CHEST Online Supplement

Global Impact of Coronavirus Disease 2019 Infection Requiring Admission to the ICU

A Systematic Review and Meta-analysis

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e-Appendix 1. Systematic Review protocols and Meta-analysis guidelines

e-Appendix 1A. PRISMA checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	2 e-Appendix 1
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	2,3
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	2,3
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	2,3 e-Appendix 2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	2,3 Figure 1
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	3
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	3
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used	3

		in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	3,4
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	4

e-Appendix 1B. MOOSE checklist

Item No	Recommendation	Reported on Page No
Reporting of background should include		
1	Problem definition	1-2
2	Hypothesis statement	-
3	Description of study outcome(s)	6
4	Type of exposure or intervention used	2
5	Type of study designs used	2-3 Table 1
6	Study population	3
Reporting of search strategy should include		
7	Qualifications of searchers (eg, librarians and investigators)	3
8	Search strategy, including time period included in the synthesis and key words	2-3 e-Appendix 2
9	Effort to include all available studies, including contact with authors	3
10	Databases and registries searched	2
11	Search software used, name and version, including special features used (eg, explosion)	e-Appendix 2
12	Use of hand searching (eg, reference lists of obtained articles)	3 Figure 1
13	List of citations located and those excluded, including justification	3 Figure 1 e-Appendix 3
14	Method of addressing articles published in languages other than English	-
15	Method of handling abstracts and unpublished studies	3
16	Description of any contact with authors	3
Reporting of methods should include		
17	Description of relevance or appropriateness of studies assembled for assessing the hypothesis to be tested	3 Table 1
18	Rationale for the selection and coding of data (eg, sound clinical principles or convenience)	3
19	Documentation of how data were classified and coded (eg, multiple raters, blinding and interrater reliability)	3

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20	Assessment of confounding (eg, comparability of cases and controls in studies where appropriate)	3-4
21	Assessment of study quality, including blinding of quality assessors, stratification or regression on possible predictors of study results	3 Table 1 e-Appendix 4
22	Assessment of heterogeneity	4
23	Description of statistical methods (eg, complete description of fixed or random effects models, justification of whether the chosen models account for predictors of study results, dose-response models, or cumulative meta-analysis) in sufficient detail to be replicated	4
24	Provision of appropriate tables and graphics	Figures 1-3 Tables 1-2 e-Appendix 5-14
Reporting of results should include		
25	Graphic summarizing individual study estimates and overall estimate	Table 2
26	Table giving descriptive information for each study included	Table 1 e-Appendix 4
27	Results of sensitivity testing (eg, subgroup analysis)	6 Appendix 14
28	Indication of statistical uncertainty of findings	6-9

Item No	**Recommendation**	**Reported on Page No**
Reporting of discussion should include		
29	Quantitative assessment of bias (eg, publication bias)	e-Appendix 13
30	Justification for exclusion (eg, exclusion of non-English language citations)	-
31	Assessment of quality of included studies	e-Appendix 4
Reporting of conclusions should include		
32	Consideration of alternative explanations for observed results	6-9
33	Generalization of the conclusions (ie, appropriate for the data presented and within the domain of the literature review)	9
34	Guidelines for future research	-
35	Disclosure of funding source	1

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e-Appendix 2. Search Strategies for the different database ran on July 18, 2020.

e-Appendix 2A. Medline (OVID)

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to July 18, 2020
1. exp coronaviridae infections/ or exp coronavirus infections/
2. exp Coronavirus/
3. 2019-nCoV.mp.
4. SARS-CoV.mp. or exp SARS Virus/
5. MERS-CoV.mp. or exp Middle East Respiratory Syndrome Coronavirus/
6. severe acute respiratory syndrome.mp. or exp Severe Acute Respiratory Syndrome/
7. 1 or 2 or 3 or 4 or 5 or 6
8. (critical* adj4 care).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
9. intensive care.mp. or exp Critical Care/
10. (critical* adj4 ill).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
11. (critical* adj4 condition).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
12. (severe* adj4 ill).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
13. (terminal* adj4 ill).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
14. (terminal* adj4 condition).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
15. 8 or 9 or 10 or 11 or 12 or 13 or 14
7 AND 15

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e-Appendix 2B. Embase (OVID)

Ovid Embase and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to July 18, 2020
1. exp coronaviridae infections/ or exp coronavirus infections/
2. exp Coronavirus/
3. 2019-nCoV.mp.
4. SARS-CoV.mp. or exp SARS Virus/
5. MERS-CoV.mp. or exp Middle East Respiratory Syndrome Coronavirus/
6. severe acute respiratory syndrome.mp. or exp Severe Acute Respiratory Syndrome/
7. 1 or 2 or 3 or 4 or 5 or 6
8. (critical* adj4 care).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
9. intensive care.mp. or exp Critical Care/
10. (critical* adj4 ill).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
11. (critical* adj4 condition).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
12. (severe* adj4 ill).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
13. (terminal* adj4 ill).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
14. (terminal* adj4 condition).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
15. 8 or 9 or 10 or 11 or 12 or 13 or 14
7 AND 15

e-Appendix 2.C Cochrane Library

#1 MeSH descriptor: [covid-19]
#2 MeSH descriptor: [coronavirus]
#3 MeSH descriptor: [SARS-CoV-2]
#4 MeSH descriptor: [Intensive care] explode all trees
#5 MeSH descriptor: [Critical care] explode all trees
#6 MeSH descriptor: [Critically ill] explode all trees
#7 #1 OR #2 OR #3
#8 #4 OR #5 OR #6
#9 #7 AND #8 with Cochrane Library publication date in the last 9 months

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e-Appendix 3. Duplicate patient data details

Author	Sample size	Quality score	Country	Location	Start date	End date	Study type	Study site
Xu J et al	239		China	Wuhan	12/01/2020	03/02/2020	Retrospective (Multi-centre)	Jin Yin-tan Hospital, Wuhan Union Hospital and Wuhan Third Hospital
Zhou F et al*	50	9/9	China	Wuhan	29/12/2019	31/01/2020	Retrospective cohort (Multi-centre)	Jin Yin-tan Hospital (Wuhan, China) and Wuhan Pulmonary Hosptial
Huang C et al*	13	5/9	China	Wuhan	16/12/2019	02/01/2020	Prospective cohort (Single centre)	Jin Yin-tan Hospital (Wuhan, China)
Yang X et al*	52		China	Wuhan	24/12/2020	26/01/2020	Retrospective observational (Single centre)	Jin Yin-tan Hospital (Wuhan, China)
Guan et al*	173		China		11/12/2019	29/01/2020	Centre not specified - ethics by Jin Yin-tan	Jin Yin-tan Hopsital - and more
Zhang G et al	55	4/6	China	Wuhan	02/01/2020	10/02/2020	Retrospective case series (Single centre)	Zhongnan hospital in Wuhan
Cao et al*	18	3/6	China	Wuhan	03/01/2020	01/02/2020	Retrospective Case series (Single centre)	Zhongnan hospital in Wuhan
Wang D et al*	36		China	Wuhan	01/01/2020	28/01/2020	Retrospective Case series (Single centre)	Zhongnan hospital in Wuhan
Wang Y et al	344	5/6	China	Wuhan	25/01/2020	25/02/2020	Case series (Single-centre)	Tongji Hospital
Lu et al*	244	6/9	China	Wuhan	25/01/2020	25/02/2020	Retrospective cohort study (Single centre)	Tongji Hospital (Wuhan, China)
Wang F et al*	14	4/6	China	Wuhan	29/01/2020	10/02/2020	Retrospective case series (Single centre)	Tongji Hospital (Wuhan, China)
Yan et al*	193	5/9	China	Wuhan	10/01/2020	24/02/2020	Retrospective observational (Single centre)	Tongji Hospital (Wuhan, China)
Li Y et al*	54	6/9	China	Wuhan	28/01/2020	11/02/2020	Retrospective (Single centre)	Tongi Hospital of Huazhong University of Science and Technology
Feng Y et al*	124		China	Wuhan, Shanghai	01/01/2020	15/02/2020	Retrosepctive (Multi-centre)	Tongji Hospital, Jin Yin-tan Hospital, Shanghai public health clinical centre
Qin et al*	286		China	Wuhan	10/01/2020	12/02/2020	Retrospective (Single centre)	Tongji Hospital (Wuhan, China)
Liu et al*	41		China	Wuhan	01/02/2020	24/02/2020	Retrospective observational (Single centre)	Tongi Hospital
Zheng et al	34	4/6	China	Huangzhou	22/01/2020	05/03/2020	Retrospective case series	First Affiliated Hospital of Zhejiang University, Huangzhou
Liu et al*	23	2/6	China	Hangzhou	22/01/2020	20/03/2020	Retrospective Case series	First Affiliated Hospital of Medical College of Zhejiang University
Grasselli et al	1715		Italy	Milan	20/02/2020	22/04/2020	Retrospective observational cohort	ICU network in Lombardy
ICNARC et al	10624		England, Wales, Northern Ireland	-	01/03/2020	30/07/2020	National clinical audit	ICNARC (Intensive Care National Audit & Research Centre) database- all NHS adult, general intensive care, combined intensive care/high dependency units in England – 289 participating critical care units
Fraser et al*	10		England	London	-	-		Level 3 academic ICU at London Health Sciences Centre - Victoria Campus

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Wendel et al*	639	-	Multi-national	Europe	13/03/2020	22/04/2020	Prospective observational cohort	RISC-19-ICU registry - 54 collaborating centres in 10 countries (NOTE: overlaps NHS and ICU network in Lombardy)
Dochery et al*	3001		United Kingdom		06/02/2020	19/04/2020	Prospective observational cohort	ISARIC (International Severe Acute Respiratory and emerging Infections Consortium) WHO - 208 participating hospital
Helms et al	150		France		03/03/2020	31/03/2020	Prospective cohort	University Hospital of Strasbourg
Marullo et al*	17		France	Strasbourg	03/03/2020	01/04/2020		University Hospital of Strasbourg
Cummings et al	257		United States	New York	02/03/2020	01/04/2020	Prospective cohort	New Work Presbyterian / Columbia University Irving Medical Center
Argenziano et al*	236		United States	New York	01/03/2020	05/04/2020	Retrospective study	New York-Presbyterian / Columbia University Irving Medical Center

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e-Appendix 4. Study characteristics

e-Appendix 4A. Risk of bias quality assessment details

No	First author	Study Design	Quality tool[1]	Quality Assessment	Quality Score	Quality Type
1	Almazeedi et al	Retrospective cohort	NOS	S(4), C(2), O(2)	8/9	Good
	Almit et al	Retrospective chart review	NOS	S (4), C(2), O(3)	9/9	Good
2	Arentz et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(1)	4/6	Fair
3	Auld et al	Retrospective cohort	NOS	S(4), C(0), O(2)	6/9	Poor
4	Barrasa et al	Prospective cohort	NOS	S(3), C(0), O(2)	5/9	Poor
5	Bhatla et al	Prospective cohort	NOS	S(4), C(2), O(2)	8/9	Good
6	Bhatraju et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(1)	4/6	Fair
7	Borobia et al	Retrospective cohort	NOS	S(4), C(2), O(3)	9/9	Good
8	Cardoso et al	Case series	Case series tool[2]	S(1), A(0), c(0), R(1)	2/6	Poor
	Chen et al	Retrospective case control	NOS	S(2), C(1), O(1)	4/9	Poor
9	Cui et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(0)	3/6	Poor
10	Cummings et al	Prospective cohort	NOS	S(4), C(1), O(2)	7/9	Good
11	Ferguson et al	Chart review	NOS	S(4), C(0), O(2)	6/9	Poor
12	Grasselli et al	Retrospective cohort	NOS	S (4), C(0), O(2)	6/9	Poor
13	Halasz et al	Case series	Case series tool[2]	S(1), A(1), c(1), R(1)	4/6	Fair
14	Halvatsiotis et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(1)	4/6	Fair
15	Helms et al	Prospective cohort	NOS	S (4), C(2), O (2)	8/9	Good
16	Hur et al	Retrospective case control	NOS	S(4), C(1), O(2)	7/9	Good
17	ICNARC et al	National clinical audit	-	-	-	-
18	Khamis et al	Case series	Case series tool[2]	S(1), A(1), c(0), R(0)	2/6	Poor
19	Klok et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(0)	3/6	Poor
20	Li J et al	Retrospective case control	NOS	S(4), C(0), O(2)	6/9	Poor
21	Ling et al	Retrospective cohort	NOS	S(3), C(0), O(1)	4/9	Poor
22	Llitjos et al	Retrospective case control	NOS	S(3), C(0), O(1)	4/9	Poor
23	Longchamp et al	Case series	Case series tool[2]	S(1), A(1), c(0), R(0)	2/6	Poor
24	Maatman et al	Retrospective cohort	NOS	S(3), C(0), O(3)	6/9	Poor
25	Mitra et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(1)	4/6	Fair
26	Myers et al	Retrospective cohort	NOS	S(4), C(1), O(1)	6/9	Poor
	Pavoni et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(1)	4/6	Fair
27	Pedersen et al	Case series	Case series tool[2]	S(1), A(1), c(1), R(0)	3/6	Poor
28	Richardson et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(1)	4/6	Fair
29	Rodriguez et al	Prospective cohort	NOS	S(4), C(0), O(2)	6/9	Poor
30	Simonnet et al	Retrospective cohort	NOS	S(4), C(2), O(2)	8/9	Good
31	Thomas et al	Case series	Case series tool[2]	S(0), A(1), c(0), R(0)	1/6	Poor
32	Wang Y et al	Case series	Case series tool[2]	S(1), A(2), c(1), R(1)	5/6	Good
	Wei et al	Retrospective case control	NOS	S(3), C(1), O(2)	6/9	Poor
33	Wu et al	Retrospective case control	NOS	S(4), C(1), O(2)	7/9	Good
34	Xu B et al	Retrospective case control	NOS	S(4), C(1), O(2)	7/9	Good

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	Xu J et al	Retrospective cohort	NOS	S(4), C(1), O(2)	7/9	Good
35	Yang L et al	Retrospective case control	NOS	S(4), C(1), O(2)	7/9	Good
36	Yu et al	Prospective cross-sectional	Cross sectional tool[3]	S(4), C(0), O(2)	6/10	Poor
37	Zhang G et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(1)	4/6	Fair
38	Zhang J et al	Case series	Case series tool[2]	S(1), A(0), c(0), R(0)	1/6	Poor
39	Zheng et al	Case series	Case series tool[2]	S(1), A(2), c(0), R(1)	4/6	Fair
41	Zhou Y et al	Retrospective case control	NOS	S(3), C(0), O(2)	5/9	Poor

S – Selection, C – Comparability, O – Outcome, A – Ascertainment, c – Causality, R – Reporting, [1]NOS Newcastle Ottawa Scale described by Wells et al , [2]NOS quality scale adapted for case series as described by Murad et al, [3]NOS quality scale adapted for cross-sectional studies as described by Modesti et al

e-Appendix 4B. Details of single / multi-centre studies

First author	**Country**	**State**	Multi/Single Center	Single Center Detail
Almazeedi et al	Kuwait	Kuwait	Single	Jabet Al Ahmad Al-Sabah hospital
Amit et al	Israel	Israel	Multi [1]	-
Arentz et al	United States	Washington	Single	Evergreen Hospital
Auld et al	United States	Georgia	Multi [2]	-
Barrasa et al	Spain	Vitoria	Single	University Hospital Araba
Bhatla et al	United States	Pennsylvania	Singe	Hospital of University of Pennsylvania
Bhatraju et al	United States	Seattle	Multi [3]	-
Borobia et al	Spain	Madrid	Single	La Paz University Hospital
Cardoso et al	Portugal	Lisbon	Single	Curry Cabral Hospital
Chen et al	China	Hebei	Multi	-
Cui et al	China	Wuhan	Single	Tongi Medical College, Huazhong University of Science and Technology
Cummings et al	United States	New York	Multi [4]	-
Ferguson et al	United States	California	Multi [5]	-
Grasselli et al	Italy	Milan	Multi [6]	-
Halasz et al	Italy	Piacenza	Single	Guglelmo da Saliceto Hopsital
Halvatsiotis et al	Greece	Attica, Macedonia, Peloponnese, Thessaly	Multi [7]	-
Helms et al	France	Strasbourg	Multi [8]	-
Hur et al	United States	Chicago	Multi [9]	-
ICNARC et al	England	-	Multi [10]	-
Khamis et al	Oman	Muscat	Multi [11]	-
Klok et al	Netherlands	Leiden	Multi [12]	-
Li J et al	China	Wuhan	Single	Wuhan Fourth Hospital
Ling et al	China	Hong Kong	Multi[13]	-
Llitjos et al	France	-	Multi[14]	-
Longchamp et al	Switzerland	Sion	Single	Sion (Switzerland) Hospital
Maatman et al	United States	Indiana	Multi[15]	-
Mitra et al	Canada	British Columbia	Multi[16]	-
Myers et al	United States	California	Single	Katser Permanente Northern California
Pavoni et al	Italy	Tuscany	Single	Santa Maria Annunziata Hospital
Pedersen et al	Denmark	Roskilde	Single	Zealand University Hospital

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Richardson et al	United States	New York	Multi[17]	-
Rodriguez et al	Spain	Tarragona	Single	Hospital Universitari de Tarragona Joan
Simonnet et al	France	Lillle	Single	Roger Salengro Hopsital
Thomas et al	United Kingdom	Cambridge	Single	Addenbrooke's Hospital
Wang Y et al	China	Wuhan	Single	Tongji hospital
Wei et al	China	Hubei province	Single	Suizhou Zengdu Hospital
Wu et al	China	Jiangsu province &Anhu	Multi [18]	-
Xu B et al	China	Wuhan	Single	Hubei Provincial Hospital of traditional Chinese and Western medicine
Xu J et al	China	Wuhan	Multi [19]	-
Yang L et al	China	Hubei province	Single	Yichang Central People's Hospital
Yu et al	China	Wuhan	Multi [20]	-
Zhang G et al	China	Wuhan	Single	Zhongnan Hospital of Wuhan University
Zhang J et al	China	Wuhan	Single	Liyuan Hospital
Zheng et al	China	Huangzhou	Single	First Affiliated Hospital, Zhejiang University
Zhou Y et al	China	Jiangsu province	Single	The First Affiliated Hospital of Nanjing Medical University

[1] Israel COVID-19 ICU registry among 13 participating hospitals, [2] Three Emory Healthcare acute-care hospitals in Atlanta, [3] Nine hospital ICUs in Seattle: three University of Washington (UW) Medicine Hospitals (Harborview Medical Center, UW Medical Center–Montlake, and Northwest campuses), the Virginia Mason Medical Center, and the Swedish Hospitals (First Hill and Cherry Hill). This group represents six of the eight adult acute care hospitals in the city of Seattle; hospitals connected to these systems in suburbs outside Seattle (UW– Valley Medical Center, Swedish–Issaquah, and Swedish–Edmonds) were also included in the group of nine,, [4] Two New York Presbyterian hospitals affiliated with Columbia University Irving Medical Center in northern Manhattan, [5] Standford University Hospital, Stanford Health Care-Valley Care, [6] ICU network in Lombardy - Fondazione IRCCS, [7] University hospital "ATTIKON", "EVANGELISMOS" general hospital, "THRIASSION" General hospital, "AHEPA" University hospital, "G.PANPANIKLAOU" General Hospital, "AGIOS DIMITRIOS" General Hospital, Patras Univeristy hospital, "KOUTLIBANEIO" General hospital, [8] Two centers of a French tertiary hospital, [9] Ten NorthWestern Medicine (NW) hospitals - NM Central DuPage Hospital,NM Huntley Hospital, NM Delnor Hospital, NM McHenry Hospital, NM Woodstock Hospital, NM Valley West Hospital, NM Kishwaukee Hospital, NM Lake Forest Hospital, Northwestern Memorial Hospital, Marianjoy Rehabilitation Hospital, [10] NHS hospitals and some non-NHS hospitals, [11] The Royal Hospital, Al Nahdha Hospital, [12] Leiden University Medical Center, Erasmus University Medical Center, Amphia Hospital Breda, [13] Prince of Wales Hospital, Princess Margaret Hospital, Pamela Youde Nethersole Eastern Hospital, [14] Two French intensive care units, [15] Three Indianapolis area hospital, [16] Vancouver General hospital, Surrey Memorial Hospital, Llons Gate Hospital, St Pauls Hospital, Royal Columbian Hospital, Richmond Hospital, [17] Hospitals in Northwell Health, [18] First People's Hospital of Yancheng city, Second People's Hospital of Fuyang City, Second People's hospital of Yancheng City, Fifth People's Hospital of Wuxi, [19] Wuhan Union, Jinyintan Hospital and Wuhan Third Hospital, [20]16 centres – unknown

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e-Appendix 5. Demographics and co-morbidities of ICU patients with COVID-19

		Demographics				**Comorbidities**										
First author	N	Male	Age	Current smoker	BMI	HTN	DM	CVD	CKD	Malignancy	COPD	CLD	Asthma	Immuno-suppressed	OSA	Organ transplant
Almazeedi et al (2020) [63]	42	32 (76%)	54·8(11)	5 (12%)	29·0 (5·1)	17 (41%)	18 (43%)	9 (21%)	3 (7%)	1 (2%)	2 (5%)	-	6 (14%)	0 (0%)	-	-
Amit et al (2020) [64]	156	108 (69%)	72 (60-82)	2 (1%)	-	85 (55%)	62 (40%)	64 (41%)	24 (15%)	8 (5%)	13 (8%)	2 (1%)	-	6 (4%)	-	-
Arentz et al (2020) [52]	21	-	-	-	-	-	7 (33%)	9 (43%)	12 (57%)	-	7 (33%)	1 (5%)	2 (9%)	3 (14%)	6 (29%)	2 (10%)
Auld et al (2020) [53]	217	119 (54%)	64 (54-73)	-	30 (26-35)	134 (62%	99 (46%)	72 (33%)	58 (27%)	-	21 (10%)	-	19 (9%)	-	-	-
Barrasa et al (2020) [20]	48	27 (56%)	67 (53-74)	9 (19%)	-	21 (44%)	9 (19%)	5 (10%)	-	-	-	-	-	3 (6%)	-	-
Bhatla et al (2020) [54]	79	40 (51%)	63 (16)	4 (7%)	33 (12)	68 (78%)	35 (44%)	43 (54%)	16 (20%)	-	14 (18%)	14 (18%)	-	-	23 (29%)	-
Bhatraju et al (2020) [55]	24	15 (63%)	64 (23-97)	5 (22%)	33·2 (7·2)	-	14 (58%)	2 (8%)[16]	5 (21%)	0 (0%)	1 (4%)	-	3 (14%)	-	5 (21%)	-
Borobia et al (2020) [21]	75	57 (76%)	64 (54-71)	10 (13%)	-	39 (52%)	21 (28%)	-	5 (7%)	12 (15%)	13 (17%)	3 (4%)	4 (5%)	1 (1%)	-	-
Cardoso et al (2020) [22]	20	18 (90%)	67 (52-74)	-	29 (26-32)	-	-	-	-	-	-	-	-	-	-	-
Chen et al (2020) [37]	51	27 (53%)	58.9 (13.7)	4 (8%)	-	21 (41%)	11 (22%)	17 (33%)	2 (4%)	1 (2%)	-	3 (6%)	-	-	-	-
Cui et al (2020) [38]	81	37 (46%)	59·9 (14·1)	35 (43%)	-	20 (25%)	8 (10%)	10 (12%)	-	-	-	-	-	-	-	-
Cummings et al (2020) [56]	257	171 (67%)	62 (51-72)	33 (13%)	30·8 (7·7)	162 (63%)	92 (36%)	49 (19%)	37 (14%)	18 (7%)	24 (9%)	5 (2%)	21 (8%)	8 (3%)[9]	-	10 (4%)
Ferguson et al (2020) [57]	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grasselli et al (2020)[23]	1715	-	65 (56-70)	-	-	-	-	-	-	-	-	-	-	-	-	-
Halasz et al (2020)[24]	242	194 (80%)	64 (56-71)	-	27·7 (25·4-29·7)	110 (46%	37 (15%)	35 (15%)	-	-	21 (9%)	-	-	-	-	-
Halvatsiotis et al (2020)[25]	90	72 (80%)	65·5 (56-73)	26 (29%)	28 (26·1-32·0)	45 (50%)	17 (19%)	19 (21%)	4 (4%)	7 (8%)	8 (9%)	7 (6%)	3 (3%)	-	-	-
Helms et al (2020)[26]	150	122 (81%)	63 (53-71)	-	-	-	30 (20%)	72 (48%)	6 (4%)	9 (6%)	-	4 (3%)	-	-	-	-
Hur et al (2020) [58]	138	88 (64%)	-	-	-	85 (62%)	56 (41%)	40 (29%)	12 (9%)	20 (15%)	-	-	-	15 (11%)	17 (12%)	7(5%)
ICNARC et al (2020)[27]	10624	7458 (70%)	60 (21-68)	-	-	-	-	68 (1%)	180 (2%)	-	-	-	-	365 (4%)	-	-
Khamis et al (2020) [65]	24	21 (88%)	50 (17)	-	-	7 (29%)	11 (46%)	-	1 (4%)	-	-	-	-	-	-	-
Klok et al (2020)[28,29]	184	139 (76%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Li J et al (2020) [39]	74	44 (60%)	65 (55–72)	10 (14%)	-	35 (47%)	14 (19%)	6 (8%)	-	2 (3%)	-	2 (3%)	-	-	-	-
Ling et al (2020) [40]	8	4 (50%)	64 (42-70)	1 (13%)	-	3 (38%)	2 (25%)	0 (0%)	2 (25%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	-	-	-
Llitjos et al (2020)[30]	26	20 (77%)	68(51·5-74·5)	7 (27%)	-	22 (85%)	-	-	-	0 (0%)	-	-	-	-	-	-
Longchamp et al (2020)[31]	25	16 (64%)	68 (49-82)	6 (24%)	-	10 (40%)	1 (4%)	3 (12%)	-	2 (8%)	2 (6%)	-	1 (4%)	-	3 (12%)	-
Maatman et al (2020) [59]	109	62 (57%)	61 (18-95)	33 (30%)	34·8 (11·8)	74 (68%)	43 (39%)	17 (15%)	16 (15%)	-	18 (16%)	-	16 (15%)	-	-	-

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Mitra et al (2020) [60]	117	78 (68%)	69 (60-75)	16 (14%)	38 (32·5)	54 (46%)	36 (31%)	20 (17%)	15 (13%)	7 (6%)	8 (7%)	2 (2%)	14 (12%)	-	-	-
Myers et al (2020) [61]	113	74 (66%)	63 (53-73)	-	-	58 (51%)	45 (40%)	-	12 (11%)	6 (5%)	-	-	-	-	-	-
Pavoni et al (2020)[32]	40	24 (60%)	61 (13)	-	28.4 (4.7)	16 (40%)	16 (40%)	12 (30%)	-	-	4 (10%)	-	-	-	-	-
Pedersen et al (2020)[33]	16	12 (75%)	69·5 (56-84)	7 (44%)	28·9 (8·5)	9 (56%)	2 (13%)	3 (19%)	-	3 (19%)	-	-	-	-	-	-
Richardson et al (2020) [62]	373	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rodriguez et al (2020)[34]	43	27 (63%)	65 (52-72)	-	-	13 (30%)	8 (18%)	6 (14%)	2 (5%)	-	-	-	-	-	-	-
Simonnet et al (2020)[35]	124	90 (73%)	60 (51-70)	-	29·6 (26·4-36·4)	60 (49%)	28 (23%)	-	-	-	-	-	-	-	-	-
Thomas et al (2020)[36]	63	44 (69%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wang Y et al (2020) [41]	344	179 (52%)	64 (52-72)	-	-	141 (41%)	64 (19%)	40 (12%)	-	-	16 (5%)	-	-	-	-	-
Wei et al (2020) [42]	14	10 (71%)	65 (60-73)	4 (29%)	24.2 (22.5-25.5)	8 (57%)	2 (14%)	5 (36%)	-	1 (7%)	2 (14%)	-	-	-	-	-
Wu et al (2020) [43]	83	45 (54%)	63·0 (10·2)	-	-	-	-	-	2 (2%)	-	1 (1%)	4 (5%)	-	-	-	2 (2%)
Xu B et al (2020) [44]	107	73 (68%)	-	-	-	35 (33%)	-	-	-	-	-	-	-	-	-	-
Xu J et al (2020) [45]	239	143 (60%)	62.5 (13.3)	-	-	105 (44%)	44 (18%)	48 (20%)	-	13 (5%)	-	20 (8%)	-	-	-	-
Yang L et al (2020) [46]	29	16 (55%)	71 (13·4)	1 (3%)	-	9 (31%)	4 (14%)	-	2 (7%)	1 (3%)	-	0 (0%)	-	-	-	-
Yu et al (2020) [47]	226	139 (62%)	64 (57-70)	-	-	96 (43%)	47 (21%)	47 (21%)	8 (4%)	10 (4%)	-	3 (1%)	-	-	-	-
Zhang G et al (2020) [48]	55	35 (64%)	62 (52-74)	-	-	26 (47%)	7 (13%)	24 (44%)	5 (9%)	4 (7%)	4 (7%)	4 (7%)	-	1 (2%)	-	-
Zhang J et al (2020) [49]	19	11 (58%)	73 (38-91)	-	-	11 (58%)	4 (21%)	6 (32%)	-	-	-	-	-	-	-	-
Zheng et al (2020) [50]	34	23 (67%)	66 (58-76)	-	-	22 (65%)	8 (24%)	4 (12%)	2 (6%)	-	2 (6%)	4 (12%)	-	-	-	-
Zhou Y et al (2020) [51]	21	13 (62%)	66·1 (13·9)	-	-	10 (48%)	5 (24%)	11 (52%)	0 (0%)	-	2 (10%)	-	-	0 (0%)	-	-
Crude prevalence/ sample size (%)		9927/14431 (68.8%)	-	218/1321 (16.5%)	-	1631/3283 (49.7%)	907/3345 (27.1%)	766/13604 (5.6%)	431/12786 (3.4%)	125/1925 (6.5%)	183/2053 (8.9%)	78/1744 (4.5%)	89/985 (9.0%)	402/11437 (3.5%)	54/287 (18.8%)	21/499 (4.2%)

Data are median (IQR) or mean (SD) or n (%). BMI – Body Mass Index, CAD – Coronary Artery Disease, CCF – Congestive Cardiac Failure, CKD - Chronic Kidney Disease - stage 3 or higher and/or end-stage renal disease, CLD – Chronic Liver Disease, COPD – Chronic Obstructive Pulmonary Disease, CVD – Cardiovascular Disease, DM – Diabetes Mellitus, HTN – Hypertension, ICNARC – Intensive Care National Audit & Research Centre, OSA – Obstructive Sleep Apnoea: as defined by the authors

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e-Appendix 6. Initial presenting symptoms of ICU patients with COVID-19

First author	N	Symptoms														
		Cough	Dysnoea	Fever	Diarrhoea	Fatigue	Sputum	Myalgia	Sore throat	Headache	Rhinorrhea	N&V	Anorexia	Hemoptysis	Chest pain	Symptoms onset to ICU, days
Almazeedi et al (2020) [63]	42	23 (55%)	12 (29%)	-	1 (2%)	3 (7%)	6 (14%)	4 (10%)	4 (10%)	1 (2%)	-	2 (5%)	-	0 (0%)	-	-
Amit et al (2020) [64]	156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arentz et al (2020) [52]	21	11 (48%)	17 (76%)	11 (52%)	-	-	-	-	-	-	-	-	-	-	-	-
Auld et al (2020) [53]	217	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barrasa et al (2020) [20]	48	35 (73%)	42 (88%)	48 (100%)	-	-	-	0 (0%)	-	-	-	-	-	-	-	7 (5-12)
Bhatla et al (2020) [54]	79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bhatraju et al (2020) [55]	24	21 (88%)	21 (88%)	12 (50%)	-	-	10 (42%)	2 (8%)	2 (8%)	2 (8%)	4 (17%)	-	-	-	-	-
Borobia et al (2020) [21]	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cardoso et al (2020) [22]	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chen et al (2020) [37]	51	34 (67%)	18 (35%)	48 (94%)	6 (12%)	14 (28%)	19 (38%)	7 (14%)	-	4 (8%)	-	-	-	-	-	10.2 (4.7)
Cui et al (2020) [38]	81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cummings et al (2020) [56]	257	169 (66%)	190 (74%)	183 (71%)	32 (12%)	-	-	67 (26%)	15 (6%)	10 (4%)	19 (7%)	-	-	-	-	-
Ferguson et al (2020) [57]	21	14 (67%)	12 (57%)	16 (76%)	6 (29%)	5 (24%)	3 (14%)	13 (62%)	5 (24%)	5 (24%)	4 (19%)	2 (10%)	-	-	2 (10%)	-
Grasselli et al (2020)[23]	1715	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8 (4-11)
Halasz et al (2020)[24]	242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halvatsiotis et al (2020)[25]	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Helms et al (2020)[26]	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hur et al (2020) [58]	138	113 (82%)	116 (84%)	107 (78%)	38 (28%)	69 (50%)	-	-	-	-	-	17 (12%)	-	-	-	-
ICNARC et al (2020)[27]	10624	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Khamis et al (2020) [65]	24	-	15 (63%)	-	-	-	-	-	-	-	-	-	-	-	-	-
Klok et al (2020)[28,29]	184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Li J et al (2020) [39]	74	34 (46%)	49 (66%)	67 (91%)	6 (8%)	49 (66%)	13 (18%)	23 (31%)	-	-	-	-	41 (55%)	6 (8%)	-	-
Ling et al (2020) [40]	8	6 (75%)	8 (100%)	8 (100%)	2 (25%)	-	5 (63%)	-	-	0 (0%)	0 (0%)	-	-	-	-	10 (9-11)
Llitjos et al (2020)[30]	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7 (3·2-8·7)
Longchamp et al (2020)[31]	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10 (3)
Maatman et al (2020) [59]	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mitra et al (2020) [60]	117	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8 (4·5)
Myers et al (2020) [61]	113	40 (35%)	67 (59%)	39 (35%)	-	-	-	-	-	-	-	-	-	-	-	-
Pavoni et al (2020)[32]	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.6 (4)
Pedersen et al (2020)[33]	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Richardson et al (2020) [62]	373	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rodriguez et al (2020)[34]	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Simonnet et al (2020)[35]	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Thomas et al (2020)[36]	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wang Y et al (2020) [41]	344	233 (68%)	208 (61%)	301 (88%)	92 (27%)	167 (49%)	135 (39%)	-	-	-	-	-	91 (27%)	-	-	-
Wei et al (2020) [42]	14	14 (100%)	6 (43%)	8 (57%)	1 (7%)	8 (57%)	10 (71%)	2 (14%)	3 (21%)	2 (14%)	-	3 (21%)	-	1 (7%)	-	-
Wu et al (2020) [43]	83	83 (100%)	83 (100%)	83 (100%)	6 (7%)	-	-	43 (52%)	25 (30%)	-	11 (13%)	3 (4%)	-	-	9 (11%)	-
Xu B et al (2020) [44]	107	85 (79%)	-	90 (84%)	27 (25%)	-	-	19 (18%)	4 (4%)	6 (6%)	-	13 (12%)	-	-	8 (8%)	-
Xu J et al (2020) [45]	239	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yang L et al (2020) [46]	29	16 (55%)	22 (76%)	-	3 (10%)	-	-	5 (17%)	1 (3%)	2 (7%)	-	2 (7%)	-	-	-	-
Yu et al (2020) [47]	226	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zhang G et al (2020) [48]	55	36 (66%)	35 (63%)	-	9 (16%)	42 (76%)	-	-	8 (15%)	4 (7%)	-	-	34 (62%)	-	-	-
Zhang J et al (2020) [49]	19	8 (42%)	2 (11%)	13 (69%)	-	-	-	-	-	-	-	-	-	-	-	6
Zheng et al (2020) [50]	34	7 (21%)	-	20 (59%)	2 (6%)	2 (6%)	10 (29%)	5 (15%)	-	2 (6%)	-	-	-	-	-	-
Zhou Y et al (2020) [51]	21	19 (91%)	12 (57%)	17 (81%)	5 (24%)	5 (24%)	10 (47%)	2 (10%)	4 (19%)	0 (0%)	-	0 (0%)	-	1 (5%)	-	-
Crude prevalence/ sample size (%)		1001/1503 (66.6%)	935/1386 (67.5%)	1071/1377 (77.8%)	236/1278 (18.5%)	364/794 (45.8%)	221/633 (34.9%)	192/781 (24.6%)	71/701 (10.1%)	38/663 (5.7%)	38/393 (9.7%)	42/455 (9.2%)	166/473 (35.1%)	8/151 (5.3%)	19/211 (9.0%)	-

Data are n (%), ICNARC – Intensive Care National Audit & Research Centre, N&V – nausea and vomiting, Note: Only studies that reported signs and symptom on initial hospital presentation

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e-Appendix 7. Initial laboratory and radiological findings of ICU patients with COVID-19

		Laboratory						**Pulmonary radiology**	
First author	N	Lymphocyte (x10^9/L)	D-Dimer	CRP (mg/L)	Lactate (mmol/L)	Procalcitonin (ng/mL)	Ferritin (µg/mL)	CXR - Bilateral chest infiltrates	CT--Ground glass opacity
Almazeedi et al (2020) [63]	42	-	1357 (1392) mg/mL	121 (120)	-	0·79 (1·9)	-	22 (52%)	7 (17%)
Amit et al (2020) [64]	156	-	-	-	-	-	-	-	-
Arentz et al (2020) [52]	21	0·889 (0·2-2·39)	-	-	1·8 (0·8-4·9)	1·8 (0·12-9·56)	-	6 (29%)	10 (48%)
Auld et al (2020) [53]	217	-	1731 (934-6948) ng/mL	190 (126-262)	-	-	-	-	-
Barrasa et al (2020) [20]	48	-	-	-	-	-	-	-	-
Bhatla et al (2020) [54]	79	-	7·2 (21·1) ng/mL	112·3 (52·1)	-	2·8 (10·8)	-	-	-
Bhatraju et al (2020) [55]	24	0·72 (0·52-1·375)	-	-	-	-	-	23 (4%)	-
Borobia et al (2020) [21]	75	-	-	-	-	-	-	-	-
Cardoso et al (2020) [22]	20	-	-	-	1·1 (0·8-1·2)	-	-	-	-
Chen et al (2020) [37]	51	-	-	-	-	-	-	-	-
Cui et al (2020) [38]	81	-	-	-	-	-	-	-	-
Cummings et al (2020) [56]	257	-	-	-	-	-	-	-	-
Ferguson et al (2020) [57]	21	0·89 (0·52-1·09)	-	-	-	-	1422 (817-1944)	19 (91%)	-
Grasselli et al (2020)[23]	1715	-	-	-	-	-	-	-	-
Halasz et al (2020)[24]	242	-	-	-	-	-	-	-	-
Halvatsiotis et al (2020)[25]	90	-	-	-	-	-	-	-	-
Helms et al (2020)[26]	150	-	2·27 (1·16-20) mg/L	-	-	-	-	-	-
Hur et al (2020) [58]	138	-	-	-	-	-	-	-	-
ICNARC et al (2020)[27]	10624	-	-	-	-	-	-	-	-
Khamis et al (2020) [65]	24	-	-	-	-	-	-	12 (50%)	-
Klok et al (2020)[28,29]	184	-	-	-	-	-	-	-	-
Li J et al (2020) [39]	74	-	-	-	-	-	-	-	74 (100%)
Ling et al (2020) [40]	8	0·6 (0·5-0·85)	-	194 (72·9-284)	-	-	-	8 (100%)	-
Llitjos et al (2020)[30]	26	-	1750 (1130-2850) ng/mL	187 (147-279)	-	-	-	-	-
Longchamp et al (2020)[31]	25	-	-	-	-	-	-	-	-
Maatman et al (2020) [59]	109	-	-	-	-	-	-	-	-
Mitra et al (2020) [60]	117	0·8 (0·5-1)	-	-	1·5 (1·1-1·9)	-	-	-	-
Myers et al (2020) [61]	113	0·9 (0·7-1·2)	-	-	1·4 (1·0-1·8)	-	-	96 (85%)	-
Pavoni et al (2020)[32]	40	-	-	-	-	-	-	-	-
Pedersen et al (2020)[33]	16	-	13·4 (8·2) mg/L	343 (110)	1·3 (0·8)	-	2744 (2211)	-	-
Richardson et al (2020) [62]	373	-	-	-	-	-	-	-	-
Rodriguez et al (2020)[34]	43	-	-	-	-	-	-	-	-
Simonnet et al (2020)[35]	124	-	-	-	-	-	-	-	-
Thomas et al (2020)[36]	63	-	-	-	-	-	-	-	-
Wang Y et al (2020) [41]	344	0·9 (0·6-1·2)	1·3 (0·5-5·0) µg/mL	55 (14-106)	-	0·9 (0·4-2·3)	-	110 (32%)	164 (48%)
Wei et al (2020) [42]	14	0.7 (0.4-0.8)	-	-	-	-	-	-	12 (86%)
Wu et al (2020) [43]	83	0·5 (0·4-0·8)	-	-	-	1·5 (0·5-2·9)	-	30 (36%)	-
Xu B et al (2020) [44]	107	-	-	-	-	-	-	-	-
Xu J et al (2020) [45]	239	-	-	-	-	-	-	-	-
Yang L et al (2020) [46]	29	-	-	-	-	-	-	-	-

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Yu et al (2020) [47]	226	-	-	-	-	-	-	-	-
Zhang G et al (2020) [48]	55	-	443 (211-1304) ng/mL	-	-	-	-	55 (100%)	-
Zhang J et al (2020) [49]	19	-	-	-	-	-	-	-	-
Zheng et al (2020) [50]	34	-	-	-	-	-	-	-	-
Zhou Y et al (2020) [51]	21	-	-	-	-	-	-	-	-
Crude prevalence/ sample size (%)		-	-	-	-	-	-	381/735 (51.8%)	267/495 (53.9%)

Data are median (IQR) or mean (SD), CT- computed tomography, CXR – Chest X-ray, ICNARC – Intensive Care National Audit & Research Centre, Note: Studies were excluded if they (1) did not report on when laboratory results were taken (2) report results without units (3) incomplete data.

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e-Appendix 8. Severity of illness scores and organ dysfunction of ICU patients with COVID-19

		Severity of Illness sore		**Organ dysfunction**								
First author	N	SOFA	APACHE II	ARDS	Acute Kidney injury	Acute Cardiac injury	Thrombotic complication	Secondary Infection	Shock	Acute Liver injury	Arrhythmia	Neurological complication
Almazeedi et al (2020) [63]	42	-	-	31 (74%)[1]	11 (26%)[1]	-	2 (5%)[17]	-	7 (17%)[1]	-	-	1 (2%)[32]
Amit et al (2020) [64]	156	-	-	109 (70%)	40 (26%)	19 (12%)	-	27 (17%)	29 (19%)	-	-	-
Arentz et al (2020) [52]	21	-	-	21 (100%)[2]	4 (19%)[3]	7 (33%)[6]	-	4 (19%)[18]	-	3 (14%)[27]	-	1 (5%)[33]
Auld et al (2020) [53]	217	7 (5-11)	-	-	-	-	-	-	-	-	-	-
Barrasa et al (2020) [20]	48	7 (4-8)	15 (12-19)	-	-	-	-	-	-	-	-	-
Bhatla et al (2020) [54]	79	-	-	-	-	-	-	-	-	-	-	-
Bhatraju et al (2020) [55]	24	-	-	-	-	-	-	-	-	-	-	-
Borobia et al (2020) [21]	75	-	-	-	-	-	-	-	-	-	-	-
Cardoso et al (2020) [22]	20	8 (7-9)	18 (14-21)	-	-	-	-	-	-	-	-	-
Chen et al (2020) [37]	51	-	-	-	5 (10%)	10 (20%)	-	-	-	4 (8%)	-	-
Cui et al (2020) [38]	81	-	-	-	-	-	20 (25%)[12]	-	-	-	-	-
Cummings et al (2020) [56]	257	11 (8-13)	-	-	-	-	-	-	-	-	-	-
Ferguson et al (2020) [57]	21	-	-	13 (62%)[2]	4 (19%)[4]	2 (10%)[7]	-	7 (33%)[19]	-	-	6 (29%)[30]	-
Grasselli et al (2020)[23]	1715	-	-	-	-	-	-	-	-	-	-	-
Halasz et al (2020)[24]	242	-	-	-	-	-	-	-	-	-	-	-
Halvatsiotis et al (2020)[25]	90	-	-	-	-	-	-	-	-	-	-	-
Helms et al (2020)[26]	150	8 (5-10)	-	-	-	0 (0%)[8]	28 (19%)[13]	-	-	-	-	2 (1%)[34]
Hur et al (2020) [58]	138	-	-	-	-	-	-	-	-	-	-	-
ICNARC et al (2020)[27]	10624	-	15 (11-18)	-	-	-	-	-	-	-	-	-
Khamis et al (2020) [65]	24	-	-	12 (50%)[2]	-	-	-	-	-	-	-	-
Klok et al (2020)[28,29]	184	-	-	-	-	-	57 (31%)[14]	-	-	-	-	-
Li J et al (2020) [39]	74	-	-	-	-	-	-	-	-	-	-	-
Ling et al (2020) [40]	8	6 (4-7)	12·5 (9-16)	-	-	-	-	-	-	-	-	-
Llitjos et al (2020)[30]	26	3 (2-4·7)	-	21 (81%)[1]	9 (35%)[1]	-	6 (23%)[15]	-	-	4 (15%)[1]	-	-
Longchamp et al (2020)[31]	25	-	-	-	-	-	11 (44%)[16]	-	-	-	-	-
Maatman et al (2020) [59]	109	-	-	-	-	-	-	-	-	-	-	-
Mitra et al (2020) [60]	117	6 (2-11)	18 (10-28)	-	-	-	-	-	-	-	-	-
Myers et al (2020) [61]	113	-	-	-	-	-	-	-	-	-	-	-
Pavoni et al (2020)[32]	40	4 (1)	-	-	-	-	-	-	-	-	-	-
Pedersen et al (2020)[33]	16	-	-	-	-	-	-	-	-	-	-	-
Richardson et al (2020) [62]	373	-	-	-	-	-	-	-	-	-	-	-
Rodriguez et al (2020)[34]	43	6 (4-7)	18 (15-24)	40 (93%)[2]	18 (42%)[5]	-	-	13 (30%)[20]	25 (58%)[24]	-	-	-
Simonnet et al (2020)[35]	124	-	-	-	-	-	-	-	-	-	-	-
Thomas et al (2020)[36]	63	-	-	-	-	-	-	-	-	-	-	-
Wang Y et al (2020) [41]	344	-	-	145 (42%)[2]	86 (25%)[3]	111 (32%)[9]	71 (21%)[17]	-	114 (33%)[25]	54 (16%)[28]	-	-
Wei et al (2020) [42]	14	-	-	-	-	-	-	-	-	-	-	-

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Wu et al (2020) [43]	83	-	-	-	-	-	-	5 (6%)[21]	-	-	-	-
Xu B et al (2020) [44]	107	-	-	-	-	-	-	-	-	-	-	-
Xu J et al (2020) [45]	239	6 (5-7)	15 (13-17)	164 (69%)	119 (50%)	103 (43%)	-	40 (17%)	-	191 (80%)	-	-
Yang L et al (2020) [46]	29	-	-	21 (72%)[1]	12 (41%)[1]	15 (52%)[1]	-	5 (17%)[1]	4 (14%)[1]	-	-	-
Yu et al (2020) [47]	226	4 (2-8)	-	161 (71%)[2]	57 (26%)[3]	61 (27%)[10]	-	49 (22%)[22]	36 (16%)[26]	-	21 (9%)[31]	-
Zhang G et al (2020) [48]	55	-	-	48 (87%)[1]	8 (15%)[1]	16 (29%)[1]	-	9 (16%)[23]	15 (27%)[1]	-	22 (40%)[1]	-
Zhang J et al (2020) [49]	19	-	-	-	-	-	-	-	-	-	-	-
Zheng et al (2020) [50]	34	-	-	33 (97%)[2]	7 (21%)[3]	13 (38%)[11]	-	-	-	14 (41%)[29]	-	-
Zhou Y et al (2020) [51]	21	-	-	-	-	-	-	-	-	-	-	-
Crude prevalence/ sample size (%)		-	-	819/1260 (65.0%)	380/1287 (30.2%)	357/1326 (26.9%)	195/852 (22.9%)	159/873 (18.2%)	230/895 (25.7%)	270/715 (37.8%)	49/302 (16.2%)	4/213 (1.9%)

Data are n (%), ARDS – Acute Respiratory Distress Syndrome, ICNARC – Intensive Care National Audit & Research Centre [1]Not Defined by authors [2] Berlin criteria, [3] KDIGO classification, [4] increase in serum Creatinine during admission of 1·5times baseline, [5] RIFLE classification [6]evidence of a globally decreased left ventricular systolic function on transthoracic echocardiogram in addition to clinical signs of cardiogenic shock, an elevation of level in creatinine kinase or troponin, or a decrease in central venous oxygen saturation (<70%) without a past history of systolic dysfunction, [7] ejection fraction<50% after previously normal ejection fraction on echocardiogram in the preceding 2 years and/or >10% decrease in ejection fraction from baseline, [8] elevation in high sensitivity cardiac troponin levels above the 99th percentile, [9] cardiac biomarkers or new abnormalities in electrocardiography and echocardiography, [10] hs-TnI >28ng/L or TnI >0·3ng/ml, [11]blood levels of hypersensitive troponin I above the 99th percentile upper reference limit (>28pg/ml) or new abnormalities shown on electrocardiography and echocardiography, [12]venous thromboembolism, [13]pulmonary embolism and lower-extremity deep venous thrombosis, [14]pulmonary embolism, deep vein thrombosis, upper extremity thrombosis, arterial thrombotic events (all ischaemic strokes), [15]pulmonary embolism, [16]pulmonary embolism, proximal lower-extremity DVT, 17disseminated intravascular coagulation defined per the International Society of Thrombosis and Haemostasis, [18]pseudomonas bacteraemia Influenza A and parainfluenza type 3, [19]ventilator or hospital-associated pneumonia and catheter-related bloodstream infection, [20]ventilator associated pneumonia, [21]defined as cultures for nine kinds of respiratory pathogens including virus, bacteria and fungi, [22]hospital acquired infection with patients having concomitant pneumonia, blood stream infections and deep soft tissue infection, [23]hospital acquired infection, [24]the presence of shock on admission was considered as the need for a dose of noradrenaline within the first 6 hours after admission to maintain mean arterial pressure, [25]septic shock defined according to the 2016 third international consensus, [26]septic shock defined according to the sepsis-3 criteria, [27]alanine aminotransferase or aspartate aminotransferase level greater than 3 times the upper limit of normal, [28]diagnosed according to elevation of bilirubin and aminotransferase, [29]acute liver injury defined as an increase in alanine aminotransferase (ALT) over two times the upper limit of the normal range (ULN) or an increase in conjugated bilirubin or a combined increase in aspartate aminotransferase (AST), alkaline phosphatase and total bilirubin pro- vided that one of them was above two times ULN, [30]atrial fibrillation, supraventricular tachycardia, bradycardia, [31]atrial fibrillation, supraventricular tachycardia, ventricular tachycardia, [32]Encephalopathy/Encephalitis, [33]seizures, [34]Cerebral Ischemic att

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e-Appendix 9. Interventions and Treatment of ICU patients with COVID-19

		Interventions			**Treatment**					
First author	N	Invasive mechanical ventilation	Non-invasive ventilation	Vasopressors	ECMO	RRT	Antimicrobial	Antiviral	Glucocorticoid	IVIG
Almazeedi et al (2020) [63]	42	-	-	-	8 (19%)	4 (10%)	42 (100%)	35 (83%)	7 (17%)	-
Amit et al (2020) [64]	156	93 (60%)	39 (25%)	78 (50%)	6 (4%)	14 (9%)	131 (84%)	31 (20%)	34 (22%)	7 (4%)
Arentz et al (2020) [52]	21	15 (71%)	4 (19%)	14 (67%)	-	-	-	-	-	-
Auld et al (2020) [53]	217	165 (76%)	-	143 (66%)	4 (2%)	63 (29%)	-	-	-	-
Barrasa et al (2020) [20]	48	45 (94%)	-	-	1 (2%)	-	42 (88%)	45 (94%)	17 (35%)	-
Bhatla et al (2020) [54]	79	-	-	-	-	-	-	20 (25%)	-	-
Bhatraju et al (2020) [55]	24	18 (75%)	0 (0%)	17 (71%)	0 (0%)	-	-	8 (33%)	0 (0%)	-
Borobia et al (2020) [21]	75	-	-	-	-	-	-	-	-	-
Cardoso et al (2020) [22]	20	20 (100%)	0 (0%)	19 (95%)	-	7 (35%)	-	-	-	-
Chen et al (2020) [37]	51	14 (27%)	6 (12%)	31 (61%)	2 (4%)	3 (6%)	51 (100%)	51 (100%)	48 (94%)	28 (55%)
Cui et al (2020) [38]	81	-	-	-	-	-	-	-	-	-
Cummings et al (2020) [56]	257	203 (79%)	-	170 (66%)	6 (3%)	79 (31%)	229 (89%)	23 (9%)	68 (26%)	-
Ferguson et al (2020) [57]	21	-	-	13 (62%)	-	4 (19%)	19 (91%)	16 (76%)	2 (10%)	-
Grasselli et al (2020)[23]	1715	-	-	-	-	-	-	-	-	-
Halasz et al (2020)[24]	242	-	-	-	-	-	-	-	-	-
Halvatsiotis et al (2020)[25]	90	82 (91%)	-	-	-	-	-	-	-	-
Helms et al (2020)[26]	150	150 (100%)	-	-	12 (8%)	-	-	-	-	-
Hur et al (2020) [58]	138	-	-	-	-	-	132 (96%)	-	-	-
ICNARC et al (2020)[27]	10624	7425 (70%)	-	-	-	2738 (27%	-	-	-	-
Khamis et al (2020) [65]	24	15 (62%)	0 (0%)	-	-	6 (25%)	-	24 (100%)	13 (54%)	-
Klok et al (2020)[28,29]	184	-	-	-	-	23 (13%)	-	-	-	-
Li J et al (2020) [39]	74	6 (8%)	14 (19%)	-	2 (3%)	-	68 (92%)	74 (100%)	70 (95%)	-
Ling et al (2020) [40]	8	6 (75%)	-	6 (75%)	0 (0%)	2 (25%)	-	-	-	-
Llitjos et al (2020)[30]	26	-	-	23 (88%)	2 (8%)	4 (15%)	25 (96%)	-	-	-
Longchamp et al (2020)[31]	25	23 (92%)	-	19 (76%)	-	-	-	-	-	-
Maatman et al (2020) [59]	109	-	-	-	-	-	109 (100%)	-	-	-
Mitra et al (2020) [60]	117	74 (63%)	15 (13%)	-	3 (3%)	-	-	0(0%)	28 (24%)	-
Myers et al (2020) [61]	113	103 (91%)	1 (1%)	-	-	-	-	-	14 (12%)	-
Pavoni et al (2020)[32]	40	-	-	-	-	-	-	-	-	-
Pedersen et al (2020)[33]	16	16 (100%)	-	-	-	-	16 (100%)	-	-	-
Richardson et al (2020) [62]	373	320 (86%)	-	-	-	-	-	-	-	-
Rodriguez et al (2020)[34]	43	-	-	-	-	-	-	-	-	-
Simonnet et al (2020)[35]	124	85 (69%)	-	-	-	-	-	-	-	-
Thomas et al (2020)[36]	63	52 (83%)	-	-	-	23 (37%)	-	-	-	-
Wang Y et al (2020) [41]	344	100 (29%)	34 (10%)	-	-	-	-	-	-	-
Wei et al (2020) [42]	14	-	-	-	-	-	-	-	-	-
Wu et al (2020) [43]	83	-	-	-	12 (14%)	-	83 (100%)	83 (100%)	-	68 (81%)
Xu B et al (2020) [44]	107	-	-	-	-	-	103 (96%)	-	84 (79%)	65 (61%)
Xu J et al (2020) [45]	239	79 (33%)	86 (36%)	-	9 (4%)	12 (5%)	229 (96%)	132 (55%)	189 (79%)	138 (58%)
Yang L et al (2020) [46]	29	14 (48%)	-	-	-	2 (7%)	29 (100%)	28 (97%)	20 (69%)	-
Yu et al (2020) [47]	226	85 (38%)	20 (9%)	48 (21%)	14 (6%)	24 (11%)	168 (74%)	117 (51%)	37 (16%)	29 (13%)
Zhang G et al (2020) [48]	55	16 (29%)	25 (45%)	-	10 (18%)	4 (7%)	-	50 (91%)	40 (73%)	-
Zhang J et al (2020) [49]	19	-	-	-	-	-	-	-	-	-
Zheng et al (2020) [50]	34	15 (44%)	19 (56%)	-	11 (32%)	5 (15%)	30 (88%)	33 (97%)	33 (97%)	27 (79%)
Zhou Y et al (2020) [51]	21	8 (38%)	13 (62%)	-	1 (5%)	-	20 (95%)	21 (100%)	-	3 (14%)

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Crude prevalence/ sample size (%)	9247/13543 (68.3%)	276/1519 (18.2%)	581/1052 (55.2%)	103/1828 (5.6%)	3017/1227((24.6%)	1526/1677 (91.0%)	791/1580 (50.1%)	704/1617 (43.5%)	365/917 (39.8%)

Data are median (IQR) or mean (SD) or n (%), APACHE – Acute Physiology and Chronic Health Evaluation, ECMO – ExtraCorporeal Membrane Oxygenation, ICNARC - Intensive Care National Audit & Research Centre, ICU –Intensive Care Unit, IVIG – Intravenous Immunoglobulin, RRT – Renal Replacement Therapy, SOFA – Sequential Organ Failure Assessment on admission: as defined by the authors

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e-Appendix 10. Outcomes and disposition of ICU patients with COVID-19

First author	N	Outcomes		Disposition		
		ICU LOS , days	Hospital LOS, days	In-Hospital mortality	Remain in Hospital	Discharged from Hospital
Almazeedi et al (2020) [63]	42	-	-	17 (41%)	19 (45%)	6 (14%)
Amit et al (2020) [64]	156	10 (5-17)		87 (56%)	0 (0%)	69 (44%)
Arentz et al (2020) [52]	21	-	-	11 (52%)	10 (48%)	-
Auld et al (2020) [53]	217	9 (5-15)	15 (9-24)	67 (31%)	19 (9%)	131 (60%)
Barrasa et al (2020) [20]	48	-	-	14 (29%)	21 (44%)	13 (27%)
Bhatla et al (2020) [54]	79	-	-	18 (23%)	-	-
Bhatraju et al (2020) [55]	24	9 (4-14)	12 (8-18)	12 (50%)	7 (29%)	5 (21%)
Borobia et al (2020) [21]	75	-	-	55 (70%)	-	20 (25%)
Cardoso et al (2020) [22]	20	10·3 (8-12)	22·4 (14·1-26·7)	3 (15%)	-	-
Chen et al (2020) [37]	51	-	20 (16-26)	3 (6%)	2 (4%)	46 (90%)
Cui et al (2020) [38]	81	-	-	8 (10%)	9 (11%)	64 (79%)
Cummings et al (2020) [56]	257	-	-	101 (39%)	98 (39%)	58 (23%)
Ferguson et al (2020) [57]	21	12 (5-28)	17(11-30)	3 (14%)	4 (19%)	14 (67%)
Grasselli et al (2020)[23]	1715	12 (7-20)	22 (12-42)	915 (53%)	127 (7%)	673 (93%)
Halasz et al (2020)[24]	242	-	-	78 (32%)	-	-
Halvatsiotis et al (2020)[25]	90	-	-	26 (29%)	-	-
Helms et al (2020)[26]	150	9·5 (4·6)	-	13 (9%)	101 (67%)	36 (54%)
Hur et al (2020) [58]	138	-	-	21 (15%)	65 (47%)	52 (38%)
ICNARC et al (2020)[27]	10624	-	-	4405 (42%)	731 (7%)	5488 (52%)
Khamis et al (2020) [65]	24	-	-	5 (19%)	-	-
Klok et al (2020)[28,29]	184	-	-	41 (22%)	65 (35%)	78 (43%)
Li J et al (2020) [39]	74	-	15 (11-22)	14 (19%)	5 (7%)	55 (81%)
Ling et al (2020) [40]	8	12 (8-16)	-	1 (13%)	6 (75%)	1(13%)
Llitjos et al (2020)[30]	26	-	-	3 (12%)	-	-
Longchamp et al (2020)[31]	25	-	-	5 (20%)	-	-
Maatman et al (2020) [59]	109	-	-	27 (25%)	7 (6%)	75 (69%)
Mitra et al (2020) [60]	117	9 (5-21)	18 (11-30)	18 (15%)	28 (24%)	71 (61%)
Myers et al (2020) [61]	113	-	-	34 (38%)	22 (24%)	34 (38%)
Pavoni et al (2020)[32]	40	8 (2.3)	22.3 (5.5)	5 (13%)	-	-
Pedersen et al (2020)[33]	16	14 (9)	-	7 (44%)	-	-
Richardson et al (2020) [62]	373	-	-	291 (78%)	0 (0%)	82 (22%)
Rodriguez et al (2020)[34]	43	-	-	10 (23%)	5 (12%)	28 (65%)
Simonnet et al (2020)[35]	124	-	-	18 (15%)	46 (37%)	60 (48%)
Thomas et al (2020)[36]	63	-	-	10 (16%)	-	-
Wang Y et al (2020) [41]	344	-	-	133 (39%)	26 (8%)	185 (54%)
Wei et al (2020) [42]	14	-	-	5 (36%)	5 (36%)	4 (29%)
Wu et al (2020) [43]	83	-	-	0 (0%)	51 (62%)	32 (39%)
Xu B et al (2020) [44]	107	-	-	28 (26%)	30 (28%)	49 (46%)
Xu J et al (2020) [45]	239	-	17 (10-26)	147 (62%)	0 (0%)	92 (38%)
Yang L et al (2020) [46]	29	-	-	14 (48%)	11 (38%)	4 (14%)
Yu et al (2020) [47]	226	-	-	87 (39%)	15 (7%)	124 (55%)
Zhang G et al (2020) [48]	55	-	-	12 (22%)	36 (66%)	7 (13%)
Zhang J et al (2020) [49]	19	-	-	8 (42%)	-	-
Zheng et al (2020) [50]	34	-	-	0 (0%)	14 (41%)	20 (59%)
Zhou Y et al (2020) [51]	21	-	-	3 (14%)	5 (24%)	13 (62%)
Crude prevalence/ sample size (%)		-	-	6783/16561 (41.0%)	1590/15842 (10.0%)	7689/15896 (48.4%)

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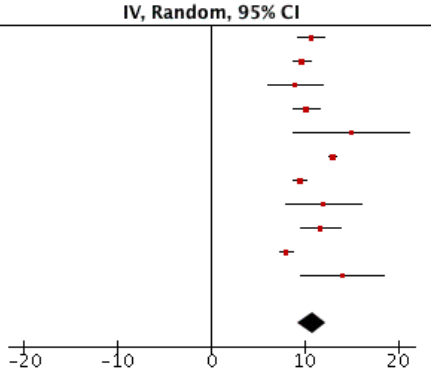
e-Appendix 11. Forest plots of length of Stay of ICU patients with COVID-19

e-Appendix 11A. Intensive Care Unit (ICU) length of Stay

Study or Subgroup	Pooled ICU Length of Stay	SE	Weight	Pooled ICU Length of Stay IV, Random, 95% CI
Amit et al	10.7	0.712	10.6%	10.70 [9.30, 12.10]
Auld et al	9.7	0.503	11.1%	9.70 [8.71, 10.69]
Bhatraju et al	9	1.512	8.0%	9.00 [6.04, 11.96]
Cardoso et al	10.2	0.712	10.6%	10.20 [8.80, 11.60]
Ferguson et al	15	3.178	3.9%	15.00 [8.77, 21.23]
Grasselli et al	13	0.233	11.5%	13.00 [12.54, 13.46]
Helms et al	9.5	0.376	11.3%	9.50 [8.76, 10.24]
Ling et al	12	2.095	6.3%	12.00 [7.89, 16.11]
Mitra et al	11.7	1.096	9.4%	11.70 [9.55, 13.85]
Pavoni et al	8	0.364	11.4%	8.00 [7.29, 8.71]
Pedersen et al	14	2.25	5.8%	14.00 [9.59, 18.41]
Total (95% CI)			**100.0%**	**10.76 [9.25, 12.27]**

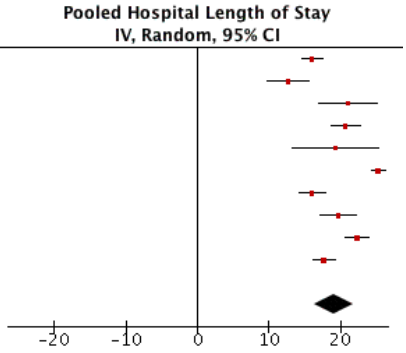
Heterogeneity: Tau² = 5.08; Chi² = 171.21, df = 10 (P < 0.00001); I² = 94%
Test for overall effect: Z = 13.98 (P < 0.00001)



e-Appendix 11B. Hospital length of stay

Study or Subgroup	Pooled Hospital Length of Stay	SE	Weight	Pooled Hospital Length of Stay IV, Random, 95% CI
Auld et al	16	0.754	10.7%	16.00 [14.52, 17.48]
Bhatraju et al	12.7	1.512	9.8%	12.70 [9.74, 15.66]
Cardoso et al	21.1	2.087	8.9%	21.10 [17.01, 25.19]
Chen et al	20.7	1.037	10.4%	20.70 [18.67, 22.73]
Ferguson et al	19.3	3.071	7.2%	19.30 [13.28, 25.32]
Grasselli et al	25.3	0.537	10.9%	25.30 [24.25, 26.35]
Li J et al	16	0.947	10.5%	16.00 [14.14, 17.86]
Mitra et al	19.7	1.301	10.1%	19.70 [17.15, 22.25]
Pavoni et al	22.3	0.87	10.6%	22.30 [20.59, 24.01]
Xu J et al	17.7	0.767	10.7%	17.70 [16.20, 19.20]
Total (95% CI)			**100.0%**	**19.10 [16.34, 21.85]**

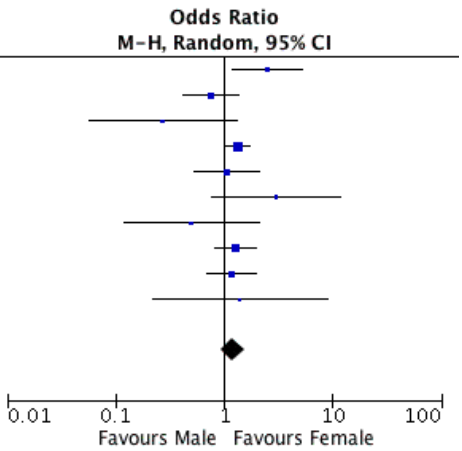
Heterogeneity: Tau² = 17.83; Chi² = 182.49, df = 9 (P < 0.00001); I² = 95%
Test for overall effect: Z = 13.59 (P < 0.00001)



e-Appendix 12. Forrest plot of mortality by gender of ICU patients with COIVD-19

Study or Subgroup	Male Events	Male Total	Female Events	Female Total	Weight	Odds Ratio M-H, Random, 95% CI
Amit et al	52	108	13	48	9.0%	2.50 [1.19, 5.24]
Auld et al	31	119	31	98	12.3%	0.76 [0.42, 1.37]
Borobia et al	39	57	16	18	2.5%	0.27 [0.06, 1.31]
Grasselli et al	700	1398	136	317	26.9%	1.33 [1.04, 1.71]
Halasz et al	64	194	14	44	9.7%	1.05 [0.52, 2.13]
Li J et al	11	44	3	30	3.2%	3.00 [0.76, 11.86]
Rodriguez et al	5	27	5	16	2.9%	0.50 [0.12, 2.10]
Wang Y et al	74	179	59	165	17.6%	1.27 [0.82, 1.96]
Xu J et al	90	143	57	96	14.1%	1.16 [0.68, 1.97]
Zhang J et al	5	11	3	8	1.8%	1.39 [0.22, 8.92]
Total (95% CI)		**2280**		**840**	**100.0%**	**1.20 [0.93, 1.55]**
Total events	1071		337			

Heterogeneity: Tau² = 0.05; Chi² = 13.42, df = 9 (P = 0.14); I² = 33%
Test for overall effect: Z = 1.39 (P = 0.16)



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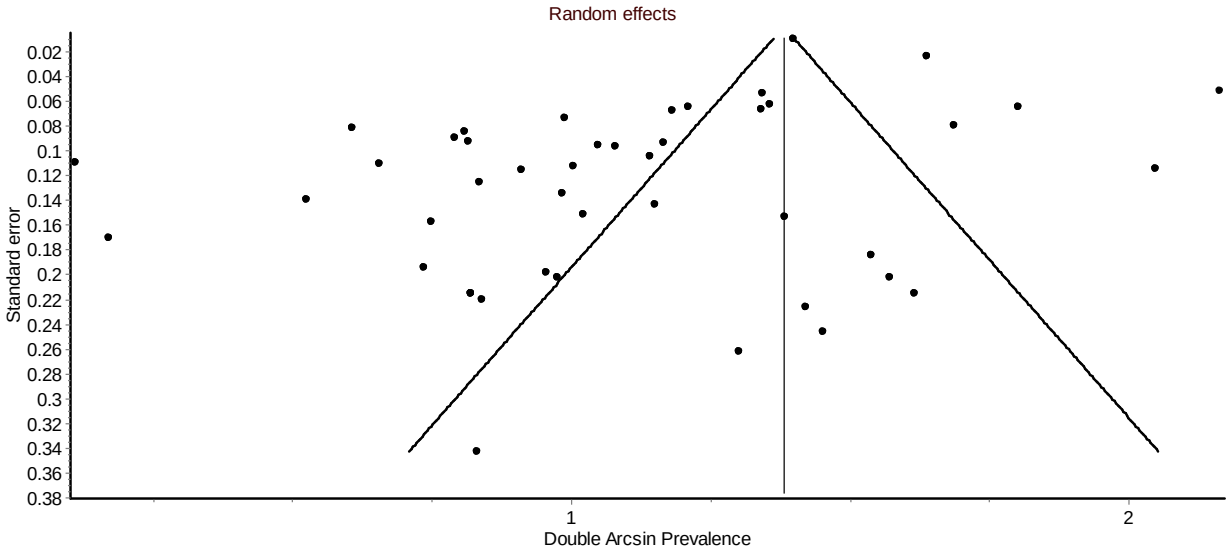
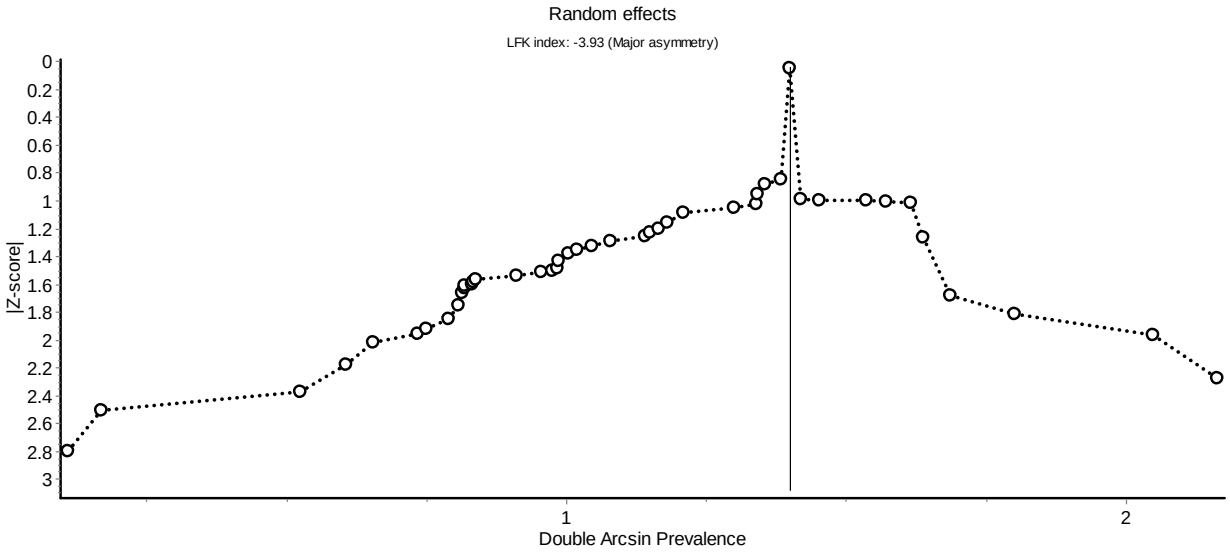
e-Appendix 13. Funnel plot for in-hospital mortality of ICU patients with COVID-19

e-Appendix 13A. Funnel plot to assess for publication bias



e-Appendix 13B. Doi plot analysis and LFK index to assess for publication bias



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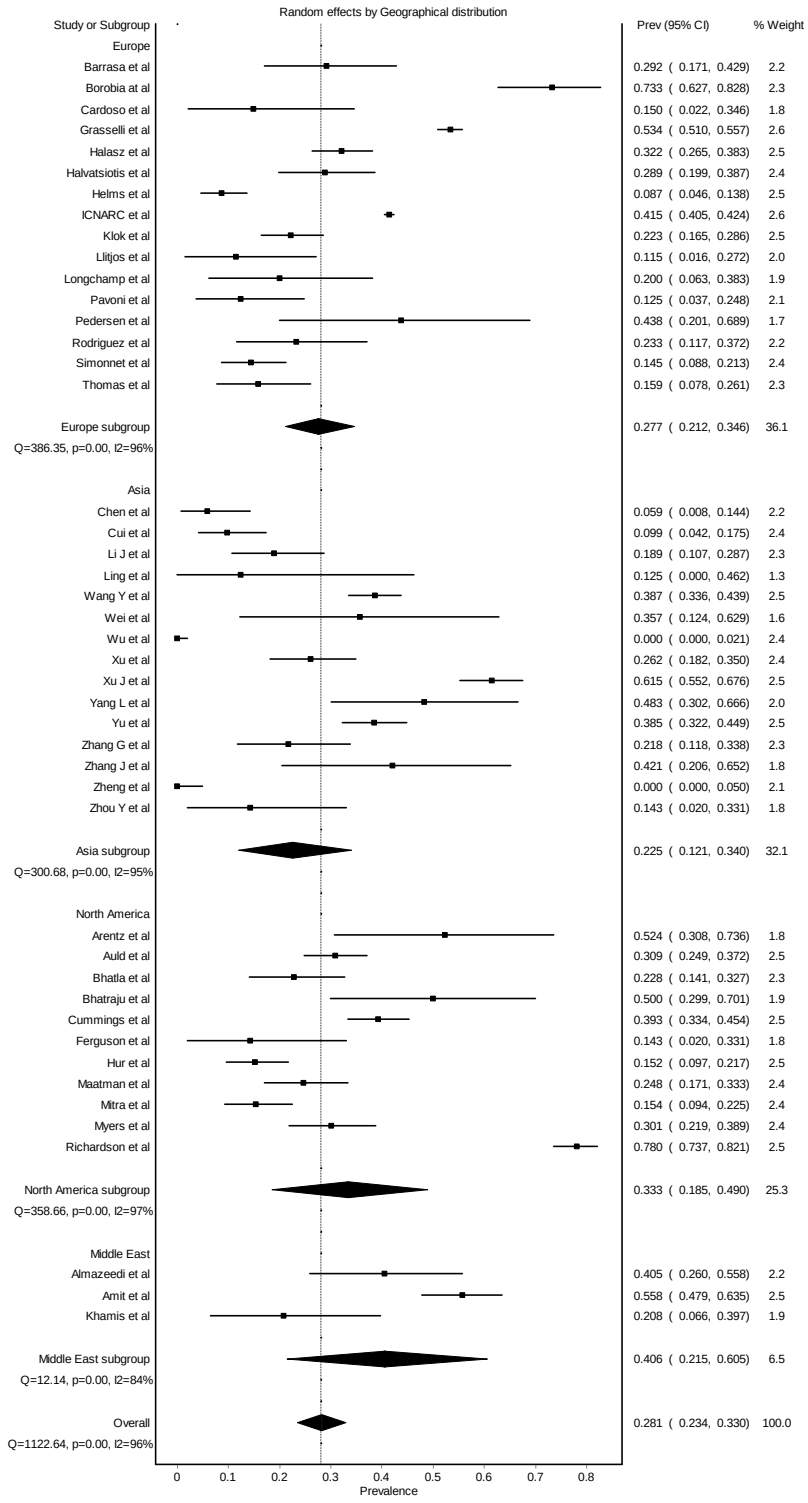
e-Appendix 14. Subgroup analyses of mortality of ICU patients with COVID-19

e-Appendix 14A. Subgroups based on geographical distribution (Europe versus Asia versus North America versus Middle East)



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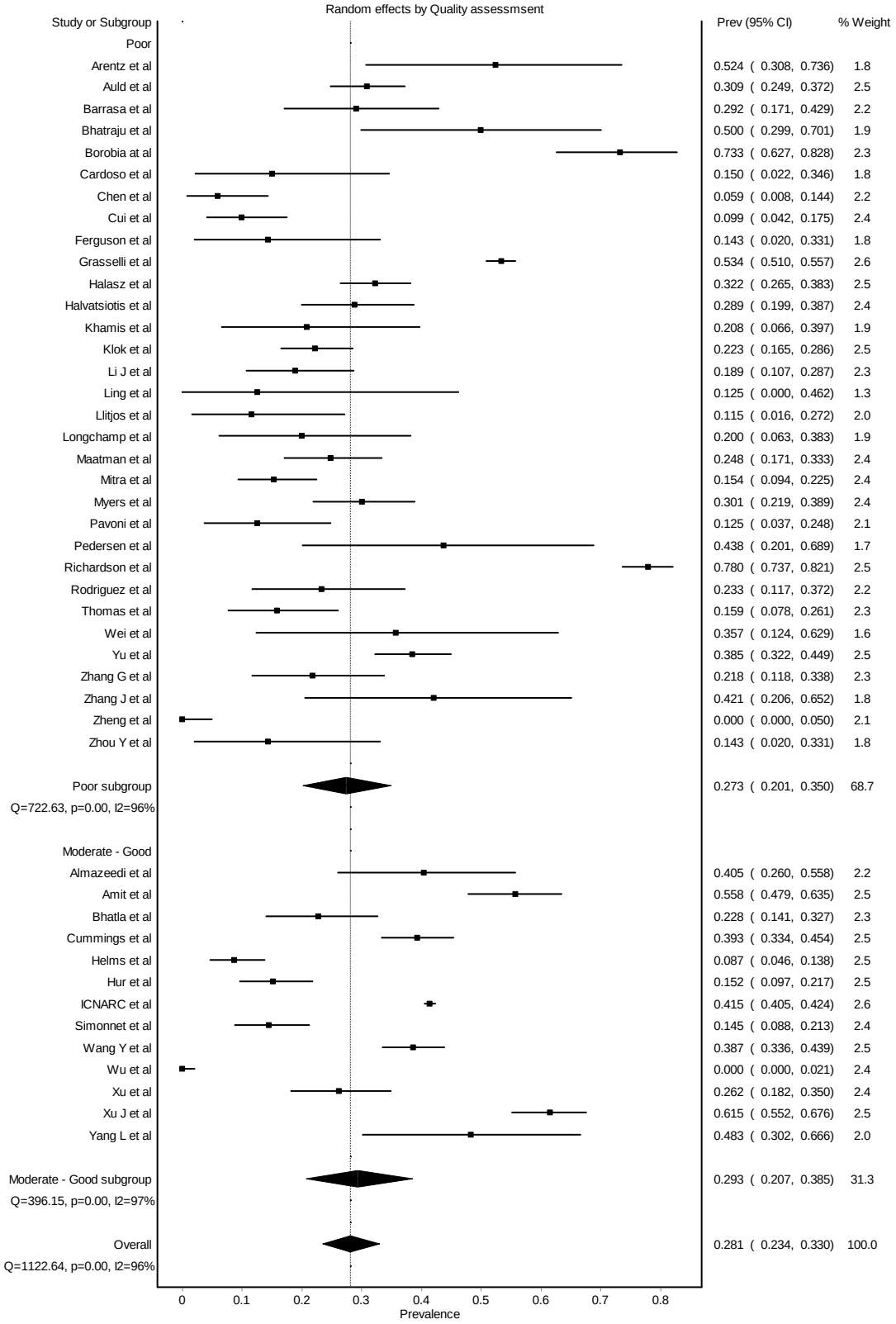
e-Appendix 14B. Subgroups based on Quality assessment – Risk of bias (High versus Low)



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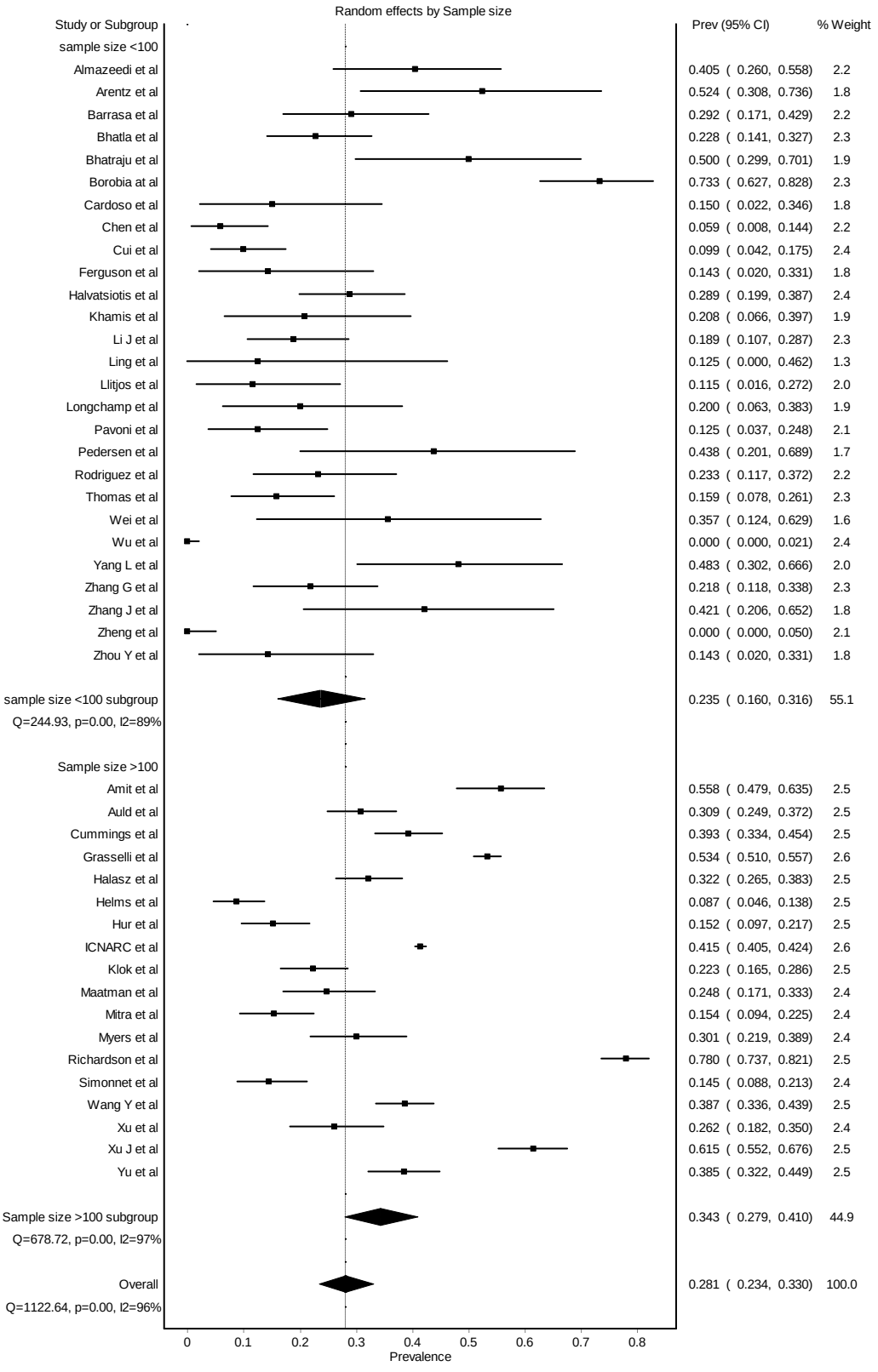
e-Appendix 14C. Subgroups based on sample size (>150 versus <150)



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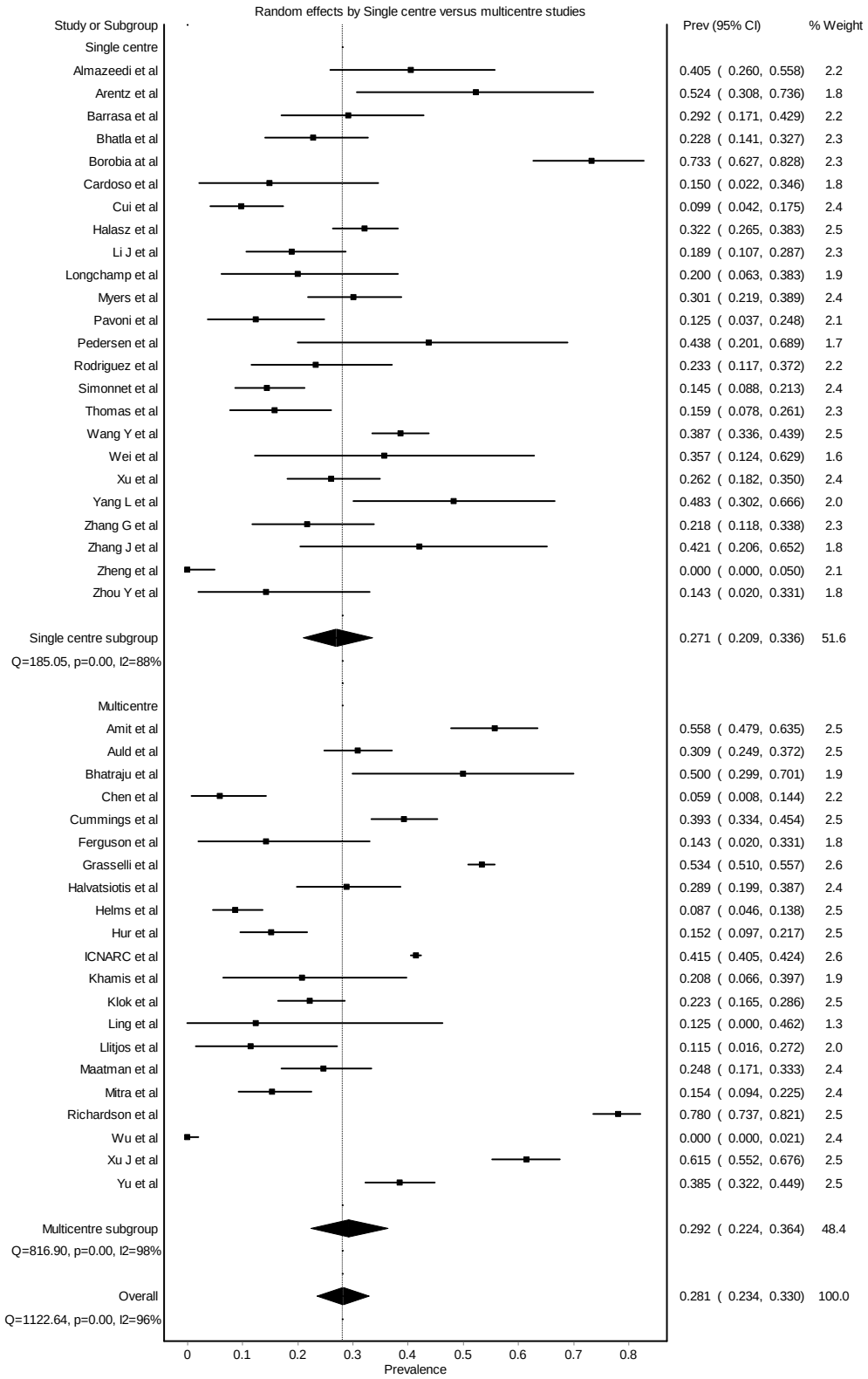
e-Appendix 14D. Subgroups based on centre-type (multi-centre versus single centre)



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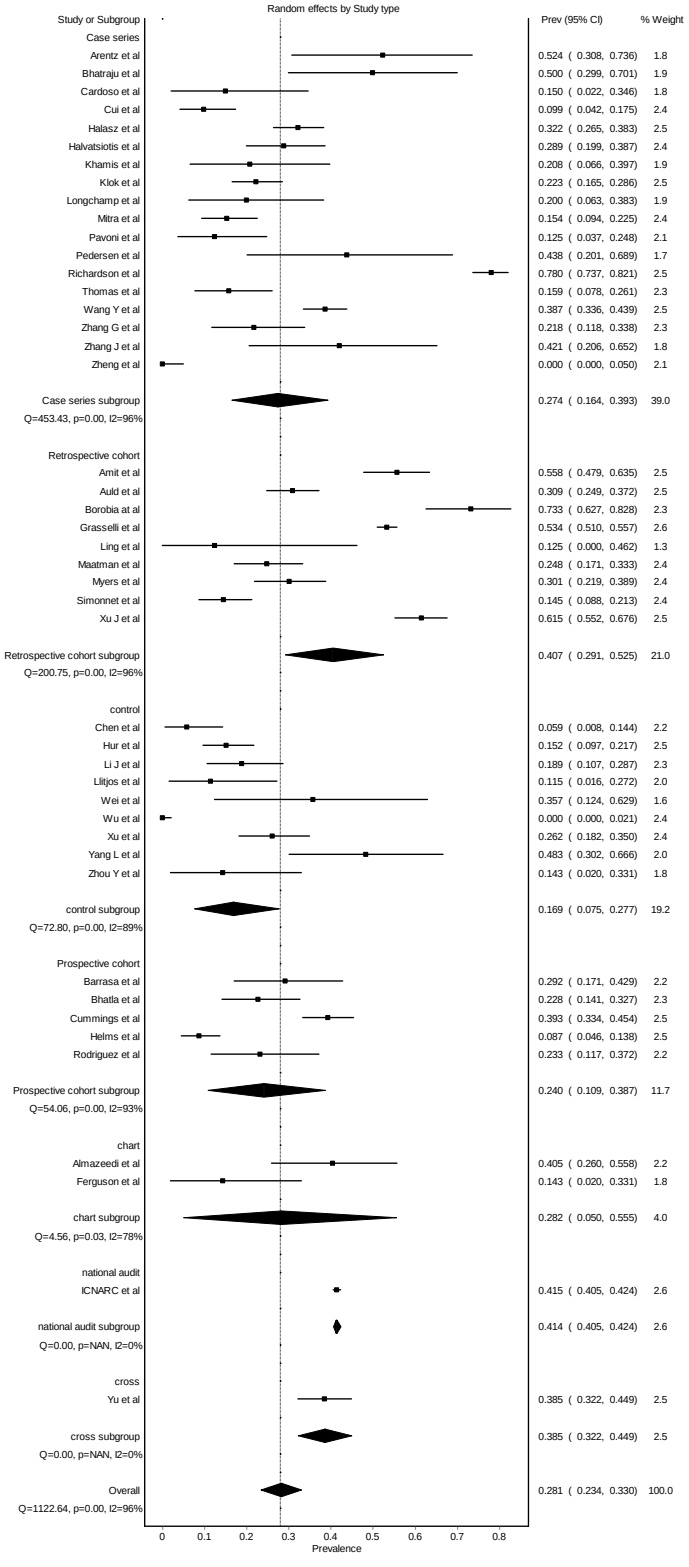
e-Appendix 14E. Subgroups based on study type (case series versus retrospective cohort versus case control versus prospective cohort versus prospective cross-sectional versus chart review versus national audit)



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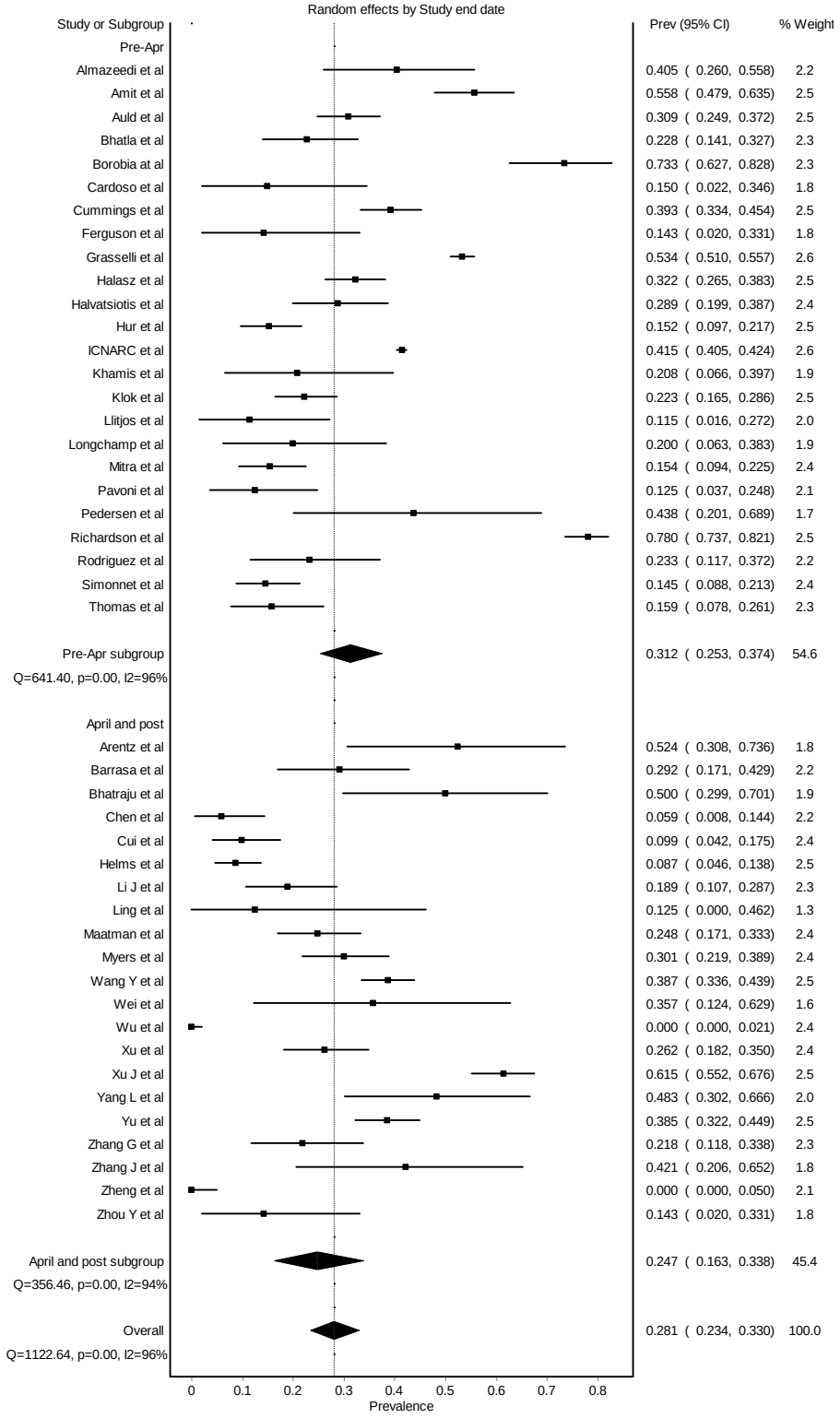
e-Appendix 14F. Subgroup analysis based on study end date (Pre-April 2020 versus post-April 2020)



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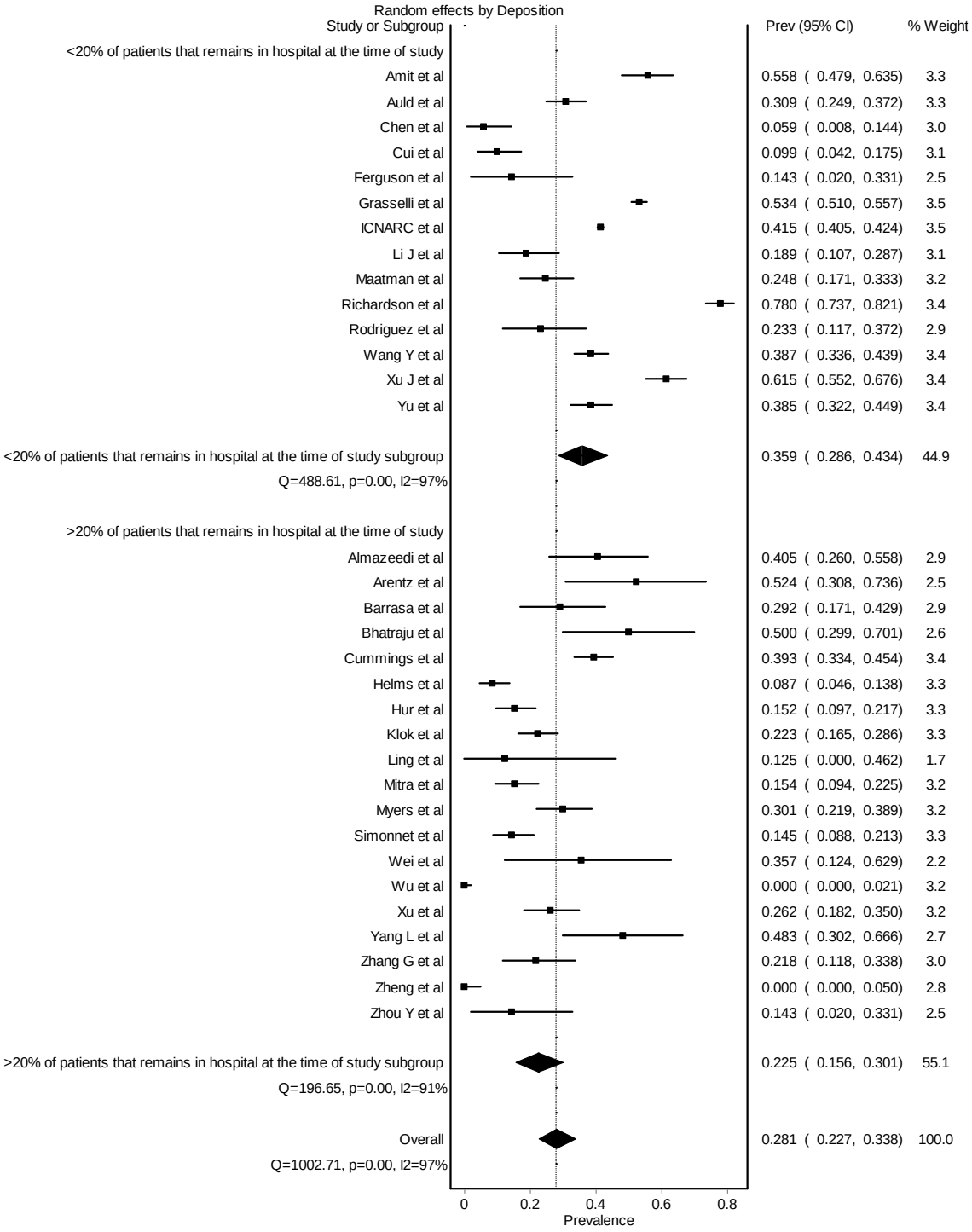
e-Appendix 14G. Subgroups based on patient disposition – proportion censored at study end date (<20% in-hospital at time of publication versus >20% in hospital)



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