ONLINE SUPPLEMENTARY MATERIAL

COPD and the Risk of Poor Outcomes in COVID-19: a Systematic Review and Meta-analysis

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Figure S1: Diverse Health Outcomes & Severity Reported

Presence of significant heterogeneity in the reported outcome by selected studies for the meta-analysis

Table S1: Examination for potentially overlapping patient populations among the included studies

Country: China	**Hospitals**	**Authors**	**Recruitment and Follow-up period**
	Renmin hospital	Wang L et.al[1]	January 31 to February 5, 2020
	Renmin hospital	Jiang et.al[2]	January 30 to March 8, 2020 (followed til April 10 2020)
	Jinyin-tan Hospital	Huang C et.al[3]	December 16, 2019, to January 2, 2020 (outcome reported by Jan 22)
	Jinyin-tan Hospital	Feng Y et.al[4]	January 1, 2020, to February 15, 2020
	Jinyin-tan Hospital	Guan W.J et.al[5]	December 11th, 2019 to January 31, 2020
	Jinyin-tan hospital	Yang X et.al[6]	Dec 24, 2019, to Jan 26, 2020 (last follow-up of Feb 9, 2020)
	Jinyin-tan Hospital	Zhou F et.al[7]	Dec 29, 2019 to Jan 31, 2020
	No. 7 Hospital of Wuhan	Zhang J et.al[8]	January 16 to February 3, 2020
	Shanghai Public Health Clinical Center	Feng Y. et.al[4]	January 1, 2020, to February 15, 2020
	Shanghai Public Health Clinical Center	Guan W.J et.al[5]	December 11th, 2019 to January 31, 2020
	The Wuhan Central Hospital	Guan W.J et.al[5]	December 11th, 2019 to January 31, 2020
	The Central Hospital of Wuhan	Wang Y et.al[9]	January 1 to February 10, 2020
	Third Xiangya Hospital	Guan W.J et.al[5]	December 11th, 2019 to January 31, 2020
	Tongling People's Hospital	Feng Y et.al[4]	January 1, 2020, to February 15, 2020
	Tongling People's Hospital	Guan W.J et.al[5]	December 11th, 2019 to January 31, 2020
	Tongji Hospital	Li K et.al[10]	January 31 to March 5, 2020
	Tongji Hospital	Cui et.al[11]	January 14 and March 9, 2020
	Union Hospital Affiliated to Tongji Medical College of Huazhong University of science and technology	Guan W.J et.al[5]	December 11th, 2019 to January 31, 2020
	Union Hospital Affiliated to Tongji Medical College of Huazhong University of Science and Technology & Shenzhen Union Hospital of Huazhong University of Science and Technology	Guan W.J et.al[5]	December 11th, 2019 to January 31, 2020
	Wuhan Pulmonary Hospital	Zhou F et.al[7]	December 29, 2019 to January 31, 2020

	Wuhan Pulmonary Hospital	Guan W.J et.al[5]	December 11, 2019 to January 31, 2020
	Zhongnan Hospital of Wuhan University	Wang D et.al[12]	January 1 to January 28, 2020; final date of follow-up was February 3, 2020
	Zhongnan Hospital of Wuhan University	Zhang G et.al[13]	January 2, 2020 to February 10, 2020
Country: USA (New York City)	**Hospitals**	**Authors**	**Recruitment and Follow-up period**
	Mount Sinai	Mohamed et.al[14]	March 28 to April 15, 2020
	Mount Sinai	Van Gerwen et.al[15]	March 1 to April 1, 2020
	Mount Sinai	Gupta S et.al[16]	March 4 to April 4, 2020
	New York- Presbyterian Columbia university	Arganziano et.al[17]	March 1 to April 5, 2020
	? New York- Presbyterian Queens university	Gupta S et.al[16]	March 4 to April 4, 2020
	Weill Cornell medicine	Goyal et.al[18]	March 3 to March 27, 2020
	Weill Cornell Medical Centre	Gupta S. et.al[16]	March 4 to April 4, 2020
Country: Mexico	**Hospitals**	**Authors**	**Recruitment and Follow-up period**
	General directorate of epidemiology	Bello-Chavolla et al[19]	All positive PCR tests up to June 3, 2020
	General bureau of epidemiology	Giannouchos T et al[20]	All positive PCR tests up to May 2020
	General bureau of epidemiology	Mancilla-Galindo et.al[21]	February 28 to May 30, 2020
	Epidemiological source of respiratory diseases (475 monitoring units)	Parra-Bracamonte et.al[22]	January 13 to July 17, 2020
Country: Italy (Rome)	**Hospitals**	**Authors**	**Recruitment and Follow-up period**
	5 COVID-19 designated treatment centres	Violi et.al[23]	March to April, 2020
	Italian National Institute for Infectious Diseases (Lazzaro Spallanzani)	Lanini et.al[24]	January 29 to March 28, 2020
Country: Italy (Mialn)	**Hospitals**	**Authors**	**Recruitment and Follow-up period**
	the Network ICUs	Grasselli. et al[25]	February 20 to April 22, 2020 (followed util May 30, 2020)
	Policlinico di Monza hospital, (the Lombardy region)	Ciardullo et al[26]	February 22 to May 15, 2020

Subsequent comparison of the authors, site of the study and the date of recruitment and follow-up led to removal of ones that contained the fewer patients prior to the final analysis in order to avoid double counting of patients.

Table S2: Risk of bias in the included studies

CLARITY Risk of Bias assessment questions	***Q1:*** *Was the selection of exposed and non-exposed cohorts drawn from the same population?* ***Q2:*** *Can we be confident in the assessment of exposure?* ***Q3:*** *Can we be confident that the outcome of interest was not present at start of study?* ***Q4:*** *Did the study match exposed and unexposed for all variables that are associated with the outcome of interest or did the statistical analysis adjust for these prognostic variables?* ***Q5:*** *Can we be confident in the assessment of the presence or absence of prognostic factors?* ***Q6:*** *Can we be confident in the assessment of outcome?* ***Q7:*** *Was the follow up of cohorts adequate?* ***Q8:*** *Were co-interventions similar between groups?*
Responses	**"Definitely yes" (lower risk of bias) « "Probably yes" « "Probably no" « "Definitely no" (higher risk of bias) " N/A": not applicable to the specific outcome**

First Author	Q1	Q2	Q3			Q4			Q5	Q6			Q7			Q8
			Hosp.	Severe	Mort.	Hosp.	Severe	Mort.		Hosp.	Severe	Mort.	Hosp.	Severe	Mort.	
Aggarwal[27]	Def. yes	Prob. yes	N/A	Def. yes	Def. yes	N/A	Def. no	Def. no	Prob. yes	N/A	Def. yes	Def. yes	N/A	Prob. yes	Prob. no	Prob. yes
Argenziano[17]	Def. yes	Prob. yes	N/A	Prob. no	N/A	N/A	Def. no	N/A	Prob. yes	N/A	Prob. yes	N/A	N/A	Prob. yes	N/A	Prob. no
Atkins[28]	Def. yes	Prob. yes	N/A	N/A	Def. yes	Def. yes	N/A	Def. yes	Prob. yes	Def. yes	N/A	Prob. yes	N/A	N/A	Def. no	Prob. no
Attaway[29]	Def. yes	Def. yes	Def. no	Def. no	Prob. yes	Def. yes	Def. yes	Def. yes	Prob. yes	Prob. yes	Prob. yes	Prob. yes	Prob. no	Prob. no	Def. no	Prob. no
Auld[30]	Def. yes	Prob. no	N/A	N/A	Def. yes	N/A	N/A	Def. no	Prob. no	N/A	N/A	Def. yes	N/A	N/A	Def. no	Prob. no
Azoulay[31]	Def. yes	Prob. yes	N/A	N/A	Def. yes	N/A	N/A	Prob. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Prob. no	Prob. yes
Barman[32]	Def. yes	Prob. no	N/A	N/A	Prob. yes	Def. no	N/A	N/A	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. no
Bello-Chavolla[19]	Def. yes	Prob. no	Def. no	Def. no	Prob. no	Prob. no	Prob. yes	Prob. yes	Prob. no	Prob. no	Prob. no	Prob. no	Def. no	Def. no	Def. no	Def. no
Bravi[33]	Def. yes	Prob. yes	N/A	Def. no	Def. yes	Prob. yes	Prob. yes	Prob. yes	Prob. yes	Prob. yes	Prob. no	Prob. no	Def. no	Def. no	Def. no	Def. no
Buckner[34]	Def. yes	Prob. no	N/A	Def. no	Def. yes	N/A	Def. no	Def. no	Prob. yes	N/A	Def. yes	Def. yes	N/A	Prob. yes	Prob. yes	Def. no
Calmes[35]	Def. yes	Def. yes	N/A	Prob. no	Prob. yes	N/A	Def. yes	Def. yes	Prob. yes	N/A	Def. yes	Prob. yes	N/A	Def. no	Def no	Prob. no
Caraballo[36]	Def. yes	Prob. yes	N/A	N/A	N/A	N/A	N/A	Def. no	Prob. no	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. yes
Cen et al[37]	Def. yes	Prob. no	N/A	Def. yes	Def. yes	N/A	Def. yes	Def. no	Prob. yes	N/A	Def. yes	Def. yes	N/A	Prob. yes	Prob. yes	Prob. yes
Ciardullo[26]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Prob. yes	Prob. no	N/A	N/A	Def. yes	N/A	N/A	Def. yes	Def. no
Cui[11]	Def. yes	Prob. no	N/A	N/A	Def. yes	N/A	N/A	Prob. yes	Prob. yes	N/A	N/A	Def. yes	N/A	N/A	Def. yes	Prob. no
Feng Y[4]	Def. yes	Prob. yes	N/A	Def. no	Def. yes	N/A	Def. no	Def. no	Prob. yes	N/A	Def. no	N/A	N/A	Def. no	N/A	Def. no
Giannouchos T[20]	Prob. yes	Prob. no	Def. no	Def. no	Prob. no	Def. yes	Def. yes	N/A	Prob. no	Prob. no	Prob. no	Prob. no	N/A	N/A	N/A	Prob. no
Goyal[18]	Def. yes	Prob. yes	N/A	Def. no	Def. yes	N/A	Def. no	N/A	Prob. yes	N/A	Prob. yes	Prob. yes	N/A	Def. no	Def. no	Prob. no
Grasselli G[25]	Def. yes	Def. no	N/A	N/A	Def. yes	N/A	N/A	Prob. yes	Prob. no	N/A	N/A	Def. yes	N/A	N/A	Def. no	Def. no
Guan W J[5]	Def. yes	Prob. no	N/A	Def. no	Prob. yes	N/A	Prob. no	Prob. no	Prob. no	N/A	Prob. yes	Prob. no	N/A	Def. no	Def. no	Def. no

Gupta R[38]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Prob. yes	Prob. yes	N/A	N/A	Def. yes	N/A	N/A	Def. yes	Prob. yes
Gupta S[16]	Def. yes	Prob. yes	N/A	N/A	Def. yes	N/A	N/A	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. no
Hansen[39]	Def. yes	Prob. no	N/A	Def. no	Prob. yes	N/A	Prob. no	Prob. no	Prob. no	N/A	Prob. yes	Prob. yes	N/A	Prob. yes	Prob. yes	Def. no
Huang C[3]	Def. yes	Prob. yes	N/A	Prob. yes	Def. yes	N/A	Def. no	N/A	Prob. yes	N/A	Prob. yes	N/A	N/A	Def. no	Def. no	Prob. yes
Islam[40]	Def. yes	Prob. no	N/A	N/A	Def. no	N/A	N/A	Def. no	Prob. no	N/A	N/A	Def. yes	N/A	N/A	Def. yes	Def. no
Israelsen[41]	Def. yes	Prob. no	N/A	Def. no	Def. yes	N/A	Def. no	N/A	Prob. no	N/A	Prob. yes	N/A	N/A	Def. no	N/A	Def. no
Itelman[42]	Def. yes	Def. no	N/A	Def. no	Def. yes	N/A	Def. no	N/A	Def. no	N/A	Prob. yes	Def. yes	N/A	Def. no	Prob. no	Def. no
Jalili[43]	Def. yes	Prob. no	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. no	N/A	N/A	Prob. yes	N/A	N/A	Prob. yes	Def. no
Javanian[44]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. yes	Prob. yes	N/A	N/A	Def. yes	N/A	N/A	Prob. yes	Prob. no
Jiang[2]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. yes	N/A	N/A	Def. yes	N/A	N/A	Prob. yes	Prob. yes
Jimenez[45]	Def. yes	Prob. no	N/A	Prob.no	Prob. yes	N/A	Def. no	Prob. no	Prob. no	N/A	Def. yes	Def. yes	N/A	Def. yes	Def. yes	Prob. no
Kalyanaraman Marcello[46]	Def. yes	Prob. no	Prob. yes	N/A	Prob. yes	Def. no	N/A	Def. no	Prob. no	Prob. yes	N/A	Prob. yes	Prob. yes	N/A	Def. no	Def. no
Kim[47]	Def. yes	Def. no	N/A	N/A	Prob. yes	N/A	Prob. no	N/A	Def. no	N/A	Prob. yes	N/A	N/A	Def. yes	N/A	Def. no
Lagi[48]	Def. yes	Prob. no	N/A	Prob. no	Def. yes	N/A	Def. no	N/A	Prob. no	N/A	Prob. yes	N/A	N/A	Prob. no	N/A	Def. no
Lanini[24]	Def. yes	Prob. no	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. no	N/A	N/A	Def. yes	N/A	N/A	Def. yes	Def. no
Li K[10]	Def. yes	Prob. no	N/A	N/A	Def. yes	N/A	N/A	Def. no	Prob. no	N/A	N/A	Prob. yes	N/A	N/A	Prob. no	Prob. no
Liu W[49]	Def. yes	Def. no	N/A	Def. no	Def. yes	N/A	Def. no	N/A	Def. no	N/A	Prob. yes	Prob. yes	N/A	Prob. yes	Prob. no	Prob. no
Ludwig[50]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Def. no
Mancilla-Galindo[21]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Prob. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Def. no
Mohamed[14]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Prob. no	Def. no
Parra-Bracamonte[22]	Def. yes	Prob. yes	Prob. yes	N/A	Prob. yes	Def. no	N/A	Def. yes	Prob. yes	Prob. yes	N/A	Prob. yes	Def. no	N/A	Def. no	Def. no
Rica R[51]	Def. yes	Prob. no	N/A	Prob. yes	Def. yes	N/A	Def. no	N/A	Prob. yes	N/A	Def. yes	Prob. yes	N/A	Def. no	N/A	Prob. no
Salacup[52]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. yes	Prob. no
Shah[53]	Def. yes	Prob. no	N/A	N/A	Prob. yes	N/A	N/A	Def. yes	Prob. no	N/A	N/A	Prob. yes	N/A	N/A	Def. yes	Def. no
Smith A[54]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. yes	Def. no
Song J[55]	Def. yes	Prob. yes	N/A	Def. no	Prob. yes	N/A	Def. no	Def. no	Prob. yes	N/A	Def. no	Prob. yes	N/A	Def. yes	Def. yes	Def. no
Suleyman G[56]	Def. yes	Prob. yes	Prob. yes	Def. no	Def. yes	N/A	Prob. no	Prob. no	Prob. yes	Prob. yes	Prob. yes	Def. yes	Prob. yes	Def. yes	Prob. yes	Def. no
Tomlins J[57]	Def. yes	Def. no	N/A	N/A	Def. yes	N/A	N/A	Def. no	Def. no	N/A	N/A	Prob. yes	N/A	N/A	Prob. no	Def. no
van Gerwen[15]	Def. yes	Prob. no	Prob. no	Prob. no	Prob. yes	Prob. yes	Prob. yes	Prob. yes	Prob. no	Prob. yes	Def. yes	Prob. yes	Prob. no	Prob. no	Prob. no	Def. no
Violi F[23]	Def. yes	Prob. no	N/A	N/A	Def. yes	N/A	N/A	Def. yes	Prob. no	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Def. no
Wang D[12]	Def. yes	Prob. yes	N/A	Def. no	Def. yes	N/A	Def. no	N/A	Prob. yes	N/A	Prob. yes	N/A	N/A	Prob. no	N/A	Prob. no
Wang L[1]	Def. yes	Def. no	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Def. no	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Def. no
Wang Y[9]	Def. yes	Prob. no	N/A	Def. no	Def. yes	N/A	Prob. no	N/A	Prob. no	N/A	Prob. no	N/A	N/A	Def. no	N/A	Def. no
Wu F[58]	Prob. no	Prob. yes	N/A	Def. no	Prob. yes	N/A	Def. yes	Def. yes	Def. no	N/A	Prob. no	Prob. yes	N/A	Def. no	Def. no	Def. no
Yang X[6]	Def. yes	Prob. yes	N/A	N/A	Def. yes	N/A	N/A	N/A	Prob. yes	N/A	N/A	Def. yes	N/A	N/A	Prob. yes	Prob. no
Zhang G[13]	Def. yes	Prob. yes	N/A	Def. no	Prob. yes	N/A	Def. no	N/A	Prob. yes	N/A	Prob. yes	N/A	N/A	Prob. no	N/A	Prob. no

Zhang J[8]	Def. yes	Prob. yes	N/A	Def. no	N/A	N/A	Def. no	N/A	Prob. yes	N/A	Prob. yes	N/A	N/A	N/A	N/A	Def. no
Zheng F[59]	Def. yes	Def. no	N/A	Def. no	Prob. yes	N/A	Def. no	N/A	Def. no	N/A	Prob. yes	N/A	N/A	N/A	N/A	Def. no
Zhou F[7]	Def. yes	Prob. yes	N/A	N/A	Prob. yes	N/A	N/A	Def. no	Prob. yes	N/A	N/A	Def. yes	N/A	N/A	Def. yes	Prob. no

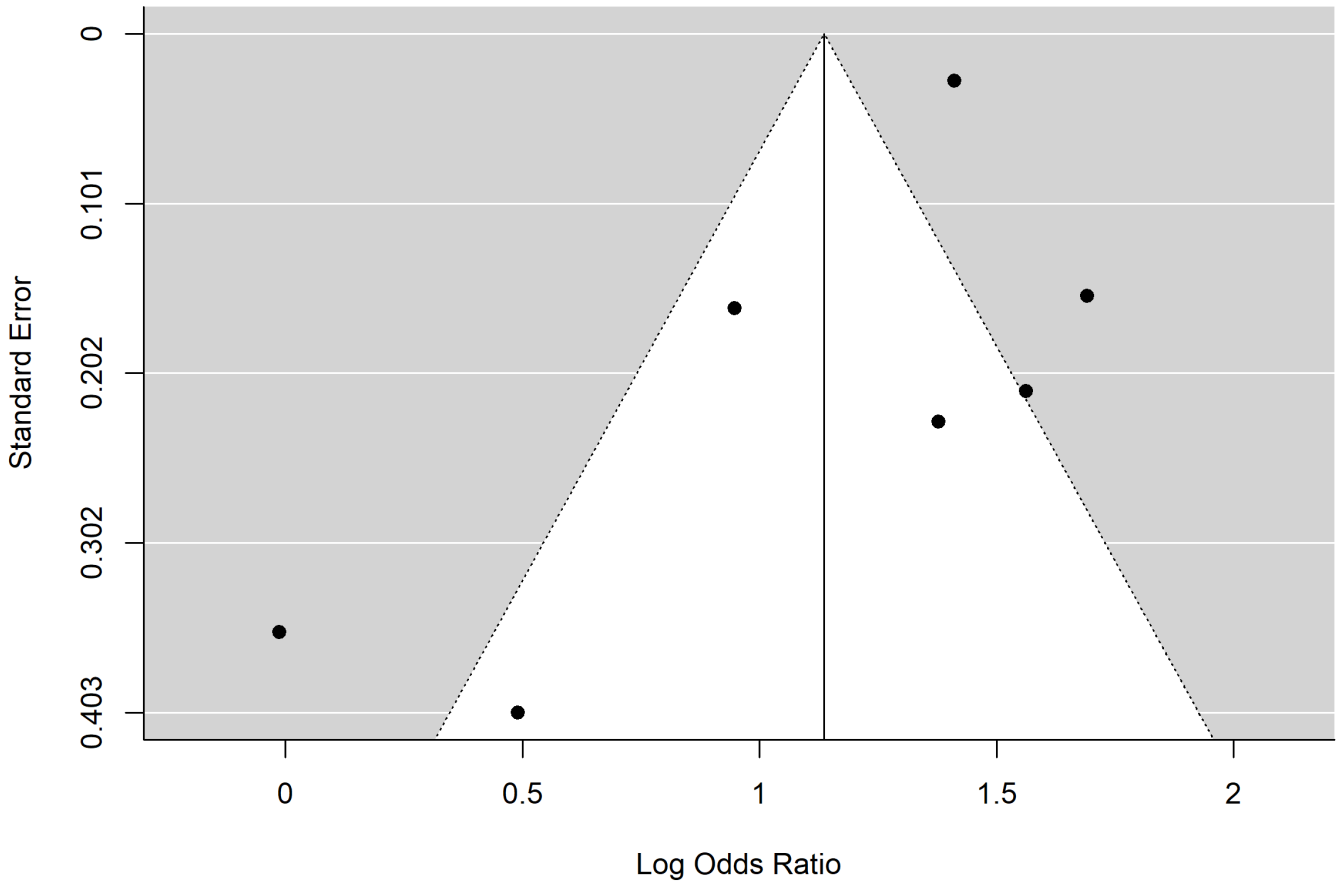

Figure S2: Funnel plot for hospitalization meta-analysis

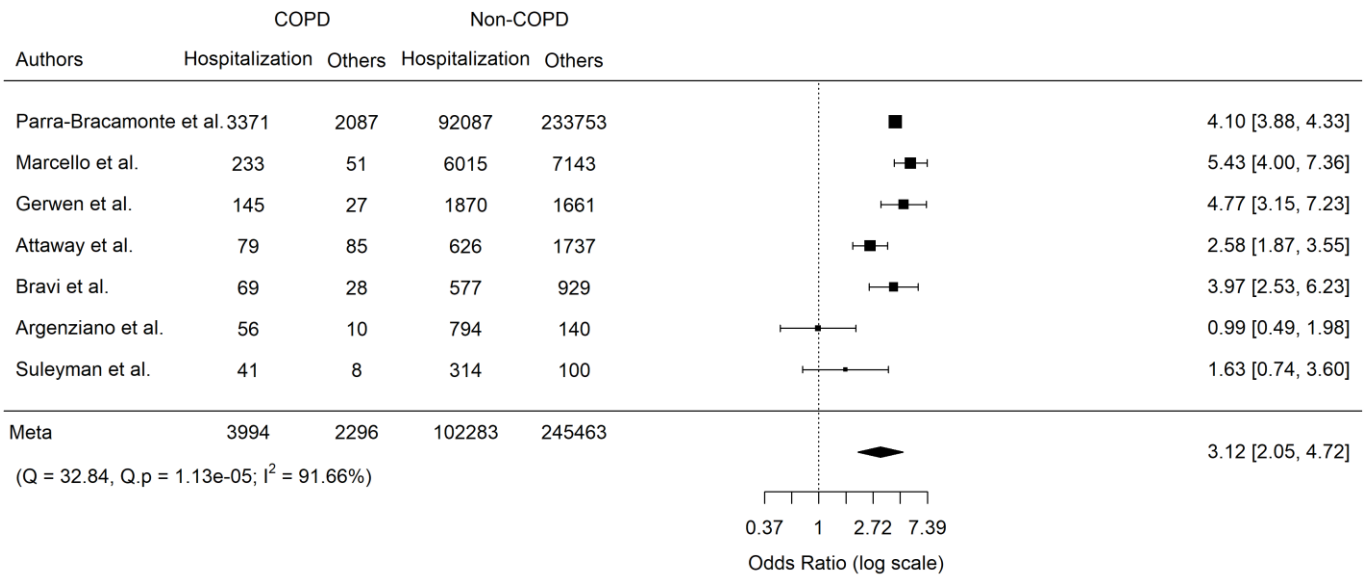

Figure S3: Forest plot for hospitalization meta-analysis of all studies where data was available, showing significant heterogeneity (Cochran's Q and I^2 tests) among the estimates. Odds ratios [95% confidence intervals] for individual studies (squares and bars) and the pooled odds ratio [95% CI] (diamond).

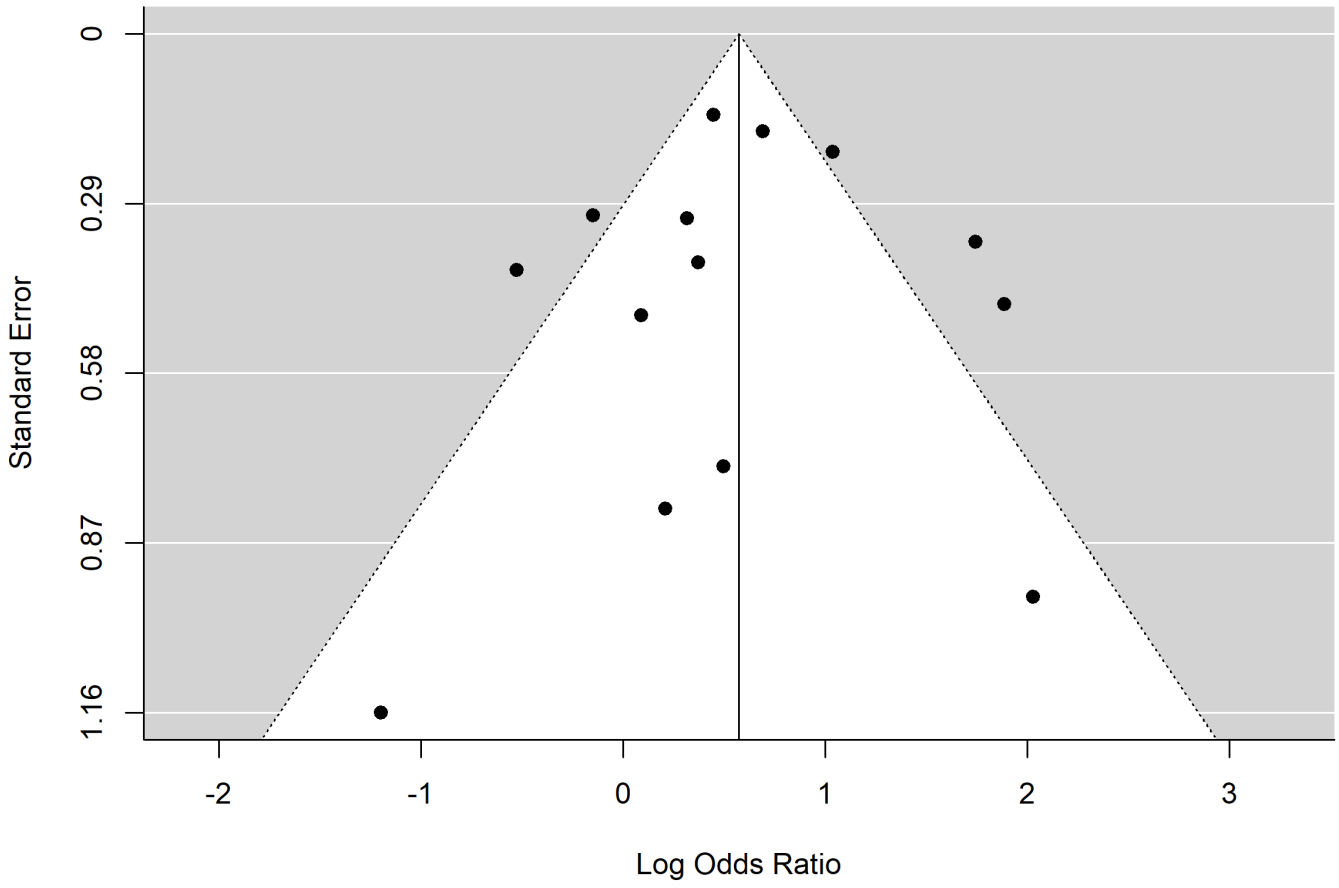

Figure S4: Funnel plot for severe COVID-19 meta-analysis

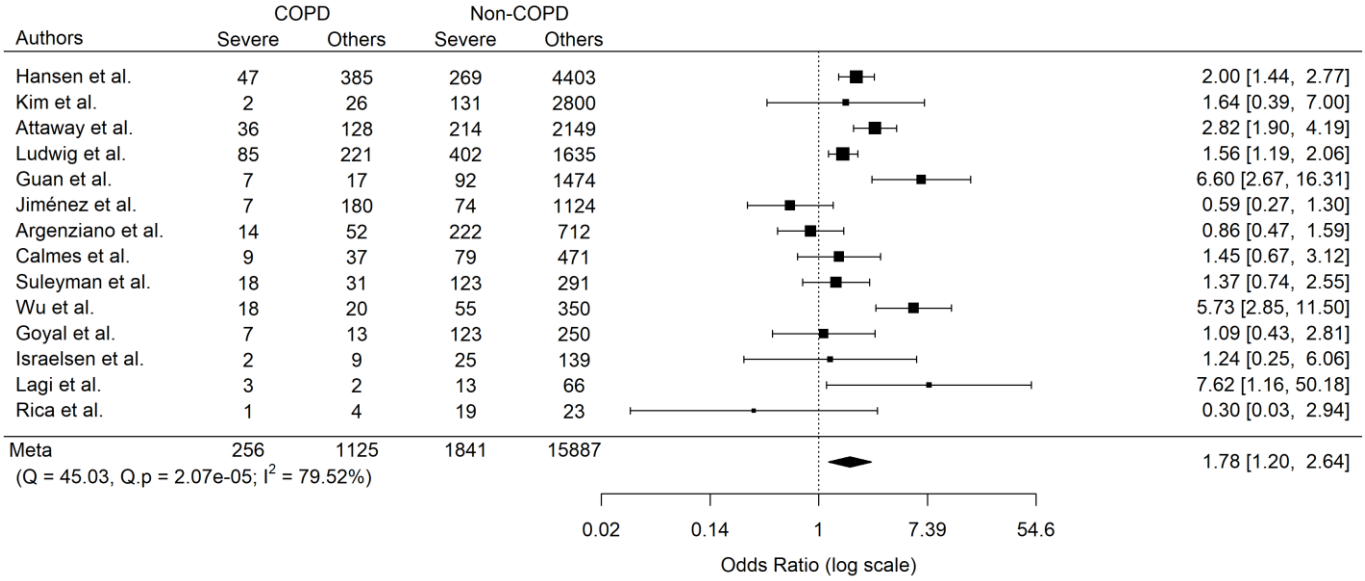

Figure S5: Forest plot for severe COVID-19 meta-analysis of all studies where data was available, showing significant heterogeneity (Cochran's Q and I^2 tests) among the estimates. Odds ratios [95% confidence intervals] for individual studies (squares and bars) and the pooled odds ratio [95% CI] (diamond).

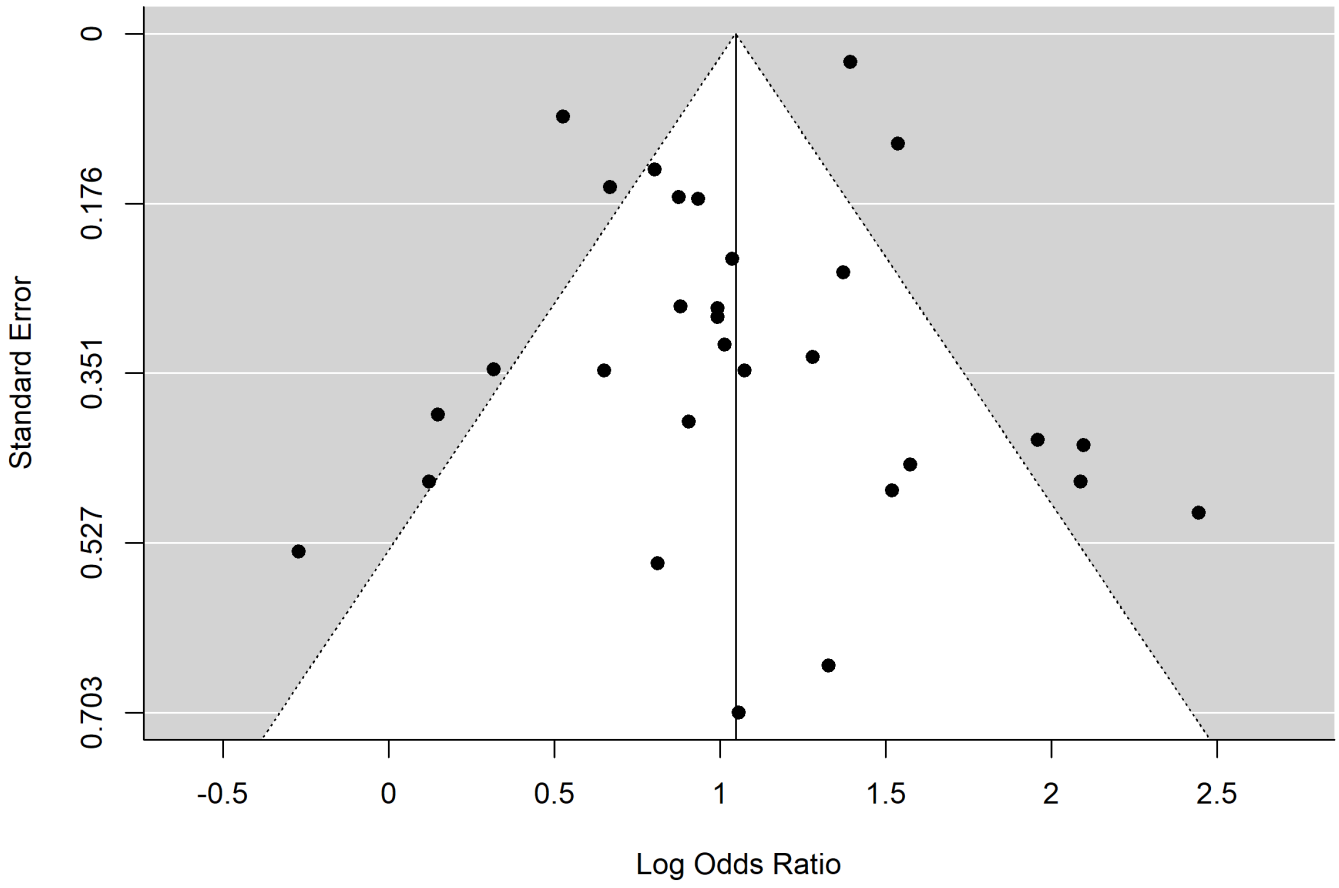

Figure S6: Funnel plot for mortality meta-analysis

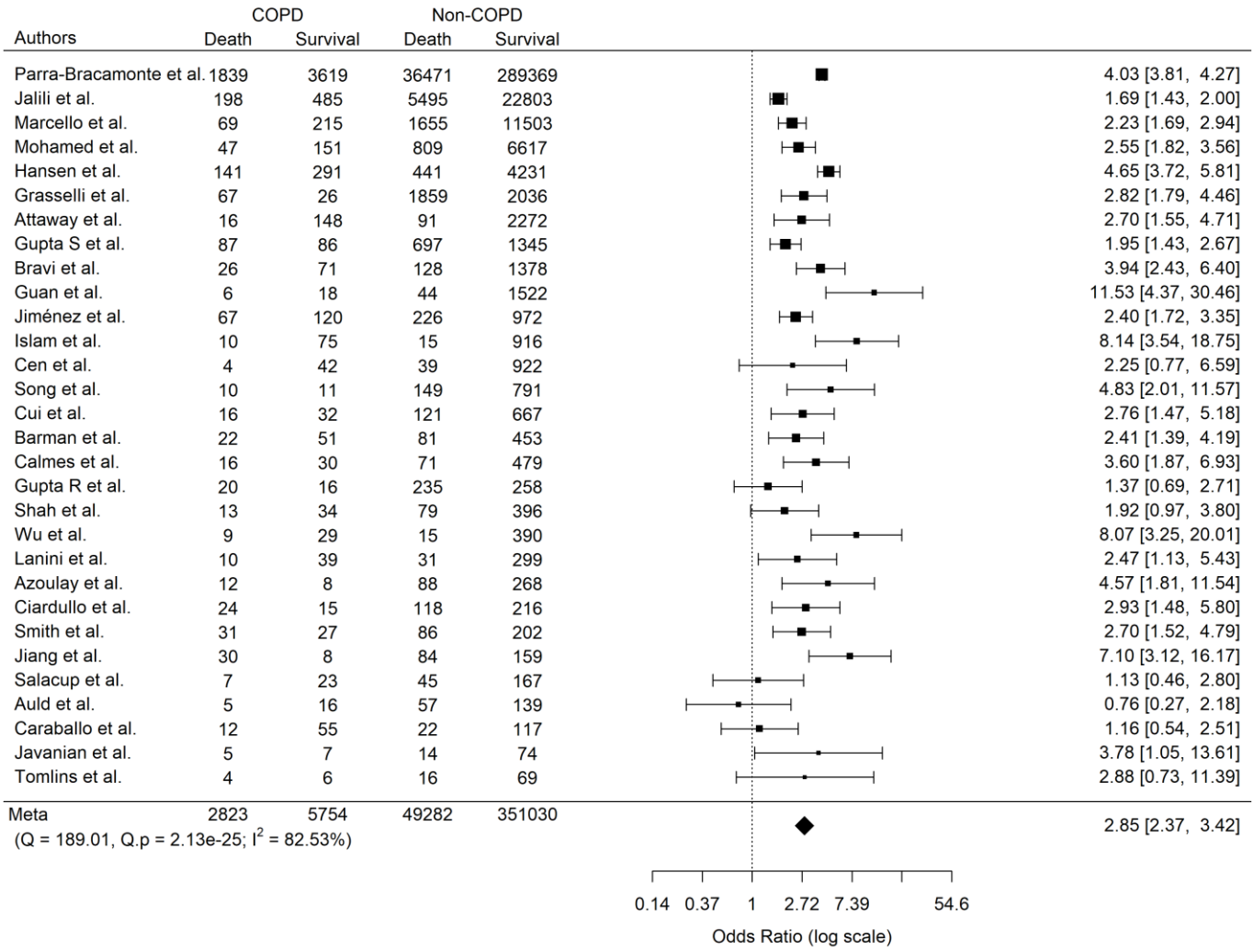

Figure S7: Forest plot for mortality meta-analysis of all studies where data was available, showing significant heterogeneity (Cochran's Q and I^2 tests) among the estimates. Odds ratios [95% confidence intervals] for individual studies (squares and bars) and the pooled odds ratio [95% CI] (diamond).

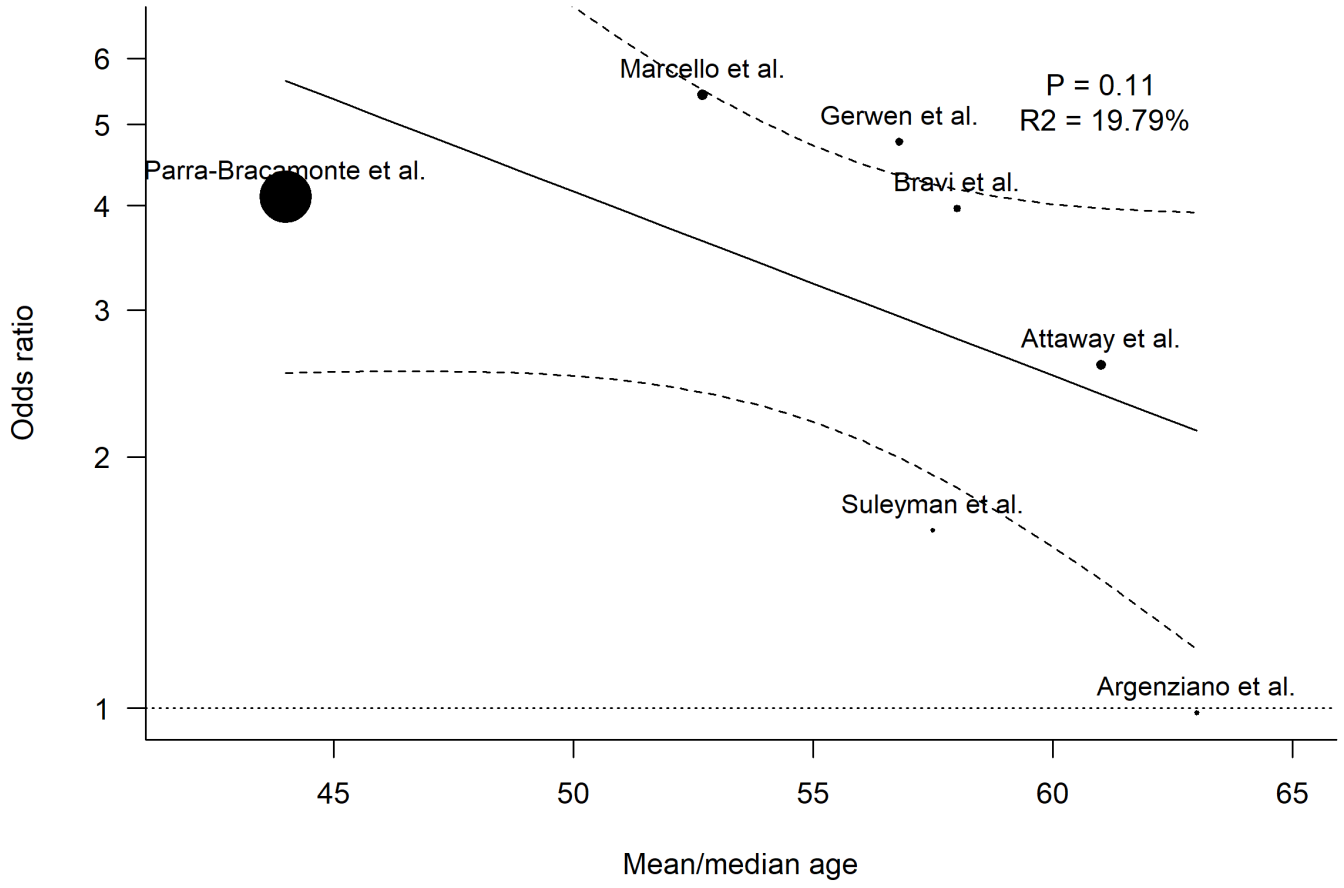

Figure S8: Meta-regression of odds ratios for hospitalization against age (mean or median as available).

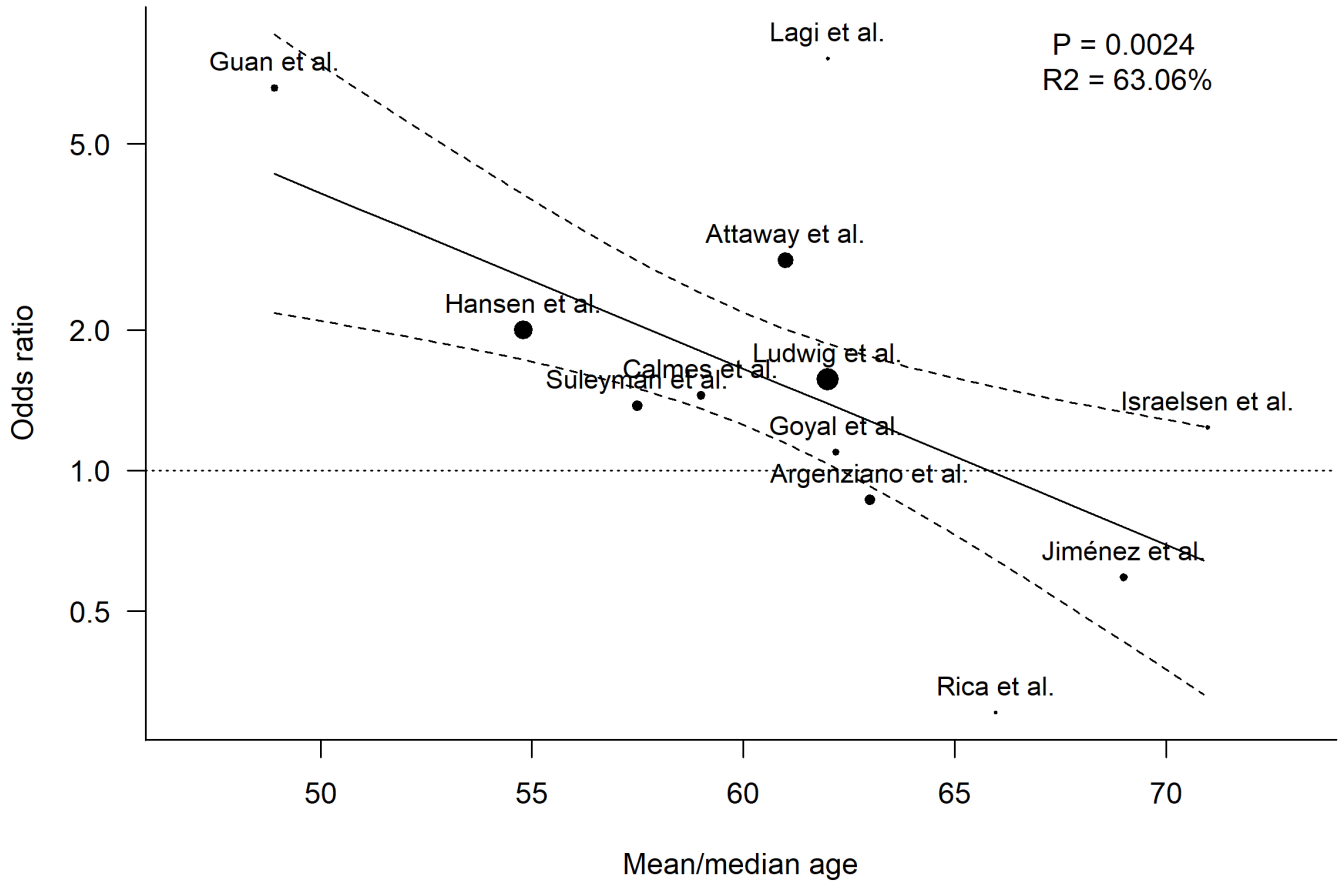

Figure S9: Meta-regression of odds ratios for severe COVID-19 (ICU admission) against age (mean or median as available).

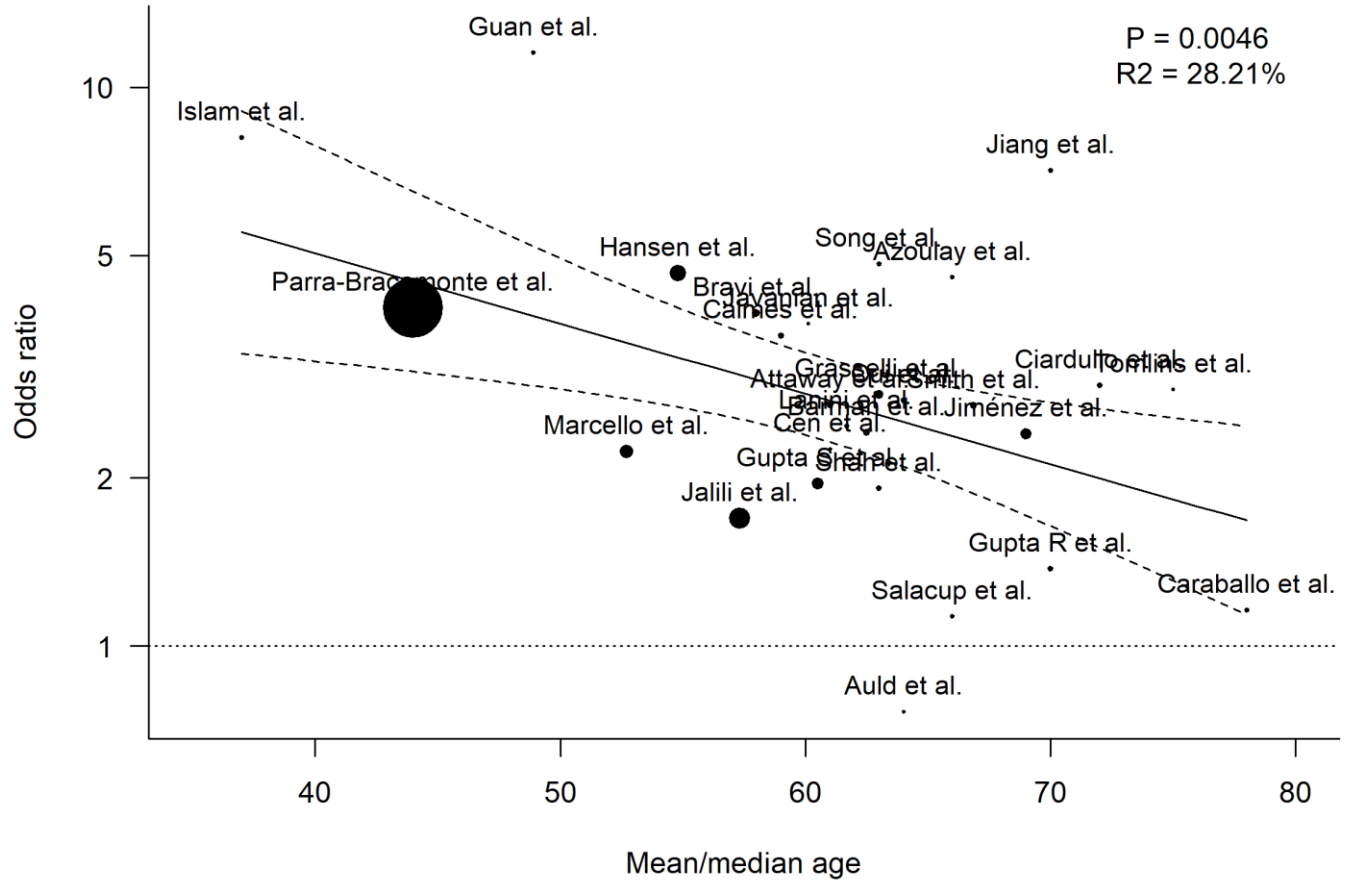

Figure S10: Meta-regression of odds ratios for mortality against age (mean or median as available).

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