

# Considerations and guidance to control the rebound in COVID-19 cases

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**SUMMARY** Induced by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and its variants, the COVID-19 pandemic has caused a serious crisis for healthcare systems worldwide. COVID-19 vaccine coverage has increased in many countries, but the COVID-19 epidemic has rapidly expanded, with a daily increase of 30,390 COVID-19 cases and 9,761 deaths since August 12, 2021. This article provides a brief overview of growing concerns about a rebound of the COVID-19 pandemic caused by the Delta variant and public health epidemic control measures that have recently been relaxed. As of August 13, 2021, 465,679 cases of COVID-19 due to the Delta variant of SARS-CoV-2 have been detected in over 120 countries. Epidemic control measures were relaxed in some areas, such as allowing large gatherings and improper criteria for ending self-isolation. Even in China, where the epidemic was tightly controlled with strict non-pharmaceutical interventions (NPIs), new COVID-19 cases, and asymptomatic cases in particular, spiked in the first 13 days of August. More importantly, most of those cases were local, while most of the cases accounting for the previous increase were imported. Therefore, relaxed epidemic control measures and asymptomatic infections possibly caused by the Delta variant of SARS-CoV-2 may increase the risk of virus transmission. Accordingly, suggestions for COVID-19 containment, such as encouraging vaccination of the general population, using Internet of Things technology (IoT) to reduce the possibility of contact with the asymptomatic infected, and enhancing disease surveillance, have been offered here.

**Keywords** COVID-19, SARS-CoV-2, non-pharmaceutical interventions, vaccination, Internet of Things technology (IoT), vaccines

## 1. Introduction

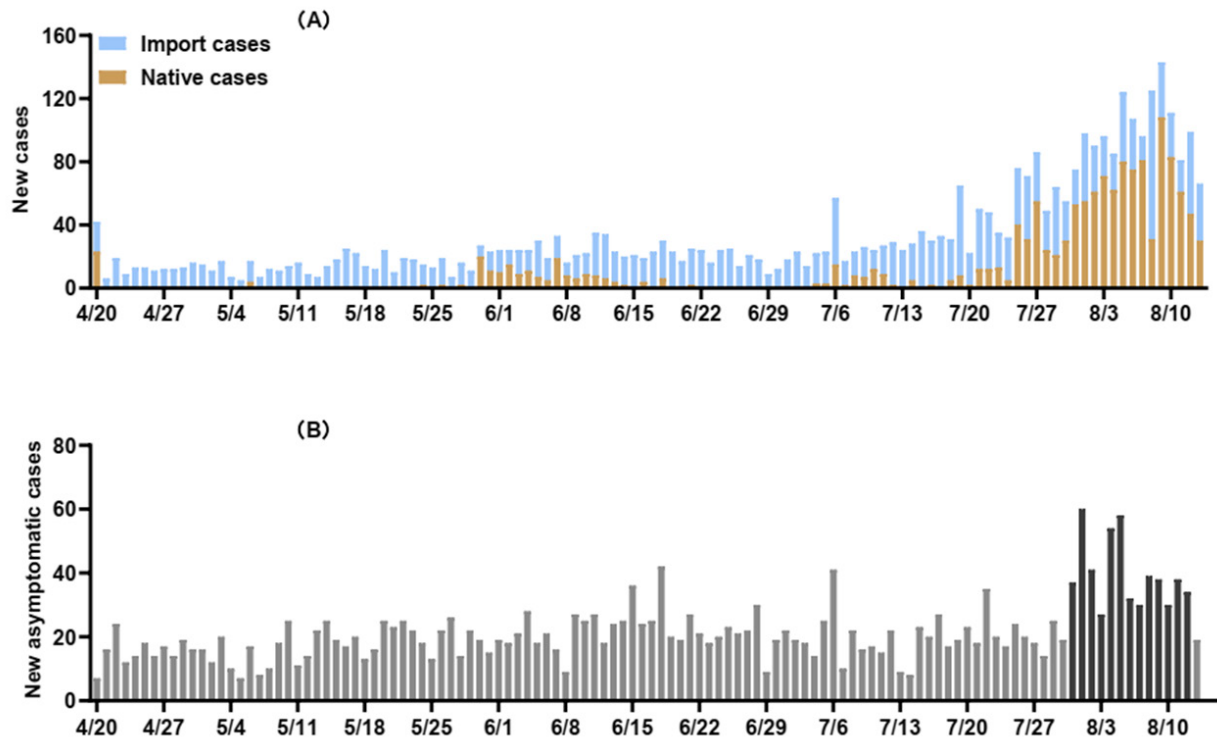
COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This global threat has led to 205,338,159 confirmed cases, including 4,333,094 deaths, since August 13, 2021 (1). Although more than 4 billion vaccine doses have been administered, the daily confirmed cases continued to increase from 302,979 to 686,063 from June 23, 2021 to August 12, 2021 (1). To make matters worse, the B.1.617.2 (Delta) variant of SARS-CoV-2 spread from its origin in India, and this variant is more transmissible than other variants, especially in indoor sports settings and within households (2). Despite such troubling circumstances, epidemic control measures have been relaxed in some areas because vaccination coverage increased (1). Thus, the reason for the daily increase in new cases over the last two months and further suggestions for COVID-19

control have been discussed here.

## 2. The possibility of a new rebound in cases

### 2.1. The spread of the Delta variant

After the Delta variant (also known as B.1.617.2) emerged in India after December 2020, it spread to over 120 countries, and it has led to 465,679 confirmed cases as of August 13, 2021 (2,3). Compared to previous variants, the Delta variant is highly contagious (more than twice as contagious than previous variants), and the Delta variant leads to more infections and it spreads faster (4). The high transmissibility of the Delta variant was responsible for not only the deadly second wave of COVID-19 infections in April 2021 in India (3,4) but also the highest number of cases due to SARS-CoV-2, with 246,284 confirmed cases in UK as of August 13,



**Figure 1. (A), The daily increase in new COVID-19 cases between April 20, 2021 and August 13, 2021. Blue bars indicate imported cases, and yellow bars indicate the number of local cases. (B), The daily increase in new asymptomatic cases of COVID-19 between April 20, 2021 and August 13, 2021. A darker color indicates a significant increase in new asymptomatic cases over the past few months.**

2021 (3,5).

Although there have been great breakthroughs and promising vaccine coverage in some countries, cases have continued to rebound since late June 2020 (1). Various studies have examined the Delta variant's transmissibility and contagiousness in unvaccinated people and fully vaccinated people. Those studies revealed that even fully vaccinated people who are asymptomatic could be infectious and that unvaccinated people are much more likely to transmit the virus through contact. In addition, the Delta variant seems to produce the same high viral titer in unvaccinated and fully vaccinated people (6-8).

2.2. Public health epidemic control measures that have recently been relaxed

In addition to vaccination, tightening public health and social measures have also contributed substantially to control of the virus (9). However, epidemic control measures are a balance of infections and deaths and economic loss. A modelling study by Yang *et al* found that if lockdowns were lifted too early and too extensively across the UK, then there could be a risk of a second wave, possibly resulting in 23.4 million infected and 897,000 deaths (10). In countries and regions that have relaxed public health measures and self-isolation, lifting lockdowns too early (such as improper criteria for ending self-isolation) could be a major cause of

a rebound in cases. Agreeing with those findings, a study by Zhang *et al.* stated that the combination of vaccination and interventions can effectively suppress the transmission of new COVID-19 variants (11). Thus, public health epidemic control measures that have recently been relaxed may also be responsible for the rebound in cases.

2.3. COVID-19 cases can even rebound in countries with stringent epidemic controls

As mentioned before, China has tightened its stringent epidemic controls and it has a promising vaccination rate, thus successfully controlling the epidemic during the first wave (9). However, cases have increased over the last month (Figure 1A). Unlike most of the previous sporadic cases that were imported, most of the cases from August 1, 2021 to August 12, 2021 were local. Based on this phenomenon, asymptomatic infection will presumably increase the risk of virus transmission. The daily increase in the asymptomatic infected from August 1, 2021 to August 12, 2021 was higher than previous increases (Figure 1B). After the first nadir in COVID-19 cases in China, the asymptomatic infected accounted for more than 65.8% (2521/3831) of the daily increase in cases from April 20, 2021 to August 13, 2021. Corroborating that fact, Snider *et al.* reported that asymptomatic cases were a hidden challenge in predicting confirmed cases of COVID-19 (12). Therefore, the public should pay

more attention to asymptomatic infections even after the pandemic has subsided.

### 3. Guidance to control the rebound in COVID-19 cases

COVID-19 has led to tremendous hardships and challenges worldwide. As the epidemic continues, various effective vaccines have been developed and administered despite the rise and spread of various variants. However, the asymptomatic infected, and especially those who self-quarantined or who were released prematurely after close contact, are a hidden challenge (12).

Suggestions to deal with those issues are as follows: First, to better ascertain the characteristics of asymptomatic COVID-19 infection and to reduce the harm to the public, more clinical research on the contagiousness, transmissibility, and mortality rate of the virus and its variants should be conducted in large populations and at multiple centers. Second, non-pharmaceutical interventions can protect not only the symptomatic infected but also the asymptomatic infected. Personal protective measures need to be maintained even after the COVID-19 epidemic. Measures such as wearing a mask, disinfecting one's hands, and social distancing should be continued for a prolonged period. Third, to avoid the infections caused by symptomatic individuals, vaccination of the general public is required to reduce the risk of infection.

Last, since asymptomatic cases are usually hard to detect and the contacts of those affected are difficult to track, the criteria for release have been lax. However, the Internet of things (IoT) can play a role in combating the COVID-19 pandemic (13-15). For example, remote monitoring of health data, long-term follow-up and data collection can be used to tackle COVID-19. The IoT provides an excellent integrated network and it supplies useful information that can aid healthcare decision-making and public health management.

In order to better control COVID-19, new IoT technologies should be improved and then implemented. Simpler follow-ups, nucleic acid testing for the self-quarantined, and integrating information on close contacts are several issues the IoT could tackle (14). Another issue is accurately and rapidly conducting nucleic acid testing. Predicting outbreaks and the rebound of the epidemic are additional issues IoT could tackle. The security and privacy of patient data need to be monitored, and this issue is still a subject of debate (16).

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