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Brief Report

Early Intervention Reduces the Spread of COVID-19 in Long-Term Care Facilities in the Republic of Korea



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ABSTRACT

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This study describes the epidemiological characteristics of coronavirus disease 2019 (COVID-19) based on reported cases from long-term care facilities. As of April 20th, 2020, 3 long-term care facilities in a metropolitan area of South Korea had reported cases of COVID-19. These facilities' employees were presumed to be the sources of infection. There were 2 nursing hospitals that did not report any additional cases. One nursing home had a total of 25 cases, with an attack rate of 51.4% (95% CI 35.6-67.0), and a fatality rate of 38.9% (95% CI 20.3-61.4) among residents. The results from this study suggest that early detection and maintenance of infection control minimizes the risk of rapid transmission.

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Introduction

The first Korean patient confirmed as infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was reported on 20th January 2020. This novel virus first appeared in China on the 8th December 2019. As of the 20th April 2020, the total COVID-19 cases in Korea were 10,674 [1]. Of these, 1,372 were confirmed cases from metropolitan areas of

Seoul, Gyeonggi-do, and Incheon, and represented 12.9% of all COVID-19 cases. Among the confirmed cases, 44.8% of them were related to congregated settings, and 25.1% of these were related to health and long-term care facilities (LTCFs). LTCF residents who have pre-existing comorbidities are more susceptible to coronavirus disease 2019 (COVID-19) infection and spread. Moreover, adults older than 65 years reportedly have a higher fatality rate than children or young adults [2].

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This report describes the epidemiological characteristics of COVID-19 based on reported cases from LTCFs until 20th April 2020.

Materials and Methods

From the 20th January to the 20th April 2020, 3 LTCFs in Korean metropolitan areas reported COVID-19 cases. All reported COVID-19 cases were tested using reverse transcriptase polymerase chain reaction (RT-PCR) and case information was entered into the National Notifiable Disease Surveillance System, operated by Korean Centres for Disease Control and Prevention. To obtain demographic, epidemiological, and early clinical information, COVID-19 reports and surveillance data were retrieved from the National Notifiable Disease Surveillance System operated under the Korean Centers for Disease Control and Prevention. Pre-existing conditions of confirmed COVID-19 patients were cross-checked with the National Health Insurance Corporation data [1]. An “index case” was defined as the first documented laboratory-confirmed case, or the first documented patient included in an epidemiologic investigation within a cluster. A “source case” was defined as a patient who gave rise to an outbreak [3]. Contacts who were in high risk groups (household contacts, healthcare personnel) were routinely tested, whereas non-high-risk groups were only tested if they had COVID-19 symptoms including a fever and respiratory symptoms. Non-high-risk, asymptomatic contacts were mandated to self-quarantine for 14 days (from the last day of encountering the index case) and were placed under active surveillance.

This investigation was a part of the public health response and was not subject to institutional review board approval therefore, written informed consent from individuals was not required.

Results

1. LTCF A

The LTCF A index case (female, aged 46) was a caregiver who was confirmed COVID-19 positive on the 12th March. During the outbreak at building X, contact tracing began on the 9th March, and an outbreak at a church was confirmed on the 10th March, with an index case classified from a contact list from an outbreak at building X [4]. The LTCF A index case was classified as a contact from an outbreak at a church on the 11th March, was asymptomatic and confirmed RT-PCR positive for COVID-19 on the 12th March while in home-quarantine.

LTCF A is a 5-story hospital with 142 patients, and 87

employees, and admission units on floors 2-5. Index patient A worked on the 3rd floor but was determined to have contact with a patient on the 4th floor. All admitted patients and employees were subsequently tested on the 12th March and were negative for COVID-19. However, 64 patients on floors 2 and 5 who did not have contact with the confirmed patient, were transferred to 3 other hospitals. Sixteen employees who had contact with the confirmed case were self-isolated at home, and patients on floors 3 and 4 were cohort-quarantined. Employees caring for patients on these floors were also cohort-quarantined within the hospital and remained there for the duration of the 14-day quarantine. RT-PCR screening was performed on all patients and employees before the quarantine was lifted and all individuals tested negative for COVID-19. There were no additional COVID-19 confirmed cases at this facility (Table 1).

2. LTCF B

The LTCF B index case (female, aged 50) was a hospital nurse who attended the same church as the caregiver from LTCF A, and was under home-quarantine from the 11th March due to church attendance on the 8th March. RT-PCR was performed on the 12th March and the result was COVID-19 negative, but she had symptoms of rhinorrhea, headaches, and pharyngitis beginning on the 19th March. She was tested again on the 21st March while under home-quarantine and tested positive for COVID-19.

LTCF B housed 392 patients and 375 employees in a 6-story hospital with admission units on floors 2-6. The confirmed case worked on the 4th floor until the 10th March. She had no contacts at the hospital the day before her symptoms appeared. Nonetheless, 89 patients and employees at LTCF B as well as 3 symptomatic individuals were tested for COVID-19. All were negative, and there have been no additional confirmed COVID-19 patients from LTCF B.

3. LTCF C

The LTCF C index case (female, aged 85), was a resident on the 5th floor of the nursing home. She had sputum and a cough since the 14th March, and was confirmed to have COVID-19 on 19th March. She was a resident for 2 years and had underlying dementia and hypertension. An epidemiological investigation was initiated immediately. There were 35 residents and 21 employees tested for COVID-19, with 1 physical therapist and 3 residents on the 4th floor testing positive for COVID-19. The history of using the medical facilities was evaluated by reviewing drug use for all workers at LTCF C [5], and only 1 individual, a physical therapist, had to seek medical attention due to fever on the 10th March, prior to the occurrence of the index case symptoms. At that time, the RT-PCR test for

Table 1. Characteristics of COVID-19 cases in the metropolitan LTCFs.

Characteristics	Institutions		
	A	B	C
Type	Nursing hospital	Nursing hospital	Nursing home
No. of beds/no. of hospitalized patients	163/142	404/392	35 [†]
No. of employees	87	375	31
Source case characteristics			
Occupation	Caregiver	Nurse	Physical therapist
Symptoms	Asymptomatic	Rhinorrhea, pharyngitis, headache	Fever
Symptom-time to confirmation (d)	0	2	9
Symptom-work days until confirmation (d) *	1	0	4
Contacts			
No. of patients (resident)	142	0	35
Age (y, mean \pm SD)	78.0 \pm 13.3		86.9 \pm 5.8
Gender			
Male	55 (38.7)		13 (37.1)
Female	87 (61.3)		22 (62.9)
No. of employees	16	0	30 [‡]
Age (y, mean \pm SD)	53.1 \pm 11.9		57.9 \pm 6.2
Gender			
Male	1 (6.3)		5 (16.7)
Female	15 (93.8)		25 (83.3)
Method of initial quarantine of contacts	Transfer to other institution, Cohort	-	Cohort
No. of new cases among contacts (%)			
Patients (%)	0 (0)	0 (0)	18 (51.4)
Employee (%)	0 (0)	0 (0)	6 (20.0)

* Workdays until 1 day prior to symptom onset (1 day prior to sampling if asymptomatic).

[†] Includes 2 discharged residents.

[‡] Employees who worked more than 1 day between 9th March and 8th April, 5 of 20 original employees confirmed, 1 of 10 new employees confirmed.

LTCF = long-term care facility.

COVID-19 was negative, but she stayed home until the 14th March, and her symptoms improved while taking antipyretic drugs, allowing her to return to work on the 15th March.

The LTCF C was a 5-story building where the 4th and 5th floors were comprised of the nursing home facility. Twenty-seven residents stayed in 8 rooms on the 4th floor, and 6 residents stayed in 3 rooms on the 5th floor. All 4th and 5th floor residents

were cohort-quarantined. A minimum of a 2-meter distance between beds was implemented with the use of empty rooms and creative bed rearrangements. Apart from essential personnel to care for the residents, all employees home-quarantined. New caregivers were brought into the center on the 20th March. They received education about the correct use of personal protective equipment and infection control. On

the 19th March, a total of 6 RT-PCR tests were conducted for residents and employees. The last confirmed COVID-19 case was a new caregiver who was introduced into the setting on

the 23rd March. A total of 25 confirmed COVID-19 cases were identified in LTCF C from the first confirmed case on the 19th March until the 8th April 2020 (Figure 1).

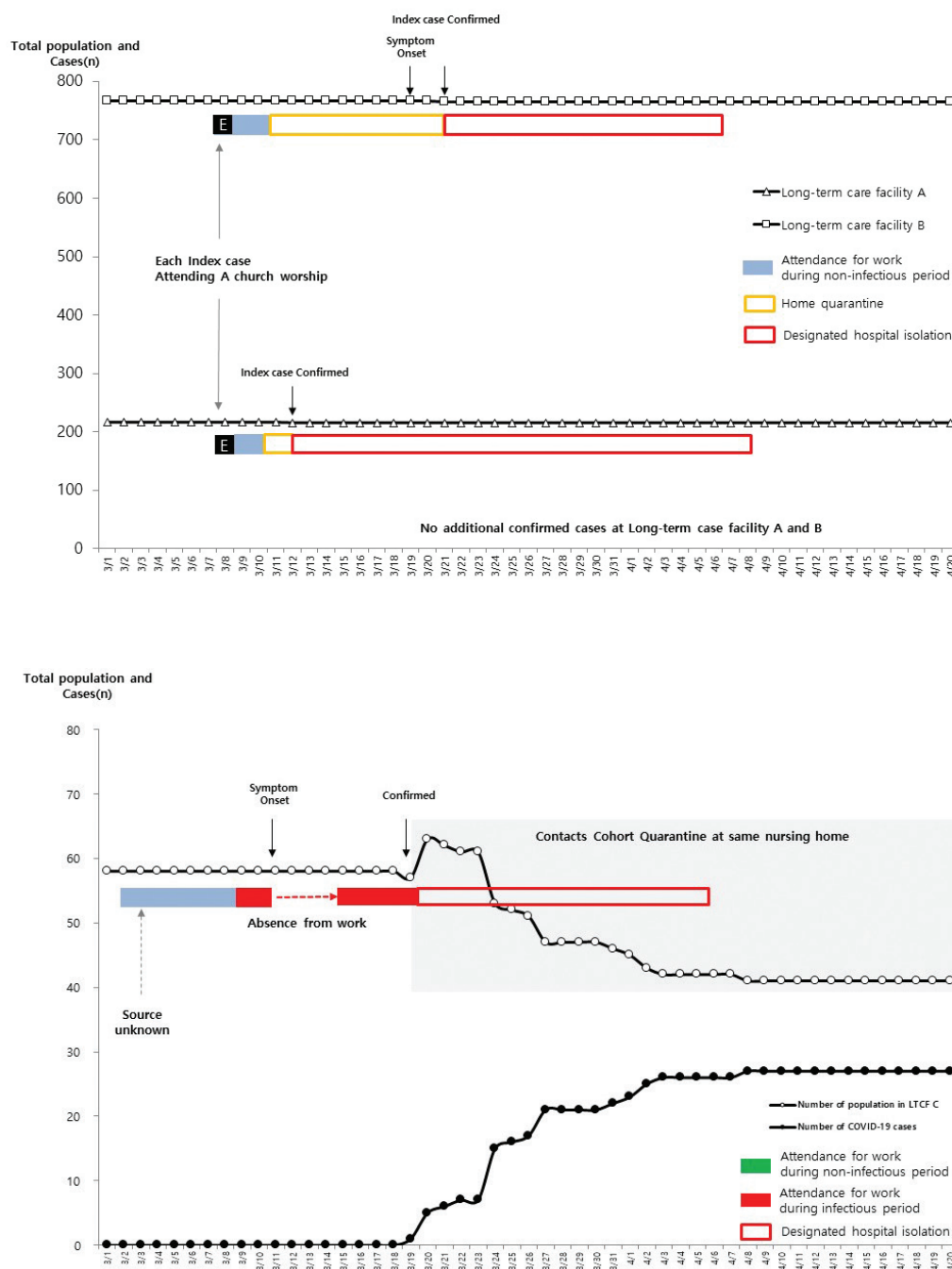


Figure 1. Confirmed cases of COVID-19 and the total population in LTCFs. Differences between LTCFs A, B, and C were dependent upon when the COVID-19 cases were detected. LTCF = long-term care facility.

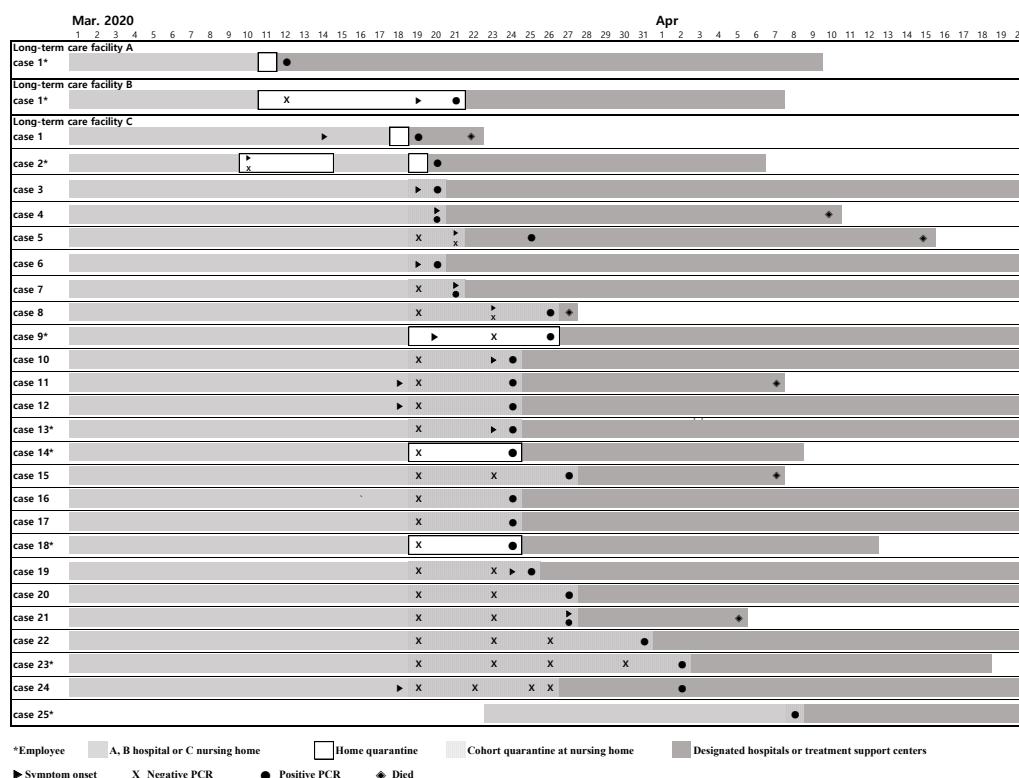


Figure 2. Timeline showing confirmed cases of COVID-19 at long-term care facilities A, B, and C.

Discussion

Epidemiological characteristics and contact management of a COVID-19 outbreak in LTCFs in South Korea has been described in this article. In the case of LTCF C, the employee was COVID-19 negative on the 10th March test, but there were no prior suspicious cases among residents or workers, and antipyretic drugs were taken from that date onwards. Three additional cases, other than the employee, were identified through laboratory testing (RT-PCR) immediately after the identification of the index case. They were all on the 4th floor and index cases were on the 5th floor. Employees can be the source of the spread of COVID-19. Recently, in the United States, there has been an outbreak of 167 COVID-19 cases that were linked to a LTCF employee who was the index case [6]. It appeared that the higher attack rate and fatality rate in LTCF C was a result of delayed identification of the index case (Figure 2). In LTCFs A and B, screening was performed within 3 days of the employees' exposure to COVID-19, with the former index case presenting as asymptomatic, and only attending her LTCF for 1 day. In the case of LTCF C, the employee worked for 4 days before quarantine. Even if the physical therapist was not the

source, the detection of the index case was delayed because the RT-PCR was performed 3 days after the onset of symptoms. In addition, in situations where there is a high possibility of infection due to prolonged exposure, individual distributed deployment should be considered rather than cohort isolation. Yet, transferring process in an outbreak setting is often complex and difficult due to limited hospital beds and resources. A plan should be placed ahead to secure healthcare facilities or alternate care sites with adequate staffing and to transfer the contacts from LTCF to designated facilities. [3,7]. Unlike the LTCF C, LTCF A transferred about 50% of cases to other medical institutions within 48 hours after the occurrence of a confirmed case, which enabled the LTCF to cope with the situation appropriately despite a reduction in human resources due to increased patient numbers and isolation of medical staff.

Between February and March 2020, the Korean government investigated a total of 1,470 LTCFs nationwide to check if they were requesting that workers who had recently travelled to China or other affected regions to stay home, as well as restricting visitors, and monitoring patients with unknown causes of pneumonia [8]. In addition, to improve the

surveillance of LTCFs, tests were conducted on 6,544 people including employees, caregivers, and new inpatients at 46 nursing hospitals in the metropolitan areas of Seoul, Gyeonggi-do from the 17th to 27th April, all of which were negative [9].

Once COVID-19 had been introduced into LTCFs, rapid transmission was a significant risk therefore, a strategy was needed to minimize the risk. Strict monitoring was reinforced for employees and patients for infection control guideline adherence, visitor restriction, and the restriction of admitted patients from going out, monitoring for fever and/or respiratory symptoms, and COVID-19 screening for symptomatic individuals. It was essential that symptomatic individuals were tested for COVID-19 and excluded from the workplace until symptoms reduced without medication [10]. In conclusion, early detection was the most important outbreak control method used in LTCFs.

Conflicts of Interest

The authors have no conflicts of interest to declare.

Acknowledgments

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