

Supplementary Table S1. Study characteristics.

ID	Study, year	Country	Study design	Population	Severity criteria	n
TNF-α						
1	Abers MS 2021 [32]	Italy	Cohort	COVID-19 patients	–	175
2	Hou H 2020 [33]	China	Cohort	COVID-19 patients	Guidelines of diagnosis and treatment for COVID-19 made by the Chinese National Health Commission	389
3	Liu G 2021 [34]	China	Cohort	COVID-19 patients	Not stated	296
4	Tian J 2020 [35]	China	Multicenter, retrospective cohort	COVID-19 patients with any type of malignant solid tumours and haematological malignancy	WHO guidelines, complemented by the Seventh Revised Trial Version of the COVID-19 Diagnosis and Treatment Guidance (2020) of China	232
5	Wang JH 2021 [36]	China	Single-center, retrospective cohort	COVID-19 patients	–	1135
6	Wang M 2021 [37]	China	Cohort	COVID-19 patients	Diagnosis and Treatment of Novel Coronavirus Patients (the Fifth Pilot Ed.)	211
7	Xie M 2021 [38]	China	Retrospective cohort	COVID-19 patients	2019 clinical practice guideline from American Thoracic Society (ATS) and Infectious Diseases Society of America (IDSA) for diagnosis and treatment of adults with community-acquired pneumonia and WHO criteria for severe COVID-19	280
8	Yang B 2021 [39]	China	Cohort	Patients with severe COVID-19	–	320
9	Zhu Z 2020 [40]	China	Single-center, retrospective cohort	COVID-19 patients	Guidelines for diagnosis and treatment for COVID-19 (Trail Version 6)	127
IL-6						
1	Abers MS 2021 [32]	Italy	Cohort	COVID-19 patients	–	175
10	Avila-Nava A 2021 [41]	Mexico	Cohort	COVID-19 patients	–	38
11	Bai Y 2021 [42]	China	Retrospective cohort	COVID-19 patients	Guideline of diagnosis and management for COVID-19 (sixth edition) by the National Health Commission of China	3342
12	Bhadade R 2020 [43]	India	Cohort	Critically ill COVID-19 patients	–	373

13	Chen C 2020 [44]	China	Single-center, retrospective cohort	COVID-19 patients with comorbidities	–	132
14	Chen H 2021 [45]	China	Cohort	COVID-19 patients	–	855
15	Chen X 2020 [46]	China	Cohort	COVID-19 patients	New Coronavirus Pneumonia Diagnosis and Treatment Plan (trial version 6) by the National Health Committee of the People's Republic of China	102
16	Donoso- Navarro E 2021 [47]	Spain	Retrospective cohort	COVID-19 patients	–	546
17	Gao F 2021 [48]	China	Cohort	COVID-19 patients	Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia (Trial Version 7) by the National Health Commission & State Administration of Traditional Chinese Medicine	167
18	Gou L 2021 [49]	China	Retrospective cohort	Critically ill COVID-19 patients	–	114
19	Gu Y 2021 [14]	China	Single-center, retrospective cohort	COVID-19 patients admitted to the ICU	–	57
2	Hou H 2020 [33]	China	Cohort	COVID-19 patients	Guidelines of diagnosis and treatment for COVID-19 by the Chinese National Health Commission	389
20	Huang H 2021 [50]	China	Retrospective cohort	COVID-19 patients	Guidelines for the Diagnosis and Treatment for Novel Coronavirus Pneumonia (version 7) by the National Health Commission of the People's Republic of China	64
21	Laguna- Goya R 2020 [51]	Spain	Single-center, cohort	COVID-19 patients	–	501
22	Lavillegra nd R 2021 [52]	France	Multicenter, cohort	COVID-19 patients admitted to the ICU	–	101
23	Li T 2020 [53]	China	Retrospective, cohort	COVID-19 patients not younger than 65 years old	American Thoracic Society guidelines for community-acquired pneumonia	312
24	Li T 2021 [54]	China	Retrospective cohort	COVID-19 patients	–	75
3	Liu G 2021 [34]	China	Cohort	COVID-19 patients	Not stated	296
25	Liu Q 2020 [55]	China	Cross-sectional	COVID-19 patients	Novel coronavirus pneumonia diagnosis and treatment plan (trial version 7)	84
26	Liu QQ 2020 [56]	China	Single-center, retrospective cohort	COVID-19 patients	–	308

27	Maeda T 2021 [57]	United States	Single-center, retrospective cohort	COVID-19 patients	–	224
28	Martinez-Ubristond o M 2020 [58]	Spain	Single-center, cross-sectional		–	165
29	Ruscica M 2021 [59]	Italy	Retrospective cohort	COVID-19 patients	–	97
30	Sai F 2021 [60]	China	Single-center, retrospective cohort	COVID-19 patients admitted to B-ICU	–	47
4	Tian J 2020 [35]	China	Multicenter, retrospective cohort	COVID-19 patients with any type of malignant solid tumours and haematological malignancy	WHO guidelines, complemented by the Seventh Revised Trial Version of the COVID-19 Diagnosis and Treatment Guidance (2020) of China	232
31	Trecarichi EM 2020 [61]	Italy	Single-center, retrospective cohort	COVID-19 patients	–	48
5	Wang JH 2021 [36]	China	Single-center, retrospective cohort	COVID-19 patients	–	1135
6	Wang M 2021 [37]	China	Cohort	COVID-19 patients	Diagnosis and Treatment of Novel Coronavirus Patients (the Fifth Pilot Ed.)	211
32	Wang Y 2020 [62]	China	Case-control	Children diagnosed with COVID-19	Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: experts' consensus statement	43
33	Wu C 2020 [63]	China	Retrospective cohort	COVID-19 patients who developed ARDS	–	84
7	Xie M 2021 [38]	China	Retrospective cohort	COVID-19 patients	2019 clinical practice guideline from American Thoracic Society (ATS) and Infectious Diseases Society of America (IDSA) for diagnosis and treatment of adults with community-acquired pneumonia and WHO criteria	280
8	Yang B 2021 [39]	China	Cohort	Patients with severe COVID-19	–	320
34	Yi P 2020 [18]	China	Single-center, retrospective cohort	COVID-19 patients	Clinical management of 2019 nCoV guidelines by the National Health Commission of the People Republic of China	100

35	Zhao C 2021 [64]	China	Single-center, retrospective cohort	COVID-19 patients	Report of the WHO-China Joint Mission on COVID-19	172
36	Zhou F 2020 [65]	China	Multicenter, retrospective cohort	COVID-19 patients	–	191
9	Zhu Z 2020 [40]	China	Single-center, retrospective cohort	COVID-19 patients	Guidelines for diagnosis and treatment for COVID-19 (Trail Version 6)	127
37	Zhu Z 2021 [66]	China	Single-center, retrospective cohort	COVID-19 patients	National Diagnosis and Treatment Protocol for Novel Coronavirus Infection-Induced Pneumonia (6th Trial Version)	142
Vitamin D						
38	AlSafar H 2021 [67]	United Arab Emirates	Multicenter, cohort	COVID-19 patients	–	464
39	Campi I 2021 [68]	Italy	Cohort	Patients with severe COVID- 19	Severe criteria: Spontaneous oxygen saturation $\leq 93\%$ and/or PaO ₂ /FiO ₂ ratio < 300 mmHg) requiring invasive or non-invasive ventilation, with or without the presence of fever (>37.5°C) and other organ dysfunction	155
40	Cereda E 2021 [69]	Italy	Cohort	COVID-19 patients	–	129
41	De Smet D 2020 [70]	Belgium	Retrospective cohort	COVID-19 patients	–	186
42	Derakhsh anian H 2021 [71]	Iran	Retrospective cohort	COVID-19 patients	–	290
43	Jahangiri mehr A 2021 [72]	Iran	Cross-sectional	COVID-19 patients	Not stated	93
44	Jevalikar G 2021 [73]	India	Cross-sectional	COVID-19 patients	WHO ordinal scale for clinical improvement (OSCI)	410
45	Karahan S 2020 [74]	Turkey	Retrospective cohort	COVID-19 patients	Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia (Trial Version 7)	149
46	Lohia P 2021 [75]	United States	Retrospective cohort	COVID-19 patients	–	270
47	Pizzini A 2020 [76]	Austria	Cohort	COVID-19 patients	Severe criteria: patients requiring oxygen supply, respiratory support, or intensive care treatment	109
48	Vashegha ni M 2021 [77]	Iran	Cross-sectional	COVID-19 patients	WHO criteria	508