

Measures against the novel coronavirus infection at the Gifu University

A novel coronavirus infection was reported in Wuhan, China in December 2019. No drugs or safe vaccines have been established thus far. Nonetheless, the accumulation of clinical data and epidemiological findings has gradually revealed characteristics of the virus. To protect the health of students, faculty, and the community, the Gifu University has established a crisis and risk management system at the highest level to implement the best measures based on these scientific grounds.

(1) Characteristics of the novel coronavirus and countermeasures for infection at the Gifu University

The routes of the novel coronavirus infection are either droplets (small water droplets or aerosols) or contact, and it has been shown that wearing a mask and washing hands are extremely effective in preventing infection. Therefore, we believe that all students can maintain zero infection on campus by maintaining a distance of 1 m from each other, wearing masks, and washing hands thoroughly.

The novel coronavirus has a longer incubation period than other viruses and is known to infect people even during this period. In addition, some infected people that are asymptomatic and end up with no symptoms (the virus disappears from the body) can infect people. The fact that people without symptoms can infect other people has been found to be important in the prevention of this viral infection.

At the Gifu University, we take measures to prevent infection on the premise that “anyone may have the virus.” Students and faculty members are instructed to avoid the 3Cs (closed spaces, crowded places, close-contact settings) environment so as not to be infected by the virus and bring it into the university unknowingly. All members are instructed to monitor their physical condition by measuring their body temperature every day. If a member has symptoms, even if the symptoms are slight and regardless of a diagnosis of this infection, the member is instructed to wait at home for 2 days after their symptoms disappear. The Gifu University also guarantees that such correct health behaviors will not interfere with academic work.

(2) PCR testing for the novel coronavirus

PCR testing is one of the most reliable diagnostic methods for novel coronavirus infections. PCR can amplify and detect the genes of the novel coronavirus, to determine whether the patient has the virus or is infected. Samples (throat wash, sputum, saliva, etc.) are collected from sites of suspected infection, and the gene is extracted; only the gene of the novel coronavirus is amplified to confirm the presence of the virus. If the test is positive, there is almost no doubt that this virus is present (99% specificity). However, even if the virus is present, there are cases wherein the test can yield negative results. There are 20-30% false negatives that cannot be detected (70-80% sensitivity) owing to various factors such as the time of sample collection, method of sampling (e.g., sufficient samples or viruses were not collected), and testing environment and conditions (e.g., components that prevent virus amplification were accidentally mixed). In other words, if the PCR test is positive, the diagnosed can be infected with the novel coronavirus. However, it is not possible to completely rule out the infection simply because the PCR test is negative.

If a latent infected person who has become a false-negative acts freely on the basis that the test is negative, there is a possibility that the infection will spread. In addition, a negative result at the time of the test is actually negative but does not negate subsequent infection. The proof that the "PCR test was negative" is only proof that the virus could not be detected, and it is not possible to prove that the individual does not have the virus or that he or she "will not infect others." On the contrary, it is feared that the carelessness caused by negative results may increase the risk of infection.

(3) How PCR test results are used

PCR tests are performed in three major conditions.

Diagnostic tests (in clinical practice): Patients suspected of having the novel coronavirus infection, owing to symptoms such as sudden high fever, prolonged fever, impaired taste and smell, general weakness, cough, and shortness of breath, are subjected to PCR tests for a diagnosis. If the result is negative, treatment is started while

determining the possibility of other diseases, and careful examination is continued, such as a chest CT scan for pneumonia symptoms, blood oxygen concentration measurement, and PCR re-test, while carefully considering the possibility of a false negative. Treatment and follow-up observations are continued with great care.

Tests to check and control the spread of infection (at the Health Administration site): If a person is found to be positive for the PCR test, from 2 days before the symptoms appear until positivity is evident (at the start of isolation), people who were in close contact with that person are identified and PCR-tested to confirm whether they have been infected with the virus from the person that tested positive. This is performed regardless of the presence or absence of symptoms because the aim is to check whether the virus has spread by any close contact, such as having a conversation without a mask. Even if the PCR test results are negative, as there is the possibility of a false negative, there is no proof that the tested person does not have the virus. Therefore, anyone identified as a close contact is instructed to stay at home for 10-14 days from the date of contact.

Efficient identification of virus-infected individuals in high-risk areas (in pandemic sites): Owing to the high incidence of patients, in cities and regions that require immediate detection, treatment, and isolation of infected persons among the population, strategies have been put in place to conduct PCR testing on as many people as possible. It is still fresh in our memories that PCR testing was carried out for all those who wanted it in cities in foreign countries and in the night streets of Tokyo. However, if PCR testing, which is expensive and labor-intensive, is performed where the frequency of occurrence is low, it is a waste of labor and money to detect only a few positive cases and it will put an excessive burden on the site of infection control.

In the current situation, wherein the virus has spread across borders, PCR testing is required at the time of entry in many countries, and upon entry, it is mandatory to quarantine at home for 14 days; Japan is no exception.

(4) Should PCR tests for the novel coronavirus be performed on healthy individuals?

For example, there are people who ask "how about PCR testing for all university students?" Tests targeting healthy groups of university students must be considered after understanding the features of the aforementioned PCR test. Even when performed for a certain group of people, it is not possible to prove that everyone does not have a virus nor does it prove that everyone will not infect people or that a mass infection (cluster) will not occur.

One can find a very small number of infected persons who are asymptomatic. However, if university students are strict about avoiding the 3Cs on a daily basis, it is unlikely that they will acquire the virus unknowingly. A high test fee will have to be paid (not covered by national health insurance) to detect a very small number of virus, resulting in a burden on the testing site. Even if there are infected individuals that are asymptomatic among the students, if all students wear masks, wash their hands, etc. to avoid the 3Cs, there will be no close contact and infection on campus can be prevented. In other words, one can say that continuing to carry out these infection prevention actions is a more effective infection prevention measure than performing PCR testing.

Considering the labor and costs involved in PCR testing, one can realize that testing healthy subjects is not practical from a cost-effectiveness perspective.

(5) Should antibody tests for the novel coronavirus be carried out on healthy subjects?

It is currently possible to measure the level of the IgG antibody against the novel coronavirus in the blood. The level gradually increases in the blood after infection and remains high for a while. Therefore, if the antibody level is measured and the value is high, antibody positivity is judged, and the understanding is that the individual was infected by the novel coronavirus in the past. However, there are still unclear points such as when the infection took place, whether the presence of the antibody implies no future infection, for how long this antibody will remain, etc.

For example, in infectious diseases wherein the nature of the antibody has already been revealed and a vaccine has been established, the antibody titer in the blood is measured. People with insufficient antibody titers can be given additional immunizations

to boost their immunity. If this is performed in a group, group immunity can be acquired, and even if a highly infectious pathogen enters the group, mass infection can be prevented. The Gifu University measure antibody titers for measles, rubella, mumps, and chickenpox for all first-year students. Students with insufficient antibody titers gain lifelong immunity through additional vaccinations and do not have to suffer from such infections. It also helps to prevent mass outbreaks at the Gifu University because mass immunity can be acquired. Every year, all first-year students can check their immunity status, and more than half the students receive additional vaccinations owing to lack of antibodies. We believe that it is cost-effective and useful to conduct antibody tests for measles, rubella, mumps, and chickenpox for all students as it promotes the students' lifelong health as well as the safety and security of the Gifu University.

However, much remains unknown about the antibody test for the novel coronavirus; whether the appropriate antibody can be measured, whether a lifelong immunity can be attained, what the adequate antibody titer is, how the antibody titer changes after infection, etc.

(6) The most effective way to prevent infection on campus is to ensure that students adhere to correct infection prevention practices.

Even a healthy university student can catch a cold or become unwell. Even with minor symptoms, we do not know what kind of pathogen the person has and one cannot say that it is not a novel coronavirus infection. The Gifu University instructs all students to take the correct action of staying at home without attending school if they experience any symptoms and to seek medical help at home or at a medical institution. All faculty members take care not to force or hide their symptoms.

We believe that our students can adhere to correct infection prevention practices based on scientific evidence. The Gifu University pledge to do our best to ensure that our students have sufficient self-health care capabilities.

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