To bring the spread of SARS-CoV-2 infection under control

Proposal of infection prevention measures from a new perspective

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Hiroshi Kase

The number of daily infections of the new coronavirus (COVID-19) in Japan has exceeded 10,000, and the spread of infection is unprecedented and unstoppable. Expectations are high for the effectiveness of vaccination, but the spread of the Delta variant virus has shown the limits of its effectiveness. In order to overcome this serious situation, we will return to the basic issue of "how to prevent infection" and propose measures to fundamentally solve this problem and bring the infection under control.

The decisive factor in controlling infection is to ensure that good ventilation is distributed throughout the area so that there are no holes. If this ventilation is widespread, the SARS-CoV-2 virus will be expelled from the area and disappear, which is an extremely simple but effective measure against the elimination of the virus based on scientific evidence. The scientific basis for this is described below.

Since the new coronavirus is transmitted by three routes: droplet infection, contact infection, and aerosol airborne infection, it is impossible to suppress infection unless all three routes are protected. Currently, there is a big hole in the control of airborne infection *via* aerosols.

Droplets are relatibly large in size (more than 5μm in diameter), which fall quickly because they are heavy. Droplets are almost completely blocked by masks, so if everyone wears masks, droplet infection will disappear. In situations where masks need to be removed, such as at dinners, droplet infection can be avoided by blocking droplets with a face shield or acrylic partition, or by keeping a certain distance.
Contact infection is avoided by encouraging hand washing.
The above infection prevention measures have been implemented in all regions so far, and they have become quite entrenched and widespread throughout the country, and their thoroughness has been repeatedly required

and strengthened every time an infection has spread.

One of the major issues that has been left behind is the prevention of aerosol airborne infection. Aerosols are tiny droplets (less than 5μm in diameter) that are invisible to the eye that float in the air and spread over long distances on the air currents present in the space. In the aerosol released by COVID-19 patients, SARS-CoV-2 retains its ability to multiply for several hours.
Aerosols are "constantly released" by breathing, vocalization, etc., and in the absence of airflow, they stay in the air and are "cumulative and persistent". Aerosols are removed by ventilation, and aerosols that are not removed "enter the body through respiration."

Aerosols are removed and eliminated by ventilation, but due to the peculiar properties described above, good ventilation is essential "at all times", otherwise aerosols will remain and their concentrations enter the danger zone of infection. Even while you sleep, if good ventilation does not remove aerosols, you are at risk of aerosol airborne transmission.
This is the key to understanding aerosol airborne transmission and taking infection control measures.

Masks effectively block aerosols and are effective in preventing infection, but if there is a gap between the face and the mask, aerosols are inhaled through breathing and enter the body, so masks alone cannot be said to completely prevent airborne infection. Even if you are talking while wearing a mask, the risk of infection increases if good ventilation is interrupted even temporarily.

As for the answer to the question "How to prevent the spread of new coronavirus infection", "(1) Prevent all three routes of infection without omission, (2) Of these, the protection of two routes of infection by droplets and contact infection has been quite thoroughly established and spread throughout the region, so it is necessary to maintain and continue these control measures, (3) and the decisive factor for prevention measures is good ventilation at all times should be closely controlled to remove and eliminate aerosols in the area."

If these issues (1)-(3) is "effectively implemented" in the region, the increase

in SARS-CoV-2 will be suppressed, decreased, and disappeared. In other words, the increase in the number of people infected with the virus in the region will be suppressed and decreased, and it will be possible to move toward zero infections.

As an effective implementation method, we propose an "infection prevention project in which local residents participate." It is essential for the project to instill in the community the new concept that "the decisive factor in infection control is to remove and eliminate aerosols by closely managing good ventilation at all times." Specifically, carbon dioxide (CO_2) monitors will be installed in restaurants, amusement facilities, workplaces, nursing care facilities, nursery schools, kindergartens, schools, etc., where people are staying and infections are likely to spread. Carbon dioxide (CO_2) monitors will be installed in these priority areas, where they manage ventilation based on the concept and promote the project. Since the CO2 monitor visualizes the risk of infection as a numerical value (ppm), it is possible for everyone to participate and manage the opening and closing of windows and increase the amount of ventilation, carefully operating good ventilation at all times. "If the risk of infection is higher than the boundary value (1000 ppm), open the window."

For the places where CO_2 monitors are installed and ventilation management is carried out well, it would be effective for the district administration to certify it with stickers. In addition, it will be necessary to look at the results of infection prevention and give them the merit of lifting restrictions on sales and business.

Even in response to the current urgent issue of "mutant virus prevention," the concept of this infection prevention measure does not need to be changed at all. In order to reduce the risk of infection, it is possible to respond to highly infectious mutant viruses by setting the boundary value of the CO_2 monitor as low as 800 ppm.

The introduction of CO_2 monitors is also an upfront investment in the future sanitation and health environment of the region and can be used as a tool for participatory activities of local residents. It is also effective as a

countermeasure against influenza and hay fever.

Let's prevail this infection prevention measure from region to region and throughout the country to stop the spread of infection under control.