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# Clinical presentation and course of COVID-19

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## ABSTRACT

Information about the clinical presentation and course of COVID-19 is rapidly evolving. Data are emerging from retrospective clinical studies conducted in Wuhan, China, showing the symptoms and characteristics of COVID-19 caused by severe acute respiratory virus coronavirus 2 (SARS-CoV-2) infection, including fever, cough, and shortness of breath. Radiographic data on COVID-19 cases reveal bilateral opacities on chest radiography and ground-glass opacities on computed tomography. Data on laboratory markers and mortality and morbidity are also emerging.

## CLINICAL SYMPTOMS

Data are emerging from retrospective clinical studies conducted in Wuhan, China, showing the symptoms and characteristics of COVID-19 caused by severe acute respiratory virus coronavirus 2 (SARS-CoV-2) infection. The largest of these studies reported on 191 patients in two hospitals.[1] Fever was present in 94% of patients, cough in 72% to 82%, sputum production in 22% to 26%, myalgia in 15%, and diarrhea in 4% to 5%. A pooled analysis of 278 patients from 3 studies cited similar numbers but with some variation in less specific symptoms such as myalgia in up to 43.9% of the patients and diarrhea in up to 10.1%.[2] A research letter citing statistics from 21 critically ill patients at the Evergreen Hospital in Kirkland, Washington, listed the most common symptoms as cough (47.6%), shortness of breath (76.2%), and fever (52.4%).[3] Another study from China using data from outside Wuhan analyzed the prevalence of gastrointestinal (GI) symptoms in 651 hospitalized patients with COVID-19.[4] They reported that 74 of the patients (11.4%) had at least one GI symptom (nausea, vomiting, or diarrhea). Other characteristics described were sore throat (99 patients, 15.2%), fatigue (119, 18.8%), shortness of breath (27, 4.1%), headache (67, 10.3%), cough (435, 77.6%), and fever (130, 18.3%). A systematic review by Rodriguez-Morales et al of data on 656 cases published in January and February 2020 reported fever in 88.7%, cough in 57.6%, dyspnea in 45.6%, myalgia or fatigue in 29.4%, sore throat in 11.0%, headache in 8.0%, and diarrhea in 6.1%.[5]

## LABORATORY FINDINGS

Using data from the retrospective Wuhan study, Zhou et al compared clinical characteristics and laboratory findings for survivors (n = 137) and nonsurvivors (n = 54) using univariate and multivariate logistic regression models to determine significant differences.[1] Results showed that a higher Sequential Organ Failure Assessment (SOFA) score[a] and CURB-65 score[b] were associated with decreased survival. Statistically significant laboratory markers in nonsurvivors included lymphopenia (lymphocyte count < 0.8 × 109, $P < .0001$), platelet count (< 100 × 103 per L, $P < .0001$), albumin (29.1 vs 33.6 g/L, $P < .0001$), alanine transaminase (> 40 U/L, $P = .005$), creatinine (> 133 µmol/L, $P = .045$), high-sensitivity cardiac troponin I (> 28 pg/mL, $P < .0001$), prothrombin time (< 16 seconds, $P = 0.016$), D-dimer (< .5 µg/mL, $P < .0001$), and serum ferritin (> 300 µg/L, $P = .0008$). The meta-analysis by Rodriguez-Morales et al found lymphopenia was present in 43.1% of the cases, high C-reactive protein in 58.3%, and high-lactate dehydrogenase in 57%.[4]

The statements and opinions expressed in COVID-19 Curbside Consults are based on experience and the available literature as of the date posted. While we try to regularly update this content, any offered recommendations cannot be substituted for the clinical judgment of clinicians caring for individual patients.

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**Footnotes**

[a] SOFA score refers to a calculation used to determine mortality in the intensive care unit setting, proposed in May 2010. The calculation involves partial pressure of oxygen from blood gas, inhaled fraction of oxygen, need for mechanical ventilation, platelet level, Glasgow coma scale, bilirubin, mean arterial pressure or the need for vasoactive medication, and serum creatinine.[6]

[b] CURB-65 score is a pneumonia severity calculation that uses confusion, blood urea nitrogen, respiratory rate, blood pressure, and age to determine the need for hospital admission.[7]

## RADIOGRAPHIC PRESENTATION

The Rodriguez-Morales et al meta-analysis also reviewed radiographic data on COVID-19 cases. They reported that 25% of the cases had unilateral opacity on chest radiography, 72.9% had bilateral opacities on chest radiography, and 68.5% had ground-glass opacity on computed tomography.[4] Radiographic findings of consolidation ($P$ = .0065) and ground-glass opacity ($P$ = .049) have been found to be statistically associated with increased mortality rates.[1]

## MORBIDITY AND MORTALITY

The data from the state of Washington show that 57.1% developed severe acute respiratory distress syndrome (ARDS) and 71% required mechanical ventilation, with a mortality rate of 52.4%.[3] The multinational systematic review by Rodriguez-Morales et al reported a death rate of 15.9% and a discharge rate of 38.1%.[5] About 7.1% of patients developed ARDS. Only 1.6% of the cases developed a secondary infection.

The pooled analysis of 278 patients in the Wuhan, China, by Lai et al showed that 72 patients were admitted to the intensive care unit, 20.1% developed ARDS, 8.3% required invasive mechanical ventilation, and 3.2% required extracorporeal membrane oxygenation for refractory hypoxemia.[2] Hemodynamic shock was seen in 6.8% of patients. The mortality rates ranged from 4.3% to 14.6%. Mortality rates can vary if patient admission criteria is not standardized (ie, if a lower threshold for admission is present then the mortality rate will be lower). This may also reflect testing bias as cause of death may not be attributed to SARS-CoV-2 if the patient went untested or died at home without a clear diagnosis after discharge. These data showed a median time of death from first symptoms was 14 days. Cause of death has been attributed to multiple organ failure with ARDS, cardiac injury, acute kidney injury, and shock.

At the time of writing (4/15/2020), there were 613,187 cases in the United States with 27,085 deaths, a 4.4% mortality rate. Worldwide, there are 2,023,663 confirmed cases with 132,276 deaths, a mortality rate of 6.5%.[5] These numbers are more likely to be closer to the true mortality rate as more patients are tested, which captures more cases of less severe disease in the denominator.

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