Original Article

Successful treatment of 28 patients with coronavirus disease 2019 at a medical center in Taiwan

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Background: Coronavirus disease-2019 (COVID-19) is a worldwide pandemic. We present the clinical characteristics and outcomes of 28 COVID-19 patients treated in our hospital in Taiwan.
Methods: Patients with COVID-19, confirmed by positive real-time reverse-transcriptase polymerase chain reaction results for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viral nucleic acids from oropharyngeal swab specimens between February 4, 2020 and July 6, 2020, were enrolled. Their clinical characteristics and outcomes were reviewed.
Results: Seventeen of the 28 patients (60.7%) had pneumonia. The most frequent symptoms were cough (n = 23, 82.1%) and fever (n = 17, 60.7%). The development of pneumonia was associated with age $\geq$40 years ($p < 0.024$), body mass index (BMI) $\geq$25 kg/m^2 ($p = 0.014$), fever ($p = 0.007$), shortness of breath ($p = 0.036$), chills (($p = 0.047$), and lower platelet counts ($<$200,000/μL) ($p = 0.007$). Increased quarantine duration was associated with age $\geq$40 years ($p = 0.026$), Charlson index $\geq$1 ($p = 0.037$), lower lymphocyte ($<$1500/uL; $p = 0.028$) or platelet counts ($<$200,000/μL) ($p = 0.016$), lower serum sodium ($<$140 mEq/L; $p = 0.006$), and higher C-reactive protein (CRP) level ($\geq$1 mg/dl; $p = 0.04$). Treatment with hydroxychloroquine or in combination with other medicines did not reduce the quarantine duration. All 28 patients recovered with a median quarantine duration of 27.2 days.
Conclusion: COVID-19 patients with older age, higher BMI, fever, chills or shortness of breath, lower serum sodium level, lower platelet or lymphocyte count, and higher CRP level may be associated with developing pneumonia or longer quarantine duration.

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Introduction

The coronavirus disease-2019 (COVID-19) outbreak is an ongoing pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The outbreak was initially identified in Wuhan, China in December 2019 and has been a public health emergency of international concern since its spread within China and worldwide.[1—4]

Many COVID-19 patients are reportedly asymptomatic or mildly ill with only flu-like symptoms such as fever and cough. However, many patients develop pneumonia, acute respiratory distress syndrome, and multiple organ failure in a short time.[5—7] Identifying the risk factors for developing pneumonia, longer quarantine duration, and mortality in COVID-19 patients is important. However, due to the Taiwan government's rapid action on the disease, including border control, compulsory quarantine, and comprehensive contact tracing, Taiwan has been able to contain the pandemic. Thus, there are limited data regarding the clinical characteristics of COVID-19 patients in Taiwan.

Our hospital, the Tri-Service General Hospital, is a tertiary medical center in Northern Taiwan with 12 airborne infection isolation rooms and eight airborne infection isolation critical care rooms. Since February 4, 2020, 28 confirmed COVID-19 patients were admitted to our airborne infection isolation rooms. All patients were discharged with recovery. Due to the limited available data on the clinical characteristics of COVID-19 patients in Taiwan, we conducted this study to clarify the risk factors for developing pneumonia and longer quarantine duration in COVID-19 patients in Taiwan.

Methods

Study population

Adult patients (age ≥20 years) with COVID-19 infection, as confirmed by positive identification of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viral nucleic acids, were enrolled. These were confirmed using real-time reverse-transcriptase polymerase chain reaction (RT-PCR) assays from oropharyngeal swab specimens collected between February 4, 2020, and July 6, 2020. Positive patients were admitted to our airborne infection isolation wards at Tri- Service General Hospital and included in our study. The study was approved by the Institutional Review Board of Tri Service General Hospital and informed consent was obtained from the included patients.

Demographic, clinical symptom, laboratory, and medication data

Relevant clinical data on the enrolled patients, including age, sex, height, weight, imported or indigenous transmission, underlying diseases, clinical symptoms, laboratory data, treatment medicine, and hospitalization days, were recorded. Pneumonia was diagnosed as the presence of lower respiratory tract symptoms such as cough, systemic symptoms such as fever, and new onset radiology findings of infiltration.[8,9]

Data on the clinical symptoms were collected from patient accounts at and during admission. Laboratory data including white cell counts, platelet counts, neutrophil and lymphocyte ratios; total bilirubin, albumin, creatine kinase C-reactive protein (CRP), D-dimer, procalcitonin, myoglobulin, ferritin, lactic dehydrogenase, and alkaline phosphatase levels; and erythrocyte sedimentation rates were examined in patients 24 h after admission. Renal function was assessed based on blood urea nitrogen and creatinine measurements, while liver function was assessed according to aspartate transaminase and alanine transaminase concentrations. The cycle threshold (Ct) values of the COVID-19 RT-PCR assays from the oropharyngeal swab specimens were also obtained. Patients who were discharged fulfilled the criteria decided by Taiwan's Centers for Disease Control, which required the symptoms to have subsided as well as three negative COVID-19 test results from oropharyngeal swab specimens and sputum.

Statistical analysis

The patients were sub-grouped according to demographic data, symptoms, laboratory data, and treatment medicines to clarify the risk factors for developing pneumonia and long quarantine duration. All results were analyzed using a commercially available software package (IBM SPSS Statistics for Windows, version 21.0; IBM Corp., Armonk, NY, USA). Categorical variables were analyzed using chi-squared tests. Continuous variables with categorical variables were analyzed using independent sample t-tests. The odds ratio of each factor were obtained by logistic regression tests. All p-values were two-tailed, and values less than 0.05 were considered statistically significant.

Results

Our study included a total of 28 COVID-19 confirmed patients hospitalized and discharged between February 4, 2020, and July 6, 2020 at Tri Service General Hospital. The median age of these patients was 41 years (range, 18—80 years). Among them, 17 patients (60.7%) had pneumonia. All 28 patients recovered and were discharged, with a median hospital quarantine duration was 27.2 days. The median Charlson comorbidity index of these patients was 0.93.

Associations between demographic data and outcomes

The sub-grouped demographic data are shown in Table 1. The incidence between men and women was equal (50% men vs. 50% women). Most of the patients (n = 25; 89.3%) had a travel history and were classified as imported cases. Four patients (14.3%) had underlying hypertension and five (17.9%) had underlying hyperlipidemia. More patients who were 40 years old or older developed pneumonia compared to patients younger than 40 (84.6% vs. 40%; $p = 0.024$). More patients who developed pneumonia had a BMI greater than or equal to 25 compared to those with a BMI under 25 kg/m^2 (100% vs. 47.6%; $p = 0.014$). More patients shorter than 1.7 m developed pneumonia compared to patients taller than 1.7 m (25% vs. 75%; $p = 0.023$). Patients 40 years of age or older had a longer quarantine duration compared to that in patients younger than 40 years (31.7 ± 10.8 days vs. 23.3 ± 8.1 days; $p = 0.026$). Patients with a higher Charlson comorbidity index had a longer quarantine duration than that in patients with a lower Charlson comorbidity index (32.2 ± 11.6 days vs. 24 ± 8.1 days; $p = 0.037$).

Associations between clinical symptoms and outcomes

The symptoms of the included COVID-19 patients are listed in Table 2. The most frequent symptoms were cough (n = 23, 82.1%) and fever (n = 17, 63%). Seven patients (25%) had a distorted sense of taste and 10 patients (35.7%) had a distorted sense of smell. Ten patients (35.7%) had shortness of breath. Other symptoms included headache (14.3%), myalgia (17.9%), rhinorrhea (42.9%), sore throat (28.6%), diarrhea (35.7%), chest pain (17.9%), chills (17.9%), nausea and vomiting (10.7%), and eye illness (3.6%). Patients with fever seemed more prone to develop pneumonia than patients without (82.4% vs. 27.3%; $p = 0.007$). Patients with shortness of breath or chills also had a higher possibility of having pneumonia than did patients without (shortness of breath vs. no shortness of breath; 90% vs. 44.4%; $p = 0.036$) (chills vs. no chills; 100% vs. 52.2%; $p = 0.047$).

Associations between laboratory findings and outcomes

The laboratory results of these COVID-19 patients, confirmed within 24 h after admission, are listed in Table 3. Among these confirmed cases, 16 patients (57.1%) had a relatively lower absolute lymphocyte count (ALC) (<1500/uL). They were more prone to a longer quarantine duration than that in patients with a higher ALC (21.9 ± 9 days vs. 31.2 ± 9.5 days; $p = 0.028$). Eight patients (28.6%) had a relatively lower platelet count (<200,000/uL). They were more prone to having pneumonia (45% vs. 100%; $p = 0.007$) and a longer quarantine duration (24.4 ± 8.6 days vs. 34.3 ± 11 days; $p = 0.016$) than those in patients with a higher platelet count. Patients with relatively low serum sodium (<140 mmol/L) (71.4%) levels or higher CRP levels (≥1 mg/dL) were prone to longer quarantine durations than patients with higher serum albumin or lower CRP levels (Na ≥140 mmol/L vs. Na < 140 mmol/L; 19.1 ± 5.6 days vs. 30.5 ± 10 days; $p = 0.006$) (CRP ≥1 mg/dl vs. CRP <1 mg/dl; 32.5 ± 11.8 days vs 24.3 ± 8.2 days; $p = 0.04$)

Associations between drug choices and outcomes

The medications prescribed to these confirmed COVID-19 patients are listed in Table 4. Hydroxychloroquine was administered to 22 (78.6%) of the 28 patients. The combined use of hydroxychloroquine and azithromycin was prescribed to 13 patients (46.4%). The combined use of hydroxychloroquine, azithromycin, ceftriaxone, and teicoplanin was prescribed to three patients (10.7%). Three patients (10.7%) did not receive any antibiotics or hydroxychloroquine. The quarantine durations did not differ significantly between patients treated with different medicine combinations (Table 4).

Discussion

The COVID-19 outbreak first occurred in Wuhan, China in December 2019 and has spread worldwide in just 2 months. Since February 21, 451 confirmed COVID-19 cases have been

Table 1 Demographic data of patients with coronavirus disease-2019 (COVID-19).

		Number (%)	No pneumonia	Pneumonia	Odds ratio	p value	Quarantine duration (days)	p value
Sex	Male	14 (50%)	7 (50%)	7 (50%)	0.4 (0.084−1.909)		28.9 ± 7.7	
	Female	14 (50%)	4 (28.6%)	10 (71.4%)	1	0.25	25.5 ± 12.4	0.387
Age (years)	≥40	13 (46.4%)	2 (15.4%)	11 (84.6%)	8.25 (1.328−51.263)		31.7 ± 10.8	
	<40	15 (53.6%)	9 (60%)	6 (40%)	1	0.024	23.3 ± 8.1	0.026
BMI (kg/m^2)	≥25	7 (25)	0	7 (100%)	NA		34.0 ± 11.7	
	<25	21 (75%)	11 (52.4%)	10 (47.6%)	NA	0.014	25.0 ± 8.9	0.051
Height (m)	≥1.7	8 (28.6%)	6 (75%)	2 (25%)	0.111 (0.017−0.738)		29.1 ± 8.1	
	<1.7	20 (71.4%)	5 (20%)	15 (75%)	1	0.023	26.5 ± 11.1	0.544
Source	Imported	25 (89.3%)	9 (36%)	16 (64%)	3.6 (0.282−44.884)		27.2 ± 10.6	
	Indigenous	3 (10.7%)	2 (66.7%)	1 (33.3%)	1	0.327	27.6 ± 9.2	0.937
Charlson Index	≥1	11 (39.3%)	2 (18.1%)	9 (81.8%)	5.1 (0.833−30.75)		32.2 ± 11.6	
	<1	17 (60.7%)	9 (52.9%)	8 (47.1%)	1	0.078	24 ± 8.1	0.037

Table 2 Symptoms of patients with coronavirus disease-2019 (COVID-19).

		Number (%)	No pneumonia	Pneumonia	Odds ratio	*p* value	Quarantine duration (days)	*p* value
Fever	Yes	17 (60.7%)	3 (17.6%)	14 (82.4%)	12.444 (2.015−76.872)		29.7 ± 9.4	
	No	11 (39.3%)	8 (72.7%)	3 (27.3%)	1	0.007	23.4 ± 10.7	0.198
Cough	Yes	23 (82.1%)	9 (39.1%)	14 (60.9%)	1.037 (0.144−7.477)		27.3 ± 10.2	
	No	5 (17.9%)	2 (40%)	3 (60%)	1	0.971	27 ± 11.9	0.96
Headache	Yes	4 (14.3%)	0	4 (100%)	NA		22.7 ± 3.7	
	No	24 (85.7%)	11 (45.8%)	13 (54.2%)	NA	0.082	27.9 ± 10.8	0.357
Myalgia	Yes	5 (17.9%)	1 (20%)	4 (80%)	3.077 (0.296−31.982)		32 ± 9.5	
	No	23 (82.1%)	10 (43.5%)	13 (56.5%)	1	0.347	26.2 ± 10.3	0.258
Distorted sense of taste	Yes	7 (25%)	3 (42.9%)	4 (57.1%)	0.821 (0.144−4.66)		29.6 ± 8.3	
	No	21 (75%)	8 (38.1%)	13 (61.9%)	1	0.823	26.4 ± 10.9	0.493
Distorted sense of smell	Yes	10 (35.7%)	5 (50%)	5 (50%)	0.5 (0.103−2.428)		25.7 ± 10.1	
	No	18 (64.3%)	6 (33.3%)	12 (66.7%)	1	0.39	28.1 ± 10.5	0.571
Rhinorrhea	Yes	12 (42.9%)	4 (33.3%)	8 (66.7%)	1.556 (0.329−7.361)		26.8 ± 10	
	No	16 (57.1%)	7 (43.8%)	9 (56.2%)	1	0.577	27.6 ± 10.7	0.84
Sore throat	Yes	8 (28.6%)	1 (12.5%)	7 (87.5%)	7 (0.722−67.84)		28.6 ± 9.9	
	No	20 (71.4%)	10 (50%)	10 (50%)	1	0.093	26.7 ± 10.6	0.654
Diarrhea	Yes	10 (35.7%)	2 (20%)	8 (80%)	4 (0.659−24.297)		25.3 ± 11.4	
	No	18 (64.3%)	9 (50%)	9 (50%)	1	0.132	28.3 ± 9.8	0.473
Chest pain	Yes	5 (17.9%)	1 (20%)	4 (80%)	3.077 (0.296−31.982)		21.6 ± 4.2	
	No	23 (82.1%)	10 (43.5%)	13 (56.5%)	1	0.347	28.4 ± 10.8	0.182
Shortness of breath	Yes	10 (35.7%)	1 (10%)	9 (90%)	11.25 (1.167−108.407)		30.1 ± 11.8	
	No	18 (64.3%)	10 (55.6%)	8 (44.4%)	1	0.036	25.6 ± 9.3	0.276
Chillness	Yes	5 (17.9%)	0	5 (100%)	NA		20.8 ± 4	
	No	23 (82.1%)	11 (47.8%)	12 (52.2%)	NA	0.047	28.6 ± 10.7	0.125
Nausea/vomiting	Yes	3 (10.7%)	0	5 (100%)	NA		19 ± 2.6	
	No	25 (89.3%)	11 (44%)	14 (56%)	NA	0.14	28.2 ± 10.4	0.146
Eye illness	Yes	1 (3.6%)	0	1 (100%)	NA		23	
	No	27 (96.4%)	11 (40.7%)	16 (59.3%)	NA	0.413	27.4 ± 10.4	0.684

reported in Taiwan. Due to the Taiwan government's rapid actions, the country has been able to contain the pandemic. Thus, there are limited data on the clinical characteristics of COVID-19 patients in Taiwan. Since February 2020, 28 confirmed COVID-19 patients had been admitted to our hospital. All patients recovered and were discharged. Our study aimed to present the clinical characteristics of these confirmed COVID-19 cases in Taiwan and to clarify the risk factors for developing pneumonia and longer quarantine durations.

Confirmed COVID-19 patients in Taiwan can leave quarantine only after three negative COVID-19 tests. Due to the long communicability period of COVID-19 and the relatively mild disease severity of confirmed patients in our hospital, all of our COVID-19 patients recovered from the disease before they obtained three negative COVID-19 test results required to leave quarantine. Thus, the quarantine duration in the present study more reflected the time required for virus eradication rather than disease severity.

All patients with confirmed COVID-19 in our hospital recovered eventually. Several factors may have contributed to the lack of mortality. First, our COVID-19 patients were relatively young with well performance. Most were classified as imported cases (n = 25; 89.3%) and had gone abroad for study or tourism. As in a previous study, patients with comorbidity showed poorer clinical outcomes than those

without.[10] Second, most of our COVID-19 patients had relatively mild illnesses. Among them, only one patient developed acute respiratory distress syndrome (ARDS) (n = 1; 3.6%) while other studies reported much higher percentages of patient developing ARDS.[11,12] Third, most of our patients were diagnosed in the early stage of disease. Symptomatic patients who visited our hospital with a travel or contact history were all referred to our emergency room and tested for COVID-19. Timely identification of patients at risk allowed early diagnosis and relatively mild disease severity in our patients. Finally, successful supportive treatment may also play a role. Optimized supportive care remains the mainstay of therapy for COVID-19, and the clinical efficacy for the subsequent agents is still under investigation.

In our study, older COVID-19 patients (age ≥40 years) were prone to having pneumonia and a longer quarantine duration compared to younger patients (Table 1). Older age is reportedly associated with higher mortality in COVID-19 patients.[13] This may be due to the age-dependent differences in activity and expression of pulmonary renin-angiotensin system components under pathophysiologic conditions.[14] An animal study reported increased fluid-soluble angiotensin-converting enzyme activity was in bronchoalveolar lavage of rats exposed to lipopolysaccharide. This increased enzyme activity was significantly higher

Table 3 Laboratory findings of patients with coronavirus disease-2019 (COVID-19) during admission.

		Number (%)	No pneumonia	Pneumonia	Odds ratio	p value	Quarantine duration (day)	p value
White blood cell count (/uL)	≥4000	23 (82.1%)	10 (43.5%)	13 (56.5%)	1		27.7 ± 10.7	
	<4000	5 (17.9%)	1 (20%)	4 (80%)	2.571 (0.246−26.851)	0.43	24.8 ± 8.8	0.572
Absolute lymphocyte count (/uL)	≥1500	12 (42.9%)	7 (58.3%)	5 (41.7%)	1		21.9 ± 9.0	
	<1500	16 (57.1%)	4 (25%)	12 (75%)	4.2 (0.838−21.047)	0.081	31.2 ± 9.5	0.028
Platelets (/uL)	≥200,000	20 (71.4%)	11 (55%)	9 (45%)	NA		24.4 ± 8.6	
	<200,000	8 (28.6%)	0	8 (100%)	NA	0.007	34.4 ± 11.0	0.016
CK (u/L)	≥50	11 (44%)	4 (36.4%)	7 (63.6%)	1		27.9 ± 6.5	
	<50	14 (56%)	5 (35.7%)	9 (69.2%)	1.029 (0.199−5.326)	0.973	27.4 ± 12.2	0.901
Cr (mg/dL)	<1	22 (78.6%)	10 (45.5%)	12 (54.5%)	1		27.9 ± 10.9	
	≥1	6 (21.4%)	1 (16.66%)	5 (83.3%)	4.167 (0.416−41.776)	0.225	27.1 ± 6.4	0.869
AST (u/L)	≥20	13 (46.4%)	6 (46.2%)	7 (53.8%)	1		26.3 ± 12.4	
	<20	15 (53.6%)	5 (33.33%)	10 (66.7%)	1.714 (0.371−7.918)	0.49	28 ± 8.4	0.672
ALT (u/L)	≥20	11 (39.3%)	4 (36.36%)	7 (63.6%)	1		25.7 ± 13.1	
	<20	17 (60.7%)	7 (41.2%)	10 (58.8%)	0.816 (0.171−3.895)	0.799	28.2 ± 8.3	0.548
Total bilirubin (mg/dL)	≥0.5	18 (66.7%)	8 (44.44%)	10 (55.6%)	1		28.5 ± 11.3	
	<0.5	9 (33.3%)	2 (22.2%)	7 (77.8%)	2.8 (0.451−17.383)	0.269	24.8 ± 8.3	0.387
Albumin (g/dL)	≥4	14 (53.8%)	4 (28.6%)	10 (71.4%)	1		26.7.1 ± 9.0	
	<4	12 (46.2%)	5 (41.6%)	7 (58.3%)	0.875 (0.171−4.472)	0.873	29.3 ± 7.6	0.597
Na (mmol/L)	≥140	8 (28.6%)	4 (50%)	4 (50%)	1		19.1 ± 5.6	
	<140	20 (71.4%)	7 (35%)	13 (65%)	1.857 (0.352−9.795)	0.466	30.5 ± 10.0	0.006
K (mmol/LL)	≥3.5	23 (82.1%)	10 (43.5%)	13 (56.5%)	1		27.0 ± 8.0	
	<3.5	5 (17.9%)	1 (20%)	4 (80%)	3.077 (0.296−31.982)	0.347	28.2 ± 18.9	0.818
C-reactive protein (mg/dLL)	≥1	10 (35.7%)	2 (20%)	8 (80%)	1		32.5 ± 11.8	
	<1	18 (64.3%)	9 (50%)	9 (50%)	0.281 (0.046−1.734)	0.132	24.3 ± 8.2	0.04
D-dimer (μg/mL)	≥0.5	3 (27.3%)	1 (33.33%)	2 (66.7%)	1		32 ± 7	
	<0.5	8 (72.7%)	2 (25%)	6 (75%)	1.5 (0.084−26.855)	0.782	24.1 ± 12.9	0.354
Procalcitonin (ng/mL)	≥0.03	7 (70%)	1 (14.28%)	6 (85.7%)	NA		31.2 ± 12.2	
	<0.03	3 (30%)	0	3 (100%)	NA	0.490	33.3 ± 9.8	0.806
Myoglobulin (ng/mL)	≥10	8 (66.7%)	3 (37.5%)	5 (62.5%)	1		25.7 ± 7.8	
	<10	4 (33.3%)	1 (25%)	3 (75%)	1.8 (0.124−26.196)	0.665	25.7 ± 9.0	1
Ferrtin (ng/mL)	≥200	9 (56.2%)	2 (18.18%)	7 (81.8%)	1		28.2 ± 10.6	
	<200	7 (43.8%)	4 (57.1%)	3 (42.9%)	0.167 (0.02−1.419)	0.101	25.6 ± 10.1	0.599
Lactate dehydrogenase (u/L)	≥150	15 (57.7%)	5 (33.3%)	10 (66.7%)	1		26.5 ± 11.4	
	<150	11 (42.3%)	5 (45.45%)	6 (54.5%)	0.6 (0.121−2.973)	0.532	28.4 ± 7.4	0.619
Alkaline-phosphatase (u/L)	≥50	15 (62.5%)	6 (40%)	9 (60%)	1		31.2 ± 9.6	
	<50	9 (37.5%)	2 (22.2%)	7 (77.8%)	2.333 (0.356−15.3)	0.377	25 ± 9.9	0.147
Erythrocyte sedimentation rate (mm/hr)	≥20	6 (75%)	1 (16.66%)	5 (83.3%)	NA		24.6 ± 6.9	
	<20	2 (25%)	0	2 (100%)	NA	0.537	31.5 ± 12.0	0.337
Cycle threshold of RT-PCR	≥25	16 (59.3%)	6 (37.5%)	10 (62.5%)	1		29.0 ± 8.7	
	<25	11 (40.7%)	4 (36.36%)	7 (63.6%)	1.05 (0.214−5.158)	0.952	25.9 ± 11.8	0.432

in elderly rats.[14] This may indicate that the elderly more prone to the development and progression of lung injuries. COVID-19 patients who were overweight (BMI ≥25 kg/m^2) were more likely to have pneumonia than were non-overweight patients (Table 1). This risk factor was also reported in H1N1-infected patients. In previous studies, obesity was found to increase H1N1 vulnerability[15] and may be associated with the need for hospitalization and death in H1N1 patients.[16] Patients with a high Charlson comorbidity index (≥1) in our study had longer quarantine durations (Table 1). A previous study suggested that the Charlson comorbidity index might serve as an independent determinant for hospital mortality in COVID-19 patients.[17] Our study revealed that it might also serve as a determinant for hospital quarantine durations in COVID-19 patients.

The most frequent symptoms in our patients were cough and fever (Table 2). This finding was similar to those of other studies.[13] A growing number of papers have reported smell or taste disturbances in COVID-19 patients.[18] In our study, 10 (35.7%) and seven patients (25%) had distorted

Table 4 Treatment medications and durations of coronavirus disease-2019 (COVID-19) patient quarantine.

Medication Combinations		Number (%)	Quarantine duration (days)	p value
Hydroxychloroquine+Azithromycin+Ceftriaxone+Teicoplanin	Yes	3 (10.7%)	28.6 ± 2.8	
	No	25 (89.3%)	27.0 ± 10.8	0.801
Hydroxychloroquine+Azithromycin+Ceftriaxone	Yes	10 (35.7%)	27.4 ± 9.3	
	No	18 (64.3%)	26.8 ± 12.3	0.877
Hydroxychloroquine+Azithromycin	Yes	13 (46.4%)	28.4 ± 11.3	
	No	15 (53.6%)	26.1 ± 9.5	0.56
Hydroxychloroquine+Ceftriaxone	Yes	13 (46.4%)	25.3 ± 11	
	No	15 (53.6%)	28.8 ± 9.6	0.39
Hydroxychloroquine	Yes	22 (78.6%)	26.3 ± 10.7	
	No	6 (21.4%)	30.6 ± 8.4	0.363
Ceftriaxone	Yes	16 (57.1%)	27.6 ± 11.2	
	No	12 (42.9%)	26.7 ± 9.3	0.812
Azithromycin	Yes	13 (46.4%)	28.4 ± 11.3	
	No	15 (53.6%)	26.1 ± 9.5	0.56
No Antibiotics or Hydroxychloroquine	Yes	3 (10.7%)	24 ± 3.6	
	No	25 (89.3%)	27.6 ± 10.8	0.576

senses of smell and taste, respectively (Table 2). Changes in smell and taste in COVID-19 patients may be related to angiotensin-converting enzyme 2 protein in nasal respiratory and olfactory epithelial cells.[19] Most of the patients in our hospital with distorted smell or taste gradually recovered their senses following their recovery. Based on these symptoms, a team at King's College London developed a model to identify which combination of symptoms could predict COVID-19 cases, including a combination of loss of smell and taste, fever, persistent cough, fatigue, diarrhea, abdominal pain, and loss of appetite.[20] They found that the strongest predictor was loss of smell and taste.[20] Clinical physicians should be on alert in patients with symptoms of distorted smell or taste.

A previous study reported that lymphopenia might be associated with severe COVID-19.[21] The results of our study showed that it may also be associated with longer hospital quarantine (Table 3). A meta-analysis of nine studies suggested that thrombocytopenia was significantly associated with COVID-19 severity.[22] A more sizable drop in platelet counts was noted, especially in non-survivors.[22] In our study, a lower platelet count (<200,000/uL) might also be associated with developing pneumonia and longer hospital quarantine duration (Table 3). Lower serum sodium levels may indicate poor nutrition and health status. In our study, serum sodium (<140 mmol/L) was associated with longer hospital quarantine (Table 3). A previous study reported a high prevalence of malnutrition in elderly COVID-19 patients.[23] Low real-time RT-PCR cycle threshold (Ct) values of COVID-19 from oropharyngeal swabs indicated high viral loads. However, in our study, there was no relationship between Ct values and the occurrence of pneumonia or longer hospital quarantine. We could not predict the outcome or disease severity using the virus Ct. Yen et al. reported similar viral loads between asymptomatic and symptomatic patients.[24] Additional studies are needed to clarify the correlation between viral loads and disease severity or COVID-19 patient outcomes.

Hydroxychloroquine and azithromycin reportedly decrease viral load in COVID-19 patients.[25] We prescribed hydroxychloroquine to most of the enrolled patients; however, the hospital quarantine duration did not differ significantly between patients who received hydroxychloroquine and those who did not (Table 4). This may be due to the small number of cases in our study. Further studies on the efficacy of hydroxychloroquine or azithromycin are needed. However, a previous study reported that hydroxychloroquine may not reduce the need for intubation or mortality in COVID-19 patients.[26] The combination of hydroxychloroquine and different antibiotics in our study did not reduce the duration of hospital quarantine (Table 4). Further studies are needed to clarify the efficacy of these agents.

Our study has several limitations. First, it was conducted in a single center; thus, the results may have some biases. Second, this was a retrospective cohort study and not all laboratory examinations were performed in all patients. Third, our treatment options were not chosen randomly, which may also have caused biases. Fourth, due to the small sample size of our study, multivariate logistic regression analysis was difficult to perform to assess the relationship between the outcome (developing pneumonia and increased quarantine duration) and the predictive factors. Further studies are needed to clarify the clinical characteristics and efficacy of treatment options in COVID-19 patients.

Conclusion

In conclusion, among the patients with COVID-19 enrolled in our study, older age; higher BMI; shorter body height; symptoms of fever, chills, or short of breath; and lower platelet count may be associated with developing pneumonia, while older age, higher Charlson comorbidity index, lower lymphocyte count, lower platelet count, lower serum sodium level, and higher CRP level may be associated with a longer quarantine duration. Prescribing hydroxychloroquine alone or combined with other antibiotics may not reduce the duration of hospital quarantine.

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Declaration of Competing Interest

The authors have no conflicts of interest relevant to this article.

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