Article

Impact of Japan's State of Emergency due to the COVID-19 Pandemic on Trends in Diabetes Care: A Descriptive and Retrospective Study

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Abstract: Objective: This study examined the impact of Japan's state of emergency on trends in diabetes care during the coronavirus disease 2019 (COVID-19) pandemic. **Design:** A descriptive and retrospective study. **Setting:** Showa University Hospital, Japan. **Participants:** Patients with diabetes who received medical treatment from 2018 to 2020. **Determinants of interest:** Number of patients with diabetes visiting the hospital per week. To examine the impact of the Japan's state of emergency, the number hospital visiting by patients with diabetes was summarized from 28 weeks of data, from calendar week 8 to week 35, for each year. **Results:** Compared with the mean of 2018 and 2019, no significant difference was found between the three periods (before, during, and after the state of emergency). However, the numbers of patients from both inside and outside Tokyo increased at 7 weeks after the state of emergency was lifted. **Conclusions:** A significant increase in the numbers of patients with diabetes was seen compared with the same period in 2018 and 2019, suggesting that the state of emergency may have hindered diabetes care. Therefore, patients with diabetes should be followed up continuous of diabetes care while keeping a close eye on measures.

KEYWORDS: COVID-19 pandemic; diabetes care; infection control; Japanese; state of emergency

Introduction

Worldwide, coronavirus 2019 (COVID-19) pandemic has continuously caused a global public health emergency since 2020 [1]. In this pandemic, substantial increases in infected and critically ill patients resulted in shortages of medical staff and resources, intensive care units, ventilators and personal protective equipment. Many countries implemented lockdowns, including closures of services and restrictions on outings, to stem the spread of COVID-19. The lockdowns in most countries compelled compliance by force and penalized offenders for violations. Lockdowns prevent spread of infection or would otherwise be devastating, resulting in economic damage as well as delays in treatment [2]. In particular, delayed diabetes care is a problem in health systems worldwide. Ikesu et al. reported that the number of diabetes care services in Japan declined from preceding weeks during the outbreak of COVID-19 [3].

During the state of emergency, Japan chose to enforce a "mild lockdown," which was unenforceable and nonpunitive [4]. On April 7, 2020, the government declared Japan's state of emergency due to the outbreak in seven prefectures (urban areas). Tokyo had the highest number of infected patients among the all prefectures, and Tokyo Metropolitan Government asked its citizens to impose own restrictions. [5]. The state of emergency expanded throughout Japan on April 16, 2020, and it was gradually lifted from May 14, 2020.

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COVID-19 pandemic policy in Japan was characterized as "requesting" the citizen to refrain from going out, except for face to emergencies, and to temporarily close certain businesses. The pandemic transformed citizens activities and medical treatment in throughout Japan. For example, the number of monthly train users decreased by 45.5% in April 2020 compared with in April 2019 [6]. Japanese patients with chronic diseases were more likely to become severely ill from COVID-19 infection, and it is possible that patients with diabetes may have been discouraged from seeing a doctor [7]. Therefore, examining the impact of the COVID-19 pandemic on diabetes care is a critical issue affecting the mortality rate in Japan.

Given this background, the present study, which hypothesized that Japan's state of emergency suppressed patient comes to the hospital for diabetes care, aimed to compare trends among consultations of patients with diabetes in Tokyo during the state of emergency, and to examine changes in patient consultations, including transfers across prefectures.

Methods

This retrospective and descriptive study was carried out in Tokyo. The study participants were patients with diabetes who had diagnosed at Showa University Hospital and been received medical treatment from 2018 to 2020. To examine the impact of Japan's state of emergency, the numbers of comes to Showa University Hospital for diabetes were summarized from 28 weeks of data, from calendar week 8 to calendar week 35 (showed in Figure 1 and Figure 2). Showa University Hospital locate eastern Tokyo and near the border of Kanagawa where the secondary populous prefecture. The COVID-19 patients in this area has keep large number from early stages of the pandemic, indicating that it has been one of areas most affected by the COVID-19 pandemic. In the case of a return to the hospital, the participants defined as patients who has newly diagnosed diseases.

To measure the impact of Japan's state of emergency, we compared the number of weekly patients in four 7-week periods: 1) before the state of emergency (B1), 2) during the state of emergency (SOE), 3) immediately after the state of emergency (A1), and 4) at 7 weeks after the state of emergency (A2). Trends in the number of patients with diabetes from inside and outside of Tokyo are shown in Figures 1 and 2, respectively. Moreover, using Tukey's honestly significant difference test, we compared the rates of patients from inside (Figure 3) and outside of Tokyo (Figure 4) in 2020 to those in 2018–2019 (mean) at each period by calendar week.

This study was approved by the Medical Ethics Committee of Showa University School of Medicine (approval No. 2954). We used JMP 16.2 (SAS Institute Inc. Cary, NC, USA) for all statistical analyses. When a two tailed P value less than 0.05, we defined statistically significant for all analyses.

Results

No significant change in the number of patients was seen at 7 weeks before or immediately after the state of emergency. However, a significant increase in the number of patients at 7 weeks after the state of emergency had been lifted (in May 2020) was seen among those both from inside and outside of Tokyo.

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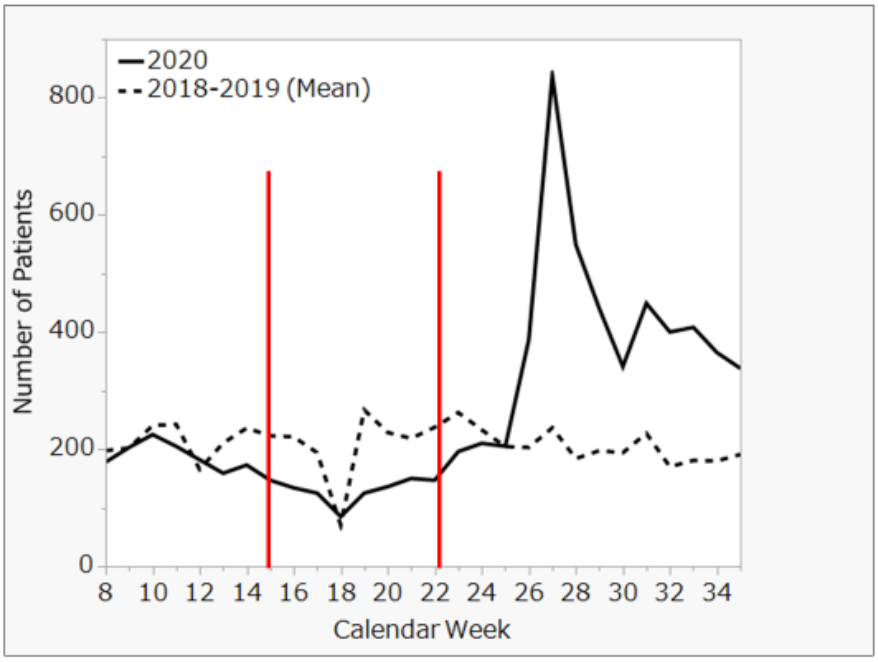

Fig. 1 Trends in number of diabetes patients from Tokyo, 2018 through 2020.

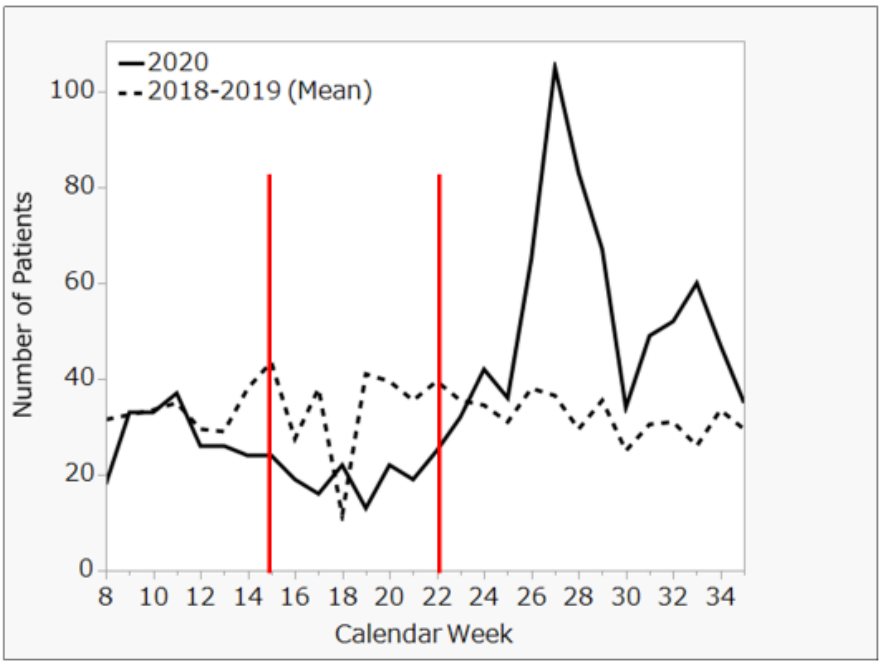

Fig. 2 Trends in number of diabetes patients from Outside Tokyo, 2018 through 2020.

A comparison of the weekly number of patients for the three periods before and after the state of emergency during the previous 2 years and 2020 showed no significant differences from either inside or outside of Tokyo.

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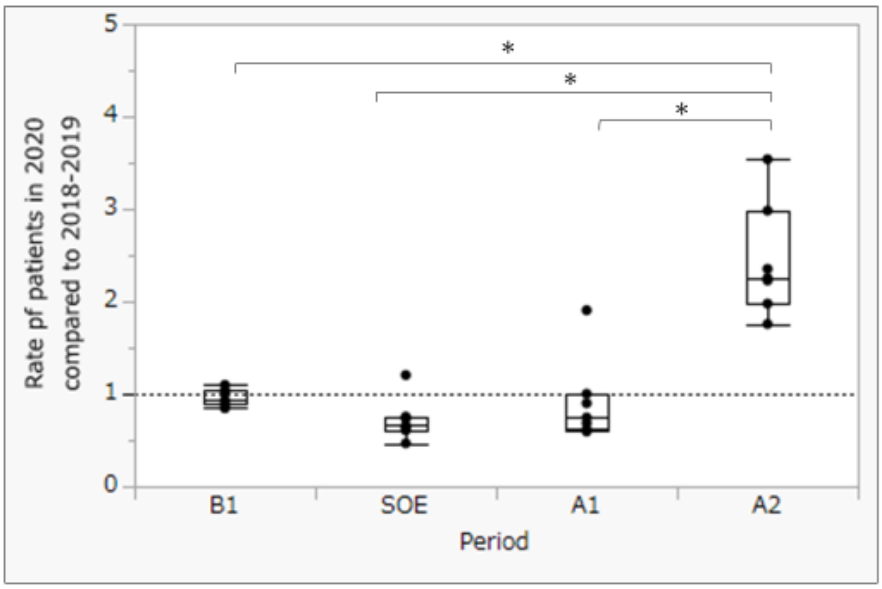

Fig. 3 Rate of patients from Tokyo in 2020 compared to 2018-2019 at each time period for calendar week.
* $P<0.05$ (Tukey's honestly significant difference test)

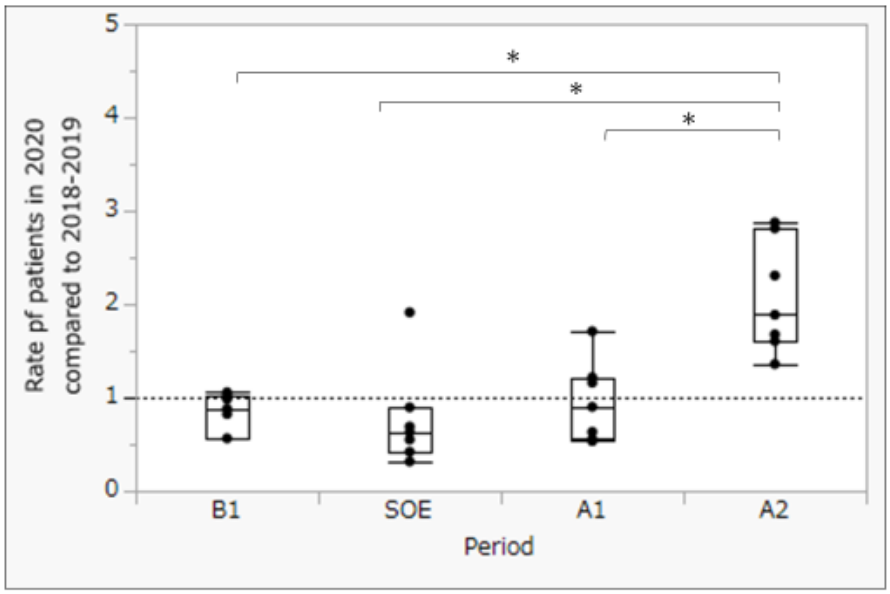

Fig. 4 Rate of patients from outside Tokyo in 2020 compared to 2018-2019 at each time period for calendar week.
* $P<0.05$ (Tukey's honestly significant difference test)

Discussion and Conclusion

While the results of this study showed a significantly increase in visits by patients with diabetes to Showa University Hospital for the first 7 weeks after the COVID-19 state of emergency compared with the same period in 2018-2019, the number of patients with diabetes did not significantly decrease for 21 weeks, including the 7 weeks both before

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and after the state of emergency. These results suggest that the COVID-19 state of emergency inhibited the provision of continuous diabetes through delayed doctor visits.

While Japan has many public holidays in May, the holidays effects should be noted. A study in southwest Scotland reported that emergency medical visits to a district general hospital has significantly higher mortality which associated with admission on public holidays both on weekdays and weekends, but weekend admissions was not generally. However, it was not reported that mortality rates associated with weekend hospitalizations [8]. Lapointe-Shaw et al. reported that patients discharged from the hospital during the December holiday period were less likely to have prompt outpatient follow-up and were at higher risk of death or readmission within 30 days [9]. While the golden-week holidays set usually between end of April and beginning of May in Japan, and the number of hospital visits tends to greatly decrease during the week. According to this schedule, this vacation (about 7 days) may overlapped the effects of the state of emergency. However, as the number of visits by patients with diabetes continued to decrease when after the state of emergency was lifted. It is possible that the state of emergency is exerting a long-time effect on consultation behaviours.

Xiao et al. reported that Chinese lockdown for the pandemic affected psychological impact on patients with cancer, and it is important to keep psychological support [10]. Infection-control measures during emergency for the pandemic are essential to achieve a higher level of preparedness for hospital outbreak. While major hospitals in Japan were spared from the severe acute respiratory syndrome epidemic, substantial differences in emergency infection control measures, with differences across institutions exceeding those across disciplines [11]. Since medical institutions has regional differences of their systems between rural and urban, the health-care system varies greatly in each municipality. Collecting long-term data designed by longitudinal study could help clarify the effects of public holiday (or weekend) and the state of emergency on patients with diabetes in Japan. As this was a cross-sectional study, it was not possible to identify the extent of the delay in diabetes treatment. Hanna et al. found that a month delay of cancer care/treatment was associated with increased cancer mortality worldwide [12]. Therefore, it is necessary to verify the delay in long-term diabetes treatment and maintain appropriate diabetes treatment during a pandemic.

In this study, our findings suggest that the Japan's state of emergency may not have inhibited the hospital visits of patients with diabetes across prefectures. Inoue et al. suggested that personal social capital was associated with continuous of medical care among Japanese [13]. While the present study focused on urban contexts, the pandemic also affected rural contexts in Japan [14]. In these points, more verification is needed in other regions of Japan.

This study did have some limitations. First, it was based on trends in consultations at a single hospital, so the generalizability of the results has challenged point. This study has provided large number of patient's information showing that they refrained from attending medical examinations because of the state of emergency using data from a single hospital. However, further study using data from multiple hospitals is necessary.

In conclusion, the present findings showed a significant increase in the number of visits by patients with diabetes to Showa University Hospital in the first 7 weeks after the COVID-19 state of emergency compared with the same period in the previous 2 years. It is also possible that diabetes care that could have been available may not have been provided because of the state of emergency; therefore, it is necessary to follow up patients with diabetes while keeping a close eye on measures other than infectious diseases.

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