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ORIGINAL ARTICLE

Contributing Factors Affecting the Length of Hospital Stay among Febrile Patients with Omicron Reported in Suzhou

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SUMMARY

Background: **Coronavirus disease 2019 (COVID-19) has had global attention with regard to the urgent challenging threat to global public health. Currently, the novel Omicron variant is showing rapid transmission across the world, which appears to be more contagious than the previous variants of COVID-19. Early recognition of disease is critical for patients' prognosis. Fever is the most common symptom. We evaluated the clinical characteristics of febrile patients with COVID-19 reported in Suzhou and explored the predictors for a longer duration of hospitalization in febrile patients.**

Methods: **This retrospective study was carried out in 146 Omicron variant infected patients confirmed by nucleic acid tests in the Affiliated Infectious Hospital of Soochow University between February 13, 2022 and March 2, 2022. Data of febrile and afebrile laboratory-confirmed patients on hospital admission in Suzhou were collected and compared. According to the median length of stay (LOS), febrile cases were divided into short and long LOS groups. Then the predictive factors for a prolonged duration of hospitalization were analyzed using logistic regression methods. Receiver Operating Characteristic (ROC) Curve analysis was used to analyze the effectiveness of the risk factors for prolonged duration of hospitalization in febrile COVID-19 patients.**

Results: **Of the 146 discharged patients in our study, 112 patients (76.7%) caught a fever. Compared to afebrile Omicron patients, febrile patients showed a significantly longer duration of hospitalization (15.00 (5.80) vs. 13.00 (6.00), p = 0.002). Taking the median LOS (15 days) as the dividing point, 64 febrile cases were assigned to the short LOS group and the rest to the long LOS group. The long LOS group had a longer virus shedding duration than the short LOS group (18.42 ± 2.86 vs. 11.94 ± 2.50 days, p < 0.001). Compared to short LOS febrile patients, long LOS patients were older (44.88 ± 21.36 vs. 30.89 ± 17.95 years, p < 0.001) and showed a higher proportion of greater than 60 years old (33.3% vs. 9.4%, p = 0.002; Supplemental Table S2). Febrile patients with long LOS also showed a higher proportion of hypertension (25% vs. 6.3%, p = 0.005) and higher levels of cTnI (5.00 (3.00) vs. 4.00 (2.00) μg/L, p = 0.025). The multivariate analysis indicated that virus shedding duration (OR 2.369, 95% CI 1.684 - 3.333, p < 0.001) was the independent risk factor associated with long-term hospital stay in febrile patients with Omicron. Furthermore, ROC Curve analysis revealed that the area under the curve (AUC) for virus shedding duration to diagnose prolonged duration of hospitalization in febrile COVID-19 patients was 0.951 (95% CI 0.913 - 0.989). The cutoff point was set at 14.5 days.**

Conclusions: **More than half of the non-severe patients exposed to the new Omicron variant had symptoms of fever. In total, 42.86% of the febrile patients were discharged within 15 days since hospital admission. Febrile Omicron cases took a longer duration of hospitalization compared to afebrile patients, and virus shedding duration (OR 2.369, 95% CI 1.684 - 3.333, p < 0.001) was probably a predictive factor for long-term hospital stays.**
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Supplementary Data

Table S1. Demographic and clinical characteristics of febrile and afebrile patients with COVID-19 on admission to hospital.

Variables	Total (n = 146)	Afebrile (n = 34)	Febrile (n = 112)	$Z/t/\chi^2$	p-value
Demographic characteristics					
Age (years), mean ± SD	37.10 ± 19.84	37.79 ± 17.37	36.90 ± 21.97	0.233	0.816
Age stratification, n (%)				-0.072	0.943
< 18	22 (15.1)	4 (11.8)	18 (16.1)		
18 - 60	97 (66.4)	25 (73.5)	72 (64.3)		
≥ 60	27 (18.5)	5 (14.7)	22 (19.6)	0.422	0.516
BMI (kg/m^2), mean ± SD	22.83 ± 4.04	23.46 ± 3.80	22.64 ± 4.11	1.045	0.298
Gender, n (%)				0.176	0.675
Male	77 (52.7)	19 (55.9)	58 (51.8)		
Female	69 (47.3)	15 (44.1)	54 (48.2)		
Exposure history, n (%)				8.268	0.071
Contact with confirmed family member(s)	63 (43.2)	12 (35.3)	51 (45.5)		
Contact with confirmed friends or colleagues	44 (30.1)	15 (44.1)	29 (25.9）		
Involved in mass gathering	13 (8.9)	0 (0)	13 (11.6)		
Do not know	13 (8.9)	4 (11.8)	9 (8.0)		
Travel or residence in epidemic communities	13 (8.9)	3 (8.8)	10 (8.9)		
Have been to medium-and high-risk areas outside Suzhou	0	0	0		
Clinical characteristics					
Vaccination status, n (%)				-0.245	0.806
Not vaccinated	25 (17.1)	5 (14.7)	20 (17.9)		
Incomplete vaccination	9 (6.2)	3 (8.8）	6 (5.4)		
Complete vaccination without booster vaccination	72 (49.3)	16 (47.1)	56 (50.0)		
Complete vaccination with booster vaccination	40 (27.4)	10 (29.4)	30 (26.8)		
Comorbidity, n (%)					
Hypertension	22 (15.1)	6 (17.6)	16 (14.3)	0.23	0.631
Diabetes	5 (3.4)	2 (5.9)	3 (2.7)	0.131	0.718
Chronic respiratory diseases	10 (6.8)	4 (11.8)	6 (5.4)	0.824	0.364
Cardiovascular disease	2 (1.4)	0 (0)	2 (1.8)		1
Cerebrovascular disease	8 (5.5)	1 (2.9)	7 (6.3)	0.098	0.755
Chronic liver disease	5 (3.4)	0 (0)	5 (4.5)	0.512	0.474
> 1 comorbidity	18 (12.3)	4 (11.8)	14 (12.5)	0	1
Clinical type on admission, n (%)				-4.161	< 0.001
Asymptomatic	28 (19.2)	19 (55.9)	9 (8.0)		
Mild	87 (59.6)	9 (26.5)	78 (69.6)		
General	31 (21.2)	6 (17.6)	25 (22.3)		
Time from illness onset to admission (days), median (IQR)	1.00 (2.00)	1.00 (1.00)	1.00 (2.00)	-1.252	0.211

Table S1. Demographic and clinical characteristics of febrile and afebrile patients with COVID-19 on admission to hospital (continued).

Variables	Total (n = 146)	Afebrile (n = 34)	Febrile (n = 112)	Z/t/χ^2	p-value
Early symptoms, n (%)					
Cough	78 (53.4)	10 (29.4)	68 (60.7)	10.271	0.001
Phlegm	42 (28.8)	5 (14.7)	37 (33.0)	4.276	0.039
Nasal congestion	21 (14.4)	2 (5.9)	19 (17.0)	1.779	0.182
Runny nose	9 (6.2)	0 (0)	9 (8.0)	1.688	0.194
Pharyngalgia	45 (30.8)	8 (23.5)	37 (33.0)	1.105	0.293
Fatigue	11 (7.5)	1 (2.9)	10 (8.9)	0.620	0.431
Chills	12 (8.2)	0 (0.0)	12 (10.7)	2.676	0.102
Myalgia	21 (14.4)	0 (0.0)	21 (18.8)	6.001	0.014
Headache	19 (13.0)	1 (2.9)	18 (16.1)	2.897	0.089
Diarrhea	4 (2.7)	0 (0)	4 (3.6)		0.573
Vomit	7 (4.8)	0 (0)	7 (6.3)	1.073	0.300
Vital signs on admission					
MAP (mmHg), mean ± SD	97.71 ± 12.67	99.17 ± 14.56	97.27 ± 12.08	0.763	0.447
Heart rate (beats/minute), mean ± SD	98.29 ± 16.84	91.06 ± 14.53	100.49 ± 16.94	-2.934	0.004
SpO_2 (%), median (IQR)	98.00 (3.00)	99.00 (3.00)	98.00 (3.00)	-0.128	0.898
Treatments, n (%)					
Antiviral	57 (39.0)	14 (41.2)	43 (38.4)	0.085	0.771
Anticoagulation	33 (22.6)	5 (14.7)	28 (25.0)	1.58	0.209
Immunity-boosting	88 (60.3)	19 (55.9)	69 (61.6)	0.357	0.55
Prone position	31 (21.2)	6 (17.6)	25 (22.3)	0.341	0.559
Chinese medicine	143 (97.9)	34 (100.0)	109 (97.3)		1
Prognostic indicators					
LOS (days), median (IQR)	15.00 (6.00)	13.00 (6.00)	15.00 (5.80)	-3.071	0.002
Virus shedding duration (days), mean ± SD	14.01 ± 4.41	11.68 ± 4.44	14.71 ± 4.17	-3.665	< 0.001
Chest CT scan, n (%)				-0.118	0.906
None	42 (28.8)	10 (29.4)	32 (28.6)		
Unilateral pneumonia	51 (34.9)	11 (32.4)	40 (35.7)		
Bilateral pneumonia	53 (36.3)	13 (38.2)	40 (35.7)		
Laboratory findings					
WBC (× 10^9/L), mean ± SD	6.48 ± 2.10	6.76 ± 2.29	6.40 ± 2.05	0.882	0.379
Lymphocyte count (× 10^9/L), median (IQR)	1.18 (0.90)	1.34 (0.94)	1.10 (0.90)	-1.794	0.073
D-Dimer (μg/L), median (IQR)	230.00 (265.00)	210.00 (180.00)	235.00 (270.00)	-0.829	0.407
Fibrinogen (g/L), mean ± SD	2.89 ± 0.66	2.84 ± 0.72	2.91 ± 0.65	-0.517	0.606
IL-6 (pg/mL), median (IQR)	9.90 (1.60)	10.40 (1.30)	9.90 (1.67)	-1.198	0.231
CRP (mg/L), median (IQR)	3.91 (7.27)	4.00 (9.06)	3.80 (6.57)	-0.500	0.617
PCT (ng/mL), median (IQR)	0.14 (0.13)	0.11 (0.12)	0.14 (0.11)	-2.032	0.042
Total bilirubin (μmol/L), mean ± SD	8.93 ± 4.84	9.30 ± 4.67	8.82 ± 4.91	0.499	0.618
Albumin (g/L), mean ± SD	44.55 ± 4.18	44.92 ± 4.88	44.44 ± 3.96	0.523	0.604
ALT(U/L), median (IQR)	33.00 (14.00)	34.00 (16.50)	32.50 (13.00)	-0.459	0.646
AST(U/L), median (IQR)	25.00 (11.00)	23.00 (11.50)	26.00 (11.00)	-1.273	0.203
Cholesterol (mmol/L), mean ± SD	4.81 ± 1.10	4.77 ± 0.99	4.82 ± 1.14	-0.221	0.825

Table S1. Demographic and clinical characteristics of febrile and afebrile patients with COVID-19 on admission to hospital (continued).

Variables	Total	Afebrile	Febrile	$Z/t/\chi^2$	p-value
	(n = 146)	(n = 34)	(n = 112)		
Triglyceride (mmol/L), mean ± SD	1.05 ± 0.72	1.07 ± 0.79	1.05 ± 0.70	0.147	0.883
Creatinine (μmol/L), mean ± SD	57.42 ± 25.32	54.26 ± 17.88	58.38 ± 27.17	-0.831	0.407
Myoglobin (ug/L), median (IQR)	24.82 (18.22)	24.82 (20.00)	24.85 (17.49)	-0.233	0.816
CK-MB (ug/L), median (IQR)	1.28 (1.25)	1.26 (1.35)	1.31 (1.24)	-0.431	0.666
cTnI (μg/L), median (IQR)	4.00 (3.00)	4.00 (4.00)	4.00 (3.00)	-2.351	0.019
NT-proBNP (ng/L), median (IQR)	34.00 (48.00)	36.00 (39.00)	32.50 (56.75)	-0.373	0.709
Calcium (mmol/L), mean ± SD	2.32 ± 0.13	2.34 ± 0.11	2.31 ± 0.13	0.993	0.322
Phosphorus (mmol/L), mean ± SD	1.42 ± 0.29	1.38 ± 0.26	1.43 ± 0.30	-0.948	0.345
Magnesium (mmol/L), mean ± SD	0.78 ± 0.08	0.79 ± 0.07	0.78 ± 0.08	0.523	0.602
Potassium (mmol/L), mean ± SD	4.08 ± 0.38	4.13 ± 0.30	4.07 ± 0.40	0.821	0.413
Sodium (mmol/L), mean ± SD	137.64 ± 3.64	137.97 ± 3.62	137.55 ± 3.66	0.589	0.557
Chloride (mmol/L), mean ± SD	101.30 ± 2.72	101.94 ± 2.92	101.11 ± 2.64	1.571	0.118

Continuous variables were shown as median with interquartile range or N (%) and analyzed by Mann-Whitney U test. Categorical variables were indicated as percentages and analyzed by χ^2 test or Fisher's exact test. COVID-19 - coronavirus disease 2019, IOR - interquartile range, MAP - mean arterial pressure, SpO_2 - pulse oximeter O_2 saturation, LOS - length of hospital stay, CT - computed tomographic, WBC - white blood cell, IL-6 - Interleukin-6, CRP - C-reactive protein, PCT - procalcitonin, ALT - alanine aminotransferase, AST - aspartate aminotransferase, CK-MB - creatine kinase isoenzyme, cTnI - troponin I, NT-proBNP - N-terminal pro-brain natriuretic peptide.