COVID-19

Relationship Between the Number of Patients Visiting Emergency Department and Tokyo Health System’s Capacity During Early Stages of the First Wave of COVID-19

Yohei Ishikawa¹,² · Toru Hifumi¹ · Norio Otani¹ · Ryosuke Miyamichi³ · Mitsuyoshi Urashima² · Satoshi Takeda³ · Shinichi Ishimatsu¹

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Abstract
The first coronavirus 2019 (COVID-19) patients were reported in China on December 12, 2019, and the first COVID-19 patients were reported in Japan on January 16, 2020. Here, we investigated the number of patients in Emergency Departments (EDs) in three major hospitals in Tokyo, and also briefly discussed about the relationship between the number of patients in EDs and health system’s capacity. We compared the number of patients in 2020 to the average number of patients from 2016 to 2019. Numbers were compared in three periods: before the first COVID-19 patient was reported in Japan (January 1 to January 16), after the government encouraged social distancing (February 26 to March 10), and the interval between them (January 17 to February 25). The average number of daily patients in 2020 (n = 122) decreased by 17% compared to the average number of patients from 2016 to 2019 (n = 144) (Mann-Whitney test, p < 0.001). This phenomenon might be due to a fear of contracting the virus at hospitals, companies having their employees work remotely and postponing events, people following the Japanese Ministry of Health, Labour and Welfare’s instructional guidelines for going to the hospital, prevention awareness becoming widespread, and a decreased number of tourists. The number of patients visiting Emergency Departments in Tokyo was decreased and the number of COVID-19 infections has remained within the health system’s capacity during the early phase of COVID-19 first wave.

Keywords COVID-19 · SARS-CoV-2 · Japanese Ministry of Health · Labour and Welfare · Capacity

Introduction
The first coronavirus 2019 (COVID-19) patients were reported in China on December 12, 2019, and the first COVID-19 patients were reported in Japan on January 16, 2020. The total number of cases in Japan had increased to 552 patients (including 12 deaths) by March 10 [1]. The Japanese Ministry of Health, Labour and Welfare’s (MHLW) response to COVID-19 included giving instructions on when to go to the hospital (2 days after having a fever or other symptoms for high-risk people, and 4 days after having a fever or other symptoms for normal-risk people), setting up official call centers for patients with suspected COVID-19 and adjusting hospitals to accept them [2], encouraging companies to have employees work remotely, recommending the cancellation of events [1], advising the closure of all elementary and junior high schools in the country [3], and requiring everyone arriving from the affected area by sea and air travel to be isolated for 14 days at a location designated by the quarantine station chief and not use public transportation in Japan, whether symptomatic or asymptomatic [1].
Initially, staff in Emergency Departments (EDs) anticipated the number of patients to increase. In actuality, the number of patients seemed to decrease.

Here, we investigated the number of patients in EDs in three major hospitals in Tokyo, and also briefly discussed about the relationship between the number of patients in EDs and health system’s capacity.

**Methods**

Hospital characteristics (total number of beds, critical care medical center) and the average number of patients visiting EDs per day in three hospitals (The Jikei University Hospital, The Jikei University Daisan Hospital, and St. Luke’s International Hospital) were collected. We compared the number of patients in 2020 to the average number of patients from 2016 to 2019 in three major hospitals in Tokyo. Numbers were compared in three periods: before the first COVID-19 patient was reported in Japan (January 1 to January 16), after the government encouraged social distancing (February 26 to March 10), and the interval between them (January 17 to February 25). The Mann-Whitney test was used to perform the comparison of the number of daily patients in 2020 and the 2016–2019 average in 3 Tokyo EDs.

**Results and Discussion**

Characteristics and the average number of patients visiting EDs per day in three hospitals are showed in Table 1. Our results show, especially after the government announced social distancing on February 25, that the average number of daily patients in 2020 ($n = 122$) decreased by 17% compared to the average number of patients from 2016 to 2019 ($n = 144$) (Mann-Whitney test, $p < 0.001$; Fig. 1).

This phenomenon might be due to a fear of contracting the virus at hospitals, companies having their employees work remotely and postponing events, people following the MHLW instructional guidelines for going to the hospital, prevention awareness becoming widespread, and a decreased number of tourists.

Decrease in number of patients visiting EDs during COVID-19 pandemic has been also reported in several countries possibly due to lockdown and fear of contagion [4–6]; however, lockdown restrictions have not initiated in Tokyo [7]. Moreover, consideration of universal health insurance system in Japan, it was highly expected that many patients would visit the EDs for obtaining peace of mind as well as physical health. Thus, it is worth noting that same tendency was observed in Japan with such unique situations.

Although several discussions have occurred with regard to the instructions (i.e. patients should contact consultation

|                      | The Jikei University Hospital | The Jikei University Daisan Hospital | St. Luke’s International Hospital |
|----------------------|-------------------------------|-------------------------------------|----------------------------------|
| Total number of beds | 1075                          | 581                                 | 520                              |
| Critical care medical center | No                           | No                                  | Yes                              |
| The number of patients before the first COVID-19 patient was reported in Japan (January 1 to January 16) |                   |                                      |                                  |
| 2016                 | 31.5                          | 50.7                                | 85.6                             |
| 2017                 | 34.3                          | 54.8                                | 92.6                             |
| 2018                 | 39.3                          | 61.0                                | 96.4                             |
| 2019                 | 38.6                          | 60.1                                | 106.2                            |
| 2020                 | 35.9                          | 41.6                                | 90.6                             |
| The number of patients (January 17 to February 25) |                   |                                      |                                  |
| 2016                 | 31.6                          | 41.1                                | 88.7                             |
| 2017                 | 30.2                          | 39.6                                | 78.8                             |
| 2018                 | 37.1                          | 41.2                                | 87.4                             |
| 2019                 | 32.2                          | 42.0                                | 88.3                             |
| 2020                 | 31.3                          | 34.5                                | 82.5                             |
| The number of patients after the government encouraged social distancing (February 26 to March 10) |                   |                                      |                                  |
| 2016                 | 33.9                          | 40.9                                | 81.0                             |
| 2017                 | 31.6                          | 34.5                                | 69.6                             |
| 2018                 | 31.8                          | 33.5                                | 79.2                             |
| 2019                 | 32.5                          | 34.2                                | 82.6                             |
| 2020                 | 22.7                          | 28.1                                | 70.9                             |
offices if they had flulike symptoms and a fever over 37.5 °C that continued for four days) proposed by MHLW, this contributed the decrease in number of patients visiting EDs and maintain the health system’s capacity in the early stage of the COVID-19 first wave.

Conclusions

The number of patients visiting Emergency Departments in Tokyo was decreased and the number of COVID-19 infections has remained within the health system’s capacity during the early phase of COVID-19 first wave.

Compliance with Ethical Standards

Conflict of Interest This study was supported by Japan Society for the Promotion of Science (JSPS) KAKENHI (Grant-in-Aid for Scientific Research [C]) Grant Number 19K13948.

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