Supplementary Online Content

Table S1. Corpus of studies included in meta-analysis (search closing date of 4 July 2020.

Appendix to Table S1: Publications included in the meta-analysis

Fig. S1: PRISMA flowchart.

Fig. S2: Funnel plots (A) mortality, (B) severity of COVID-19 disease, and (C) hospitalization.

Table S1. Corpus of studies included in meta-analysis (search closing date of 4 July 2020; citations in Appendix to this Table).

Study	Country	Design	Study Period	ACEI/ARB	Non-ACEI/ARB	Outcomes of interest	Statistical adjustments	NOS
Bean et al[1]	UK	Multi-center retrospective study	1st Mar to 13th Apr, 2020	399	801	Mortality Severity (death or organ support within 21-days of symptom onset)	Mortality: none Severity: age, sex, comorbidities	7
Bravi et al[2]	Italy	Population-based case-control retrospective study	Up to 24th Apr, 2020	450	1152	Severity (requiring ICU or causing death)	Severity: age, gender, diabetes, major cardiovascular diseases, COPD, cancer, renal diseases	7
Chen et al[3]	China	Single-center retrospective study	1st Jan to Mar 17th, 2020	32	39	Mortality	None	5
Conversano et al[4]	Italy	Single-center retrospective study	27th Feb to 17th Mar, 2020	-	-	Mortality	None	5
Felice et al[5]	Italy	Single-center retrospective study	9th Mar to 31st Mar 2020	82	51	Mortality Severity (requiring semi ICU or ICU) Hospitalization	Mortality, severity, hospitalization: age, gender, BMI, days with symptoms, previous cardiovascular	8
Feng et al[6]	China	Multi-center retrospective study	1st Jan to 15th Feb 2020	35	62	Severity (National Health Commission of China definition)	None	5

Fosbøl et al[7]	Denmark	National registry retrospective cohort study	1st Feb to 4th May, 2020	895	3585	Mortality Severity (unclear definition)	Mortality, severity: age, sex, comorbidities	9
Gao et al[8]	China	Single-center retrospective observational study	5th Feb to 15th Mar, 2020	183	527	Mortality Severity (unclear definition)	Mortality, severity: propensity score matched for age, sex, diabetes, insulin-treated diabetes, myocardial infarction, underwent PCI/CABG, renal failure, stroke, heart failure, COPD.	8
Guo et al[9]	China	Single-center retrospective study	23th Jan to 23th Feb, 2020	19	168	Mortality	None	4
Huang et al[10]	China	Single-center retrospective study	7th Feb to 3rd Mar, 2020	20	30	Mortality Severity (National Health Commission of China definition)	None	4
Jung et al[11]	Korea	Retrospective observational data from nationwide database	Up to 8th Apr, 2020.	377	1577	Mortality (in-hospital death)	Mortality: age, sex, Charlson Comorbidity Index, immunosuppression	7
Li et al[12]	China	Single-center retrospective case series	15th Jan to 15th Mar, 2020	115	247	Mortality Severity (National Health Commission of China definition)	None	4
Liabeuf et al[13]	France	Single-center retrospective study	Feb 28th to 30th Mar, 2020	96	172	Mortality Severity (admission to ICU)	Mortality: none Severity: comorbidities	4

Li Xiaochen et al[14]	China	Single-center ambispective cohort study	Jan 26th to Feb 5th, 2020	42	503	Severity (IDSA Pneumonia severity)	None	4
Liu Y et al[15]	China	Multi-center retrospective study	Jan 11th to Feb 5th, 2020	12	34	Severity (National Health Commission of China definition)	Severity: sex	6
Lopez-Otero[16]	Spain	Single-center retrospective study	Mar 10th to April 6th, 2020	210	755	Mortality Severity (ICU admissions)	Mortality, severity: propensity score matching	8
Mancia et al[17]	Italy	Population-based case–control study	Feb 21th to Mar 11th, 2020	2896	12506	Severity (defined as critical or fatal disease)	Severity: propensity score matching	9
Mehta et al[18]	USA	Multi-center retrospective study	Mar 8th to Apr 12th, 2020	211	1494	Mortality Severity (admission to ICU) Hospitalization	Mortality: none Severity, hospitalization: propensity score matching	8
Meng et al[19]	China	Single-center retrospective study	Jan 11th to Feb 23rd, 2020	17	25	Mortality Severity (National Health Commission of China definition)	None	4
Richardson et al[20]	USA	Population-based retrospective case series study	Mar 1st to Apr 4th, 2020	413	953	Mortality Severity (ICU care)	None	4
Rentsch et al[21]	USA	Population-based retrospective cohort	Feb 8th and Mar 30th, 2020	1532	2247	Severity (ICU admission) Hospitalization	Severity, hospitalization: age, race, comorbid conditions, and Veterans Aging Cohort Study Index of physiologic injury	9

Reynolds et al[22]	USA	Multi-center retrospective cohort study	Mar 1st to Apr 15th, 2020	1774	439	Severity (defined as intensive care, mechanical ventilation, or death)	Propensity score matching	9
Rossi et al[23]	Italy	Population-based prospective cohort study	Feb 27th Up to Apr 8th	818	4488	Mortality Hospitalization	Mortality, severity: age, sex, Charlson Comorbidity Index	8
Tedeschi et al[24]	Italy	Multi-center prospective cohort study	Feb 1st to Apr 4th, 2020	175	136	Mortality	Mortality: age, gender, presence of comorbidities	8
Yang et al[25]	China	Single-center retrospective study	Jan 5th to Feb 22nd, 2020	43	83	Mortality Severity (National Health Commission of China definition)	None	4
Yan et al[26]	China	Population-based retrospective case-control study	Jan 10th to Feb 28th, 2020	-	-	Severity (National Health Commission of China definition)	Severity: age, sex, BMI	4
Yu et al[27*]	China	Multi-center retrospective cohort study	Jan 17th to Feb 19th, 2020	103	173	Mortality	Mortality: sex, age, smoking, symptoms, chronic diseases	9
Zeng et al[28]	China	Single-center retrospective study	Jan 5th to Mar 8th, 2020	28	47	Mortality Severity (IDSA Pneumonia severity) Hospitalization	None	4
Zhang et al[29]	China	Multi-center retrospective study	Dec 31st to Feb 20th, 2020	174	348	Mortality Severity (ARDS)	Mortality, severity: propensity score matching	9
Zhou et al[30]	China	Single-center retrospective study	Jan 25th to Feb 20th, 2020	15	21	Mortality	None	4

* Data were not reported separately but merged into the Zhang et al (2020) meta-analysis. Data included here are as reported in the meta-analysis.

Abbreviations

ACEI: angiotensin converting enzyme inhibitors

ARB: Angiotensin II receptor blockers

ARDS: Acute respiratory distress syndrome

BMI: Body mass index

CABG: Coronary artery bypass surgery

COPD: Chronic obstructive pulmonary disease

ICU: Intensive care unit

IDSA: Infectious Diseases Society of America

PCI: Percutaneous coronary intervention
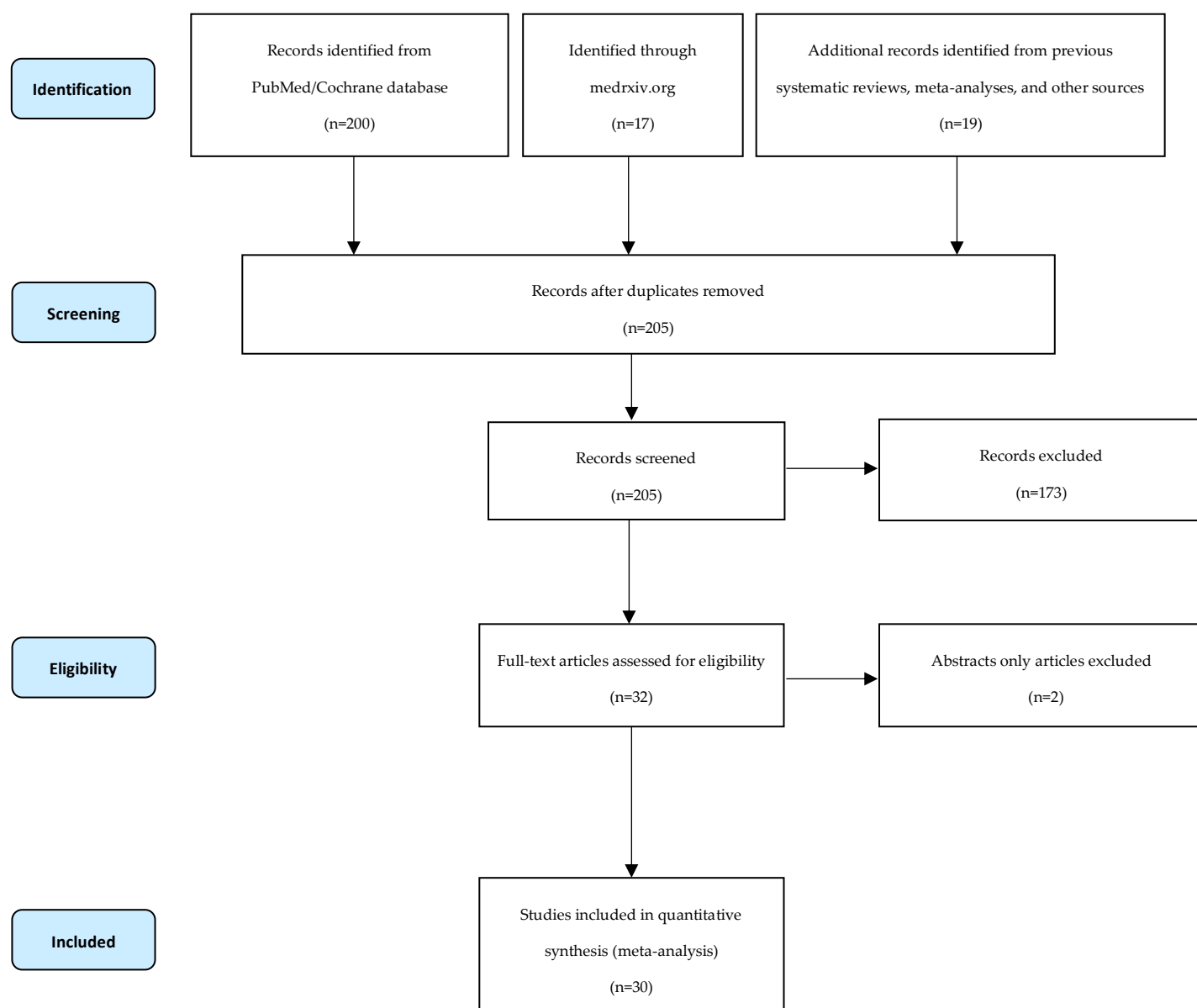
NOS: Newcastle-Ottawa Scale

Appendix to Table S1: Publications included in the meta-analysis

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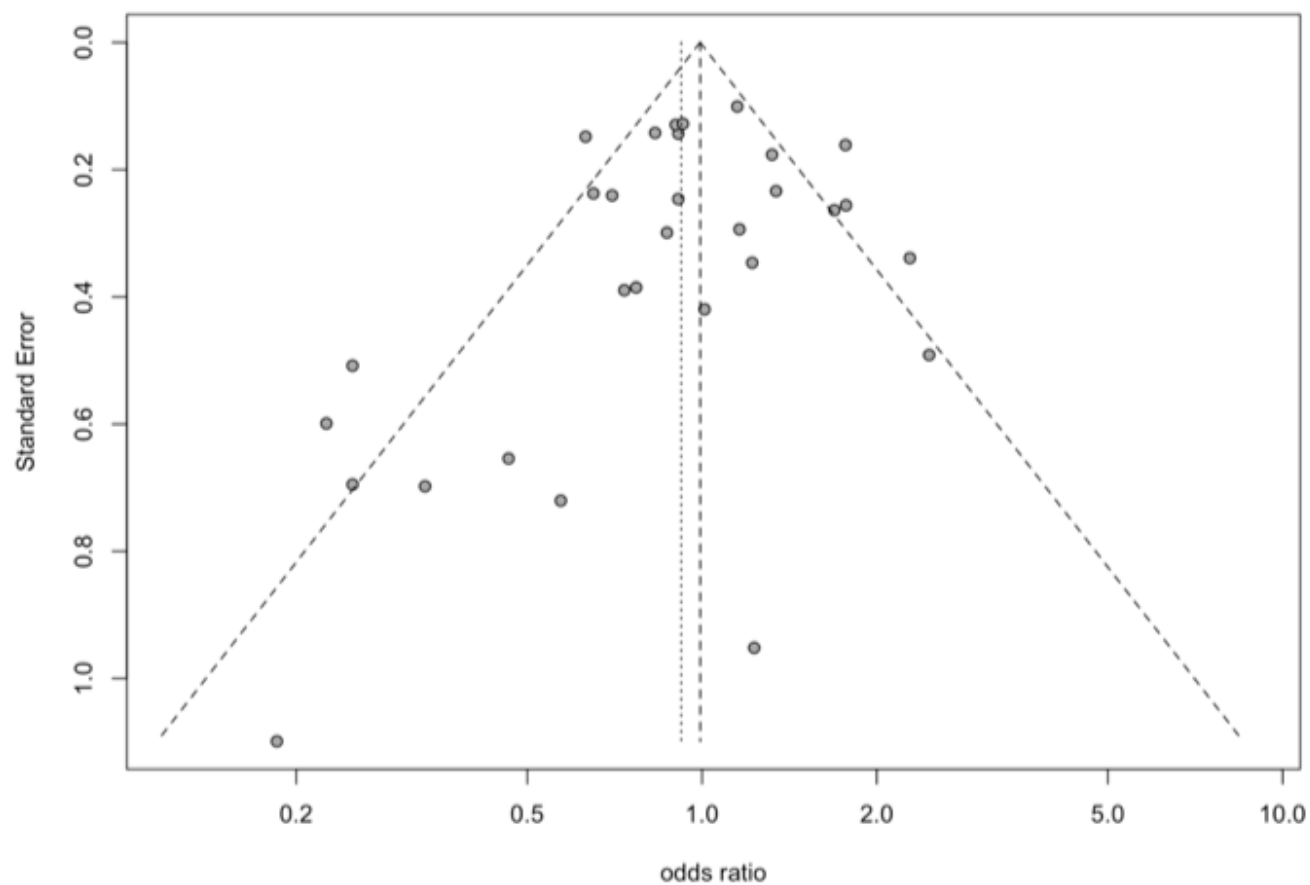
Fig. S1: PRISMA flowchart

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Identification

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  │ Records identified  │   │ Identified through  │   │ Additional records identified    │
  │ from PubMed/Cochrane│   │ medrxiv.org         │   │ from previous systematic reviews,│
  │ database            │   │ (n=17)              │   │ meta-analyses, and other sources │
  │ (n=200)             │   │                     │   │ (n=19)                           │
  └─────────────────────┘   └─────────────────────┘   └──────────────────────────────────┘

Screening

  ┌──────────────────────────────────────────────────────────────────────────────────────┐
  │                        Records after duplicates removed                                │
  │                                    (n=205)                                             │
  └──────────────────────────────────────────────────────────────────────────────────────┘

  ┌─────────────────────┐                              ┌─────────────────────┐
  │ Records screened    │ ───────────────────────────► │ Records excluded    │
  │ (n=205)             │                              │ (n=173)             │
  └─────────────────────┘                              └─────────────────────┘

Eligibility

  ┌─────────────────────────────────┐                  ┌──────────────────────────────┐
  │ Full-text articles assessed for │ ───────────────► │ Abstracts only articles      │
  │ eligibility (n=32)              │                  │ excluded (n=2)               │
  └─────────────────────────────────┘                  └──────────────────────────────┘

Included

  ┌─────────────────────────────────┐
  │ Studies included in quantitative│
  │ synthesis (meta-analysis)       │
  │ (n=30)                          │
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Figure Legend

Figure. S2: Funnel plots (A) mortality, (B) severity of COVID-19 disease, and (C) hospitalization.

Panel A: Mortality
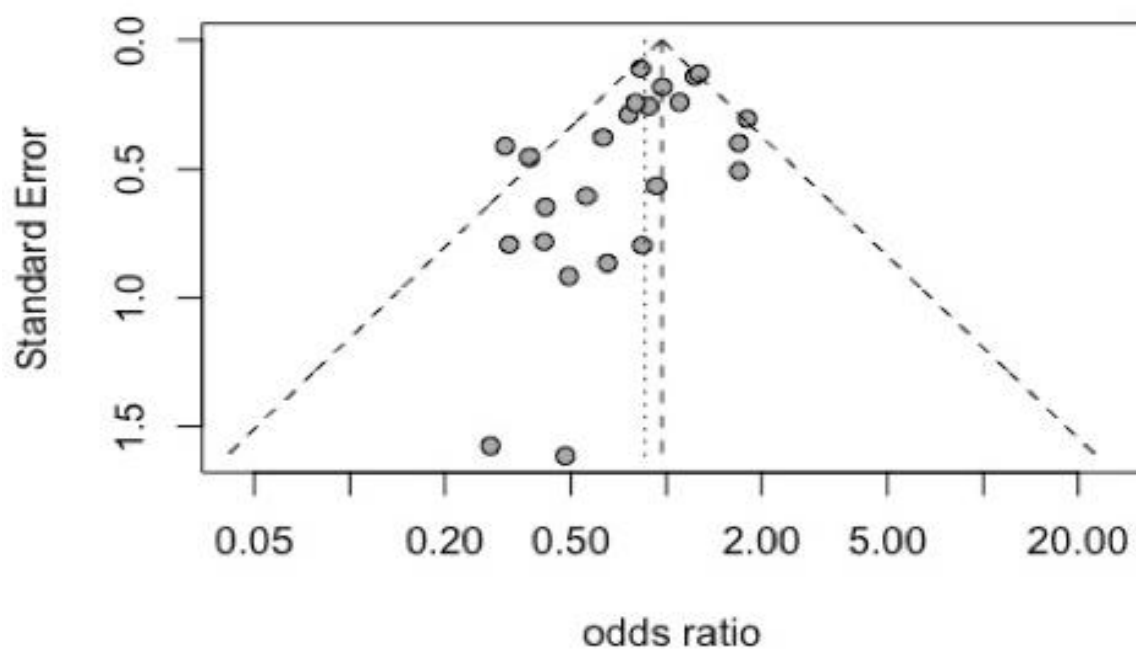
Panel B: Severity

Panel C: Hospitalization