

Letter to the Editor

COVID-19 first stage in Japan – how we treat ‘Diamond Princess Cruise Ship’ with 3700 passengers?

Dear Editor

We report the current situation regarding the case of multiple patients who tested positive via polymerase chain reaction (PCR) for the novel coronavirus infection and were transported from the Diamond Princess cruise ship, from the viewpoint of medical facilities in Yokohama City to serve as a reference for future development of emergency medical care systems in each region. Please note that the following numbers are preliminary (unconfirmed) and may change based on the counts determined by related organizations in the future.

The Medical Control Council recognizes the importance of verifying the overall situation once the crisis has settled down. Please refer to reports from each organization to gain administrative perspectives. The present report is merely one of the documents that could be used to review regional emergency medical systems when large numbers of coronavirus disease (COVID-19) patients are observed in each region.

BEGINNING OF THE QUARANTINE

THE DIAMOND PRINCESS cruise ship (British registered) arrived offshore of Yokohama port on the evening of February 3 (Monday) and the quarantine began.

There were 2,666 passengers and 1,045 crew members on the ship (a total of more than 3,700).

Initially, quarantine began due to one passenger (a man who boarded in Yokohama on January 20 and disembarked in Hong Kong on January 25) being tested positive for the novel coronavirus infection via PCR, but eventually, many passengers tested positive via PCR for the infection.

TRANSPORTATION OF PATIENTS

TRANSPORTATION OF THE PCR-positive patients to the designated medical institutions for class I infectious diseases (one location in Yokohama City) and to the designated medical institutions for class II infectious diseases (seven in Kanagawa Prefecture) in Kanagawa Prefecture began on February 4. However, more number of patients tested positive via PCR in the subsequent days, making it a physically difficult situation for such designated medical institutions to accept all the patients. This became even more difficult when some of the patients developed severe illness (the federal government announced on February 9 that the

patients may be accepted at facilities other than these designated medical institutions).

Dates	Number of patients transported (approximate: unconfirmed)
February 4	10 (all numbers are approximate)
February 5	10
February 6	10
February 7 and 8	43 (on early morning of February 8, the cruise ship temporarily left the Yokohama port and sailed off the coast of the Boso Peninsula because of water generation on board)

Due to a rapid increase in the number of patients, the emergency medical facilities in Yokohama City, Kanagawa Prefecture, could not meet the requirements of all patients.

During this period, there were cases of life-threatening conditions such as acute myocardial infarction and cerebral infarction among those who were PCR-positive and those with unconfirmed test results who required urgent care (including passengers of foreign nationalities). Regardless of PCR results, patients requiring urgent treatment were admitted to the only advanced emergency medical center in the City (not a designated medical institution for infectious diseases, but the degree of medical emergency was prioritized: there are nine emergency medical facilities in Yokohama City, with only one of them being an advanced emergency medical center). There was a case of a foreign national admitted to a medical facility in the City who developed gastrointestinal perforation, requiring an emergency surgery. Because emergency surgery of PCR-positive patients was considered difficult in general hospitals due to lack of staff, the patient was transported to the abovementioned medical center for emergency surgery.

PATIENTS TRANSPORTED OUT OF THE PREFECTURE

SUBSEQUENTLY, THE NUMBER of patients requiring transport to medical facilities due to being PCR-positive or due to other symptoms continued to increase—10 (approximately) on February 9, 15 on February 10, and 70 on February 11—reaching a point where it was impossible for medical facilities in Kanagawa Prefecture to handle all patients.

Japan Disaster Medical Assistance Teams (DMATs) came into the scene as of February 8 and started medical practice on the ship. It was reported that the medical situation drastically improved (there was an overwhelming lack of staff on the ship until this point). On February 10, full-scale stratification of disembarking patients was performed by the members of the DMATs:

Patients for whom emergency treatment was deemed necessary regardless of PCR results → transportation via ambulance to an emergency hospital in Yokohama City
 PCR-positive patients with mild subjective symptoms → transportation to medical facilities in Kanagawa Prefecture

PCR-positive patients without subjective symptoms → transportation to medical facilities outside of Kanagawa Prefecture (distantly located) via DMAT vehicles, private ambulances, Self-Defense Forces (SDF) vehicles, and buses, among others.

Stratified transportation of patients based on their condition was led by the Coronavirus Countermeasures Headquarters and DMAT Adjustment Headquarters set up in the Kanagawa Prefectural Government Office.

In this manner, medical facilities of Yokohama City were able to focus on “admitting passengers who needed immediate treatment.”

Subsequently, the following numbers of passengers were disembarked:

- 37 passengers (approximate; February 12)
- 27 passengers (February 13)
- 40 passengers (February 14)

THE SUMMARY OF TRANSPORTED CASES (PRELIMINARY/UNCONFIRMED NUMBERS)

GENERAL PASSENGERS BEGAN disembarking on February 19.

The total number of transported cases by the evening of February 18 was 512 (approximate).

(Transportation due to the need for emergency medical care) To medical facilities in Yokohama City	64
Medical facilities in Kanagawa Prefecture	102
Medical facilities outside of Kanagawa Prefecture	346

BALANCING WITH REGULAR EMERGENCY MEDICAL CARE SYSTEM

BECAUSE DMATS ASSIGNED patients in need of immediate treatment to local medical facilities and

asymptomatic and stable PCR-positive patients to distant hospitals based on appropriate medical judgment, we were able to avoid the arrival of 500 transported patients at medical facilities in Yokohama City all at once.

It would not be an exaggeration to say that thanks to DMATs, it was possible to balance the regular emergency medical system and admissions of COVID-19 patients in Yokohama City, and as the chairman of the Medical Control Council of the Yokohama City, I appreciate the support provided by DMATs from across the country (and also many other medical teams such as SDF medical officers, Japan Medical Association Team [JMAT], and infection control team for providing support for medical care in Yokohama City).

However, I have the impression that if multiple COVID-19 patients are admitted to a local medical facility (with most of such facilities being hospitals that are not designated medical institutions for infectious diseases), it will be difficult to maintain a system in parallel with accepting patients from regular ambulances from an infection prevention aspect. (At this point, there is still no announcement from the Yokohama City Fire Bureau regarding the extended time for hospital selection by on-site ambulances.)

SITUATION FOLLOWING THE DISEMBARKATION OF GENERAL PASSENGERS

THE MAJORITY OF passengers were aged ≥ 60 years, with more than half being 70 years or older (press report).

After disembarkation of passengers, approximately 1,000 crew members were remaining on the ship, mainly comprising Filipinos and Indians. However, these were healthy people without any underlying conditions, and emergency calls have drastically decreased to 1–2 per day. Because the Philippine government had their crews return back to their country, it is likely that the transportation of patients from the Diamond Princess cruise ship in Yokohama has settled down. On the other hand, there have been reports, one after another, of new COVID-19 patients across Japan; thus, Yokohama must prepare for the next phase.

CURRENT SITUATION OF MEDICAL FACILITIES IN YOKOHAMA CITY

AS DISCUSSED, 64 people (approximate; as of February 18) from the Diamond Princess cruise ship were admitted to emergency medical facilities in Yokohama City.

Among these admitted passengers, some patients with a stable respiratory condition at the time of transport gradually deteriorated, requiring ventilator support and extracorporeal

membrane oxygenation (ECMO). (For further detail, please refer to reports from The Japanese Society of Intensive Care Medicine and five other associations who have jointly established Japan COVID-19 Countermeasure ECMO-net Project).

In nine emergency medical centers in Yokohama City, beds for critical patients have already been filled by COVID-19 patients from the Diamond Princess cruise ship.

This is one of the greatest concerns regarding the future increase in the number of patients from the City.

On February 20, there was a request to transport ECMO patients from hospital A in Yokosuka City; however, advanced medical facilities in Yokohama City, Kanagawa Prefecture, were unable to accept critical patients from the Diamond Princess cruise ship. Therefore, these patients were transported from Yokosuka to referral hospitals in Tama, Tokyo Prefecture (This was performed by collaborating with COVID-19 Countermeasure ECMO-net Project established by six associations such as Japanese Association for Acute Medicine and The Japanese Society of Intensive Care Medicine, as needed, and paramedics of Yokohama City University went to Yokohama and rode with patients as they were transported from Yokosuka to Tama to secure their safety.).

FUTURE CONCERNS

TRANSPORTATION OF PATIENTS from the Diamond Princess cruise ship seems to have settled down for the moment. However, even on February 26, patients transported from the cruise ship to the medical facility B in the City became critical and were transported to hospital B; they subsequently required ventilator support. So far, there is no sign of the treatment of critical patients coming to an end.

At the same time, the number of critical patients being emergency transported from the City due to symptoms of pneumonia is increasing. Considering that passengers from the Diamond Princess cruise ship who require treatment have nearly filled the beds in medical facilities in Yokohama City, when the number of patients with COVID-19 and pneumonia from the City increase in future, the provision of support by accepting patients at medical facilities outside of Yokohama and Kanagawa Prefecture will be necessary.

BALANCING WITH NORMAL EMERGENCY SYSTEM

THE EMERGENCY MEDICAL system of Yokohama City is not only for COVID-19 patients. It cannot have a negative impact on the regular emergency system, handling cases such as traffic injuries and other medical diseases. However, it is not easy to maintain the system to accept routine emergency patients while taking measures to prevent infection, secure staff, and stop harmful rumors. In future, if there are COVID-19 patients all across Japan, the challenge would be to balance COVID-19 patient management (serious patients with ventilator and ECMO requirements, among others) with routine emergency patient management without impacting the latter.

ACKNOWLEDGEMENT

THE CASE OF transporting 3,700 passengers and crew of the Diamond Princess cruise ship has not yet ended (this document was prepared on February 26, 2020). However, the emergency medical system of Yokohama City has been maintained to date without collapse because of not only the work put forth by medical facilities but also the efforts of the government (Kanagawa Prefecture, Yokohama City, Ministry of Health, Labour and Welfare, and Cabinet Secretariat); expert teams such as DMAT and JMAT infection countermeasure teams; Yokohama City Fire Bureau; private emergency responders; SDF; and especially, all hospital staff members.

Hoping that the present case in Yokohama will be expertly and objectively verified from various perspectives and will contribute to future infection countermeasures, we will continue to play our role as the Medical Control Council to address the present situation.

DISCLOSURE

Approval of the Research Protocol: N/A.

Informed Consent: N/A.

Registry and the Registration no. of the Study/trial: N/A.

Animal Studies: N/A.

Conflict of Interest: None.

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