	N/R	5·8 (1·0)	12·7 (3·3)
	Intervention	501	29·2 (12·4)		N/R	5·8 (1·1)	12·2 (3·0)
Guerin C[54]	Control	378	41 (15)	<300	155 (59)	8·1 (1·9)	7·5 (3·2)
	Intervention	413	40 (20)		150 (59)	8·1 (2)	7·9 (3·4)
Guérin C[55]	Control	229	35 (15)	<150	100 (20)	6·1 (0·6)	10 (4)
	Intervention	237	36 (23)		100 (30)	6·1 (0·6)	10 (3)
Hodgson C[56]	Control	56	34·17 (12·83)	<200	122 (41)	6·0 (0·9)	11·7 (3·0)
	Intervention	58	35·18 (11·61)		168 (55)	5·8 (1·4)	16·1 (3·6)
Steinberg KP[57]	Control	91	24·9 (11·7)	<200	126 (40)	7·4 (2·0)	12·3 (4·7)
	Intervention	89	23·3 (10·2)		126 (42)	7·2 (2·1)	12·9 (5·6)
Mancebo J[58]	Control	62	32 (10)	<200	161 (94)	8·6 (1·6)	12·3 (2·4)
	Intervention	80	31 (11)		132 (74)	8·3 (1·7)	12·4 (1·9)
Mercat A[59]	Control	382	36·1 (13·8)	<300	143 (57)	7·5 (1·5)	7·9 (3·3)
	Intervention	385	36·4 (14·6)		155 (58)	7·4 (1·4)	8·2 (3·7)
Papazian L[60]	Control	162	31·9 (10·7)	<150	115 (41)	6·48 (0·92)	9·2 (3·5)
	Intervention	177	31·5 (11·6)		106 (36)	6·55 (1·12)	9·2 (3·2)

C_{RS}: static compliance of the respiratory system, PaO_2: Partial pressure of oxygen, FiO_2: Fraction of inspired Oxygen, PEEP: Positive end expiratory pressure, N/R: Not reported

References

1. Abu Sayf A, Ouellette D, Fadel R. Mechanical ventilation and COVID-19: A case-control analysis of clinical characteristics, lung mechanics, and mortality. *Chest* 2021; **160**(4): A1012-A.
2. Baedorf Kassis E, Schaefer MS, Maley JH, et al. Transpulmonary pressure measurements and lung mechanics in patients with early ARDS and SARS-CoV-2. *J Crit Care* 2021; **63**: 106-12.
3. Bagate F, Tuffet S, Masi P, et al. Rescue therapy with inhaled nitric oxide and almitrine in COVID-19 patients with severe acute respiratory distress syndrome. *Ann Intensive Care* 2020; **10**(1): 151.
4. Bain W, Yang H, Shah FA, et al. COVID-19 versus Non-COVID-19 Acute Respiratory Distress Syndrome: Comparison of Demographics, Physiologic Parameters, Inflammatory Biomarkers, and Clinical Outcomes. *Ann Am Thorac Soc* 2021; **18**(7): 1202-10.
5. Bell J, William Pike C, Kreisel C, Sonti R, Cobb N. Predicting Impact of Prone Position on Oxygenation in Mechanically Ventilated Patients with COVID-19. *Journal of Intensive Care Medicine* 2022: 08850666221081757.
6. Boscolo A, Sella N, Lorenzoni G, et al. Static compliance and driving pressure are associated with ICU mortality in intubated COVID-19 ARDS. *Critical Care* 2021; **25**(1): 263.
7. Bastos GAN, Azambuja AZ, Polanczyk CA, et al. Clinical characteristics and predictors of mechanical ventilation in patients with COVID-19 hospitalized in Southern Brazil. *Rev Bras Ter Intensiva* 2020; **32**(4): 487-92.
8. Bavishi AA, Mylvaganam RJ, Agarwal R, Avery RJ, Cuttica MJ. Timing of Intubation in Coronavirus Disease 2019: A Study of Ventilator Mechanics, Imaging, Findings, and Outcomes. *Crit Care Explor* 2021; **3**(5): e0415.
9. Beloncle F, Studer A, Seegers V, et al. Longitudinal changes in compliance, oxygenation and ventilatory ratio in COVID-19 versus non-COVID-19 pulmonary acute respiratory distress syndrome. *Crit Care* 2021; **25**(1): 248.
10. Blot M, Jacquier M, Aho Glele LS, et al. CXCL10 could drive longer duration of mechanical ventilation during COVID-19 ARDS. *Crit Care* 2020; **24**(1): 632.
11. Caravita S, Baratto C, Di Marco F, et al. Haemodynamic characteristics of COVID-19 patients with acute respiratory distress syndrome requiring mechanical ventilation. An invasive assessment using right heart catheterization. *Eur J Heart Fail* 2020; **22**(12): 2228-37.
12. Carboni Bisso I, Huespe I, Lockhart C, et al. Clinical characteristics of critically ill patients with COVID-19. *Medicina (B Aires)* 2021; **81**(4): 527-35.
13. Chaudhary S, Lo KB, Matta A, Azmaiparashvili Z, Benzaquen S, Patarroyo-Aponte G. Ventilator mechanics and outcomes in critically ill patients with COVID-19 infection. *CHEST* 2020; **158**(4): A627.
14. Chew SY, Lee YS, Ghimiray D, Tan CK, Chua GS. Characteristics and Outcomes of COVID-19 Patients with Respiratory Failure Admitted to a "Pandemic Ready" Intensive Care Unit - Lessons from Singapore. *Ann Acad Med Singap* 2020; **49**(7): 434-48.
15. Cummings MJ, Baldwin MR, Abrams D, et al. Epidemiology, clinical course, and outcomes of critically ill adults with COVID-19 in New York City: a prospective cohort study. *Lancet* 2020; **395**(10239): 1763-70.
16. Diaz RA, Graf J, Zambrano JM, et al. Extracorporeal Membrane Oxygenation for COVID-19-associated Severe Acute Respiratory Distress Syndrome in Chile: A Nationwide Incidence and Cohort Study. *Am J Respir Crit Care Med* 2021; **204**(1): 34-43.
17. Diehl JL, Peron N, Chocron R, et al. Respiratory mechanics and gas exchanges in the early course of COVID-19 ARDS: a hypothesis-generating study. *Ann Intensive Care* 2020; **10**(1): 95.
18. Dreher M, Kersten A, Bickenbach J, et al. The Characteristics of 50 Hospitalized COVID-19 Patients With and Without ARDS. *Dtsch Arztebl Int* 2020; **117**(16): 271-8.
19. Dupuis C, Bouadma L, de Montmollin E, et al. Association Between Early Invasive Mechanical Ventilation and Day-60 Mortality in Acute Hypoxemic Respiratory Failure Related to Coronavirus Disease-2019 Pneumonia. *Crit Care Explor* 2021; **3**(1): e0329.
20. Estenssoro E, Loudet CI, Ríos FG, et al. Clinical characteristics and outcomes of invasively ventilated patients with COVID-19 in Argentina (SATICOVID): a prospective, multicentre cohort study. *Lancet Respir Med* 2021; **9**(9): 989-98.
21. Fanelli V, Giani M, Grasselli G, et al. Extracorporeal membrane oxygenation for COVID-19 and influenza H1N1 associated acute respiratory distress syndrome: a multicenter retrospective cohort study. *Critical Care* 2022; **26**(1): 34.
22. Ferreira JC, Ho YL, Besen B, et al. Protective ventilation and outcomes of critically ill patients with COVID-19: a cohort study. *Ann Intensive Care* 2021; **11**(1): 92.

23. Fogagnolo A, Grasso S, Dres M, et al. Focus on renal blood flow in mechanically ventilated patients with SARS-CoV-2: a prospective pilot study. *J Clin Monit Comput* 2021: 1-7.
24. Gamberini L, Tonetti T, Spadaro S, et al. Factors influencing liberation from mechanical ventilation in coronavirus disease 2019: multicenter observational study in fifteen Italian ICUs. *J Intensive Care* 2020; **8**: 80.
25. Gattinoni L, Coppola S, Cressoni M, Busana M, Rossi S, Chiumello D. COVID-19 Does Not Lead to a "Typical" Acute Respiratory Distress Syndrome. *Am J Respir Crit Care Med* 2020; **201**(10): 1299-300.
26. Gibot S, Conrad M, Courte G, Cravoisy A. Positive End-Expiratory Pressure Setting in COVID-19-Related Acute Respiratory Distress Syndrome: Comparison Between Electrical Impedance Tomography, PEEP/FiO2 Tables, and Transpulmonary Pressure. *Frontiers in Medicine* 2021; **8**.
27. Giraud R, Legouis D, Assouline B, et al. Timing of VV-ECMO therapy implementation influences prognosis of COVID-19 patients. *Physiol Rep* 2021; **9**(3): e14715.
28. Ibarra-Estrada M, García-Salas Y, Mireles-Cabodevila E, et al. Use of Airway Pressure Release Ventilation in Patients With Acute Respiratory Failure Due to Coronavirus Disease 2019: Results of a Single-Center Randomized Controlled Trial. *Crit Care Med* 2021.
29. Jozwiak M, Chiche JD, Charpentier J, et al. Use of Venovenous Extracorporeal Membrane Oxygenation in Critically-Ill Patients With COVID-19. *Front Med (Lausanne)* 2020; **7**: 614569.
30. Laghlam D, Rahoual G, Malvy J, Estagnasié P, Brusset A, Squara P. Use of Almitrine and Inhaled Nitric Oxide in ARDS Due to COVID-19. *Frontiers in Medicine* 2021; **8**.
31. Lang CN, Zotzmann V, Schmid B, et al. Intensive Care Resources and 60-Day Survival of Critically-Ill COVID-19 Patients. *Cureus* 2021; **13**(2): e13210.
32. Langer T, Brioni M, Guzzardella A, et al. Prone position in intubated, mechanically ventilated patients with COVID-19: a multi-centric study of more than 1000 patients. *Critical Care* 2021; **25**(1): 128.
33. Lemmers DHL, Abu Hilal M, Bnà C, et al. Pneumomediastinum and subcutaneous emphysema in COVID-19: barotrauma or lung frailty? *ERJ Open Res* 2020; **6**(4).
34. Lemyze M, Courageux N, Maladobry T, et al. Implications of Obesity for the Management of Severe Coronavirus Disease 2019 Pneumonia. *Crit Care Med* 2020; **48**(9): e761-e7.
35. Lenka J, Chhabria MS, Sharma N, et al. Clinical characteristics and outcomes of critically ill patients with COVID-19 in a tertiary community hospital in upstate New York. *J Community Hosp Intern Med Perspect* 2020; **10**(6): 491-500.
36. Li J, Fink JB, Augustynovich AE, Mirza S, Kallet RH, Dhand R. Effects of Inhaled Epoprostenol and Prone Positioning in Intubated Coronavirus Disease 2019 Patients With Refractory Hypoxemia. *Crit Care Explor* 2020; **2**(12): e0307.
37. Mahida RY, Chotalia M, Alderman J, et al. Characterisation and outcomes of ARDS secondary to pneumonia in patients with and without SARS-CoV-2: a single-centre experience. *BMJ Open Respir Res* 2020; **7**(1).
38. Mittermaier M, Pickerodt P, Kurth F, et al. Evaluation of PEEP and prone positioning in early COVID-19 ARDS. *EClinicalMedicine* 2020; **28**: 100579.
39. Pan C, Lu C, She X, et al. Evaluation of Positive End-Expiratory Pressure Strategies in Patients With Coronavirus Disease 2019-Induced Acute Respiratory Distress Syndrome. *Front Med (Lausanne)* 2021; **8**: 637747.
40. Park J, Lee HY, Lee J, Lee SM. Effect of prone positioning on oxygenation and static respiratory system compliance in COVID-19 ARDS vs. non-COVID ARDS. *Respir Res* 2021; **22**(1): 220.
41. Puah SH, Cove ME, Phua J, et al. Association between lung compliance phenotypes and mortality in COVID-19 patients with acute respiratory distress syndrome. *Ann Acad Med Singap* 2021; **50**(9): 686-94.
42. Roldán R, Rodriguez S, Barriga F, et al. Sequential lateral positioning as a new lung recruitment maneuver: an exploratory study in early mechanically ventilated Covid-19 ARDS patients. *Ann Intensive Care* 2022; **12**(1): 13.
43. Schavemaker R, Schultz MJ, Lagrand WK, van Slobbe-Bijlsma ER, Serpa Neto A, Paulus F. Associations of Body Mass Index with Ventilation Management and Clinical Outcomes in Invasively Ventilated Patients with ARDS Related to COVID-19-Insights from the PRoVENT-COVID Study. *J Clin Med* 2021; **10**(6).
44. Schenck EJ, Hoffman K, Goyal P, et al. Respiratory Mechanics and Gas Exchange in COVID-19-associated Respiratory Failure. *Ann Am Thorac Soc* 2020; **17**(9): 1158-61.
45. Clinical characteristics and day-90 outcomes of 4244 critically ill adults with COVID-19: a prospective cohort study. *Intensive Care Med* 2021; **47**(1): 60-73.
46. Torres A, Motos A, Riera J, et al. The evolution of the ventilatory ratio is a prognostic factor in mechanically ventilated COVID-19 ARDS patients. *Crit Care* 2021; **25**(1): 331.

47. Weiss TT, Cerda F, Scott JB, et al. Prone positioning for patients intubated for severe acute respiratory distress syndrome (ARDS) secondary to COVID-19: a retrospective observational cohort study. *Br J Anaesth* 2021; **126**(1): 48-55.
48. Wiles S, Mireles-Cabodevila E, Neuhofs S, Mukhopadhyay S, Reynolds JP, Hatipoğlu U. Endotracheal Tube Obstruction Among Patients Mechanically Ventilated for ARDS Due to COVID-19: A Case Series. *J Intensive Care Med* 2021; **36**(5): 604-11.
49. Wolf M, Alladina J, Navarrete-Welton A, et al. Obesity and Critical Illness in COVID-19: Respiratory Pathophysiology. *Obesity (Silver Spring)* 2021; **29**(5): 870-8.
50. ESICM LIVES 2021: Part 1. *Intensive Care Medicine Experimental* 2021; **9**(1): 51.
51. Zorbas JS, Ho KM, Litton E, Wibrow B, Fysh E, Anstey MH. Airway pressure release ventilation in mechanically ventilated patients with COVID-19: a multicenter observational study. *Acute Crit Care* 2021; **36**(2): 143-50.
52. Brower RG, Lanken PN, MacIntyre N, et al. Higher versus lower positive end-expiratory pressures in patients with the acute respiratory distress syndrome. *N Engl J Med* 2004; **351**(4): 327-36.
53. Cavalcanti AB, Suzumura É A, Laranjeira LN, et al. Effect of Lung Recruitment and Titrated Positive End-Expiratory Pressure (PEEP) vs Low PEEP on Mortality in Patients With Acute Respiratory Distress Syndrome: A Randomized Clinical Trial. *Jama* 2017; **318**(14): 1335-45.
54. Guerin C, Gaillard S, Lemasson S, et al. Effects of Systematic Prone Positioning in Hypoxemic Acute Respiratory FailureA Randomized Controlled Trial. *JAMA* 2004; **292**(19): 2379-87.
55. Guérin C, Reignier J, Richard JC, et al. Prone positioning in severe acute respiratory distress syndrome. *N Engl J Med* 2013; **368**(23): 2159-68.
56. Hodgson CL, Cooper DJ, Arabi Y, et al. Maximal Recruitment Open Lung Ventilation in Acute Respiratory Distress Syndrome (PHARLAP). A Phase II, Multicenter Randomized Controlled Clinical Trial. *Am J Respir Crit Care Med* 2019; **200**(11): 1363-72.
57. Steinberg KP, Hudson LD, Goodman RB, et al. Efficacy and safety of corticosteroids for persistent acute respiratory distress syndrome. *N Engl J Med* 2006; **354**(16): 1671-84.
58. Mancebo J, Fernández R, Blanch L, et al. A multicenter trial of prolonged prone ventilation in severe acute respiratory distress syndrome. *Am J Respir Crit Care Med* 2006; **173**(11): 1233-9.
59. Mercat A, Richard JC, Vielle B, et al. Positive end-expiratory pressure setting in adults with acute lung injury and acute respiratory distress syndrome: a randomized controlled trial. *Jama* 2008; **299**(6): 646-55.
60. Papazian L, Forel JM, Gacouin A, et al. Neuromuscular blockers in early acute respiratory distress syndrome. *N Engl J Med* 2010; **363**(12): 1107-16.