

# Large-scale national screening for Coronavirus Disease 2019 in China

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## Abstract

Faced with the new challenges in the pandemic control, imported coronavirus disease (COVID-19) infections and asymptomatic infection, Chinese authorities have implemented new intervention measures—national large-scale nucleic acid testing. This article summarizes the population who needs the nucleic acid testing, analyzes the current data of COVID-19 testing capacity, concludes the timeline of coronavirus testing and suggests what needs to be done to facilitate the government large-scale screening measures.

## KEYWORDS

COVID-19, nucleic acid testing

In light of the new situation and problems of the epidemic at home and abroad, further control measure—national large-scale nucleic acid testing<sup>1</sup> was taken from 22 April 2020 on to prevent the epidemic from rebounding in China.

Despite the orderly resumption of production and restoration of economics, there has been imported coronavirus disease (COVID-19) infections,<sup>2</sup> asymptomatic infection,<sup>3,4</sup> clusters of cases and cross-infections in hospitals,<sup>5</sup> therefore, large-scale nucleic acid testing, as the first and crucial step in the "Four early" measures, plays a key role to achieve great control effect. "Four early" measure (early detection, early report, early isolation, early treatment), an important means for the prevention and control of infectious diseases, has been adopted since the very beginning of the coronavirus outbreak. The improvement of detection capacity needs to be accelerated and nucleic acid testing should be carried out to contain the progress of the epidemic on a regular basis, restraining the alarming spread of the outbreak from the very first step. Nucleic acid testing enables a rapid response to the COVID-19 outbreak by identifying suspected cases, confirming release of recovered patients, screening close contacts, and high-risk groups.

## 1 | WHO NEEDS THE NUCLEIC ACID TESTING?

The diagnostic criteria of COVID-19 are defined as suspected cases with one of the following<sup>6</sup>:

- (1) positive nucleic acid results by reverse transcription-polymerase chain reaction;
- (2) highly homologous sequencing of virus gene to severe acute respiratory syndrome coronavirus 2;
- (3) positive serum immunoglobulin G and immunoglobulin M results;

and the incubation lasts 1 to 14 days, therefore, the quarantine requisite involves a period of 14 days' isolation observation at home, isolation medical observation at home or centralized isolation medical observation.

The large-scale nucleic acid testing should cover targeted population, units and venues where people gather amid work and production resumption, especially the population who are at high risks. Based on the data released by Chinese authorities,<sup>7,8</sup> the key populations include:

- (1) Confirmed COVID-19 cases and close contacts;
- (2) Imported cases and close contacts;
- (3) Asymptomatic cases and close contacts;
- (4) Patients with fever;
- (5) Patients in need of hospitalization;
- (6) Personnel returning from business trip, especially from regions of high risks;
- (7) Personnel returning to school or work;
- (8) Staff of medical institutions, port quarantine inspection, public security and judicial supervision, social welfare and pension institutions, maternal and child service institutions and other key places.

For some key places and areas, the measure covers everyone, such as the whole population's nucleic acid testing in Wuhan city starting from 15 May 2020. Compared with some drive-through screening center,<sup>9</sup> the testing in China is officially organized and taken in designated hospitals and institutions, with sample collected by professional healthcare personnel and examined in specialized laboratory. Furthermore, Chinese authorities declared to speed up the improvement of rapid detection capability, especially to promote the production of nucleic acid rapid detection equipment with results in shortened time and no need for laboratory.<sup>10</sup>

It must be ensured that all confirmed and suspected cases, asymptomatic cases and close contacts are traced, to block the channels of the spread of the virus and fill the loopholes in COVID-19 prevention. Great importance should be attached to prevent clustered epidemics, especially hospital infections.

## 2 | WHAT NEEDS TO BE DONE TO FACILITATE THE GOVERNMENT LARGE-SCALE SCREENING MEASURES?

### 2.1 | Make sure of adequate supply of nucleic acid testing kits

With the COVID-19 pandemic continuing to ravage the world, fears of a massive demand for coronavirus test kits ignited a major concern worldwide, including countries, such as the US, Italy, Iran, and so on,<sup>11</sup> especially at the early stage. Globally, the number of daily COVID-19 tests per thousand people has gradually increasing. As for China, the nucleic acid detection capacity has reached 1.5 million per day by the end of 17 May 2020 and will be further improved.<sup>12</sup>

The timeline of coronavirus testing (Figure 1) showed that the authorities had invested a lot on the testing and the detection capacity had been greatly improved. However, with the decision of national large-scale nucleic testing, further improved detection capability will be required, therefore, sustained and steady growth of testing kits should be ensured to meet the demand.

### 2.2 | Keep a close watch on imported cases and asymptomatic patients

After 3 months' stringent measures against the virus, China has entered into the phase of mitigation, however, it is still faced with the

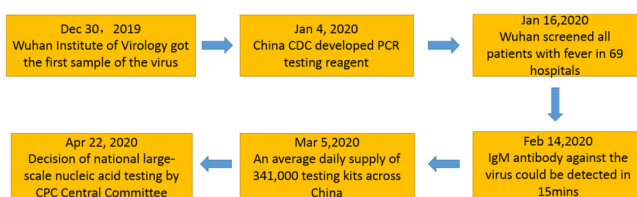


FIGURE 1 The timeline of coronavirus testing

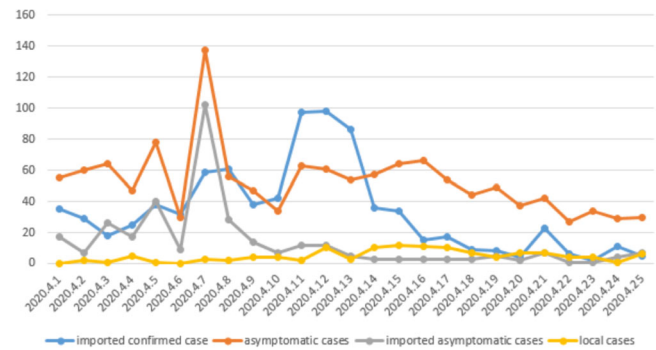


FIGURE 2 Number of cases from 1 April to 25 April 2020

high risk of rebounding due to not only the imported cases but also asymptomatic patients. Studies<sup>13,14</sup> have indicated that asymptomatic patients are infectious and can potentially transmit COVID-19, which deserves close attention and proper handling. Based on the daily reports from the National Health Commission of the People's Republic of China from 1 to 25 April 2020, the number of imported cases and asymptomatic cases exceeded that of local cases by a great deal<sup>15</sup> (Figure 2). Up to 25 April 2020, there were a total of 694 imported confirmed cases and 1000 asymptomatic cases with COVID-19, including 151 asymptomatic imported cases. Imported cases and asymptomatic patients, as two groups of the key targeted populations, accounted for a big proportion of the whole infected cases. The current interventions for them and their close contacts are 14 days of centralized quarantine and observation, with the releasing requirement of two consecutive negative nucleic acid tests. For more thorough inspection of the targeted populations, improved mechanism of joint regional defense and deepened international cooperation at borders or customs will be demanded to facilitate the pandemic control management.

During the period of large scale nucleic acid testing, as hard as it is, the active cooperation of the whole society has been witnessed, which guarantees the positive invention effect. However, the pandemic keeps in a dynamic and rapidly evolving stage, so there is still a long way to go in the battle against the COVID-19, where constant vigilance is needed.

### CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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