

Nonpolio Enterovirus Activity during the COVID-19 Pandemic, Taiwan, 2020

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In Taiwan, lower nonpolio enterovirus activity during the coronavirus disease pandemic in 2020 compared with 2014–2019 might be attributable to adherence to nonpharmaceutical interventions. The preventable fraction among unexposed persons indicated that 90% of nonpolio enterovirus activity might have been prevented during 2014–2019 by adopting the same measures enforced in 2020.

Nonpharmaceutical interventions have been shown to be effective in preventing the spread of infectious diseases. The strict compliance with nonpharmaceutical interventions implemented during the coronavirus disease (COVID-19) pandemic has been associated with a decline in influenza activity in many countries, including Taiwan (1–4). Handwashing, disinfecting frequently touched surfaces, and closure of schools might also be effective against nonpolio enteroviruses (NPEV), which commonly cause a spectrum of illnesses in young populations in Asia (5). We observed lower NPEV activity during the 2019–20 season in Taiwan compared with the average of the 5 previous seasons, which might be attributable to strict compliance with nonpharmaceutical interventions. We further estimated the protective effect that could have been achieved if the population strictly adhered to the same nonpharmaceutical interventions during those previous seasons.

We collected nationwide data on weekly outpatient and emergency department (ED) visits during November 2014–June 2020 from the Taiwan National Infectious Disease Statistics System (<https://nidss.cdc.gov.tw>) (6). Patients ≥ 15 years of age were excluded because of their milder symptoms and low number of cases. The original data were transferred from the National Health Insurance program of Taiwan, which covers >99% of Taiwan residents (Appendix, <https://wwwnc.cdc.gov/EID/article/27/1/20-3394-App1.pdf>). The Institutional Review Board of the National Health Research Institutes approved this study (approval no. EC1051207-R4).

NPEV activity was measured by using the number of visits that yielded diagnoses of hand, foot, and mouth disease (International Classification of Diseases [ICD], 9th Revision, Clinical Modification, code 074.3 or ICD, 10th Revision, Clinical Modification, code B08.4) or herpangina (ICD, 9th Revision, Clinical Modification, code 074.0 or ICD, 10th Revision, code B08.5). The period from week 47 of 1 year and week 23 of the following year was defined as 1 season. We estimated the change in NPEV activity after the first imported COVID-19 case in Taiwan, when nonpharmaceutical interventions were introduced and enforced, by using a difference-in-difference model used in a previous influenza study (Appendix) (4). The total number of outpatient and ED visits for NPEV at baseline was adjusted to eliminate the preintervention differences in NPEV activity between groups (2019–20 season vs. 2014–2019 seasons). The total number of outpatient and ED visits for all disease in different weeks and different years was used for normalization because their numbers decreased after the COVID-19 pandemic. We estimated the preventable fraction among the unexposed (PF_u) to measure the reduction of NPEV that would have been possible in each week of the 2014–2019 seasons, had the same nonpharmaceutical interventions been strictly followed, and adjusted PF_u to control for potential confounder (Appendix).

The number of NPEV visits during the 2019–20 season was 81,942, compared with the average of 205,979 during the 2014–2019 seasons (Appendix Table 1). NPEV activity increased after week 16 across the past 6 seasons except 2019–20, when the earlier low level of weekly activity continued (Figure; Appendix Figure 1). The difference-in-difference analysis revealed that after normalization by visits for NPEV at baseline and for all diseases, NPEV activity during weeks 16–23 in the 2019–20 season was significantly lower than during the same calendar weeks of the 2014–2019 seasons (Appendix Table 2). The lower activity during weeks 16–23 in 2019–20 remained significant across all age groups and hospital settings (Appendix Table 3, 4). The weekly PF_u increased from 73% to 90% (from 17% to 71% for adjusted PF_u) during weeks 16–23 (Table; Appendix Table 5). Similar benefits of the nonpharmaceutical interventions were observed across different age groups of patients and hospital settings (Table; Appendix Table 6).

We observed a significant and persistent decrease of NPEV during the 2019–20 season, which might be attributable to strict compliance with the nonpharmaceutical interventions. Up to 90% (71% adjusted) of NPEV activity might have been prevented during the 2014–2019 seasons by adopting the same nonpharmaceutical interventions enforced in 2020. Many

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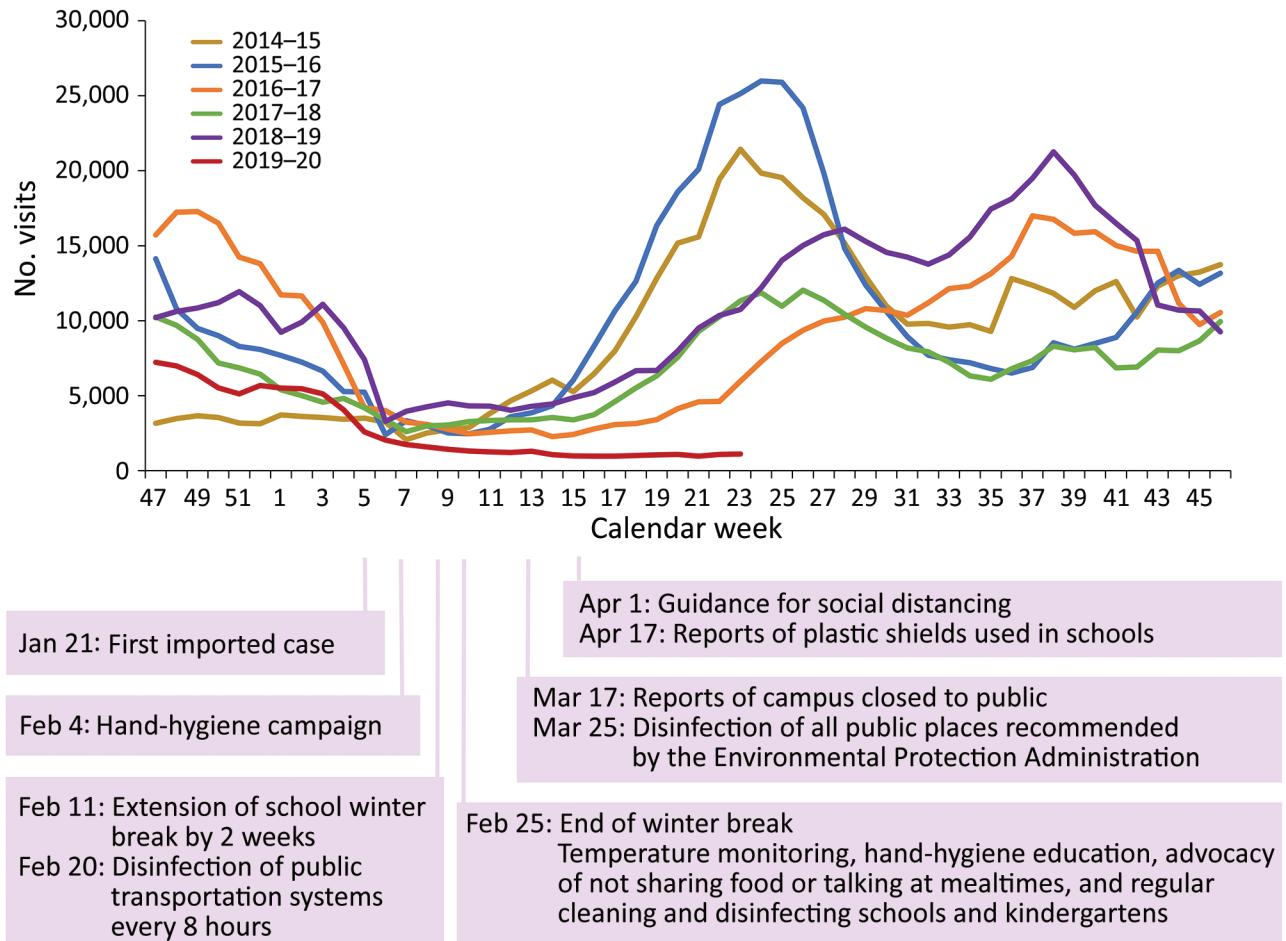


Figure. Nonpolio enterovirus activity during 2019–20 season compared with the same weeks in the previous 5 seasons in patients <15 years of age, Taiwan. The y-axis represents the number of outpatient department and emergency department visits in which a diagnosis of hand, foot and mouth disease or herpangina was made for patients <15 years of age.

factors, such as detection bias and healthcare avoidance, might confound our analyses. However, the detection of NPEV is based on symptoms and was less likely to be affected by the COVID-19 pandemic. In addition, COVID-19 had little impact on the surveillance system in Taiwan because <450 total COVID-19 cases had been reported as of June 17 and no local cases have been reported since April 12.

Our study is limited by the healthcare avoidance caused by the COVID-19 pandemic (4). The normalization procedure using the number of visits for all diseases in our study and subgroup analyses on ED patients (Appendix Table 4, 6) are insufficient to eliminate the impact of healthcare avoidance; active surveillance is required. The effect of individual non-pharmaceutical intervention is difficult to assess. The

Table. Weekly estimated PF_u during calendar weeks 16–23 in 2020 compared with the same weeks in the previous 5 seasons in patients <15 years of age, by age group, Taiwan*

| Calendar week | Estimated PF_u (95% CI) | | | | |
|---------------|---------------------------|------------------|------------------|------------------|------------------|
| | Overall | 0–2 y | 3–4 y | 5–9 y | 10–14 y |
| 16 | 0.73 (0.67–0.78) | 0.55 (0.46–0.63) | 0.76 (0.70–0.81) | 0.78 (0.73–0.83) | 0.74 (0.68–0.79) |
| 17 | 0.76 (0.72–0.80) | 0.61 (0.54–0.67) | 0.79 (0.75–0.82) | 0.81 (0.77–0.85) | 0.78 (0.73–0.81) |
| 18 | 0.79 (0.76–0.82) | 0.66 (0.61–0.70) | 0.82 (0.79–0.84) | 0.84 (0.81–0.86) | 0.81 (0.78–0.83) |
| 19 | 0.82 (0.80–0.84) | 0.70 (0.67–0.73) | 0.84 (0.82–0.86) | 0.86 (0.84–0.88) | 0.83 (0.81–0.85) |
| 20 | 0.84 (0.82–0.86) | 0.74 (0.71–0.76) | 0.86 (0.84–0.88) | 0.88 (0.86–0.89) | 0.86 (0.84–0.87) |
| 21 | 0.86 (0.84–0.88) | 0.77 (0.74–0.80) | 0.88 (0.86–0.89) | 0.89 (0.88–0.91) | 0.87 (0.86–0.89) |
| 22 | 0.88 (0.86–0.90) | 0.80 (0.77–0.83) | 0.89 (0.87–0.91) | 0.91 (0.89–0.92) | 0.89 (0.87–0.91) |
| 23 | 0.90 (0.87–0.91) | 0.82 (0.79–0.85) | 0.91 (0.89–0.93) | 0.92 (0.90–0.94) | 0.91 (0.88–0.92) |

*All values are statistically significant. PF_u , estimated preventable fraction among the unexposed.

prolonged winter break might have played a major role in reducing NPEV activity. However, considering the high contagiousness of NPEV, their activity was expected to peak after school reopening if no other interventions were implemented. The persistent low NPEV activity throughout the semester, which began in March 2020, indicated the effectiveness of other interventions.

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Absence of SARS-CoV-2 Transmission from Children in Isolation to Guardians, South Korea

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We explored transmission of severe acute respiratory syndrome coronavirus 2 among 12 children and their uninfected guardians in hospital isolation rooms in South Korea. We found that, even with close frequent contact, guardians who used appropriate personal protective equipment were not infected by children with diagnosed coronavirus disease.

Coronavirus disease (COVID-19) in children is known to occur mainly from family clusters (1). However, children can be the only infected members in a household, especially when COVID-19 is contracted from relatives or teachers. Such situations raise concerns about isolation because little information is available on transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes COVID-19, during colocation of young children with their uninfected guardians. Although children generally are asymptomatic or have mild symptoms, they could be infective (1,2). We explored whether SARS-CoV-2 was transmitted from children to their uninfected guardians in a hospital isolation setting.

During February 18–June 7, 2020, we analyzed all children <19 years of age with COVID-19 and their uninfected guardians who were isolated together in 7 hospitals in South Korea. The infected children were encouraged to wear face masks. The guardians were advised to wear personal protective equipment (PPE), but the degree of PPE varied among hospitals. Adherence to PPE was monitored by the medical staff; compliance was judged as good when PPE was worn most of the time, fair for frequent adherence,