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COVID-19 in Nursing Facilities: Experience in Republic of Korea

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ABSTRACT

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Objectives: Coronavirus disease 2019 (COVID-19) outbreaks in nursing facilities can easily lead to a high rate of infection and fatality. A surge in newly infected cases in the first quarter of 2020 in Gyeongsan-si, in the Republic of Korea, was followed by several outbreaks in nursing facilities in the same area. The aim of this study is to report on the epidemiological investigation and the management to reduce the infection rate in nursing facilities for older adults.

Methods: The municipal government and the Korea Centers for Disease Control and Prevention performed an epidemiological investigation into 5 nursing facilities that reported a high number of COVID-19 infection cases from February to May 2020. COVID-19 infected cases in the facilities were investigated to identify the infection routes, and the fatality rate of the 5 facilities.

Results: The 5 facilities had a combined fatality rate of 12.2% (9 deceased among the 74 infected cases). The median age of the deceased was 87 years old (range: 82-91). The infection was first identified on February 27th, 2020, peaked on March 6th, and was last detected on March 24th, 2020.

Conclusion: Difficulties specific to such facilities included the delay in the recognition of symptoms and limitation in distancing. Tailored strategies such as daily monitoring of symptoms and proactive COVID-19 screening of quarantined residents, contributed to a decline in the infections in the facilities.

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Introduction

Since the outbreak of Coronavirus disease 2019 (COVID-19), various clinical features related to the novel coronavirus have been identified. The virus is highly infectious, and particularly fatal in older adults, and individuals with multiple chronic co-morbidities [1]. Globally, as several outbreaks occurred in senior nursing facilities, many residents were infected with

COVID-19 and died [2]. In the Republic of Korea, as of May 16th, 2020, the fatality rate among those aged ≥ 60 years was over 2% (2.79% in those aged 60-69 years, 10.78% in those aged 70-79 years, and 25.92% in those aged above 80 years), whereas the fatality rate among those < 60 years was below 1% (0.76% in those 50-59 years, 0.21% in those 40-49 years, and 0.17% in those 30-39 years) [3].

Gyeongsan-si, a city with a total area of 411.76 km², a

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population of 274,375, is located next to Daegu metropolitan city. Gyeongsan-si has 53 nursing facilities for the older adults. Many citizens are commuting between Gyeongsan-si and Daegu every day.

As of May 16th, 2020 in Daegu, a city with a total area of 883 km² and a population of 2,433,568, the number of COVID-19 infected people was 6,869. This number of infections accounted for 62.41 % of the total number of infection cases in the Republic of Korea. There were 730 infected cases in Seoul, the capital of the country, with a total area of 605 km², and a population of 9,733,655 [3].

During the first quarter of 2020, there was a surge in newly confirmed cases in Daegu and its neighboring cities in Gyeongsangbuk-do, a province in South East Korea. An exponential increase in the number of COVID-19 patients in those cities was mainly attributed to viral transmission amongst the members of a religious group who stimulated the transmission in communities and hospitals [4]. This sudden, and massive increase in confirmed COVID-19 cases led to several outbreaks in nursing facilities in the province.

This is a report of the investigation into 5 nursing facilities in Gyeongsan-si and the management to control the infection.

Materials and Methods

An epidemiological investigation was conducted into 5 nursing facilities that reported a considerably high number of COVID-19 infected patients and thus required close management. Most of the older adults in those facilities had a mild-to-severe senile dementia or were bedridden with chronic underlying diseases. Two of the facilities were for residents only and 3 were for both residents and daytime users commuting from their homes.

The municipal government and the community health center (CHC) of Gyeongsan-si investigated and managed the nursing

facilities with the support and guidance of the epidemiological intelligence response team from the Korea Centers for Disease Control and Prevention (KCDC).

The cases were investigated during the outbreak in the nursing facilities and followed until May 16th, 2020. In this report, the term “quarantine” was used to indicate that cases were selected as control targets and classified as contacts by the quarantine authorities, based on their history of contact with a confirmed patient. The term “isolation” was used when the cases were confirmed to have been infected and were segregated in a medical institute as patients [5].

Results

As of May 16th, 2020, a total of 74 COVID-19 infection cases were identified among 296 nursing facility users and workers. Facilities A, B, and C were for both daytime users and residents, and facilities D and E were for residents only.

Facility A had a total of 55 people: 17 residents, 16 daytime users, and 22 workers. Among them, 18 were COVID-19 infected (9 residents, 5 daytime users, and 4 workers; Table 1). The first infection case, identified on March 5th, 2020, was a 91-year-old daytime user with abdominal pain and diarrhea. All the facility users and workers were tested for COVID-19 on the same day, and another 16 were determined to be infected. Facility A is a multi-storied building. The infection occurred on floor X first where daytime users stayed, and then on floor Y, an exclusive area for the residents. The last case of COVID-19 infection, identified on March 24th, was a daytime user who had been quarantined outside the facility. One resident and 1 daytime user deceased due to COVID-19 (Figure 1). No more infection cases were identified in Facility A as of May 16th, 2020.

Facility B had a total of 53 people: 28 residents, 6 daytime users, and 19 workers. Among them, 6 residents and 2 daytime users were COVID-19 infected and there were no infections

Table 1. The number of COVID-19 confirmed cases in each facility (as of May 16th, 2020).

Facility	No. of COVID-19 confirmed cases / No. of individuals in facility				
	A	B	C	D	E
Residents	9/17	6/28	5/10	3/8	18/74
Daytime users	5/16	2/6	10/20	NA	NA
Workers	4/22	0/19	3/21	1/8	8/47
Total	18/55	8/53	18/51	4/16	26/121
Deceased	2	1	2	0	4

Figure 1. Transmission of the coronavirus in 5 nursing facilities.

among the workers (Table 1). The first case of COVID-19 infection, identified on March 4th, 2020, was a 95-year-old daytime user with respiratory symptoms. All the facility users and workers were tested on the same day, and another 7 cases were confirmed positive for COVID-19. Facility B is a multi-story building, but the infection was limited to 1 floor where daytime users and residents shared a dining and entertainment hall. One resident in Facility B deceased due to COVID-19 (Figure 1). No further infections were determined in Facility B.

Facility C had a total of 51 people: 10 residents, 20 daytime users, and 21 workers. Among them, 5 residents, 10 daytime users, and 3 workers were infected with COVID-19 (Table 1). The first infection cases, identified on March 3rd, 2020, included an 81-year-old daytime user with myalgia, cough, and sputum, whose daughter was COVID-19 positive, and an 88-year-old daytime user with a mild fever. All the facility users and workers were tested on the same day, and another 12 were confirmed COVID-19 positive. Facility C is a single-floored building where daytime users and residents shared a dining and entertainment hall. People suspected of having been in contact with a COVID-19 infected case were quarantined and their symptoms were monitored. One symptomatic resident, 1 daytime user, and 1 worker tested COVID-19 positive. As the occurrence of the infection continued, all individuals in Facility

C were tested on March 17th and 1 COVID-19 infection case was detected. Two daytime users deceased due to COVID-19 (Figure 1). No further COVID-19 infections were identified.

Facility D is a small building for residents only. The facility had a total of 16 people: 8 residents and 8 workers. Three residents and 1 worker were COVID-19 infected (Table 1). The first infection case, identified on February 29th, 2020, was an 85-year-old resident with severe dementia who developed general weakness. All the residents and workers were tested for COVID-19. The result showed that 1 resident who shared a room with the first case, and 1 worker were confirmed COVID-19 positive. At the second round of COVID-19 screening performed on March 12th, 1 more person was determined to be COVID-19 infected (Figure 1). There were no deaths related to COVID-19. No further infections were detected.

Facility E is for residents only. The facility had a total of 121 people: 74 residents and 47 workers. Among them, 18 residents and 8 workers were COVID-19 infected (Table 1). The facility is a multi-story building. The first identified COVID-19 infection case was a worker who had been in close contact with a COVID-19 infected person from outside the facility. In the investigation, the first case was classified as a contact, and was confirmed as COVID-19 positive. In Korea, the KCDC's preventive measures guidance is to test all the people who have been in contact with a confirmed COVID-19 case. The investigation showed that the first case had been in contact with other workers and ate meals together. Through the first case, the other workers were assumed to be infected first and then the residents. Immediately after the first case was identified, all residents and workers were tested. There were 12 more people determined to be COVID-19 infected. In the second round of COVID-19 screening performed for all the workers and residents, 8 more people were determined to be COVID-19 infected on floor X. On that floor, most of the residents were actively mobile, whereas the residents on floors Y and Z were mostly bedridden. After the transport of infected cases, the symptoms of the quarantined people were monitored. During regular monitoring, symptomatic residents were tested for COVID-19 and 2 were positive. With more COVID-19 infections occurring, all the residents and workers were tested and 3 infection cases were detected. Two were residents who previously shared a room with a COVID-19 infected patient and the other was a worker who attended 3 COVID-19 confirmed cases. In this facility, even with keeping a distance between beds in a room, there were several cases of COVID-19 infection on floor X. They were mostly dementia patients who used the same room. Four residents deceased due to COVID-19 (Figure 1). No further infections were determined.

In total, 9 patients (3 daytime users and 6 residents) died among 74 infected people (41 residents, 17 daytime users, and 16 workers) in the 5 nursing facilities. The fatality rate was

hospital and the CHC notified the facility that any person in contact with the infected case should be identified and screened for COVID-19.

The identified contacts were all tested for COVID-19 infection. If the test result was negative, the residents in contact were quarantined for 2 weeks in the facility.

Many of the facility users were active senile dementia patients sharing common living spaces which limited social distancing practice and workers had several designated people to take care of. Consequently, the contacts who needed to be investigated included a cohort of almost all the residents and the workers on the same floor, or even in the whole facility. The duration of quarantine was extended by 2 weeks in the cohort with the identification of new COVID-19 infected cases. Assigning 1 person per room was not feasible due to limited space in the nursing facilities, so the residents in contact were quarantined together in designated areas or on the same floor. If a person was identified to have particularly close and/or frequent contact with an infected patient, or had symptoms related to COVID-19, that person was quarantined alone in a room, and designated caregivers were assigned with PPE (such as level D protection suits) to care for them.

The infected patients were sent to a hospital as soon as the COVID-19 test result was positive. In the case that a resident was COVID-19 infected, the CHC provided a designated ambulance where the driver and crew wore the appropriate PPE and transported the patient to a hospital that the CHC pre-arranged. After transportation, the vehicle and the facilities were disinfected and ventilated. If the infected person was a daytime user or a facility worker, that person was sent to

Figure 2. Management of COVID-19 confirmed cases in nursing facilities for older adults.

Figure 3. The number of COVID-19 confirmed cases by COVID-19 laboratory confirmed date (as of May 16th, 2020).

The body temperatures and symptoms of all the people in contact, including those of residents and caregivers, were monitored and recorded twice daily. Through continuous monitoring, the numbers and patterns of symptomatic residents were observed. The data were sent to the CHC by email or fax. The CHC kept track of these records and based on this, the range of people to receive COVID-19 testing was determined. The range was from symptomatic individuals, to all the people in the facility if symptomatic people accounted for large numbers at a time or were detected frequently. Consequently, all of those who were quarantined received COVID-19 testing at least once or twice a week, like regular screening. The CHC sent staffs to test the symptomatic residents and workers. As residents were transported to hospitals and new COVID-19 infection cases and symptomatic residents were identified, the allocation of rooms to the residents had to be changed appropriately. There was a need to secure at least 1 or 2 empty room(s) in each of the facilities. The purpose was to have space to isolate COVID-19 infected patients and symptomatic individuals temporarily until they were sent out to hospitals or tested for the infection.

With simultaneous outbreaks in many of the nursing facilities in Gyeongsan-si, a lot of caregivers were identified as the contact. The workers with no symptoms related to COVID-19 were asked if they wanted to be quarantined at home for 2 weeks or continue working in the facilities to attend the residents. The workers who agreed to work were assigned to take care of the residents who they were in contact with. They stayed in the facilities for an entire quarantine period without commuting where possible or commuted from and to their homes only, self-segregated themselves from the

rest of their family members, and kept home-staying hours to a minimum. When taking care of the residents, they wore PPE to protect themselves and the residents as they were all identified as the contacts. The workers were monitored for their body temperatures and symptoms, and they were separated from the other workers or residents who had not been in any contact with COVID-19 infected patients. If any COVID-19 symptoms appeared, they were tested and moved out of the nursing facilities.

Discussion

The nursing facility users shared common spaces where social distancing was limited, and reinforcement of mask wearing was not followed by the residents. Quarantine of residents was with caregivers because continuous care was required. These difficulties, specific to nursing facilities, required tailored COVID-19 infection control and prevention measures. Having a hotline open at any time between the community government and the nursing facility managers helped staff to deal with the difficulties in infection control and prevention at the site. The community government maintained close communication and gave continuous support to the nursing facilities as a high priority.

The 5 facilities showed the same pattern from when the first COVID-19 screening was performed for the facilities. As the first COVID-19 infection case was identified, numerous residents who were mostly asymptomatic or with unrecognized symptoms, had already been infected. In addition, the infection route between the individuals nor the primary case was not

clear, except for Facility E. Nevertheless, through several rounds of screening tests and monitoring of symptoms, COVID-19 infected patients were promptly identified, rigorously categorized, and transferred out of the facilities. The COVID-19 screening test was performed at least once or twice a week during the outbreak. After a while, a dramatic decrease in the spread of the infection in all the nursing facilities was observed (Figure 3).

Customized strategies such as twice daily monitoring of symptoms and proactive COVID-19 screening of quarantined residents played a critical role in reducing further infections in the nursing facilities reviewed.

Conflicts of Interest

The authors have no conflicts of interest to declare for this report.

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