**Clinical features and outcomes of adults with COVID-19: A systematic review and pooled analysis of the literature**

Running title: Clinical features and outcomes of COVID-19

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**Abstract**

**Background:** The 2019 coronavirus disease (COVID-19) has become a global pandemic and the published literature describing the virus has grown exponentially.

**Methods:** We conducted a systematic review of the literature to identify the symptoms, comorbidities present, radiological features and outcomes for adults testing positive for COVID-19 admitted to hospital. The results across multiple studies were numerically pooled to yield total estimated.

**Results:** A total of 45 studies were included in this review with 14,358 adult participants (average age 51 years, male 51%). The pooled findings suggest that the most common symptom among patients was fever (81.2%) followed by cough (62.9%), fatigue (38.0%) and anorexia/loss of appetite (33.7%). The comorbidities that were most prevalent among patients with the virus were hypertension (19.1%), cardiovascular disease (17.9%), endocrine disorder (9.3%) and diabetes (9.2%). Abnormal chest X-ray findings were present in 27.7% of patients and ground-glass opacity was demonstrated on chest CT in 63.0% of patients. The most frequent adverse outcomes were acute respiratory distress syndrome (27.4%), acute cardiac injury (16.2%) and acute kidney injury (12.6%). Death occurred in 8.2% of patients and 16.3% required intensive care admission and 11.7% had mechanical ventilation. Bacterial or secondary infections affected 8.5% of patients and 6.9% developed shock.

**Conclusions:** COVID-19 most commonly presents with fever, cough, fatigue and anorexia among patients with existing hypertension and cardiovascular disease. It is important as serious adverse outcomes can develop such as acute respiratory distress syndrome, acute cardiac injury, acute kidney injury and death.

**What is known about the topic?**

* First identified in December 2019 as a cause of pneumonia in Wuhan China, the coronavirus disease 2019 (COVID-19) has become a global pandemic.
* As this is a new disease, literature which scientists, clinicians and politicians could rely on to determine how best to control the spread of the virus and manage infected patients was limited and largely based on experience drawn from managing or other respiratory virus pandemics.

**What does the study add?**

* Our review of 45 studies shows that majority of the literature is currently dominated by reports from China and whether the results are generalizable to other countries is uncertain.
* The symptoms of patients with COVID-19 are very heterogeneous as there are population with common features like fever and cough as well as those which are asymptomatic or have atypical symptoms such as loss of taste/smell.
* Death occurred in 8.2% of hospitalised patients but many suffered from acute respiratory distress syndrome, acute cardiac injury and acute kidney injury and required intensive care admission and mechanical ventilation.

**Introduction**

First identified in December 2019 as a cause of pneumonia in Wuhan China, the coronavirus disease 2019 (COVID-19) has become a global pandemic [[[1]](#endnote-1)]. As of June 2020 there are over 9 million cases worldwide and it is responsible for nearly 470,000 deaths [[[2]](#endnote-2)]. As this is a new disease, literature which scientists, clinicians and politicians could rely on to determine how best to control the spread of the virus and manage infected patients was limited and largely based on experience drawn from managing or other respiratory virus pandemics.

In the efforts to quickly understand this virus there has been an exponential growth of literature on COVID-19 over a relatively short time span [[[3]](#endnote-3),[[4]](#endnote-4),[[5]](#endnote-5),[[6]](#endnote-6),[[7]](#endnote-7)]. At the same time, there have been numerous reports from experts within their respective clinical disciplines providing opinions based on the interpretation of the limited published literature [[[8]](#endnote-8),[[9]](#endnote-9)] The few reviews published have limitations including not being systematic in nature [[[10]](#endnote-10)], including a small number of studies [[[11]](#endnote-11)] or including studies with low patient number including case reports and small patient case series [[[12]](#endnote-12)].

In view of the urgent need to understand the literature and inform practice, we aimed to determine systematically the evidence from studies of more than 100 adult patients that reported clinical features and outcomes of those affected by COVID-19. As this virus affects patients from all settings such as community and hospitals, we pooled the findings of the individual studies to gain an estimate of how it affects the population as a whole.

**Methods**

We conducted a systematic review of the literature to identify the symptoms, comorbidities present, radiological features and outcomes for adults testing positive for COVID-19 admitted to hospital.

*Inclusion criteria*

We included studies that evaluated adults with a laboratory confirmed diagnosis of COVID-19. The studies also had to report information on one or more of the following: clinical features of patients, comorbidities of patients, radiological findings for patients and outcomes for patients. In addition, we required that the sample size of the studies be greater than 100 patients so that less common symptoms would be captured and there would be sufficient sample size for calculating adverse event rates. There was no restriction based on language of study and Google Translate was used to convert studies from Chinese journals to English.

*Search strategy*

We searched MEDLINE and EMBASE using OVID on 26 April 2020. We used the following broad search terms in our search strategy: (“COVID-19” OR “2019-nCoV” OR “SARS-COV-2” OR “Wuhan coronavirus” OR “novel coronavirus” OR “new coronavirus”) AND (“clinical features” OR “presentation” OR “symptoms” OR “clinical course” OR “clinical characteristics” OR “outcomes” OR “complications” OR “ventilation” OR “intubation” OR “recovery” OR “death” OR “mortality” OR “survival”). We limited the search results to studies published in 2019 or 2020.

*Study selection and data extraction*

Due to the initially large number of studies the search terms returned, we screened study titles and abstracts in independent pairs (SB & JM, JT & CSK and DD & CWW) to assess the potential for each study to meet the inclusion criteria. Full articles of potentially relevant studies were retrieved and reviewed for inclusion. Studies where there were discrepancies regarding inclusion were reviewed in detail and decisions about inclusion were made by consensus. Data was extracted by SB and JT and checked by CSK. The data was collected on study design, country, year when it took place, number of participants, mean/median age of participants, % male, patient inclusion criteria, symptoms, comorbidities, radiological findings, follow up and adverse outcomes. We further collected data on admission criteria, criteria for starting oxygen and renal disease (acute kidney injury, end-stage renal failure and dialysis). Risk of bias was performed based on the Ottawa-Newcastle scale[[[13]](#endnote-13)] with studies being assessed out of a maximum of 7 stars over 3 different domains: selection, comparability and outcome.

*Data analysis*

Data was extracted and presented in Tables. Statistical pooling according to methods by Kwok et al [[[14]](#endnote-14)]. Pooled results were presented in Figures for patient symptoms, comorbidities, radiological findings and outcomes along with the number of studies and number of patients that were pooled.

**Results**

A total of 45 studies [3,4,5,6,7,[[15]](#endnote-15),[[16]](#endnote-16),[[17]](#endnote-17),[[18]](#endnote-18),[[19]](#endnote-19),[[20]](#endnote-20),[[21]](#endnote-21),[[22]](#endnote-22),[[23]](#endnote-23),[[24]](#endnote-24),[[25]](#endnote-25),[[26]](#endnote-26),[[27]](#endnote-27),[[28]](#endnote-28),[[29]](#endnote-29),[[30]](#endnote-30),[[31]](#endnote-31),[[32]](#endnote-32),[[33]](#endnote-33),[[34]](#endnote-34),[[35]](#endnote-35),[[36]](#endnote-36),[[37]](#endnote-37),[[38]](#endnote-38),[[39]](#endnote-39),[[40]](#endnote-40),[[41]](#endnote-41),[[42]](#endnote-42),[[43]](#endnote-43),[[44]](#endnote-44),[[45]](#endnote-45),[[46]](#endnote-46),[[47]](#endnote-47),[[48]](#endnote-48),[[49]](#endnote-49),[[50]](#endnote-50),[[51]](#endnote-51),[[52]](#endnote-52),[[53]](#endnote-53),[[54]](#endnote-54)] were included in this review (Figure 1).

The descriptions of the study design and patient characteristics are shown in Table 1. There were 40 retrospective cohort studies, 2 prospective cohort studies, 1 cross-sectional study and 2 cohort studies of unclear design. All of the studies originated from China except for 2 studies from the United States and one multicentre European study which took place in Belgium, France, Italy and Spain. The studies included a cumulative total of 14,358 patients which ranged from 101 to 1,590 from each individual study. Among the studies that reported mean age and sex of the participants, the average across the studies was 51 years and the proportion of male patients was 51%. All patients had laboratory confirmed COVID-19 infection. Majority of studies did not report the exact criteria for admissions to hospital and the criteria for starting oxygen therapy (Supplementary Table 1).

The quality of the included studies is shown in Supplementary Table 2. All included studies were graded to be 4 to 6 stars out of a maximum of 7.

The symptoms reported by patients with COVID-19 are described for each study in Supplementary Table 3. Collectively pooled, the most common symptom among patients was fever (81.2%) followed by cough (62.9%), fatigue (38.0%) and anorexia/loss of appetite (33.7%) (Figure 2). More than 1 in 5 patients had shortness of breath (26.9%), anosmia/loss of taste (25.4%) and sputum/expectoration (24.2%). Only 2.8% of patients were asymptomatic. Other symptoms commonly reported but only from single studies are shown in Figure 3 and prevalent symptoms included weakness (85.0%), facial pain/heaviness and ear pain (14.6%).

The comorbidities of patients with COVID-19 are shown for each study in Supplementary Table 4. The most common comorbidities among these patients after pooling the studies was hypertension (19.1%), cardiovascular disease (17.9%), endocrine disease (9.3%) and diabetes (9.2%) (Figure 4). Patients with a smoking history represented 8.3% of the pooled cohort. The descriptions of acute kidney injury, end-stage renal failure or dialysis use is shown in Supplementary 5.

The findings from chest X-ray and CT scans are reported for each study in Supplementary Table 6. The pooled results suggest that 27.7% of patients had abnormal chest X-rays, 79.9% had bilateral changes on chest X-ray or CT scans and 63.0% had ground-glass opacities on imaging (Figure 5).

The outcomes for patients with COVID-19 are presented in Table 2. Studies had follow-up of up to 31 days and the pooled results for outcomes are shown in Figure 6. The most common adverse outcome was acute respiratory distress syndrome (27.4%), acute cardiac injury (16.2%) and acute kidney injury (12.6%). Death occurred in 8.2% of patients and 16.3% required intensive care admission while 11.7% had mechanical ventilation. Bacterial or secondary infections affected 8.5% of patients and 6.9% developed shock.

**Discussion**

Our study has several key findings. First, the majority of the literature is currently dominated by reports from China and whether the results are generalizable to other countries is uncertain. Second, the symptoms of patients with COVID-19 are very heterogeneous as there are population with common features like fever and cough as well as those which are asymptomatic or have atypical symptoms such as loss of taste/smell. Third, cardiovascular diseases are the most common comorbidity in COVID-19 patients while other comorbidities such as diabetes, gastrointestinal disease and respiratory disease are present in less than 1 in 10 patients. Fourth, under a third of patients have abnormal chest X-ray and the majority of patients undergoing further imaging have bilateral changes and ground-glass opacities on CT scan. Finally, death occurred in 8.2% of hospitalised patients but many suffered from acute respiratory distress syndrome, acute cardiac injury and acute kidney injury and required intensive care admission and mechanical ventilation.

Our review adds to what is already known from existing studies. Our review identified three key studies: Garg et al. [23], a study from the United States, Guan et al. [25], a large cohort from China and Lechien et al. [29], a multicentre European study. Consistent across these studies and our pooled results was fever being present in more than 80% of patients. However, the American cohort showed a much greater proportion of patients with shortness of breath (80% in Garg et al, 27% in pooled analysis and 24% in Guan et al) and myalgia (34.4% in Garg et al, 14.4% in the pooled analysis and 17.5% in Guan et al) while diarrhoea was much lower in the Chinese study (4.2% in Guan et al, 13.1% in pooled analysis and 26.7% in Garg et al). Collectively these findings should be compared against the large observational study only published on a preprint server by Docherty et al which included 16,749 patients with COVID-19 at 166 hospitals in the United Kingdom.[[55]](#endnote-55) They found three clusters of symptoms which include respiratory, systemic and enteric and 17% required admission to high dependency or intensive care unit and 33% of patients died. By pooling the results from many studies, we reported the relative frequencies of individual symptoms but also built by evaluating the prevalence of less common symptoms such as anosmia/loss of taste, altered consciousness/confusion, palpitations and weakness. For outcomes, admissions to intensive care was 16% from the pooled analysis which was similar to the 17% reported by Docherty et al but death rates were much lower at 8.2% (33.3% died in Docherty et al.). We also highlight other outcomes such as acute cardiac injury and acute kidney injury which are not uncommon as they affect 16.2% and 12.6% of patients respectively. Also, the pooled findings from imaging suggest that many patients have bilateral changes and the majority have ground glass opacities.

While use of the Ottawa-Newcastle quality evaluation has classified many studies as of reasonable quality there are a few important considerations because the majority of studies are from China. Despite recent reforms to reduce healthcare inequalities, there remains a proportion of patients who require but do not receive hospital care mainly for financial reasons [[[56]](#endnote-56)]. Therefore, the population that present and are captured in the Chinese studies may not generalizable to other countries, especially those with universal access to free healthcare. In China, patients may also receive both Western and/or traditional Chinese medications [57]. The use of alternative medicine may affect the timing of presentation and consequently the severity of symptoms when patients with COVID-19 present to hospital. It is possible that patients who fail to improve on traditional Chinese medicine may present to hospitals thus skewing the data towards patients that are more symptomatic and have higher adverse event rates because of delay in presentation. In addition, it has been reported that information on COVID-19 is tightly controlled on Chinese social media and censorship of COVID-19 content started at early stages of the outbreak and continue to expand [[[57]](#endnote-57)]. It is unclear how reflective the published literature compared to actual practice due to this regulation and censorship. Finally, there are some concerns about the rigorousness of research practices in China as many researchers felt pressure to publish articles as quickly as possible and this has led to proliferation of research malpractice [[[58]](#endnote-58)].

Our study focused on adult patients that were admitted to hospital with COVID-19 but is likely not reflective of the entire population with the virus. There are many people affected with the virus that are asymptomatic or less symptomatic to the extent that they can remain in the community and do not present to hospital (in the hospital population pooled only 2.8% were asymptomatic). Furthermore, factors such as lockdown, self-isolation and community treatment are not reflected in these studies. This makes capturing the true impact of COVID-19 on adults challenging as the hospital population only potentially represents the more severe end of patients affected.

A major challenge of the current study was to ensure that the population that was pooled did not count patients from the same hospital. Many of the included studies in this review took place in Wuhan hospitals the epicentre of the virus outbreak. We therefore had to be careful and analyse which individual hospitals contributed to the reported findings. We took the approach of including the studies with the greatest number of patients because this would most likely include the most recent data in the pooled analysis.

We observed significant heterogeneity in the follow up period for the included studies which ranged from only in-hospital events to at least 34 days post discharge. While we expect that mortality risk would be greatest at time of hospitalization for the acute illness, there is still risk of mortality when discharged from hospital especially when patients are discharged for self-isolation or they are discharged before complete symptom resolution. A key consideration which we are unable to capture is the discharge criteria at each hospital as this may affect mortality rates in the community after hospitalization. This is further complicated by hospital policies that may have changed depending on the timing of the epidemic when the study took place. Mortality and outcomes for patients with COVID-19 depend on duration of follow up and the time point of the epidemic when the study occurred.

As the pandemic continues to progress, the challenge has and will remain in detecting COVID-19 cases and identifying local outbreaks as early as possible to prevent spread and secondary outbreaks. The common symptoms of patients who present to hospital as seen in this review include fever, cough, fatigue and anorexia or loss of appetite. However, we have shown that there are many other symptoms such as anosmia/loss of taste, weakness and facial/ear pain that appear in patients affected by the virus. More understanding is needed as to the timeline of symptomatology and disease progression with COVID-19 is not known. We expect that some patients present early to hospital while other wait for further symptoms to develop or increase in severity of symptoms before coming to hospital. As treatments are being developed and used in practice such as dexamethasone (RECOVERY trial) [[[59]](#endnote-59)] informing the public and clinicians of the range of symptoms of COVID-19 is important so that patients with the virus can be identified quickly and they can undergo treatment before it progresses or spreads uncontrollably within local communities.

At the time of our search for this review, most of the literature on COVID-19 were based on studies in China as the findings reported reflect those early in the COVID-19 pandemic. This is reflected by the inclusion of 42 studies from China (93.3%) in the current review. A notable study from the Boston area which was subsequently published on data early in the pandemic, showed that patients hospitalized with COVID-19 were frequently from the most vulnerable socioeconomic groups and often required intensive care. Furthermore, among those who survive COVID-19 there is substantial need for post-acute care as 10% are readmitted.[[[60]](#endnote-60)] Recently there has been a growth of literature on COVID-19 outside of China but among case-series literature majority are from China (54.0%).[[[61]](#endnote-61)]

This systematic review has several limitations. First, 44 of the included studies were retrospective and observational in nature. Second, there were inconsistent reporting amongst the studies; this was especially true for the imaging features of COVID-19, where findings ranged from including normal or abnormal to chest X-rays or chest computer tomography studies to studies providing changes per lung lobe. Third, all studies included in this review were of short follow up duration (maximum of 34 days) thus long-term follow-up information is, understandably, limited at present. Fourth, these findings are only generalizable to the hospital patients that were tested positive and it is possible that some patients have a false negative test and there may also be many patients in the community who are not tested so the true incidence and prevalence of COVID-19 is unknown. Finally, our review was searched at the end of April and the results largely reflect those from early on in the COVID-19 pandemic. As a result, many or the atypical symptoms such as loss of smells is only reported by a few studies.

**Conclusions**

Fever, cough, fatigue and anorexia are common symptoms of COVID-19 which frequently present in patients with existing hypertension and cardiovascular disease. Serious adverse outcomes associated with COVID-19 infection include acute respiratory distress syndrome, acute cardiac injury, acute kidney injury and death.

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**Figure 1: Flow diagram of study selection**



**Figure 2: Pooled analysis of symptoms of COVID-19**



**Figure 3: Proportion of patients with symptoms from single studies of COVID-19**



**Figure 4: Pooled analysis of comorbidities in patients with COVID-19**

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**Figure 5: Pooled analysis of COVID-19 changes from imaging**

**Figure 6: Pooled outcomes for patients with COVID-19**

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**Table 1: Study design and patient inclusion criteria**

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| --- | --- | --- | --- | --- | --- | --- |
| **Study ID** | **Study design; Date** | **Location** | **No. of participants** | **Mean age** | **% male** | **Inclusion criteria** |
| Cai 2020 | Retrospective cohort study; Jan-Mar 2020. | Shenzhen City, China | 298 | Median 47 | 49 | Patients with COVID-19 at Third People’s Hospital. |
| Cao 2020 | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 102 | Median 54 | 52 | Patients with COVID-19 at Wuhan University Zhongnan Hospital. |
| Chen 2020a | Retrospective cohort study; Jan-Feb 2020. | Shanghai, China | 249 | Median 51 | 51 | Patients with COVID-19 at Shanghai Public Health Clinical Centre. |
| Chen 2020b | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 274 | Median 68 | 62 | Patients with COVID-19 at Tongji Hospital. |
| Deng 2020a | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 225 | Recovered group: 40, Death group median: 69 | Recovered group: 51, Death group: 73 | Patients with COVID-19 at Tongji Medical College, Huazhong University of Science & Technology and Hankou branch of Central Hospital of Wuhan. |
| Deng 2020b | Retrospective cohort study; Jan-Mar 2020 | Wuhan, China | 112 | Median 65 | 51 | Patients with COVID-19 at Renmin Hospital of Wuhan University. |
| Du 2020 | Prospective cohort study; Dec 2019-Feb 2020. | Wuhan, China | 179 | 58 | 54 | Patients with COVID-19 (116/179) or clinically diagnosed (43/179) of COVID-19 at Wuhan Pulmonary Hospital. |
| Fan 2020 | Retrospective cohort study; Jan-Feb 2020. | Shanghai, China | 148 | Median 50 | 49 | Patients with COVID-19 at Shanghai Public Health Clinical Centre. |
| Feng 2020 | Retrospective cohort study; Jan-Feb 2020 | Wuhan, Shanghai and Tongling, China | 476 | Median 53 | 57 | Patients with COVID-19 at Jinyintan hospital in Wuhan, Shanghai Public Health Clinical Centre, Shanghai and Tongling People’s hospital. |
| Garg 2020 | Retrospective cohort study; Mar 2020. | United States | 1482 | 74.5% >50 years of age | 54 | Patients with COVID-19 in hospital across California, Colorado, Connecticut, Georgia, Iowa, Maryland, Michigan, Minnesota, New Mexico, New York, Ohio, Oregon, Tennessee, and Utah, |
| Guan 2020a | Retrospective cohort study; Dec 2019-Jan 2020. | China | 1099 | Median 47 | 58 | Patients with COVID-19 at 552 hospitals across mainland China. |
| Guan 2020b | Retrospective cohort study; Dec 2019-Jan 2020. | China | 1590 | 49 | 53 | Patients with COVID-19 at 575 hospitals across mainland China. |
| Guo 2020 | Retrospective cohort study; Feb 2020. | Wuhan, China | 174 | Median 59 | 44 | Patients with COVID-19 at to Wuhan Union hospital. |
| Han 2020a | Retrospective matched cohort study; Feb 2020. | Wuhan, China | 206 | 63 | 44 | Patients with COVID-19 at Union Hospital. |
| Han 2020b | Retrospective cohort study; Jan-March 2020. | Wuhan, China | 273 | Mild: 59. Severe:59. Critical: 57 | 36 | Patients with COVID-19 at Renmin Hospital of Wuhan University. |
| Lechien 2020 | Prospective cohort study; March 2020. | Europe | 417 | 37 | 37 | Patients with COVID-19 at 12 hospitals within Spain, Belgium, France and Italy. |
| Li 2020a | Cohort study; Jan-Feb 2020. | Hanchaun city, China | 225 | Average 50 | 53 | Patients with COVID-19 at Hanchuan City People's Hospital. |
| Li 2020b | Retrospective cohort study; Jan-Mar 2020. | Wuhan, China | 548 | Median 60 | 51 | Patients with COVID-19 at Sino-French New Branch of Tongji Hospital, Huazhong University of Science and Technology. |
| Liu 2020a | Retrospective cohort study; Dec 2019-Jan 2020 | Wuhan, China | 137 | Median 57 | 46 | Patients with COVID-19 at nine tertiary hospitals, Wuhan, China. |
| Liu 2020b | Retrospective cohort study; Dec 2019- Jan 2020. | Wuhan, China | 245 | 54 | 47 | Patients with COVID-19 at Zhongnan Hospital. |
| Lu 2020 | Retrospective cohort study; Jan-Feb 2020. | Chongqing city, China | 304 | Median 44 | 60 | Patients with COVID-19 at 42 officially designed hospitals in Chongqing city. |
| Mao 2020 | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 214 | 52 | 41 | Patients with COVID-19 at 3 centres (Main district, West branch and Tumor centre) of Union Hospital of Huazhong University of Science and Technology. |
| Mo 2020 | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 155 | Median 54 | 56 | Patients with COVID-19 in Zhongnan Hospital. |
| Pan 2020 | Cross-sectional study; Jan-Mar 2020. | Wuhan, China | 204 | 52 | 52 | Patients with COVID-19 who had chest CT and complete panel of laboratory tests from 3 hospitals (Wuhan Hanan Hospital, Wuhan Union Hospital and Huanggang Central Hospital). |
| Qin 2020 | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 452 | Median 58 | 52 | Patients with COVID-19 in Tongji hospital. |
| Tian 2020 | Retrospective cohort study; Jan-Feb 2020. | Beijing, China | 262 | Median 47 | 49 | Patients with COVID-19 in the designated hospitals in Beijing for special treatment of infectious diseases. |
| Wan 2020 | Retrospective cohort study; Jan-Feb 2020. | Chongqing, China | 135 | 47 | 53 | Patients with COVID-19 in Chongqing University Three Gorges Hospital. |
| Wang 2020a | Retrospective cohort study; Jan-Feb 2020. | Wenzhou, China | 149 | 45 | 54 | Patients with COVID-19 at Wenzhou municipal Centre for Disease Prevention and Control. |
| Wang 2020b | Retrospective cohort study; Feb 2020. | Wuhan, China | 1012 | Median 50 | 52 | Patients with COVID-19, age >16 years with ability to self-care, respiratory rate <30, blood oxygen saturations >93% and a negative result for influenza virus at Dongxihu Fangcang Hospital. |
| Wang 2020c | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 339 | 71 | 49 | Patients with COVID-19 and age >60 years in the isolation ward of Renmin Hospital. |
| Wang 2020d | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 116 | Median 54 | 58 | Patients with COVID-19 at Renmin Hospital. |
| Wang 2020e | Retrospective cohort study; Jan-Feb 2020. | Xiaogan, China | 114 | Median 53 | 51 | Patients COVID-19 and chest CT examination at Xiaogan Hospital. |
| Wang 2020f | Cohort study; Jan-Feb 2020. | Fuyang, China | 125 | 39 | 57 | Patients with COVID-19 at People’s Hospital of Fuyang City. |
| Wang 2020g | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 138 | Median 56 | 54 | Patients with COVID-19 in the Critical Care Medicine of Zhongnan Hospital of Wuhan University. |
| Xu 2020 | Retrospective cohort study; Dec 2019-Mar 2020. | Wuhan, China | 187 | Median 62 | 55 | Patients with COVID-19 at Hubei Provincial Hospital. |
| Yan 2020 | Retrospective cohort study; Mar-Apr 2020. | San Diego, United States | 169 | Median inpatient: 54, outpatient: 43 | Admitted inpatient: 9, outpatient: 52 | Patients with COVID-19 at Jacobs and Hillcrest Medical Centres. |
| Yao 2020 | Retrospective cohort study; Jan-Mar 2020. | Huanggang city, China | 108 | Median 52 | 40 | Patients with COVID-19 at Dabieshan Medical Centre. |
| Zhang 2020a | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 140 | Median 57 | 51 | Patients with COVID-19 at No. 7 Hospital of Wuhan. |
| Zhang 2020b | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 663 | Median 56 | 48 | Patients with COVID-19 at Renmin Hospital of Wuhan University. |
| Zhang 2020c | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 120 | 45 | 36 | Patients with COVID-19 at Renmin Hospital of Wuhan University. |
| Zhang 2020d | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 221 | 55 | 49 | Patients with COVID-19 at Zhongnan Hospital of Wuhan University. |
| Zhao 2020a | Retrospective cohort study; Feb 2020. | Hunan, China | 101 | 54 | 45 | Patients with COVID-19 at hospitals in four Hunan cities (Changsha, YueYang, ChangDe and Xiang-Tan). |
| Zhao 2020b | Retrospective cohort study; Jan-Feb 2020. | Hunan, China | 118 | 44 | 51 | Patients with laboratory-confirmed diagnosis of COVID-19 at The Second Hospital Xiangya Hospital. |
| Zheng 2020 | Retrospective cohort study; Jan-Feb 2020. | Changsha, China | 161 | 45 | 80 | Patients with laboratory-confirmed diagnosis of COVID-19 at First Hospital of Changsha. |
| Zhou 2020 | Retrospective cohort study; Jan-Feb 2020. | Wuhan, China | 191 | 72 | 62 | Patients with laboratory-confirmed diagnosis of COVID-19 at Jinyintan Hospital and Wuhan Pulmonary Hospital. |

**Table 2: Follow up and outcomes for patients with COVID-19**

|  |  |  |
| --- | --- | --- |
| **Study ID** | **Follow up** | **Outcomes** |
| Cai 2020 | 31 days. | Death 3/298. |
| Cao 2020 | 14 days. | Death 17/102. Intensive care admission 18/102. Acute respiratory distress syndrome 20/102. Acute cardiac injury 15/102. Acute kidney injury 20/102. Acute liver injury 34/102. Shock 10/102. Acute infection 17/102. Arrhythmia 18/102. Lymphopenia 78/102. |
| Chen 2020a | 19 days. | Death 2/249. Intensive care admission 22/298. |
| Chen 2020b | 14 days. | Death 113/274. Acute respiratory distress syndrome 197/274. Type I respiratory failure 18/67. Acute cardiac injury 89/203. Heart failure 43/176. Hypoxic encephalopathy 24/274. Sepsis 179/274. Acidosis 8/67. Alkalosis 19/76. Acute kidney injury 29/274. Disseminated intravascular coagulation 21/274. Hyperkalaemia 62/274. Shock 46/ 274, acute liver injury 13/274, gastrointestinal bleeding 1/274. |
| Deng 2020a | None. | Death 109/225. Acute respiratory distress syndrome 108/225, acute cardiac injury 66/225, acute kidney injury 20/225, shock 123/225, disseminated intravascular coagulation 7/225, |
| Deng 2020b | 20 days. | Intensive care admission 26/112. Mechanical ventilation 28/112. Extracorporeal membrane oxygenation 3/112. Death 14/112. |
| Du 2020 | None. | Death 21/179. |
| Fan 2020 | 19 days. | Remained severe/critically ill 10/148. Death 1/148. |
| Feng 2020 | 31 days. | Remained in hospital 23/476. Death 38/476. Secondary bacterial infection 35/410. |
| Guan 2020a | None. | Remained in hospital 1029/1099. Death 15/1099. Intensive care unit admission 55/1099. Mechanical ventilation 67/1099. Acute respiratory distress syndrome 37/1099, acute kidney injury 6/1099, septic shock 12/1099, disseminated intravascular coagulation 1/1099. |
| Guan 2020b | None. | Death 50/1590. Intensive care admission 90/1590. Invasive ventilation 50/1590. |
| Guo 2020 | 3 days. | Death 21/174. |
| Han 2020a | 18 days. | No significant difference in hospital stay amongst patients with digestive only symptoms vs digestive and respiratory symptoms (24.4±5.1 vs 23.9±2.4, P=0.868). |
| Han 2020b | 34 days. | Death 24/273. |
| Lechien 2020 | None. | Olfactory dysfunction persisted following clinical resolving of other symptoms in 63% patients. |
| Li 2020a | 15 days. | Death 2/225. |
| Li 2020b | 26 days. | Death 90/545. Acute respiratory distress syndrome 210/549. Cardiac injury 119/549. Liver dysfunction 106/549. Acute kidney injury 95/549. Bacteraemia infection 38/549. Disseminated intravascular coagulation 38/549. Hyperglycaemia 181/549. |
| Liu 2020a | None. | Remained in hospital 44/137. Death 16/137. |
| Liu 2020b | None. | Death 33/245. |
| Lu 2020 | None. | Seizure-like symptoms 2/304. Brain insults or metabolic imbalances 84/304. Death 10/304. Septic shock 5/304. Hypovolemia or cardiac problems 3/304. |
| Mo 2020 | 10 days. | Readmission within 10 days 70/155. |
| Pan 2020 | 28 days. | Death 37/204. Intensive care admission 16/204. |
| Tian 2020 | None. | Remained in hospital 214/262. Death 3/262. |
| Wan 2020 | None. | Remained in hospital 120/135. Death 1/135. Acute respiratory distress syndrome 21/135. Acute cardiac injury 10/135. Acute kidney injury 5/135. Secondary infection 7/135. Shock 1/135. |
| Wang 2020a | 5 days. | Remained in hospital 76/149. Death 0/149. |
| Wang 2020b | 10 days. | Remained in hospital 819/1012. Death 0/1012. |
| Wang 2020c | 28 days. | Remained in hospital 215/339. Death 76/339. Acute respiratory distress syndrome 71/339. Acute cardiac injury 70/339. Cardiac insufficiency 58/339. Acute kidney injury 27/339. Liver enzyme abnormalities 86/339. Bacterial infection 143/339. Shock 8/339. Arrhythmia 35/339. |
| Wang 2020d | None. | Death 7/116. |
| Wang 2020f | 11 days. | Remain in hospital 78/125. Death 0/125. Intensive care admission 19/125. Mechanical ventilation 4/125. Acute respiratory shock distress syndrome 6/125. Secondary infection 6/125. |
| Wang 2020g | 4 days. | Remained in hospital 85/138. Death 6/138. Intensive care admission 36/138. Mechanical ventilation 6/138. Acute respiratory distress syndrome 12/138. Acute cardiac injury 10/138. Shock 12/138. Arrhythmia 23/138. |
| Xu 2020 | 4 days. | Remained in hospital 45/187. Death 28/187. Bacterial infection 23/187. Fungal infection 2/187. |
| Yan 2020 | None. | Admitted 26/128. |
| Yao 2020 | 21 days. | Intensive care admission 17/108. Acute respiratory distress syndrome 45/108. Acute cardiac injury 8/108. Acute kidney injury 16/108. Sepsis 35/108. Septic shock 6/108. |
| Zhang 2020b | 3 days. | Improvement in clinical status 251/663. Death 25/663. |
| Zhang 2020d | 5 days. | Discharged 42/221. Remained in hospital 167/221. Death 12/221. Acute respiratory distress syndrome 48/221. Acute cardiac injury 16/221. Acute kidney injury 10/221. Shock 15/221. Arrhythmia 22/221. Bacterial infection 17/221. Fungal infection 7/221. |
| Zhoa 2020b | 7 days. | Discharged 42/118. Remained in hospital 76/118. |
| Zhou 2020 | None. | Death 54/191. Intensive care admission 50/191. Acute respiratory distress syndrome 49/191. Respiratory failure 103/191. Acute cardiac injury 33/191. Heart failure 44/191. Acute kidney injury 28/191. Septic shock 38/191. Sepsis 112/191. Coagulopathy 37/191. Secondary infection 28/191. Hypoproteinaemia 22/191. Acidosis 17/191. Mechanical ventilation 33/191. |

**Supplementary Table 1: Data on admission criteria and criteria for starting oxygen therapy**

|  |  |  |
| --- | --- | --- |
| **Study ID** | **Data on admission criteria** | **Criteria for starting oxygen therapy** |
| Cai 2020 | All Covid-19 patients in Shenzhen City. | International guidelines for community acquired pneumonia. (Metlay JP, Waterer GW, Long AC, et al. Am J Respir Crit Care Med. 2019;200:e45‐e67) |
| Cao 2020 | Covid-19 positive pneumonia and/or infected cases with a chronic illness. | No criteria for starting oxygen therapy. |
| Chen 2020a | No comment on admission criteria. | No comment on admission criteria. |
| Chen 2020b | No comment on admission criteria. | Supplemental oxygen therapy should be given immediately to patients with hypoxaemia. Oxygen therapy can be started at a flow rate of 5 L/min, and the target oxygen saturation is pulse oxygen saturation ≥90% in non-pregnant adult patients, ≥92-95% in pregnant patients, and ≥94% in patients who are critically ill with severe respiratory distress, shock, or coma. If standard oxygen therapy fails, mechanical ventilation should be considered and high flow nasal catheter oxygen or non-invasive ventilation (for example, bi-level positive airway pressure mode) can be used. If no improvement is seen within one hour of non-invasive mechanical ventilation, invasive mechanical ventilation should be used. |
| Deng 2020a | No comment on admission criteria. | No criteria for starting oxygen therapy |
| Deng 2020b | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Du 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Fan 2020 | No comment on admission criteria. | Oxygen therapy given to patients with hypoxemia, no other details provided. |
| Feng 2020 | No comment on admission criteria. | Respiratory failure requiring mechanical ventilation. |
| Garg 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Guan 2020a | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Guan 2020b | No comment on admission criteria. | Respiratory failure requiring mechanical ventilation. |
| Guo 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Han 2020a | Covid-19 positive patients without dyspnea, without clinical evidence of respiratory distress and were able to maintain blood oxygen saturation >93% in resting condition. | No criteria for starting oxygen therapy. |
| Han 2020b | No comment on admission criteria. | Respiratory failure requiring mechanical ventilation. |
| Lechien 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Li 2020a | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Li 2020b | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Liu 2020a | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Liu 2020b | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Lu 2020 | No comment on admission criteria. | Respiratory failure requiring mechanical ventilation. |
| Mao 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Mo 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Pan 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Qin 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Tian 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Wan 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Wang 2020a | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Wang 2020b | Positive result confirmed by standard SARS-CoV-2 RT-PCR test, age≥16 years with self-care ability, respiratory rate <30 with blood oxygen saturation >93% at rest and a negative result for influenza virus RT-PCR test. | Respiratory failure requiring mechanical ventilation. |
| Wang 2020c | No comment on admission criteria. | Respiratory failure requiring mechanical ventilation. |
| Wang 2020d | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Wang 2020e | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Wang 2020f | No comment on admission criteria. | Respiratory support for critically ill patients according to the criteria of the treatment protocol (version 5) (General Office of National Health Commission, General Office of National Administration of Traditional Chinese Medicine, 2020). High flow nasal catheter oxygen therapy or non-invasive ventilation is feasible when respiratory distress and (or) hypoxemia cannot be alleviated after receiving standard oxygen therapy. If the condition cannot be improved or even deteriorated in a short period of time (1-2 hours), tracheal intubation or invasive ventilation should be carried out in time. |
| Wang 2020g | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Xu 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Yan 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Yao 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Zhang 2020a | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Zhang 2020b | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Zhang 2020c | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Zhang 2020d | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Zhao 2020a | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Zhao 2020b | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Zheng 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |
| Zhou 2020 | No comment on admission criteria. | No criteria for starting oxygen therapy. |

**Supplementary Table 2: Study quality assessment**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study ID** | **Newcastle-Ottawa Quality assessment** | | | | | | | |
| **Selection domain\*** | | | | **Comparability domain\*\*** | **Outcome domain\*\*\*** | **Outcome domain\*\*\*** | **Total** |
|  | Adequate definition of case (\*) | Representatives of cases (\*) | Selection of controls (\*) | Ascertainment of exposure (\*) | Comparability of study | Assessment of outcome | Adequacy of follow up (>30days) | Maximum of 7\* |
| Cai 2020 | \* | \* | \* | \* | - | \* | \* | \*\*\*\*\*\* (6) |
| Cao 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Chen 2020a | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Chen 2020b | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Deng 2020a | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Deng 2020b | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Du 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Fan 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Feng 2020 | \* | \* | \* | \* | - | \* | \* | \*\*\*\*\*\* (6) |
| Garg 2020 | \* | \* | \* | \* | - | - | - | \*\*\*\*\* (5) |
| Guan 2020a | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Guan 2020b | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Guo 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Han 2020a | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Han 2020b | \* | \* | \* | \* | - | \* | \* | \*\*\*\*\*\* (6) |
| Lechien 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Li 2020a | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Li 2020b | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Liu 2020a | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Liu 2020b | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Lu 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Mao 2020 | \* | \* | \* | \* | - | - | - | \*\*\*\* (4) |
| Mo 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Pan 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Qin 2020 | \* | \* | \* | \* | - | - | - | \*\*\*\* (4) |
| Tian 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Wan 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Wang 2020a | \* | \* | \* | \* | - | \* | - | \*\*\*\* (4) |
| Wang 2020b | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Wang 2020c | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Wang 2020d | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Wang 2020e | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Wang 2020f | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Wang 2020g | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Xu 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Yan 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Yao 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Zhang 2020a | \* | \* | \* | \* | - | - | - | \*\*\*\* (4) |
| Zhang 2020b | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Zhang 2020c | \* | \* | \* | \* | - | - | - | \*\*\*\*(4) |
| Zhang 2020d | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Zhao 2020a | \* | \* | \* | \* | - | - | - | \*\*\*\* (4) |
| Zhao 2020b | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |
| Zheng 2020 | \* | \* | \* | \* | - | - | - | \*\*\*\* (4) |
| Zhou 2020 | \* | \* | \* | \* | - | \* | - | \*\*\*\*\* (5) |

\*Selection domain based on: 1) Representativeness of exposed cohort, 2) Selection of the non-exposed cohort, 3) Ascertainment of exposure, 4) Demonstration that outcome of interest was not present at the start of the study.

\*\*Comparability domain based on: Comparability of cohorts on the basis of the design of analysis. Control for age=\*, control for other factors=\*.

\*\*\*Outcome domain based on: 1) Assessment of outcome, 2) Was follow-up long enough for outcomes to occur, 3) Adequacy of follow up of cohorts.

**Supplementary Table 3: Symptoms in patients with COVID-19**

|  |  |
| --- | --- |
| **Study ID** | **Symptoms** |
| Cai 2020 | Fever 218/298, cough 105/298, fatigue 13/298, headache 5/298, diarrhoea 9/298, sore throat 2/298, nasal congestion 3/298. |
| Cao 2020 | Fever 83/102, dry cough 50/102, fatigue 56/102, diarrhoea 11/102, muscle ache 35/102. |
| Chen 2020a | Fever 217/249, shortness of breath 19/249, cough 91/249, fatigue 39/249, diarrhoea 8/249, dizziness and headache 28/249, rhinorrhoea 17/249, sore throat 16/249, inappetence 8/249, asymptomatic 7/249. |
| Chen 2020b | Fever 249/274, shortness of breath 120/274, cough 185/274, 137 chest tightness 103/274, fatigue 137/274, nausea 24/274, vomiting 16/274, diarrhoea 77/274, dizziness 21/274, headache 31/274, myalgia 60/274, sputum 83/274, haemoptysis 7/274, pharyngalgia 12/274, abdominal pain 19/274, anorexia 66/274. |
| Deng 2020a | Fever 189/225, shortness of breath 99/225, cough 85/225, diarrhoea 33/225, headache 13/225, myalgia 189/225, haemoptysis 7/225, expectoration 49/225, palpitations 24/225. |
| Deng 2020b | Fever 98/112, shortness of breath 63/112, cough 79/112, chest pain / tightness 73/112. |
| Du 2020 | Fever 177/179, shortness of breath 89/179, cough 146/179, fatigue 71/179, gastrointestinal symptom 39/179, headache 17/179, myalgia 34/179, sputum 55/179, haemoptysis 10/179. |
| Fan 2020 | Fever 127/148, cough 67/148, other liver disease 9/148, nausea and vomiting 3/148, diarrhoea 6/148, expectoration 38/148, asymptomatic 5/148. |
| Feng 2020 | Fever 390/454, shortness of breath 109/447, dry cough 269/453, chest pain 21/441, digestive symptoms 49/446, myalgia 55/438, pharyngodynia 35/433, sputum 161/453, haemoptysis 5/435, Shivering 24/374, neurological symptoms 47/440. |
| Garg 2020 | Fever 153/180, shortness of breath 144/180, wheezing 12/180, cough 155/180, chest pain 27/180, nausea / vomiting 44/180, diarrhoea 48/180, headache 29/180, myalgia 62/180, sore throat 32/180, nasal congestion/ rhinorrhoea 29/180, abdominal pain 15/180, altered mental status/confusion 11/180. |
| Guan 2020a | Fever 945/1099, shortness of breath 205/1099, cough 745/1099, fatigue 419/1099, nausea or vomiting 55/1099, diarrhoea 42/1099, headache 150/1099, myalgia 164/1099, sputum 370/1099, haemoptysis 10/1099, sore throat 153/1099, nasal congestion 53/1099, conjunctival congestion 9/1099, chills 126/1099. |
| Guan 2020b | Fever 1351/1536, shortness of breath 331/1394, dry cough 1052/1498, productive cough 513/1424, fatigue 584/1365, nausea/vomiting 80/1371, diarrhoea 57/1359, headache 205/1328, myalgia/arthralgia 234/1338, haemoptysis 16/1315, pharyngodynia 194/1317, nasal congestion 73/1299, conjunctival congestion 10/1345, throat congestion 21/1286, rash 3/1378, unconsciousness 320/1421. |
| Guo 2020 | Fever 136/174, shortness of breath 42/174, cough 56/174, chest pain / tightness 60/174, fatigue 47/174, nausea 17/174, diarrhoea 21/174, dizziness 23/174, headache 12/174, myalgia 36/174, pharyngalgia 9/174, chill 119/174. |
| Han 2020a | Fever 138/206, shortness of breath 30/206, cough 53/206, chest distress 49/206, fatigue 93/206, vomiting 24/206, diarrhoea 67/206, muscle soreness 44/206, pharyngodynia 13/206, poor appetite 70/206, low appetite 32/206, abdominal pain 9/206, other 52/206. |
| Lechien 2020 | Shortness of breath 115/417, sore throat 128/417, nasal obstruction 150/417, rhinorrhea 139/417, post nasal drip 116/417, face pain/heaviness 154/417, ear pain 61/417, dysphagia 42/417. |
| Li 2020a | Fever 198/225, shortness of breath 9/225, cough 126/225. |
| Li 2020b | Fever 476/548, shortness of breath 310/548, cough 415/548, chest pain 41/548, chest tightness 162/425, fatigue 258/548, vomiting 45/548, diarrhoea 179/548, dizziness 56/548, headache 62/548, myalgia 11/548, sore throat 28/548, abdominal pain 16/548, confusion 17/548. |
| Liu 2020a | Fever 112/137, shortness of breath 26/137, cough 66/137, diarrhoea 11/137, headache 13/137, myalgia or fatigue 44/137, haemoptysis 7/137, expectoration 6/137, heart palpitations 10/137. |
| Liu 2020b | Fever 198/245, shortness of breath 45/245, dry cough 140/245, fatigue 117/245, nausea 17/245, vomiting 10/245, diarrhoea 18/245, dizziness 10/245, headache 12/245, myalgia 75/245, sputum 67/245, pharyngalgia 17/245, anorexia 56/245, abdominal pain 3/245. |
| Mao 2020 | Fever 132/214, cough 107/214, diarrhoea 41/214, dizziness 36/214, headache 28/214, throat pain 31/214, anorexia 68/214, abdominal pain 10/214, impaired consciousness 16/214, central nervous system symptoms 53/214, acute cerebrovascular disease 6/214, peripheral nervous system 19/214, impaired taste 12/214, impaired smell 11/214, impaired vision3/214, nerve pain 5/214, ataxia 1/214, skeletal muscle injury 23/214. |
| Mo 2020 | Fever 126/155, shortness of breath 52/155, cough 97/155, chest pain 63/155, fatigue 60/155, nausea 5/155, vomiting 3/155, dizziness 2/155, head ache 8/155, myalgia/arthralgia 50/155, anorexia 26/155, abdominal pain 3/155. |
| Pan 2020 | Fever 95/204, vomiting 4/204, diarrhoea 35/204, muscle pain 15/204, lack of appetite 81/204, abdominal pain 2/204. |
| Qin 2020 | Fever 423/452, shortness of breath 232/452, cough 152/452, fatigue 212/452, nausea and vomiting 42/452, diarrhoea 122/452, headache 52/452, hemoptysis 12/452, myalgia 95/452, rhinorrhoea 8/452, pharyngalgia 22//452, expectoration 189/452, abdominal pain 23/452. |
| Tian 2020 | Fever 215/262, shortness of breath 18/262, cough 120/262, fatigue 69/262, headache 17/262. |
| Wan 2020 | Fever 120/135, shortness of breath 18/135, cough 102/135, chest tightness & shortness of breath 12/135, retching 4/135, diarrhoea 18/135, headache 34/135, myalgia or fatigue 44/135, sputum 12/135, hemoptysis4/135, pharyngalgia 24/135, loss of appetite 6/135, palpitations 5/135, fear of cold 14/135. |
| Wang 2020a | Fever 114/149, shortness of breath 2/149, cough 87/149, chest tightness 16/149, chest pain 5/149, nausea and vomiting 2/149, diarrhoea 11/149, headache 13/149, muscle pain 5/149, expectoration 48/149, sore throat 21/149, 5 snotty 5/149, chill 21/149. |
| Wang 2020b | Fever 761/1012, shortness of breath 231/1012, cough 531/1012, vomiting 36/1012, diarrhoea 152/1012, headache 152/1012, expectoration 220/1012, myalgia 170/1012, sore throat 144/1012, nasal congestion 69/1012, runny nose 57/1012, abdominal pain 37/1012, chills 186/1012, asymptomatic 30/1012. |
| Wang 2020c | Fever 311/339, shortness of breath 138/339, dry cough 179/339, chest tightness 88/339, fatigue 135/339, nausea 13/339, diarrhoea 43/339, dizziness 43/339, headache 12/339, myalgia 16/339, pharyngalgia 13/339, expectoration 93/339, anorexia 94/339. |
| Wang 2020e | Fever 107/114, shortness of breath 27/114, cough 91/114, chest tightness 27/114, diarrhoea 3/114, sputum 9/114, sore throat 6/114. |
| Wang 2020f | Fever 116/125, shortness of breath 57/125, cough 102/125, fatigue 43/125, nausea and vomiting 24/125, diarrhoea 50/125, dizziness/headache 11/125, myalgia 4/125, sputum 52/125, pharyngalgia 17/125, haemoptysis 4/125, sore throat 50/125, runny nose 4/125, erytha 2/125. |
| Wang 2020g | Fever 136/138, shortness of breath 43/138, dry cough 82/138, fatigue 96/138, nausea 15/138, vomiting 5/138, diarrhoea 14/138, dizziness 13/138, headache 9/138, myalgia 48/138, pharyngalgia 24/138, expectoration 37/138, anorexia 55/138, abdominal pain 3/138. |
| Xu 2020 | Fever 153/187, shortness of breath 137/187, cough 145/187, chest pain 13/187, nausea 23/187, headache 8/187, dizziness 17/187, diarrhoea 43/187, muscle pain 34/187, sore throat 9/187, poor appetite 151/187, weak 159/187. |
| Yan 2020 | Fever 90/128, shortness of breath 66/128, cough 112/128, fatigue 90/128, diarrhoea 48/128, headache 62/128, sputum 20/84, rhinorrhoea 17/128, nasal obstruction/thick discharge 35/128, loss of taste 70/120, anosmia/hyposmia 75/128. |
| Yao 2020 | Fever 80/108, shortness of breath 15/108, cough 84/108, diarrhoea 8/108, headache 1/108, myalgia or fatigue 28/108, expectoration 34/108. |
| Zhang 2020a | Fever 110/120, cough 90/120, chest pain/shortness of breath 44/120, fatigue 90/120, nausea 24/139, diarrhoea 18/139, anorexia 17/139, abdominal pain 8/139, belching 7/139, emesis 7/139. |
| Zhang 2020b | Fever 527/663, shortness of breath 161/663, cough 410/663, chest tightness 154/663, fatigue 208/663, nausea 31/663, vomiting 17/663, diarrhoea 61/663, dizziness 23/663, headache 20/663, muscle ache 63/663, expectoration 166/663, abdominal pain 5/663, bloating 8/663, unconsciousness 10/663. |
| Zhang 2020c | Fever 81/120, shortness of breath 38/120, cough 75/120, diarrhoea 7/120, headache 28/120, myalgia or fatigue 75/120, sputum 12/120, pharyngalgia 16/120, no appetite 3/120, gastrointestinal discomfort 10/120, sneeze 17/120. |
| Zhang 2020d | Fever 200/221, shortness of breath 64/221, cough 136/221, fatigue 159/221, diarrhoea 25/221, headache 17/221, pharyngalgia 22/221 anorexia 80/221, abdominal pain 5/221. |
| Zhao 2020a | Fever 79/101, shortness of breath 1/101, cough 63/101, nausea and vomiting 2/, diarrhoea 3/101, myalgia or fatigue 17/101, sore throat 12/101, asymptomatic 1/101. |
| Zhoa 2020b | Fever 91/118, shortness of breath 1/118, cough 64/118, fatigue or myalgia 23/118, nausea and vomiting 3/118, headache 4/118, sore throat 13/118, asymptomatic 3/118. |
| Zheng 2020 | Fever 122/161, shortness of breath 23/, cough 101/161, fatigue 64/161, nausea 6/161, diarrhoea 17/161, headache 12/161, muscle ache 18/161. |
| Zhou 2020 | Fever 180/191, cough 151/191, fatigue 44/191, nausea or vomiting 7/191, diarrhoea 9/191, myalgia 29/191, sputum 44/191. |

**Supplementary Table 4: Comorbidities in patients with COVID-19**

|  |  |
| --- | --- |
| **Study ID** | **Comorbidities** |
| Cai 2020 | Hypertension 47/298, diabetes 18/298, cardiovascular disease 25/298, liver disease 28/298, malignancy 4/298. |
| Cao 2020 | Hypertension 28/102, diabetes 11/102, respiratory disease 10/102, cardiovascular disease 5/102, cerebrovascular disease 6/102, chronic liver disease 2/102, chronic kidney disease 4/102, malignancy 4/102. |
| Chen 2020a | Cardiovascular and cerebrovascular diseases 55/249, respiratory system diseases 5/249, chronic hepatitis B 2/249, malignancy 1/249, endocrine system disease 25/249, digestive system diseases 9/249. |
| Chen 2020b | Hypertension 93/274, diabetes 47/274, cardiovascular disease 23/274, chronic heart failure 1/274, cerebrovascular disease 4/274, chronic lung disease 18/, malignancy 7/274, hepatitis B surface antigen positivity 11/274, chronic kidney disease 4/274, gastrointestinal diseases 3/274, metabolic arthritis 4/274, autoimmune disease 2/274, smoking history 31/274. |
| Deng 2020a | Hypertension 58/225, diabetes 26/225, cardiovascular disease 17/225, lung disease 25/225, malignancy 8/225, others 46/225. |
| Deng 2020b | Hypertension 36/112, diabetes 19/112, cardiovascular disease 15/112, chronic obstructive pulmonary disease 4/112, atrial fibrillation 4/112. |
| Du 2020 | Hypertension 58/179, diabetes 33/179, cardiovascular or cerebrovascular disease 29179/, chronic hepatic or renal insufficiency 4/179, malignancy 4/179, chronic digestive disorders 21/179, tuberculosis 8/179, peripheral vascular disease 4/179. |
| Feng 2020 | Hypertension 113/476, diabetes 49/476, cardiovascular disease 38/476, cerebrovascular disease 17/476, chronic obstructive pulmonary disease 22/476, malignancy 12/476, chronic nephropathy 7/476, immunosuppression 7/476, smoking history 11/476, others: 103/476. |
| Garg 2020 | Hypertension 79/159, diabetes 47/166, cardiovascular disease 68/162, heart failure 11/162, chronic obstructive pulmonary disease 17/159, chronic lung disease 55/159, asthma 27/159, gastrointestinal / liver disease 10/152, renal disease 20/153, immunosuppression 15/156, neurological disease 22/157, rheumatology / autoimmune disease 3/154, obesity 73/151. |
| Guan 2020a | Hypertension 165/1099, diabetes 81/1099, cardiovascular disease 27/1099, chronic obstructive pulmonary disease 12/1099, cerebrovascular disease 15/1099, hepatitis B infection 23/1099, chronic kidney disease 8/1099, malignancy 10/1099, immunosuppression 2/1099. |
| Guan 2020b | Hypertension 269/1590, diabetes 130/1590, cardiovascular disease 853/1590, chronic obstructive pulmonary disease 25/1590, hepatitis B infection 28/1590, chronic kidney disease 21/1590, malignancy 18/1590, immunodeficiency 3/1590, smoking history 111/1590. |
| Guo 2020 | Hypertension 43/174, cardiovascular disease 32/174, cerebrovascular disease 13/174, pulmonary disease 14/174, chronic liver disease 8/174, chronic kidney disease 13/174, 2 hepatitis B 2/174, malignancy 17/174, immunodeficiency 4/174. |
| Han 2020a | Hypertension 56/206, diabetes 21/206, 17 cerebrovascular disease 17/206, chronic lung disease 8/206, others 16/206. |
| Lechien 2020 | Allergies 85/417, smoking history 56/417. |
| Li 2020a | Hypertension 45/225. |
| Li 2020b | Hypertension 166/548, diabetes 83/548, cardiovascular disease 34/548, chronic obstructive pulmonary disease 17/548, asthma 5/548, chronic kidney disease 10/548, hepatitis B 5/548, tumor 24/513, tuberculosis 9/548, smoking history 92/544. |
| Liu 2020a | Hypertension 13/137, diabetes 14/137, cardiovascular disease 10/137, chronic obstructive pulmonary disease 2/137, malignancy 2/137, other 24/137. |
| Liu 2020b | Hypertension 52/245, diabetes 23/245, cardiovascular disease 18/245, chronic obstructive pulmonary disease 8/245, malignancy 9/245, chronic liver disease 7/245, HIV 2/245, smoking 10/245. |
| Mao 2020 | Hypertension 51/214, diabetes 30/214, cardiac or cerebrovascular disease 15/214, chronic kidney disease 6/214, malignancy 13/214. |
| Mo 2020 | Hypertension 37/155, diabetes /155, cardiovascular disease15/155, cerebrovascular disease 7/155, chronic obstructive pulmonary disease 9/155, chronic liver disease 14/155, HIV 4/155, chronic kidney disease 12/155, malignancy 14/155, tuberculosis 6/155, smoking history 12/155. |
| Pan 2020 | Cardiovascular disease 44/204, respiratory disease 9/204, malignancy 13/204, endocrine disease 24/204, nervous system disease 5/204. |
| Qin 2020 | Hypertension 135/452, diabetes 75/452, cardiovascular disease 27/452, cerebrovascular disease 11/452, chronic obstructive pulmonary disease 12/452, chronic liver disease 6/452, chronic kidney disease 10/452, malignancy 14/452, smoking history 7/452. |
| Wan 2020 | Hypertension 13/135, diabetes 12/135, cardiovascular disease 7/135, chronic obstructive pulmonary disease 1/135, chronic liver disease 3/135, malignancy 4/135, smoking history 9/135. |
| Wang 2020a | Cardio-cerebrovascular disease 28/149, respiratory 1/149, malignancy 2/149, digestive system diseases 8/149, endocrine diseases 9/149, neural system diseases 0/149, other 4/149. |
| Wang 2020b | Hypertension 46/1012, diabetes 27/1012, cardiovascular disease 15/1012, respiratory disease 20/1012, others 34/1012. |
| Wang 2020c | Hypertension 138/339, diabetes 54/339, cardiovascular disease 53/339, cerebrovascular disease 21/339, chronic obstructive pulmonary disease 21/339, chronic liver disease 2/339, chronic kidney disease 13/339, malignancy 15/339, autoimmune disease 5/339. |
| Wang 2020d | Hypertension 43/116, diabetes 18/116, cerebral infarction 7/116, chronic kidney disease 5/116, malignancy 12/116. |
| Wang 2020e | Hypertension 33/114, cardiovascular diseases 7/114, respiratory diseases 5/114, malignancy 1/114, digestive diseases 5/114, endocrine diseases 15/114, neural system diseases 1/114. |
| Wang 2020f | Cardiovascular disease 18/125, respiratory disease 2/125, malignancy 1/125, endocrine diseases 10/125, digestive diseases 8/125, rheumatic immune disease 1/125, nervous system diseases 1/125, haematological disease 1/125. |
| Wang 2020g | Hypertension 43/138, diabetes 14/138, cardiovascular disease 20/138, cerebrovascular disease 7/138, chronic obstructive pulmonary disease 4/138, chronic liver disease 4/138, HIV infection 2/138, chronic kidney disease 4/138, malignancy 10/138. |
| Xu 2020 | Hypertension 24/187, cardio-cerebrovascular disease 19/187, pulmonary disease 3/187, metabolic disease 21/187. |
| Yan 2020 | Hypertension 22/128, diabetes 14/128, cardiovascular disease 8/128, cerebrovascular disease 3/128, chronic obstructive pulmonary disease 4/128, asthma 13/128, HIV / immunosuppressive 15/128, chronic kidney disease 4/128, malignancy 6/128, sinusitis 5/128, obstructive sleep apnoea 4/128. |
| Yao 2020 | Hypertension 16/108, diabetes 5/108, cardiovascular disease 4/108, pulmonary disease 3/108, chronic liver disease 2/108, malignancy 2/108, smoking history 4/108. |
| Zhang 2020a | Hypertension 90/140, diabetes 17/140, cardiovascular disease 7/140, stroke 3/140, chronic obstructive pulmonary disease 2/140, fatty liver and abnormal liver function 8/140, chronic renal insufficiency 2/140, thyroid disease 5/140, electrolyte imbalance 4/140, secondary pulmonary tuberculosis 2/140, arrhythmia 5/140, aorta sclerosis 2/140, urolothiasisX3/140, cholelithiasis 6/140, chronic gastric and gastric ulcer 7/140, smoking history 9/140. |
| Zhang 2020b | Cardiovascular disease 16/663, respiratory disease 51/663, malignancy 14/663, endocrine disease 67/663, gastrointestinal disease 31/663, inflammatory disease 6/663, urinary system disease 21/663. |
| Zhang 2020c | Hypertension 19/120, diabetes 7/120, cardiovascular 9/120, chronic obstructive pulmonary disease 4/120, chronic liver disease 1/120, malignancy 7/120, other disease 5/120. |
| Zhang 2020d | Hypertensions 54/221, diabetes 22/221, cardiovascular disease 22/221, cerebrovascular disease, 15/221, chronic obstructive pulmonary disease 6/221, chronic liver disease 7/221, chronic kidney disease 6/221, malignancy 9/221, immunosuppression 3/221. |
| Zhao 2020a | Cardiovascular disease 16/101, respiratory disease 5/101 cerebrovascular disease 16/101, digestive disease 6/101, endocrine disease 3/101, surgical history 7/101, none 71/101. |
| Zhoa 2020b | Cardiovascular and cerebrovascular disease 18/118, respiratory disease 4/118, digestive disease 4/118, endocrine and rheumatology disease 9/118, urinary system disease 2/118, surgery history 9/118, none 81/118. |
| Zheng 2020 | Hypertension 22/161, diabetes 7/161, cardiovascular disease 4/161, chronic obstructive pulmonary disease 6/161, cerebrovascular disease 4/161, chronic liver disease 4/161. |
| Zhou 2020 | Hypertension 58/191, diabetes 36/191, cardiovascular disease 15/191, chronic obstructive pulmonary disease 6/191, chronic kidney disease 2/191, malignancy 2/191, other 22/191. |

**Supplementary Table 5: Acute kidney injury, end-stage renal failure and dialysis**

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| --- | --- |
| **Study ID** | **Data on acute kidney injury, end-stage renal failure and dialysis** |
| Cai 2020 | Acute kidney injury was more common amongst severe vs non-severe patients (22.4% vs 1.7%, p<0.001). No comment on end-stage renal failure or use of dialysis. |
| Cao 2020 | Survivors vs non-survivors: acute kidney injury 5.9% vs 88.2%. No comment on end-stage renal failure or use of dialysis. |
| Chen 2020a | No comment on AKI, end-stage renal failure or use of dialysis |
| Chen 2020b | Acute kidney injury present in 28% of the population. No comment on end-stage renal failure or use of dialysis. |
| Deng 2020a | Survivors vs non survivors: acute kidney injury (0% vs 18.3%, p<0.001). No comment on end-stage renal failure or use of dialysis |
| Deng 2020b | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Du 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Fan 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Feng 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Garg 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Guan 2020a | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Guan 2020b | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Guo 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Han 2020a | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Han 2020b | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Lechien 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Li 2020a | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Li 2020b | Acute kidney injury present in 17.3% of the population. Continuous renal replacement therapy used in 0.4% of the population. |
| Liu 2020a | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Liu 2020b | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Lu 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Mao 2020 | Patients with severe Covd-19 symptoms had multiple organ damage including kidney damage. No further comments on acute kidney injury, end-stage renal failure or use of dialysis. |
| Mo 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Pan 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Qin 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Tian 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Wan 2020 | Acute kidney injury present in 3.7% of the population. No comment on use of dialysis. |
| Wang 2020a | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Wang 2020b | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Wang 2020c | Acute kidney injury present in 8.1% of the population. Survivors vs non-survivors: acute kidney injury 4.0% vs 28.3%. No comment on end-stage renal failure or use of dialysis. |
| Wang 2020d | No episodes of acute kidney injury in patient cohort. |
| Wang 2020e | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Wang 2020f | Acute kidney injury present in 3.6% of the population. No comment on end-stage renal failure or use of dialysis. |
| Wang 2020g | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Xu 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Yan 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Yao 2020 | Acute kidney injury present in 14.8% of the population. Survivors vs non-survivors: acute kidney injury 23.8% vs 58.3%. |
| Zhang 2020a | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Zhang 2020b | Acute kidney injury present in 10.3% of the population. Survivors vs non-survivors: acute kidney injury 10.0% vs 27.8%, p=0.021. |
| Zhang 2020c | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Zhang 2020d | Acute kidney injury present in 4.5% of the population. No comment on end-stage renal failure or use of dialysis. |
| Zhao 2020a | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Zhao 2020b | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Zheng 2020 | No comment on acute kidney injury, end-stage renal failure or use of dialysis. |
| Zhou 2020 | Acute kidney injury present in 15% of the population and renal replacement therapy in 5% of the population. Survivors vs non-survivors: acute kidney injury 1% vs 50% and renal replacement therapy 19% vs 0%. |

**Supplementary Table 6. Imaging features in patients with COVID-19**

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| --- | --- |
| **Study ID** | **Imaging features reported** |
| Cai 2020 | ***Chest CT & Chest X-ray:*** no change 44/298, mild 32/298, advanced 185/298, severe 37/298. |
| Cao 2020 | ***Chest CT & Chest X-ray:*** local patchy shadowing 30/102, bilateral patchy shadowing 72/102, ground-glass opacity 18/102. |
| Chen 2020a | ***Chest CT or Chest X-ray:*** bilateral pneumonia 203/249 unilateral lesion 39/249. |
| Chen 2020b | ***Chest CT:*** bilateral involvement on chest CT scan 265/274.  ***Chest X-ray:*** abnormalities 274/274. |
| Feng 2020 | ***Chest CT***: bilateral lungs involved 373/442, consolidation 87/442, Ground-glass opacity 425/442, linear opacity 129/442, pleural effusion 25/442, plural thickening 238/442. |
| Guan 2020a | ***Chest CT:*** ground glass opacity 550/975, local patchy shadowing 409/975, bilateral patchy shadowing 505/975, interstitial abnormalities 143/975.  ***Chest X-ray:*** ground glass opacity 55/274, local patchy shadowing 77/274, bilateral patchy shadowing 100/274, interstitial abnormalities 12/274. |
| Guan 2020b | ***Chest CT:*** abnormal 1130/1590.  ***Chest X-ray:*** abnormal 243/1590. |
| Guo 2020 | ***Chest CT:*** abnormalities 174/174. |
| Li 2020a | ***Chest CT:*** lung infiltrates 225/225, multiple patchy glassy shadows in both lungs 193/225. |
| Li 2020b | ***Chest CT:*** multi-lobar pulmonary infiltrates 436/461, uni-lobar lesion 21/461. |
| Liu 2020a | ***Chest CT:*** bilateral lung involvement 116/137, multiple patch-like shadows 36/137, bilateral ground-glass opacity 55/137, consolidation shadow 25/137. |
| Liu 2020b | ***Chest CT***: consolidation or ground glass opacity 237/245. |
| Mo 2020 | **Chest CT:** bilateral pneumonia 143/155, pleural effusion 16/155. |
| Wan 2020 | ***Chest X-ray:***  bilateral involvement and multiple patchy, flocculent, or strip ground glass shadow 135/135. |
| Wang 2020a | ***Chest CT:*** centrilobular nodules 3/149, tree-in-bud 1/149, reticular pattern 79/149, subpleural linear opacity 31/149, bronchial dilatation 26/149, cystic change 12/149, lymphadenopathy 12/149, pleural effusion 10/149. |
| Wang 2020b | ***Chest CT:*** small patchy opacities 355/917, large ground-glass opacity 508/917, large consolidated opacity 54/917. |
| Wang 2020e | ***Chest CT:*** CT at initial diagnosis: ground-glass opacity 30/114, consolidation 30/114, both 50/114  CT at follow-up (interval of 4-19 days): no change 0/114, lesion disappeared 0/114, lesion mitigated slightly 4/114, mild disease progression 7/114, moderate disease progression 5/114, severe disease progression 0/114. |
| Wang 2020f | ***Chest CT:*** bilateral pneumonia 100/125, multiple mottling and ground-glass opacity 26/125, no abnormality 5/125. |
| Wang 2020g | ***Chest CT:*** bilateral distribution of patchy shadows or ground glass opacity 138 /138. |
| Xu 2020 | ***Chest CT***: mildly ill patient: one lateral lesion 7/107, bilateral lesion 70/107, multi-segment lesion 70/107.  Severely ill patients: multi-segment lesion 45/45.  Critically ill patients: bilateral or multi-segment lesion 62/62 |
| Yan 2020 | ***Chest X-ray:*** positive 38/60. |
| Yao 2020 | ***Chest X-ray:*** unilateral infiltrates 10/108, bilateral infiltrates 98/108. |
| Zhang 2020a | ***Chest CT:*** bilateral involvement 121/135, single lung left 5/135, single lung right 8/135, normal 1/135. |
| Zhang 2020b | ***Chest CT:*** bilateral pneumonia 500/663. |
| Zhang 2020c | ***Chest CT:*** bilateral 68/120, ground glass opacities 107/120, consolidations 62/120, pleural effusion 9/120. |
| Zhang 2020d | ***Chest X-ray:*** bilateral involvement 215/221. |
| Zhao 2020a | ***Chest CT:*** ground glass opacity 84/101, mixed ground glass opacity and consolidation 65/101. |
| Zhao 2020b | ***Chest CT:*** ground glass opacity 101/118, consolidation 64/118, mixed ground glass opacity and consolidation 74/118, pleural effusion 14/118. |
| Zheng 2020 | ***Chest CT:*** ground glass opacity 82/161, focal lesion 113/161, bilateral patch shadow 89/161, interstitial fibrosis 2/161. |
| Zhou 2020 | ***Chest CT:*** consolidation 112/191, ground glass opacity 136/191, bilateral pulmonary infiltration 143/191. |

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