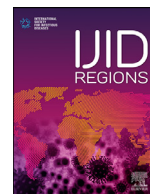




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Short Communication

Reduction of influenza in Osaka, Japan during the COVID-19 outbreak: a population-based ORION registry study



Tomoya Hirose^{1,2,*}, Yusuke Katayama^{1,2}, Kenta Tanaka³, Tetsuhisa Kitamura^{1,3},
Shunichiro Nakao^{1,2}, Jotaro Tachino^{1,2}, Shota Nakao^{1,4}, Masahiko Nitta^{1,5}, Taku Iwami^{1,6},
Satoshi Fujimi^{1,7}, Toshifumi Uejima^{1,8}, Yuji Miyamoto^{1,9}, Takehiko Baba^{1,10},
Yasumitsu Mizobata^{1,11}, Yasuyuki Kuwagata^{1,12}, Takeshi Shimazu⁷, Tetsuya Matsuoka^{1,4}

¹ The Working Group to Analyze the Emergency Medical Care System in Osaka Prefecture

² Department of Traumatology and Acute Critical Medicine, Osaka University Graduate School of Medicine, 2-15 Yamadaoka, Suita, Osaka 565-0871, Japan

³ Division of Environmental Medicine and Population Sciences, Department of Social and Environmental Medicine, Osaka University Graduate School of Medicine, 2-15 Yamadaoka, Suita, Osaka 565-0871, Japan

⁴ Senshu Trauma and Critical Care Center, Rinku General Medical Center, 2-23 Rinku-orai kita, Izumisano, Osaka 598-8577, Japan

⁵ Department of Emergency Medicine, Osaka Medical and Pharmaceutical University, 2-7 Daigaku-machi, Takatsuki, Osaka 596-8686, Japan

⁶ Kyoto University Health Service, Yoshida Honmachi, Sakyo-ku, Kyoto 606-8501, Japan

⁷ Department of Emergency Medicine, Osaka General Medical Center, 3-1-56 Bandai-Higashi, Sumiyoshi-ku, Osaka, Osaka 558-8558, Japan

⁸ Department of Acute Medicine, Kindai University, 377-2 Ohnohigashi, Osakasayama, Osaka 589-8511, Japan

⁹ Otemae Hospital, 1-5-34 Otemae, Chuo-ku, Osaka, Osaka 540-0008, Japan

¹⁰ Baba Memorial Hospital, 4-244 Hamadera Funaocho-higashi, Nishi-ku, Sakai, Osaka 592-8555, Japan

¹¹ Department of Trauma and Critical Care Medicine, Osaka City University Graduate School of Medicine, 1-4-3 Asahimachi, Abeno-ku, Osaka, Osaka 545-8585, Japan

¹² Department of Emergency and Critical Care Medicine, Kansai Medical University Hospital, 2-3-1 Shinmachi, Hirakata, Osaka 573-1191, Japan

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ABSTRACT

Objectives: The spread of COVID-19 has affected the incidence of other infectious diseases, but there are no reports of studies using comprehensive regional population-based data to evaluate the impact of COVID-19 on influenza incidence. We attempted to evaluate the impact of COVID-19 on influenza using the population-based ORION (Osaka Emergency Information Research Intelligent Operation Network) registry.

Methods: The ORION registry of emergency patients treated by emergency medical service (EMS) personnel was developed by the Osaka Prefecture government. From ORION, we included emergency patients with influenza using the ICD (International Statistical Classification of Diseases and Related Health Problems) 10 codes. Influenza incidence rate ratio (IRR) and associated 95% CI were calculated.

Results: The number of influenza patients transported by EMS decreased during the COVID-19 pandemic. The IRR showed a substantial decrease in influenza patients in 2020 (IRR 2020/2018 0.39, 95% CI 0.37–0.41).

Conclusions: A comprehensive regional analysis using the population-based ORION registry confirmed that from January 2020, when the first confirmed cases of COVID-19 infection were reported in Osaka, Japan, the number of influenza patients transported by EMS decreased dramatically.

Introduction

The global outbreak of COVID-19 has resulted in various prevention and control measures being implemented globally to control its spread

(Yanase and Sugimori, 2021; Daemi et al., 2021). Although the spread of COVID-19 affected the incidence of other infectious diseases, there are no reports using comprehensive regional population-based data to evaluate the impact of COVID-19 on influenza incidence.

* Corresponding author. Tomoya Hirose, MD, PhD, Department of Traumatology and Acute Critical Medicine, Osaka University Graduate School of Medicine, 2-15 Yamadaoka, Suita, Osaka 565-0871, Japan. Tel.: +81-6-6879-5707; Fax: +81-6-6879-5720.

E-mail addresses: hTomoya1979@hp-emerg.med.osaka-u.ac.jp (T. Hirose), orion13@hp-emerg.med.osaka-u.ac.jp (Y. Katayama), tanaken.0414@gmail.com (K. Tanaka), lucky_unatan@yahoo.co.jp (T. Kitamura), shunichironakao@hp-emerg.med.osaka-u.ac.jp (S. Nakao), jotarotachino@hp-emerg.med.osaka-u.ac.jp (J. Tachino), shotaan24@gmail.com (S. Nakao), nittam@osaka-med.ac.jp (M. Nitta), iwami.taku.8w@kyoto-u.ac.jp (T. Iwami), sfujimi40@nifty.com (S. Fujimi), uejiman@gmail.com (T. Uejima), y Miyamoto@otemae.gr.jp (Y. Miyamoto), pegasushoujinhonbu@yahoo.co.jp (T. Baba), mizobata@med.osaka-cu.ac.jp (Y. Mizobata), kuwagata@hirakata.kmu.ac.jp (Y. Kuwagata), shimazu@hp-emerg.med.osaka-u.ac.jp (T. Shimazu), t-matsuoka@rgmc.izumisano.osaka.jp (T. Matsuoka).

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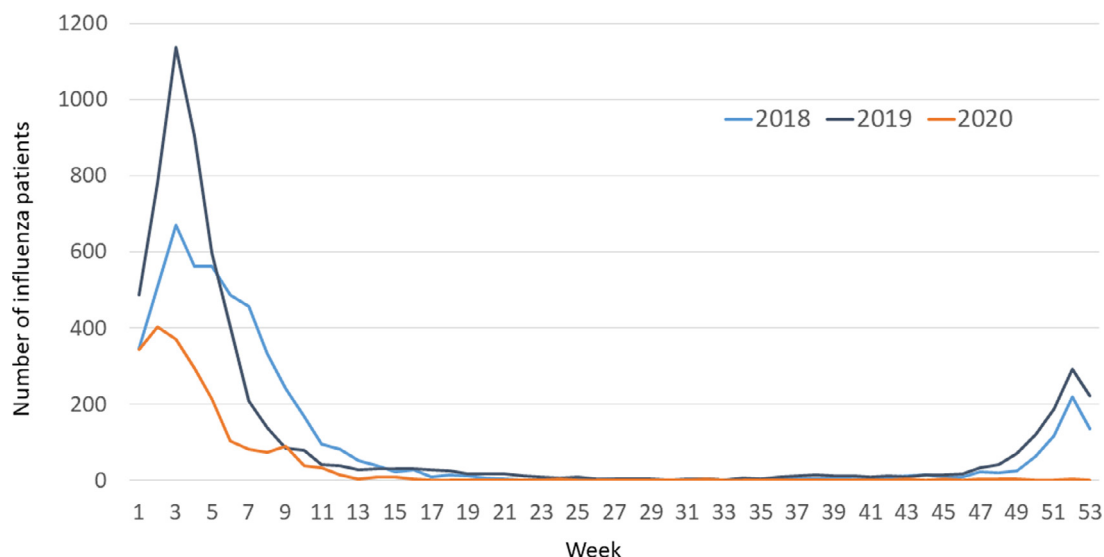


Figure 1. The weekly number of influenza patients between 2018 and 2020.

The Osaka Prefecture government developed an information system for emergency patients transported by emergency medical service (EMS) personnel called the Osaka Emergency Information Research Intelligent Operation Network (ORION) system, which compiles prehospital ambulance records and in-hospital information such as diagnosis and prognosis (Okamoto et al., 2019). In the present study, we attempted to evaluate the impact of COVID-19 on the incidence of influenza using the population-based ORION registry.

Methods

We conducted a retrospective observational study using the ORION database (Okamoto et al., 2019). The study period spanned 3 years, from 1 January 2018 to 31 December 2020. Osaka Prefecture is located in the western area of Japan, covers an area of 1905 km², and has a population of 8.8 million served by 519 hospitals (106 273 beds) (Okamoto et al., 2019).

We included emergency patients with influenza from the ORION database with ICD (International Statistical Classification of Diseases and Related Health Problems) 10 codes: J09, influenza due to certain identified influenza viruses; J10, influenza due to other identified influenza virus; and J11, influenza due to unidentified influenza virus. The influenza incidence rate ratio (IRR) and associated 95% CI were calculated based on a previous study (Maeda et al. 2021) using R software (version 4.0.4; R Development Core Team, Vienna, Austria). The influenza IRR was defined in this study as the relative difference in the incidence of influenza occurring at any given time point by year. The analytical models included the monthly number of patients who lived in Osaka Prefecture as an offset term.

This study was approved by the Ethics Committee of the Osaka University Graduate School of Medicine (No. 15003). This study was conducted based on the ORION database under the present researchers' responsibility, and it differs from the statistics published by Osaka Prefecture. This research was not conducted by the Osaka Prefecture government.

Results

The first confirmed cases of COVID-19 infection in Osaka, Japan, were reported in January 2020. Figure 1 shows the weekly number of influenza patients in Osaka Prefecture between 2018 and 2020. From January 2020, the number of influenza patients dramatically decreased,

and almost no influenza patients were recognized in the winter of 2020. Table 1 shows the monthly incidence and IRR of influenza patients. The IRR values show that the decrease in influenza patients in 2020 was remarkable (IRR_{2020/2018} 0.39 [95% CI 0.37–0.41]).

Discussion

Influenza is a well-known, highly contagious viral infection that has been responsible for the death of many people over the history of pandemics (Daemi et al., 2021). However, our analysis of the population-based ORION registry in Osaka, Japan, revealed a reduction of influenza in Japan during the COVID-19 outbreak.

Many infectious diseases transmitted by droplets or contact have declined in other countries and areas during the COVID-19 pandemic (Sawakami et al., 2021). In Japan, national reports from sentinel surveillance show that influenza outbreaks have declined since the COVID-19 pandemic (Sawakami et al., 2021, Sakamoto et al., 2020). Our study, using the comprehensive regional ORION database, showed the same result. Possible reasons for the reduction in influenza may be that 1) influenza viral infection is less infectious than COVID-19 (Biggerstaff et al., 2014, Locatelli et al. 2021, Mir and Koul, 2021) and 2) social distancing, intermittent lockdowns, closure of schools, and restrictions on mass gatherings were effective. Similar reports have been published in other countries, and we will continue to follow this trend in the future (Mir and Koul, 2021, Olsen et al., 2020).

The monthly influenza IRR had already decreased in January 2020, although the first confirmed case of COVID-19 in Osaka was reported in January 2020. During this period, infection controls such as closure of schools and restriction on mass gatherings had not started. However, COVID-19 might have begun to alter the attitude of citizens toward the prevention of infection in January 2020 because information on COVID-19 was already being reported worldwide, especially from China.

This study has limitations. First, it included only influenza patients evaluated by EMS personnel and did not include walk-in patients. Second, only data collected after 2018 when ORION was developed were included, and thus they cannot be compared with data prior to 2018. However, sentinel surveillance data of influenza in Osaka Prefecture, including walk-in patients and data prior to 2018, showed the same trend as the findings from our study (Osaka Institute of Public Health, 2021). Thus, the ORION database could provide important in-

Table 1
Monthly incidence and IRR of influenza patients.

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Incidence (n)													
2018	2423	1645	491	96	30	4	4	8	17	28	66	561	5373
2019	3759	960	214	122	73	26	11	15	44	44	107	891	6266
2020	1608	361	94	17	1	3	1	2	2	4	9	10	2112
IRR (95% CI)													
2019/2018	1.55 (1.48-1.63)	0.58 (0.54-0.63)	0.44 (0.37-0.51)	1.27 (0.97-1.66)	2.43 (1.59-3.71)	6.50 (2.27-18.63)	2.75 (0.88-8.64)	1.88 (0.80-4.42)	2.59 (1.48-4.53)	1.57 (0.98-2.52)	1.62 (1.19-2.20)	1.59 (1.43-1.77)	1.17 (1.13-1.21)
2020/2018	0.66 (0.62-0.71)	0.22 (0.20-0.25)	0.19 (0.15-0.24)	0.18 (0.11-0.30)	0.03 (0.01-0.24)	0.75 (0.17-3.35)	0.25 (0.03-2.23)	0.25 (0.05-1.18)	0.12 (0.03-0.51)	0.14 (0.05-0.41)	0.14 (0.07-0.27)	0.02 (0.01-0.03)	0.39 (0.37-0.41)

IRR, incidence rate ratio; CI, confidence interval.

formation about emergency patients with influenza similar to sentinel surveillance.

Conclusions

A comprehensive regional analysis using the population-based ORION registry found that from January 2020, when the first confirmed cases of COVID-19 infection were reported in Osaka, Japan, the number of influenza patients in Osaka Prefecture decreased dramatically.

Declaration of Competing Interest

All authors report no conflicts of interest.

Author contributions

YKatayama and TK designed study. TH, YKatayama, KT, Shunichi-roNakao, JT and TK analyzed data. MN, TI, SF, TU, YMiyamoto, TB, TMizobata, YKuagata, TS and TM supervised this research project. TH wrote the first draft. All of the authors read and approved the final manuscript.

Ethical approval

This study was approved by the Ethics Committee of the Osaka University Graduate School of Medicine (No. 15003).

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