Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Short Communication

Successful interruption of seasonal influenza transmission under the COVID-19 rapid response in Zhejiang Province, China

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ABSTRACT

Objectives: The objective of this study was to evaluate whether the non-pharmaceutical interventions (NPIs) introduced to curb the spread of coronavirus disease 2019 (COVID-19) also interrupted the transmission of influenza.
Study design: This is a descriptive epidemiological study.
Methods: Data on changes in the number of reported influenza cases, number of influenza-like illness (ILI) visits, ILI percentage and influenza virus positivity were compared between the first 18 weeks of 2020 and the same period of 2019.
Results: The changes in the weekly average number of influenza cases were statistically significant between 2020 and 2019 (−4319 vs −525 per week; $P < 0.05$). The slopes of regression lines for the number of ILI visits were also statistically significant between 2020 and 2019 (−911 vs −98 per week; $P < 0.05$).
Conclusions: This study found that the prevalence of influenza was substantially decreased when NPIs were implemented for the containment of COVID-19.

In December 2019, a cluster of acute respiratory illness, now known as coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), occurred in Wuhan, Hubei Province in China.[1] The condition rapidly spread globally, and on 11 March 2020, the World Health Organization declared a COVID-19 pandemic.[2]

To curb the spread of COVID-19, Zhejiang Province, located on the east coast of China with a population of 58.5 million, initiated the level-1 provincial public health rapid response on 23 January 2020. Consistent with the national emergency response, Zhejiang provincial government developed and implemented a package of strict non-pharmaceutical interventions (NPIs), including but not limited to traffic restriction, quarantine of travellers from COVID-19 epidemic areas, closure of public entertainment places, cessation of festival celebrations, reduction of public gatherings, postponement of work resumption and school opening and closure of highway entrances and exits.[3] The intense and multifaceted NPIs in China lead to a dramatic reduction of COVID-19.[4] On 2 March and 23 March, Zhejiang Province downgraded the rapid response level to level-2 and level-3, respectively.

Studies from Singapore, Hong Kong and Taiwan in China have suggested that influenza transmission also declined substantially during the period when the NPIs were implemented to combat COVID-19.[5–7] However, to date, no study has been conducted to evaluate the influence of NPIs on the epidemic of influenza in mainland China where comprehensive NPIs have been strictly, widely and effectively applied to prevent COVID-19. In this study, changes in the prevalence of influenza are reported during the period of COVID-19 rapid response interventions, which may contribute to coping with future influenza epidemics.

Influenza-like illness (ILI) sentinel surveillance data were reported by 16 hospitals in Zhejiang Province as part of the National Sentinel Influenza Surveillance Network. The number of cases of COVID-19 and influenza was reported to the Chinese National Notifiable Diseases Reporting System by all hospitals within the province. This study compared the changes in the number of reported influenza cases, the number of ILI visits, ILI percentage and influenza virus positivity in the first 18 weeks of 2020 with those during the same period of 2019. In terms of influenza cases and ILI visits, changes within the two time periods were compared using simple linear regression. The definitions of ILI, ILI percentage and influenza virus detection rate are consistent with a previous analysis.[8]

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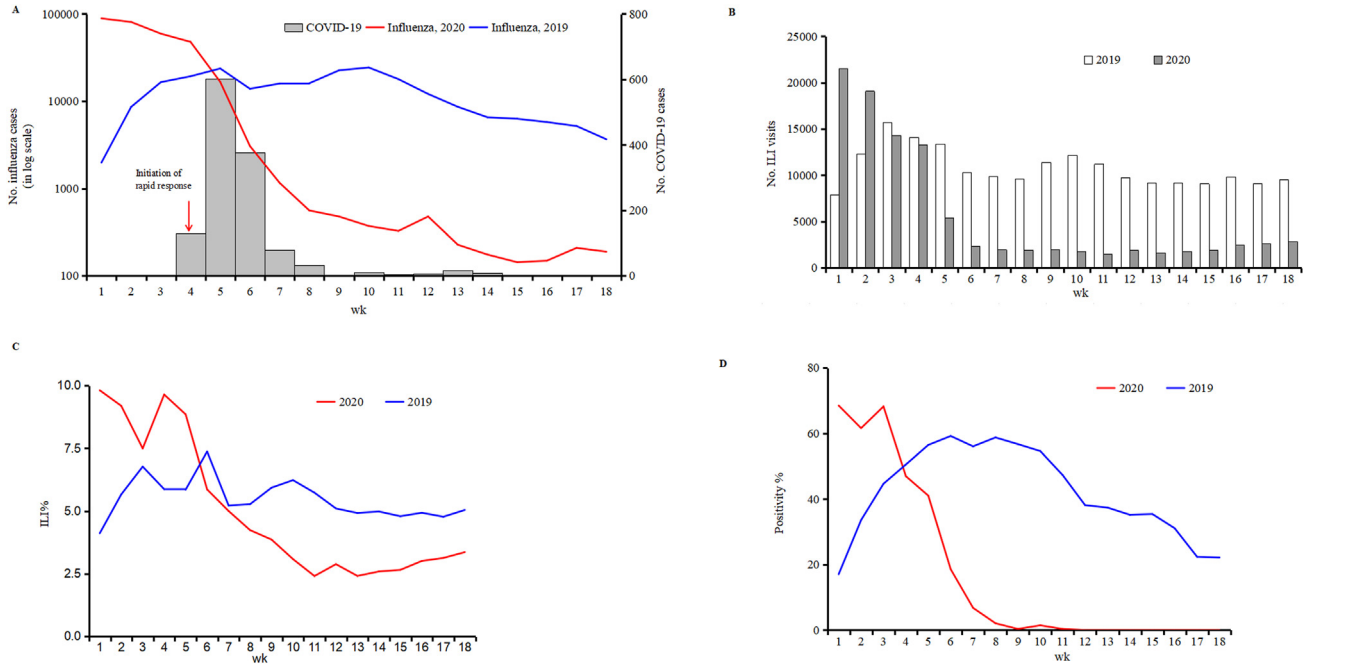

Fig. 1. Influenza-like illness (ILI) sentinel surveillance results in Zhejiang Province during the first 18 weeks of 2020 and 2019. (A) Reported influenza and COVID-19 cases; (B) the number of ILI visits in all sentinel hospitals; (C) ILI percentage; (D) influenza positivity of the samples tested.

The number of influenza cases at the beginning of 2020 was stable with a high incidence. Moreover, the weekly number of influenza cases in the first 4 weeks in 2020 was higher than that in the same period of 2019 (Fig. 1, panel A). However, the number of influenza cases then decreased rapidly, coinciding with the initiation of rapid response interventions to control COVID-19. The weekly average number of influenza cases between the 5th and 18th weeks in 2020 decreased by 97.5% compared with the first 4 weeks. The changes in the weekly average number of influenza cases (slope of regression lines) were statistically significant between 2020 and 2019 (−4319 vs −525 per week; $P < 0.05$) (Fig. 1, panel A).

The number of ILI visits was declining at the beginning of 2020, and this decline accelerated after the initiation of the rapid response (from the 5th week). The weekly average number of ILI cases after the initiation of rapid response interventions decreased by 86.6% compared with the first 4 weeks in 2020. In contrast, the number of ILI visits remained at a high level during the same period in 2019. The slopes of regression lines for the number of ILI visits were also statistically significant between 2020 and 2019 (−911 vs −98 per week; $P < 0.05$) (Fig. 1, panel B).

The trend of the change in ILI percentage was similar to the number of ILI visits between 2020 and 2019 (Fig. 1, panel C). However, the decline of influenza positivity in 2020 was more striking; influenza positivity plummeted from more than 60% in the first three weeks to less than 10% at week 7 in 2020. Influenza positivity even reached, and remained at, zero in the 12th to 18th weeks of 2020 (Fig. 1, panel D).

The peak influenza season in Zhejiang Province is usually from December to February or March of the following year.[8] This study demonstrates that the implementation of rapid responses to COVID-19 in Zhejiang also significantly decreased the seasonal prevalence of influenza. Circulation of influenza virus was almost completely interrupted 4 weeks after the initiation of the rapid response. The influenza virus detection rate in sentinel hospitals' ILI specimens maintained at zero for several weeks. This phenomenon is rare, even in non-influenza seasons of previous years. Without the massive introduction of specific measures, such as vaccines or antiviral drugs for influenza, NPIs to contain COVID-19 have been shown to significantly decrease the prevalence of influenza.

Notably, avoidance of care-seeking for ILI may be a confounder of the current findings. However, during the rapid response periods, more efforts were made to identify individuals with influenza-like symptoms, such as screening body temperatures in public places and encouraging ILI cases to seek medical help to identify causes of ILI during the COVID-19 pandemic.[9] In addition, SARS-CoV-2 and the influenza virus have similar modes of transmission through respiratory and contact routes. Therefore, NPIs to reduce or stop transmission of COVID-19 should have the same effect on influenza.[7]

Results of this study are consistent with the studies in Taiwan, Hong Kong and Singapore, although the interventions in their communities may not have been implemented in such a large scale.[5–7] Therefore, it was reasonable to infer that containment of seasonal influenza in Zhejiang in 2020 is a result of the rapid responses that were originally developed for controlling the spread of COVID-19.

In the early stages of an emerging influenza epidemic, there can be some delays in the availability of specific vaccines and shortage of antiviral drugs.[10] NPIs, such as those implemented in the COVID-19 rapid response, should be taken into consideration to seize the short window of opportunity to reduce prevalence. In the present study, successful containment of seasonal influenza as a result of COVID-19 control measures has provided some useful insights for controlling emerging influenza epidemics in the future.

Author statements

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Ethical approval

The National Commission ruled that the collection of data for influenza and COVID-19 was part of a continuing public health investigation of an emerging outbreak. The study was therefore exempt from institutional review board assessment.

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Competing interests

None declared.

Author contributions

J.P. and E.C. conceived the idea of the study. W.C. and W.S. analysed the data. S.L., F.L. and Z.Y. contributed reagents/materials/analysis tools for the study. J.P. wrote the article.

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