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Original Article

Clinical Features and Outcomes of Elderly COVID-19 Patients in a Community Isolation Facility: A Retrospective, Observational Study

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SUMMARY

Background: We reported clinical features of elderly COVID-19 patients who were initially asymptomatic or mildly ill, and characterized the clinical features of those requiring hospital transfer.
Methods: Patients with confirmed COVID-19 infection admitted to a community isolation facility (CIF) from May 21 to July 12, 2021 were assessed on demographic data, clinical symptoms, and pulse oximetry. The determinants of hospital transfer in the elderly patients (≥ 65 years) were analyzed. Residual symptoms were followed up among the elderly patients who left the CIF, regardless of hospital transfer or going home.
Results: Of consecutive 408 patients (20 to 91 years old), 67 (16.4%) were older than 65 years old. The proportion of elderly people with hospital transfer was higher, compared to the non-elderly patients (49.3% vs. 15.2%, $p < 0.001$). Elderly patients were more prone to develop dyspnea and fatigue, but fewer headache, sore throat, and dysosmia, compared to the non-elderly patients (all $p < 0.05$). Factors determining hospitalization for the elderly patients included dyspnea, low oxygen saturation, and persistent fever. The elderly patients with hospital transfer were more likely to develop sequelae, and fatigue (20.8%) was the most common symptom. Two elderly patients died after hospitalization.
Conclusion: The clinical profiles of the COVID-19 elderly diverged from those of the non-elderly. Admission to a CIF for asymptomatic or mildly ill elderly with daily monitoring of clinical presentation to decide hospital transfer is feasible during an outbreak. Early identification of elderly COVID-19 patients at risk of severe disease may deserve early intervention and improve treatment outcomes.

1. Introduction

In December 2019, a new infectious disease, coronavirus disease-19 (COVID-19), broke out in Wuhan City, Hubei Province, China. It rapidly spread within China and then worldwide. The pathogen was identified as a novel beta-coronavirus, named severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2). COVID-19 infection causes a wide clinical spectrum of disease, appears as asymptomatic disease or shows mild symptoms in the majority of patients. Asymptomatic infection rate may be as high as 40% to 45%.[1] However, asymptomatic infected people was estimated to account for more than half of all transmission.[2] A study of 72,314 cases from China reported that 80% of COVID-19 patients are asymptomatic or have mild symptoms.[3] In fact; it is worthwhile to be cautious that some patients will develop pneumonia as well as multiple organ failure. The elderly patients appear to be more likely to develop severe outcomes.[4] The reason that deserves our attention is that COVID-19 has resulted in a large number of death and depressed economy in the world.[5]

During the surge of COVID-19 outbreak mainly owing to alpha variant in May, 2021, New Taipei City (NTC) was the first city most affected and the number of infected people accounted for 47.5% of Taiwanese COVID-19 patients. In response to such a situation, NTC government implemented the first community isolation facility (CIF) at a hotel located in Northern Taiwan. The CIF intended to isolate COVID-19 confirmed patients with either asymptomatic or mild symptoms and the ultimate goal was to put an end to the continued spread of the epidemic in the community and family. The priority of CIF task guarantees for all health workers' and COVID-19 patients' safety. Health care was augmented by telemedicine, daily pulse oximetry, provision of emergency oxygen, and fast hospital transfer. During the most severe period of Taiwan's epidemic, government allocated reverse transcription-polymerase chain reaction (RT-PCR) confirmed COVID-19 patients to stay in CIF to observe disease progression in order to decide whether to transfer the patients to hospital. The model of community isolation setting has been successfully validated in Daegu, South Korea.[6] The function of CIF can offer prehospital care, prevent the epidemic from spreading in the community, and save a hospital bed shortage during a rapid and massive COVID-19 outbreak.[7]

The aim of this study was to compare clinical differences between young and old patients, and for the old patients, to identify

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indicators that determine referral of them to hospital, and to track persistent symptoms after recovery.

2. Materials and methods

This is a retrospective cases study. We reviewed COVID-19 patients aged 20 or older who were admitted from May 21 to July 12, 2021 to a CIF of 164 rooms located in New Taipei City. COVID-19 diagnosis was confirmed with a positive RT-PCR result of nasopharyngeal sampling. When the patients were transported to the CIF, the health care workers there provided each patient a thermometer (digital pen type thermometer, microlife, Taiwan) and a pulse oximeter (P0200, FORA, Taiwan), and completed the health status check, including currently diagnosed and/or history of hypertension, diabetes mellitus, hyperlipidemia, heart disease, asthma, allergic rhinitis, gastroesophageal reflux disease, cancer, hyperthyroidism, gout, and others, by telephone at the first day. In the following days, the patients were asked to daily report the oral temperature and oximeter readings as well as symptoms. If the patients failed to report, the health care workers would enter the rooms to see the patients and collect the data. Unless transferal to hospitals, the patients with an initial Ct value of PCR test 27 or more left the CIF after 10 full days of admission, and the remaining patients left the CIF after 14 full days of admission. Before discharge, all patients undertook a second PCR test to determine further quarantine at home or not. This study was approved by the institutional review board of MacKay Memorial Hospital (MMH) (21MMHIS376e).

2.1. Staff assignment and patient transfer to hospital

The CIF had onsite nurses, each of whom cared no more than 30 patients for 12 hours daily. In addition, one family medicine doctor worked in the CIF at day time, backed up by an infection specialist in MMH by telephone. One infection specialist of MMH was on call in the evenings and nights for the CIF. The patients were transferred to hospitals for further care if they met one of the below criteria: 1. Oxygen saturation below 94%; 2. Persistent fever (temperature $\geq$ 38 °C for three consecutive days); 3. Chest tightness and/or dyspnea; 4. The doctors' judgment.

2.2. Follow-up

Patients were followed up by telephone to ask the physical symptoms and emotional distress at 28th to 30th days after they leaved the CIF, regardless of transferal to hospitals or going home.

2.3. Statistical analysis

The patients were divided into 2 groups. Those older than 65 belonged to the elderly group, leaving the others in the non-elderly group. We compared differences in symptoms between the groups and analyzed the determinants of hospital transfer, in particular for the elderly group. We also compared the differences in persistent symptoms between hospital-discharged elderly and CIF-leaved elderly. Continuous variables were tested by Independent T test, and categorical variables by Chi-Square Test ($\chi 2$ test) to analyze the differences between the two groups. The statistical significance level (α level) was set at 0.05. Data were analyzed using IBM Statistical Package for the Social Sciences (SPSS) for Windows, version 19.

3. Results

A total of 408 (204 males) RT-PCR positive COVID-19 patients were studied. The mean age was 48.8 $\pm$ 15.6 (range 20 to 91) years old. As a whole, the elderly group, compared to non-elderly group, had higher rates of comorbidities, except allergic rhinitis, cancer, hyperthyroidism, and gout. Hypertension existed in 9.7% of the non-elderly group, and it increased steeply to 32.8% in the elderly group ($p < 0.001$). Similarly, the elderly had a higher rate of heart disease compared to the non-elderly (6.0% vs. 1.5%, $p = 0.044$). The data were listed in Table 1.

Table 2 compares the symptoms, signs, oxygen saturation, and outcome between the 2 groups. For both groups, the percentages of asymptomatic patients at admission were lower in the elderly patients, compared to the non-elderly. The percentages of asymptomatic patients in both groups decreased during quarantine, and the decrement was higher in the elderly group, so that the percentage of asymptomatic patients before discharge was lower in the elderly group ($\chi 2 = 17.12$, $p < .001$). The most common symptom was cough

Table 1
Demographic and clinical characteristics of all patients.

Variables	Total (n = 408)	Non-elderly (≤ 64 years) (n = 341)	Elderly (≥ 65 years) (n = 67)	*p* value
Age, years	48.8 (±15.6)	44.3 (±12.8)	71.3 (±6.2)	
Gender				
Male	204 (50%)	169 (49.6%)	35 (52.2%)	0.395
Female	204 (50%)	172 (50.4%)	32 (47.8%)	
Past history				
No	289 (70.8%)	254 (74.5%)	35 (52.2%)	< 0.001
Yes	119 (29.2%)	87 (25.5%)	32 (47.8%)	
Diagnosis				
Hypertension	55 (13.5%)	33 (9.7%)	22 (32.8%)	< 0.001
Diabetes mellitus	33 (8.1%)	24 (7.0%)	9 (13.4%)	0.259
Hyperlipidemia	16 (3.9%)	12 (3.5%)	4 (6.0%)	0.313
Heart disease	9 (2.2%)	5 (1.5%)	4 (6.0%)	0.044
Asthma	12 (2.9%)	9 (2.6%)	3 (4.5%)	0.323
Allergic rhinitis	10 (2.5%)	9 (2.6%)	1 (1.5%)	0.491
Gastroesophageal reflux disease	9 (2.2%)	6 (1.7%)	3 (4.5%)	0.282
Cancer	7 (1.7%)	6 (1.7%)	1 (1.5%)	0.677
Hyperthyroidism	7 (1.7%)	7 (2.1%)	0	0.282
Gout	3 (0.7%)	3 (0.9%)	0	0.513
Others	18 (4.2%)	12 (3.5%)	6 (9.0%)	0.063

Data are expressed in number (%), except age (SD).

followed by fever in both groups. In the elderly group, dyspnea was as common as fever, and was much more frequently claimed, compared to the non-elderly (43.3% vs. 16.0%, $p < 0.001$). In addition to dyspnea, the percentage of elderly patients experiencing fatigue was higher than that of non-elderly patients (15.0% vs. 6.1%, $p = 0.027$). In contrast, the non-elderly group experienced more throat pain, headache and dysosmia (all $p < 0.05$, see Table 2). We didn't identify any anosmic patient among the elderly group. As to the daily pulse oximetry measurements, the percentage of the elderly patients with values less than 94% of oxygen saturation was significantly higher than that of non-elderly patients ($p < 0.001$). Of all patients, 85 (20.8%) were hospitalized. Nearly half of the elderly patients were transferred to the hospital, much higher than that of non-elderly group (49.3% vs. 15.2%, $p < 0.001$) and accounted for 38.8% of all hospitalization.

In Table 3, we compared the symptoms, signs, and oxygen saturation in the elderly patients between those with hospital transfer and those without. The significant differences included high temperature (≥ 38 °C), dyspnea, and low oxygen saturation (< 94%). Another finding was that low oxygen saturation (< 94%) occurred more than dyspnea in the elderly patients requiring hospital transfer.

We tracked residual symptoms of the elderly patients by telephone 4 weeks after they leaved the CIF, either going home or hospitalization. Of all 67 elderly patients, 2 patients (respectively 84 and 85 years old) died after hospitalization and 9 patients were unable to reach, leaving 56 patients in Table 4. The elderly patients who were transferred to the hospital had higher rates of residual symptoms and or distress (29.2% vs. 6.3%, p = 0.026), including fatigue, in-

Table 2
Comparison of physical symptoms, signs, and hospitalization between the groups.

Variables	Non-elderly (≤ 64 years) (n = 341)	Elderly (≥ 65 years) (n = 67)	*p* value
Symptoms at admission			
Yes	249 (73.0%)	46 (68.7%)	0.278
No	92 (27.0%)	21 (31.3%)	
Symptoms during quarantine			
Yes	293 (85.9%)	60 (89.6%)	0.282
No	48 (14.1%)	7 (10.4%)	
Symptoms			
Cough	210 (71.7%)	38 (63.3%)	0.495
Fever	127 (43.3%)	26 (43.3%)	0.890
Throat pain	112 (38.2%)	11 (11.3%)	0.008
Headache	89 (30.4%)	8 (13.3%)	0.024
Diarrhea	69 (23.5%)	14 (23.3%)	0.869
Chest tightness	61 (20.8%)	14 (23.3%)	0.605
Dyspnea	47 (16.0%)	26 (43.3%)	< 0.001
Muscle pain	52 (17.7%)	12 (20.0%)	0.583
Dizziness	21 (7.2%)	7 (11.7%)	0.194
Fatigue	18 (6.1%)	9 (15.0%)	0.027
Dysosmia	23 (7.8%)	0	0.020
Allotriogeusia	22 (7.5%)	1 (1.7%)	0.147
Chest pain	18 (6.1%)	2 (3.3%)	0.551
Physiological monitoring during isolation			
Oral temperature (≥ 38 °C)	56 (17.0%)	11 (16.4%)	0.535
Oxygen saturation < 94%	49 (14.3%)	29 (43.3%)	< 0.001
Hospitalization			
Yes	52 (15.2%)	33 (49.3%)	< 0.001**
No	289 (84.8%)	34 (50.7%)	

Data are expressed in number (%).

Table 3
Differences in symptoms and signs of elderly patients between those with hospitalization and those without.

Variables	Hospitalization (n = 33)	No hospitalization (n = 34)	*p* value
Symptom			
Cough	18 (52.4%)	20 (58.8%)	0.624
Fever	10 (30.3%)	16 (47.1%)	0.136
Throat pain	8 (24.2%)	3 (8.8%)	0.186
Headache	4 (12.1%)	4 (11.8%)	0.628
Diarrhea	7 (21.2%)	7 (20.6%)	0.593
Chest tightness	10 (30.3%)	4 (11.8%)	0.077
Dyspnea	19 (57.6%)	7 (20.6%)	0.003
Muscle pain	7 (21.2%)	5 (14.7%)	0.539
Dizziness	3 (9.1%)	4 (11.8%)	0.517
Fatigue	7 (21.2%)	2 (5.9%)	0.083
Allotriogeusia	1 (3.0%)	0	0.493
Chest pain	2 (6.1%)	0	0.239
Physiological monitoring during isolation			
Oral temperature (≥ 38 °C)	9 (27.3%)	2 (5.9%)	< 0.001
Oxygen saturation < 94%	26 (78.8%)	3 (8.8%)*	0.023

Data are expressed in number (%).
* The patients denied physical symptoms and refused hospital transfer.

somnia, cough, and dyspnea, all of which were higher, compared to those non-hospitalized (all $p < 0.05$, see Table 4). Residual symptoms in the non-hospitalized patients were uncommon, mainly cough, though one patient was worried about the sequelae of COVID-19 infection.

Table 4
Comparison of distribution of symptoms during follow-up between the elderly patients with hospitalization and those without.

Variables	Hospitalization (n = 24)	No hospitalization (n = 32)	*p*
Symptom/distress			
Yes	7 (29.2%)	2 (6.3%)	0.026
No	17 (70.8%)	30 (93.8%)	
Physical symptoms			
Cough	2 (8.3%)	2 (6.3%)	0.046
Dyspnea	2 (8.3%)	0	0.040
Fatigue	5 (20.8%)	0	0.024
Insomnia	3 (12.5%)	0	0.030
Emotional distress	2 (8.3%)	1 (3.1%)	0.060

4. Discussion

There were 3 major findings in this study. First, hypertension was the most common comorbidity in our patients with COVID-19 infection, regardless of age. Second, elderly patients tended to develop symptoms during quarantine and required hospitalization, though the percentage of elderly patients with initial manifestation of symptoms after the infection might be not as high as that of non-elderly patients. Last, the elderly patients sent for hospitalization tended to have lasting effects of COVID-19 even after recovery from the disease. All the findings had implications for clinical practice.

Hypertension was reported to be associated with worse outcomes in patients with COVID-19. However, when age and other risk factors were considered, hypertension did not increase the risk of adverse outcomes, nor did the risk of new infection.[8] In our study, we observed that the elderly patients had higher rates of hospitalization, compared to the other patients (49.3% vs. 15.2%). It is clear that age is by far the most significant determinant for morbidity and mortality after COVID-19 infection.[9] In other words, the severity and outcome of COVID-19 largely depends on the patients' age. One speculation is that ageing is associated with physiological changes in immune system and functional decline. Another conjecture is that the elderly patients with multiple comorbidities are more vulnerable to severe COVID-19.[10] Elderly patients had the higher tendency for hospital transfer and advanced medical care. In view of the above arguments, more intervention efforts should be offered to the elderly patients in community isolation setting.

As a result of high transmission rate from COVID-19 infection, isolation policy is the most effective measure of non-pharmacological intervention to control its spreading in the community. The establishment of community isolation setting has indeed effectively suppressed the spread of the epidemic. Clinical presentation of COVID-19 varied widely and manifested from a mild disease in the majority of patients to life-threatening conditions in others. Because the majority of patients are asymptomatic or mildly affected, when the diagnosis is established, the patients can be admitted to a quarantine facility for observation and provision of preliminary treatment before transfer to the hospital due to worsening clinical presentation. Our study showed that 21% (85 out of 408 patients) were eventually hospitalized. This finding is consistent with a previous report that demand for advanced medical services applied to about 20% of total COVID-19 patients.[11]

Our data showed that the elderly patients with COVID-19 can behave in a different manner from the non-elderly ones. Atypical symptoms should be considered when treating older patients.[12] Our non-elderly patients had typical clinical symptoms of COVID-19 such as sore throat and headache. One particular observations was that olfactory dysfunction was less affected in the elderly patients. Two studies also showed that olfactory dysfunction is inversely related to age.[13,14] They also reported that elder patients are less prone to have taste disturbances. In our data, the same finding existed and co-occurred with dysomia and dysgeusia.

Considering the high morbidity background in the elderly, older patients are bound to have high hospitalization rate. Naito K, et al. described that older patients had a shorter time to develop the need for hospitalization.[15] We also found that some elderly people, even if they were asymptomatic at first, had a higher proportion of symptoms worsening during quarantine observation. Thus, we should not ignore older patients with asymptomatic or mild symptom in the early stage of disease development. In the study of Dananché C, et al., they pointed out that delay between symptom onset and hospital admission is a key issue affecting prognosis.[16] We also identified abnormal pulse oximetry being a crucial determinant for advanced medical care. Low oxygen saturation (< 94%) for older adults was demonstrated to be a predictive factor of high mortality.[17] Without daily pulse oximetry, health workers caring for patients with possible asymptomastic or silent hypoxia are like driving in the dark without light on. In addition to low oxygen saturation, dyspnea was another important indicator for the elderly to be transferred to the hospital for further medical treatment. A systematic review and meta-analysis showed that dyspnea is the only symptom predicative for severe COVID-19 and intensive care unit admission.[18] Thus, we draw an inference that low oxygen saturation and dyspnea are two determinants of hospital transfer for the elderly patients.

"Long COVID" is a term being used to describe illness in people who have recovered from COVID-19, but still complain lasting effects of the infection or suffer from usual symptoms for far longer than would be expected.[19] The majority of COVID-19 patients will recover within 2 weeks. However, there is more evidence that some patients who have recovered from COVID-19 infection still have persistent symptoms. Thus, follow-up programs should be conducted to assess long COVID-19 syndrome. We disclosed that the most common persistent symptoms were fatigue (20.8%) and insomnia (12.5%) among the hospitalized elder patients. Research on prevalence of persistent COVID-19 symptoms also found that fatigue is the most common persistent symptom.[20] It is worth noting that 87% of patients had at least one persistent symptom at a mean of 60 days after symptom onset, with the most common symptoms being fatigue (53.1%).[21] Becker JH, et al. highlighted cognitive dysfunction among the elderly patients after COVID-19 infection.[22] Regarding this part, our telephone interview failed to cover the cognitive domains.

4.1. Limitation

First, under-estimation of long-COVID could be attributed to televisits themselves. Persistent symptoms secondary to COVID-19 infection should be conducted by comprehensive and standardized evaluation instead of telephone interview only. Second, some patients did not have complete medical records at CIF, and the information of comorbidities could not be recorded in great detail. Third, the elderly did not often use audio-visual technology products, making telemedicine more difficult.

4.2. Strength

Published data on community isolation services associated with COVID-19 remains scarce. Practical information obtained from our CIF with well organization and good teamwork can be used as a reference for future application.

5. Conclusion

Clinical features of the elderly patients with COVID-19 infection may differ from those of the non-elderly patients. Old patients have a higher chance of disease progression. The use of daily pulse oximetry can detect hypoxia regardless of dyspnea and save vulnerable patients at a considerable risk. Our care experiences can be refined and provide prompt referral to hospital for advanced medical treatment.

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Conflicts of interest

All contributing authors declare no conflict of interest.

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