A comprehensive presentation of SARS-CoV-2 infection – A systematic review and meta-analysis

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Summary

Objective: In December 2019, the first case of pneumonia caused by SARS-CoV-2 was reported in the Chinese province Wuhan, China. Due to a rapid spread of the infection, more than 17 million cases worldwide have been registered so far.

Methods: A systematic literature survey was performed using PubMed, Google Scholar and Web of Science until 19 March 2020. Infections had to be confirmed by polymerase chain reaction. Eligible studies had to report data pertaining to comorbidities, clinical symptoms, laboratory alterations or treatment options. Studies with missing data, opinion articles and letters were excluded. For the meta-analysis, a binary random effect model was used to calculate prevalences and the 95% confidence intervals (95% CI).

Results: In total, 958 articles were identified, 80 studies involving 5,053 patients were included. Cardiovascular (20.5%, 95% CI 16.5% to 24.5%) and endocrine diseases (9.6%, 95% CI 7.7% to 11.6%) were the most prevalent comorbidities. Patients presented with fever (77.0%, 95% CI 73.3% to 80.7%) and malaise (31.1%, 95% CI 25.0 to 37.3). Lymphocytes were decreased in 42.2% (95% CI 35.2% to 49.3%). Radiological lung changes were predominantly bilateral (74.0%, 95% CI 66.3% to 81.6%).

Conclusions: This meta-analysis provides a comprehensive presentation of all aspects of infection. Early detection of symptoms and patients at risk is crucial for beneficial treatment.

Einleitung

Introduction

On 29 December 2019 the first four cases of a "pneumonia of unknown aetiology" were identified by a local hospital in Wuhan, China [1]. Over time, an increasing number of patients were identified of having a new kind of viral pneumonia, caused by a novel RNA betacoronavirus named SARS-CoV-2 [2,3]. Since then, SARS-CoV-2 infections spread rapidly and were declared a public health emergency of international concern by the World Health Organization (WHO) [4]. On 31st July 2020, over 17 million infections were reported globally by the Johns Hopkins University [5].

So far, a few observational studies have been published and provide information on infection-related risk factors, clinical and laboratory features, complications and treatment options in patients [6–23]. In a descriptive study, Chen et al. analysed the epidemiological and clinical features of 99 patients with SARS-CoV-2 infection. It was revealed that 50% had underlying chronic diseases, their clinical symptoms mostly consisted of fever and respiratory symptoms [6]. Typical radiological features of infection were bilateral or unilateral ground-glass opacities as well as pneumonia [6,11].

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Interessenkonflikte

K. Zacharowski erhielt in den letzten drei Jahren 2015–2018 Forschungsstipendien, Honorare für Advisory Boards und wissenschaftliche Vorträge sowie finanzielle Unterstützung für seine Klinik von: German Research Foundation (ME 3559/1-1, ME 3559/3-1, SFB 834 B4, SFB 815 A17, KFO TP07), ECCPS, LOEWE TP 6, European Union, AbbVie Deutschland GmbH & Co. KG, Aesculap Akademie GmbH, AIT GmbH, Wien, Amomed GmbH, Ashai Kasai Pharma, Astellas Pharma GmbH, B. Braun Melsungen AG, B. Braun Avitum AG, Bayer AG, Biotest AG, CSL Behring GmbH, Christian Doppler Stiftung, Cyto Sorbents GmbH, Dr. F. Köhler Chemie GmbH, Dräger Medical GmbH, Edward Life Science GmbH, Envico SRL, Executive Insight AG, Fering Arzneimittel, Forum Sanitas, Fresenius Kabi GmbH, Fresenius Medical Care, Hartmannbund Landesverband, Haemonetics Corporation, Health Advances GmbH, Heinen+Löwenstein GmbH, Hexal AG, INC Research, Johnson & Johnson, Karl Storz AG, M&M Gesundheitsnetzwerk, Maquet GmbH, Marien-Akademie, Markus Lücke Kongress Organisation, Masimo Schweiz, Masimo International, med Update GmbH, MSD Sharp&Dohme GmbH , Novo Nordisk Pharma GmbH, Nordic Group, Orion Pharma GmbH , Pall GmbH, Pfizer Pharma GmbH, Ratiopharm GmbH, Reha Medi GmbH, Salvia Medical GmbH, Schering Stiftung, Schöchl Medical Österreich, Siemens Healthcare, Teflex Medical GmbH, TEM International, Vifor Pharma GmbH

F. Raimann: HemoSonics LLC, Charlottesville, VA, USA., Keller Medical GmbH, Bad Soden/Ts., Hessen, Germany, HELIOS Kliniken GmbH, Boehringer Ingelheim,
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Keywords
SARS-CoV-2 – COVID-19 – CoV-19 – Wuhan pneumonia

Nevertheless, in some cases SARS-CoV-2 may also be asymptomatic with no radiological abnormalities, emphasising the clinical variety of infection [11] Regarding laboratory results, it has been demonstrated that the majority of patients presented with lymphocytopenia [9]. In case of severe infection, multi-organ dysfunction like acute kidney injury, acute respiratory distress syndrome (ARDS) and liver dysfunction may occur [6,11,20]. These studies, however, have several limitations: The sample sizes of the study populations are often limited, with a majority of studies analysing patient populations with less than 100 patients [6–8,11,20]. Trials with low numbers of patients are important to understand the impact of infection; however, they might often be underpowered and fail to detect the main characteristics of an infection. Furthermore, many studies lack a holistic presentation thus limiting their main focus on existing comorbidities or clinical symptoms only [6]. To date, there are only a few systematic reports and meta-analyses which have investigated all aspects of infection, i.e. comorbidities, clinical and laboratory characteristics and treatment options [24] or at least two of these four main aspects [25–27]. A meta-analysis performed by Fu et al. includes 43 articles and a a total of 3,600 patients. However, only publications from the mainland of China were included, thus ruling out global application of the results [24]. Another meta-analysis, conducted by Rodriguez-Morales and colleagues, only focused on the clinical and laboratory characteristics of infection, without considering possible treatment options [26]. In addition, infections were not always confirmed by real-time reverse transcriptase polymerase chain reaction (rRT-PCR). A diagnosis based on clinical symptoms or laboratory results alone may lead to false positive results [26,27]. Knowledge about predisposing conditions and the clinical features of infection is highly important for both diagnosis and targeted therapy. To conquer these limitations, we therefore conducted a meta-analysis including peer-reviewed, worldwide published articles on all four aspects of infection, i.e. demographic data, clinical symptoms, laboratory results, and treatment options in a large patient population.

Material and Methods

Registration and Protocol

The present study follows the recommendations established by the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRSIMA) [28].

Search Strategy

A systematic search was performed using Medline electronic database (PubMed), Web of Science and Google Scholar. The following search string: **((COVID-19 OR "Novel coronavirus" OR "Novel coronavirus 2019" OR "2019 nCoV" OR "Wuhan coronavirus" OR "Wuhan pneumonia" OR "SARS-CoV-2") AND (demographics OR clinical OR epidemiological OR characteristics))** was used to identify published studies. The database search was conducted until 19 March 2020. Two independent researchers (F.R., V.N.) evaluated the search results. Duplicates were identified and removed in a primary survey.

Eligibility criteria

Articles that reported cases of SARS-CoV-2 infections confirmed by rRT-PCR were eligible for inclusion. Only peer-reviewed articles were included. To provide high-quality data, the studies had to include at least two of the following data: demographical, clinical, laboratory or treatment data. Eligible study designs were multicentre – and single centre studies, observational studies, case-control studies, cohort studies, case series, and case reports. Only English language articles were included. Review articles, meta-analyses, opinion articles, and letters were excluded. Studies with missing data were also excluded. There was no exclusion based on age, sex or ethnicity of the study population.

Study selection

For title and abstract management and screening, we exported initial search results to Microsoft Excel (Excel 365; Microsoft Corp., Redmond, Washington, USA). Titles and abstracts were screened for eligibility by two independent authors (F.R., V.N.). The full texts of the references appearing eligible were downloaded and analysed with regard to the inclusion and exclusion criteria of meta-analysis. In addition, reference lists of identified studies as well as already published meta-analyses and reviews were hand-searched for further relevant studies. Authors were contacted via e-mail whenever additional information was required. Any discrepancies between the two reviewers (F.R., V.N.) were resolved by consensus through discussion with a third reviewer (F.P.).

Data collection

Two researchers (F.R., V.N.) independently extracted relevant information including first author, publication time, country, study designs, number of patients with SARS-CoV-2, mean or median age of patients, gender of patients, smoking history, presence of medical comorbidities, clinical symptoms, radiologic findings, laboratory data, complications and treatment options of patients with SARS-CoV-2. No specific treatment medication was mentioned, since the therapy of infection was reported in various ways; specific drug, group of used drug, and the dosage time and time of administration were mostly not mentioned. Laboratory findings were included when authors classified their laboratory results as high or low, or when laboratory-specific normal ranges were stated. Filled-in data were double checked by the two independent reviewers (F.R., V.N.). Any discrepancies were solved by consensus through discussion with a third investigator (F.P.).

Risk of Bias Assessment and Quality of Evidence

For quality assessment of the included retrospective multicentre and single-centre studies, the Methodological Index for Non-randomized Studies (MINORS) was used [29]. Each of the eight items were scored as: 0 (not reported), 1 (reported but inadequate) and 2 (reported

and adequate). The risk of bias needs to be evaluated on 8 items assessing non-comparative study among MINORS tools. The ideal maximum score was 16. Scoring more than 70% of a maximum score of 16 (score ≥11), conferred a risk of bias that was seen as low with a high quality in included studies. For scores below 11, the risk of bias was seen to be high.

For case series and case reports the Methodological Quality and Synthesis of Case Series and Case Reports Protocol by Murad et al. was used for risk of bias assessment [30]. Each of the eight items were scored as follows: NA (not available), 1 (No) and 2 (Yes). Questions 5 and 6 were not applicable to the included study reports. The ideal maximum score was 12. Scoring more than 70% of a maximum score of 12 (score ≥8) conferred a bias risk that was regarded to be low with a high quality in included studies. For scores below 8, risk of bias was seen as high. The two investigators (F.R., V.N.) assessed the risks of bias independently. Discrepancies were solved by consensus through discussion with a third reviewer (F.P). Quality of Evidence was assessed by applying a modified scheme of the Oxford Centre for Evidence-based Medicine for ratings of individual studies [31].

Statistical analysis

All data were retrieved from original articles as they were presented in each report. Accordingly, data are reported as count (n), mean ± standard deviation (SD) or median (range or IQR 25 to 75), respectively. Statistical analyses and graphical illustrations were performed by using Microsoft Excel. The meta-analysis was performed by using the software OpenMeta (Analyst) (B. Wallace, Boston, MA, USA) for single-arm studies. A binary random effect model was used to calculate the prevalence of all variables and their 95% confidence interval (95% CI). To assess heterogeneity between studies, Cochran`s Q and I^2 was used. For I2 values of 25%, 50% and 75% represent low, moderate and high heterogeneity, respectively. In addition, the tau-squared test was estimated and reported. Meta-analyses for each variable of interest was performed. In figures, variables of interest are displayed with a forest plot, 95% CI, number of articles reporting the variable and number of patients included in reporting articles, I^2 and p-value of analysis. A p-value <0.05 was considered as statistically significant.

Results

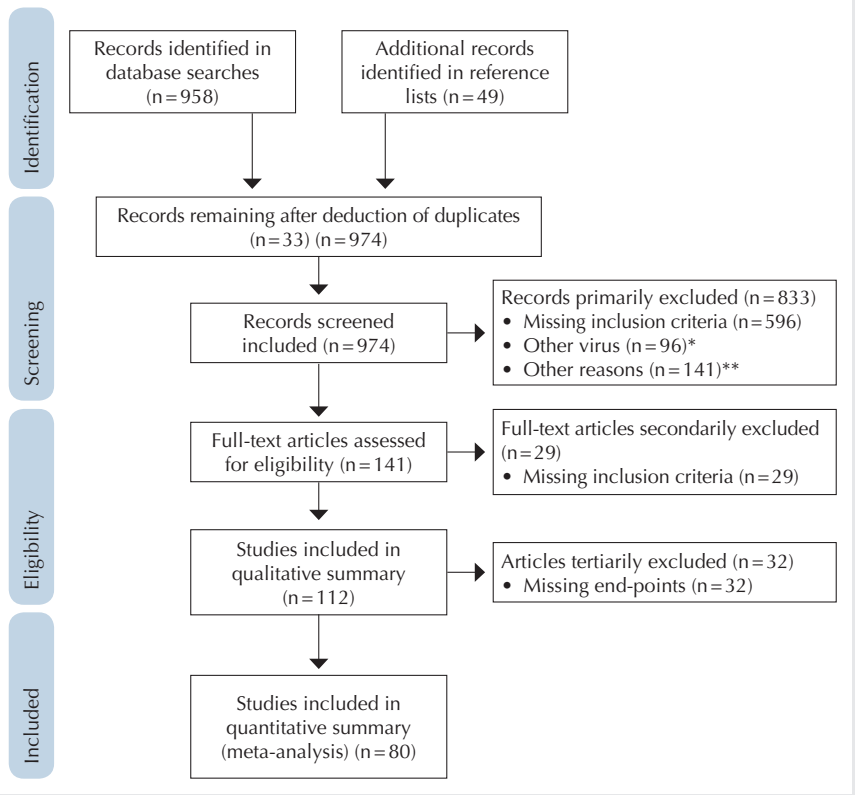
Identified studies

A total of 958 studies were identified by applying the search strategy in Medline electronic database (PubMed), Web of Science and Google Scholar (Fig. 1). An additional 49 studies were identified in the course of reference list evaluation. After screening titles and abstracts, 141 studies were identified for full text eligibility. Reasons for primary exclusion were missing inclusion criteria (596), language other than English (141), dealing with a virus other than SARS-CoV-2 (e.g. MERS (=Middle East Respiratory Syndrome)) (96) and duplicates (33). Of the 141 studies assessed for full text eligibility, 29 studies were excluded due to missing inclusion criteria. In total, 112 studies were included for qualitative synthesis, 80 of them for quantitative meta-analysis. Due to lack of information we contacted one author for additional data but did not receive an answer prior to publication.

Study characteristics

The present meta-analysis includes 80 peer-reviewed studies published between 7 February 2020 and 19 March 2020. In most cases, the country of ori-

Figure 1



Prisma Flow Diagram
* Other virus: MERS (Middle East Respiratory Syndrome); SARS (Severe Acute Respiratory Syndrome); Influenza;
** Other reasons: Publications (not peer reviewed), Letter to the Editor;
(Source: Moher et al. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement).

gin was China (68), followed by Vietnam (2), Korea (2), Singapore (2), Nepal (1), United States of America (1), Italy (1), Japan (1), Taiwan (1) and Canada (1). Study designs of the included publications were retrospective multicentre studies (11) and single centre studies (31), case series (13) as well as case reports (25) (Tab. 1).

Demographic data and comorbidities of the patient population

A total of 5,053 patients were included in our meta-analysis. Regarding gender distribution, 54% of the included patients were male. Age was presented inhomogeneously in included studies. Therefore, mean age (±SD) and median age (range or IQR) of the study population as reported in each study are presented in Table 1. Overall, 35.8% of the patients had underlying chronic diseases of any kind (95% CI 30.9% to 40.7%). Of these, cardiovascular disease (20.5%, 95% CI 16.5% to 24.5%), endocrine disease (9.6%, 95% CI 7.7% to 11.6%) and respiratory disease (1.7%, 95% CI 1.3% to 2.2%) accounted for existing comorbidities (Fig. 2; Supplementary Tab. 2, Supplementary Fig. a-m).

Clinical and radiological characteristics of infection

Fever (77.0%, 95% CI 73.3% to 80.7%), coughing (55.4%, 95% CI 50.1% to 60.6%), malaise and fatigue (31.1%, 95% CI 25.0% to 37.3%) and dyspnoea (32.2%, 95% CI 20.0% to 44.5%) were the most prevalent clinical symptoms. Also, gastrointestinal symptoms like abdominal pain (7.5%, 95% CI 3.8% to 11.2%), diarrhoea (9.1%, 95% CI 6.9% to 11.3%) and vomiting (3.8%, 95% CI 2.4% to 5.2%) were found in infected patients. Regarding radiological imaging, 89.8% (95% CI 87.6% to 92.0%) of the patients had initial abnormalities in chest X-rays or CT scans of the lung. Radiological pulmonary alterations were predominantly bilateral (74.0%, 95% CI 66.3% to 81.6%), but unilateral changes were seen in 19.0% (95% CI 14.7% to 23.4%) of the patients (Fig. 2; Supplementary Tab. 3–4, Supplementary Fig. n-ii).

Complications associated with infection

Among all patients with SARS-CoV-2 infection, 26.4% developed respiratory failure (95% CI -15.8% to 68.6%), 47.7% pneumonia (95% CI 16.0% to 78.7%), 21.2% cardiac injury (95% CI 6.2% to 36.1%), 17.3% ARDS (95% CI 12.7% to 21.8%), and 5.9% secondary infections (95% CI 0.9% to 11.0%) (Fig. 2, Supplementary Tab. 5, Supplementary Fig. jj-pp).

Treatment options

Overall, infection was mainly treated with antiviral medication (73.7%, 95% CI 63.7% to 83.6%), antibiotics (75.5%, 95% CI 65.7% to 85.2%), any type of oxygen therapy (64.9%, 95% CI 50.9% to 78.8%), and glucocorticoids (31.2%, 95% CI 24.4% to 38.0%). The number of patients requiring non-invasive ventilation (NIV) (19.0%, 95% CI 13.1% to 24.9%) and invasive ventilation (6.6%, 95% CI 4.3% to 8.9%) was small. Only 1.1% of the patients were placed on extracorporeal membrane oxygenation therapy (ECMO) (95% CI 0.2% to 2.0%) and renal replacement therapy (RRT) (4.5%, 95% CI 1.7% to 7.4%). Supportive therapy (96.1%) includes mainly antitussives and bronchodilators (Fig. 3; Supplementary Tab. 6, Supplementary Fig. qq-fff).

Laboratory findings

The most prevalent laboratory findings were high C-reactive protein (CRP) (58.2%, 95% CI 48.7% to 67.7%), lymphopenia (42.2%, 95 CI 35.2% to 49.3%), high lactate dehydrogenase (LDH) (47.4%, 95% CI 30.3% to 64.4%), and leukopenia (25.1%, 95% CI 21.2% to 29.0%) among other less common findings (Fig. 3; Supplementary Tab. 7, Supplementary Fig. ggg-www).

Risk of bias

Due to the overall study design of retrospective studies, case series and case reports, risk of bias was high. All of the 42 included multicentre and single centre studies had a risk of bias score below 70%, making these reports more susceptible to bias. For case series and case reports, five reports had a risk of bias score below 70%. Overall, 33 studies scored eight or higher. The certainty of all studies included was generally low (Supplementary Tab. 9).

Discussion

Our systematic review and meta-analysis of 80 peer-reviewed articles involving more than 5,000 patients provides a comprehensive insight into demographic data, clinical and laboratory characteristics including complications, radiological findings and treatment options of patients with SARS-CoV-2 infection.

In this meta-analysis, 54% of the infected patients were male. We found that 35.8% of the patients presented with comorbidities. In this regard, cardiovascular diseases and endocrinological disorders (e.g. diabetes) were the most prevalent comorbidities. Other comorbidities like chronic renal, hepatic or gastrointestinal diseases were rare. The dominant clinical features of SARS-CoV-2 infection were fever (77.0%) and coughing (55.4%). In our study, infection was present in more male patients. These findings are in accordance with other published studies, proposing that men are more susceptible to SARS-CoV-2 infections than women [25–27]. It has been suggested that women are less susceptible to viral infections due to genetic mechanisms or sex-specific effects, including a more robust innate and adaptive immune response to SAR-CoV-2 infections. Furthermore, susceptibility to infections is assumed to be higher in males, a finding which has been observed from birth to adulthood [32]. Interestingly, our results demonstrate that many infected patients seemed not to suffer from comorbidities at all. Identical results were demonstrated by Rodriguez-Morales and colleagues; showing that 36.8% of the patients had underlying comorbidities. They stated that comorbidities like hypertension or diabetes attenuate the immune system and viral infections are favoured [26]. In addition, besides fever and cough [6], our study revealed malaise and fatigue as being one of the most common clinical

Table 1 continue: next page

Characteristics of the included references.

No.	Author	Publication date(mm/dd)	Study design	Country	No. of patients N (count)	Age Mean (±SD) Median (range or IQR)	Sex (m/f)	Reference
1	Liu et al.	02/07	Multicentre, retrospective	China	137	57 (20–83)	61/76	[14]
2	Wu et al.	02/29	Multicentre, retrospective	China	80	46±15	39/41	[18]
3	Guan et al.	02/28	Multicentre, retrospective	China	1,099	47 (I 35–58)	637/459	[9]
4	Zhou et al.	03/11	Multicentre, retrospective, cohort	China	191	56 (I 46–67)	119/72	[22]
5	Zhu et al.	02/06	Multicentre, retrospective	China	9	30 (R 25–35)	0/9	[39]
6	CNERCECMT	02/16	Multicentre, retrospective	Korea	28	43±0	15/13	[7]
7	Hu et al.	03/04	Multicentre, retrospective	China	24	33 (I 19–57)	8/16	[11]
8	Zhao et al.	03/03	Multicentre, retrospective	China	101	43 (R 17–75)	56/45	[40]
9	Liu et al.	02/28	Multicentre, retrospective	China	78	38 (I 33–57)	39/39	[15]
10	Tian et al.	02/27	Multicentre, retrospective	China	262	48 (R 1–94)	127/135	[41]
11	Yang et al.	02/26	Multicentre, retrospective, cohort	China	149	45±13	81/68	[19]
12	Huang et al.	02/29	Single centre, retrospective	China	41	49 (I 41–58)	30/11	[12]
13	Yang et al.	02/24	Single centre, retrospective	China	52	60±13	35/17	[20]
14	Zhang et al.	02/19	Single centre, retrospective	China	140	57±13	71/69	[21]
15	Song et al.	02/06	Single centre, retrospective	China	51	49±16	25/26	[42]
16	Chen et al.	02/15	Single centre, retrospective	China	99	56±13	67/32	[6]
17	Zhou et al.	03/05	Single centre, retrospective	China	62	53±12	23/39	[23]
18	Fan et al.	03/04	Single centre, retrospective	China	67	42 (I 35–54)	37/30	[8]
19	Li et al.	02/29	Single centre, retrospective	China	83	46±12	44/39	[13]
20	Lu et al.	03/18	Single centre, retrospective	China	171	7 (R 2–10)	104/67	[16]
21	Han et al.	03/17	Single centre, retrospective	China	108	45 (R 21–90)[$]	38/70	[10]
22	Wang et al.	03/16	Single centre, retrospective	China	69	42 (I 35–62)	32/37	[17]
23	Pan et al.	02/13	Single centre, retrospective	China	21	40±9	6/15	[43]
24	Li et al.	02/12	Single centre, retrospective	China	17	45 (R 22–65)	9/8	[44]
25	Liu et al.	02/13	Single centre, retrospective	China	24	43 (R 12–48)[$]	8/16	[45]
26	Mo et al.	03/16	Single centre, retrospective	China	155	54 (I 42–66)	86/69	[46]
27	Chen et al.	03/19	Single centre, retrospective	China	249	51 (I 36–64)	126/213	[47]
28	Qin et al.	03/12	Single centre, retrospective	China	452	58 (I 47–67)	235/217	[48]
29	Zhao et al.	03/12	Single centre, retrospective	China	19	48 (I27–56)	11/8	[49]
30	Xia et al.	03/05	Single centre, retrospective	China	20	2 (R 0–18)	13/7	[50]
31	Xiong et al.	03/03	Single centre, retrospective	China	42	50±14	25/17	[51]
32	Zhang et al.	03/03	Single centre, retrospective	China	14	41 (R 18–87)	7/7	[52]
33	Ling et al.	02/28	Single centre, retrospective	China	66	44 (I 34–62)	38/28	[34]
34	Xu et al.	02/25	Single centre, retrospective	China	50	44±17	29/21	[53]
35	Xu et al.	02/28	Single centre, retrospective	China	90	50 (R 18–86)	39/51	[54]
36	Liu et al.	03/18	Single centre, retrospective	China	15	32±5	0/15	[55]
37	Wang et al.	03/17	Single centre, retrospective	China	55	49 (R 2–69)	22/33	[56]
38	Cheng et al.	03/14	Single centre, retrospective	China	11	50±16	8/3	[57]
39	Wu et al.	03/13	Single centre, retrospective, cohort	China	201	51 (I 43–60)	128/73	[58]
40	Zhu et al.	03/13	Single centre, retrospective	China	32	46 (I 35–52)	15/17	[59]
41	Xu et al.	03/13	Single centre, retrospective	China	51	35 (I 29–51) 37 (I 24–48) 53 (I 35–65)	25/26	[60]
42	Wang et al.	02/07	Single centre, retrospective	China	138	56 (I 42–68)	75/63	[61]

All included publications reported infections confirmed by real time-PCR.
CNERCECMT: COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention; **m:** male; **f:** female; **Study design "Others" includes:** Case reports; Ages were reported in different calculations. mean ± SD; median (**R:** range or **I**=IQR); mean(range); **NA:** not available.

Table 1 continuing last page

Characteristics of the included references.

No.	Author	Publication date(mm/dd)	Study design	Country	No. of patients N (count)	Age Mean (±SD) Median (range or IQR)	Sex (m/f)	Reference
43	Xu et al.	02/19	Case series	China	62	41 (I 32–52)	35/27	[35]
44	Liu et al.	02/09	Case series	China	12	63 (R 10–72)	8/4	[62]
45	Wang et al.	03/16	Case series	China	4	48 (R 19–63)	3/1	[63]
46	Ki et al.	02/09	Case series	Korea	28	42 (R 20–73)	15/13	[64]
47	Chan et al.	02/15	Case series	China	6	50 (R 10–66)	3/3	[65]
48	Fan et al.	03/17	Case series	China	2	32 (R 29–34)	0/2	[66]
49	Chen et al.	03/07	Case series	China	9	28 (R 26–40)	0/9	[67]
50	Xu et al.	03/13	Case series	China	10	7 (R 0.2–16)	6/4	[68]
51	Chung et al.	02/04	Case series	China	21	51±14	13/8	[69]
52	Chen et al.	03/12	Case series	China	9	50 (R 14–56)	5/4	[70]
53	Young et al.	03/03	Case series	Singapore	18	47 (R 31–73)	9/9	[71]
54	Cai et al.	02/28	Case series	China	10	6±0	4/6	[72]
55	Li et al.	03/11	Case series	China	5	3±0	4/1	[73]
56	Wei et al.	02/26	Other	China	1	40±0	0/1	[74]
57	Bastola et al.	02/10	Other	Nepal	1	32±0	1/0	[75]
58	Zhang et al.	02/07	Other	China	2	38±0	1/1	[76]
59	Holshue et al.	03/05	Other	USA	1	35±0	1/0	[77]
60	Wang et al.	02/28	Other	China	1	28±0	0/1	[78]
61	Kam et al.	02/28	Other	Singapore	1	1±0	1/0	[79]
62	Van Cuong et al.	02/19	Other	Vietnam	1	25±0	0/1	[80]
63	Xu et al.	02/18	Other	China	1	50±0	1/0	[81]
64	Cui et al.	03/17	Other	China	1	0.2	0/1	[82]
65	Phan et al.	02/27	Other	Vietnam	2	46 (R 27–65)	2/0	[83]
66	Ni et al.	03/13	Other	China	1	53	1/0	[84]
67	Li et al.	03/05	Other	China	2	18 (R 8–36)	2/0	[85]
68	Lin et al.	02/22	Other	China	1	61	1/0	[86]
69	Albarello et al.	02/26	Other	Italy	2	67 (R 60–67)	1/1	[87]
70	Huang et al.	02/19	Other	Taiwan	2	74 (R 74–74)	0/2	[88]
71	Lu et al.	03/19	Other	China	2	NA	1/1	[89]
72	Hosoda et al.	03/19	Other	Japan	1	81	0/1	[90]
73	Li et al.	03/18	Other	China	2	4 (R 4–4)	1/1	[91]
74	Xing et al.	03/12	Other	China	2	NA	1/1	[92]
75	Zhu et al.	03/17	Other	China	1	52	1/0	[93]
76	Ji et al.	03/16	Other	China	2	12 (R 9–15)	2/0	[94]
77	Zhou et al.	03/09	Other	China	1	38	1/0	[95]
78	Wang et al.	03/12	Other	China	1	34	0/1	[96]
79	An et al.	03/06	Other	China	1	50	0/1	[97]
80	Marchand-Senécal et al.	03/09	Other	Canada	1	56	1/0	[98]
∑80 Publications		**February: ∑ 38 March: ∑ 42**	**∑ Multicentre: 11 ∑ Single centre: 31 ∑ Case series: 13 ∑ Other: 25**	**∑ 10 different countries**	**∑ 5,053 patients**		**2,718/2,332**	

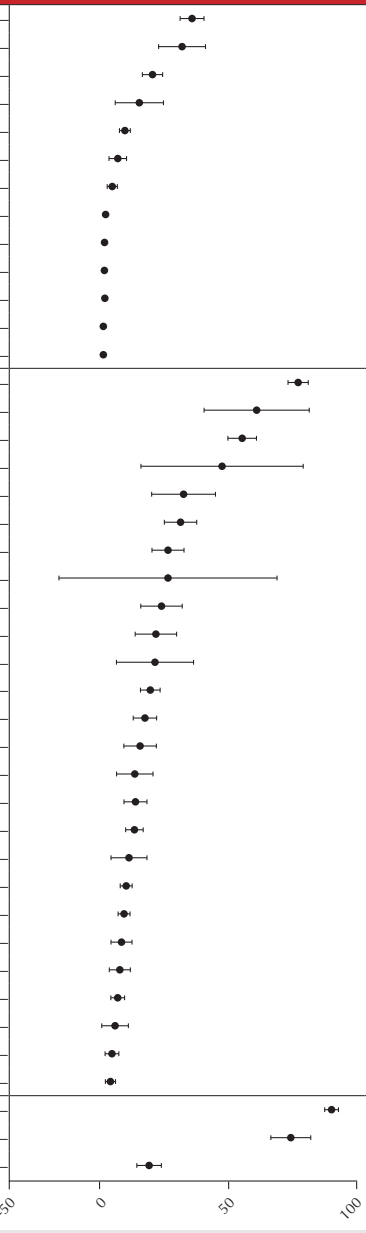
All included publications reported infections confirmed by real time-PCR.

CNERCECMT: COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention; **m:** male; **f:** female; **Study design "Others" includes:** Case reports; Ages were reported in different calculations. mean ± SD; median (**R:** range or **I**=IQR); mean(range); **NA:** not available. Guan et al. do not specify gender for three patients.

features of infection (31.1%). Dyspnoea or shortness of breath can cause derangements in pulmonary gas exchange resulting in hypoxia. Respiratory failure with decreased levels of oxygen may lead to central nervous system depression, presenting as fatigue in every day clinical practice [33]. It is noteworthy that 77% of the patients showed clinical symptoms like fever. Reasons for this high number of symptomatic patients might result from the fact that only symptomatic patients were tested in the initial phase of SARS-CoV-2 infection. This might also explain the results of severe respiratory complications (ARDS) of 17.3% in our analysis. Due to the novelty of the virus and a general lack of knowledge, only

Figure 2

Comorbidities / Symptoms Radiological Alterations	Prevalence (95% CI)	No. Reports (n)	No. Patients (n)	I^2 (%)	p-Value
comorbidities	35.8 (30.9.–40.7)	34	1,338	87.1	<0.001
existing pregnancy	31.7 (22.4–41.0)	16	31	97.9	<0.001
cardiovascular diseases	20.5 (16.5–24.5)	41	920	86.0	<0.001
surgical history	15.2 (5.6–24.8)	12	48	76.3	0.002
endocrinological diseases	9.6 (7.7–11.6)	40	414	69.5	<0.001
smoking	6.9 (3.6–10.1)	20	212	87.6	<0.001
digestive system	4.7 (3.1–6.2)	15	51	14.6	<0.001
cerebrovascular diseases	2.2 (1.5–2.9)	20	63	7.9	<0.001
chronic liver diseases	1.8 (1.1–2.4)	22	41	–	<0.001
respiratory diseases	1.7 (1.3–2.2)	33	91	1.9	<0.001
infections	1.6 (1.1–2.1)	19	48	0.8	<0.001
malignancy	1.4 (0.9–2.0)	28	70	39.8	<0.001
chronic renal diseases	1.4 (0.8–2.0)	23	46	15.7	<0.001
fever	77.0 (73.3–80.7)	75	4,020	91.9	<0.001
Tachycardia	60.9 (40.6–81.1)	6	78	34.2	<0.001
cough	55.4 (50.1–60.6)	69	2,802	91.7	<0.001
pneumonia	47.4 (16.0–78.7)	10	115	99.7	0.003
dyspnea	32.2 (20.0–44.5)	45	1,071	99.5	<0.001
malaise	31.1 (25.0–37.3)	39	1,351	94.0	<0.001
salivation	26.4 (20.3–32.5)	24	921	89.5	<0.001
respiratory failure	26.4 (-15.8–68.6)	3	106	99.1	0.220
asymptomatic	23.9 (15.8–32.0)	13	103	95.5	<0.001
Loss of appetite	21.6 (13.6–29.7)	13	233	92.5	<0.001
cardiac injury	21.2 (6.2–36.1)	6	106	92.8	0.006
myalgia/arthralgia	19.7 (16.0–23.3)	31	649	84.3	<0.001
ARDS	17.3 (12.7–21.8)	16	289	96.3	<0.001
chest pain	15.4 (9.2–21.5)	17	188	90.9	<0.001
sepsis/bacteraemia	13.6 (6.7–20.5)	8	183	99.0	<0.001
coldness/chills	9.2 (13.5–17.8)	12	175	43.3	<0.001
sore throat	13.3 (10.4–16.3)	35	367	73.5	<0.001
nausea	11.0 (4.0–18.0)	9	57	83.4	0.002
headache	10.1 (8.1–12.1)	27	398	64.1	<0.001
diarrhoea	9.1 (6.9–11.3)	44	349	80.1	<0.001
vertigo	8.4 (4.6–12.1)	12	85	73.6	<0.001
abdominal pain	7.5 (3.8–11.2)	15	202	86.2	<0.001
rhinorrhoea	6.8 (4.4–9.1)	26	145	71.3	<0.001
secondary infections	5.9 (0.9–11)	6	35	83.8	0.022
acute renal failure	4.5 (2.1–6.8)	8	62	88.5	<0.001
vomiting	3.8 (2.4–5.2)	22	155	67.2	<0.001
Initial radiological alterations	89.8 (87.6–92)	52	2,092	86.3	<0.001
bilateral pulmonary alterations	74.0 (66.3–81.6)	45	2,343	98.3	<0.001
unilateral pulmonary alterations	19.0 (14.7–23.4)	30	231	74.2	<0.001



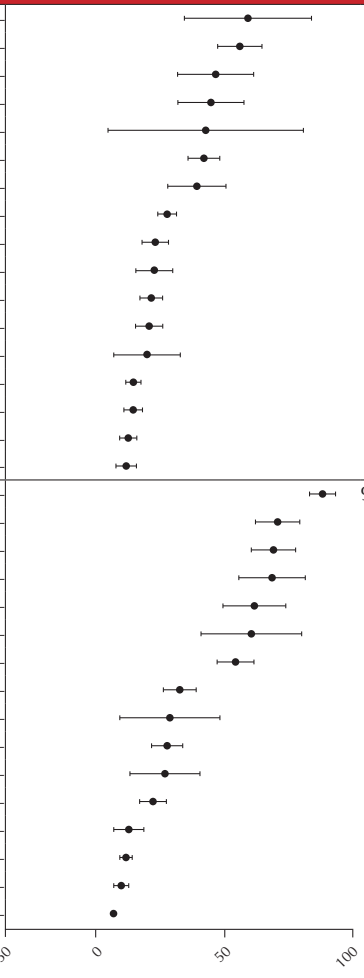
Meta-analysis of the prevalence of comorbidities, clinical symptoms and radiological imaging among patients with SARS-CoV-2 infection
CI: Confidence interval; **No. Reports:** Number of studies, reporting the variable of interest or finding; **No. Patients:** Number of patients included in the studies reporting the variable of interest or finding; **I^2:** Assessment for heterogeneity.

patients with clinical symptoms had been admitted to the hospitals, tested for SARS-CoV-2 infection and hence the number of symptomatic, positive-tested patients with severe complications was high.

In our analysis, the most frequently reported laboratory abnormalities were an elevated CRP (58.2%), a reduced lymphocyte count (42.2%), elevated LDH activity (47.4%) and leukopenia in 25.1% of the patients. Previous research suggests that these deviations may be related to the cytokine storm caused by infection. Recently, a study stated that SARS-CoV-2 acts on lymphocytes, inhibiting the body`s cellular immune function. It may be assumed that T lymphocytes, especially CD4+ T-cells, are primarily affected, resulting in significant lymphopenia as well as decreased interferon production. This might be an important factor of exacerbation in patients. In addition, the lymphocyte count has also been associated with increased disease severity. Patients who died from SARS-CoV-2 infection had significantly lower lymphocyte counts than survivors. [34]. However, small sample sizes in reported patients do not allow drawing firm conclusions and further studies are required [6,35]. It has to be pointed out that the laboratory markers mentioned above are not very specific, limiting their clinical utility. When evaluating suspect cases, clinicians should not rely on these laboratory abnormalities to confirm or exclude the diagnosis of SARS-CoV-2. [24,36].

In this meta-analysis, we found that many patients were treated with antiviral and antibiotic therapy. Despite the fact

Figure 3



Laboratory results / Treatment	Prevalence (95%KI)	No. Reports (n)	No. Patients (n)	I^2 (%)	p-Value
high fibrinogen	61.8 (32.7–90.9)	3	5	0.7	<0.001
high CRP	58.2 (48.7–67.7)	42	1,591	97.3	<0.001
high LDH	47.4 (30.3–64.4)	21	928	99.0	<0.001
high IL-6	45.2 (30.1–60.4)	6	106	74.7	<0.001
low albumin	42.9 (-1.5–87.3)	7	116	99.8	0.058
lymphopenia	42.2 (35.2–49.3)	42	969	90.1	<0.001
high glucose	38.7 (25.5–51.8)	6	133	76.5	<0.001
leukopenia	25.1 (21.2–29.0)	33	793	76.8	<0.001
high AST	20.2 (14.3–26.1)	18	353	89.0	<0.001
D-dimers	19.1 (10.9–27.3)	14	440	94.8	<0.001
high ALT	18.0 (13.0–22.9)	19	357	81.6	<0.001
high PCT	17.2 (11.6–22.7)	17	180	93.0	<0.001
high creatine kinase	16.2 (1.5–30.8)	5	15	69.6	0.030
leukocytosis	10.2 (7.1–13.3)	29	235	81.6	<0.001
low platelet counts	10.1 (6.1–14.2)	11	73	59.2	<0.001
high creatine	7.9 (4.5–11.3)	14	103	86.6	<0.001
high bilirubin	6. 7 (2.4–10.9)	8	101	82.7	0.002
aymptomatic treatment	96.1 (90.3–101.9)	6	35	0.9	<0.001
antibiotics	75.5 (65.7–85.2)	33	1,557	97.7	<0.001
antiviral medication	73.7 (63.7–83.6)	37	1,562	98.5	<0.001
nasal cannula	73.1 (58.5–87.8)	11	313	90.7	<0.001
oxygen therapy	64.9 (50.9–78.8)	20	1,282	98.0	<0.001
interferons	63.9 (41.3–86.4)	18	318	99.0	<0.001
expectorants	56.4 (48.7–64.2)	2	88	0.2	<0.001
glucocorticoids	31.2 (24.4–38.0)	25	693	94.2	<0.001
immune enhancers	26.7 (4.4–49.0)	3	88	95.3	0.019
immunoglobulins	25.5 (18.9–32.2)	16	353	91.5	<0.001
high-flow oxygen therapy	24.4 (8.4–40.4)	5	79	96.2	0.003
NIV	19.0 (13.1–24.9)	11	286	81.7	<0.001
antifungal medication	8.0 (1.5–14.5)	4	55	90.8	0.016
invasive ventilation	6.6 (4.3–8.9)	17	158	81.7	<0.001
RRT	4.5 (1.7–7.4)	6	42	81.7	0.002
ECMO	1.1 (0.2–2.0)	8	19	49.5	0.016

Meta-analysis of the prevalence of laboratory findings and treatment options of patients with SARS-CoV-2 infection.
CI: Confidence interval; **No. Reports:** Number of studies, reporting the variable of interest or finding; **No. Patients:** Number of patients included in the studies reporting the variable of interest or finding; **I^2:** Assessment for heterogeneity.

that SARS-CoV-2 causes mainly respiratory infections, NIV (19%) and invasive ventilation (6.6%) were only needed in few patients. It has to be considered that in the initial phase of infection outbreak, NIV therapy might not have been used very often due to the fear of virus transmission. Therefore, invasive ventilation was used more frequently. This could lead to a possible bias in data interpretation. Currently, there is no proven effective treatment that can cure SARS-CoV-2 infection. However, our knowledge of the SARS-CoV-2 virus and of potential targets for therapy is increasing. A study by Sanders and colleagues states that remdesivir is a promising treatment option against RNA viruses. [37] Experts recommend not to use NIV, since the extent of exhaled air dispersion during treatment is not known [20,38].

Limitations

This meta-analysis has several limitations. First, we found a substantial heterogeneity between studies. Reasons might be different samples sizes and the inclusion of infected patients from all countries. Nonetheless, most studies are from China, representing just one country of the major infection outbreak. This could be a bias, either for genetic or cultural reasons. An equal number of studies from other countries are needed for a better understanding of the infection. Due to the fact that SARS-CoV-2 infection is an emerging, rapidly evolving situation, this review only provides data up to 19 March 2020. However, the main characteristics are represented properly, and we believe they will not be modified by further publications. Besides, future studies should make more detailed information on patient outcomes available. In many publications, this information is missing, since most of these studies have been published before the end of observation. This data should be considered in future publications as time progresses. Furthermore, there is a high heterogeneity among included sample sizes. Finally, most information on this disease is given through case reports and case series. This lack of higher quality studies is mostly due to the novelty of the virus. Given the lack of high-quality evidence, this type of meta-analysis report may be helpful to reach a better understanding of infection and decision making until outcome studies are available.

Conclusion

This review provides a comprehensive characterisation of clinical features, laboratory results and treatment options of patients with SARS-CoV-2 infection. About one-third of the infected patients had underlying comorbidities; cardiovascular diseases and endocrine disorders were mostly associated with infection. The clinical features of SARS-CoV-2 infection were fever, coughing and malaise or fatigue. Among the reported laboratory findings, the most common laboratory abnormalities were elevated CRP vales and decreased lymphocyte counts. Treatment of infection is mostly done with antibacterial or antiviral medication. Our comprehensive characterisation of SARS-CoV-2 infection will support clinicians in their efforts to treat and control the current outbreak. However, randomised controlled trials and future studies are needed to enable a better understanding of infection, especially as far as beneficial treatment is concerned.

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Appendix

1) Supplementary Figures

a) 01_Comorbidities_Comorbidities
b) 02_Comorbidities_Cardiovascular_disease
c) 03_Comorbidities_Endocrinological_disease
d) 04_Comorbidities_Smoking
e) 05_Comorbidities_Respiratory_disease
f) 06_Comorbidities_Malignancies
g) 07_Comorbidities_Cerebrovascular_disease
h) 08_Comorbidities_Digestive_system
i) 09_Comorbidities_Infections
j) 10_Comorbidities_Surgical_history
k) 11_Comorbidities_Chronic_renal_disease
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m) 13_Comorbidities_Existing_pregnancy
n) 14_Symptoms_Fever
o) 15_Symptoms_Cough
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s) 19_Symptoms_Myalgia_Arthralgia
t) 20_Symptoms_Headache
u) 21_Symptoms_Sore_throat
v) 22_Symptoms_Diarrhea
w) 23_Symptoms_Anorexia
x) 24_Symptoms_Abdominal_pain
y) 25_Symptoms_Chest_pain
z) 26_Symptoms_Coldness_Chills
aa) 27_Symptoms_Vomiting
bb) 28_Symptoms_Rhinorrhoea
cc) 29_Symptoms_Asymptomatic
dd) 30_Symptoms_Dizziness_Confusion
ee) 31_Symptoms_Tachycardia
ff) 32_Symptoms_Nausea
gg) 33_Symptoms_Initial_radiology_abnormalities
hh) 34_Symptoms_Bilateral_lung_changes
ii) 35_Symptoms_Unilateral_lung_changes
jj) 36_Complications_ARDS
kk) 37_Complications_Sespis_Bacteremia
ll) 38_Complications_Pneumonia
mm) 39_Complications_Cardiac_injury
nn) 40_Complications_Respiratory_failure
oo) 41_Complications_AKI
pp) 42_Complications_Secondary_infection
qq) 43_Treatment_Antiviral
rr) 44_Treatment_Antibiotics
ss) 45_Treatment_Any_kind_of_oxygen_therapy
tt) 46_Treatment_Glucocorticoids
uu) 47_Treatment_Immunoglobulins
vv) 48_Treatment_Interfernons
ww) 49_Treatment_Nasal_cannula
xx) 50_Treatment_NIV
yy) 51_Treatment_Invasive_ventialtion
zz) 52_Treatment_immune_enhancer
aaa) 53_Treatment_Expectorants
bbb) 54_Treatment_Nasal_high_flow
ccc) 55_Treatment_Antifungal
ddd) 56_Treatment_RRT
eee) 57_Treatment_Symptomatic_treatment
fff) 58_Treatment_ECMO
ggg) 59_Laboratory_High_CRP
hhh) 60_Laboratory_Lymphopenia
iii) 61_Laboratory_High_LDH
jjj) 62_Laboratory_Leukopenia
kkk) 63_Laboratory_High_D-Dimer
lll) 64_Laboratory_High_ALT
mmm) 65_Laboratory_High_AST
nnn) 66_Laboratory_Leukocytosis
ooo) 67_Laboratory_High_PCT
ppp) 68_Laboratory_High_Glucose
qqq) 69_Laboratory_Decreased_Albumine
rrr) 70_Laboratory_High_IL-6
sss) 71_Laboratory_High_Creatine
ttt) 72_Laboratory_High_Bilirubin
uuu) 73_Laboratory_Low_Thrombocytes
vvv) 74_Laboratory_High_Creatine_kinase
www) 75_Laboratory_High_Fibrinogen

2) Supplementary Tables

a. Table_2_Comorbidities of the study subjects
b. Table_3_ Clinical symptoms of the study subjects
c. Tbale_4_ Radiology abnormalities of the study subjects
d. Table_5_Clinical complications of the study subjects
e. Table_6_Treatment of the study subjects
f. Table_7_Laboratory data of the study subjects
g. Table_8_Outcome of meta-analysis
h. Table_9_Assessment of Risk of Bias

Abbreviations and descriptions:

Laboratory results:
CRP, C-reactive protein; LDH, Lactate dehydrogenase; ALT, Alanine aminotransferase; AST, Aspartate aminotransferase; PCT, Procalcitonin; IL-6, Interleukin 6
High and low according to reference range or as stated in each individual publication

Comorbidities:
Cardiovascular disease includes: Hypertension, Valve pathologies, Coronary heart disease
Endocrine disease includes: Diabetes, Thyroid gland pathologies
Smoking includes: Former smoker, Current smoker
Respiratory disease includes: Chronic obstructive pulmonary disease, Asthma, Sinusitis
Cerebrovascular disease includes: Stroke, Intracranial bleeding
Digestive System includes: Cholecystitis
Infections includes: HIV, Hepatitis, Tuberculosis

Symptoms:
Malaise includes: Fatigue, Weakness
Sputum production includes: Sputum, Expectoration, Hemoptysis
Dyspnea includes: Dyspnea, Tachypnea, Respiratory failure
Chest pain includes: Chest distress, Chest tightness
Rhinorrhea includes: Nasal congestion, Sneezing

Complications:
ARDS, Acute respiratory distress syndrome; AKI, acute kidney injury

Treatment:
Symptomatic treatment: includes bronchodilatative medication, antitussive medication
Immune enhancer: includes Immunomodulation, antioxidants
NIV, Non-invasive Ventilation; RRT, Renal replacement therapy; ECMO, Extra corporal membrane oxygenation

Laboratory:
CRP, C-reactive protein; LDH, Lactate dehydrogenase; ALT, Alanine aminotransferase; AST, Aspartate aminotransferase; PCT, Procalcitonin; IL-6, Interleukin 6

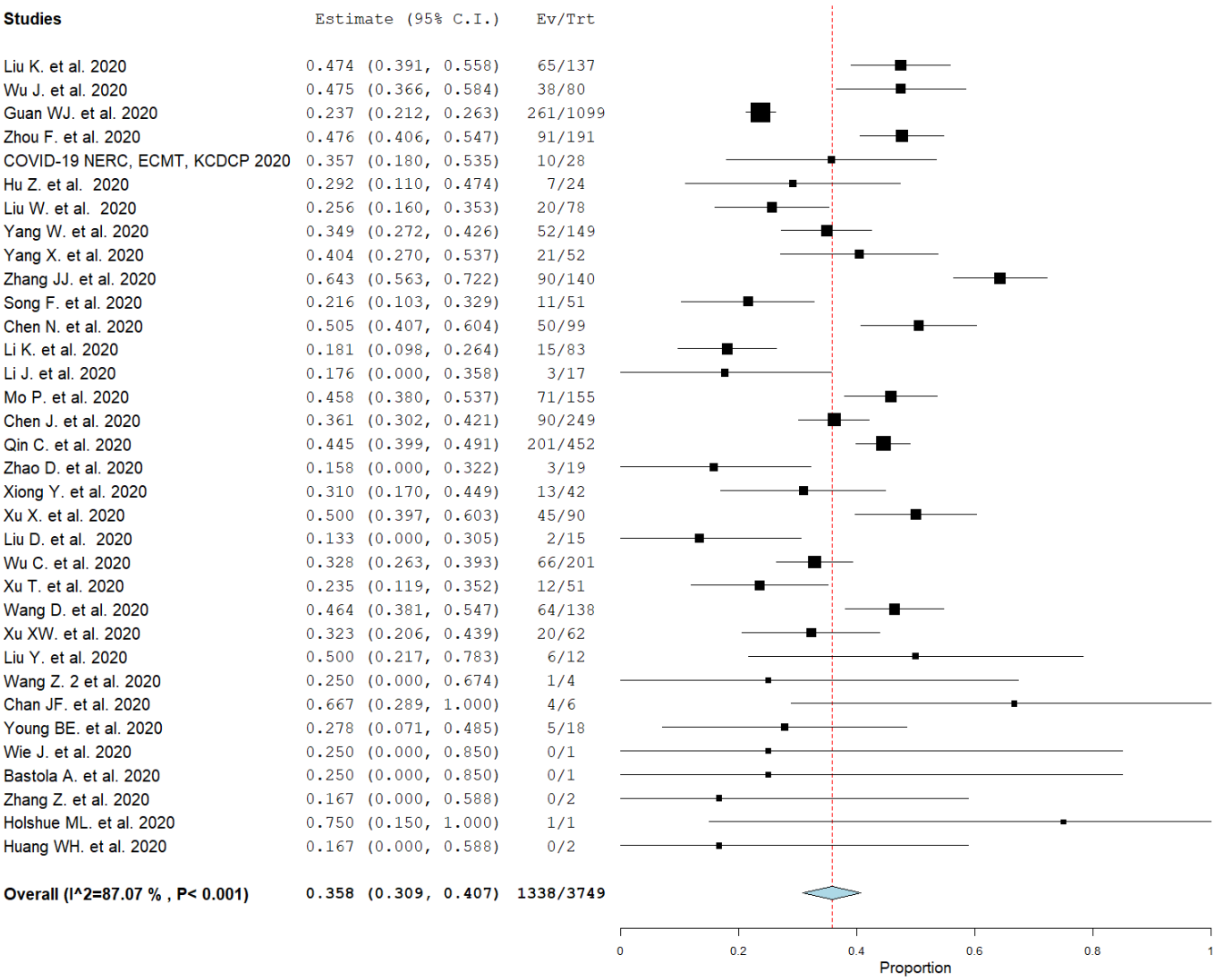
Outcome:
95% CI, 95% confidence interval; Q, Cochrane`s Q statistic for heterogeneity; I^2, Index assessment of heterogeneity; t^2, Tau-squared measure of heterogeneity
Laboratory parameters: High and low according to reference range or as stated in each individual publication

Risk of Bias:
CNERCECMT, COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention
Publication date format: mm/ dd=Month/ Day
MC, Multicenter study; SC, Single center study
Study design “Others” includes: Case reports
Quality of Evidence: modified from the Oxford Centre for Evidence-based Medicine for ratings of individual studies

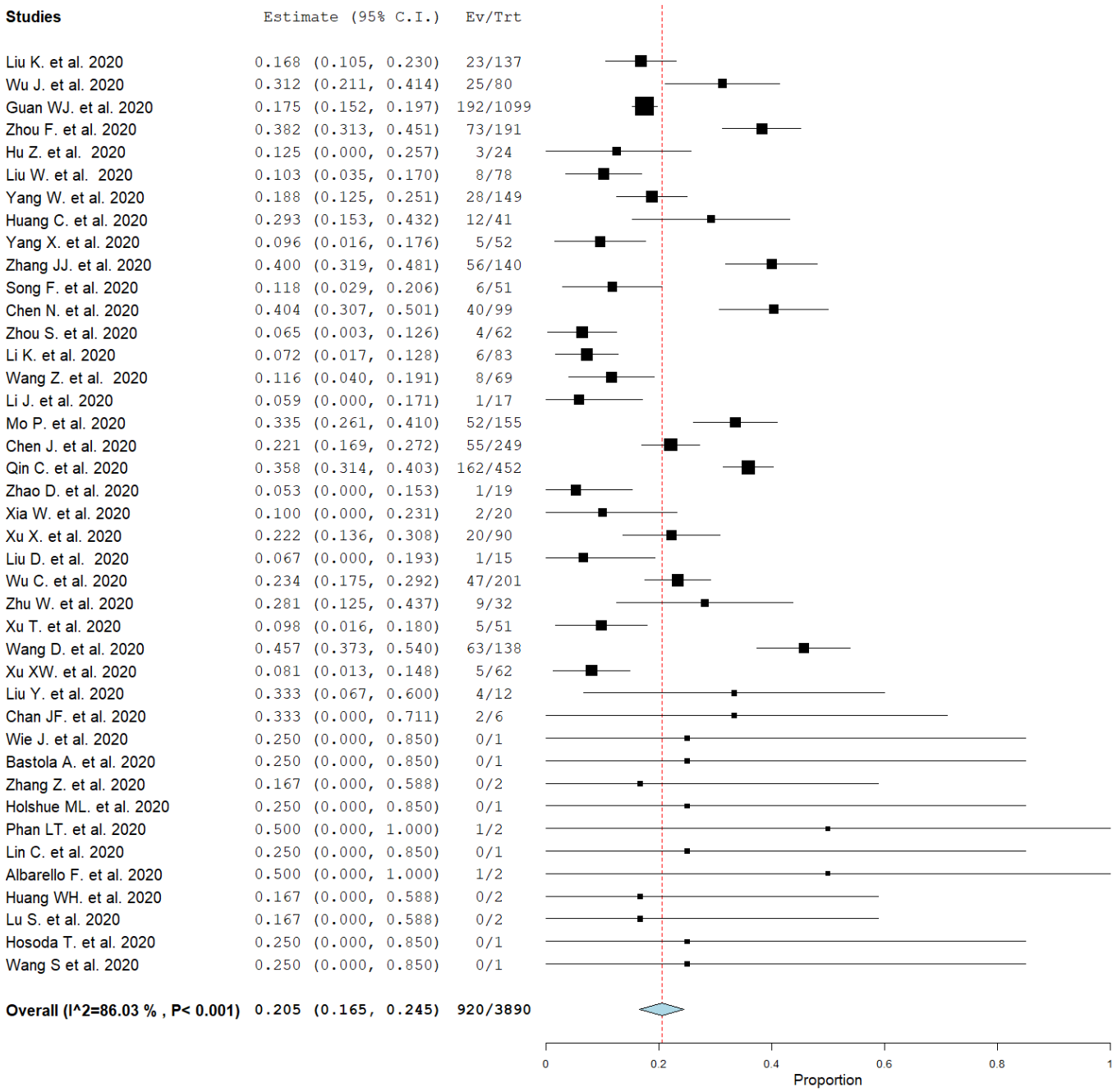
Multicenter and single center studies (Studies 1-42) were evaluated using Methodological index for non-randomized studies (minors): development and validation of a new instrument. By Slim et al. (29) (Score range: 0-16)
0=not reported, 1=reported but inadequate, 2=reported and adequate
Scoring>70% of 16 (score>11), Risk of Bias was seen as low with high quality of included studies

Case series and case reports (Studies 43-80) were evaluated using Methodological quality and synthesis of case series and case reports by Murad et al. (30) (Score range: 0-16)
Question 5 and 6 were not applicable for the included studies.
NA=Not available, 1=No, 2=Yes
Scoring>70% of 16 (score>11), Risk of Bias was seen as low with high quality of included studies

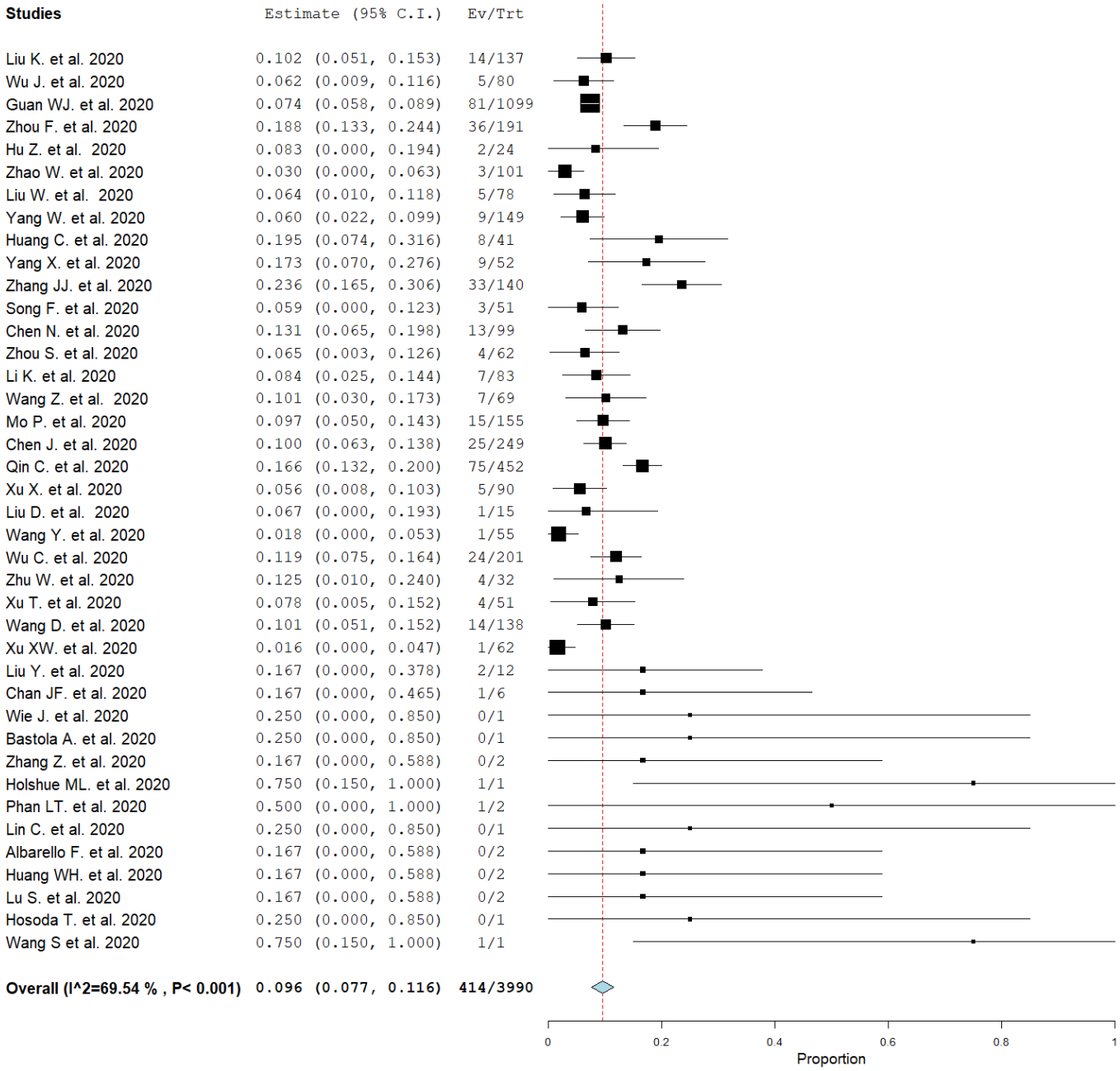
Supplementary Figure 1.a) Comorbidities



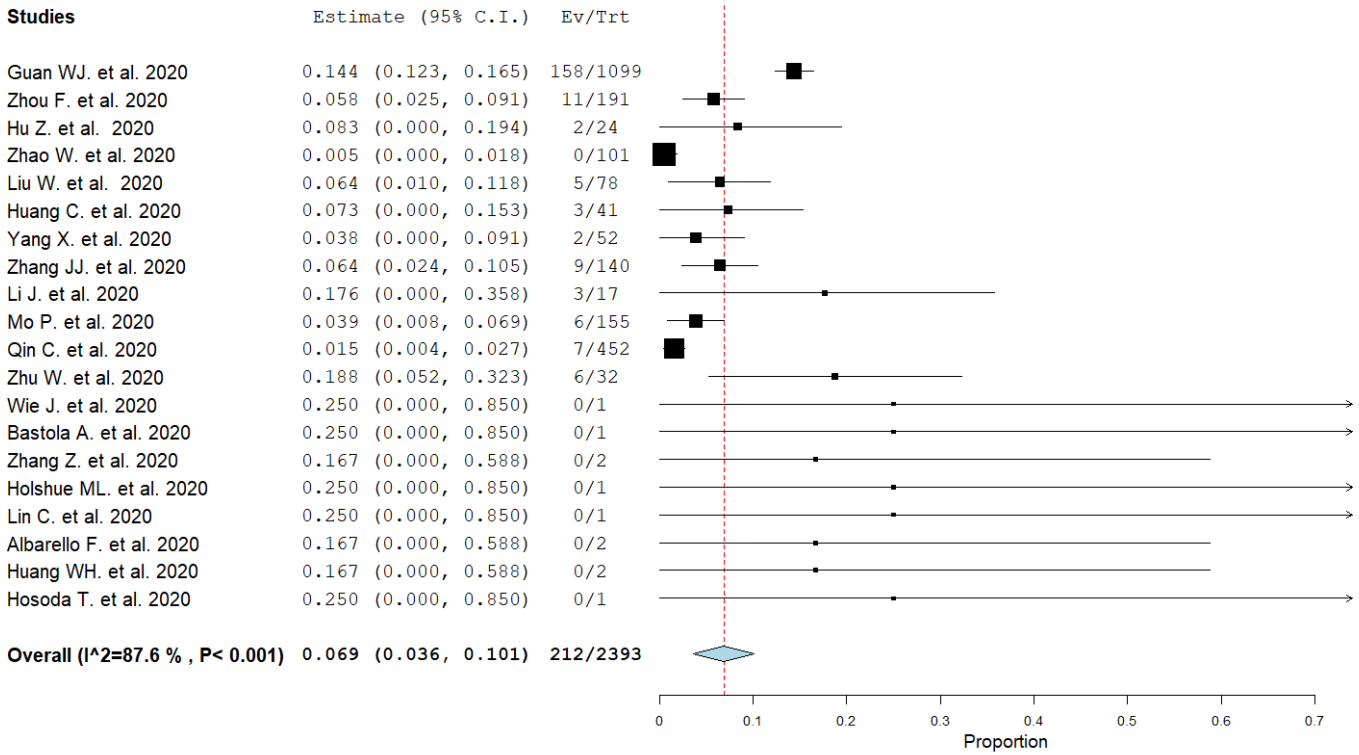
Supplementary Figure 1.b) Cardiovascular disease



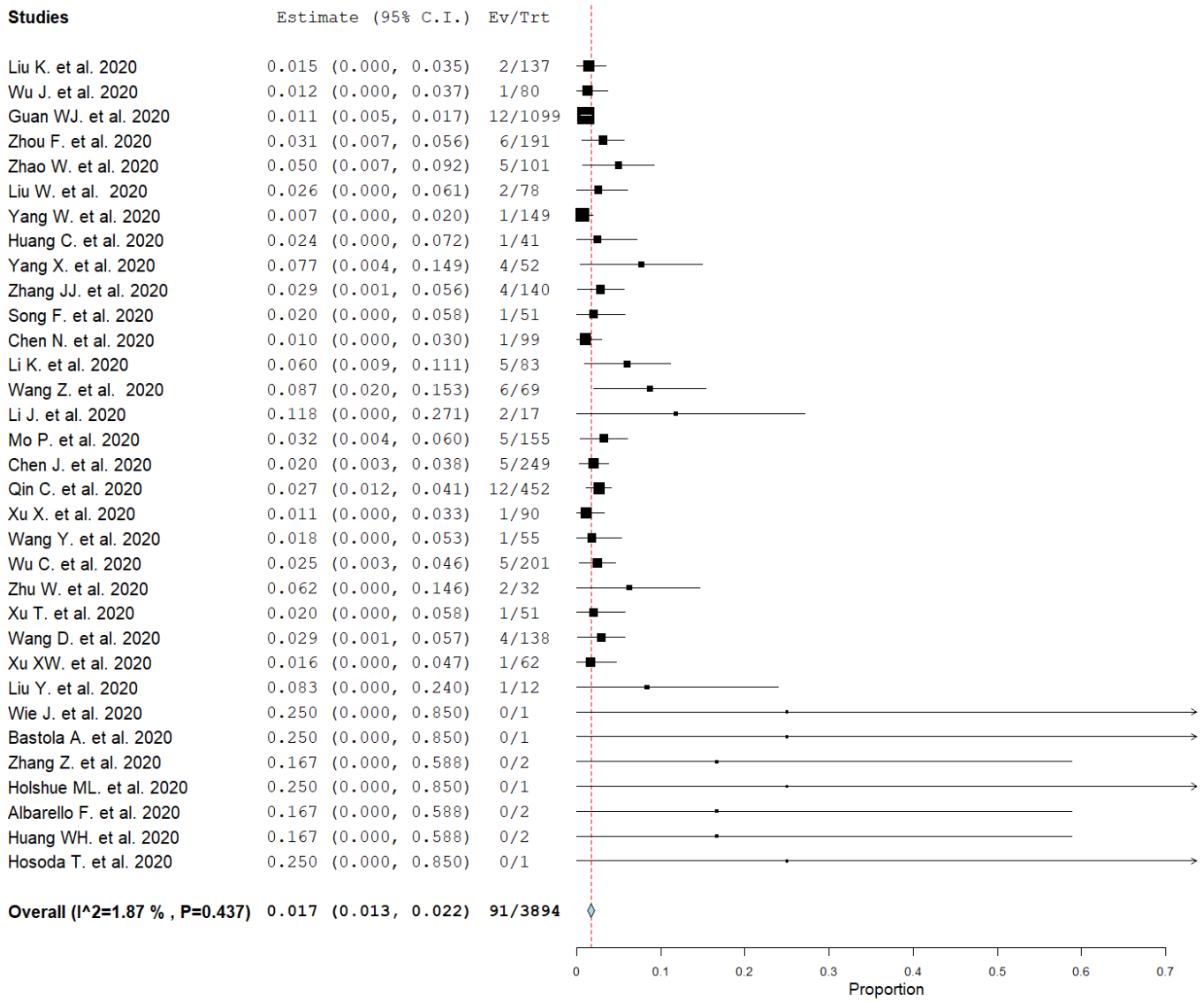
Supplementary Figure 1.c) Endocrinological disease



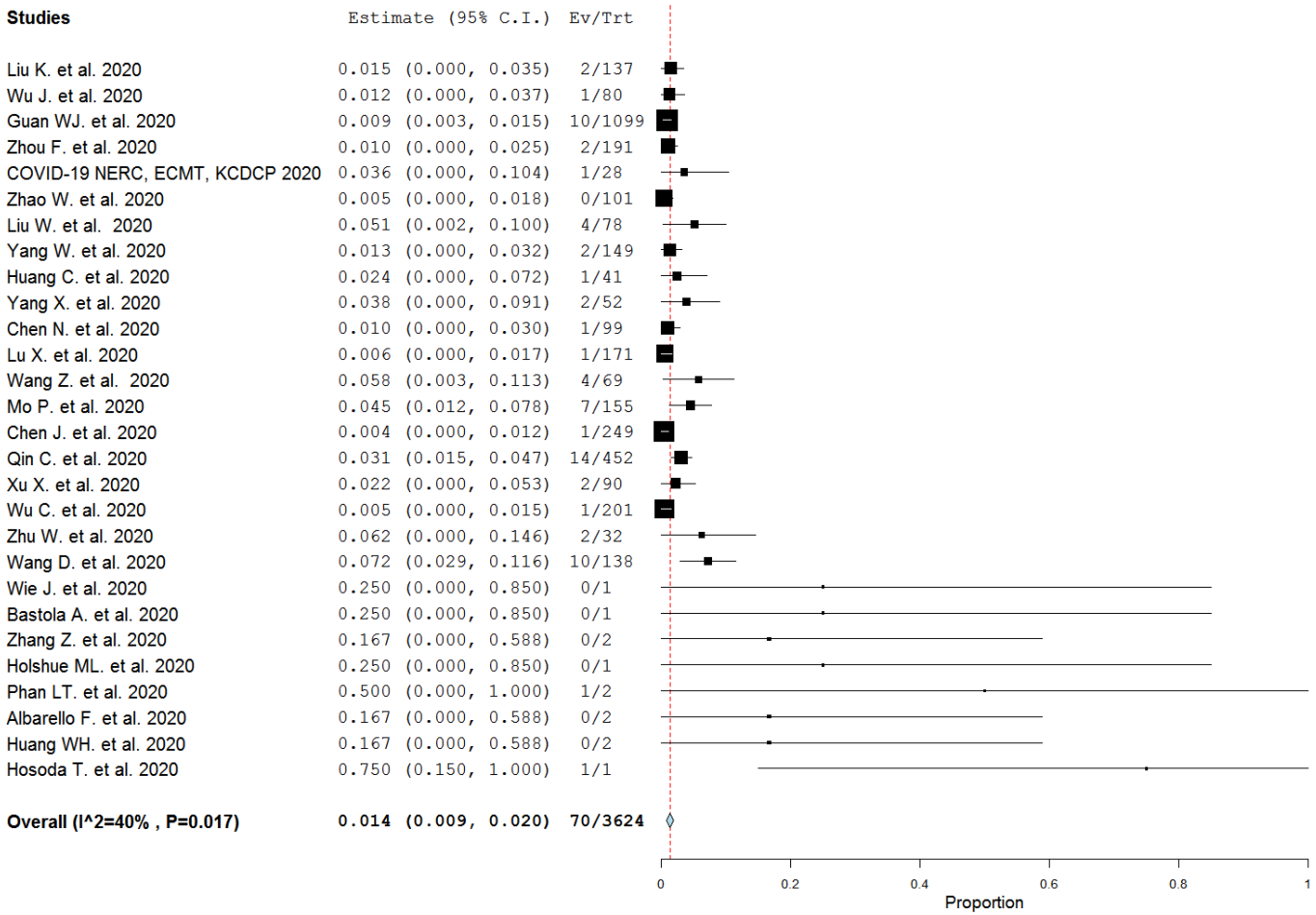
Supplementary Figure 1.d) Smoking



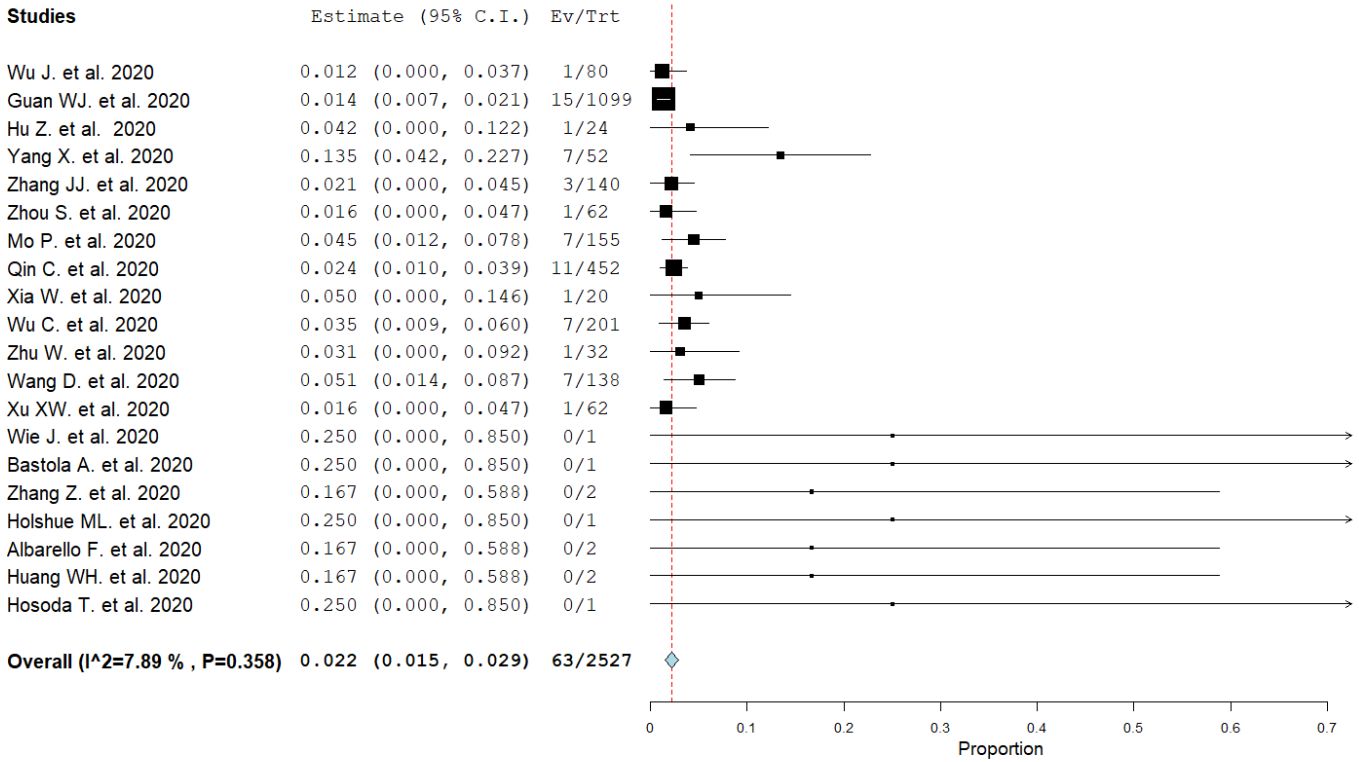
Supplementary Figure 1.e) Respiratory disease



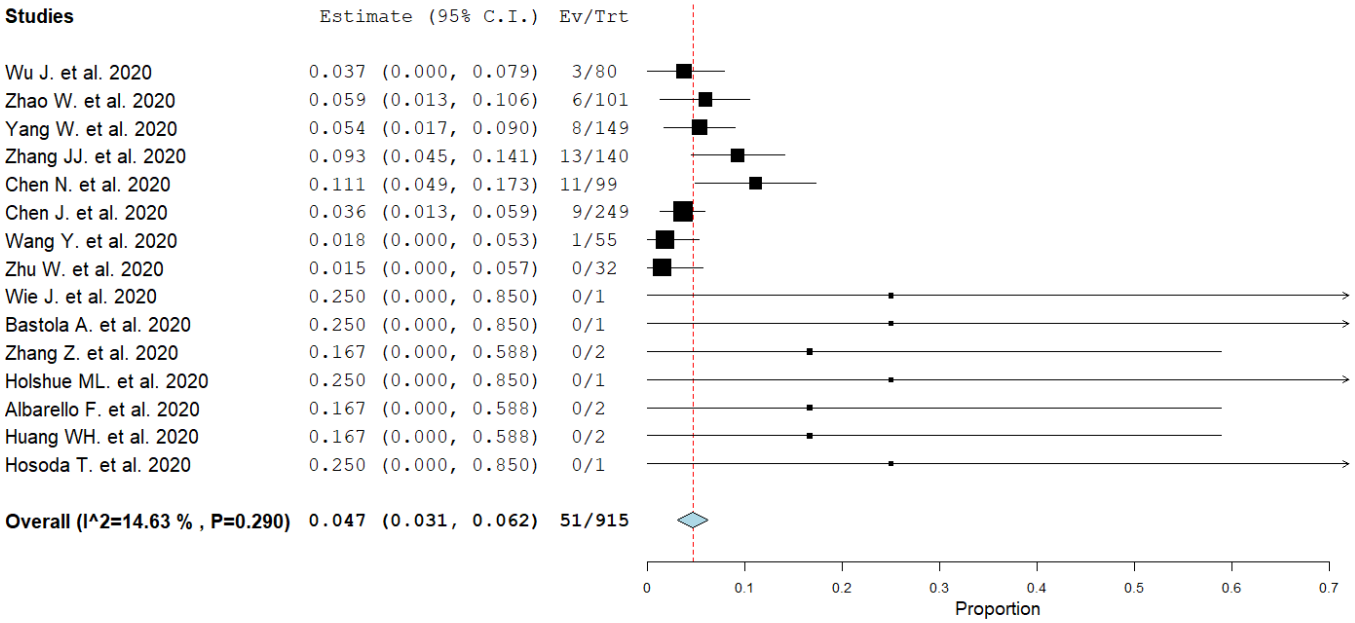
Supplementary Figure 1.f) Malignancy



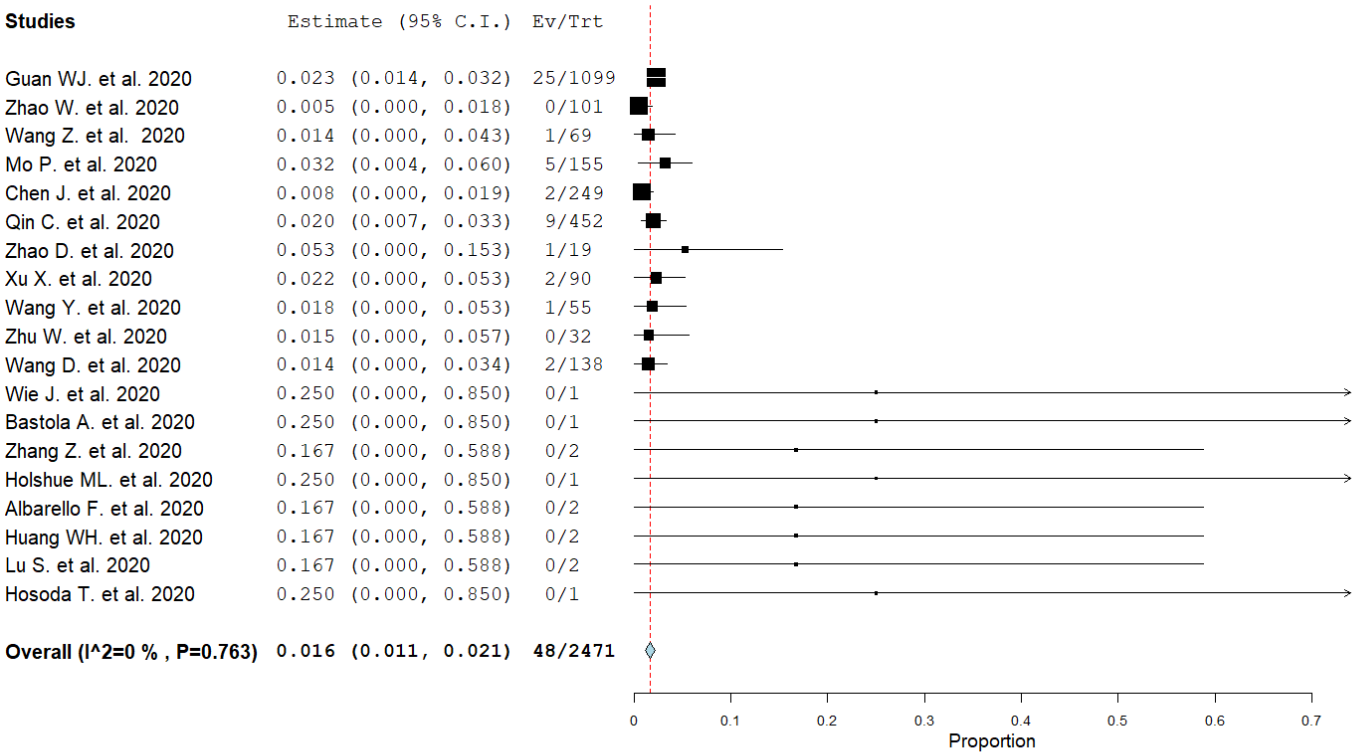
Supplementary Figure 1.g) Cerebrovascular disease



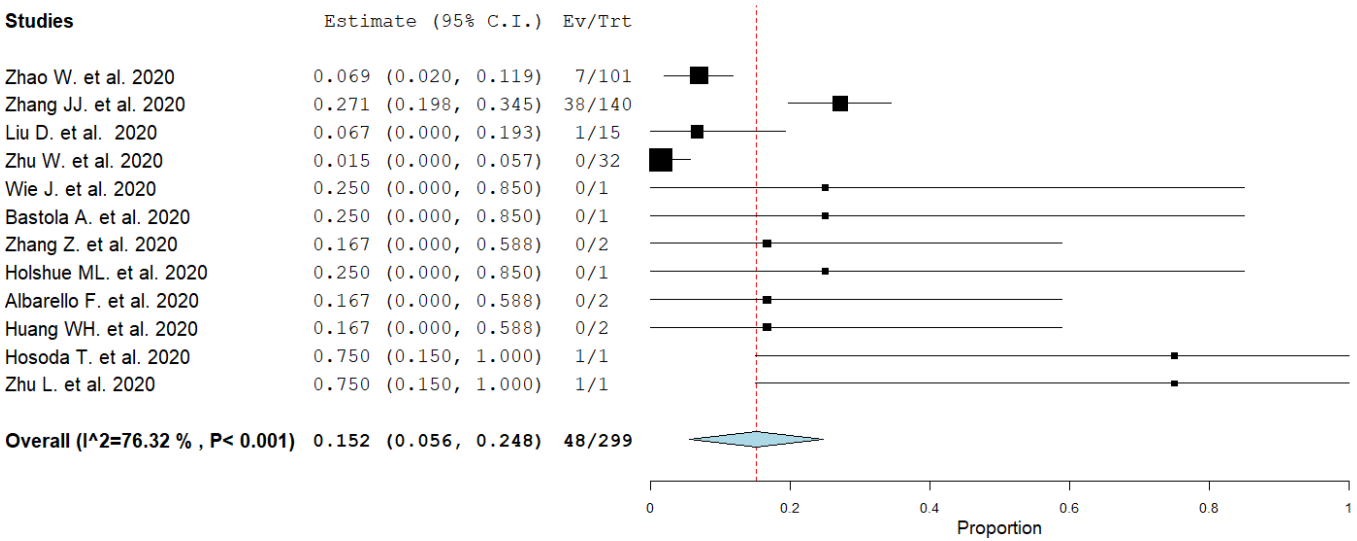
Supplementary Figure 1.h) Digestive system



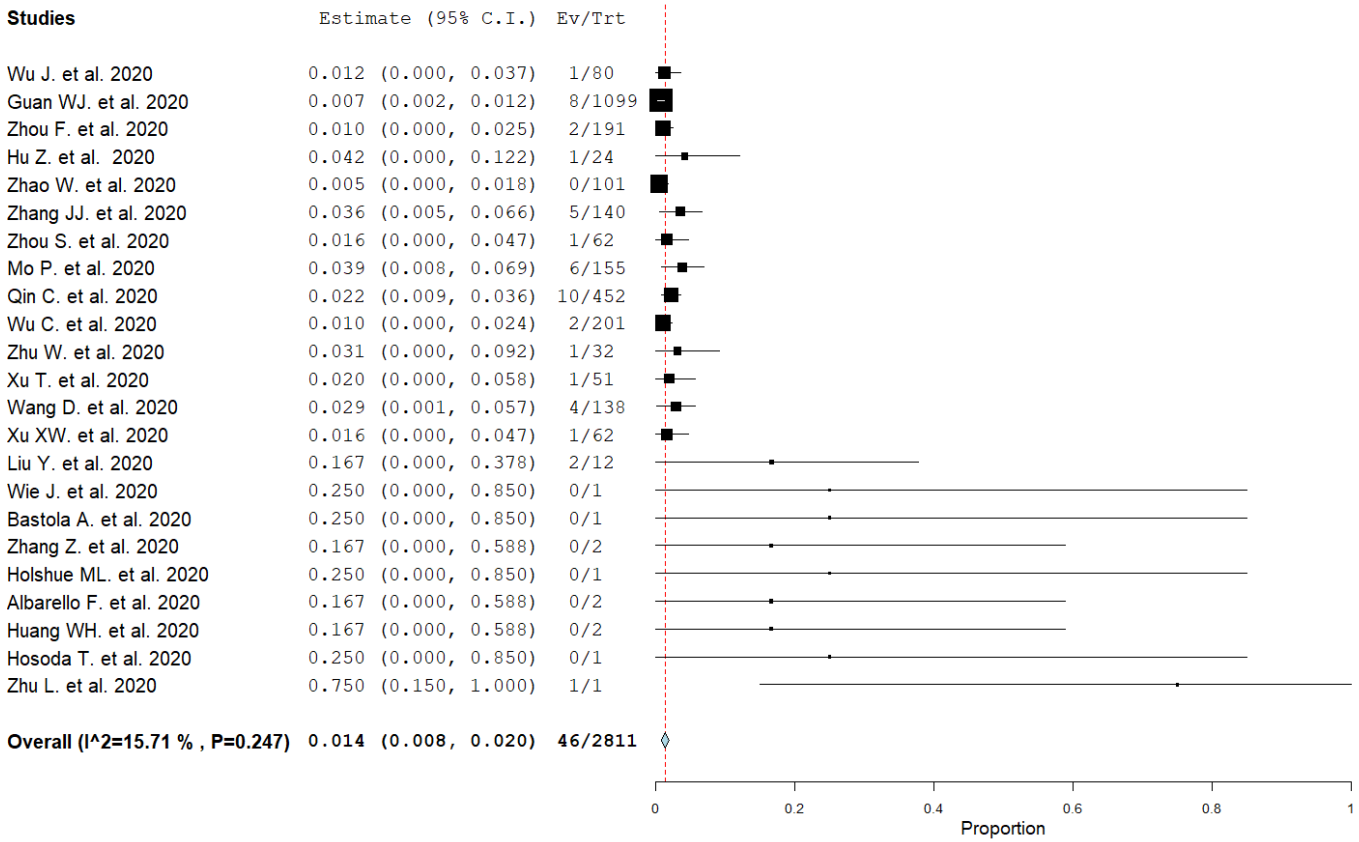
Supplementary Figure 1.i) Infections



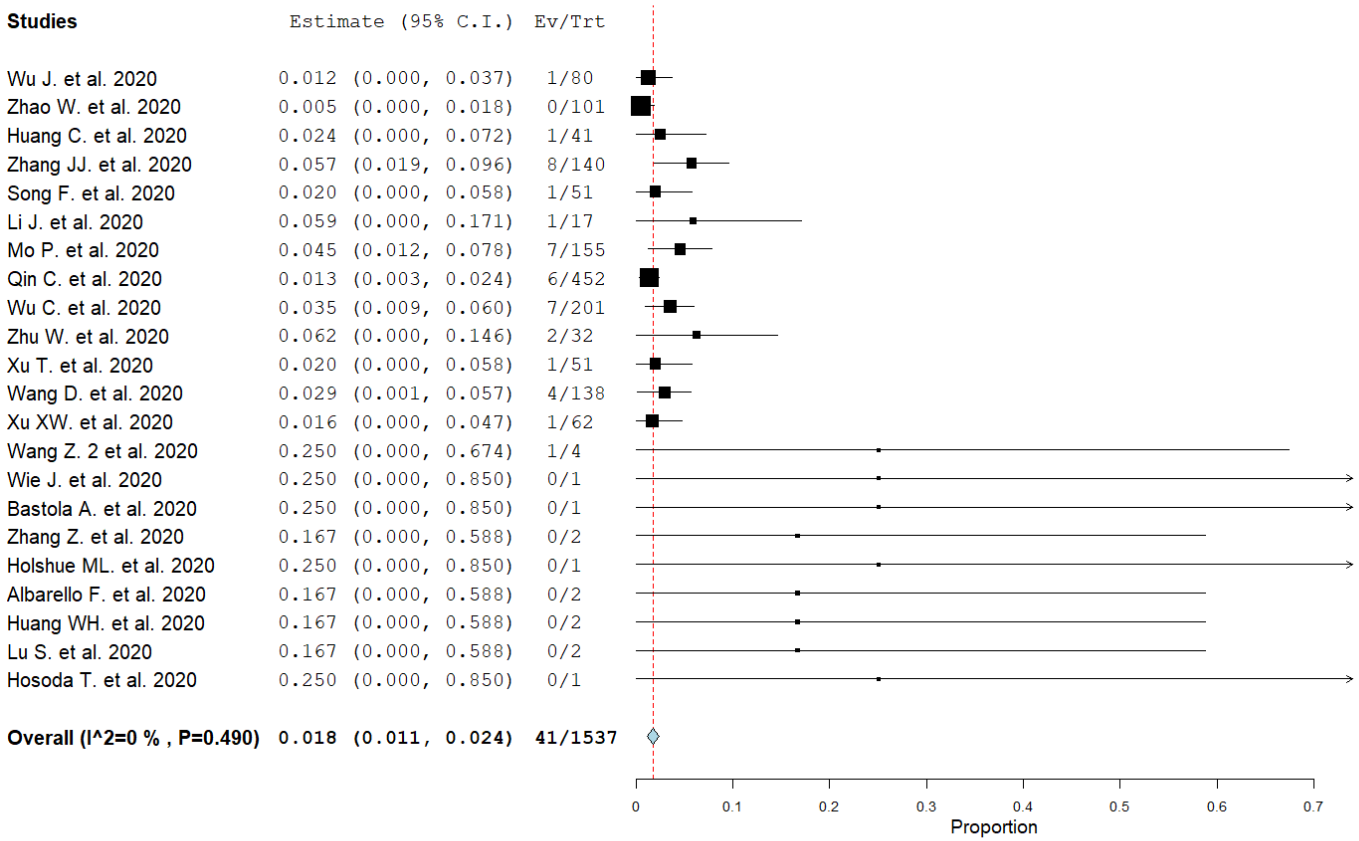
Supplementary Figure 1.j) Surgical history



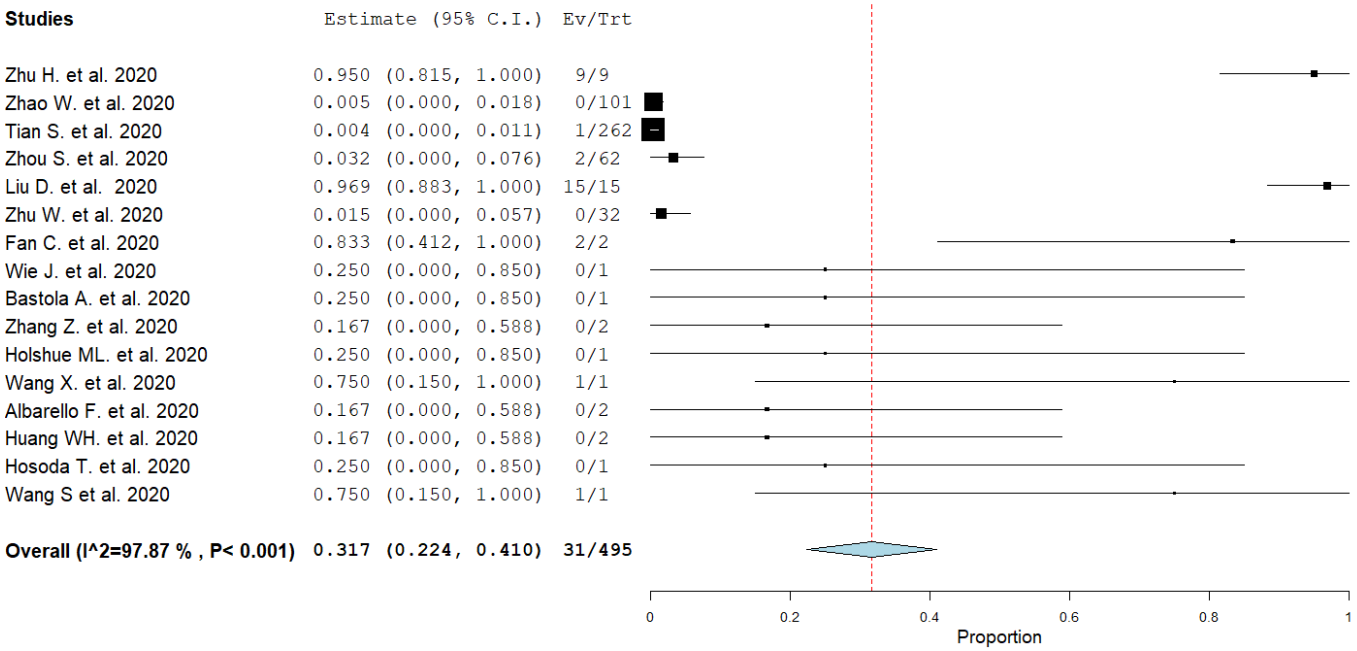
Supplementary Figure 1.k) Chronic renal disease



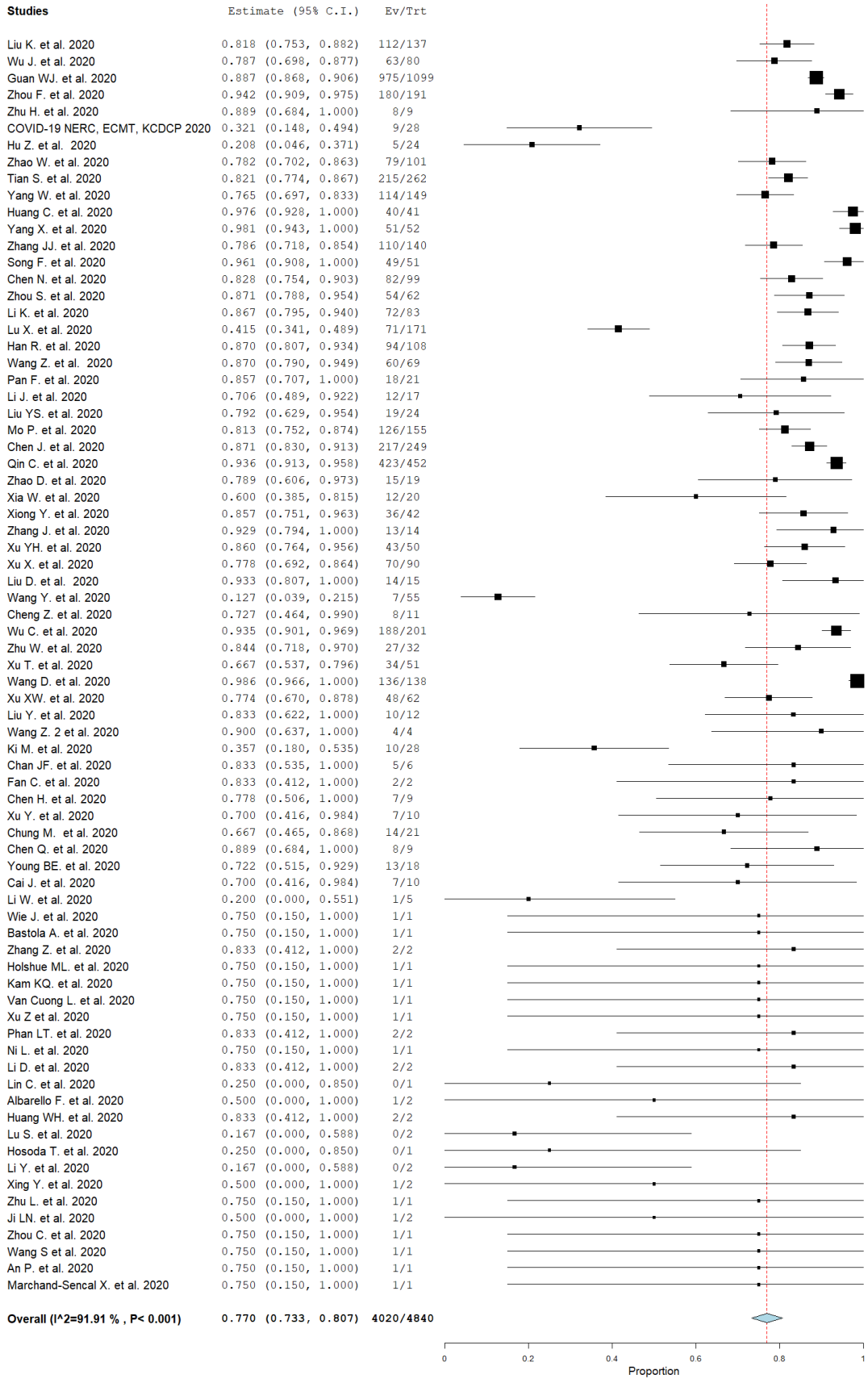
Supplementary Figure 1.l) Chronic liver disease



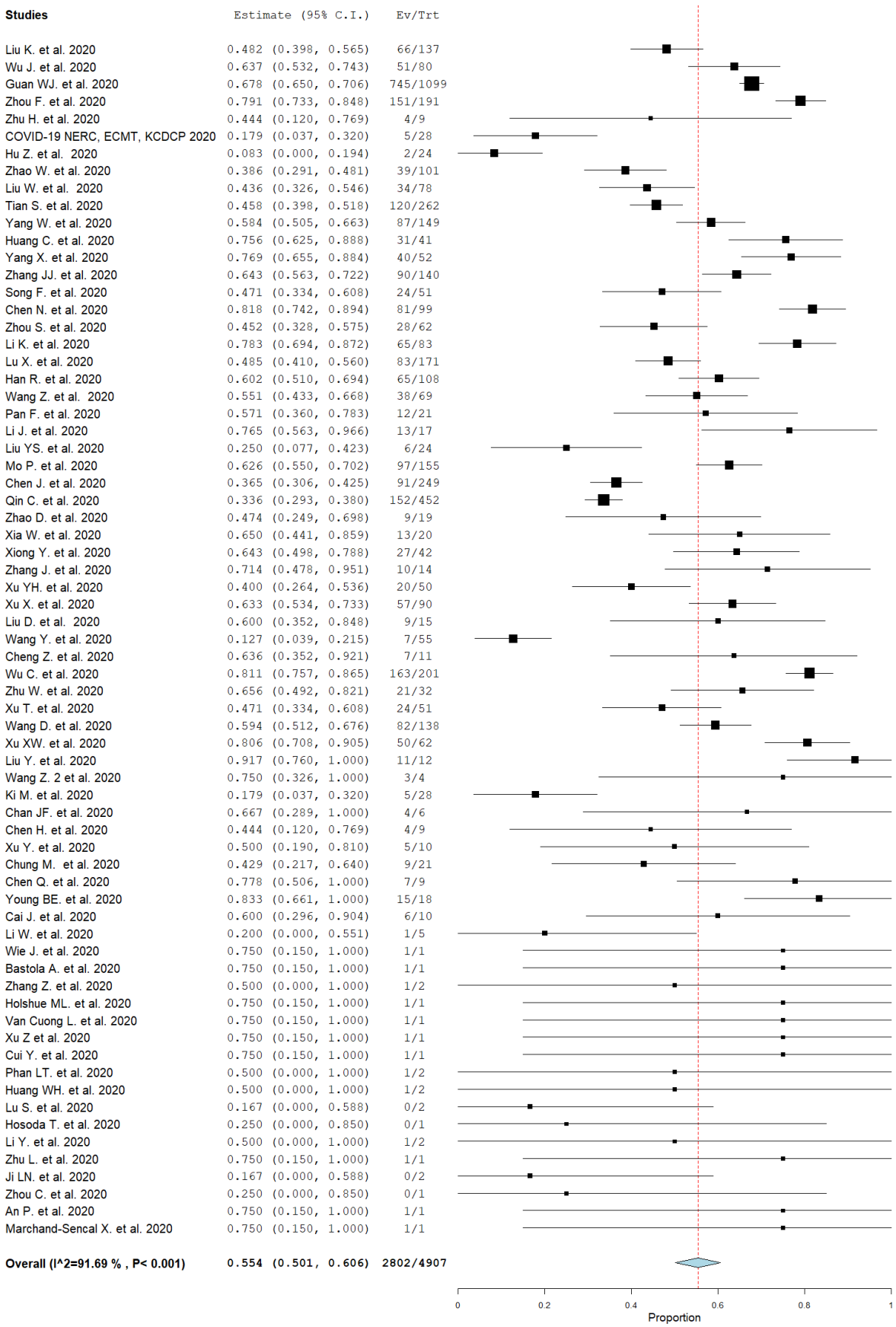
Supplementary Figure 1.m) Existing pregnancy



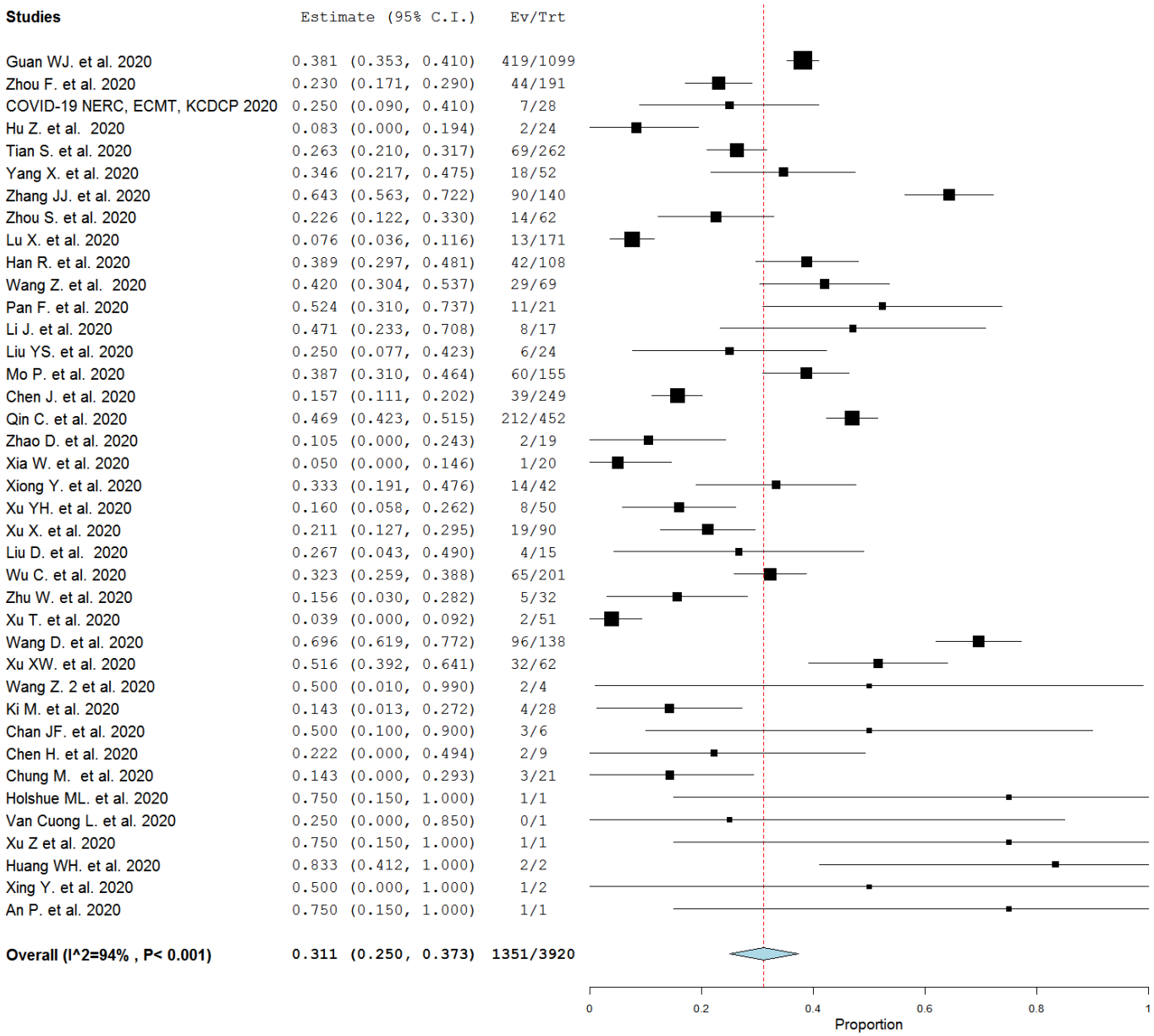
Supplementary Figure 1.n) Fever



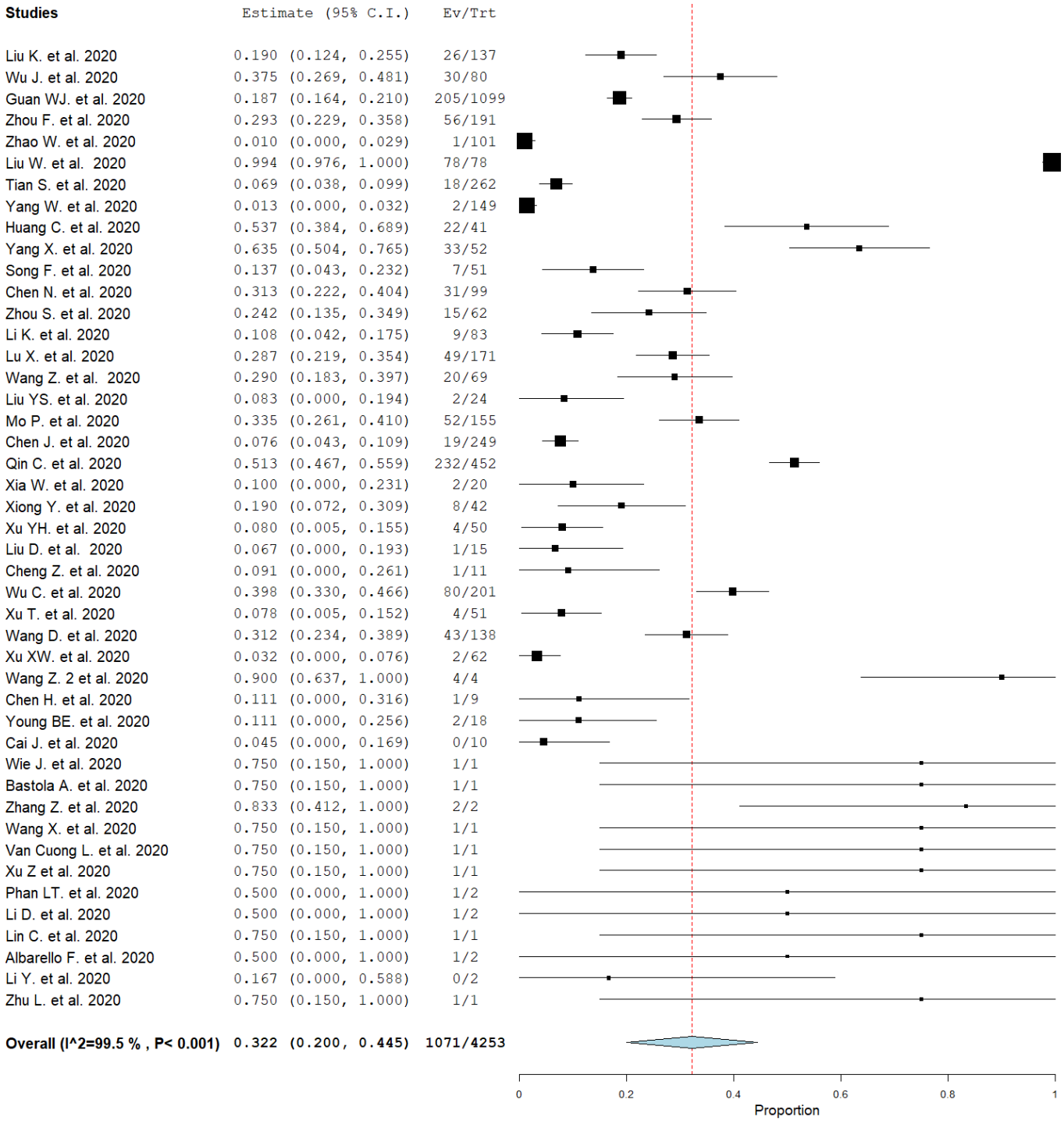
Supplementary Figure 1.o) Cough



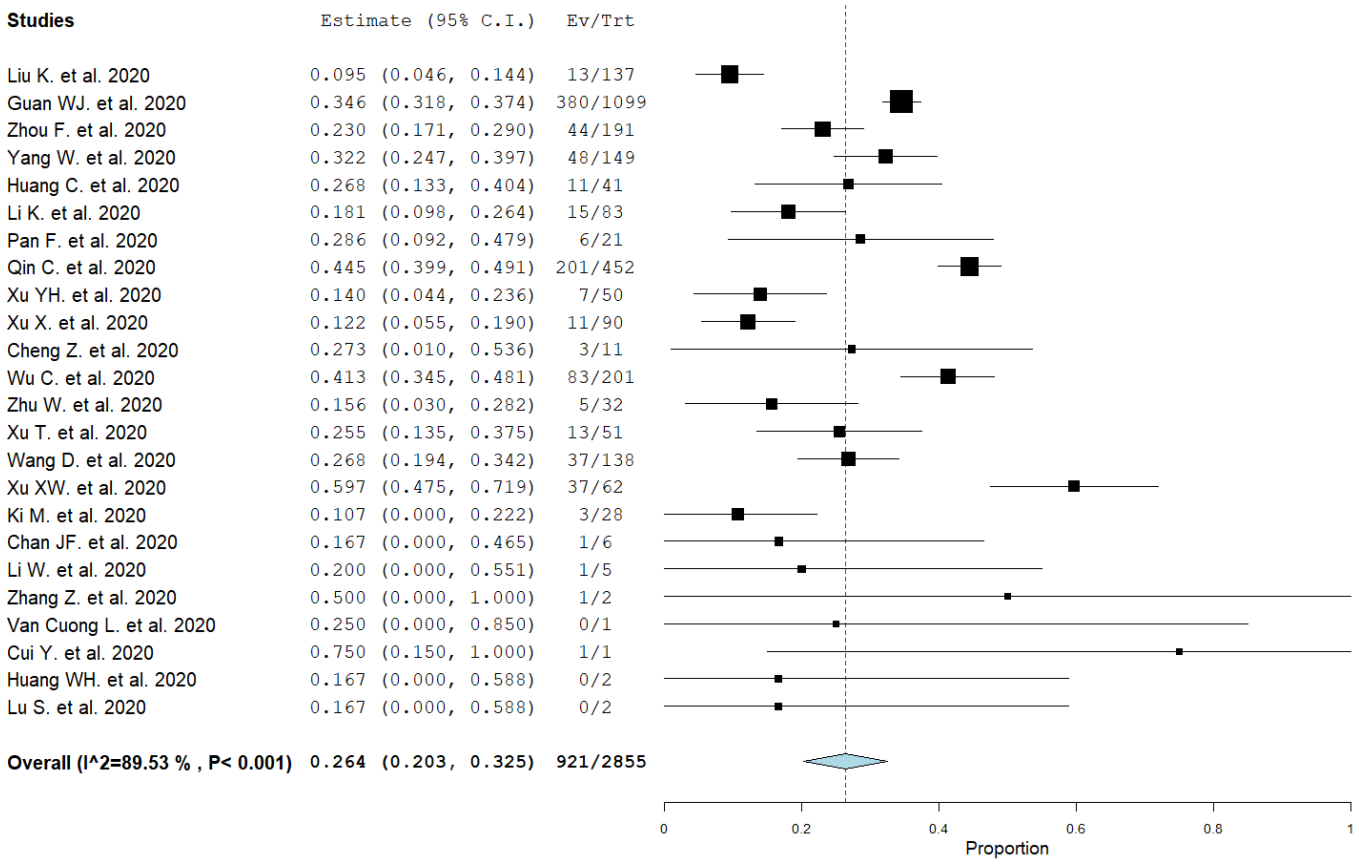
Supplementary Figure 1.p) Malaise



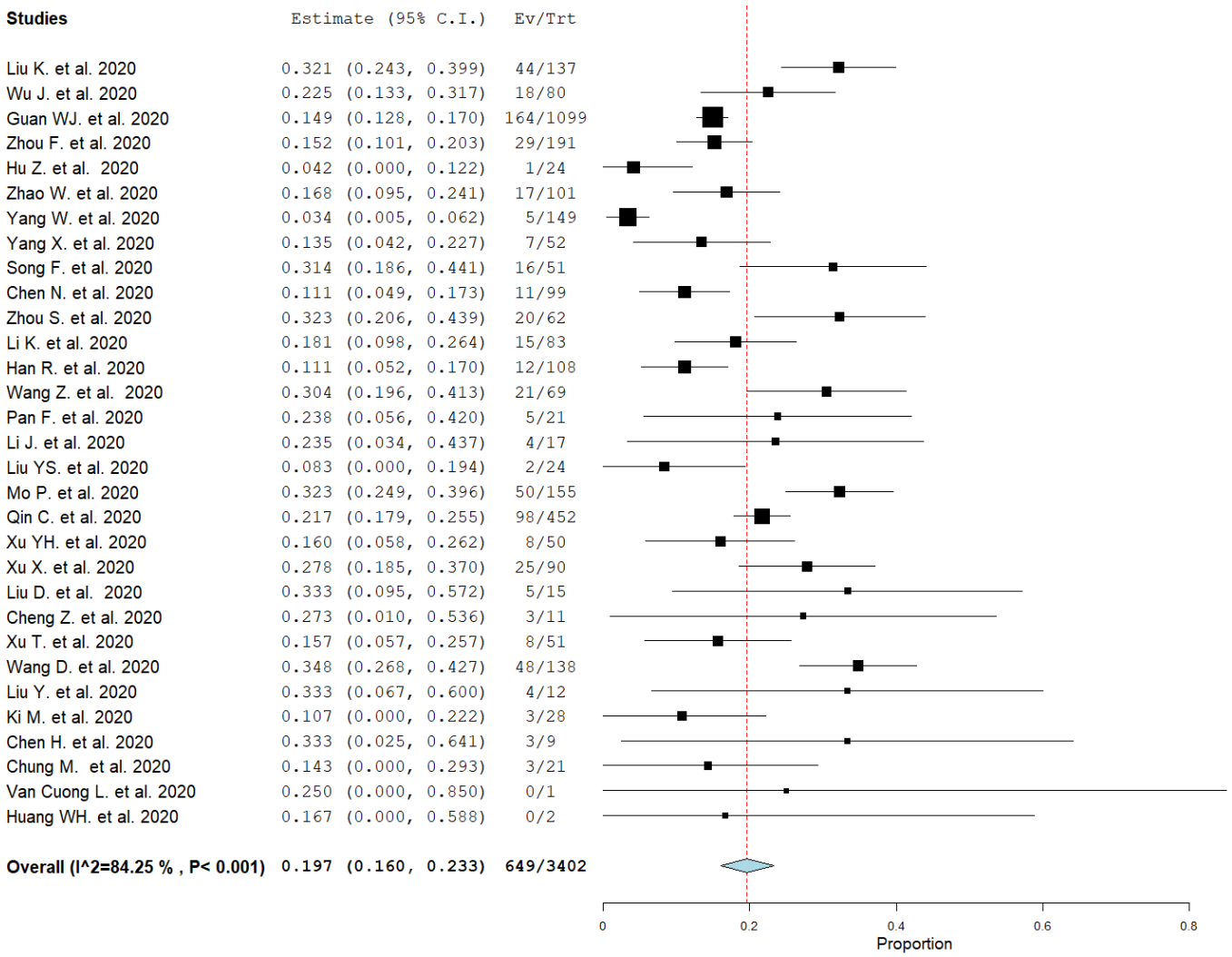
Supplementary Figure 1.q) Dyspnoea



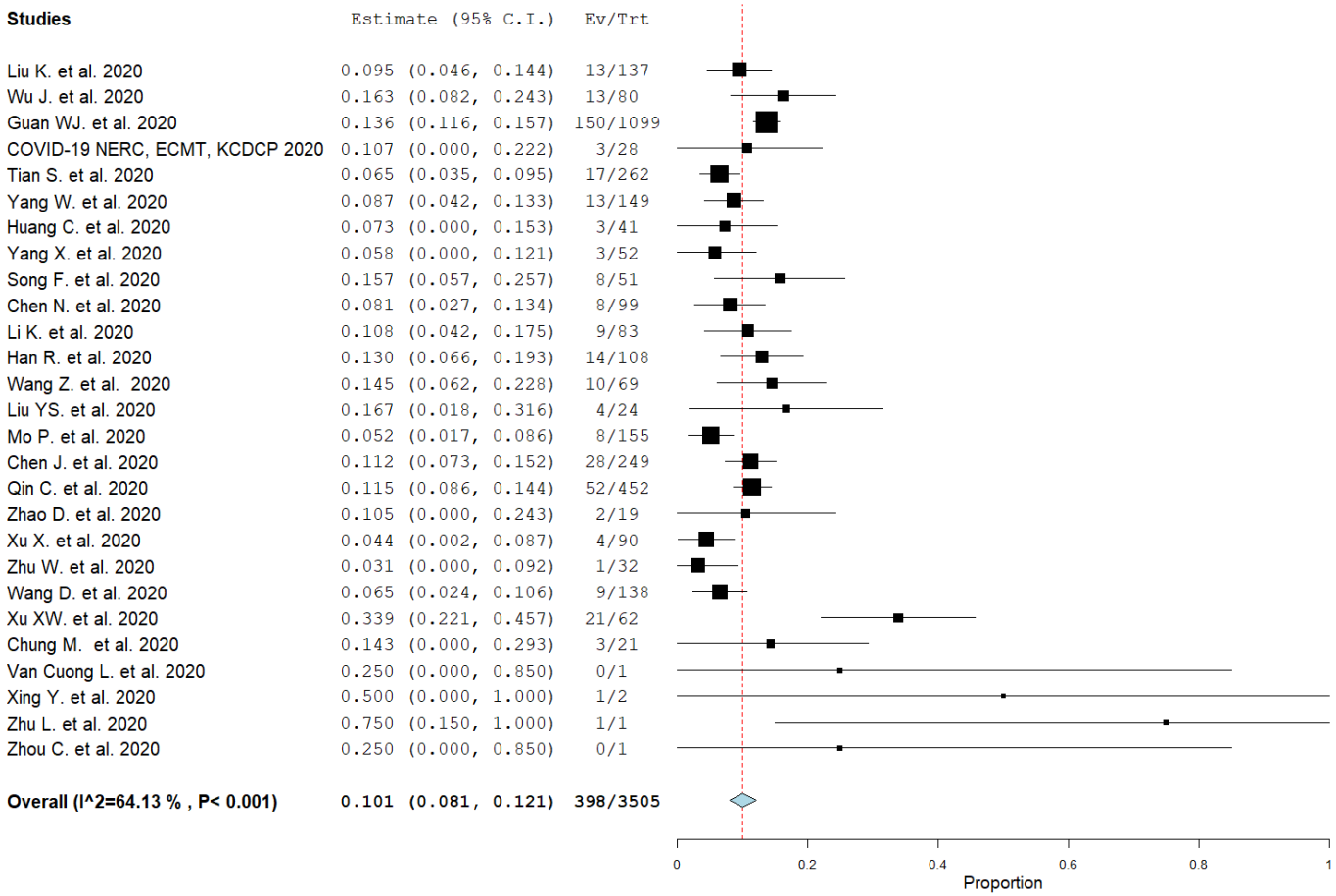
Supplementary Figure 1.r) Sputum production



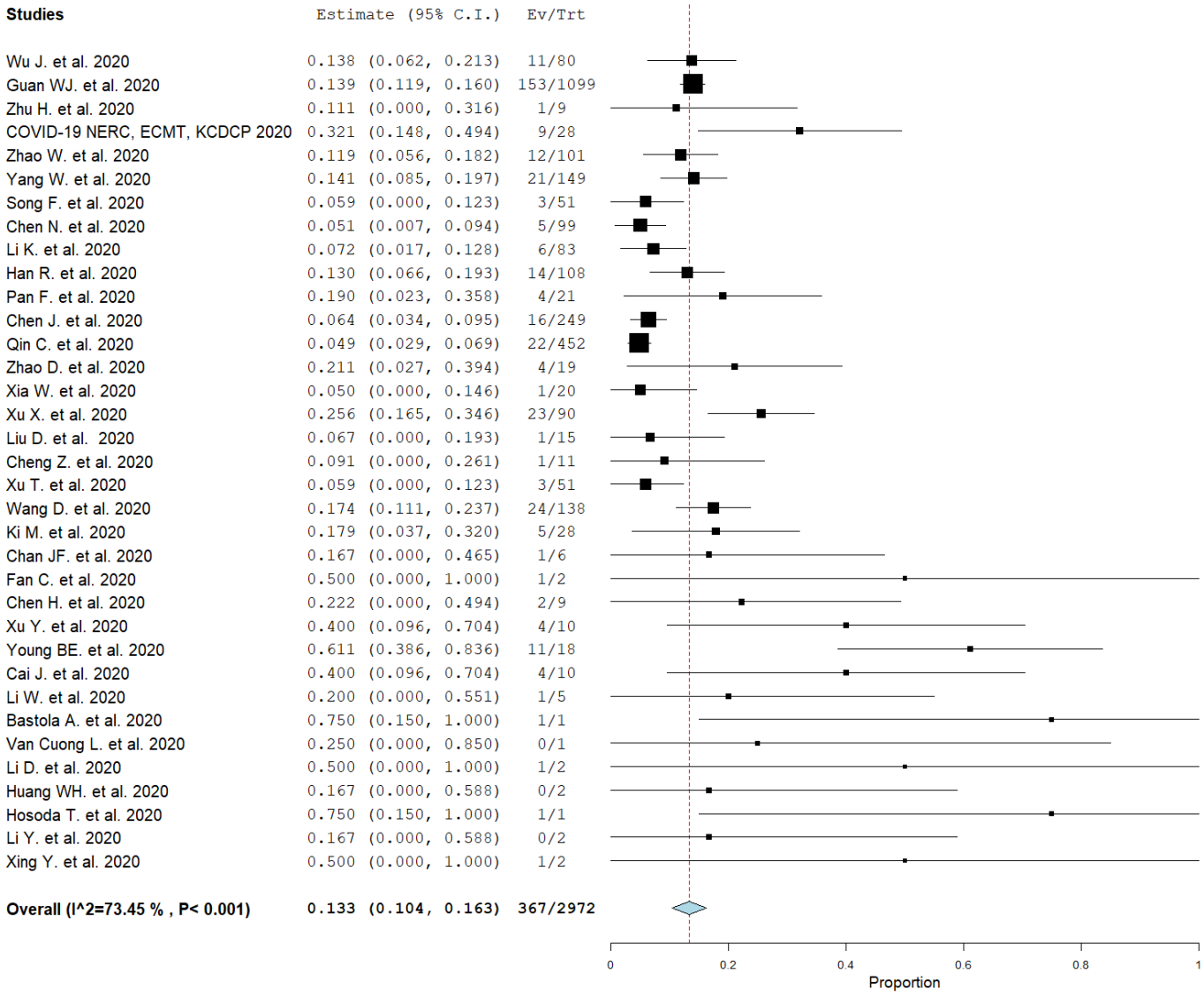
Supplementary Figure 1.s) Myalgia/Arthralgia



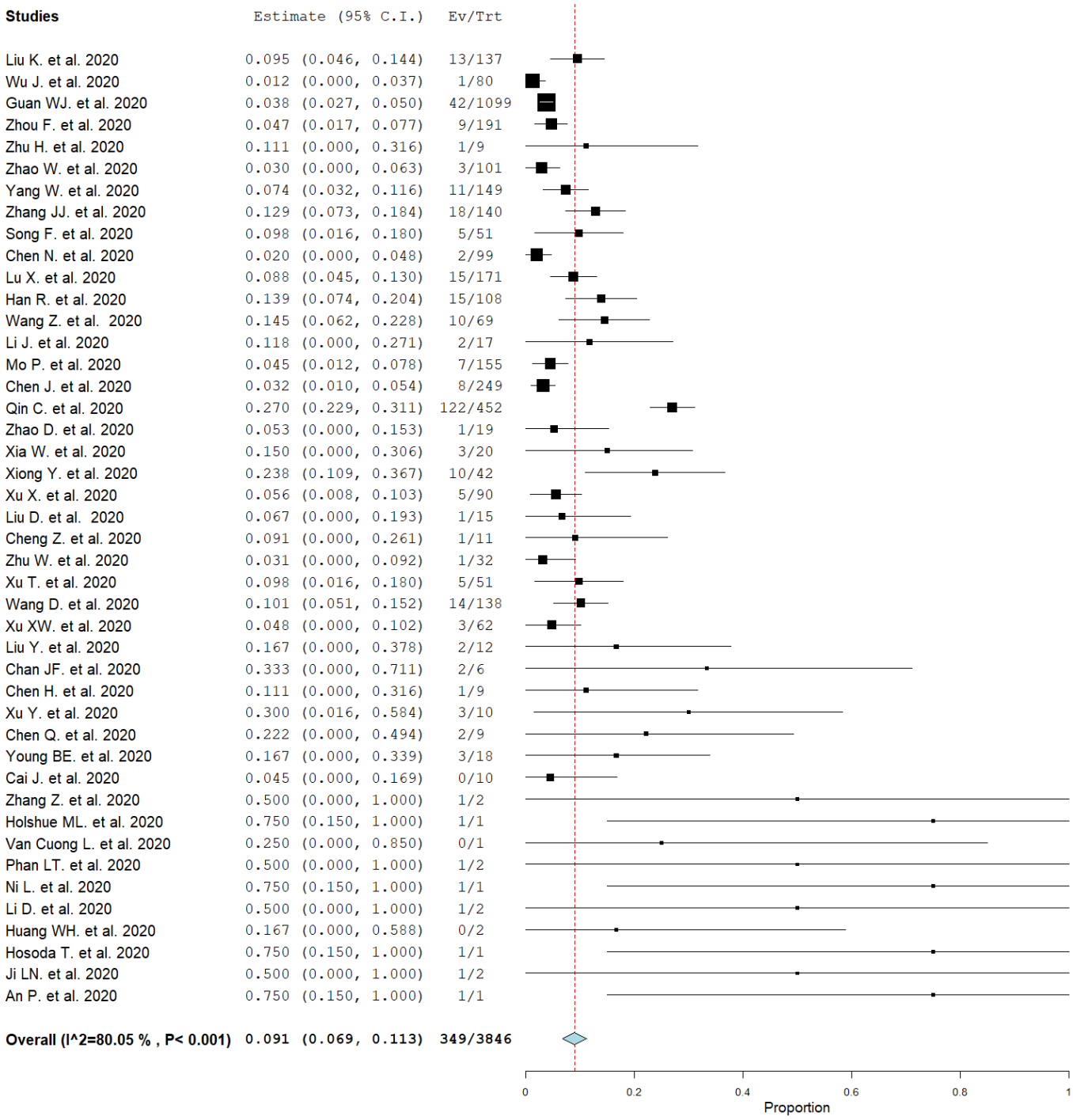
Supplementary Figure 1.t) Headache



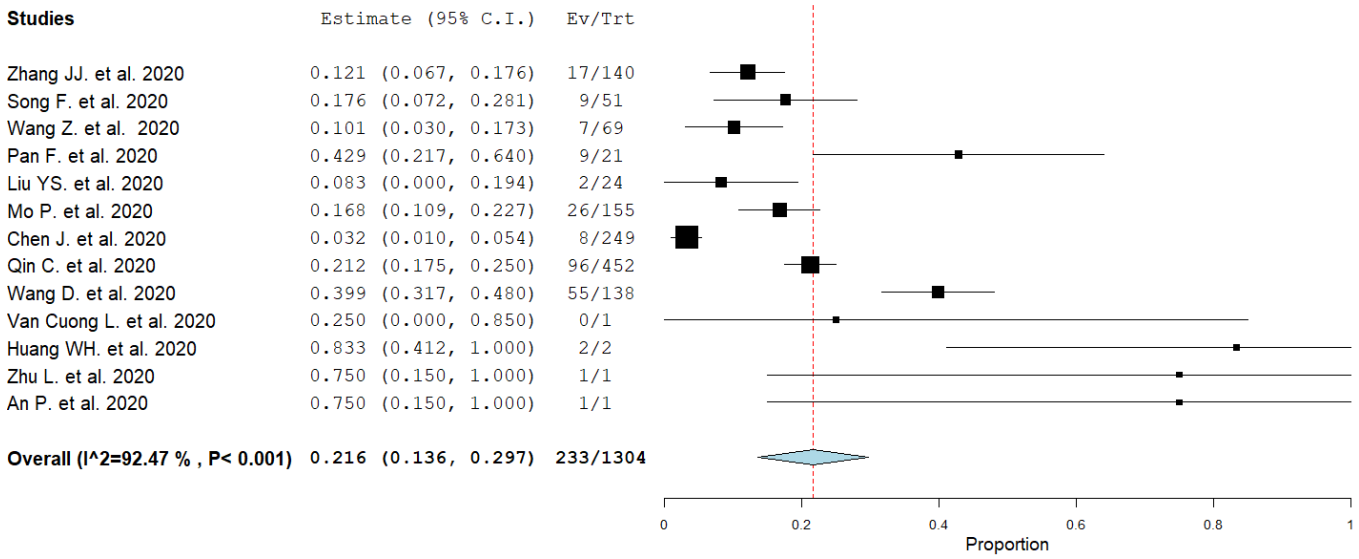
Supplementary Figure 1.u) Sore throat



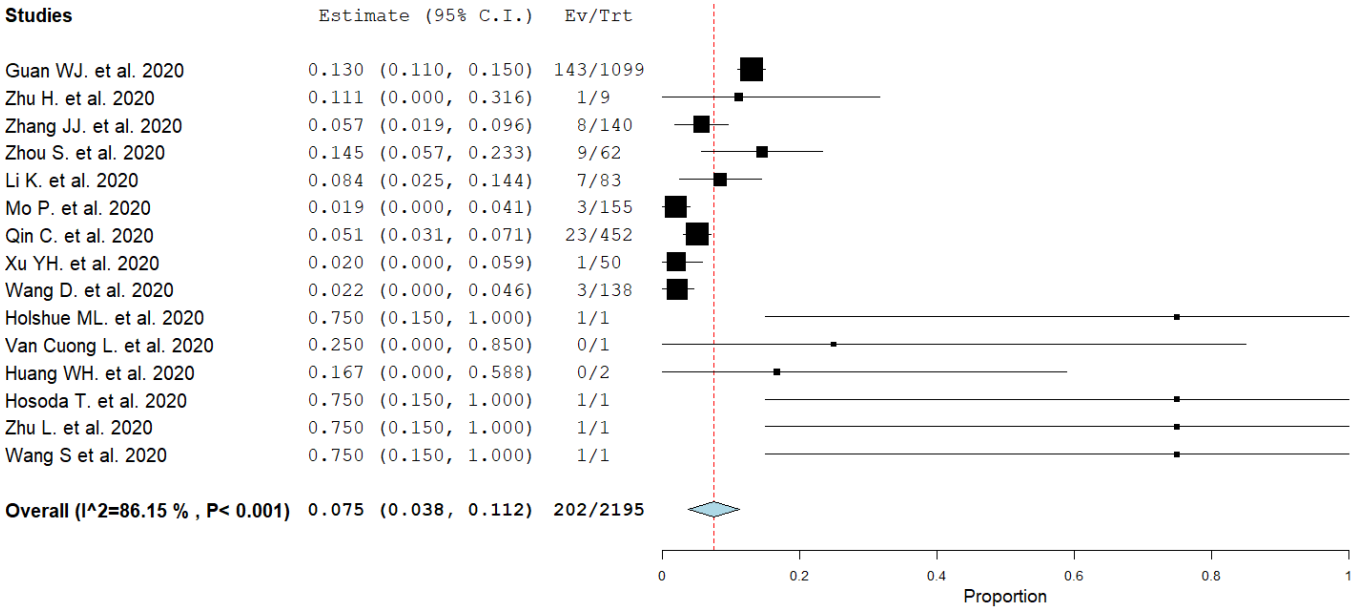
Supplementary Figure 1.v) Diarrhea



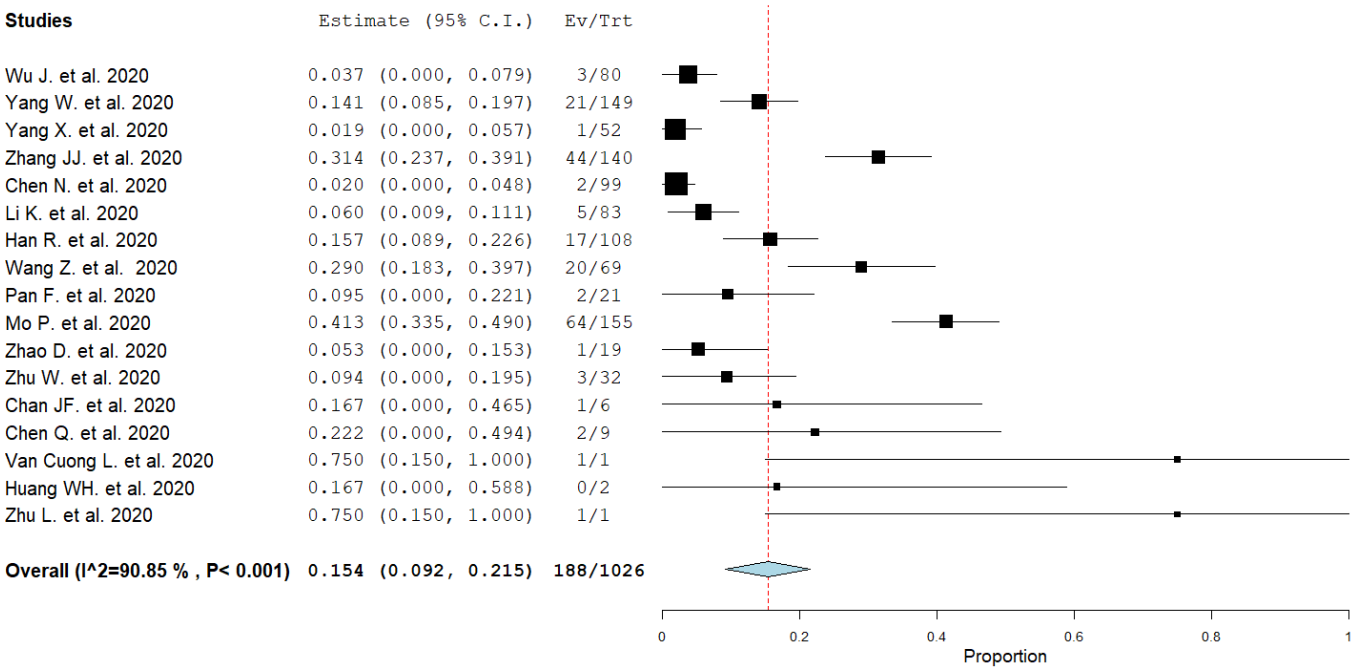
Supplementary Figure 1.w) Anorexia



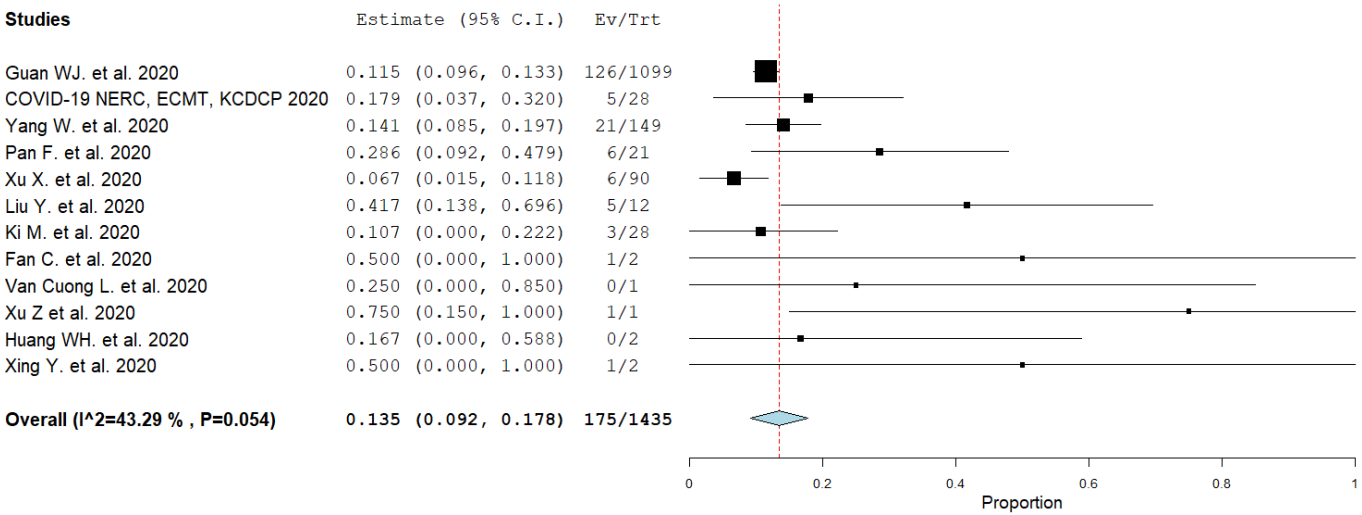
Supplementary Figure 1.x) Abdominal pain



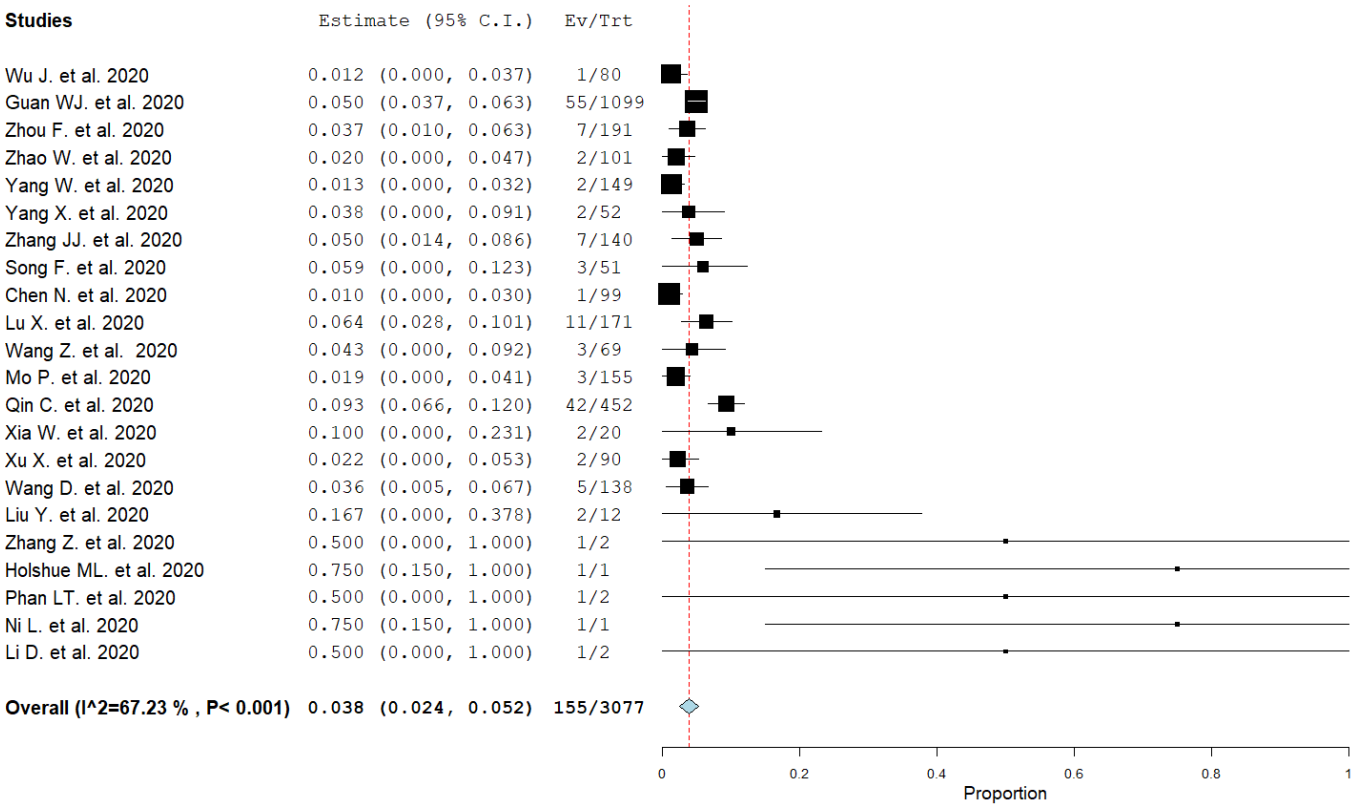
Supplementary Figure 1.y) Chest pain



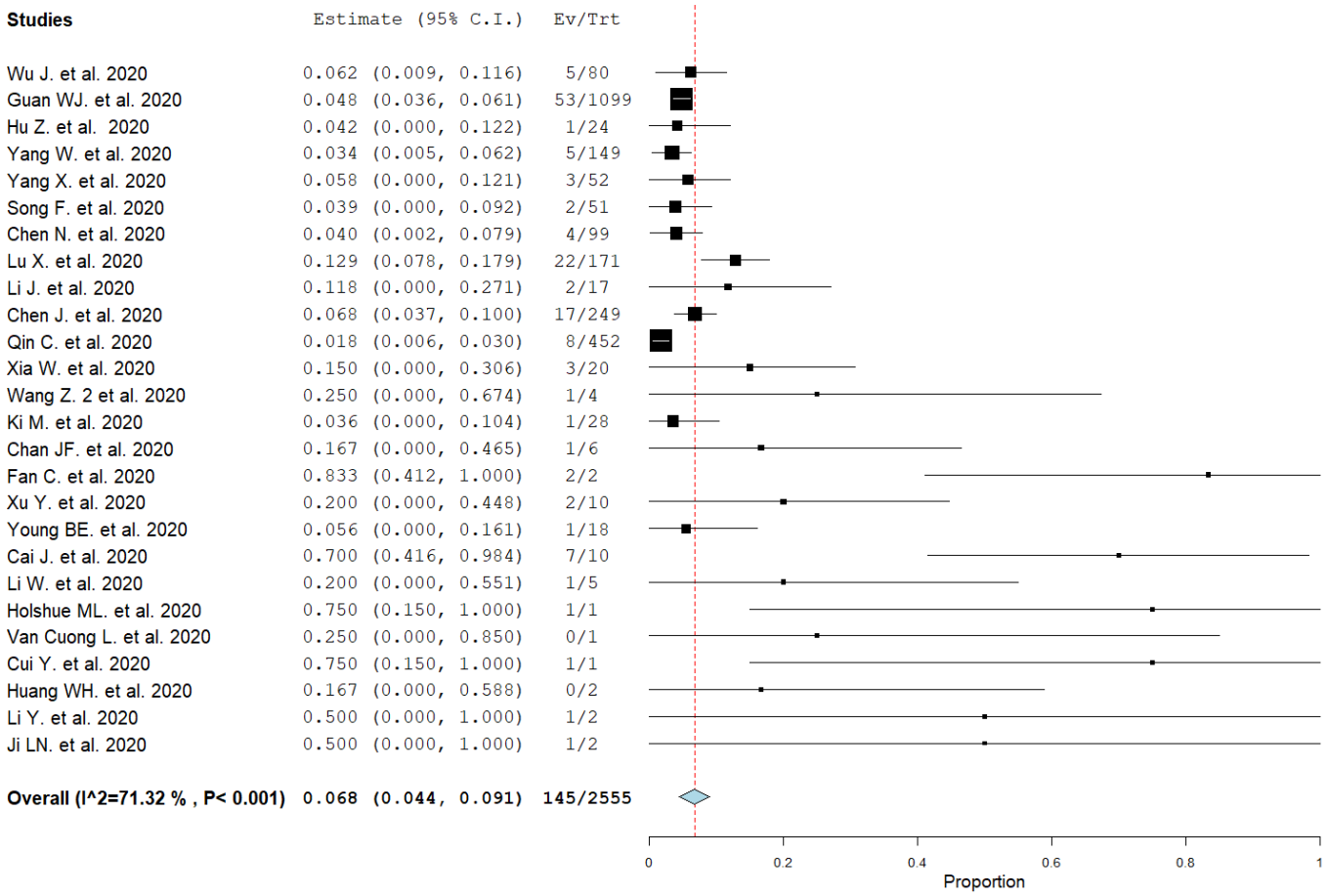
Supplementary Figure 1.z) Coldness/ Chills



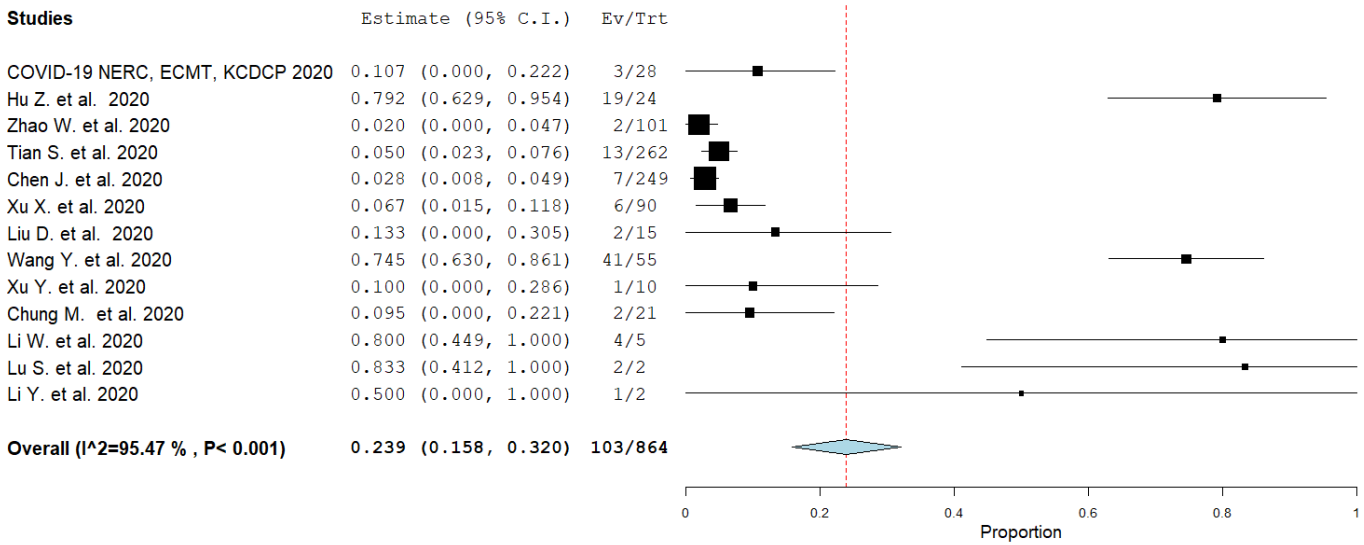
Supplementary Figure 1.aa) Vomiting



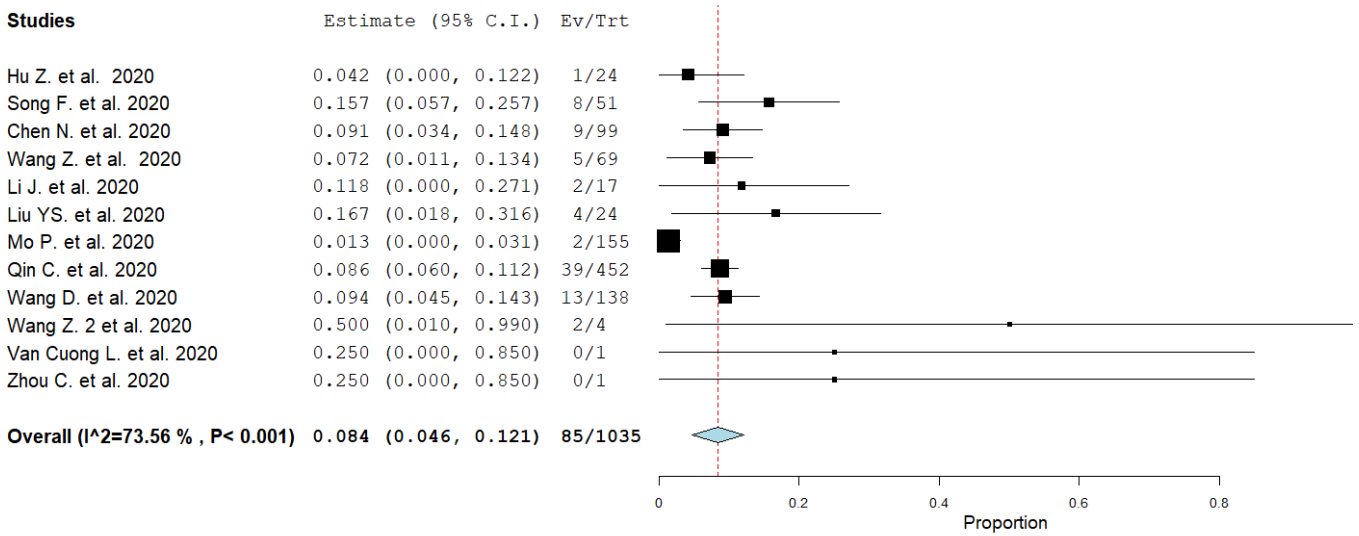
Supplementary Figure 1.bb) Rhinorrhoea



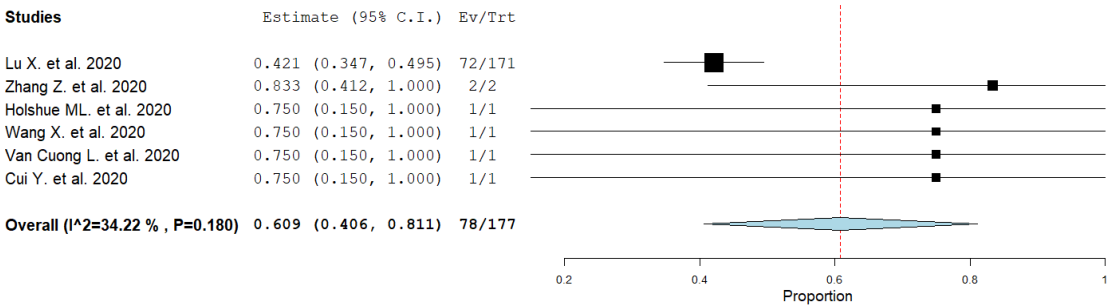
Supplementary Figure 1.cc) Asymptomatic



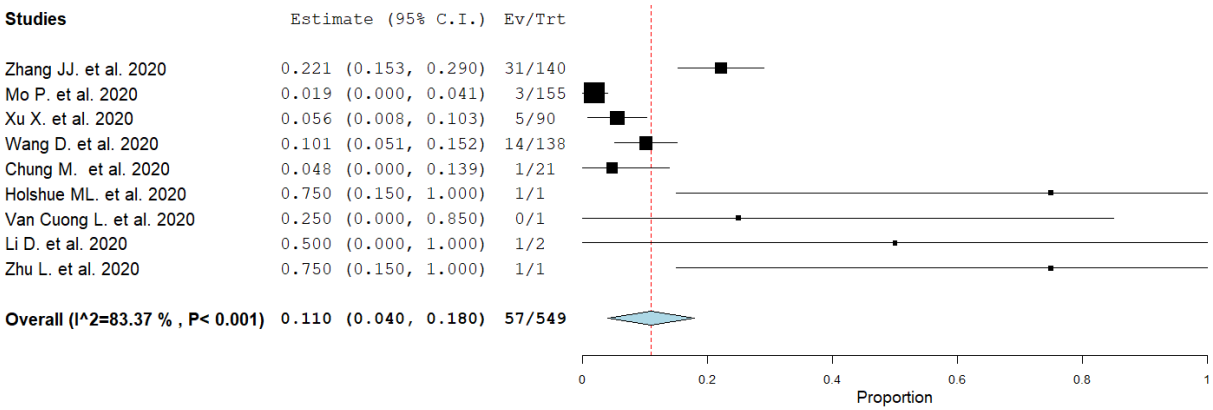
Supplementary Figure 1.dd) Dizziness/ Confusion



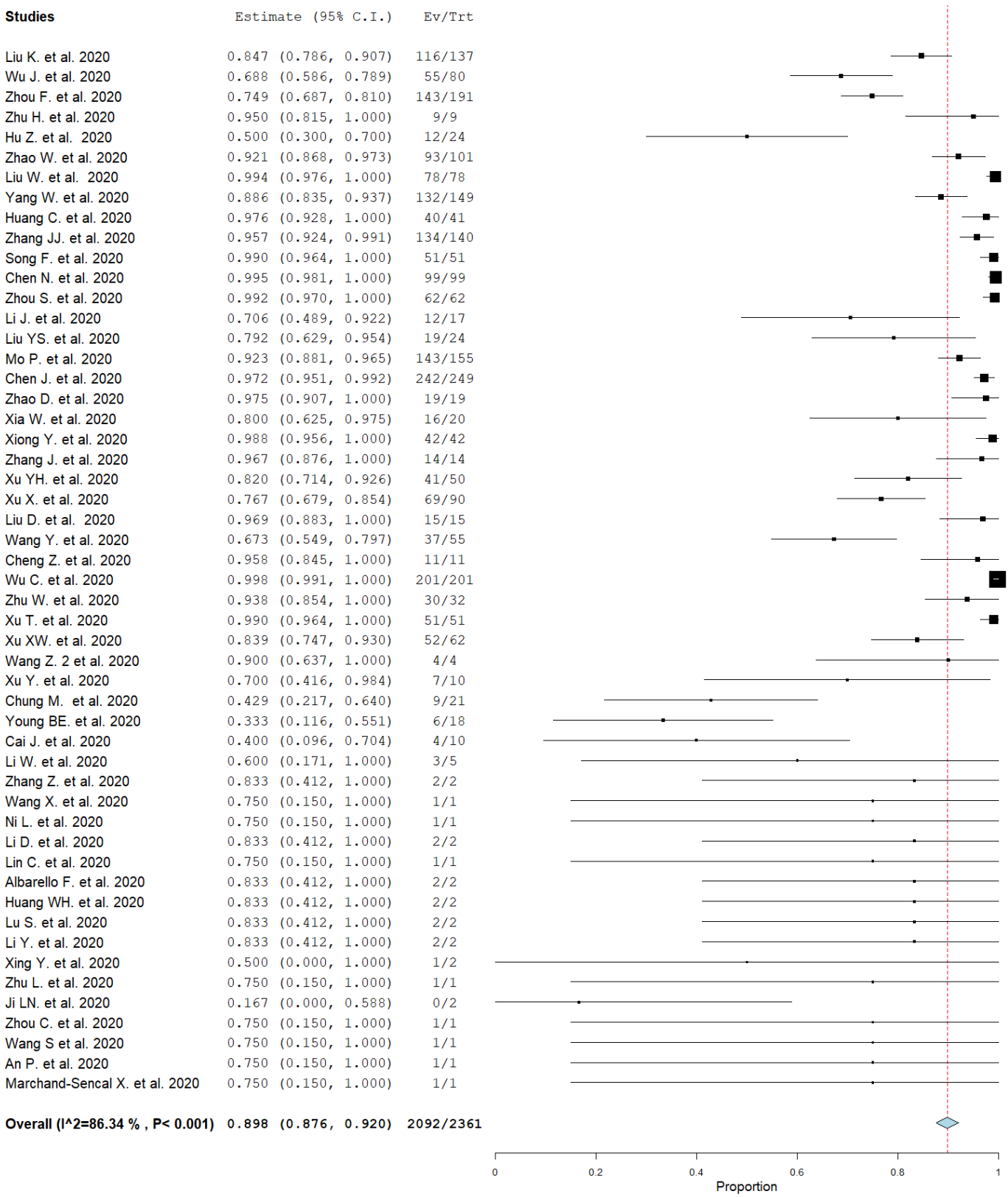
Supplementary Figure 1.ee) Tachycardia



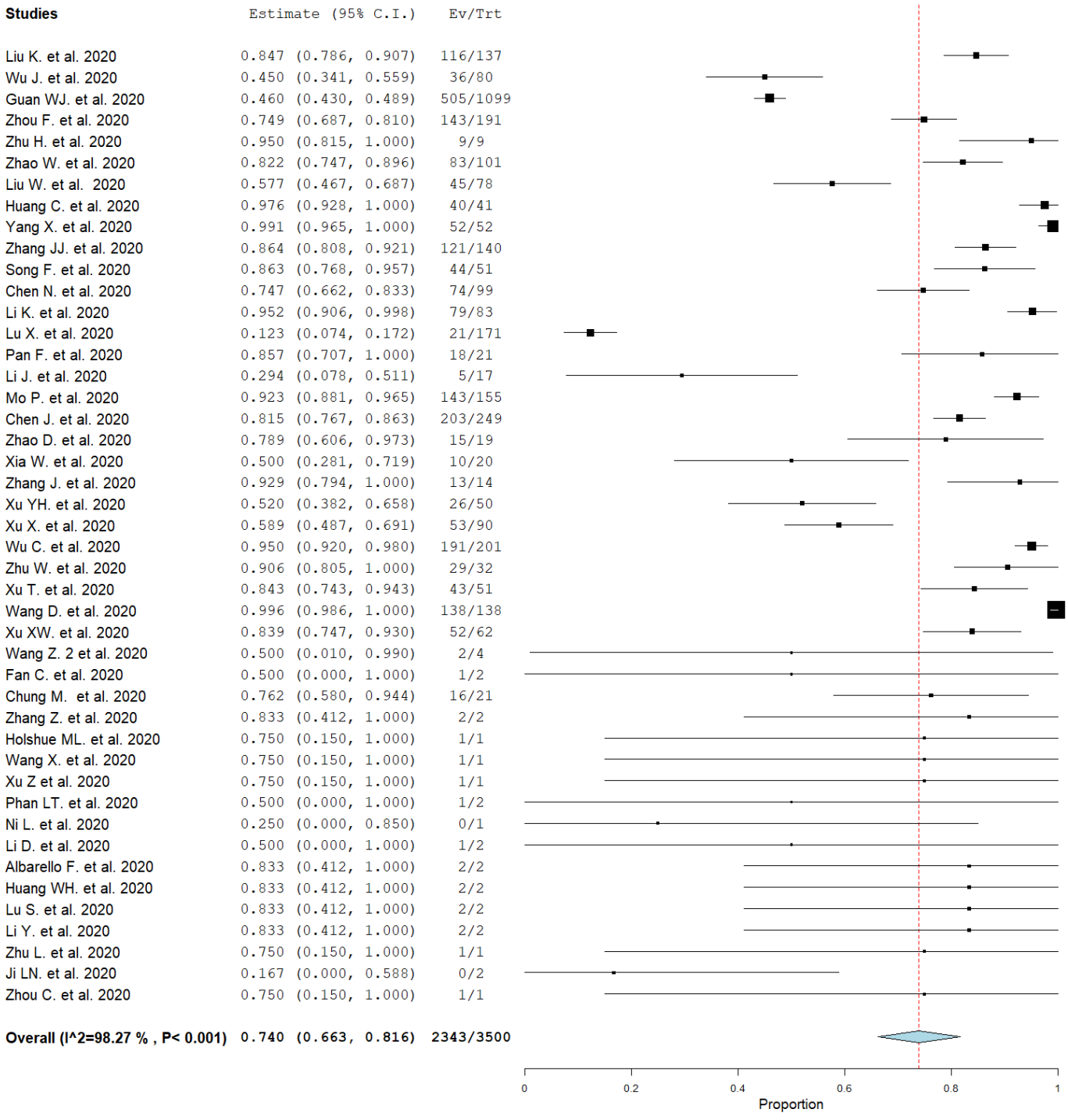
Supplementary Figure 1.ff) Nausea



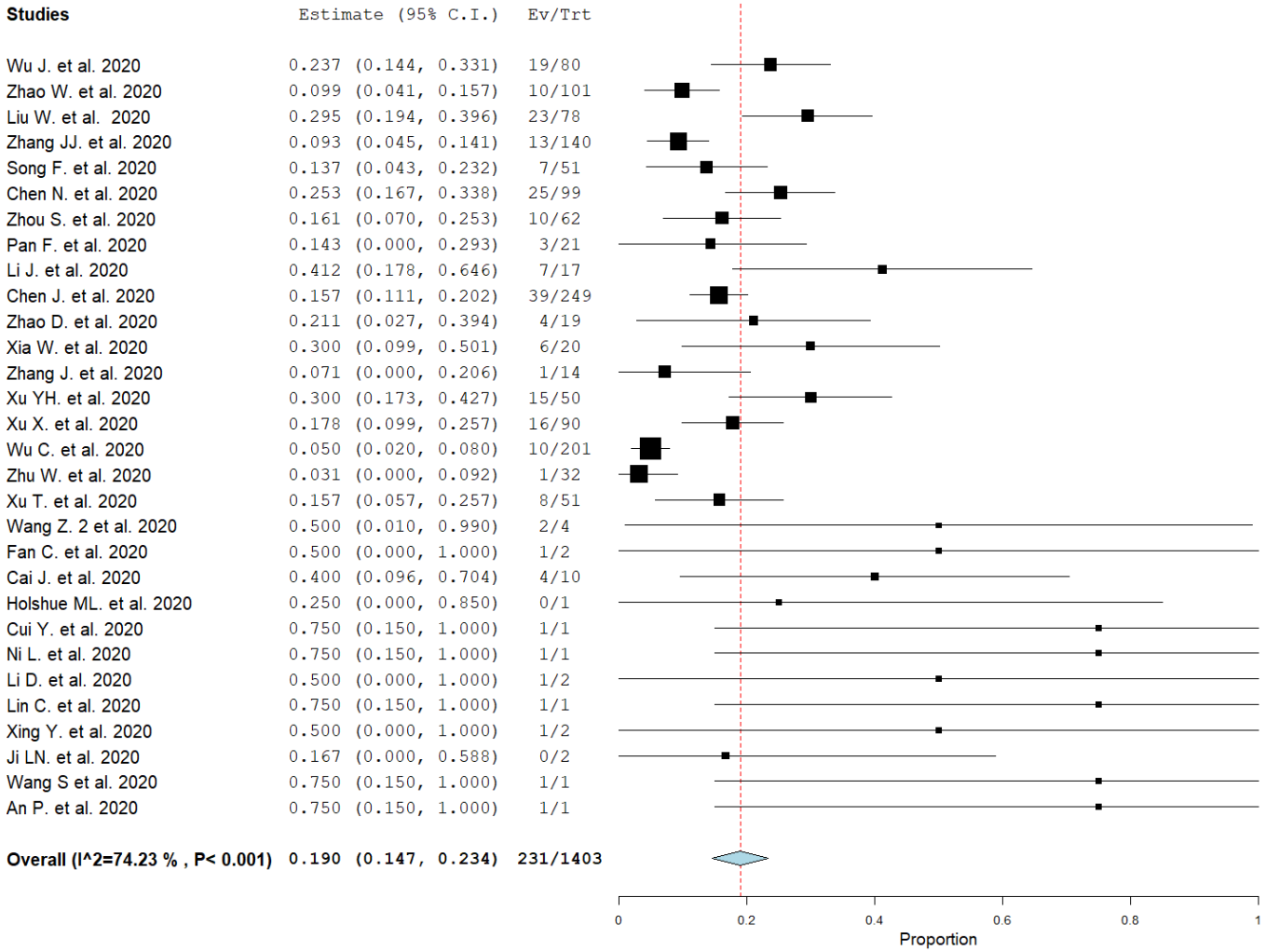
Supplementary Figure 1.gg) Initial radiology abnormalities



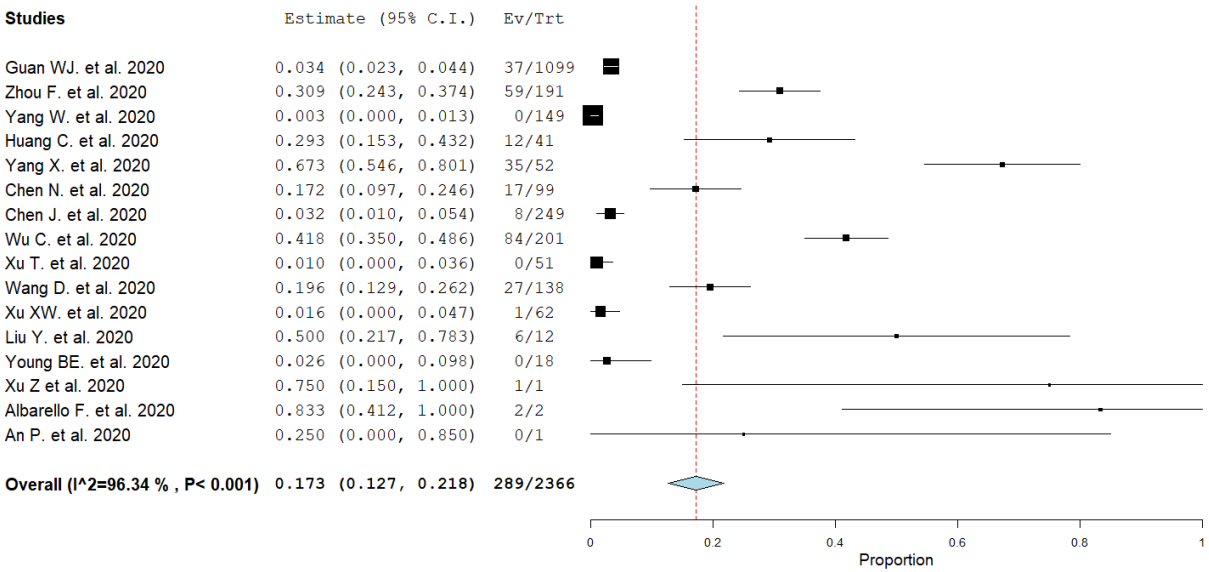
Supplementary Figure 1.hh) Bilateral lung changes



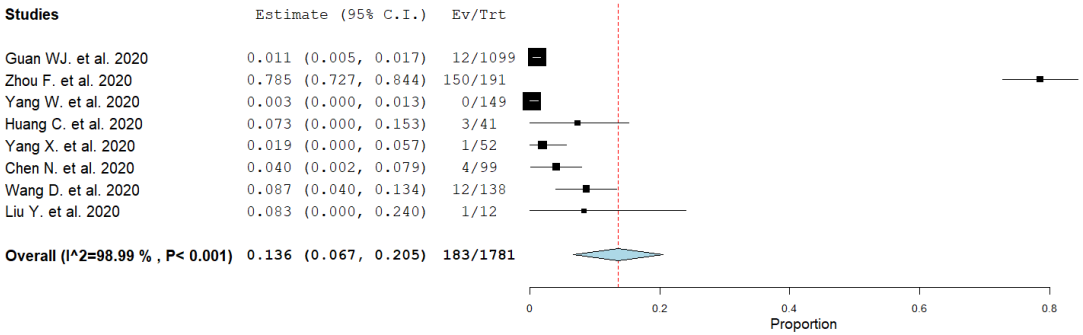
Supplementary Figure 1.ii) Unilateral lung changes



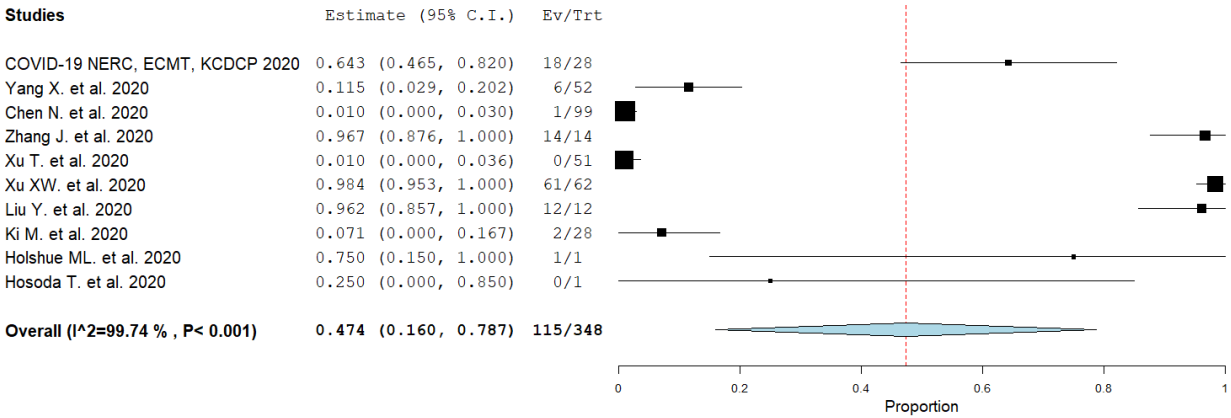
Supplementary Figure 1.jj) ARDS



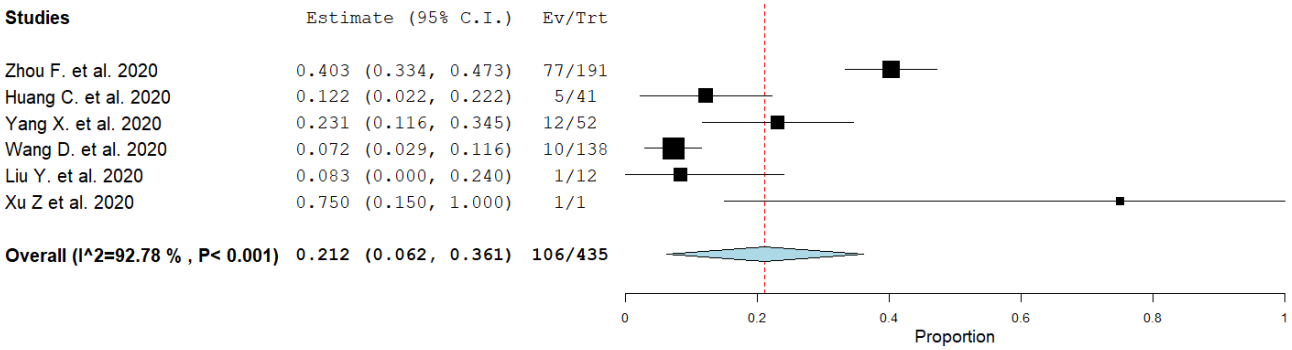
Supplementary Figure 1.kk) Sepsis/ Bacteremia



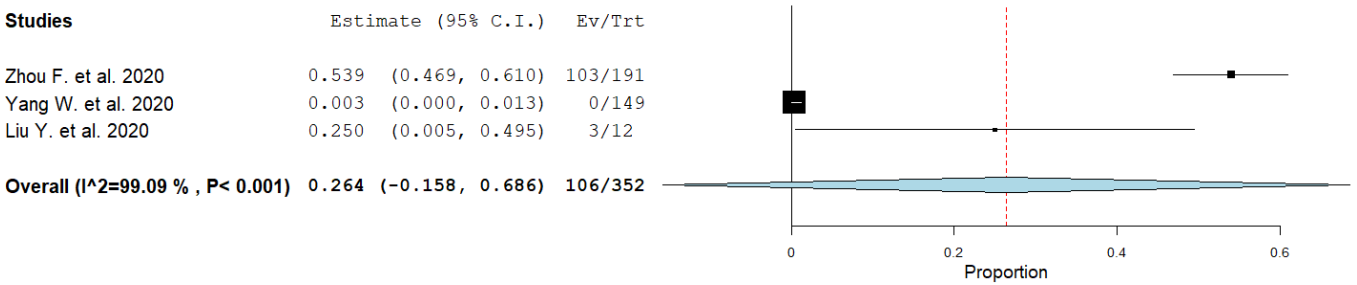
Supplementary Figure 1.ll) Pneumonia



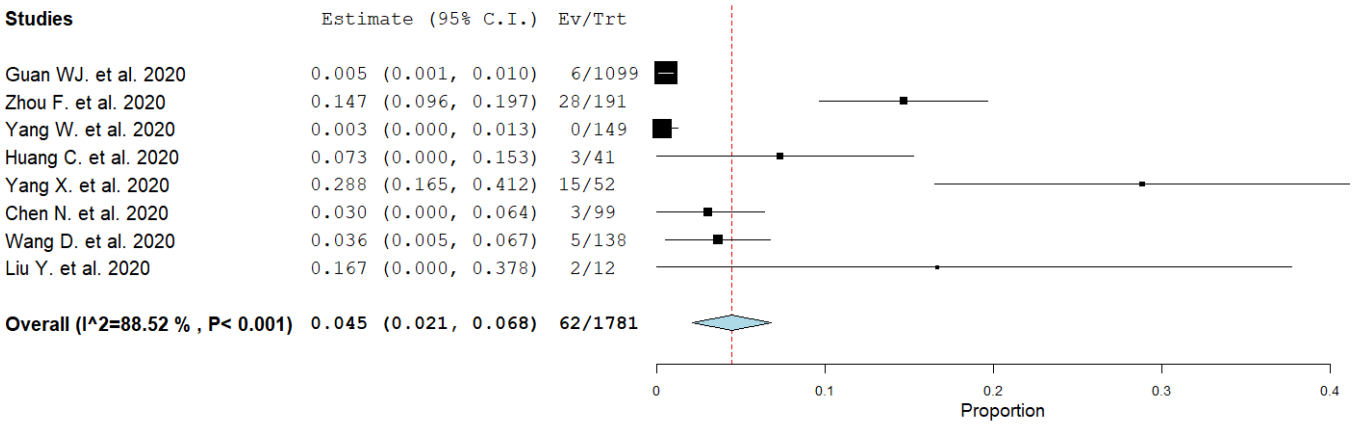
Supplementary Figure 1.mm) Cardiac injury



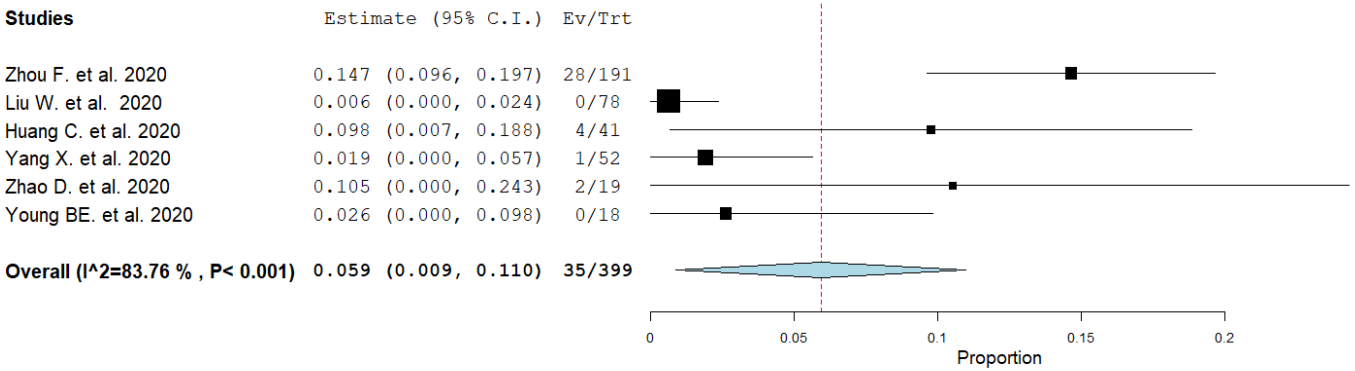
Supplementary Figure 1.nn) Respiratory failure



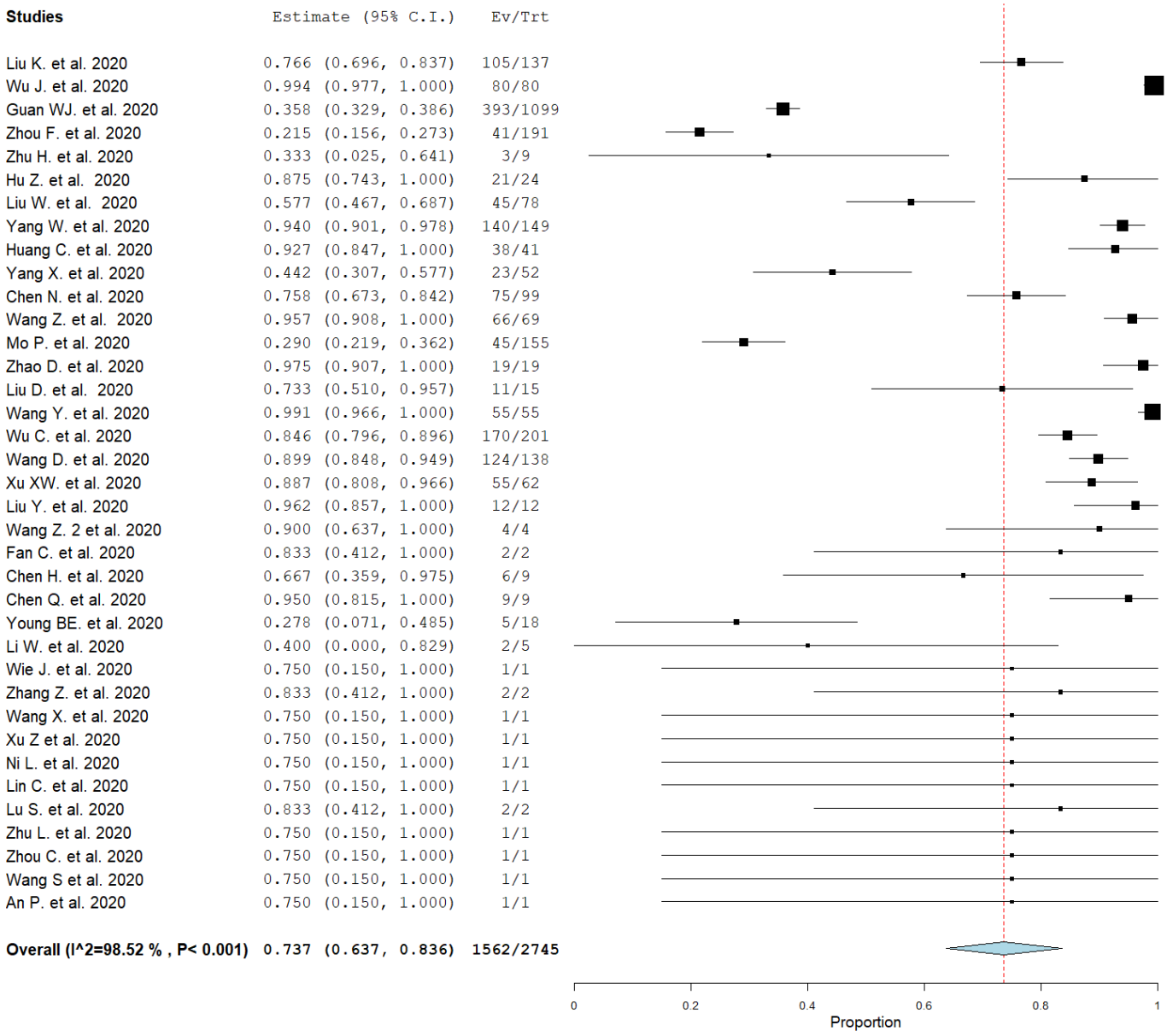
Supplementary Figure 1.oo) AKI



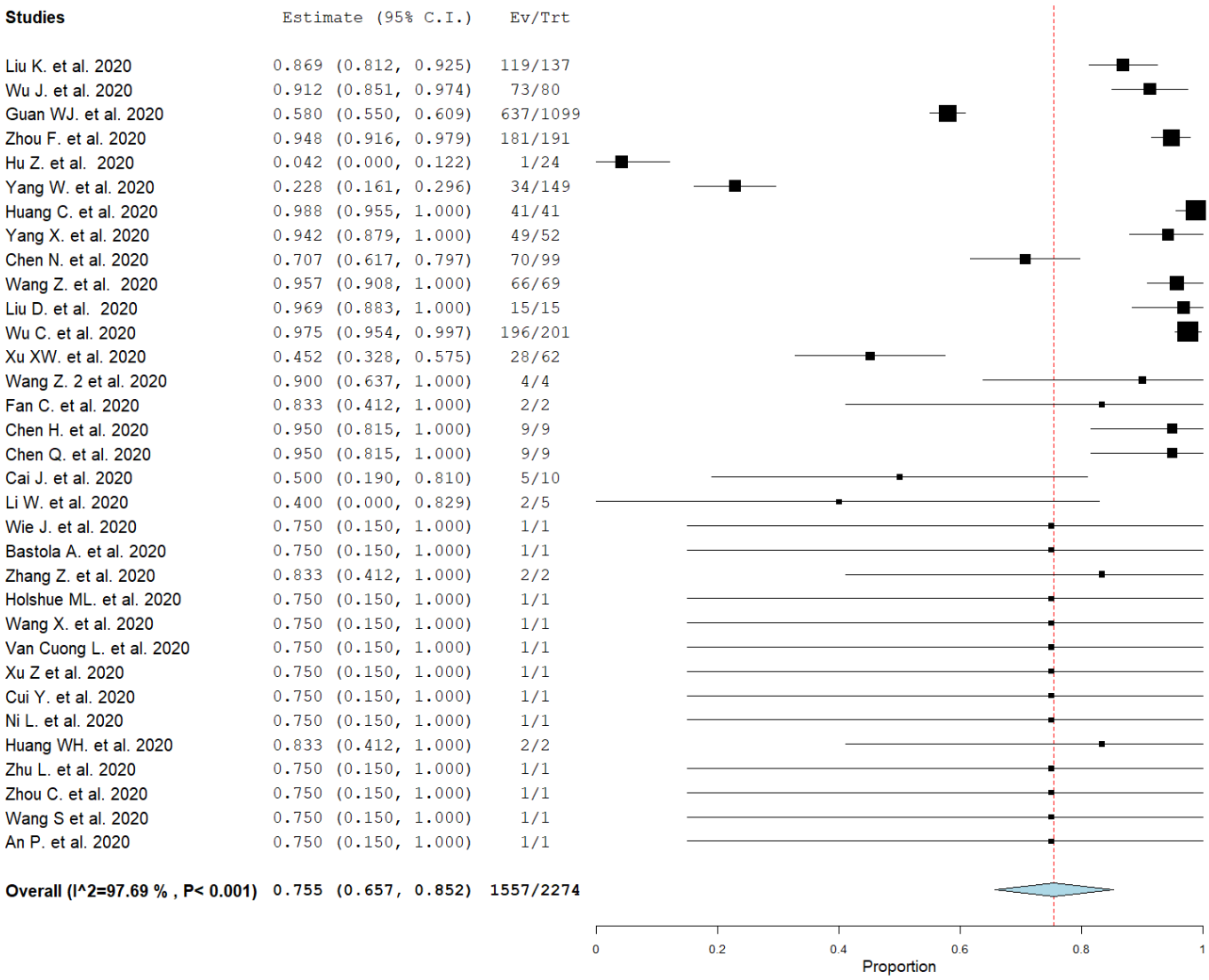
Supplementary Figure 1.pp) Secondary infection



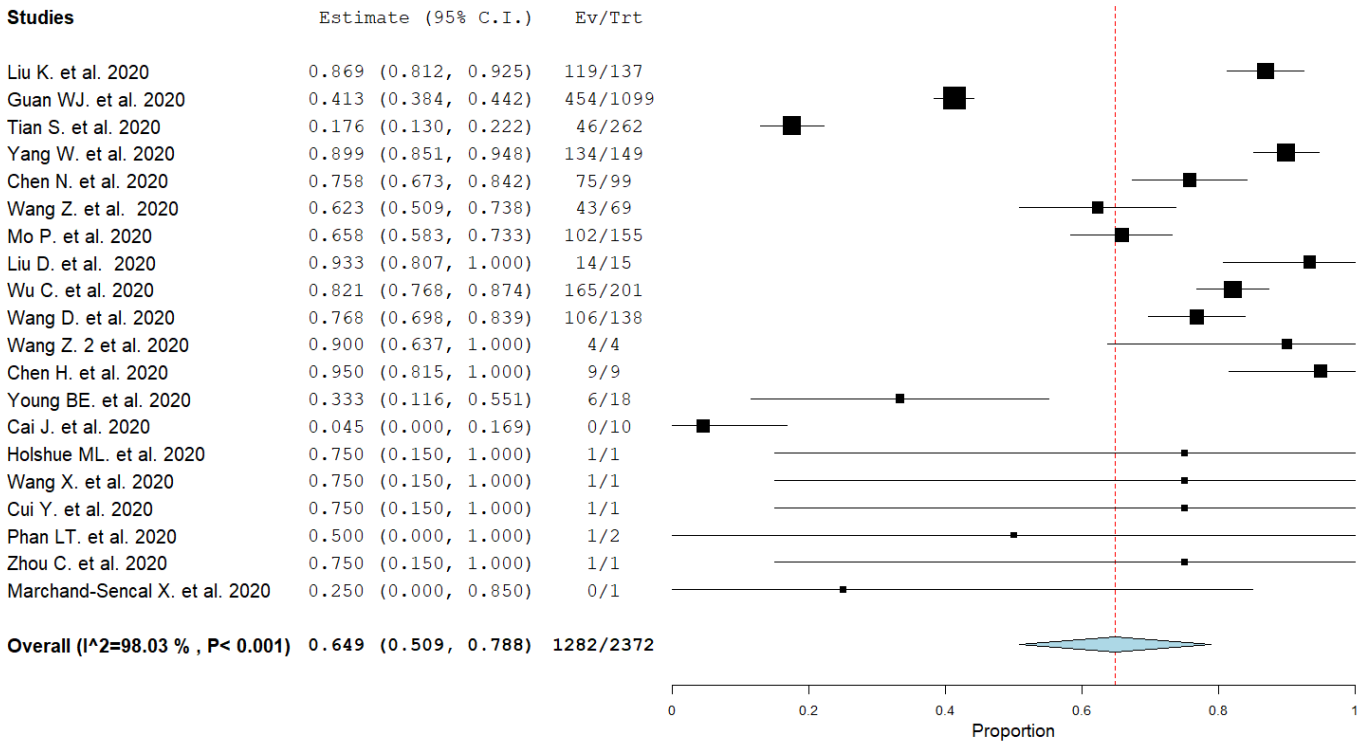
Supplementary Figure 1.qq) Antiviral



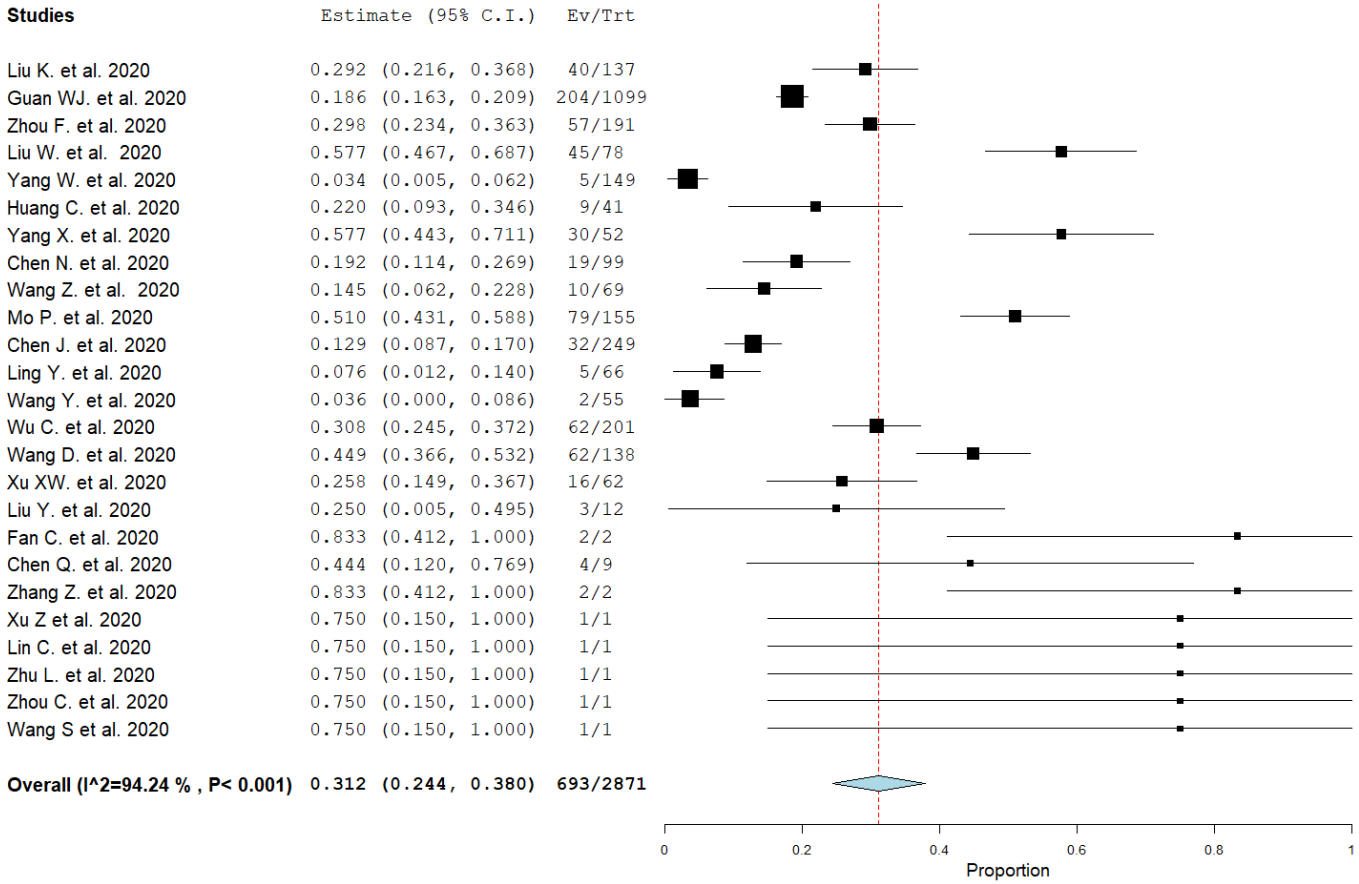
Supplementary Figure 1.rr) Antibiotics



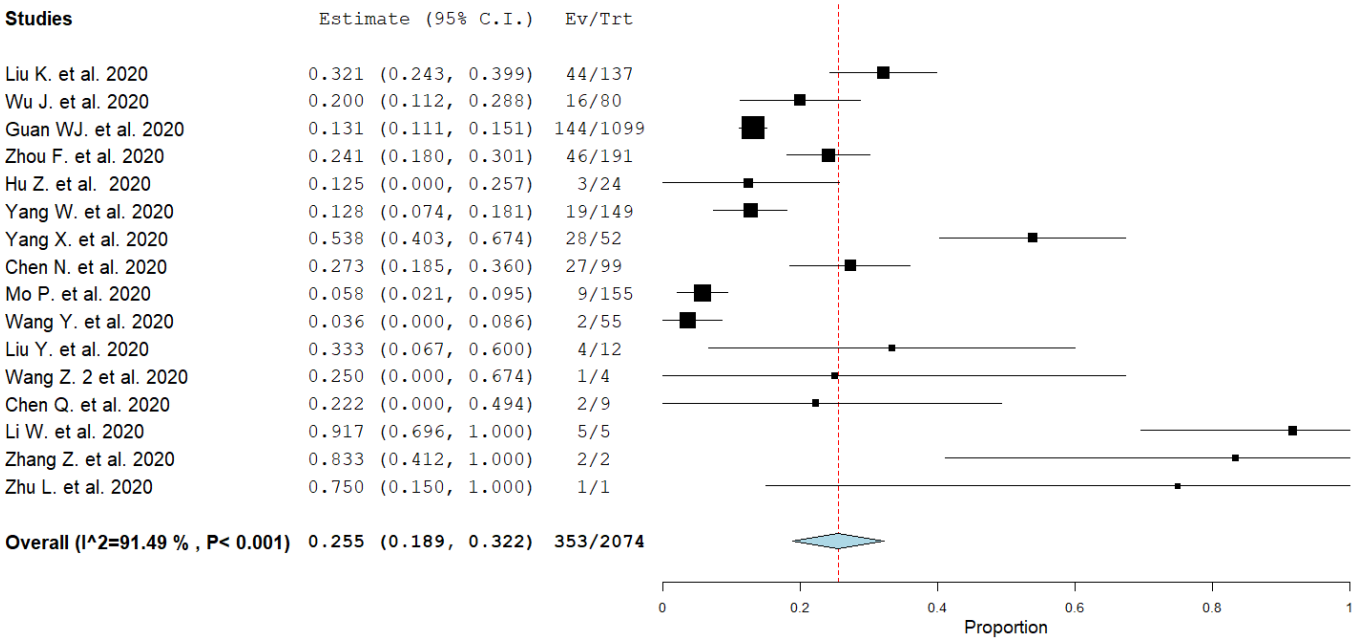
Supplementary Figure 1.ss) Any kind of oxygen therapy



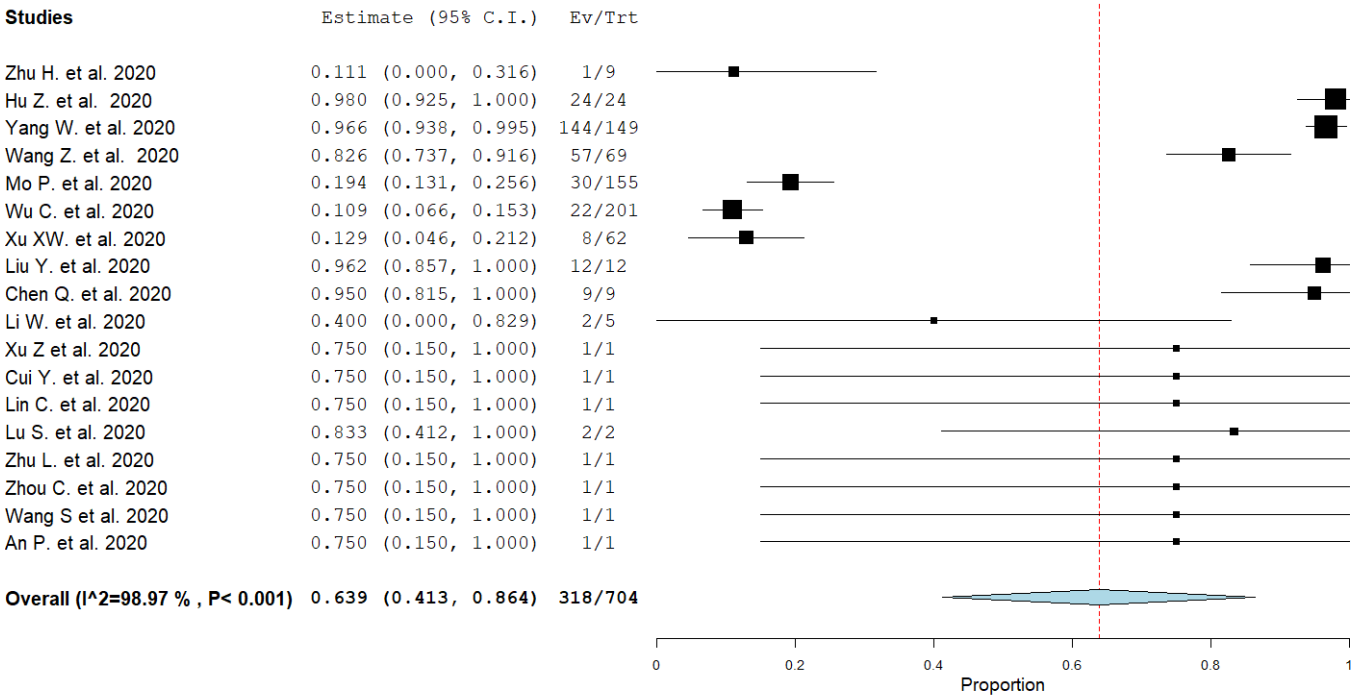
Supplementary Figure 1.tt) Glucocorticoids



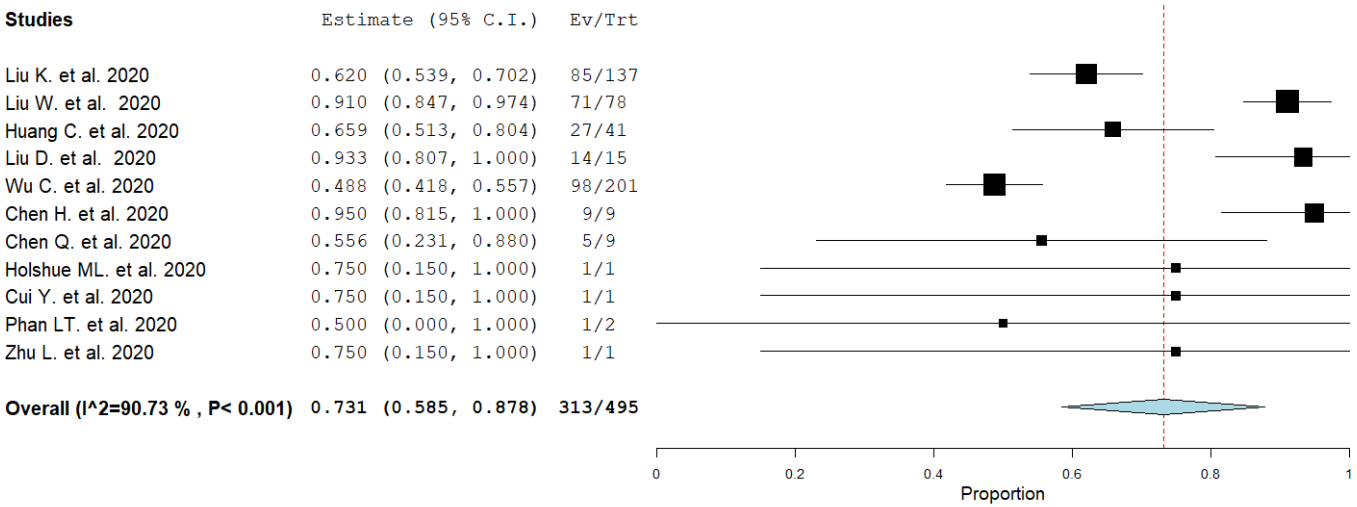
Supplementary Figure 1.uu) Immunoglobulins



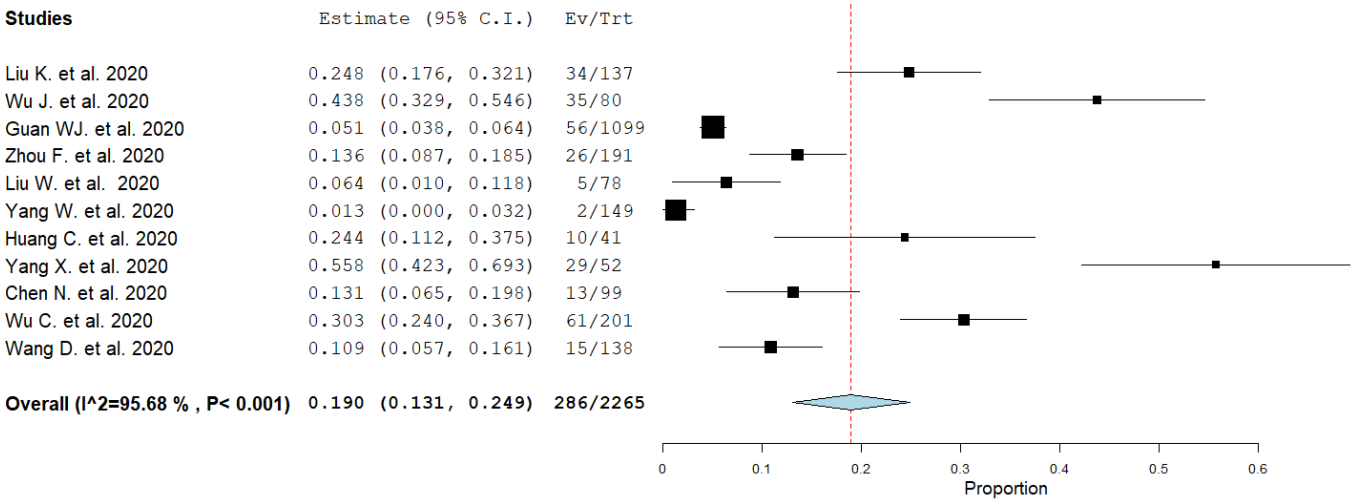
Supplementary Figure 1.vv) Interferons



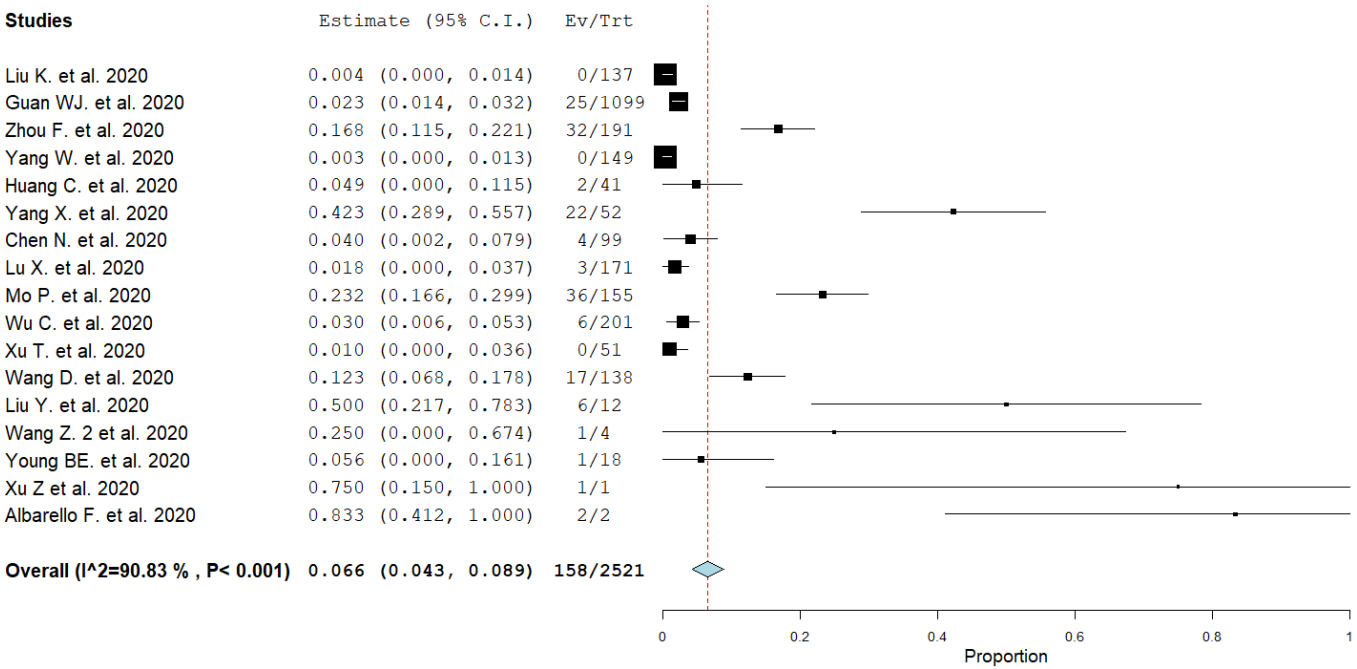
Supplementary Figure 1.ww) Nasal cannula



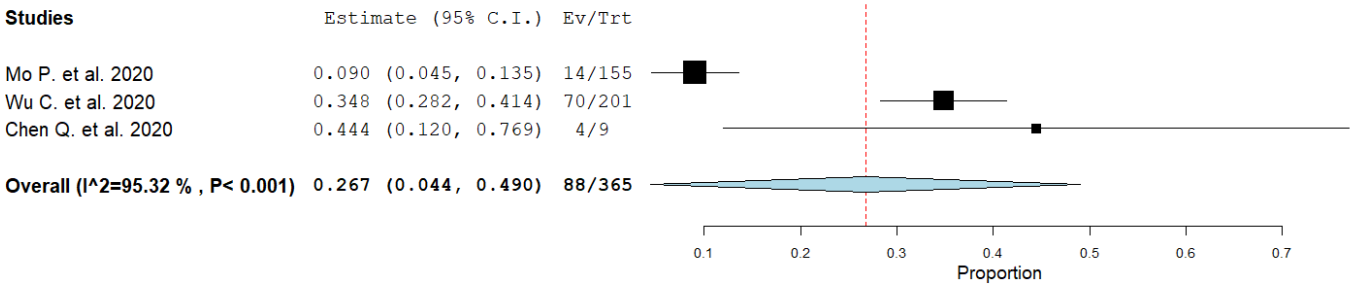
Supplementary Figure 1.xx) NIV



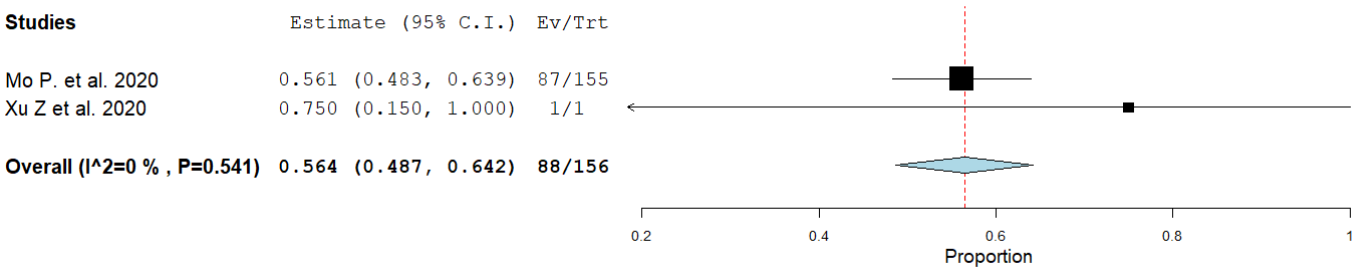
Supplementary Figure 1.yy) Invasive ventilation



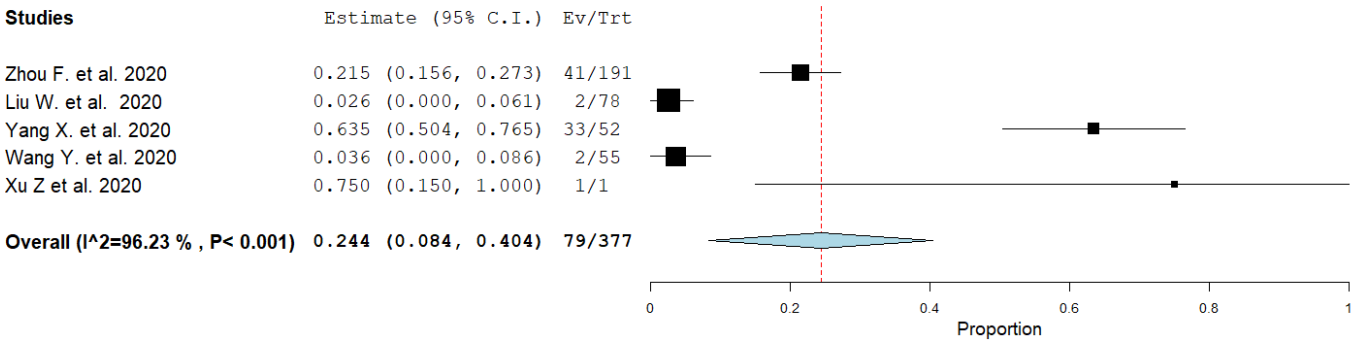
Supplementary Figure 1.zz) Immune enhancer



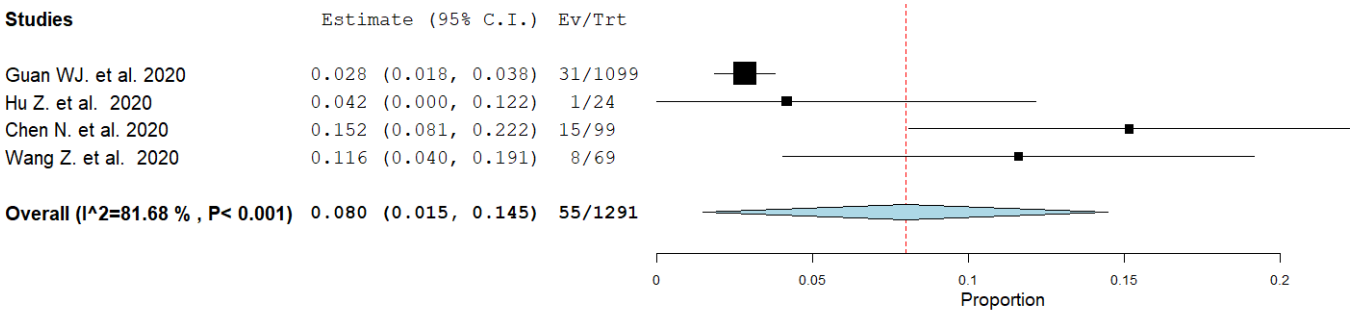
Supplementary Figure 1.aaa) Expectorants



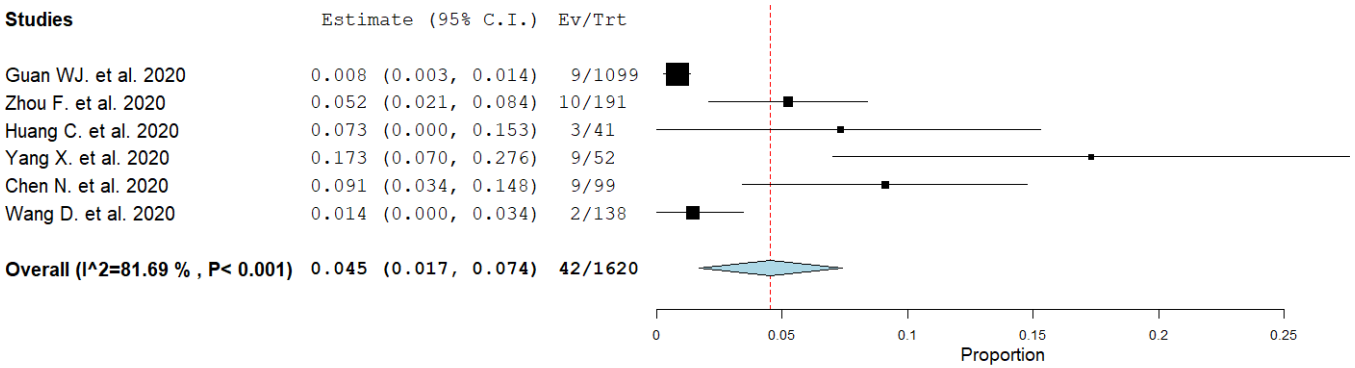
Supplementary Figure 1.bbb) Nasal high flow



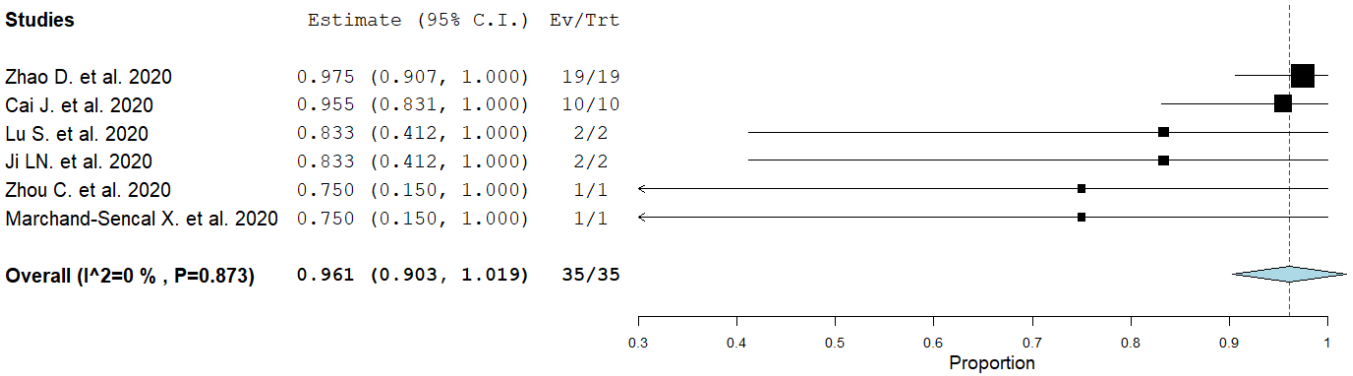
Supplementary Figure 1.ccc) Antifungal



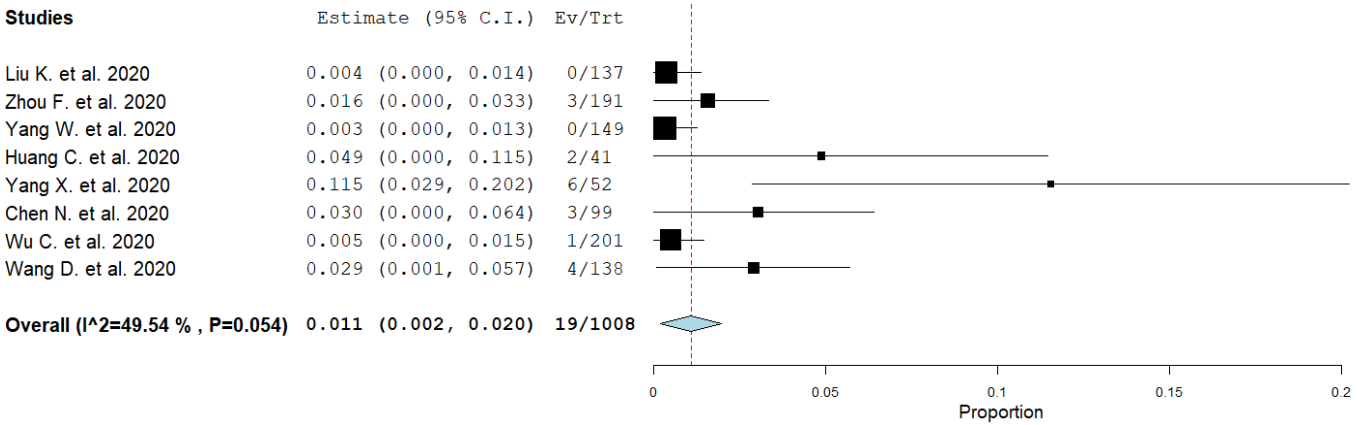
Supplementary Figure 1.ddd) RRT



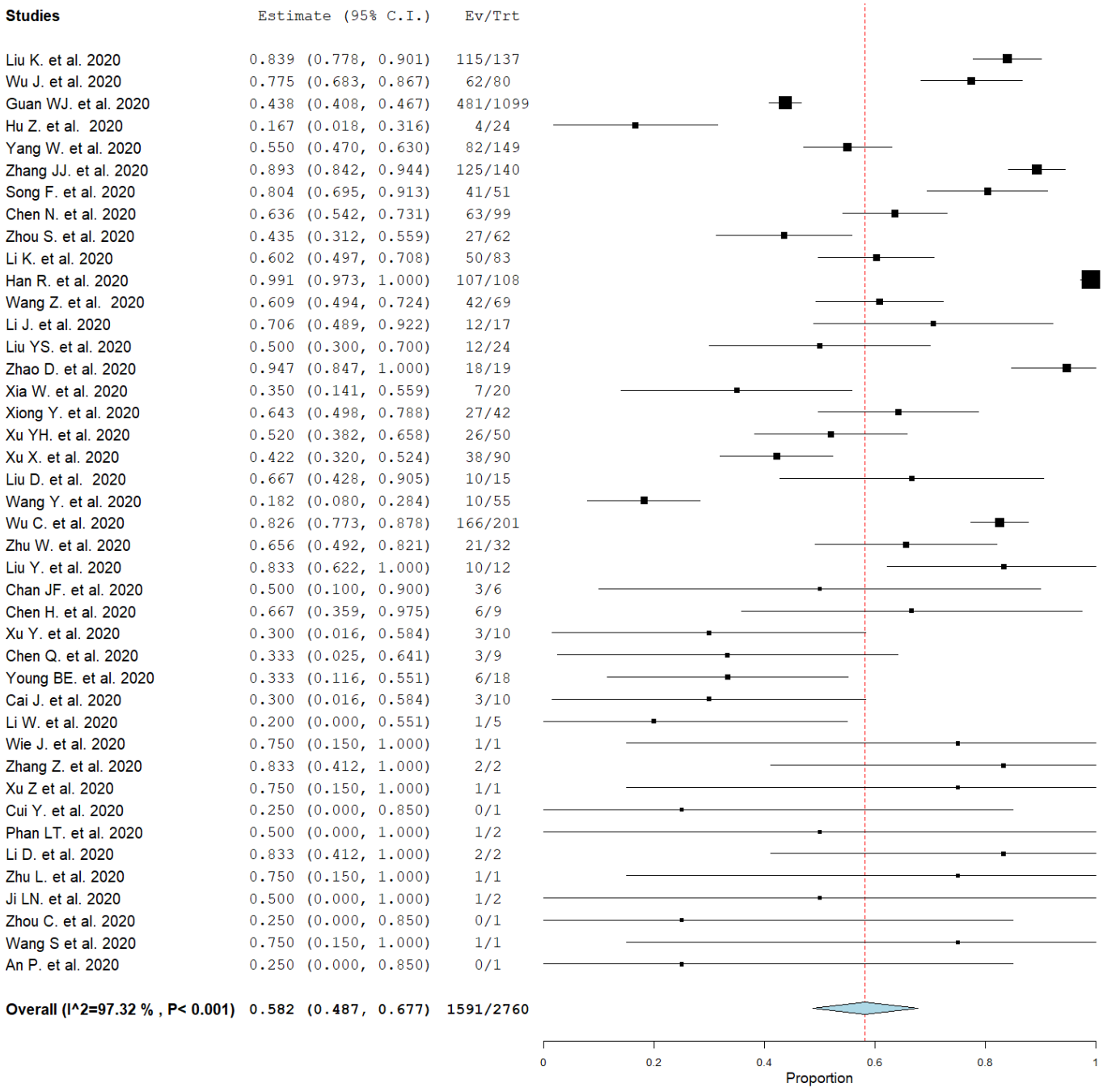
Supplementary Figure 1.eee) Symptomatic treatment



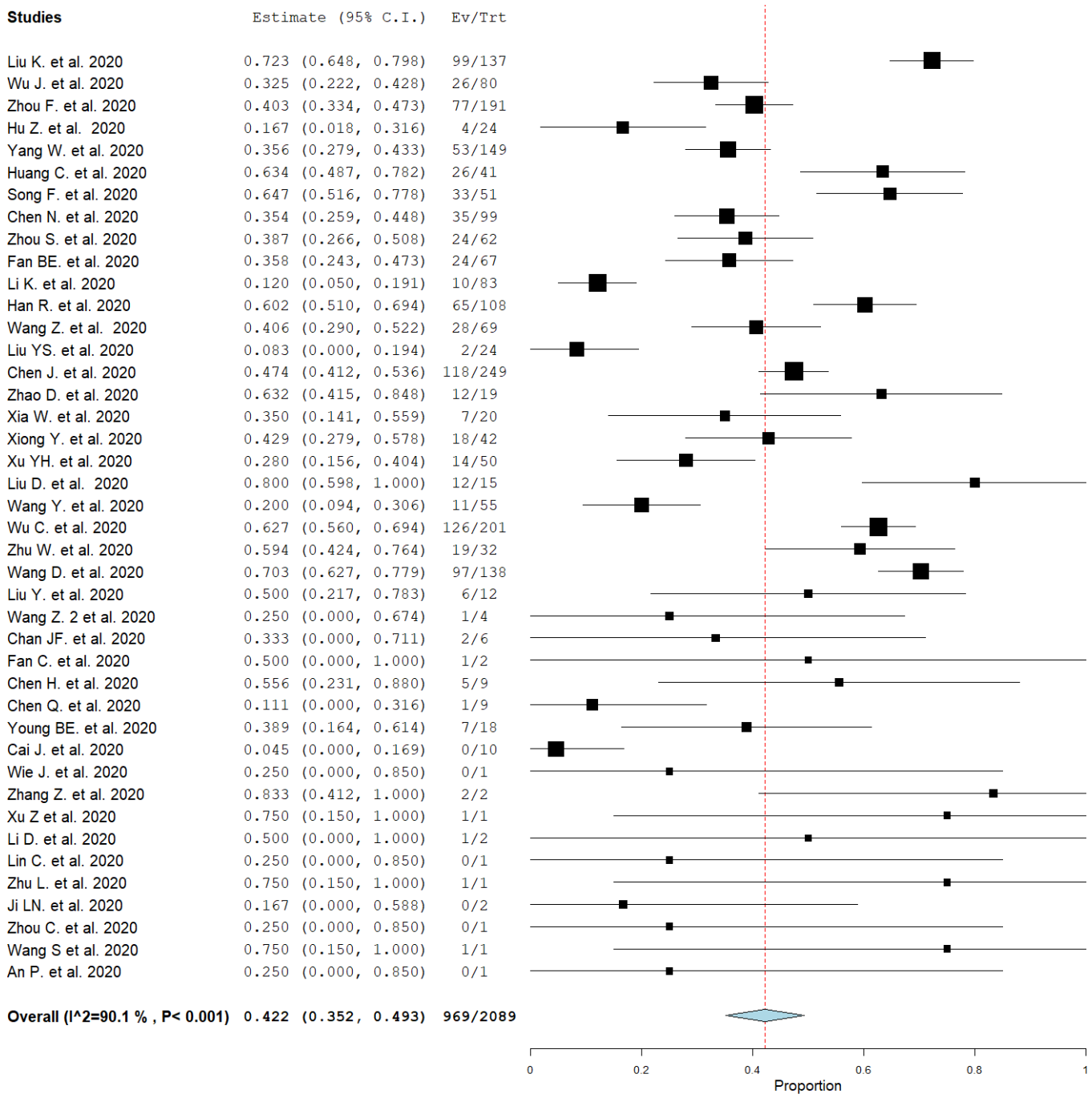
Supplementary Figure 1.fff) ECMO



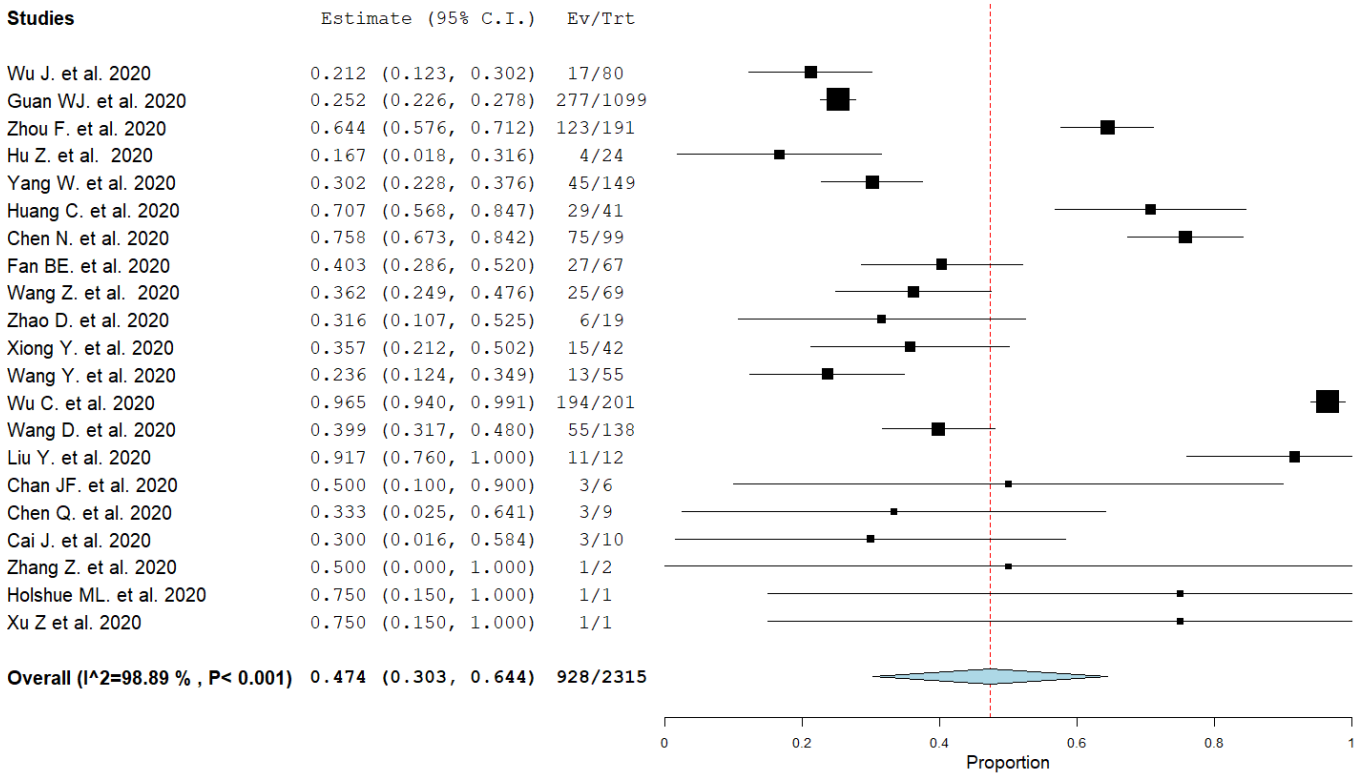
Supplementary Figure 1.ggg) High CRP



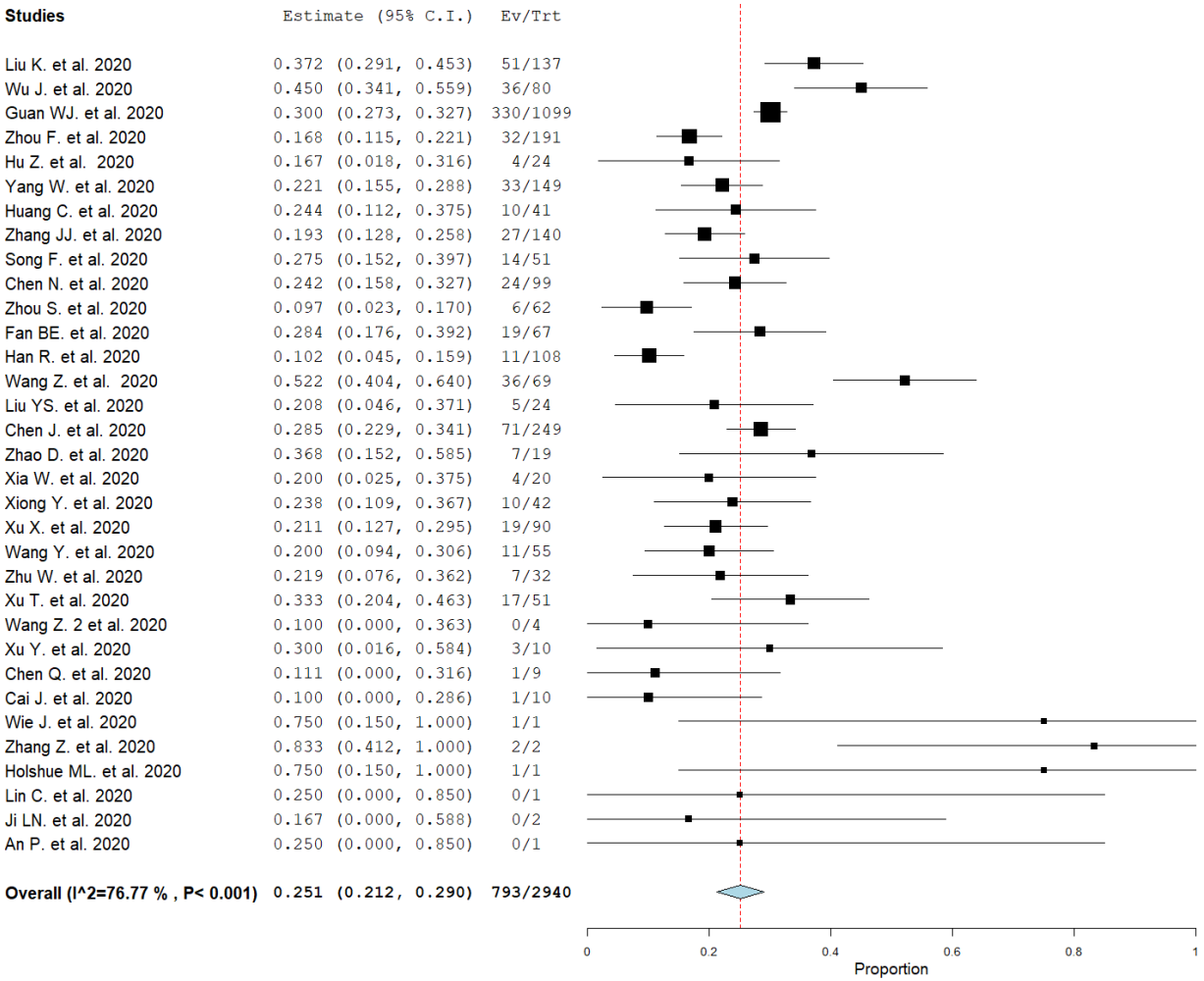
Supplementary Figure 1.hhh) Lymphopenia



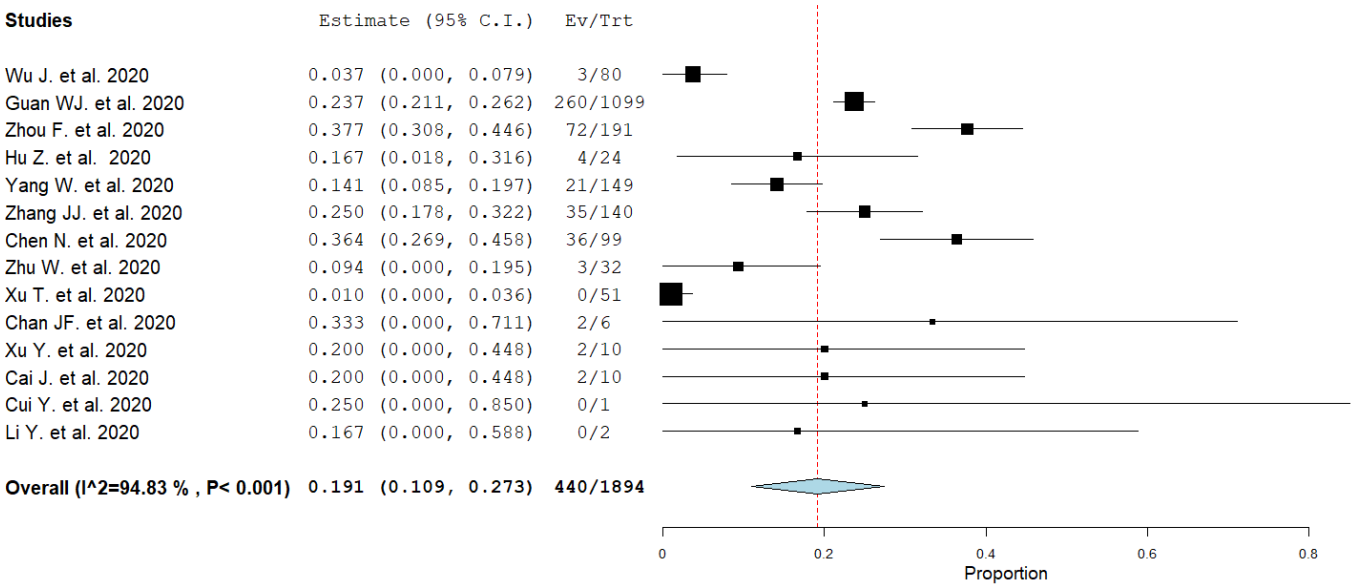
Supplementary Figure 1.iii) High LDH



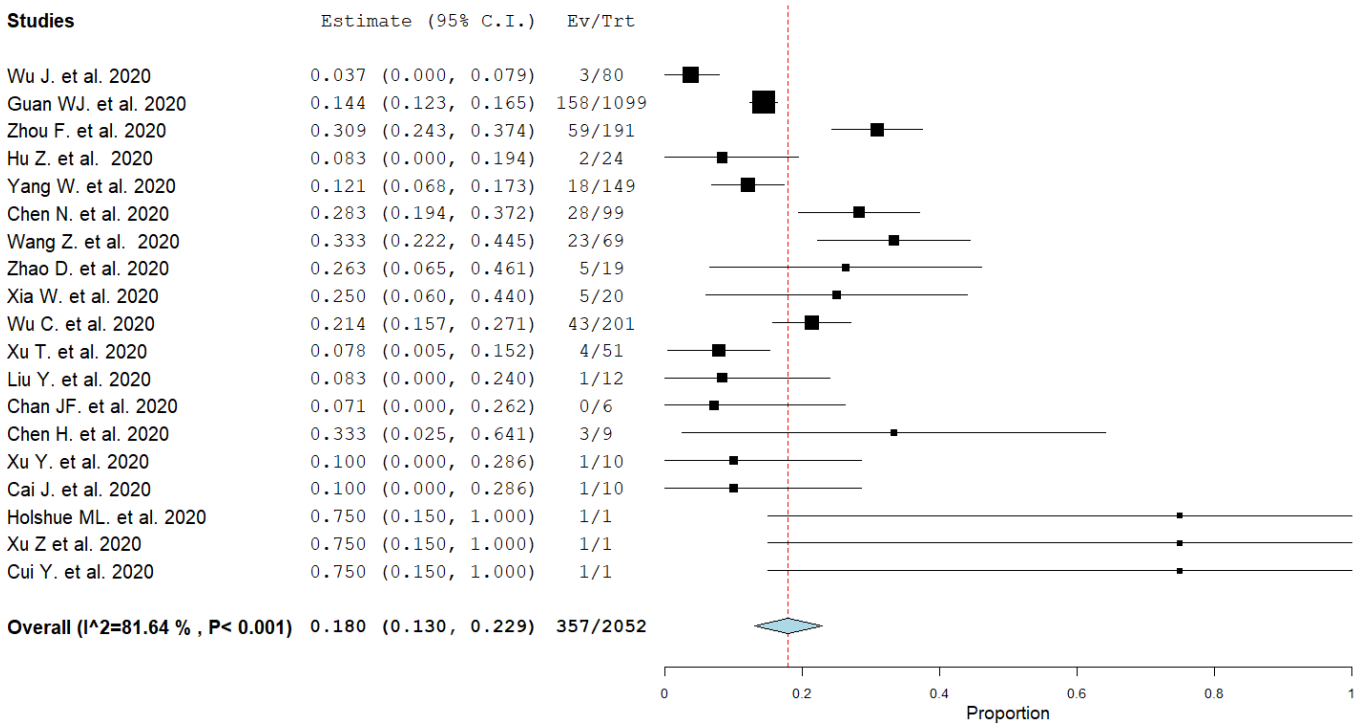
Supplementary Figure 1.jjj) Leukopenia



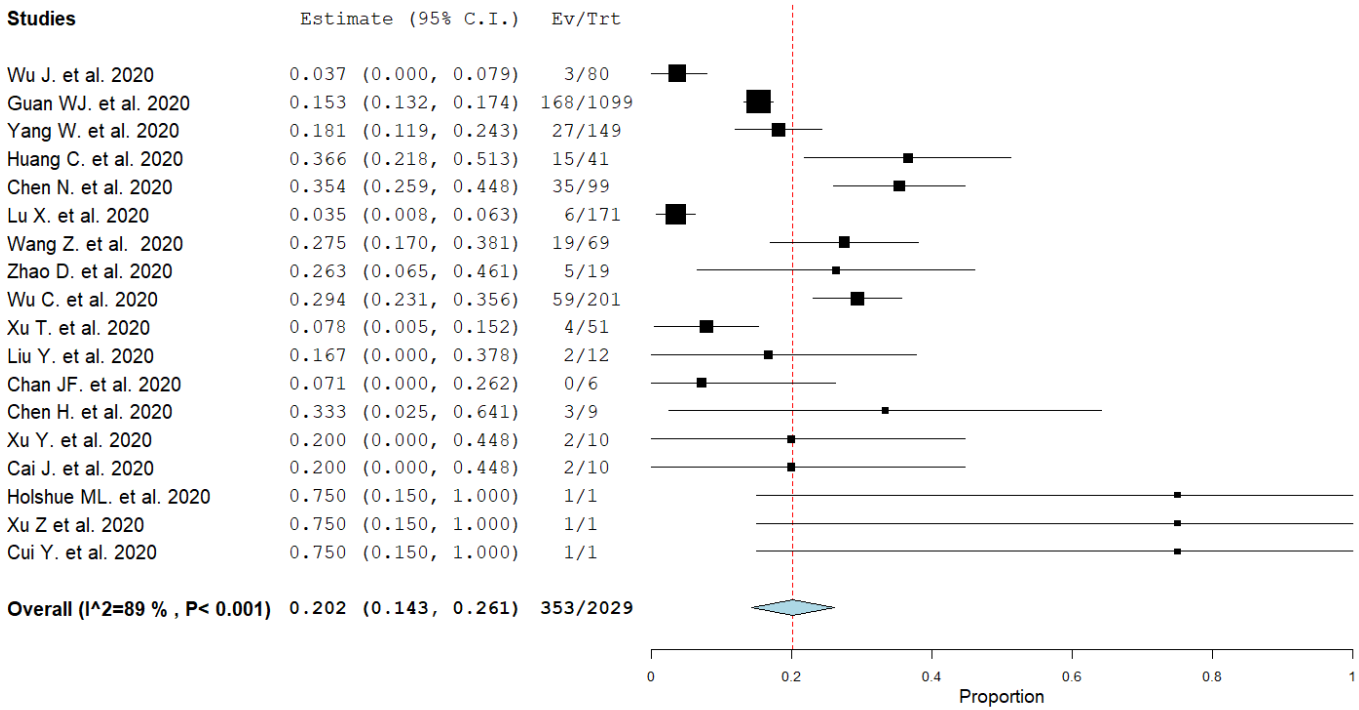
Supplementary Figure 1.kkk) High D-Dimere



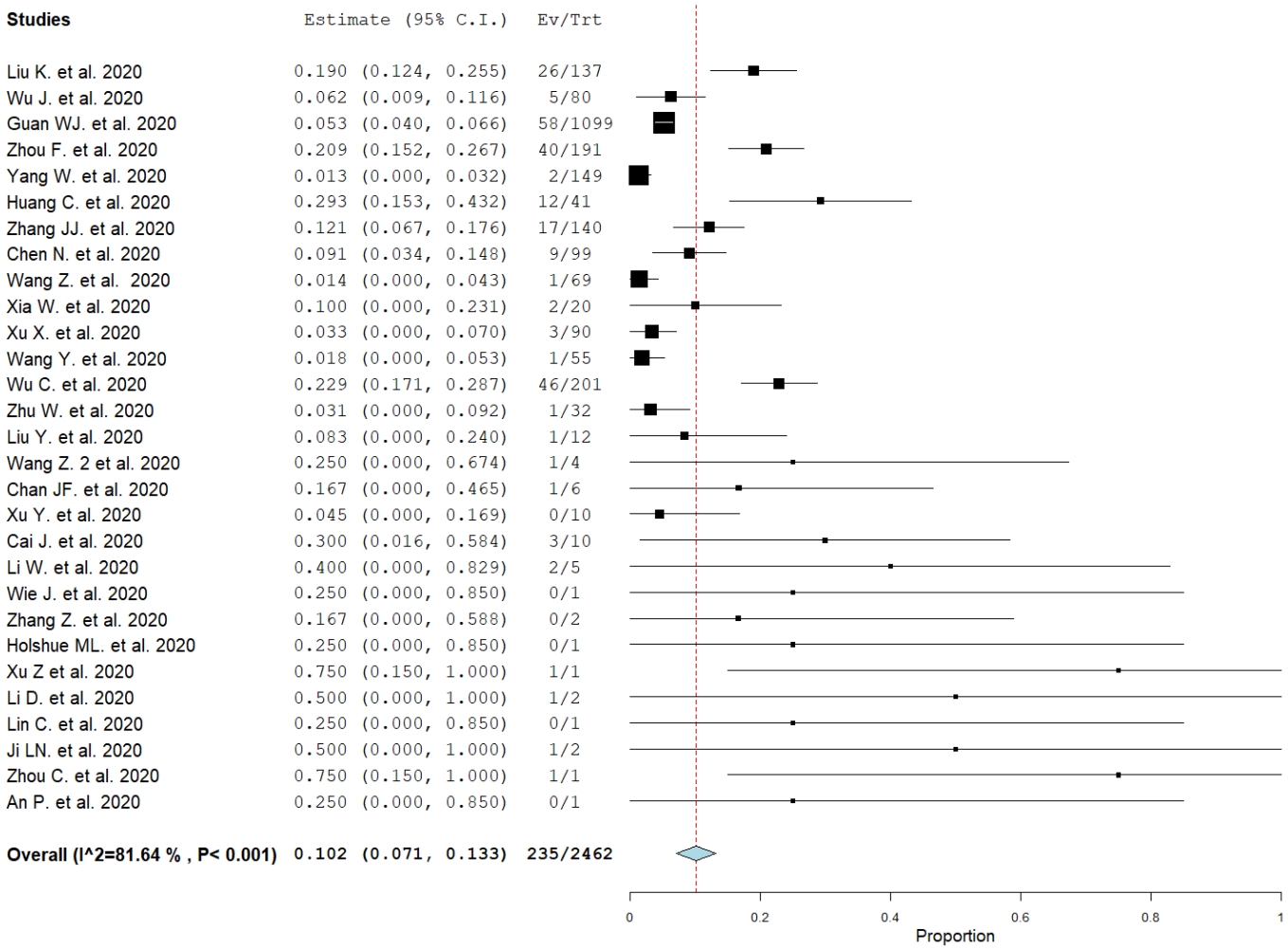
Supplementary Figure 1.lll) High ALT



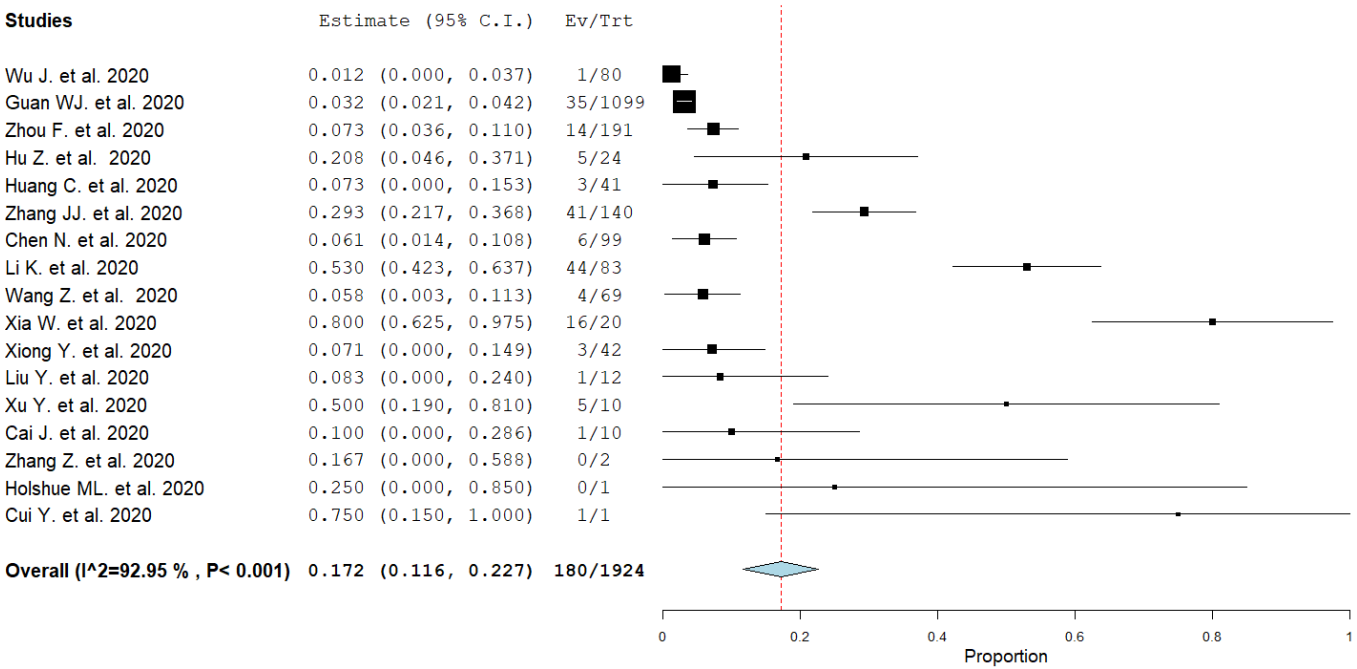
Supplementary Figure 1.mmm) High AST



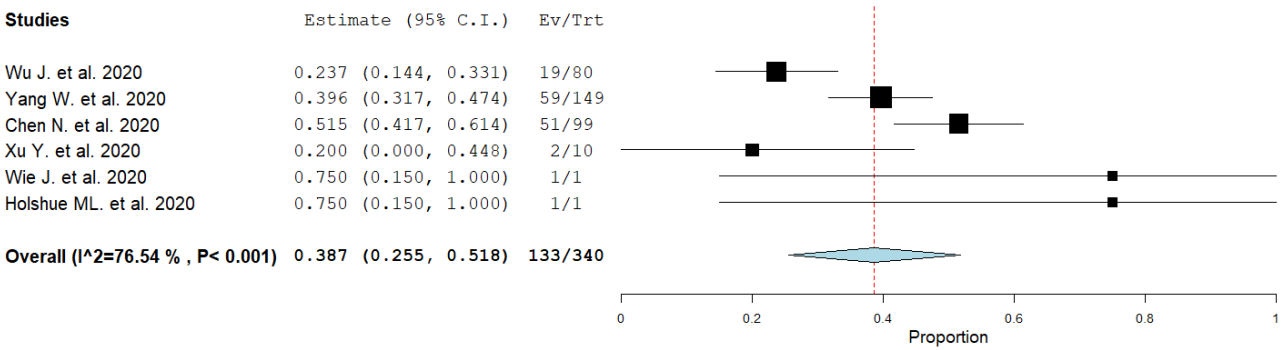
Supplementary Figure 1.nnn) Leukocytosis



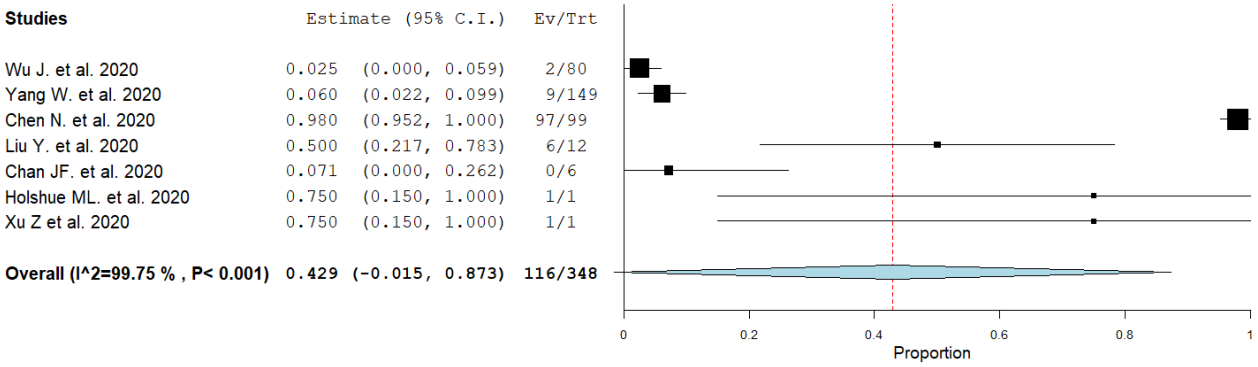
Supplementary Figure 1.ooo) High PCT



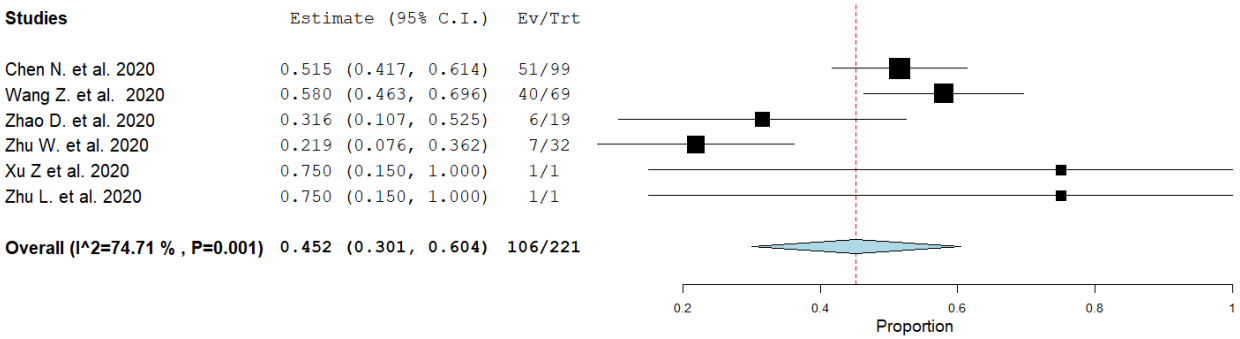
Supplementary Figure 1.ppp) High Glucose



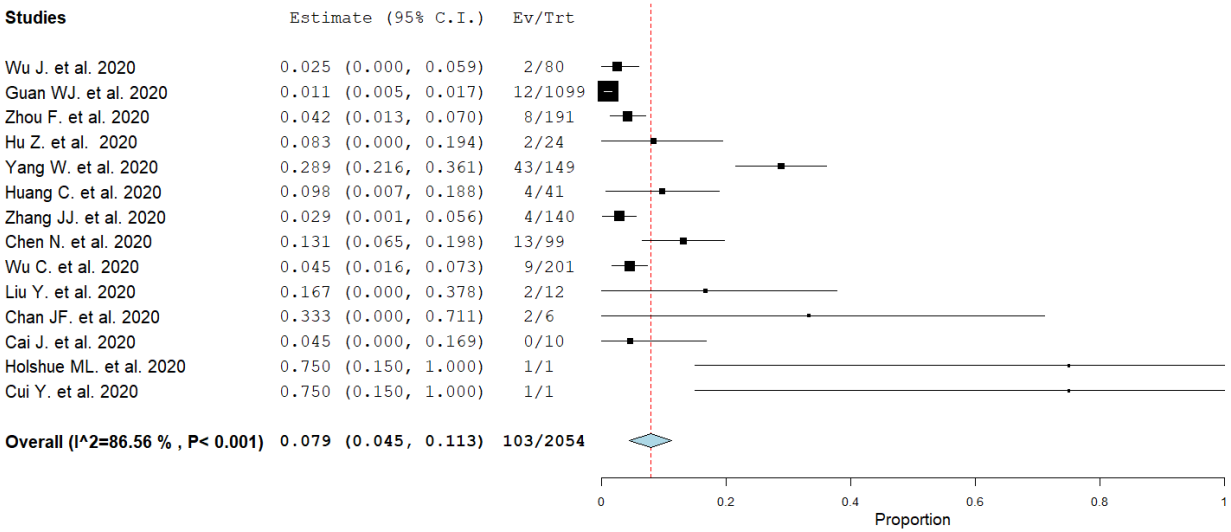
Supplementary Figure 1.qqq) Decreased Albumin



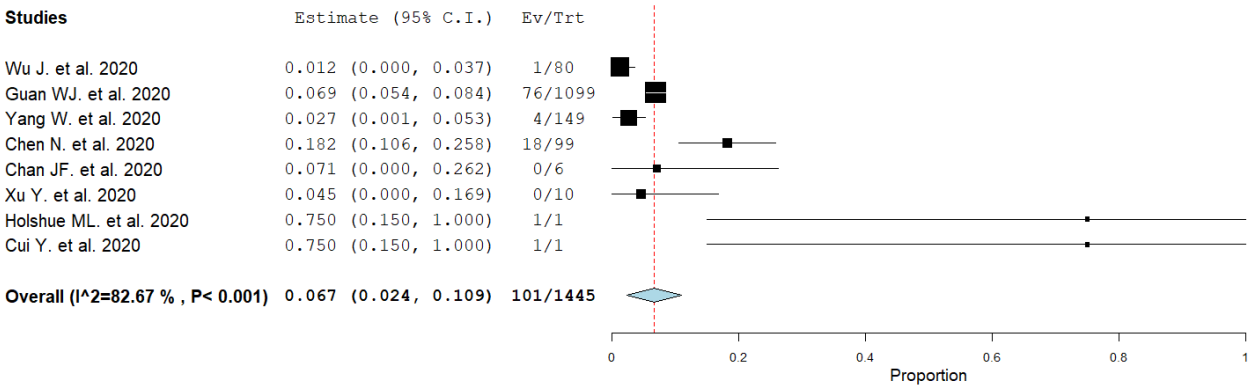
Supplementary Figure 1.rrr) High IL-6



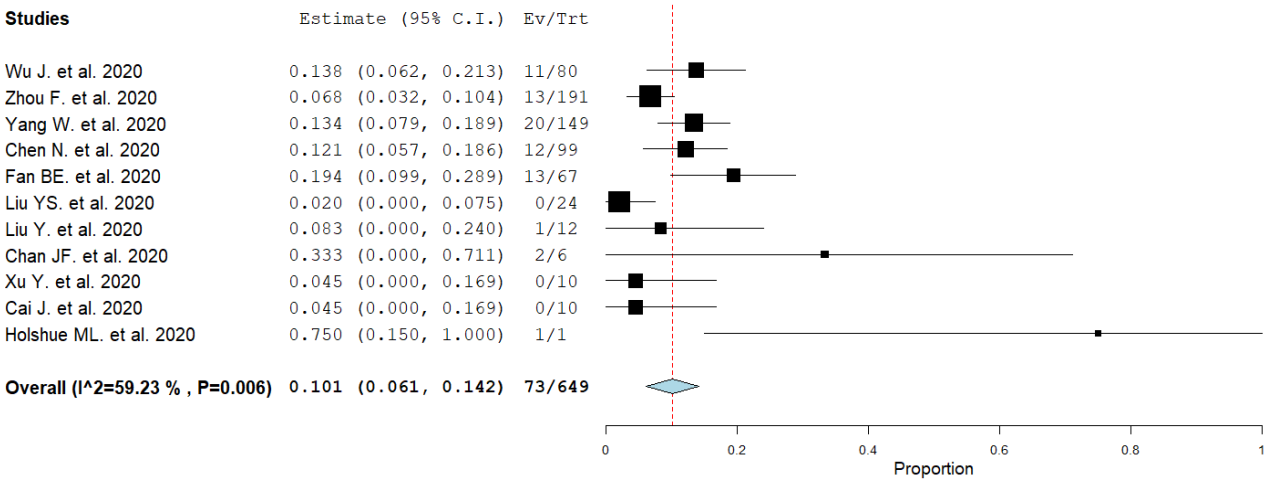
Supplementary Figure 1.sss) High Creatine



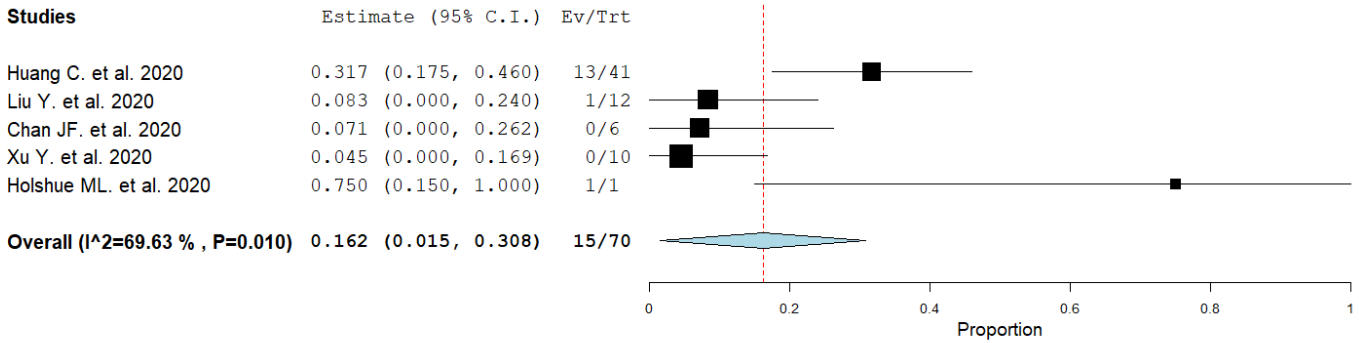
Supplementary Figure 1.ttt) High Bilirubin



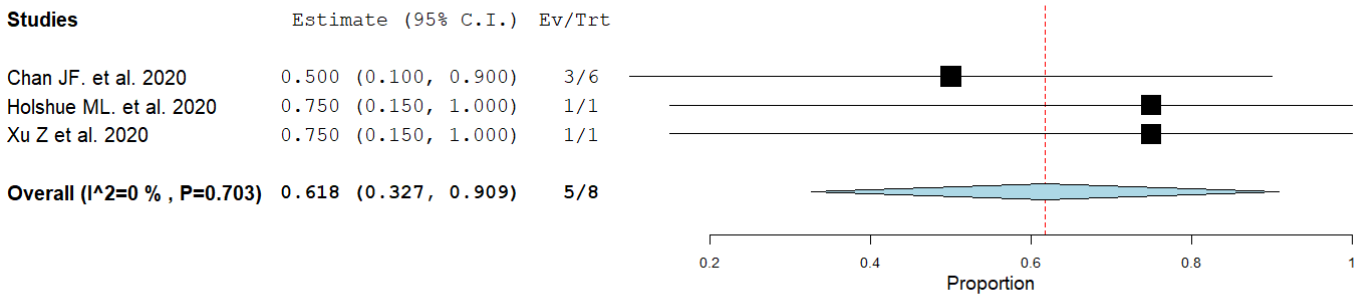
Supplementary Figure 1.uuu) Low Thrombocytes



Supplementary Figure 1.vvv) High Creatine kinase



Supplementary Figure 1.www) High Fibrinogen



Supplementary Table 2: Comorbidities of the study subjects

	Author	No. of patients N [count]	Any chronic disease	Cardiovascular disease	Endocrine disease	Smoking	Respiratory disease	Malignancies	Cerebrovascular disease	Digestive system	Infections	Surgical history	Chronic renal disease	Chronic liver disease	Existing Pregnancy
1	Liu et al.	137	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Wu et al.	80	65 (47)	23 (17)	14 (10)	-	2 (2)	2 (2)	-	-	-	-	-	-	-
3	Guan et al.	1099	38 (48)	25 (31)	5 (6)	-	1 (1)	1 (1)	1 (1)	3 (4)	-	-	1 (1)	1 (1)	-
4	Zhou et al.	191	261 (24)	192 (18)	81 (7)	158 (14)	12 (1)	10 (1)	15 (1)	-	25 (2)	-	8 (1)	-	-
5	Zhu et al.	9	91 (48)	73 (38)	36 (19)	11 (6)	6 (3)	2 (1)	-	-	-	-	2 (1)	-	-
6	CNERCECMT	28	-	-	-	-	-	-	-	-	-	-	-	-	9 (100)
7	Hu et al.	24	10 (36)	-	-	-	-	1 (4)	-	-	-	-	-	-	-
8	Zhao et al.	101	7 (29)	3 (13)	2 (8)	2 (8)	-	-	1 (4)	-	-	-	1 (4)	-	-
9	Liu et al.	78	-	-	3 (3)	0 (0)	5 (5)	0 (0)	-	6 (6)	0 (0)	7 (7)	0 (0)	0 (0)	0 (0)
10	Tian et al.	262	20 (26)	8 (10)	5 (6)	5 (6)	2 (3)	4 (5)	-	-	-	-	-	-	-
11	Yang et al.	149	-	-	-	-	-	-	-	-	-	-	-	-	1 (0)
12	Huang et al.	41	52 (35)	28 (19)	9 (6)	-	1 (1)	2 (1)	-	8 (5)	-	-	-	-	-
13	Yang et al.	52	-	12 (29)	8 (20)	3 (7)	1 (2)	1 (2)	-	-	-	-	-	1 (2)	-
14	Zhang et al.	140	21 (40)	5 (10)	9 (17)	2 (4)	4 (8)	2 (4)	7 (14)	-	-	-	-	-	-
15	Song et al.	51	90 (64)	56 (40)	33 (24)	9 (6)	4 (3)	-	3 (2)	13 (9)	-	38 (27)	5 (4)	8 (6)	-
16	Chen et al.	99	11 (22)	6 (12)	3 (6)	-	1 (2)	-	-	-	-	-	-	1 (2)	-

17	Zhou et al.	62	50 (51)	40 (40)	13 (13)	-	1 (1)	1 (1)	-	11 (11)	-	-	-	-	-
18	Fan et al.	67	-	4 (7)	4 (7)	-	-	-	1 (2)	-	-	-	1 (2)	-	2 (3)
19	Li et al.	83	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Lu et al.	171	15 (18)	6 (7)	7 (8)	-	5 (6)	-	-	-	-	-	-	-	-
21	Han et al.	108	-	-	-	-	-	1 (1)	-	-	-	-	-	-	-
22	Wang et al.	69	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Pan et al.	21	-	8 (12)	7 (10)	-	6 (9)	4 (6)			1 (1)	-	-	-	-
24	Li et al.	17	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Liu et al.	24	3 (18)	1 (6)	-	3 (18)	2 (12)	-	-	-	-	-	-	1 (6)	-
26	Mo et al.	155	-	-	-	-	-	-	-	-	-	-	-	-	-
27	Chen et al.	249	71 (46)	52 (34)	15 (10)	6 (4)	5 (3)	7 (5)	7 (5)	-	3 (3)	-	6 (4)	7 (5)	-
28	Qin et al.	452	90 (36)	55 (22)	25 (10)	-	5 (2)	1 (0)	-	9 (4)	2 (1)	-	-	-	-
29	Zhao et al.	19	201 (45)	162 (36)	75 (17)	7 (2)	12 (3)	14 (3)	11 (2)	-	9 (2)	-	10 (2)	6 (1)	-
30	Xia et al.	20	3 (16)	1 (5)	-	-	-	-	-	-	1 (5)	-	-	-	-
31	Xiong et al.	42	-	2 (10)	-	-	-	-	1 (5)	-	-	-	-	-	-
32	Zhang et al.	14	13 (31)	-	-	-	-	-	-	-	-	-	-	-	-
33	Ling et al.	66	-	-	-	-	-	-	-	-	-	-	-	-	-
34	Xu et al.	50	-	-	-	-	-	-	-	-	-	-	-	-	-
35	Xu et al.	90	-	-	-	-	-	-	-	-	-	-	-	-	-
36	Liu et al.	15	45 (50)	20 (22)	5 (6)	-	1 (1)	2 (2)	-	-	2 (2)	-	-	-	-
37	Wang et al.	55	2 (13)	1 (7)	1 (7)	-	-	-	-	-	-	1 (7)	-	-	15 (100)
38	Cheng et al.	11	-	-	1 (2)	-	1 (2)	-	-	1 (2)	1 (2)	-	-	-	-
39	Wu et al.	201	-	-	-	-	-	-	-	-	-	-	-	-	-

40	Zhu et al.	32	66 (33)	47 (23)	24 (12)	-	5 (3)	1 (1)	7 (4)	-	-	-	2 (1)	7 (4)	-
41	Xu et al.	51		9 (28)	4 (13)	6 (19)	2 (6)	2 (6)	1 (3)	0 (0)	0 (0)	0 (0)	1 (3)	2 (6)	0 (0)
42	Wang et al.	138	12 (24)	5 (10)	4 (8)	-	1 (2)	-	-	-	-	-	1 (2)	1 (2)	-
43	Xu et al.	62	64 (46)	63 (46)	14 (10)	-	4 (3)	10 (7)	7 (5)	-	2 (1)	-	4 (3)	4 (3)	-
44	Liu et al.	12	20 (32)	5 (8)	1 (2)	-	1 (2)	-	1 (2)	-	-	-	1 (2)	1(2)	-
45	Wang et al.	4	6 (50)	4 (33)	2 (17)	-	1 (8)	-	-	-	-	-	2 (17)		-
46	Ki et al.	28	1 (25)	-	-	-	-	-	-	-	-	-	-	1 (25)	-
47	Chan et al.	6	-	-	-	-	-	-	-	-	-	-	-	-	-
48	Fan et al.	2	4 (67)	2 (33)	1 (17)	-	-	-	-	-	-	-	-	-	-
49	Chen et al.	9	-	-	-	-	-	-	-	-	-	-	-	-	2 (100)
50	Xu et al.	10	-	-	-	-	-	-	-	-	-	-	-	-	-
51	Chung et al.	21	-	-	-	-	-	-	-	-	-	-	-	-	-
52	Chen et al.	9	-	-	-	-	-	-	-	-	-	-	-	-	-
53	Young et al.	18	-	-	-	-	-	-	-	-	-	-	-	-	-
54	Cai et al.	10	5 (28)	-	-	-	-	-	-	-	-	-	-	-	-
55	Li et al.	5	-	-	-	-	-	-	-	-	-	-	-	-	-
56	Wei et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
57	Bastola et al.	1	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
58	Zhang et al.	2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
59	Holshue et al.	1	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
60	Wang et al.	1	1 (100)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
61	Kam et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	1 (100)
62	Van Cuong et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-

63	Xu et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
64	Cui et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
65	Phan et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-
66	Ni et al.	1	-	1 (50)	1 (50)	-	-	1 (50)	-	-	-	-	-	-	-
67	Li et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-
68	Lin et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
69	Albarello et al.	2	-	0 (0)	0 (0)	0 (0)	-	-	-	-	-	-	-	-	-
70	Huang et al.	2	-	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
71	Lu et al.	2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
72	Hosoda et al.	1	-	0 (0)	0 (0)	-	-	-	-	-	0 (0)	-	-	0 (0)	-
73	Li et al.	2	-	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)
74	Xing et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-
75	Zhu et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
76	Ji et al.	2	-	-	-	-	-	-	-	-	-	1 (100)	1 (100)	-	-
77	Zhou et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
78	Wang et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
79	An et al.	1	-	0 (0)	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)
80	Marchand-Senécal et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
∑		**5053 (100)**	**1338**	**920**	**414**	**212**	**91**	**70**	**63**	**51**	**48**	**48**	**46**	**41**	**31**
%			**(36)**	**(24)**	**(10)**	**(9)**	**(2)**	**(2)**	**(3)**	**(6)**	**(2)**	**(19)**	**(2)**	**(3)**	**(9)**

Data presented as N (%)
CNERCECMT, COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention
Cardiovascular disease includes: Hypertension, Valve pathologies, Coronary heart disease
Endocrine disease includes: Diabetes, Thyroid gland pathologies

Smoking includes: Former smoker, Current smoker
Respiratory disease includes: Chronic obstructive pulmonary disease, Asthma, Sinusitis
Cerebrovascular disease includes: Stroke, Intracranial bleeding
Digestive System includes: Cholecystitis
Infections includes: HIV, Hepatitis, Tuberculosis
"-" = not mentioned/not reported in study

Supplementary Table 3: Clinical symptoms of the study subjects

	Author	No. of patients N [count]	Fever	Cough	Malaise	Dyspnoea	Sputum production	Myalgia/ Arthralgia	Headache	Sore throat	Diarrhoea	Anorexia	Abdominal pain	Chest pain	Coldness/ Chills	Vomiting	Rhinorrhoea	Asymptomatic	Dizziness/ Confusion	Tachycardia	Nausea
1	Liu et al.	137	112 (82)	66 (48)	-	26 (19)	13 (9)	44 (32)	13 (9)	-	13 (9)	-	-	-	-	-	-	-	-	-	-
2	Wu et al.	80	63 (79)	51 (64)	-	30 (38)	-	18 (23)	13 (16)	11 (14)	1 (1)	-	-	3 (4)	-	1 (1)	5 (6)	-	-	-	-
3	Guan et al.	1099	975 (89)	745 (68)	419 (38)	205 (19)	380 (35)	164 (15)	150 (14)	153 (14)	42 (4)	-	143 (13)	-	126 (11)	55 (5)	53 (5)	-	-	-	-
4	Zhou et al.	191	180 (94)	151 (79)	44 (23)	56 (29)	44 (23)	29 (15)	-	-	9 (5)	-	-	-	-	7 (4)	-	-	-	-	-
5	Zhu et al.	9	8 (89)	4 (44)	-	-	-	-	-	1 (11)	1 (11)	-	1 (11)	-	-	-	-	-	-	-	-
6	CNERCECMT	28	9 (32)	5 (18)	7 (25)	-	-	-	3 (11)	9 (32)	-	-	-	-	5 (18)	-	-	3 (11)	-	-	-
7	Hu et al.	24	5 (21)	2 (8)	2 (8)	-	-	1 (4)	-	-	-	-	-	-	-		1 (4)	19 (79)	1 (4)	-	-
8	Zhao et al.	101	79 (78)	39 (39)	-	1 (1)	-	17 (17)	-	12 (12)	3 (3)	-	-	-	-	2 (2)	--	2 (2)	-	-	-
9	Liu et al.	78	-	34 (44)	-	78 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Tian et al.	262	215 (82)	120 (46)	69 (26)	18 (7)	-	-	17 (6)	-	-	-	-	-	-	-	-	13 (5)	-	-	-
11	Yang et al.	149	114 (77)	87 (58)	-	2 (1)	48 (32)	5 (3)	13 (9)	21 (14)	11 (7)	-	-	21 (14)	21 (14)	2 (1)	5 (3)	-	-	-	-
12	Huang et al.	41	40 (98)	31 (76)	-	22 (54)	11 (27)	-	3 (7)	-	-	-	-	-	-	-	-	-	-	-	-
13	Yang et al.	52	51 (98)	40 (77)	18 (35)	33 (63)	-	7 (13)	3 (6)	-	-	-	-	1 (2)	-	2 (4)	3 (6)	-	-	-	-
14	Zhang et al.	140	110 (79)	90 (64)	90 (64)	-	-	-	-	-	18 (13)	17 (12)	8 (6)	44 (31)	-	7 (5)	-	-	-	-	31 (22)
15	Song et al.	51	49 (96)	24 (47)	-	7 (14)	-	16 (31)	8 (16)	3 (6)	5 (10)	9 (18)	-	-	-	3 (6)	2 (4)	-	8 (16)	-	-
16	Chen et al.	99	82 (83)	81 (82)	-	31 (31)	-	11 (11)	8 (8)	5 (5)	2 (2)	-	-	2 (2)	-	1 (1)	4 (4)	-	9 (9)	-	-
17	Zhou et al.	62	54 (87)	28 (45)	14 (23)	15 (24)	-	20 (32)	-	-	-	-	9 (15)	-	-	-	-	-	-	-	-
18	Fan et al.	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Li et al.	83	72 (87)	65 (78)	-	9 (11)	15 (18)	15 (18)	9 (11)	6 (7)	-	-	7 (8)	5 (6)	-	-	-	-	-	-	-

20	Lu et al.	171	71 (42)	83 (49)	13 (8)	49 (29)	-	-	-	-	15 (9)	-	-	-	-	11 (6)	22 (13)	-	-	72 (42)	-
21	Han et al.	108	94 (87)	65 (60)	42 (39)	-	-	12 (11)	14 (13)	14 (13)	15 (14)	-	-	17 (16)	-	-	-	-	-	-	-
22	Wang et al.	69	60 (87)	38 (55)	29 (42)	20 (29)	-	21 (30)	10 (14)	-	10 (14)	7 (10)	-	20 (29)	-	3 (4)	-	-	5 (7)	-	-
23	Pan et al.	21	18 (86)	12 (57)	11 (52)	-	6 (29)	5 (24)	-	4 (19)	-	9 (43)	-	2 (10)	6 (29)	-	-	-	-	-	-
24	Li et al.	17	12 (71)	13 (76)	8 (47)	-	-	4 (24)	-	-	2 (12)	-	-	-	-	-	2 (12)		2 (12)	-	-
25	Liu et al.	24	19 (79)	6 (25)	6 (25)	2 (8)	-	2 (8)	4 (17)	-	-	2 (8)	-	-	-	-	-	-	4 (17)	-	-
26	Mo et al.	155	126 (81)	97 (63)	60 (39)	52 (34)	-	50 (32)	8 (5)	-	7 (5)	26 (17)	3 (2)	64 (41)	-	3 (2)	-	-	2 (1)	-	3 (2)
27	Chen et al.	249	217 (87)	91 (37)	39 (16)	19 (8)	-	-	28 (11)	16 (6)	8 (3)	8 (3)	-	-	-	-	17 (7)	7 (3)	-	-	-
28	Qin et al.	452	423 (94)	152 (34)	212 (47)	232 (51)	201 (44)	98 (22)	52 (12)	22 (5)	122 (27)	96 (21)	23 (5)	-	-	42 (9)	8 (2)	-	39 (9)	-	-
29	Zhao et al.	19	15 (79)	9 (47)	2 (11)	-	-	-	2 (11)	4 (21)	1 (5)	-	-	1 (5)	-	-	-	-	-	-	-
30	Xia et al.	20	12 (60)	13 (65)	1 (5)	2 (10)	-	-	-	1 (5)	3 (15)	-	-	-	-	2 (10)	3 (15)	-	-	-	-
31	Xiong et al.	42	36 (86)	27 (64)	14 (33)	8 (19)	-	-	-	-	10 (24)	-	-	-	-	-	-	-	-	-	-
32	Zhang et al.	14	13 (93)	10 (71)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	Ling et al.	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	Xu et al.	50	43 (86)	20 (40)	8 (16)	4 (8)	7 (14)	8 (16)	-	-	-	-	1 (2)	-	-	-	-	-	-	-	-
35	Xu et al.	90	70 (78)	57 (63)	19 (21)	-	11 (12)	25 (28)	4 (4)	23 (26)	5 (6)	-	-	-	6 (7)	2 (2)	-	6 (7)	-	-	5 (6)
36	Liu et al.	15	14 (93)	9 (60)	4 (27)	1 (7)	-	5 (33)	-	1 (7)	1 (7)	-	-	-	-	-	-	2 (13)	-	-	-
37	Wang et al.	55	7 (13)	7 (13)	-	-	-	-	-	-	-	-	-	-	-	-	-	41 (75)	-	-	-
38	Cheng et al.	11	8 (73)	7 (64)	-	1 (9)	3 (27)	3 (27)	-	1 (9)	1 (9)	-	-	-	-	-	-	-	-	-	-
39	Wu et al.	201	188 (94)	163 (81)	65 (32)	80 (40)	83 (41)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	Zhu et al.	32	27 (84)	21 (66)	5 (16)	-	5 (16)	-	1 (3)	-	1 (3)	-	-	3 (9)	-	-	-	-	-	-	-
41	Xu et al.	51	34 (67)	24 (47)	2 (4)	4 (8)	13 (25)	8 (16)	-	3 (6)	5 (10)	-	-	-	-	-	-	-	-	-	-
42	Wang et al.	138	136 (99)	82 (59)	96 (70)	43 (31)	37 (27)	48 (35)	9 (7)	24 (17)	14 (10)	55 (40)	3 (2)	-	-	5 (4)	-	-	13 (9)	-	14 (10)
43	Xu et al.	62	48 (77)	50 (81)	32 (52)	2 (3)	37 (60)	-	21 (34)	-	3 (5)	-	-	-	-		-	-	-	-	-
44	Liu et al.	12	10 (83)	11 (92)	-	-	-	4 (33)	-	-	2 (17)	-	-	-	5 (42)	2 (17)	-	-	-	-	-

45	Wang et al.	4	4 (100)	3 (75)	2 (50)	4 (100)	-	-	-	-	-	-	-	-	-	-	1 (25)	-	2 (50)	-	-
46	Ki et al.	28	10 (36)	5 (18)	4 (14)	-	3 (11)	3 (11)	-	5 (18)	-	-	-	-	3 (11)	-	1 (4)	-	-	-	-
47	Chan et al.	6	5 (83)	4 (67)	3 (50)	-	1 (17)	-	-	1 (17)	2 (33)	-	-	1 (17)		-	1 (17)	-	-	-	-
48	Fan et al.	2	2 (100)	-	-	-	-	-	-	1 (50)		-	-	-	1 (50)	-	2 (100)	-	-	-	-
49	Chen et al.	9	7 (78)	4 (44)	2 (22)	1 (11)	-	3 (33)	-	2 (22)	1 (11)	-	-	-	-	-	-	-	-	-	-
50	Xu et al.	10	7 (70)	5 (50)	-	-	-	-	-	4 (40)	3 (30)	-	-	-	-	-	2 (20)	1 (10)	-	-	-
51	Chung et al.	21	14 (67)	9 (43)	3 (14)	-	-	3 (14)	3 (14)	-	-	-	-	-	-	-	-	2 (10)	-	-	1 (5)
52	Chen et al.	9	8 (89)	7 (78)	-	-	-	-	-	-	2 (22)	-	-	2 (22)	-	-	-	-	-	-	-
53	Young et al.	18	13 (72)	15 (83)	-	2 (11)	-	-	-	11 (61)	3 (17)	-	-	-	-	-	1 (6)	-	-	-	-
54	Cai et al.	10	7 (70)	6 (60)	-	0 (0)	-	-	-	4 (40)	0 (0)	-	-	-	-	-	7 (70)	-	-	-	-
55	Li et al.	5	1 (20)	1 (20)	-	-	1 (20)	-	-	1 (20)		-	-	-	-	-	1 (20)	4 (80)	-	-	-
56	Wei et al.	1	1 (100)	1 (100)	-	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57	Bastola et al.	1	1 (100)	1 (100)	-	1 (100)	-	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	-
58	Zhang et al.	2	2 (100)	1 (50)	-	2 (100)	1 (50)	-	-	-	1 (50)	-	-	-	-	1 (50)	-	-		2 (100)	
59	Holshue et al.	1	1 (100)	1 (100)	1 (100)	-	-	-	-	-	1 (100)	-	1 (100)	-	-	1 (100)	1 (100)	-		1 (100)	1 (100)
60	Wang et al.	1	-	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
61	Kam et al.	1	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
62	Van Cuong et al.	1	1 (100)	1 (100)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	-	0 (0)	-	0 (0)	1 (100)	0 (0)
63	Xu et al.	1	1 (100)	1 (100)	1 (100)	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-	-	-	-	-	-
64	Cui et al.	1	-	1 (100)	-	-	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	1 (100)	-
65	Phan et al.	2	2 (100)	1 (50)	-	1 (50)	-	-	-	-	1 (50)	-	-	-	-	1 (50)	-	-	-	-	-
66	Ni et al.	1	1 (100)	-	-	-	-	-	-	-	1 (100)	-	-	-	-	1 (100)	-	-	-	-	-
67	Li et al.	2	2 (100)	-	-	1 (50)	-	-	-	1 (50)	1 (50)	-	-	-	-	1 (50)	-	-	-	-	1 (50)
68	Lin et al.	1	0 (0)	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	Albarello et al.	2	1 (50)	-	-	1 (50)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	Huang et al.	2	2 (100)	1 (50)	2 (100)	-	0 (0)	0 (0)	-	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)	-	0 (0)	-	-	-	-

71	Lu et al.	2	0 (0)	0 (0)	-	-	0 (0)	-	-	-	-	-	-	-	-	-	-	2 (100)	-	-	-
72	Hosoda et al.	1	0 (0)	0 (0)	-	-	-	-	-	1 (100)	1 (100)	-	1 (100)	-	-	-	-	-	-	-	-
73	Li et al.	2	0 (0)	1 (50)	-	0 (0)	-	-	-	0 (0)	-	-	-	-	-	-	1 (50)	1 (50)	-	-	-
74	Xing et al.	2	1 (50)	-	1 (50)		-	-	1 (50)	1 (50)	-	-	-	-	1 (50)	-	-	-	-	-	-
75	Zhu et al.	1	1 (100)	1 (100)	-	1 (100)	-	-	1 (100)	-	-	1 (100)	1 (100)	1 (100)	-	-	-	-	-	-	1 (100)
76	Ji et al.	2	1 (50)	0 (0)	-	-	-	-	-	-	1 (50)	-	-	-	-	-	1 (50)	-	-	-	-
77	Zhou et al.	1	1 (100)	0 (0)	-	-	-	-	0 (0)	-	-	-	-	-	-	-	-	-	0 (0)	-	-
78	Wang et al.	1	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-	-	-	-	-	-
79	An et al.	1	1 (100)	1 (100)	1 (100)	-	-	-	-	-	1 (100)	1 (100)	-	-	-	-	-	-	-	-	-
80	Marchand-Senécal et al.	1	1 (100)	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Σ		**5053**	**4020**	**2802**	**1351**	**1071**	**921**	**649**	**398**	**367**	**349**	**233**	**202**	**188**	**175**	**155**	**145**	**103**	**85**	**78**	**57**
%		**(100)**	**(83)**	**(57)**	**(34)**	**(25)**	**(32)**	**(19)**	**(11)**	**(12)**	**(9)**	**(18)**	**(9)**	**(18)**	**(12)**	**(5)**	**(6)**	**(12)**	**(8)**	**(44)**	**(10)**

Data presented as N (%)
CNERCECMT, COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention
Malaise includes: Fatigue, Weakness
Sputum production includes: Sputum, Expectoration, Hemoptysis
Dyspnoea includes: Dyspnoea, Tachypnea, Respiratory failure
Chest pain includes: Chest distress, Chest tightness
Rhinorrhea includes: Nasal congestion, Sneezing
"-" = not mentioned/not reported in study

Supplementary Table 4: Radiology abnormalities of the study subjects

	Author	No. of patients	Initial Radiology abnormalities	Bilateral changes	Unilateral changes
1	Liu et al.	137	116 (85)	116 (85)	-
2	Wu et al.	80	55 (69)	36 (45)	19 (24)
3	Guan et al.	1099	-	505 (46)	-
4	Zhou et al.	191	143 (75)	143 (75)	-
5	Zhu et al.	9	9 (100)	9 (100)	-
6	CNERCECMT	28	-	-	-
7	Hu et al.	24	12 (50)	-	-
8	Zhao et al.	101	93 (92)	83 (82)	10 (10)
9	Liu et al.	78	78 (100)	45 (58)	23 (29)
10	Tian et al.	262	-	-	-
11	Yang et al.	149	132 (89)	-	-
12	Huang et al.	41	40 (98)	40 (98)	-
13	Yang et al.	52	-	52 (100)	-
14	Zhang et al.	140	134 (96)	121 (86)	13 (9)
15	Song et al.	51	51 (100)	44 (86)	7 (14)
16	Chen et al.	99	99 (100)	74 (75)	25 (25)
17	Zhou et al.	62	62 (100)	-	10 (16)
18	Fan et al.	67	-	-	-
19	Li et al.	83	-	79 (95)	-
20	Lu et al.	171	-	21 (12)	-
21	Han et al.	108	-	-	-
22	Wang et al.	69	-	-	-
23	Pan et al.	21	-	18 (86)	3 (14)
24	Li et al.	17	12 (71)	5 (29)	7 (41)
25	Liu et al.	24	19 (79)	-	-
26	Mo et al.	155	143 (92)	143 (92)	-
27	Chen et al.	249	242 (97)	203 (82)	39 (16)

28	Qin et al.	452	-	-	-
29	Zhao et al.	19	19 (100)	15 (79)	4 (21)
30	Xia et al.	20	16 (80)	10 (50)	6 (30)
31	Xiong et al.	42	42 (100)	-	-
32	Zhang et al.	14	14 (100)	13 (93)	1 (7)
33	Ling et al.	66	-	-	-
34	Xu et al.	50	41 (82)	26 (52)	15 (30)
35	Xu et al.	90	69 (77)	53 (59)	16 (18)
36	Liu et al.	15	15 (100)	-	-
37	Wang et al.	55	37 (67)	-	-
38	Cheng et al.	11	11 (100)	-	-
39	Wu et al.	201	201 (100)	191 (95)	10 (5)
40	Zhu et al.	32	30 (94)	29 (91)	1 (3)
41	Xu et al.	51	51 (100)	43 (84)	8 (16)
42	Wang et al.	138	-	138 (100)	-
43	Xu et al.	62	52 (84)	52 (84)	-
44	Liu et al.	12	-	-	-
45	Wang et al.	4	4 (100)	2 (50)	2 (50)
46	Ki et al.	28	-	-	-
47	Chan et al.	6	-	-	-
48	Fan et al.	2	-	1 (50)	1 (50)
49	Chen et al.	9	-	-	-
50	Xu et al.	10	7 (70)	-	-
51	Chung et al.	21	9 (43)	16 (76)	-
52	Chen et al.	9	-	-	-
53	Young et al.	18	6 (33)	-	-
54	Cai et al.	10	4 (40)	-	4 (40)
55	Li et al.	5	3 (60)	-	-
56	Wei et al.	1	-	-	-
57	Bastola et al.	1	-	-	-
58	Zhang et al.	2	2 (100)	2 (100)	-
59	Holshue et al.	1	-	1 (100)	0 (0)
60	Wang et al.	1	1 (100)	1 (100)	-
61	Kam et al.	1	-	-	-

62	Van Cuong et al.	1	-	-	-
63	Xu et al.	1	-	1 (100)	-
64	Cui et al.	1	-	-	1 (100)
65	Phan et al.	2	-	1 (50)	-
66	Ni et al.	1	1 (100)	0 (0)	1 (100)
67	Li et al.	2	2 (100)	1 (50)	1 (50)
68	Lin et al.	1	1 (100)	-	1 (100)
69	Albarello et al.	2	2 (100)	2 (100)	-
70	Huang et al.	2	2 (100)	2 (100)	-
71	Lu et al.	2	2 (100)	2 (100)	-
72	Hosoda et al.	1	-	-	-
73	Li et al.	2	2 (100)	2 (100)	-
74	Xing et al.	2	1 (50)		1 (50)
75	Zhu et al.	1	1 (100)	1 (100)	-
76	Ji et al.	2	0 (0)	0 (0)	0 (0)
77	Zhou et al.	1	1 (100)	1 (100)	-
78	Wang et al.	1	1 (100)	-	1 (100)
79	An et al.	1	1 (100)	-	1 (100)
80	Marchand-Senécal et al.	1	1 (100)	-	-
Σ		**5053**	**2092**	**2343**	**231**
%		**(100)**	**(89)**	**(67)**	**(17)**

Data presented as N (%)
CNERCECMT, COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention
"-" = not mentioned/not reported in study

Supplementary Table 5: Clinical complications of the study subjects

	Author	No. of patients N [count]	ARDS	Sepsis/ Bacteremia	Pneumonia	Cardiac injury	Respiratory failure	AKI	Secondary infection
1	Liu et al.	137	-	-	-	-	-	-	-
2	Wu et al.	80	-	-	-	-	-	-	-
3	Guan et al.	1099	37 (3)	12 (1)	-	-	-	6 (1)	-
4	Zhou et al.	191	59 (31)	150 (79)	-	77 (40)	103 (54)	28 (15)	28 (15)
5	Zhu et al.	9	-	-	-	-	-	-	-
6	CNERCECMT	28	-	-	18 (64)	-	-	-	-
7	Hu et al.	24	-	-	-	-	-	-	-
8	Zhao et al.	101	-	-	-	-	-	-	-
9	Liu et al.	78	-	-	-	-	-	-	0 (0)
10	Tian et al.	262	-	-	-	-	-	-	-
11	Yang et al.	149	0 (0)	0 (0)	-	-	0 (0)	0 (0)	-
12	Huang et al.	41	12 (29)	3 (7)	-	5 (12)	-	3 (7)	4 (10)
13	Yang et al.	52	35 (67)	1 (2)	6 (12)	12 (23)		15 (29)	1 (2)
14	Zhang et al.	140	-	-	-	-	-	-	-
15	Song et al.	51	-	-	-	-	-	-	-
16	Chen et al.	99	17 (17)	4 (4)	1 (1)	-	-	3 (3)	-
17	Zhou et al.	62	-	-	-	-	-	-	-
18	Fan et al.	67	-	-	-	-	-	-	-
19	Li et al.	83	-	-	-	-	-	-	-
20	Lu et al.	171	-	-	-	-	-	-	-
21	Han et al.	108	-	-	-	-	-	-	-
22	Wang et al.	69	-	-	-	-	-	-	-
23	Pan et al.	21	-	-	-	-	-	-	-
24	Li et al.	17	-	-	-	-	-	-	-
25	Liu et al.	24	-	-	-	-	-	-	-
26	Mo et al.	155	-	-	-	-	-	-	-
27	Chen et al.	249	8 (3)	-	-	-	-	-	
28	Qin et al.	452	-	-	-	-	-	-	-

29	Zhao et al.	19	-	-	-	-	-	-	2 (11)
30	Xia et al.	20	-	-	-	-	-	-	-
31	Xiong et al.	42	-	-	-	-	-	-	-
32	Zhang et al.	14	-	-	14 (100)	-	-	-	-
33	Ling et al.	66	-	-	-	-	-	-	-
34	Xu et al.	50	-	-	-	-	-	-	-
35	Xu et al.	90	-	-	-	-	-	-	-
36	Liu et al.	15	-	-	-	-	-	-	-
37	Wang et al.	55	-	-	-	-	-	-	-
38	Cheng et al.	11	-	-	-	-	-	-	-
39	Wu et al.	201	84 (42)	-	-	-	-	-	-
40	Zhu et al.	32	-	-	-	-	-	-	-
41	Xu et al.	51	0 (0)		0 (0)	-	-	-	-
42	Wang et al.	138	27 (20)	12 (9)		10 (7)		5 (4)	
43	Xu et al.	62	1 (2)	-	61 (98)	-	-	-	-
44	Liu et al.	12	6 (50)	1 (8)	12 (100)	1 (8)	3 (25)	2 (17)	
45	Wang et al.	4	-	-	-	-	-	-	-
46	Ki et al.	28	-	-	2 (7)	-	-	-	-
47	Chan et al.	6	-	-	-	-	-	-	-
48	Fan et al.	2	-	-	-	-	-	-	-
49	Chen et al.	9	-	-	-	-	-	-	-
50	Xu et al.	10	-	-	-	-	-	-	-
51	Chung et al.	21	-	-	-	-	-	-	-
52	Chen et al.	9	-	-	-	-	-	-	-
53	Young et al.	18	0 (0)	-	-	-	-	-	0 (0)
54	Cai et al.	10	-	-	-	-	-	-	-
55	Li et al.	5	-	-	-	-	-	-	-
56	Wei et al.	1	-	-	-	-	-	-	-
57	Bastola et al.	1	-	-	-	-	-	-	-
58	Zhang et al.	2	-	-	-	-	-	-	-
59	Holshue et al.	1	-	-	1 (100)	-	-	-	-
60	Wang et al.	1	-	-	-	-	-	-	-
61	Kam et al.	1	-	-	-	-	-	-	-
62	Van Cuong et al.	1	-	-	-	-	-	-	-

63	Xu et al.	1	1 (100)	-	-	1 (100)	-	-	-
64	Cui et al.	1	-	-	-	-	-	-	-
65	Phan et al.	2	-	-	-	-	-	-	-
66	Ni et al.	1	-	-	-	-	-	-	-
67	Li et al.	2	-	-	-	-	-	-	-
68	Lin et al.	1	-	-	-	-	-	-	-
69	Albarello et al.	2	2 (100)	-	-	-	-	-	-
70	Huang et al.	2	-	-	-	-	-	-	-
71	Lu et al.	2	-	-	-	-	-	-	-
72	Hosoda et al.	1	-	-	0 (0)	-	-	-	-
73	Li et al.	2	-	-	-	-	-	-	-
74	Xing et al.	2	-	-	-	-	-	-	-
75	Zhu et al.	1	-	-	-	-	-	-	-
76	Ji et al.	2	-	-	-	-	-	-	-
77	Zhou et al.	1	-	-	-	-	-	-	-
78	Wang et al.	1	-	-	-	-	-	-	-
79	An et al.	1	0 (0)						
80	Marchand-Senécal et al.	1	-	-	-	-	-	-	-
∑		**5053**	**289**	**183**	**115**	**106**	**106**	**62**	**35**
%		**(100)**	**(13)**	**(11)**	**(39)**	**(24)**	**(52)**	**(4)**	**(12)**

Data presented as N (%)
CNERCECMT, COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention; ARDS, Acute respiratory distress syndrome; AKI, acute kidney injury
"-" = not mentioned/not reported in study

Supplementary Table 6: Treatment of the study subjects

	Author	N [count]	Antiviral	Antibiotics	Any type of oxygen therapy	Glucocorticoids	Immun0globulins	Interferons	Nasal cannula	NIV	Invasive Ventilation	Expectorants	Immune enhacer	Nasal High Flow	Antifungal	RRT	Symptomatic treatment	ECMO
1	Liu et al.	137	105 (77)	119 (87)	119 (87)	40 (29)	44 (32)	-	85 (62)	34 (25)	0 (0)	-	-	-	-	-	-	0 (0)
2	Wu et al.	80	80 (100)	73 (91)	-	-	16 (20)	-	-	35 (44)	-	-	-	-	-	-	-	-
3	Guan et al.	1099	393 (36)	637 (58)	454 (41)	204 (19)	144 (13)	-	-	56 (5)	25 (2)	-	-	-	31 (3)	9 (1)	-	-
4	Zhou et al.	191	41 (21)	181 (95)	-	57 (30)	46 (24)	-	-	26 (14)	32 (17)	-	-	41 (21)		10 (5)	-	3 (2)
5	Zhu et al.	9	3 (33)	-	-	-	-	1 (11)	-	-	-	-	-	-	-	-	-	-
6	CNERCECMT	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Hu et al.	24	21 (88)	1 (4)	-	-	3 (13)	24 (100)	-	-	-	-	-	-	1 (4)	-	-	-
8	Zhao et al.	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Liu et al.	78	45 (58)	-	-	45 (58)	-	-	71 (91)	5 (6)	-	-	-	2 (3)	-	-	-	-
10	Tian et al.	262	-	-	46 (18)	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Yang et al.	149	140 (94)	34 (23)	134 (90)	5 (3)	19 (13)	144 (97)	-	2 (1)	0 (0)	-	-	-	-	-	-	0 (0)
12	Huang et al.	41	38 (93)	41 (100)	-	9 (22)	-	-	27 (66)	10 (24)	2 (5)	-	-	-	-	3 (7)	-	2 (5)
13	Yang et al.	52	23 (44)	49 (94)	-	30 (58)	28 (54)	-	-	29 (56)	22 (42)	-	-	33 (63)		9 (17)	-	6 (12)
14	Zhang et al.	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Song et al.	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Chen et al.	99	75 (76)	70 (71)	75 (76)	19 (19)	27 (27)	-	-	13 (13)	4 (4)	-	-	-	15 (15)	9 (9)	-	3 (3)
17	Zhou et al.	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

18	Fan et al.	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Li et al.	83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Lu et al.	171	-	-	-	-	-	-	-	-	3 (2)	-	-	-	-	-	-	-
21	Han et al.	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Wang et al.	69	66 (96)	66 (96)	43 (62)	10 (14)	-	57 (83)	-	-	-	--	-	-	8 (12)	-	-	-
23	Pan et al.	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Li et al.	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Liu et al.	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	Mo et al.	155	45 (29)	-	102 (66)	79 (51)	9 (6)	30 (19)	-	-	36 (23)	87 (56)	14 (9)	-	-	-	-	-
27	Chen et al.	249	-	-	-	32 (13)	-	-	-	-	-	-	-	-	-	-	-	-
28	Qin et al.	452	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Zhao et al.	19	19 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	19 (100)	-
30	Xia et al.	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	Xiong et al.	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	Zhang et al.	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	Ling et al.	66	-	-	-	5 (8)	-	-	-	-	-	-	-	-	-	-	-	-
34	Xu et al.	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	Xu et al.	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	Liu et al.	15	11 (73)	15 (100)	14 (93)	-	-	-	14 (93)	-	-	-	-	-	-	-	-	-
37	Wang et al.	55	55 (100)	-	-	2 (4)	2 (4)	-	-	-	-	-	-	2 (4)	-	-	-	-
38	Cheng et al.	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	Wu et al.	201	170 (85)	196 (98)	165 (82)	62 (31)	-	22 (11)	98 (49)	61 (30)	6 (3)	-	70 (35)	-	-	-	-	1 (0)
40	Zhu et al.	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	Xu et al.	51	-	-	-	-	-	-	-	-	0 (0)	-	-	-	-	-	-	-
42	Wang et al.	138	124 (90)	-	106 (77)	62 (45)	-	-	-	15 (11)	17 (12)	-	-	-		2 (1)	-	4 (3)

43	Xu et al.	62	55 (89)	28 (45)	-	16 (26)	-	8 (13)	-	-	-	-	-	-	-	-	-	-
44	Liu et al.	12	12 (100)	-	-	3 (25)	4 (33)	12 (100)	-	-	6 (50)	-	-	-	-	-	-	-
45	Wang et al.	4	4 (100)	4 (100)	4 (100)	-	1 (25)	-	-	-	1 (25)	-	-	-	-	-	-	-
46	Ki et al.	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	Chan et al.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	Fan et al.	2	2 (100)	2 (100)	-	2 (100)	-	-	-	-	-	-	-	-	-	-	-	-
49	Chen et al.	9	6 (67)	9 (100)	9 (100)	-	-	-	9 (100)	-	-		-	-	-	-	-	-
50	Xu et al.	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	Chung et al.	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	Chen et al.	9	9 (100)	9 (100)	-	4 (44)	2 (22)	9 (100)	5 (56)	-	-	-	4 (44)	-	-	-	-	-
53	Young et al.	18	5 (28)	-	6 (33)	-	-	-	-	-	1 (6)	-	-	-	-	-	-	-
54	Cai et al.	10	-	5 (50)	0 (0)	-	-	-	-	-	-	-	-	-	-	-	10 (100)	-
55	Li et al.	5	2 (40)	2 (40)	-	-	5 (100)	2 (40)	-	-	-	-	-	-	-	-	-	-
56	Wei et al.	1	1 (100)	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57	Bastola et al.	1		1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58	Zhang et al.	2	2 (100)	2 (100)	-	2 (100)	2 (100)	-	-	-	-	-	-	-	-	-	-	-
59	Holshue et al.	1	-	1 (100)	1 (100)	-	-	-	1 (100)	-	-	-	-	-	-	-	-	-
60	Wang et al.	1	1 (100)	1 (100)	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-
61	Kam et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
62	Van Cuong et al.	1	-	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	Xu et al.	1	1 (100)	1 (100)	-	1 (100)	-	1 (100)	-	-	1 (100)	1 (100)	-	1 (100)	-	-	-	-
64	Cui et al.	1	-	1 (100)	1 (100)	-	-	1 (100)	1 (100)	-	-	-	-	-	-	-	-	-
65	Phan et al.	2	-	-	1 (50)	-	-	-	1 (50)	-	-	-	-	-	-	-	-	-
66	Ni et al.	1	1 (100)	1 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
67	Li et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68	Lin et al.	1	1 (100)	-	-	1 (100)	-	1 (100)	-	-	-	-	-	-	-	-	-	-

69	Albarello et al.	2	-	-	-	-	-	-	-	-	2 (100)	-	-	-	-	-	-	-
70	Huang et al.	2	-	2 (100)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71	Lu et al.	2	2 (100)	-	-	-	-	2 (100)	-	-	-	-	-	-	-	-	2 (100)	-
72	Hosoda et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	Li et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	Xing et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	Zhu et al.	1	1 (100)	1 (100)	-	1 (100)	1 (100)	1 (100)	1 (100)	-	-	-	-	-	-	-	-	-
76	Ji et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 (100)	-
77	Zhou et al.	1	1 (100)	1 (100)	1 (100)	1 (100)	-	1 (100)	-	-	-	-	-	-	-	-	1 (100)	-
78	Wang et al.	1	1 (100)	1 (100)	-	1 (100)	-	1 (100)	-	-	-	-	-	-	-	-	-	-
79	An et al.	1	1 (100)	1 (100)	-	-	-	1 (100)	-	-	-	-	-	-	-	-	-	-
80	Marchand-Senécal et al.	1	-	-	0 (0)	-	-	-	-	-	-	-	-	-	-	-	1 (100)	-
Σ		**5053**	**1562**	**1557**	**2182**	**693**	**353**	**318**	**313**	**286**	**158**	**88**	**88**	**79**	**55**	**42**	**35**	**19**
%		**(100)**	**(57)**	**(68)**	**(54)**	**(24)**	**(17)**	**(45)**	**(63)**	**(13)**	**(7)**	**(56)**	**(24)**	**(21)**	**(4)**	**(3)**	**(100)**	**(3)**

Data presented as N (%)
CNERCECMT, COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention
Symptomatic treatment includes: Bronchodilative medication, Antitussive medication
Immune enhancer includes: Immunomodulation, Antioxidants
NIV, Non-invasive Ventilation; RRT, Renal replacement therapy; ECMO, Extra corporal membrane oxygenation
"-" = not mentioned/not reported in study

Supplementary Table 7: Laboratory data of the study subjects

	Author	[count]	High CRP	Lymphopenia	High LDH	Leukopenia	High D-Dimere	High ALT	High AST	Leukocytosis	High PCT	High Glucose	Decreased Albumin	High IL-6	High Creatine	High Bilirubin	Low Platelets	High Creatine kinase	High Fibrinogen
1	Liu et al.	137	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Wu et al.	80	115 (84)	99 (72)	-	51 (37)	-	-	-	26 (19)	-	-	-	-	-	-	-	-	-
3	Guan et al.	1099	62 (78)	26 (33)	17 (21)	36 (45)	3 (4)	3 (4)	3 (4)	5 (6)	1 (1)	19 (24)	2 (3)	-	2 (3)	1 (1)	11 (14)	-	-
4	Zhou et al.	191	481 (44)	-	277 (25)	330 (30)	260 (24)	158 (14)	168 (15)	58 (5)	35 (3)	-	-	-	12 (1)	76 (7)	-	-	-
5	Zhu et al.	9	-	77 (40)	123 (64)	32 (17)	72 (38)	59 (31)	-	40 (21)	14 (7)	-	-	-	8 (4)	-	13 (7)	-	-
6	CNERCECMT	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Hu et al.	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Zhao et al.	101	4 (17)	4 (17)	4 (17)	4 (17)	4 (17)	2 (8)	-	-	5 (21)	-	-	-	2 (8)	-	-	-	-
9	Liu et al.	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Tian et al.	262	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Yang et al.	149	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Huang et al.	41	82 (55)	53 (36)	45 (30)	33 (22)	21 (14)	18 (12)	27 (18)	2 (1)	-	59 (40)	9 (6)	-	43 (29)	4 (3)	20 (13)	-	-
13	Yang et al.	52	-	26 (63)	29 (71)	10 (24)	-	-	15 (37)	12 (29)	3 (7)	-	-	-	4 (10)	-	-	13 (32)	-
14	Zhang et al.	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Song et al.	51	125 (89)	-	-	27 (19)	35 (25)	-	-	17 (12)	41 (29)	-	-	-	4 (3)	-	-	-	-
16	Chen et al.	99	41 (80)	33 (65)	-	14 (27)	-	-	-	-	-	-	-	-	-	-	-	-	-
17	Zhou et al.	62	63 (64)	35 (35)	75 (76)	24 (24)	36 (36)	28 (28)	35 (35)	9 (9)	6 (6)	51 (52)	97 (98)	51 (52)	13 (13)	18 (18)	12 (12)	-	-
18	Fan et al.	67	27 (44)	24 (39)	-	6 (10)	-	-	-	-	-	-	-	-	-	-	-	-	-

19	Li et al.	83	-	24 (36)	27 (40)	19 (28)	-	-	-	-	-	-	-	-	-	-	13 (19)	-	-
20	Lu et al.	171	50 (60)	10 (12)	-	-	-	-	-	-	44 (53)	-	-	-	-	-	-	-	-
21	Han et al.	108	-	-	-	-	-	-	6 (4)	-	-	-	-	-	-	-	-	-	-
22	Wang et al.	69	107 (99)	65 (60)	-	11 (10)	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Pan et al.	21	42 (61)	28 (41)	25 (36)	36 (52)	-	23 (33)	19 (28)	1 (1)	4 (6)	-	-	40 (58)	-	-	-	-	-
24	Li et al.	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Liu et al.	24	12 (71)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	Mo et al.	155	12 (50)	2 (8)	-	5 (21)	-	-	-	-	-	-	-	-	-	-	0 (0)	-	-
27	Chen et al.	249	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	Qin et al.	452	-	118 (47)	-	71 (29)	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Zhao et al.	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Xia et al.	20	18 (95)	12 (63)	6 (32)	7 (37)	-	5 (26)	5 (26)	-	-	-	-	6 (32)	-	-	-	-	-
31	Xiong et al.	42	7 (35)	7 (35)	-	4 (20)	-	5 (25)	-	2 (10)	16 (80)	-	-	-	-	-	-	-	-
32	Zhang et al.	14	27 (64)	18 (43)	15 (36)	10 (24)	-	-	-	-	3 (7)	-	-	-	-	-	-	-	-
33	Ling et al.	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	Xu et al.	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	Xu et al.	90	26 (52)	14 (28)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	Liu et al.	15	38 (42)	-	-	19 (21)	-	-	-	3 (3)	-	-	-	-	-	-	-	-	-
37	Wang et al.	55	10 (67)	12 (80)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	Cheng et al.	11	10 (18)	11 (20)	13 (24)	11 (20)	-	-	-	1 (2)	-	-	-	-	-	-	-	-	-
39	Wu et al.	201	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	Zhu et al.	32	166 (83)	126 (63)	194 (97)	-	-	-	59 (29)	46 (23)	-	-	-	-	9 (4)	-	-	-	-
41	Xu et al.	51	21 (66)	19 (59)	-	7 (22)	3 (9)	-	-	1 (3)	-	-	-	7 (22)	-	-	-	-	-
42	Wang et al.	138	-	-	-	17 (33)	0 (0)	-	4 (8)	-	-	-	-	-	-	-	-	-	-
43	Xu et al.	62	-	97 (70)	55 (40)	-	-	-	-	-	-	-	-	-	-	-	-	-	-

44	Liu et al.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	Wang et al.	4	10 (83)	6 (50)	11 (92)	-	-	-	2 (17)	1 (8)	1 (8)	-	6 (50)	-	2 (17)	-	-	1 (8)	-
46	Ki et al.	28	-	1 (25)	-	0 (0)	-	-	-	1 (25)	-	-	-	-	-	-	-	-	-
47	Chan et al.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	Fan et al.	2	3 (50)	2 (33)	3 (50)	-	2 (33)	-	0 (0)	1 (17)	-	-	0 (0)	-	2 (33)	0 (0)	-	0 (0)	3 (50)
49	Chen et al.	9	-	1 (50)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	Xu et al.	10	6 (67)	5 (56)	-	-	-	-	3 (33)	-	-	-	-	-	-	-	-	-	-
51	Chung et al.	21	3 (30)	-	-	3 (30)	2 (20)	-	2 (20)	0 (0)	5 (50)	2 (20)	-	-	-	0 (0)		0 (0)	-
52	Chen et al.	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	Young et al.	18	3 (33)	1 (11)	3 (33)	1 (11)	-	-	-	-	-	-	-	-	-	-	-	-	-
54	Cai et al.	10	6 (33)	7 (39)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55	Li et al.	5	3 (30)	0 (0)	3 (30)	1 (10)	2 (20)	-	2 (20)	3 (30)	1 (10)	-	-	-	0 (0)	-	-	-	-
56	Wei et al.	1	1 (20)	-	-	-	-	-	-	2 (40)	-	-	-	-	-	-	-	-	-
57	Bastola et al.	1	1 (100)	0 (0)	-	1 (100)	-	-	-	0 (0)	-	1 (100)	-	-	-	-	-	-	-
58	Zhang et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
59	Holshue et al.	1	2 (100)	2 (100)	1 (50)	2 (100)	-	-	-	0 (0)	0 (0)	-	-	-	-	-	-	-	-
60	Wang et al.	1	-	-	1 (100)	1 (100)	-	-	1 (100)	0 (0)	0 (0)	1 (100)	1 (100)	-	1 (100)	1 (100)	-	1 (100)	1 (100)
61	Kam et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
62	Van Cuong et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	Xu et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64	Cui et al.	1	1 (100)	1 (100)	1 (100)	-	-	-	1 (100)	1 (100)	-	-	1 (100)	1 (100)	-	-	-	-	1 (100)
65	Phan et al.	2	0 (0)	-	-	-	0 (0)	-	1 (100)	-	1 (100)	-			1 (100)	1 (100)	-	-	-
66	Ni et al.	1	1 (50)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
67	Li et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68	Lin et al.	1	2 (100)	1 (50)	-	-	-	-	-	1 (50)	-	-	-	-	-	-	-	-	-
69	Albarello et al.	2		0 (0)	-	0 (0)	-	-	-	0 (0)	-	-	-	-	-	-	-	-	-

70	Huang et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71	Lu et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
72	Hosoda et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	Li et al.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	Xing et al.	2	-	-	-	-	0 (0)	-	-	-	-	-	-	-	-	-	-	-	-
75	Zhu et al.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76	Ji et al.	2	1 (100)	1 (100)	-	-	-	-	-	-	-	-	-	1 (100)	-	-	-	-	-
77	Zhou et al.	1	1 (50)	0 (0)	-	0 (0)	-	-	-	1 (50)	-	-	-	-	-	-	-	-	-
78	Wang et al.	1	0 (0)	0 (0)	-	-	-	-	-	1 (100)	-	-	-	-	-	-	-	-	-
79	An et al.	1	1 (100)	1 (100)	-	-	-	-	-		-	-	-	-	-	-	-	-	-
80	Marchand-Senécal et al.	1	0 (0)	0 (0)	-	0 (0)	-	-	-	0 (0)	-	-	-	-	-	-	-	-	-
Σ		**5053**	**1591**	**969**	**928**	**793**	**440**	**357**	**353**	**235**	**180**	**133**	**116**	**106**	**103**	**101**	**73**	**15**	**5**
%		**(100)**	**(58)**	**(47)**	**(40)**	**(27)**	**(24)**	**(17)**	**(17)**	**(10)**	**(9)**	**(39)**	**(34)**	**(48)**	**(5)**	**(7)**	**(12)**	**(28)**	**(63)**

Data presented as N (%)
CNERCECMT, COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention
CRP, C-reactive protein; LDH, Lactate dehydrogenase; ALT, Alanine aminotransferase; AST, Aspartate aminotransferase; PCT, Procalcitonin; IL-6, Interleukin 6
High and low according to reference range or as stated in each individual publication
"-" = not mentioned/not reported in study

Supplementary Table 8: Outcome of meta-analysis (random effect model)

Variable	Number of studies N [count]	95%CI	n	Q	I^2	τ^2	p-value
Comorbidities							
Any chronic diseases	34	0.358 (0.309, 0.407)	1338	255.3	87.1	0.015	< 0.001
Cardiovascular disease	41	0.205 (0.165, 0.245)	920	286.4	86.0	0.011	< 0.001
Endocrine disease	40	0.096 (0.077, 0.116)	414	128.0	69.5	0.002	< 0.001
Smoking	20	0.069 (0.036, 0.101)	212	153.2	87.6	0.002	< 0.001
Respiratory disease	33	0.017 (0.013, 0.022)	91	32.6	1.9	0.000	< 0.001
Malignancies	28	0.014 (0.009, 0.020)	70	44.8	39.8	0.000	< 0.001
Cerebrovascular disease	20	0.022 (0.015, 0.029)	63	20.6	7.9	0.000	< 0.001
Digestive system	15	0.047 (0.031, 0.062)	51	16.4	14.6	0.000	< 0.001
Infections	19	0.016 (0.011, 0.021)	48	13.4	0.8	0.000	< 0.001
Surgical history	12	0.152 (0.056, 0.248)	48	46.5	76.3	0.011	0.002
Chronic renal disease	23	0.014 (0.008, 0.020)	46	26.1	15.7	0.000	< 0.001
Chronic liver disease	22	0.018 (0.011, 0.024)	41	20.5	?	0.000	< 0.001
Existing pregnancy	16	0.317 (0.224, 0.410)	31	705.6	97.9	0.017	< 0.001
Clinical symptoms							
Fever	78	0.770 (0.733, 0.807)	4020	914.4	91.9	0.016	< 0.001
Cough	69	0.554 (0.501, 0.606)	2802	818.2	91.7	0.034	< 0.001

Malaise/ Fatigue	39	0.311 (0.250, 0.373)	1351	636.5	94.0	0.029	< 0.001
Dyspnea	45	0.322 (0.200, 0.445)	1071	8819.6	99.5	0.155	< 0.001
Sputum production	24	0.264 (0.203, 0.325)	921	219.7	89.5	0.015	< 0.001
Myalgia/ Arthralgia	31	0.197 (0.160, 0.233)	649	190.5	84.3	0.007	< 0.001
Headache	27	0.101 (0.081, 0.121)	398	72.5	64.1	0.001	< 0.001
Sore throat	35	0.133 (0.104, 0.163)	367	127.1	73.5	0.003	< 0.001
Diarrhea	44	0.091 (0.069, 0.113)	349	215.6	80.1	0.003	< 0.001
Anorexia	13	0.216 (0.136, 0.297)	233	159.4	92.5	0.014	< 0.001
Abdominal pain	15	0.075 (0.038, 0.112)	202	101.1	86.2	0.003	< 0.001
Chest pain	17	0.154 (0.092, 0.215)	188	174.9	90.9	0.012	< 0.001
Coldness/ Chills	12	0.135 (0.092, 0.178)	175	19.4	43.3	0.001	< 0.001
Vomiting	22	0.038 (0.024, 0.052)	155	64.1	67.2	0.001	< 0.001
Rhinorrhea	26	0.068 (0.044, 0.091)	145	87.2	71.3	0.001	< 0.001
Asymptomatic	13	0.239 (0.158, 0.320)	103	264.7	95.5	0.016	< 0.001
Dizziness/ Confusion	13	0.084 (0.046, 0.121)	85	41.6	73.6	0.002	< 0.001
Tachycardia	6	0.609 (0.406, 0.811)	78	7.6	34.2	0.021	< 0.001
Nausea	9	0.110 (0.040, 0.180)	57	48.1	83.4	0.006	0.002
Initial radiology abnormalities	52	0.898 (0.876, 0.920)	2092	373.4	86.3	0.003	< 0.001
Bilateral changes	45	0.740 (0.663, 0.816)	2343	2544.0	98.3	0.052	< 0.001
Unilateral changes	30	0.190 (0.147, 0.234)	231	112.5	74.2	0.007	< 0.001
Complications							

ARDS	16	0.173 (0.127, 0.218)	289	409.3	96.3	0.006	< 0.001
Sepsis/ Bacteremia	8	0.136 (0.067, 0.205)	183	693.5	99.0	0.009	< 0.001
Pneumonia	10	0.474 (0.160, 0.787)	115	3445.7	99.7	0.239	0.003
Cardiac injury	6	0.212 (0.062, 0.361)	106	69.3	92.8	0.028	0.006
Respiratory failure	3	0.264 (-0.158, 0.686)	106	220.7	99.1	0.134	0.220
AKI	8	0.045 (0.021, 0.068)	62	61.0	88.5	0.001	< 0.001
Secondary infection	6	0.059 (0.009, 0.110)	35	30.8	83.8	0.003	0.022
Therapy							
Antiviral	37	0.737 (0.637, 0.836)	1562	2432.4	98.5	0.075	< 0.001
Antibiotics	33	0.755 (0.657, 0.852)	1557	1386.9	97.7	0.056	< 0.001
Any type of oxygen therapy	20	0.649 (0.509, 0.788)	1282	962.9	98.0	0.082	< 0.001
Glucocorticoids	25	0.312 (0.244, 0.380)	693	416.9	94.2	0.021	< 0.001
Immunoglobulins	16	0.255 (0.189, 0.322)	353	176.3	91.5	0.012	< 0.001
Interferons	18	0.639 (0.413, 0.864)		1650.3	99.0	0.203	< 0.001
			318				
Nasal Cannula	11	0.731 (0.585, 0.878)	313	107.9	90.7	0.041	< 0.001
NIV	11	0.190 (0.131, 0.249)	286	231.2	95.7	0.009	< 0.001
Invasive Ventilation	17	0.066 (0.043, 0.089)	158	174.5	90.8	0.001	< 0.001
Immune enhancer	3	0.267 (0.044, 0.490)	88	42.8	95.3	0.032	0.019
Expectorants	2	0.564 (0.487, 0.642)	88	0.374	0.0	0.000	< 0.001
Nasal High Flow	5	0.244 (0.084, 0.404)	79	106.2	96.2	0.027	0.003

Antifungal	4	0.080 (0.015, 0.145)	55	16.4	81.7	0.003	0.016
RRT	6	0.045 (0.017, 0.074)	42	27.3	81.7	0.001	0.002
Symptomatic treatment	6	0.961 (0.903, 1.019)	35	1.8	0.9	0.000	< 0.001
ECMO	8	0.011 (0.002, 0.020)	19	13.9	49.5	0.000	0.016
Laboratory Findings							
High CRP	42	0.582 (0.487, 0.677)	1591	1530.0	97.3	0.078	< 0.001
Lymphopenia	42	0.422 (0.352, 0.493)	969	414.2	90.1	0.038	< 0.001
High LDH	21	0.474 (0.303, 0.644)	928	1801.1	99.0	0.143	< 0.001
Leukopenia	33	0.251 (0.212, 0.290)	793	137.8	76.8	0.007	< 0.001
High D-Dimer	14	0.191 (0.109, 0.273)	440	251.5	94.8	0.018	< 0.001
High ALT	19	0.180 (0.130, 0.229)	357	98.0	81.6	0.007	< 0.001
High AST	18	0.202 (0.143, 0.261)	353	154.6	89.0	0.009	< 0.001
Leukocytosis	29	0.102 (0.071, 0.133)	235	152.5	81.6	0.003	< 0.001
High PCT	17	0.172 (0.116, 0.227)	180	226.8	93.0	0.009	< 0.001
High Glucose	6	0.387 (0.255, 0.518)	133	21.3	76.5	0.015	< 0.001
Decreased Albumin	7	0.429 (-0.015, 0.873)	116	2408.7	99.8	0.332	0.058
High IL-6	6	0.452 (0.301, 0.604)	106	19.8	74.7	0.021	< 0.001
High Creatine	14	0.079 (0.045, 0.113)	103	96.7	86.6	0.002	< 0.001
High Bilirubin	8	0.067 (0.024, 0.109)	101	40.4	82.7	0.002	0.002
Low Platelets	11	0.101 (0.061, 0.142)	73	24.5	59.2	0.002	< 0.001
High Creatine kinase	5	0.162 (0.015, 0.308)	15	13.2	69.6	0.017	0.030

High Fibrinogen	3	0.618 (0.327, 0.909)	5	0.7	0.7	0.000	< 0.001

95% CI, 95% confidence interval; Q, Cochrane`s Q statistic for heterogeneity; I^2, Index assessment of heterogeneity; t^2, Tau-squared measure of heterogeneity
Laboratory parameters: High and low according to reference range or as stated in each individual publication

Supplementary Table 9: Assessment of Risk of Bias

No.	Author	Publication date [mm/dd]	Study design	No. of patients N [count]	Quality of Evidence	1 A clearly stated aim	2 Inclusion of consecutive patients	3 Prospective collection of data	4 Endpoints appropriate to the aim of the study	5 Unbiased assessment of the study endpoint	6 Follow-up period appropriate to the aim of the study	7 Loss to follow up less than 5%	8 Prospective calculation of the study size	Total score [∑]
1	Liu et al.	02/07	MC, retrospective	137	3	2	2	0	2	0	2	2	0	10
2	Wu et al.	02/29	MC, retrospective	80	3	2	2	0	2	0	2	2	0	10
3	Guan et al.	02/28	MC, retrospective	1099	3	2	2	0	2	0	0	0	0	6
4	Zhou et al.	03/11	MC, retrospective, cohort	191	3	2	2	0	2	0	2	0	0	8
5	Zhu et al.	02/06	MC, retrospective	9	3	2	2	0	2	0	1	0	0	7
6	CNERCECMT	02/16	MC, retrospective	28	3	2	2	0	2	0	1	2	0	9
7	Hu et al.	03/04	MC, retrospective	24	3	2	2	0	2	0	2	2	0	10
8	Zhao et al.	03/03	MC, retrospective	101	3	2	1	0	2	0	1	2	0	8
9	Liu et al.	02/28	MC, retrospective	78	3	2	2	0	1	0	1	2	0	8
10	Tian et al.	02/27	MC, retrospective	262	3	2	2	0	2	0	2	2	0	10
11	Yang et al.	02/26	MC, retrospective, cohort	149	3	2	2	0	2	0	2	2	0	10
12	Huang et al.	02/29	SC, retrospective	41	3	2	2	0	2	0	0	1	0	7
13	Yang et al.	02/24	SC, retrospective	52	3	2	2	0	2	0	2	2	0	10
14	Zhang et al.	02/19	SC, retrospective	140	3	2	2	0	2	0	2	2	0	10
15	Song et al.	02/06	SC, retrospective	51	3	2	2	0	2	0	2	2	0	10
16	Chen et al.	02/15	SC, retrospective	99	3	2	2	0	2	0	1	1	0	8
17	Zhou et al.	03/05	SC, retrospective	62	3	2	2	0	2	0	2	2	0	10
18	Fan et al.	03/04	SC, retrospective	67	3	2	2	0	2	0	2	2	0	10
19	Li et al.	02/29	SC, retrospective	83	3	2	2	0	2	0	2	2	0	10
20	Lu et al.	03/18	SC, retrospective	171	3	2	2	0	2	0	1	2	0	9

21	Han et al.	03/17	SC, retrospective	108	3	2	2	0	2	0	2	2	0	10
22	Wang et al.	03/16	SC, retrospective	69	3	2	2	0	2	0	1	1	0	8
23	Pan et al.	02/13	SC, retrospective	21	3	2	2	0	2	0	2	2	0	10
24	Li et al.	02/12	SC, retrospective	17	3	2	2	0	2	0	2	2	0	10
25	Liu et al.	02/13	SC, retrospective	24	3	2	2	0	2	0	2	2	0	10
26	Mo et al.	03/16	SC, retrospective	155	3	2	2	0	2	0	2	2	0	10
27	Chen et al.	03/19	SC, retrospective	249	3	2	2	0	2	0	2	2	0	10
28	Qin et al.	03/12	SC, retrospective	452	3	1	2	0	2	0	2	2	0	9
29	Zhao et al.	03/12	SC, retrospective	19	3	1	2	0	2	0	2	2	0	9
30	Xia et al.	03/05	SC, retrospective	20	3	1	1	0	2	0	2	2	0	8
31	Xiong et al.	03/03	SC, retrospective	42	3	2	2	0	2	0	2	2	0	10
32	Zhang et al.	03/03	SC, retrospective	14	3	2	2	0	2	0	2	2	0	10
33	Ling et al.	02/28	SC, retrospective	66	3	2	2	0	2	0	2	2	0	10
34	Xu et al.	02/25	SC, retrospective	50	3	2	2	0	2	0	2	2	0	10
35	Xu et al.	02/28	SC, retrospective	90	3	2	2	0	2	0	2	2	0	10
36	Liu et al.	03/18	SC, retrospective	15	3	2	2	0	2	0	2	2	0	10
37	Wang et al.	03/17	SC, retrospective	55	3	0	2	0	2	0	2	2	0	8
38	Cheng et al.	03/14	SC, retrospective	11	3	2	2	0	2	0	2	2	0	10
39	Wu et al.	03/13	SC, retrospective, cohort	201	3	2	2	0	2	0	2	2	0	10
40	Zhu et al.	03/13	SC, retrospective	32	3	1	2	0	2	0	2	2	0	9
41	Xu et al.	03/13	SC, retrospective	51	3	2	2	0	2	0	2	2	0	10
42	Wang et al.	02/07	SC, retrospective, case series	138	3	2	2	0	2	0	2	2	0	10

	1. Does the patient(s) represent(s) the whole experience of the investigato	**2. Was the exposure adequately ascertained?**	**3. Was the outcome adequately ascertained?**	**4. Were other alternative causes that may explain the observation ruled out?**	**5. Was there a challenge/rechallenge phenomenon?**	**6. Was there a dose–response effect?**	**7. Was follow-up long enough for outcomes to occur?**	**8. Is the case(s) described with sufficient details to allow other investigators to replicate the research or to allow practitioners**

						r (centre) or is the selection method unclear to the extent that other patients with similar presentation may not have been reported?							make inferences related to their own practice?	
43	Xu et al.	02/19	Case series	62	4	2	2	2	2	NA	NA	2	2	12
44	Liu et al.	02/09	Case series	12	4	2	2	2	2	NA	NA	2	2	12
45	Wang et al.	03/16	Case series	4	4	1	2	2	2	NA	NA	2	2	11
46	Ki et al.	02/09	Case series	28	4	2	1	2	1	NA	NA	1	2	9
47	Chan et al.	02/15	Case series	6	4	2	2	2	1	NA	NA	2	1	10
48	Fan et al.	03/17	Case series	2	4	1	1	NA	2	NA	NA	2	2	8
49	Chen et al.	03/07	Case series	9	4	1	2	2	2	NA	NA	2	2	11
50	Xu et al.	03/13	Case series	10	4	1	2	2	2	NA	NA	2	2	11
51	Chung et al.	02/04	Case series	21	4	1	2	2	2	NA	NA	2	2	11
52	Chen et al.	03/12	Case series	9	4	1	2	2	2	NA	NA	2	2	11
53	Young et al.	03/03	Case series	18	4	1	2	2	2	NA	NA	2	2	11
54	Cai et al.	02/28	Case series	10	4	1	2	2	2	NA	NA	2	2	11
55	Li et al.	03/11	Case series	5	4	1	2	NA	2	NA	NA	2	2	9
56	Wei et al.	02/26	Other	1	5	NA	2	2	1	NA	NA	2	2	9
57	Bastola et al.	02/10	Other	1	5	NA	2	1	2	NA	NA	NA	2	7
58	Zhang et al.	02/07	Other	2	5	NA	2	1	2	NA	NA	2	2	9
59	Holshue et al.	03/05	Other	1	5	2	2	2	2	NA	NA	2	2	12
60	Wang et al.	02/28	Other	1	5	NA	2	1	2	NA	NA	NA	2	7

61	Kam et al.	02/28	Other	1	5	NA	2	1	1	NA	NA	2	2	8
62	Van Cuong et al.	02/19	Other	1	5	2	2	1	2	NA	NA	1	2	10
63	Xu et al.	02/18	Other	1	5	NA	2	1	2	NA	NA	2	2	9
64	Cui et al.	03/17	Other	1	5	NA	2	1	2	NA	NA	1	2	8
65	Phan et al.	02/27	Other	2	5	2	2	NA	2	NA	NA	NA	2	8
66	Ni et al.	03/13	Other	1	5	NA	2	NA	2	NA	NA	1	2	7
67	Li et al.	03/05	Other	2	5	1	2	2	2	NA	NA	2	2	11
68	Lin et al.	02/22	Other	1	5	1	2	1	2	NA	NA	NA	2	8
69	Albarello et al.	02/26	Other	2	5	1	2	1	2	NA	NA	NA	2	8
70	Huang et al.	02/19	Other	2	5	1	2	1	2	NA	NA	2	2	10
71	Lu et al.	03/19	Other	2	5	1	2	1	2	NA	NA	1	2	9
72	Hosoda et al.	03/19	Other	1	5	1	2	2	2	NA	NA	2	2	11
73	Li et al.	03/18	Other	2	5	NA	2	1	2	NA	NA	NA	2	7
74	Xing et al.	03/12	Other	2	5	2	2	2	2	NA	NA	2	2	12
75	Zhu et al.	03/17	Other	1	5	2	2	2	2	NA	NA	2	2	12
76	Ji et al.	03/16	Other	2	5	1	2	2	2	NA	NA	NA	2	7
77	Zhou et al.	03/09	Other	1	5	1	2	2	2	NA	NA	2	2	11
78	Wang et al.	03/12	Other	1	5	1	2	1	2	NA	NA	1	2	9
79	An et al.	03/06	Other	1	5	1	2	1	2	NA	NA	1	1	8
80	Marchand-Senécal et al.	03/09	Other	1	5	1	2	1	2	NA	NA	1	2	9

CNERCECMT, COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention
Publication date format: mm/ dd=Month/ Day
MC, Multicenter study; SC, Single center study
Study design “Others” includes: Case reports
Quality of Evidence: modified from the Oxford Centre for Evidence-based Medicine for ratings of individual studies

Multicenter and single center studies (Studies 1-42) were evaluated using Methodological index for non-randomized studies (minors): development and validation of a new instrument. By Slim et al. (29) (Score range: 0-16)
0=not reported, 1=reported but inadequate, 2=reported and adequate
Scoring>70% of 16 (score>11), Risk of Bias was seen as low with high quality of included studies

Case series and case reports (Studies 43-80) were evaluated using Methodological quality and synthesis of case series and case reports by Murad et al. (30) (Score range: 0-16)
Question 5 and 6 were not applicable for the included studies.
NA=Not available, 1=No, 2=Yes
Scoring>70% of 16 (score>11), Risk of Bias was seen as low with high quality of included studies