Initial clinical features of suspected coronavirus disease 2019 in two emergency departments outside of Hubei, China

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Abstract
With an increasing number of Coronavirus Disease 2019 (COVID-19) cases outside of Hubei, emergency departments (EDs) and fever clinics are facing challenges posed by the large number of admissions of patients suspected to have COVID-19. Therefore, it is of crucial importance to study the initial clinical features of patients, to better differentiate between infected and uninfected patients outside Hubei. A total of 116 patients suspected of having COVID-19 who presented to two emergency departments in Anhui for the first time between 24 January 2020 and 20 February 2020 were enrolled in the study. The initial clinical data of these patients, such as epidemiological features, symptoms, laboratory results, and chest computed tomography (CT) findings were collected using a standard case report form on admission. Thirty-two patients were diagnosed with COVID-19; the remaining 84 patients were referred to as negative cases. The median age of the diagnosed patients was 46 years, but only 35 years for negative cases. History of exposure to Wuhan or COVID-19 patients in the previous 2 weeks was observed in 63% of the diagnosed and 44% of negative cases. Median time from illness onset to ED admission was 5 days for all patients, diagnosed patients, and negative cases, respectively. Fever was observed in 27 (84%) and 57 (68%) diagnosed and negative cases, respectively. Nineteen (59%) diagnosed and 24 (29%) negative cases had lymphopenia on admission in ED. A chest CT scan on admission revealed the presence of pneumonia in the majority of the diagnosed patients (30 out of 32, 94%) and in 56 (67%) negative cases. Bilateral involvement and ground-glass opacity (GGO) were present in 91% and 47% of the diagnosed patients. Thirty-two patients were diagnosed with COVID-19; the remaining 84 patients were referred to as negative cases. The median age of the diagnosed patients was 46 years, but only 35 years for negative cases. History of exposure to Wuhan or COVID-19 patients in the previous 2 weeks was observed in 63% of the diagnosed and 44% of negative cases. Median time from illness onset to ED admission was 5 days for all patients, diagnosed patients, and negative cases, respectively. Fever was observed in 27 (84%) and 57 (68%) diagnosed and negative cases, respectively. Nineteen (59%) diagnosed and 24 (29%) negative cases had lymphopenia on admission in ED. A chest...
Pneumonia caused by this coronavirus was identified as a novel acute respiratory infectious disease and was named coronavirus disease (COVID-19) by the World Health Organization (WHO) on 11 February 2020.

2019-nCoV shares over 79% of its genome sequence with the coronavirus that causes severe acute respiratory syndrome (SARS-CoV), a member of the subgenus Sarbecovirus (Beta-CoV lineage B); owing to the overall similarity between both viruses, 2019-nCoV was renamed to SARS-CoV-2. Based on the available evidence, it appears that SARS-CoV-2 can be transmitted by asymptomatic carriers, which contributes to its basic reproduction number \(R_0\) and pandemic potential. In addition to the high \(R_0\) of SARS-CoV-2, the convenience of modern means of transportation further enhance its global spread. COVID-19 is still spreading rapidly in China and globally, with 80,993 confirmed cases and 2,761 deaths as of 26 February 2020. COVID-19 has become a public health emergency of international concern, and several Asian and European countries (such as Japan and Italy) are registering increases in the number of infected patients.

With the increase in the number of confirmed cases outside of Hubei, emergency departments (EDs) and fever clinics around the world are having to accommodate a large number of patients. Preliminary diagnosis based on initial clinical features may contribute to disease control and prevention of further infection, especially in areas with limited access to rapid nucleic acid amplification tests. However, in a recent report by Li, COVID-19 patients outside Hubei exhibited relatively mild symptoms, indicating that the severity of SARS-CoV-2 infection is variable. Chest computed tomography (CT) has a high diagnostic value in the evaluation of COVID-19 patients. However, severe lung abnormalities are only apparent on chest CT scans approximately 10 days after the onset of symptoms. This poses a challenge for the early diagnosis and intervention in patients with suspected COVID-19 in the ED until a confirmation is obtained through real-time reverse-transcription polymerase chain reaction (PCR) analysis. Currently, limited data regarding the initial clinical features of COVID-19 from EDs outside of Hubei are available. Here, we describe the initial clinical features (including epidemiological characteristics, symptoms, laboratory results, and CT findings) of patients with suspected COVID-19 in an Anhui province ED, to provide insights into the preliminary diagnosis of COVID-19 in ED outside of Hubei, China.

2 | MATERIALS AND METHODS

2.1 | Patients

This retrospective study focused on the initial clinical features of patients with suspected COVID-19 who presented to the ED of the First Affiliated Hospital of USTC and the Infectious Hospital of the First Affiliated Hospital of USTC for the first time between 24 January 2020 and 20 February 2020. Patients were considered as suspected to have COVID-19 based on symptoms, exposure history, and guidelines for the diagnosis and treatment of pneumonia caused by novel coronavirus infection (trial version III) published by the National Health Commission of the People’s Republic of China. All suspected patients were admitted in quarantined observing rooms in ED. A nucleic acid amplification test was performed on swab specimens from patients with suspected disease at admission. Patients with a positive diagnosis were admitted to the hospital, while patients with a negative initial result were kept in quarantine and underwent a second nucleic acid test after 24 hours; of these, patients with a second negative result on the nucleic acid test were considered to not have an infection and were discharged from the hospital once they tested negative for SARS-CoV-2 antigens on two consecutive tests.

The present study sample consisted of 116 patients, 32 of whom were diagnosed with SARS-CoV-2 infection. This study was approved by the ethics committee of the First Affiliated Hospital of USTC and Infectious Hospital of the First Affiliated Hospital of USTC.

The inclusion criteria were (a) patients defined as suspected SARS-CoV-2 infection based on guidelines for the diagnosis and treatment of pneumonia caused by novel coronavirus infection (trial version III), (b) presentation to, clinical observation and quarantine in our ED and (c) nucleic acid amplification test performed in our ED. The exclusion criteria were (a) transfer from another hospital or previous visit to our hospital and (b) previous diagnosis of COVID-19.
2.2 | Data collection

The date of illness onset and duration of observation were collected for each patient. Epidemiological data were collected from brief interviews with the patient. Several investigators interviewed each suspected patient on admission to collect exposure histories during the 2 weeks before illness onset. All interviews were performed before an ultimate diagnosis was made. Clinical and laboratory data on admission were obtained from detailed medical records, collected in a standardized case report form by two experienced emergency doctors. Clinical data collected included demographic characteristics, symptoms of infection (such as cough, expectoration, chest pain, and weakness) and presence of comorbidities. Laboratory tests included a complete blood count, serum biochemistry, interleukin-6 (IL-6) test, creatine kinase test, lactate dehydrogenase test, and tests for the identification of other respiratory pathogens. Chest CT examinations were performed upon ED admission in all patients with suspected disease. Two certified chest radiologists independently reviewed the CT images while blinded to the names and clinical data of the patients. Not all patients presented at the same infection stage and some data were missing; thus, data could not be integrated.

2.3 | Statistical analysis

SPSS Statistics 20 (IBM Corp, Armonk, New York) was used for statistical analysis. Continuous variables were assessed as either means and standard deviations or medians with interquartile ranges (IQR). For categorical variables, the percentages of patients in each category were calculated.

3 | RESULTS

3.1 | Epidemiological characteristics

In total, 116 patients with the suspected disease were included in the study. Thirty-two patients were confirmed to have COVID-19 and referred to as “diagnosed patients”; the remaining 84 patients were referred to as “negative cases.” The median age for diagnosed patients was 46 years, and 35 years for negative cases (Table 1). There was a slight female predominance in both groups. There were 6 (19%) smokers among diagnosed patients and 13 (15%) among negative cases. Seven (22%) diagnosed and 15 (18%) negative cases had hypertension. Four (13%) diagnosed and 6 (7%) negative cases had diabetes. There were no other commonly found comorbidities in either group. There was no specific exposure history common to all patients with suspected disease: 8 (25%) diagnosed patients had visited Wuhan in the previous 2 weeks and 12 (38%) had been exposed to patients with infection in the previous 2 weeks. In negative cases, these numbers were 7 (20%) and 8 (24%), respectively. None of the patients had a history of exposure to the seafood market in Wuhan. Median time from illness onset to ED admission for all patients with the suspected disease was 5 (IQR, 2-7), 5 (IQR,4-7), and 4 (IQR,1-9) for all patients, diagnosed patients, and negative cases, respectively.

3.2 | Clinical manifestation

Fever was observed in 27 (84%) and 57 (68%) diagnosed and negative cases, respectively. The cough was the second most commonly observed symptom, found in 21 (66%) diagnosed patients and in 52 (62%) negative cases. Myalgia or fatigue seemed more common in diagnosed patients (16%) than in negative cases (7%). Although the number of negative cases (17) with expectoration was twice as high as that of diagnosed patients (5), the prevalence of expectoration was 20% and 16%, respectively. Chest congestion was noted in 3 (9%) diagnosed patients and 2 (2%) negative cases. Only 1 (1%) undiagnosed patient had hemoptysis. One (3%) of the diagnosed and 2 (2%) of the negative cases had a headache, while 1 (3%) diagnosed and 1 (1%) negative cases had diarrhea. Among the 32 diagnosed patients, the average highest temperatures on the 1st and 2nd days in the ED were 37.3 ± 0.8°C and 37.7 ± 0.8°C, respectively; the 1st-day values ranged from 36°C to 39.2°C and the 2nd-day values ranged from 36.4°C to 39.4°C. Among the 84 negative cases, the average highest temperatures on the 1st and 2nd days in the ED were 37.1 ± 0.7°C and 37 ± 0.6°C, respectively; the 1st-day values ranged from 36°C to 39.4°C and the 2nd-day values ranged from 36.2°C to 38.9°C.

3.3 | Laboratory tests

Laboratory tests on admission showed that 7 (22%) diagnosed and 4 (5%) negative cases had leukopenia (white blood cell count <3.5 × 10⁹/L), 3 (9%) diagnosed and 16 (19%) negative cases had neutrophilia (neutrophil count >6.3 × 10⁹/L) and 19 (59%) diagnosed and 24 (29%) negative cases had lymphopenia (lymphocyte count <1.1 × 10⁹/L) (Table 2). Ten (31%) diagnosed and 29 (35%) negative cases had decreased lymphocyte percentages. Increased D-dimer levels were observed in 3 (9%) diagnosed and 9 (11%) negative cases. In terms of sensitive indicators of infection, increased procalcitonin levels were found only in 5 (6%) negative cases. The erythrocyte sedimentation rate (ESR) was elevated in 16 (50%) diagnosed patients and 16 (19%) negative cases. Increased C-reactive protein (CRP) levels were confirmed in 21 (66%) diagnosed and 40 (48%) negative cases, while IL-6 levels were elevated in 7 (22%) diagnosed and 7 (8%) negative cases. The results of these indicators were not integrated, owing to different infection stages and missing data.

3.4 | Chest CT findings

Chest CT was performed in all patients with suspected disease upon admission to the ED. Most diagnosed patients (30/32, 94%) and
56 (67%) negative cases had pneumonia (Table 3). Bilateral involvement was seen in most diagnosed patients (29 out of 32, 91%) and 34 (40%) negative cases. Ground-glass opacity (GGO) was identified on chest CT in 15 (47%) diagnosed and 10 (12%) negative cases; Only 4 (13%) of the diagnosed patients had a spider web pattern visible on CT images. Only 1 (3%) diagnosed patient showed spider web and crazy-paving patterns on chest CT. No negative cases developed any of these patterns or symptoms upon admission. Among some patients with suspected disease, similar CT findings were found in both diagnosed and negative cases upon admission (Figure 1).

### DISCUSSION

Anhui is adjacent to Hubei and a large population migrates between the two provinces. As in other regions, secondary transmission of imported cases in the population rapid grows after imposed traffic control in Hubei since 23 January 2020. It is unclear whether the clinical characteristics of suspected cases are similar to those of the original cases in Hubei and whether there are differences in the initial clinical features after secondary transmission. In this study, we reported the initial clinical findings of 116 patients with suspected COVID-19 in EDs in Anhui.

### TABLE 1 Epidemiological characteristics and initial clinical symptoms of 116 patients suspected with COVID-19 in EDs in Anhui

| Characteristics                      | All suspected patients (n = 116) | Diagnosed patients (n = 32) | Negative cases (n = 84) |
|--------------------------------------|---------------------------------|-----------------------------|-------------------------|
| Median (interquartile) age (y)       | 40 (27-53)                      | 46 (35-52)                  | 35 (27-53)              |
| <30                                  | 30 (26)                         | 5 (16)                      | 25 (30)                 |
| 30-49                                | 50 (43)                         | 17 (53)                     | 33 (39)                 |
| 50-69                                | 26 (22)                         | 7 (22)                      | 19 (23)                 |
| ≥70                                  | 10 (9)                          | 3 (9)                       | 7 (8)                   |

**Sex**

|          | All suspected patients (n = 116) | Diagnosed patients (n = 32) | Negative cases (n = 84) |
|----------|---------------------------------|-----------------------------|-------------------------|
| Male     | 56 (46)                         | 15 (47)                     | 41 (46)                 |
| Female   | 65 (54)                         | 17 (53)                     | 48 (54)                 |

**BMI**

|          | All suspected patients (n = 116) | Diagnosed patients (n = 32) | Negative cases (n = 84) |
|----------|---------------------------------|-----------------------------|-------------------------|
| Hypertension | 22 (19)                      | 7 (22)                      | 15 (18)                 |
| Diabetes | 10 (9)                         | 4 (13)                      | 6 (7)                   |
| Chronic obstructive pulmonary disease | 6 (5)                        | 2 (6)                       | 4 (5)                   |
| Cerebrovascular disease | 5 (4)                         | 1 (3)                       | 4 (5)                   |
| Mental disorder | 4 (3)                        | 1 (3)                       | 3 (4)                   |
| Coronary heart disease | 5 (4)                        | 2 (6)                       | 3 (4)                   |
| Tumor    | 4 (3)                          | 2 (6)                       | 2 (2)                   |
| Liver disease | 5 (4)                        | 2 (6)                       | 3 (4)                   |
| Renal diseases | 2 (2)                        | 1 (3)                       | 1 (1)                   |
| Exposure history in Wuhan <2 wk | 15 (13)                      | 8 (25)                      | 7 (8)                   |
| Exposure history to infected cases <2 wk | 32 (28)                      | 12 (38)                     | 20 (24)                 |
| Days from illness onset | 5 (2-7)                      | 5 (4-7)                     | 4 (1-9)                 |

**Initial symptoms**

|          | All suspected patients (n = 116) | Diagnosed patients (n = 32) | Negative cases (n = 84) |
|----------|---------------------------------|-----------------------------|-------------------------|
| Fever    | 84 (72)                         | 27 (84)                     | 57 (68)                 |
| Cough    | 73 (63)                         | 21 (66)                     | 52 (62)                 |
| Myalgia or fatigue | 11 (9)                        | 5 (16)                      | 6 (7)                   |
| Expectoration | 22 (19)                      | 5 (16)                      | 17 (20)                 |
| Chest stuffiness | 5 (4)                        | 3 (9)                       | 2 (2)                   |
| Haemoptysis | 1 (1)                        | 0 (0)                       | 1 (1)                   |
| Headache | 3 (3)                          | 1 (3)                       | 2 (2)                   |
| Diarrhea | 2 (2)                          | 1 (3)                       | 1 (1)                   |

**Highest temperature (°C)**

|          | All suspected patients (n = 116) | Diagnosed patients (n = 32) | Negative cases (n = 84) |
|----------|---------------------------------|-----------------------------|-------------------------|
| 1st day in ED | 37.2 ± 0.7 (36.0-39.4) | 37.3 ± 0.8 (36.0-39.2) | 37.1 ± 0.7 (36.0-39.4) |
| 2nd day in ED | 37.1 ± 0.7 (36.2-39.4) | 37.7 ± 0.8 (36.4-39.4) | 37.0 ± 0.6 (36.2-38.9) |

Note: Data are n(%), n/N (%), mean ± SD (minimum-maximum) or and median (IQR), where N is the total number of patients with available data. Abbreviation: BMI, basal metabolic index; ED, emergency department; IQR, interquartile range; SD, standard deviation.
COVID-19 who presented in EDs and fever clinics for the first time. In total, 32 patients were eventually diagnosed with SARS-CoV-2 infection (“diagnosed patients”). Similar to the confirmed cases in Hubei, the patients who were eventually found to be infected were older than the ones who were not infected: most diagnosed patients were middle-aged or older adults and most negative cases were young or middle-aged patients.11 However, patients of all age groups have been found to be infected with SARS-CoV-2, and the proportion of older adults among diagnosed and negative cases was similar. Smokers were equally distributed in both groups, indicating that smoking is not a specific risk factor for diagnosed patients.

The median time from illness onset to ED admission was 5 (interquartile range [IQR]: 2-7), 5 (IQR: 4-7) and 4 (IQR: 1-9) days for all patients, diagnosed patients and negative cases, respectively. Fever (84%), cough (66%), myalgia and fatigue (16%) were the most common symptoms in diagnosed patients, while fever (68%), cough (62%) and expectoration (20%) were the most common in negative cases. More than half of the diagnosed patients showed a temporal pattern in symptoms: fever (84%), cough (66.0%), myalgia and fatigue (16.0%) were the most common symptoms among diagnosed patients, while fever (68%), cough (62%) and expectoration (20%) were the most common in negative cases. More than half of the diagnosed patients showed a

### Table 2: Laboratory findings in 116 patients suspected with COVID-19 on admission in EDs in Anhui

| Laboratory variables               | All suspected patients (n = 116) | Diagnosed patients (n = 32) | Negative cases (n = 84) | Normal range          |
|-----------------------------------|---------------------------------|-----------------------------|-------------------------|-----------------------|
| White blood cell count (×10⁹/L)   | 6.0 ± 2.3 (2.1-18.4)            | 5.3 ± 2.1 (2.1-11.1)        | 6.3 ± 2.3 (2.3-18.4)    | 3.5-9.5               |
| >9.5                              |                                 | 1 (3)                       | 6 (7)                   |                       |
| <3.5                              |                                 | 7 (22)                      | 4 (5)                   |                       |
| Neutrophil count (×10⁹/L)         | 4.2 ± 2.1 (0.8-15.4)            | 3.7 ± 1.9 (1.4-8.7)         | 4.4 ± 2.2 (0.8-15.4)    | 1.8-6.3               |
| >6.3                              |                                 | 3 (9)                       | 16 (19)                 |                       |
| Lymphocyte count (×10⁹/L)         | 1.4 ± 0.6 (0.2-3.1)             | 1.1 ± 0.6 (0.3-2.8)         | 1.5 ± 0.6 (0.2-3.1)     | 1.1-3.2               |
| <1.1                              |                                 | 19 (59)                     | 24 (29)                 |                       |
| Lymphocyte percentage (%)         | 25.9 ± 11.8 (3.4-56.8)          | 26.4 ± 10.8 (7.5-51.1)      | 26.4 ± 12.2 (3.4-56.8)  | 20-50                 |
| <20                               |                                 | 10 (31)                     | 29 (35)                 |                       |
| Haemoglobin (g/L)                 | 136.3 ± 18.8 (62-168)           | 135.1 ± 23.9 (78-168)       | 136.5 ± 16.7 (62-162)   | 115-150               |
| Platelet count (×10⁹/L):          | 187.9 ± 64.2 (7.383)            | 157.2 ± 54.5 (83-284)       | 199.6 ± 64.1 (7.383)    | 125-350               |
| D-dimer (mg/L)                    | 0.3 ± 0.4 (0-3.8)               | 0.2 ± 0.2 (0.01-0.9)        | 0.3 ± 0.5 (0.01-3.8)    | 0.01-0.55             |
| >0.5                              |                                 | 3 (9)                       | 9 (11)                  |                       |
| <0.5                              |                                 | 29 (91)                     | 62 (74)                 |                       |
| Alanine aminotransferase (U/L)    | 25.2 ± 20.4 (6-171)             | 30.1 ± 31.2 (8-171)         | 23.3 ± 14.0 (6-75)      | 7-40                  |
| Aspartate aminotransferase (U/L)  | 25.7 ± 11.9 (11-79)             | 31.1 ± 15.8 (15-79)         | 23.7 ± 9.5 (11-73)      | 12-40                 |
| Potassium (mmol/L)                | 4.0 ± 0.4 (3.1-5.1)             | 4.0 ± 0.4 (3.2-5.1)         | 4.0 ± 0.4 (3.1-5.1)     | 3.5-5.3               |
| Sodium (mmol/L)                   | 137.7 ± 32 (123-153)            | 136.0 ± 3.7 (123-142)       | 138.4 ± 2.8 (129-153)   | 137-147               |
| Creatine (µmol/L)                 | 67.0 ± 17.8 (33-157)            | 70.7 ± 19.6 (33-117)        | 65.7 ± 17.1 (35-157)    | 41-81                 |
| Creatine kinase (U/L)             | 132.7 ± 94.2 (22-570.1)         | 132.6 ± 118.1 (30-4570.1)   | 132.8 ± 78.3 (22-443.1) | 22-269                |
| Lactate dehydrogenase (U/L)       | 213.0 ± 80.0 (125-502)          | 246.5 ± 82.1 (136-468)      | 193.5 ± 72.2 (125-502)  | 120-250               |
| Procalcitonin (ng/mL)             | 0.2 ± 0.2 (0.01-1.63)           | 0.1 ± 0.1 (0.01-0.28)       | 0.2 ± 0.2 (0.01-1.63)   | 0-0.5                 |
| >0.5                              |                                 | 0 (0)                       | 5 (6)                   |                       |
| <0.5                              |                                 | 31 (97)                     | 68 (81)                 |                       |
| Erythrocyte sedimentation rate (mm/h) | 30.8 ± 31.8 (1-140)        | 42.4 ± 33.6 (6-119)         | 24 ± 29 (1-140)         | 0-20                  |
| >20                               |                                 | 16 (50)                     | 16 (19)                 |                       |
| <20                               |                                 | 10 (29)                     | 29 (35)                 |                       |
| CD4/CD8                           | 1.7 ± 1.3 (0.4-11.3)            | 1.5 ± 0.6 (0.4-2.9)         | 1.8 ± 1.6 (0.6-11.3)    | 1.10-1.72             |
| IL-6, pg/mL                       |                                 | <7                          | 7 (8)                   |                       |
| >7                                |                                 | 7 (22)                      | 10 (12)                 |                       |
| <7                                |                                 | 19 (59)                     | 44 (52)                 |                       |
| C-reactive protein (mg/L)         | 19.3 ± 27.0 (0.2-125.6)         | 20.7 ± 24.0 (0.5-112)       | 18.7 ± 28.2 (0.2-125.6) | 0-8                   |
| >8                                |                                 | 21 (66)                     | 40 (48)                 |                       |
| <8                                |                                 | 11 (34)                     | 44 (52)                 |                       |

Note: Data are n(%), n/N (%), mean ± SD (minimum-maximum) or and median (IQR), where N is the total number of patients with available data. Abbreviation: ED, emergency department; IQR, interquartile range; SD, standard deviation.

*Percentages do not total 100% owing to missing data.
decreased lymphocyte count (59%) and increased ESR (50%) and CRP (66%) levels.

Having initial clinical symptoms, fever being the most common is the main reason for visiting the ED. In our study, fever and cough were the most common symptoms observed in all patients with suspected disease. Due to the high seasonal incidence of respiratory diseases, these were not atypical manifestations. At the same time, not all patients with suspected disease in our study presented with high temperature when they first visited the ED, despite claims of fever symptoms. This may be attributed to the use of over-the-counter antipyretic drugs. On the 2nd day of clinical quarantine and observation in the ED, febrile symptoms were more accentuated among diagnosed patients, likely due to strict control of antipyretic drugs imposed by physicians, but this observation requires further confirmation. It should also be noted that fever and cough are not present in all confirmed cases, especially outside of Hubei. Similar to previous reports, we found that the initial clinical manifestations tended to be mild in Anhui. There were also diagnosed patients who only presented with myalgia or fatigue, headache, and chest tightness who require additional vigilance from emergency physicians.

A history of exposure is often a reason for suspected patients to visit the ED. A large number of patients with suspected disease visited the ED during the current outbreak to seek confirmation or exclusion of COVID-19, due to potential exposure history and exhibiting clinical symptoms associated with SARS-CoV-2 infection. In our study, more than half of the diagnosed patients (63%) had a specific history of exposure to Hubei or infected patients in the previous 2 weeks. In other words, 37% of the diagnosed patients did not have a specific history of exposure to Hubei. About a third (32%) of negative cases also had a history of exposure, such as staying in Wuhan/Hubei. Therefore, a specific history of exposure to Hubei or infected patients no longer seems to be a requisite for patients with the suspected disease to be diagnosed with COVID-19, likely due to

### TABLE 3 Chest CT findings compare in 117 patients suspected with COVID-19 on admission in EDs in Anhui

| CT findings                | Diagnosed patients (n = 32) | Negative cases (n = 84) |
|----------------------------|-----------------------------|-------------------------|
| Pneumonia                  | 30 (94)                     | 56 (67)                 |
| Bilateral involvement      | 29 (91)                     | 34 (40)                 |
| Ground glass opacity       | 15 (47)                     | 10 (12)                 |
| Consolidation              | 4 (13)                      | 7 (8)                   |
| Spider web sign            | 4 (13)                      | 0 (0)                   |
| Crazy-paving pattern       | 1 (3)                       | 0 (0)                   |
| Lymph node enlargement     | 1 (3)                       | 4 (5)                   |
| Pleural effusion           | 2 (6)                       | 2 (2)                   |

Note: Data are n(%).
Abbreviations: CT, computed tomography; ED, emergency department.

### FIGURE 1 Transverse chest CT from three patients suspected with COVID-19 on admission in the emergency department. A, Computed tomography (CT) of A 47-year-old woman 3 days after illness onset, bilateral ground-glass opacity was showed. She was diagnosed with COVID-19; B, CT of A 33-year-old woman 7 days after illness onset, no specific CT findings were showed. She was diagnosed with COVID-19; C, CT of A 21-year-old woman 3-days after illness onset, showing ground-glass opacity lower lobe of left lung. She was undiagnosed with COVID-19

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In our study, pneumonia was the most common diagnosed patients. Since the exact infection route is still not completely understood, even if patients deny a specific exposure history, potential unknown exposure can interfere with the judgment of ED physicians. Chest CT is considered a more accurate diagnostic tool when early clinical symptoms and exposure history are not specific.

5 | CONCLUSION

The initial clinical features of patients suspected of having COVID-19 in EDs outside Hubei were relatively mild. Definite exposure history to Hubei or infected patients may not be a requisite for diagnosis. Meanwhile, diagnosed patients without definite exposure history tend to show more atypical initial clinical features. Although we found differences in the initial clinical features of patients eventually confirmed to be infected, those differences were not specific and it seems far-fetched to use them as a basis of early clinical diagnosis of COVID-19. For emergency physicians, a combination of epidemiological features, laboratory tests, and chest CT findings may be necessary to confirm the presence of infection. Nevertheless, we recommend strict medical quarantine and observation of all patients with suspected COVID-19 in the ED or dedicated quarantine facilities, irrespective of initial clinical features, especially in radiological finding distributed in the lower lobes (unilaterally or bilaterally) in the initial stage, up to 4 days after onset of symptoms; however, these characteristics were not unique for diagnosed patients. In our study, spider web and crazy-paving patterns were exclusively observed among diagnosed patients; these patients were at a later infection stage, with a median number of 8 days since illness onset.

With the number of cases outside Hubei increasing, it is likely that EDs around the world will continue to receive large numbers of patients with the suspected disease for a long time until the outbreak is effectively controlled. Based on our experience, we recommend strict medical quarantine and observation for all patients with the suspected disease until the results of nucleic acid amplification tests from throat swabs, sputum, and even lung lavage are obtained. In under-resourced regions, where nucleic acid amplification tests are lacking or delayed, strict medical quarantine and observation in the ED or dedicated quarantine facilities (until typical clinical symptoms and CT characteristics emerge) may contribute to disease control and prevention of further infection. The psychological impact of quarantine should also be taken into account by physicians.

Our study has several limitations. First, it is a retrospective descriptive study with a limited number of patients. Although all suspected patients were enrolled according to the guidelines for the diagnosis and treatment of pneumonia caused by novel coronavirus infection (trial version III) published by the National Health Commission of the People’s Republic of China. Suspected patients not covered by the guidelines or not typical may not be admitted, resulting in a bias. In addition, the patients were only from the Anhui province; it is possible that other initial clinical features related to COVID-19 are observed outside Anhui and Hubei. Second, due to different times from illness onset to admission, and an incomplete collection of data, there was a lack of rigorous grouping and effective statistical analysis. Moreover, the time since illness onset might be shorter than the observation period of 10 days, which could result in biases of clinical observation characteristics.

| TABLE 4 | Objective clinical features compare in suspected patients with or without exposure history on admission in emergency departments in Anhui |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| Objective features | Diagnosed patients (n = 32) | Negative cases (n = 84) |
|                  | With exposure history (n = 20) | Without exposure history (n = 12) | With exposure history (n = 27) | Without exposure history (n = 57) |
| White blood cell count (>10^9/L) |
| >9.5 | 1 (3) | 0 (0) | 2 (2) | 4 (5) |
| <3.5 | 4 (13) | 3 (25) | 2 (2) | 2 (2) |
| Lymphocyte count (>10^9/L) |
| <1.1 | 14 (44) | 5 (16) | 11 (13) | 13 (15) |
| Lymphocyte percentage (%) |
| <20 | 7 (22) | 3 (25) | 18 (21) | 11 (13) |
| D-dimer (mg/L) |
| >0.55 | 1 (3) | 2 (6) | 3 (4) | 3 (4) |
| Procalcitonin (ng/mL) |
| >0.5 | 0 (0) | 0 (0) | 2 (2) | 2 (2) |
| C-reactive protein (mg/L) |
| >8 | 14 (44) | 7 (22) | 18 (21) | 22 (26) |
| Pneumonia | 19 (59) | 11 (32) | 26 (31) | 30 (36) |
| Bilateral involvement | 18 (56) | 11 (32) | 21 (25) | 13 (15) |
| Ground glass opacity | 10 (31) | 5 (16) | 4 (5) | 6 (7) |

Note: Data are n(%). *Percentages do not total 100% owing to missing data.
under-resourced regions where rapid nucleic acid amplification tests are lacking.

CONFLICT OF INTERESTS
The authors declare that there are no conflict of interests.

AUTHOR CONTRIBUTIONS
ZW and XK prepared and drafted the manuscript; XL conceived and designed the study; LH collected the data; XL, ZS, and FS read, corrected, and approved the final manuscript. All authors read and approved the final manuscript.

DATA AVAILABILITY STATEMENT
Please contact the author for data requests.

ETHICS STATEMENT
This study was approved by the ethics committee of the First Affiliated Hospital of USTC and Infectious Hospital of the First Affiliated Hospital of USTC. As for this research, an opt-out of the informed consent, the information disclosure, and an undiagnosed opportunity are guaranteed in the Ethical approval.

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