Analysis of Epidemiological and Clinical features in older patients with Corona Virus Disease 2019 (COVID-19) out of Wuhan

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Summary: Older patients with COVID-19 had significantly higher rate of female gender, high temperature, familiar clustering, co-existing of basic diseases, dyspnea, lymphocytopenia, severe/critical type and ICU admission; higher level of AST, CK, LDH, CRP and lower level of haemoglobin, albumin.

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Abstract

BACKGROUND: The outbreak of COVID-19 has become a big threat to China, with high contagious capacity and varied mortality. This study aimed to investigate the epidemiological and clinical characteristics of older patients with COVID-19 out of Wuhan.

METHODS: A retrospective study was performed, with collecting data from medical records of confirmed COVID-19 patients in Zhejiang province from Jan 17 to Feb 12, 2020. Epidemiological, clinical and treatment data were analyzed between those older (≥60y) and younger (<60y) patients.

RESULTS: Total 788 patients with confirmed COVID-19 were selected, where 136 were older patients with corresponding age of 68.28y±7.314y. There was a significantly higher frequency of women in the older patients compared with the younger patients (57.35% *vs* 46.47%, *P*=0.021). The presence of coexisting medical condition was significantly higher in older patients compared with younger patients (55.15% *vs* 21.93%, *P*<0.001), including the rate of hypertension, diabetes, heart diseases and COPD. Significantly higher rates of severe (older *vs* younger groups: 16.18% *vs* 5.98%, *P*<0.001)/critical (8.82% *vs* 0.77%, *P*<0.001) type, shortness of breath (12.50% *vs* 3.07%, *P*<0.001) and high temperature of >39.0℃（13.97% *vs* 7.21%, P=0.010）were observed in older patients compared with younger patients. Finally, Higher rates of ICU admission (9.56% *vs* 1.38%, *P*<0.001) and methylprednisolone application (28.68% *vs* 9.36%, *P*<0.001) were also identified in older patients.

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CONCLUSIONS: The specific epidemiological and clinical features of older COVID-19 patients included significantly higher female gender, body temperature, co-existing of basic diseases and rate of severe and critical type.

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Introduction

COVID-19 is a novel identified infectious disease with rapid human to human transmission capacity and varied fatality, due to acute respiratory distress syndrome (ARDS), multi-organ failure and other serious complications[1-3]. Since first reported in Dec 1 as the pneumonia for unknown reason, the pathogen of COVID-19 was later identified by the Chinese Center for Disease Control and Prevention (CDC) from the throat swab sample of a patient, and was subsequently named SARS-CoV-2 by WHO[4]. Though huge efforts have been made by Chinese government even including quarantining Wuhan city on Jan 23, its accelerated dissemination has appeared, infecting 68584 patients in China by Feb 15, 2020 and spreading over the world. Currently, combating COVID-19 is the most important and first task for China, which also raises global alert.

Coronaviruses are named for the crown-like spikes on their surface, with known species of 229E, NL63, OC43, HKU1, severe acute respiratory syndrome coronavirus (SARS-CoV) and middle east respiratory syndrome coronavirus (MERS-CoV), where the latter two are zoonotic in origin and have been linked to lethal diseases[5, 6]. SARS-CoV-2 was the 7th identified coronavirus with human infection capacity. The high mortality rate in older patients especially those with co-morbidities of hypertension, diabetes and renal failure, had been reported both in SARS and MERS[7, 8]. Calculating from Initial data of Wuhan, we found that the fatality for the COVID-19 patients aged ≥60 was 63.6%[1]. Previous study from SARS also suggested that older age was one of the strongest predictor of poor outcome[9]. Nevertheless, the specific features of older patients with COVID-19 out of Wuhan has not been reported hitherto.

By Feb 15, 2020, Zhejiang province had the 4th largest cases of 1167 confirmed COVID-19 in China. Comparing with disease features in Wuhan, Zhejiang province had much lower

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severe/critical cases (76/1167, 6.5%) and higher rate of discharge from hospital (437/1167, 37.4%), with no reported death case. It is well acknowledged that older patients tend to have more serious diseases and complications, where previous study also indicated the higher ICU admission rate in patients with median age > 66y[10]. However, there are no reports specifically focusing on older patients with COVID-19. We aimed, in this study, to provide the first line information about the epidemiological and clinical characteristics of 136 older patients (≥60y) with laboratory-confirmed COVID-19 in Zhejiang province.

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Methods

Data sources and ethics

We retrospectively investigated the epidemiological, clinical, imaging, and laboratory characteristics of confirmed cases of COVID-19 with WHO interim guidance in Zhejiang province from Jan 17 to Feb 12, 2020. All patients were diagnosed as COVID-19 by positive PCR result. The data was uniformly collected by the Health Commission of Zhejiang province, where all patients were allocated at specific hospitals for unified treatment according to the government emergency rule. The diagnosis was based on WHO interim guidance and all data were shared with WHO[4], with the primary analytic results reported to the authority of Zhejiang province. Since cases collection and analysis were determined by the Health Commission of Zhejiang province under national authorization and considered as part of the continuing public health outbreak investigation, our study was regarded exempt from institutional review board approval.

During analysis, patients were divided into two groups according to age (older group≥60y *vs* younger group<60y). The subtype definition of COVID-19 patients was based on the

diagnosis and treatment scheme for COVID-19 of Chinese (5th edition), as previously reported[11]. In detail, the degree of COVID-19 was categorized as mild, severe, or critical. Mild type included non-pneumonia and mild pneumonia cases. Severe type was characterized by dyspnea, respiratory frequency ≥30/minute, blood oxygen saturation ≤93%, PaO_2/FiO_2 ratio <300, and/or lung infiltrates >50% within 24–48 hours. Critical cases were those that exhibited respiratory failure, septic shock, and/or multiple organ dysfunction/ failure.

Procedures

The epidemiological, demographic, clinical, laboratory and management data from patients' medical records were retrieved and reviewed by two independent observers. The clinical outcomes were followed up to Feb 12, 2020. Missing or vague date were confirmed by direct communicating with health care providers. Laboratory confirmation of COVID-19 was done in the CDC of Zhejiang province and local city level and the First Affiliated Hospital, School of Medicine, Zhejiang University, with national authorization. Throat-swab specimens from upper respiratory tract and sputum from all patients at admission were maintained in viral-transport medium. COVID-19 was confirmed by real-time RT-PCR using the same protocol described previously [2]. Other common respiratory viruses including influenza A and B virus, respiratory syncytial virus, parainfluenza virus, adenovirus, SARS and MERS were routinely precluded. All patients received chest x-rays or chest CT at admission.

Outcomes

The epidemiological data were collected, including exposure to Wuhan, contacting with confirmed patients and family clustering. The incubation period is calculated from the specific date of contacting with confirmed COVID-19 patient to the date of illness onset.

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Other important parameters were also summarized, including the anthropometrics/ demographic data, symptoms/signs on admission, laboratory and chest X-ray/CT results, comorbidity, co-infection with other respiratory pathogens treatment (including drugs, intensive care and mechanical ventilation) and clinical outcomes.

Statistical analysis

Mean (SD) and median (IQR) were used for continuous variables with and without normal distribution while number (%) was used for categorical variables, followed by Mann-Whitney U and chi-square test for comparison. For laboratory results, whether the measurements were outside the normal range was also analyzed. The Kaplan–Meier method was used to estimate hospitalization time, and the log rank test was applied for comparisons between the younger and older groups. The Kaplan–Meier analysis was conducted with survfit function in the library of survival in R (3.6.1). A two-sided α of less than 0.05 was considered statistically significant and SPSS (version 26.0) was used for all analyses.

Results

Demographic and epidemiologic Characteristics

This study described 788 patients with confirmed COVID-19 from Jan 17, 2020 to Feb 12, 2020 in Zhejiang province. As shown in Table 1, there were 136 and 652 patients in older and younger groups, with corresponding age of 68.28y±7.314y and 41.15y±11.38y. There was no significant difference in the percentage of current smoker in two groups. However, There was a significantly higher frequency of women in the older patients compared to the younger patients (female in older *vs* younger group: 57.35% *vs* 46.47%, *P*=0.021), indicating the sex predisposition to female in older patients with COVID-19. The presence of any coexisting medical condition was significantly higher in older patients compared to the

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younger patients (older *vs* younger groups: 55.15% *vs* 21.93%, *P*<0.001), including the rate of hypertension (38.97% *vs* 11.20%, *P*<0.001), diabetes (17.65% *vs* 5.06%, *P*<0.001), heart diseases (4.41% *vs* 0.77%, *P*=0.005) and COPD (2.21% *vs* 0%, *P*=0.005). Based on data from definite exposure date to epidemic area (Wuhan), we found more patients had a history of traveling to Wuhan in younger group compared to older group (older *vs* younger groups: 31.62% *vs* 53.68%, *P*<0.001). More patients in older group had confirmed cluster history of contacting with patients from local area compared to patients in younger group (older *vs* younger groups: 33.09% vs 23.01%, *P*<0.001).

Thirty-two and 156 patients from older and younger groups had definite exposure time and their calculated median incubation period was 5 days for both groups. Differing from patients of younger group, significantly more patients in older group were diagnosed as severe (older *vs* younger groups: 16.18% *vs* 5.98%, *P* <0.001) and critical (8.82% *vs* 0.77%, *P* <0.001) types.

Clinical Features and Laboratory Abnormalities

The clinical characteristics of the patients were shown in Table 2. Briefly, fever and cough were the most common symptoms in both group. There were no significant differences in the percentages of fever, cough, sputum production, GI symptoms, muscle ache and headache in two group. However, Older patients had significantly higher rate of shortness of breath (older *vs* younger groups: 12.50% *vs* 3.07%, *P*<0.001) and lower rate of nasal obstruction (older *vs* younger groups: 1.47% *vs* 6.90%, *P*=0.015) when compared with younger patients. Besides, older patients had significantly lower and higher rates of normal (T<37.3℃) and high (38℃ ≤T≤39℃) temperature (older *vs* younger groups: 10.29% *vs* 21.17%, *P*=0.003; 40.44% *vs* 29.60%, *P*=0.013). For extreme high fever, older patients also had significantly higher rate of

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high temperature (T>39℃) (older *vs* younger groups: 13.97% *vs* 7.21%, P=0.010) than that in younger patients.

On admission, significantly more patients in older group had lymphocytopenia (older *vs* younger groups: 30.88% *vs* 14.11%, *P*<0.001) and lower level of haemoglobin (older *vs* younger groups: 129g/L *vs* 140g/L, *P*<0.001). Furthermore, there were significantly decreased level of albumin (older *vs* younger groups: 39.2g/L *vs* 41.7g/L, *P*<0.001), elevated level of aspartate aminotransferase (older *vs* younger groups: 28U/L vs 24U/L, *P*=0.002), increased level of creatine kinase (74.5U/L *vs* 67.0U/L, *P*=0.039) and lactate dehydrogenase (244.0U/L *vs* 204.0U/L, *P*<0.001) in older group. Concerning infection-related parameters, C-reactive protein (CRP) was significantly increased in older group than that in younger group (older *vs* younger groups: 19.0mg/L vs 6.75mg/L, *P*<0.001). CT scan is pivotal for disease identification and diagnosis, significantly more patients in the older group presented multiple mottling and ground-glass opacity.

Treatment and outcomes

COVID-19 patients were isolated in designated hospitals with supportive and empiric medication. There were 117 patients (86.03%) in older group and 551 (84.51%) patients in younger group administrated with antiviral treatment, with a median period from onset of illness to antiviral therapy of 3 days and median antiviral duration of 11 days for both groups. There were 192 and 43 patients received zInterferon-α sprays, lopinavir and ritonavir 2 tablets (500 mg) twice daily and arbidol hydrochloride capsules (2 tablets three times daily); 140 and 25 patients received Interferon-α sprays and Lopinavir/Ritonavir; 61 and 12 patients received Lopinavir/Ritonavir and Arbidol; 31 and 10 patients received Interferon-α sprays and Arbidol, in younger group and older group respectively. There were no difference regarding the antiviral regimen between two groups. Glucocorticoid therapy is considered if

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PaO2/FiO2 <300 mmHg and is not recommended for mild patients. Dose of Glucocorticoid is 0.75-1.5mg/kg.d and the median duration of corticosteroid therapy was 15 days. Compared with patient in younger group, more patient in older group (26.68% vs 9.36%, p<0.001) received corticosteroid therapy.

Older patients had higher rate of severe (older *vs* younger groups: 16.18% *vs* 5.98%, *P*<0.001) and critical (8.82% vs 0.77%, *P*<0.001) type compared. 788 patients were divided into two groups according to exposure history to Wuhan. There were 393 and 395 patients with and without Wuhan exposure history in the last month, respectively. We found that there was no significant difference in the rate of severe and critical type (with vs without Wuhan exposure, 7.89% *vs* 7.59%, *P*=0.895; 2.04 *vs* 2.28%, *P*=1.000) between the two groups.

Oxygen therapy plays an important role in supportive care of patients. In this study, 6.62% patients in older group received mechanical ventilation, significantly higher than that of 1.38% in younger group (*P* =0.001). The ventilator adopted P-SIMV mode, with the inhaled oxygen concentration of 35-100% and the positive end-expiratory pressure of 6-12 cm H_2O. Meanwhile, significantly more patients in older group (9.56% *vs* 1.38%, *P* <0.001) were admitted into ICU compared to younger group by Feb 12, 2020. Till now, no patients received continuous blood purification due to renal failure and extracorporeal membrane oxygenation (ECMO). Liver injury was the most common complication, followed by ARDS and acute kidney injury. Significantly more patients in older patients group developed ARDS than that in the younger group (16.9% *vs* 5.37%, *P* <0.001). By the end of Feb 12, all patients were survived and significantly more patients in younger group (44.6% *vs* 22.8%, *P* <0.001) had discharged than those in older group (Figure 1).

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Discussion

COVID-19 is a novel identified human infectious disease, belonging to the family of coronavirus[12]. Starting from 788 confirmed cases from Zhejiang province, we found that the age of patients spanned from infant of 3 month to elder of 96 year, where 136 cases were over 60 year. Differing from young patients, 68.3% older patients had no history of Wuhan traveling and 86.3% older patients were exposed to COVID-19 patients, with median incubation period of 5 days (IQR:2-9). More importantly, there were 49.5% of patients infected by family clustering and social activities, where 5 couples infected each other, 6 patients got infection after attending ritual in local temple, 5 patients got infection after dinner party and some were infected by square dancing. The other reason may rely on the inadequate recognition of COVID-19 by elders, with lower rates of mask wearing. The explanation for the phenomenon of significantly higher ratio of female in elder group may rely on the finding that ACE2 expression of rat lung was significantly higher in Female than that in male[13].

This study confirmed that features of COVID-19 in older adults resembled other forms of CAP. COVID-19 from older group had higher rates of coexisting basic diseases, where hypertension, diabetes, chronic heart disease and COPD reaching statistical significance. On admission, the rate of severe/critical type was significantly higher in older group than that in younger group. Fever, cough and dyspnea are the common symptoms of acute CAP and there was no significant difference in the rate of fever between two groups. However, the ratio of > 38℃ was significantly higher in older than that in younger group. It is well acknowledged that the degree of high fever is associated with inflammatory cytokine secretion and the clinical symptoms.

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There were no significant differences of cough, sputum production, hemoptysis, sore throat, nasal obstruction, muscle ache, fatigue and GI tract symptoms between older and younger groups. In contrast, the rate of shortness of breath was significantly higher in older group, which is in accordance with more severe lung CT findings of multiple mottling and ground-glass opacity and more ARDS in those patients. The heart injury was also more common in older group, as reflected by significantly increased AST and LDH levels. The rates of low albumin and Hemoglobin levels were significantly higher in older group, which may be related with poor nutrition and disease progression.

Currently, there was no effective anti-viral therapy for COVID-19[14]. We used Interferon-α, Lopinavir/Ritonavir and Arbidol for virus inhibition according to previous clinical experience but the unified treatment plan is still lack. A retrospective study revealed that proper use of corticosteroid in confirmed critical SARS resulted in lowered mortality and shorter hospitalization stay[15]. Another study also showed that low-to-moderate-dose corticosteroids might reduce mortality of influenza A (H1N1)pdm09 viral pneumonia patients with PaO2 /FiO2 <300 mm Hg[16]. In this study, corticosteroid therapy was initiated if COVID-19 patients with PaO2/FiO2<300mmHg had quicker disease progression, higher temperature and more lung inflammatory exudation, their glucocorticoid application rate (28.68%) was significantly higher than that in younger patients (9.36%). To avoid side effects of corticosteroid, its dosage was decreased into 40-80 mg/daily. Until now, only two cases of GI tract bleeding and 10 cases of hyperglycemia were identified in this study, with no secondary bacteria and fungi infection. Therefore, the application of antibiotics and anti-fungi drugs was also lower in Zhejiang province than in Wuhan.

Previous study[9] showed that 21% SARS patients were over 60y and accounted for 68% of all deaths related to SARS**.** The 30- and 150-day mortality rates in >60y SARS patients were 56% and 60%, respectively. In this study, we found that 32% confirmed COVID-19

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patients were >60y who had 25% severe/critical type in admission. Those elder patients of severe/critical type accounted for 43% of the total severe/critical type in our study. Comparing with SARS, the mortality of COVID-19 was much lower. Comparing with Wuhan, the number of COVID-19 patients in Zhejiang province was also much lower and the medical resources were more abundant, contributing to the earlier diagnosis, quarantine and treatment of those patients. Till Feb 12, 2020, there were total 322 COVID-19 patients discharged from hospital and no death case was reported. According to accumulated reports from Wuhan, the rate of severe/critical type and mortality were relatively high, reaching 15% in one study[2]. Additionally, another study revealed that the median age for ICU and non-ICU patients were 66y and 51y, with mortality of 4.3%[10]. We compared COVID-19 patients of Zhejiang province with and without Wuhan exposure history and found no significant differences in clinical and virological features (unpublished preliminary data). Additionally, for COVID-19 patients of Zhejiang province, the median time was 2 days (1-4 day), 4 days (2-7 day) and 3 days (1-7 day) for illness onset to outpatient clinics visit, confirmed diagnosis and isolation therapy. In Wuhan, the official estimated median time for illness onset to hospital admission was 9.84 days, which may be caused by the shortage of health care resources.

Our study has several limitations. Firstly, the retrospective design of this study may decrease its credibility and future perspective cohort study should be considered. Secondly, the comprehensive analysis of older patients with COVID-19 on national level is urgently needed, which will provide data that are more reliable. Thirdly, though we summarized the application of antiviral therapy and glucocorticoids usage in the older patients with COVID-19, it is still lack of randomized clinical trials to provide high quality evidence. Finally, the data regarding the outcomes of older patients with COVID-19 need to be further investigated, for most older patients were still under treatment in hospital.

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In summary, we reported the specific epidemiological and clinical features of older patients with COVID-19, including significantly higher female gender, body temperature, familiar clustering, co-existing of basic diseases and rate of severe/critical type.

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Notes

Author contributions. Jiangshan Lian, Xi Jin, Shaorui Hao, Huan Cai, Shanyan Zhang contributed equally to this article. Yida Yang, Jifang Sheng, Lanjuan Li and Yunqing Qiu designed the study, Jiangshan Lian, Xi Jin, Shaorui Hao coordinated the work and took the lead in drafting the manuscript and interpreting, Huan Cai, Shanyan Zhang developed the statistical methods, Lin Zheng, Hongyu Jia, Jianhua Hu, Jianguo Gao, Yimin Zhang, Xiaoli Zhang, Guodong Yu, Xiaoyan Wang, Jueqing Gu, Chanyuan Ye1, Ciliang jin, Yingfeng Lu, Xia Yu, Xiaopeng Yu and Yue Ren were Participated in the collection of experimental data. Yida Yang and Jifang Sheng reviewed the manuscript prior to submission. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Table 1. Demographic and Epidemiologic Features of older COVID-19 Patients

Characteristic	Age <60(n=652)	Age≥ (n=136)	P Value
Age	41.15±11.38	68.28±7.314	<0.001
Sex(Female)	303/652 (46.47%)	78/136 (57.35%)	0.021
Current Smoker	46/652 (7.06%)	8/136 (5.88%)	0.622
Coexisting Condition			
Any	143/652 (21.93%)	75/136 (55.15%)	<0.001
Hypertension	73/652 (11.20%)	53/136 (38.97%)	<0.001
Diabetes	33/652 (5.06%)	24/136 (17.65%)	<0.001
Chronic liver disease	25/652 (3.83%)	6/136 (4.41%)	0.753
Cancer	3/652 (0.46%)	3/136 (2.21%)	0.067
Chronic renal disease	5/652 (0.77%)	2/136 (1.47%)	0.347
Heart disease	5/652 (0.77%)	6/136 (4.41 %)	0.005
COPD	0/652 (0%)	3/136 (2.21%)	0.005
Immunosuppression	0/652 (0 %)	1/136 (0.74%)	0.173
Exposure History			
From Wuhan	350/652 (53.68 %)	43/136 (31.62 %)	<0.001
Contact with patients	269/652 (41.26%)	63/136 (46.32 %)	0.276
Cluster	150/652 (23.01 %)	45/136 (33.09%)	0.013
Timing from onset of illness to consultation	2(1-4)	2(1-4)	0.867
Timing from onset of	4(2-7)	4(2-7)	0.410

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illness to confirm the diagnosis			
Timing from onset of illness to hospitalization	3(1-7)	3(1-6)	0.945
Clinical Type on admission			
Severe/Critical Type (%)	44/652(6.75%)	33/136(24.26%)	<0.001
Mild	608/652 (93.25 %)	102/136 (75.0 %)	<0.001
Severe	39/652 (5.98%)	22/136 (16.18%)	<0.001
Critical	5/652 ((0.77%)	12/136 (8.82)	<0.001

Data are presented as medians (interquartile ranges, IQR), n (%) and n/N (%).

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Table 2. Clinical Features and Selected Laboratory Abnormalities of older COVID-19 Patients

Characteristic	Age <60(n=652)	Age≥ (n=136)	P Value
Fever	521/652 (79.91%)	115/136 (84.56 %)	0.211
<37.3	138/652(21.17%)	14/136 (10.29%)	0.003
37.3-38.0	274/652 (42.02%)	48/136 (35.29%)	0.146
38.1-39.0	193/652 (29.60%)	55/136(40.44%)	0.013
>39.0	47/652 (7.21%)	19/136 (13.97%)	0.010
Cough	421/652 (64.57%)	85/136 (62.50%)	0.647
Sputum production	216/652 (33.13%)	49/136 (36.03%)	0.515
Hemoptysis	12/652 (1.84%)	3/136 (2.21%)	0.732

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Sore throat	94/652 (14.42%)	17/136 (12.50 %)	0.559
Nasal obstruction	45/652 (6.90 %)	2/136 (1.47 %)	0.015
Muscle ache	71/652 (10.89 %)	20/136 (14.71%)	0.205
Fatigue	115/652 (17.64 %)	24/136 (17.65%)	0.998
Shortness of breath	20/652 (3.07%)	17/136 (12.50%)	<0.001
GI symptoms	77/652 (11.81%)	11/136 (8.09 %)	0.210
headache	67/652 (10.28 %)	8/136 (5.88%)	0.112
Blood routine			
Leucocytes($\times10^9$/L; normal range 4-10)	4.8(3.8-5.9)	4.8(3.9-6.4)	0.236
>10 $\times10^9$/L	9/652 (1.38 %)	9/136 (6.62 %)	0.001
<4 $\times10^9$/L	196/652 (30.06 %)	38/136 (27.94%)	0.623
Neutrophils($\times10^9$/L; normal range 2-7)	2.9(2.2-3.9)	3.2(2.5-4.4)	0.002
Lymphocytes($\times10^9$ /L; normal range 0.8-4)	1.2(0.9-1.6)	1.1(0.7-1.4)	<0.001
<0.8$\times10^9$/L	92/652 (14.11%)	42/136 (30.88%)	<0.001
Platelets($\times10^9$/L; normal range 83-303)	184.0(152.0-223.0)	169.5(132.0-207.5)	<0.001
<100$\times10^9$/L	20/652 (3.07 %)	7/136 (5.15 %)	0.295
Haemoglobin(g/L; normal range: male 131-172,female 113-151)	140.0(129.0-152.0)	129.0(120.3-140.8)	<0.001
Hematokrit(%; normal range: male 38-50.8,female 33.5-45)	41.0%(38.1%-44.4%)	38.3%(35.5%-41.3%)	0.004

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Coagulation function			
International normalized ratio(normal range 0.85-1.15)	1.02(0.97-1.09)	1.03(0.96-1.07)	0.567
Blood biochemistry			
Albumin(g/L; normal range 40-55)	41.7(39.0-44.1)	39.2(36.0-42.0)	<0.001
Alanine aminotransferase(U/L; normal range 9-50)	22.0(15.0-35.0)	21.0(16.0-29.0)	0.625
Aspartate aminotransferase(U/L; normal range 15-40)	24.0(19.0-32.0)	28.0(22.0-36.0)	0.002
Total bilirubin(umol/L; normal range 0-26)	9.5(7.0-13.2)	9.7(7.0-13.5)	0.802
Serum sodium(mmol/L; normal range 137-147)	138.7(136.6-140.5)	137.0(135.0-139.1)	<0.001
Serum potassium(mmol/L; normal range 3.5-5.3)	2.8(3.6-4.1)	3.9(3.6-4.1)	0.750
Blood urea nitrogen(mmol/L; normal range 3.1-8)	3.6(2.9-4.5)	4.4(36-5.9)	<0.001
Serum creatinine(umol/L; normal range: male 57-97,female 41-73)	66.0(55.0-77.5)	69.0(58.6-79.6)	0.013
Creatine kinase(U/L; normal range 50-310)	67.0(46.0-104.0)	74.5(52.3-123.0)	0.039

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Lactate dehydrogenase(U/L; normal range 120-250)	204.0(165.0-255.0)	244.0(206.0-311.0)	<0.001
Infection-related biomarkers			
C-reactive protein(mg/L; normal range 0-8)	6.75(2.0-16.9)	19.0(5.6-44.7)	<0.001
Chest x-ray/CT findings			
Normal	82/652 (12.58%)	5/136 (3.68%)	0.003
Unilateral pneumonia	149/652 (22.85 %)	15/136 (11.03%)	0.002
Bilateral pneumonia	239/652 (36.66 %)	57/136 (41.91%)	0.250
Multiple mottling and ground-glass opacity	176/652 (26.99 %)	59/136 (43.38 %)	<0.001

Data are presented as medians (interquartile ranges, IQR), n (%) and n/N (%).

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Table 3. Treatment and outcomes in older COVID-19 Patients

Variable	**Age <60(n=652)**	**Age≥ (n=136)**	Value
Complications			
Acute respiratory distress syndrome	35/652 (5.37 %)	23/136 (16.91%)	<0.001
Septic Shock	1/652 (0.15%)	1/136 (0.74%)	0.316
liver function abnormality	72/652 (11.04 %)	10/136 (7.35%)	0.200
Acute kidney injury	10/652 (1.53%)	3/136 (2.21%)	0.478
Treatment			
Anti-coronavirus treatment	550/652 (84.36%)	117/136 (86.03%)	0.622
Timing from onset of illness to antiviral therapy	3(1-6)	3(1-6)	0.653
Antiviral duration	11(7-16)	11(6-17)	0.877
Antivirus regimen	551/652 (84.51%)	117/136 (86.03%)	0.793
Interferon-α+Lopinavir/Ritonavir+ Arbidol	192/652 (29.44%)	43/136(31.62%)	0.608
Interferon-α+Lopinavir/Ritonavir	140/652 (21.47%)	25/136 (18.38%)	0.487
Lopinavir/Ritonavir+ Arbidol	61/652 (9.36%)	12/136 (8.82%)	1.000
Interferon-α+ Arbidol	31/652 (4.75%)	10/136 (7.35%)	0.207

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[#]others	127/652 (19.48%)	27/136 (19.85%)	0.906
Mechanical Ventilation	9/652 (1.38 %)	9/136 (6.62%)	0.001
Non-invasive	4/652 (0.61 %)	3/136 (2.21%)	0.103
invasive	5/652 (0.77%)	6/136 (4.41%)	0.005
CRRT	0	0	
ECMO	0	0	
Glucocorticoids	61/652 (9.36%)	39/136 (28.68%)	<0.001
*Max. dosage	40(40-80)	40(40-80)	0.663
IVIGt	38/652 (5.83%)	24/136 (17.65%)	<0.001
Admission to intensive care unit	9/652 (1.38%)	13/136 (9.56%)	<0.001
Clinical outcomes			
Discharged/ Stay in hospital	291/652 (44.60%)	31/136 (22.80%)	<0.001

Data are presented as medians (interquartile ranges, IQR), n (%) and n/N (%). * Glucocorticoid dosages were converted into an equivalent of methylprednisolone. [#]others include Oseltamivir, Interferon-α and Lopinavir/Ritonavir monotherapy.

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Figure legends

Figure 1: Kaplan–Meier estimates of hospitalization time in younger and older groups (p=0.0022).

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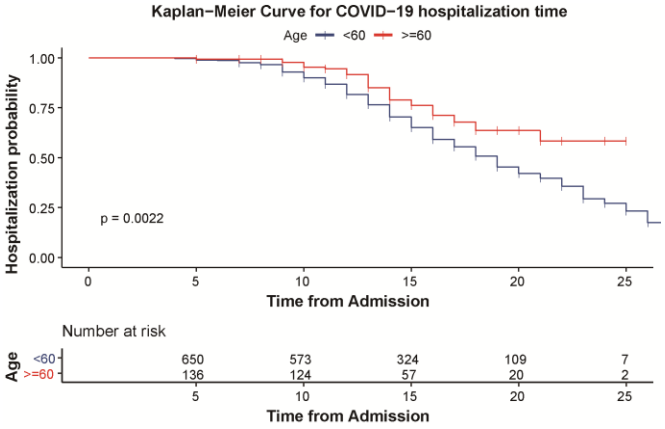
Figure 1



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