Coronavirus SARS-CoV-2

Situation update - What can be done?

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SARS-CoV-2, the virus responsible for COVID-2019 (for Coronavirus disease 2019) is a new coronavirus discovered in the city of Wuhan (Hubei province) in China in December 2019. It is responsible for an epidemic which epicenter is in China. If the majority of cases and deaths are still in mainland China (respectively 80,411 and 3,013 as of March 5, 2020), the dynamic of the epidemic has shifted because for the first time on February 26, 2020, the majority of new cases have been registered outside of China, a country which has seen its number of new cases decreased since February 14, 2020. Three secondary sites of infections are particularly active: South Korea which alone presented on February 27 more new cases than China; Italy, which on March 5, 2020 had a total number of cases 3,089 cases, particularly in three provinces in the north of the country (Lombardy, Veneto, Emilia Romagna) and Iran, where the fatality seems to be particularly high (92 deaths for a total number of cases of 2,922 to March 5, 2020). The total number of cases is 95,748 cases with an overall lethality of 3,286 cases as of March 5, 2020.(https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467)
Note that for many countries (particularly African), the implementation of the detection of this virus remains at a very preliminary stage, partially distorting certain epidemiological data.

Several cases of hospital transmission with health personal have already been described mainly in Wuhan but also in Italy, South Korea, and France.

The situation in Switzerland is 107 positive people on March 5, 2020 and 1 death. These cases observed in almost all the cantons may be mainly linked to contamination originating in northern Italy. This number of cases reported to its population is currently in Switzerland 4 times lower than that observed in Italy but twice higher than that observed in France and Germany.

In humans, six species of coronavirus were previously known: seasonal HCoV, SARS-CoV, MERS-CoV and now SARS-CoV-2 identified as the seventh pathogenic coronavirus for humans. Coronaviruses are enveloped RNA viruses belonging to the family of Coronaviridae, genus betacoronavirus. The animal source of contamination by SARS-CoV-2 seems to be the bat as primary reservoir then transmission to man via the pangolin, scaly Asian mammal of the anteater family, on sale on the Chinese markets including those from Wuhan. Human-to-human transmission occurs via respiratory droplets and also indirectly by contact between inert surface-hands-mucous membranes with a transmission rate of 3 to 4 (1 person may infect 3 to 4 persons). This transmission rate would be 2 times that of seasonal flu.

The development of this new epidemic is largely due to the fact that the human species has no natural or acquired antibodies against this virus. The virus therefore meets individuals "naive" for this virus, who have never produced corresponding antibodies.

The incubation period seems to be 5 days on average (2-12 days), with the epidemic doubling time from 6.4 to 7.5 days. This is why the recommended duration of the quarantine is 14 days.

The period of contagiousness is not yet well defined, but it is not excluded that a person may be contagious in the 24 hours preceding the symptoms. Analysis of the literature reveals the presence of asymptomatic carriers (1.2%). The clinical symptomatology is also variable with, perhaps, on the order of 80% of non-symptomatic forms (as for influenza). The occurrence of non-serious forms such as the presence of upper airway infections (nasopharyngitis, cough), conjunctivitis, flu-like syndrome with headache, myalgia, asthenia and sometimes diarrhea is common. We observe the presence of pauci-symptomatic lower respiratory infections (fever, cough, absence of dyspnea but presence of images compatible with radiological pneumonia) but also the expression of serious forms: hypoxemic pneumonia, respiratory distress syndrome. Total recovery might occur in 98% of the cases.

Cases of recontamination have been reported. This may correspond to varying amounts of virus that make patients undetectable for a period of time, or to weak or non-persistent antibody production allowing for a real recontamination.

This pathology occurs rather in patients over 40 years, 2.4% of cases would occur in patients under 18 years. The sex ratio would be 53% for men and 47% for women.

The lethality rate of infection (number of deaths relative to the number of infected) is difficult to define with certainty; 2-2.5% of cases (China, Italy, South Korea, France). It is estimated that this lethality would be 1% under optimal conditions of care and in the absence of co-morbidities (diabetes, hypertension,
chronic respiratory failure). The sex ratio for this lethality is 2.8% in men and 1.7% in women, as observed in many infectious diseases. This lethality would be 20 to 25 higher than that of seasonal flu (0.1%). This lethality is mainly observed in people over 80 years old (15% of lethality) having associated factors of co-morbidity (diabetes, respiratory failure) Hospitalization in an intensive care unit mainly concerns elderly patients. It is estimated that 7-8% of infected patients will require intensive care, which could cause problems in the availability of intensive care beds in Europe in particular.

Detection and treatment

Molecular detection of this virus is easy. The diagnostic tests used are based on the amplification of nucleic acids (PCR, RT-PCR), those tests being now commercially available. The results are obtained in 2 to 4 h.

The difficulty of the diagnosis lies more in the quality of the samples (nasal and oropharyngeal samples) sometimes difficult to perform. In addition, the amount of virus (viral load) also appears to vary from patient to patient. Therefore, the sensitivity of the diagnostic test would not be excellent (80%?).

The detection and management systems for "suspect patients", "possible cases" and "confirmed cases" have been activated in order to prevent the implantation of the virus on the territory in order to detect and contain possible cases as soon as possible and ensure adequate care for confirmed cases. The whole strategy is to delay the development of the inevitable epidemic, hoping that the virus is seasonal and that the epidemic will decrease with warming of the atmosphere (May, June). In addition to symptomatic management (antipyretic molecules, ultimately hospitalization in medical intensive care unit and mechanical ventilation), certain molecules seem to have some activity, at least in vitro. They are the lopinavir / ritonavir combination already used against HIV, or remdesivir, an antiviral currently in evaluation but without sufficient level of evidence to establish recommendations. In particular, the results of several Chinese studies testing remdesivir in infected patients are expected by the end of April 2020.

To date, however, no antiviral treatment of certain efficacy is available. Vaccine development trials are underway. In the best of cases, such a vaccine would not be available before 8 to 12 months. Such a vaccination strategy would prevent the appearance of an epidemic but also limit the appearance of a new epidemic focus by vaccinating a population around an epidemic focus, thereby rapidly reducing its spread.

Outbreak perspective

Nobody can predict the real dynamics of this epidemic and the number of cases that will be observed in Switzerland. The number of new cases in China appears to have stabilized. On the other hand, it is certain that the number of cases will continue to increase in Europe (including Switzerland) and especially in northern Italy. Will the respiratory virus be seasonal? The seasonality of some respiratory viruses is believed to be due to the fact that the envelope of these viruses stiffens, which facilitates its transmission from person-to-person during the winter months. The SARS-CoV virus (commonly known as SARS) was possibly seasonal, disappearing during one season thanks to extensive investigations and very strict isolation measures. However, MERS-CoV that is also a coronavirus persisted for three years. It is very likely that this pandemic will also affect extensively the North American continent, many cases have been described already in the states of Washington (Seattle) and California that have a large Chinese population. The economic consequences of this epidemic will be very important for China, for Europe, and most certainly for the whole world, greatly reducing the activity of entire sectors of the economy (automobile, tourism, air transportation, etc.).
Prevention

The political recommendations linked to the emergence of this epidemic vary widely from one country to another. There is no specific data on whether or not to ban this or that meeting according to the number of participants. In France for example, gatherings of more than 5,000 persons are now prohibited; in Switzerland this threshold is currently set at 1,000 persons. Italy has decided to close schools and universities until March 15 while in Switzerland, it is considered at the Office of Public Health in Bern that closing schools would on the contrary conduct to put children more in contact with the old people who are preferential targets of this virus. The aim of all of those containment measures is to slow the spread of the epidemic, but at the same time not "disrupting" economic and social activity too much. This balance between limiting the spread of the virus and maintaining the country's economic activity is extremely difficult to find. It evolves day by day according to each local, regional and national situation. Given the evolution of the epidemic in all European countries, these measures to avoid the spread of the virus will become increasingly drastic at least in March and April 2020.

Transmission of this virus is through respiratory droplets (maximum contagiousness within 1 meter (because the droplets are quite heavy!) and secondary contamination of the hands. Its duration of survival on inert surfaces is unknown. Transmission by aerosols is very weak, mainly occurring during aspiration from ventilated intensive care patients. It seems that the virus is no longer infectious after 3 hours, if it is not transmitted from humans to humans.

The coronaviruses are susceptible to the usual virucidal disinfectants such as sodium hypochlorite 0.5%, peracetic acid / hydrogen peroxide, ethanol or isopropanol at 70%, glutaraldehyde ... according to standard EN 14476 if they are used in accordance with the manufacturer's recommendations (compliance with the concentration and contact time).

Wearing a simple surgical mask on the street would do little to prevent infection. This type of mask is used for infected people to prevent a large part of the SARS-Cov-2 they harbor from spreading around.

In front of a contaminated person wearing a mask called FFP2 is the only safe way to prevent contamination. Those masks very difficult to obtain because reserved for health professionals.

Hygiene recommendations

• Hand washing with soap very frequently, use of alcoholic solutions, sneezing in the elbow, use of disposable tissues (in short, follow classic measures in times of epidemics of respiratory and manual transmission virus).
• Stay at home if you are sick.
• Always call before going to the doctor or to the emergency room.
• No hugs, don't shake hands. Avoid physical contact.
• Avoid any feeding using the hands directly because it may increase the risk of bringing hands to mouth and face. Particular attention should be taken for smokers. Avoid bringing hands to face; cut nails short.
• Wash not only hands but face in the evening when you come home, or alternatively by taking a shower. The face is the surface exposed to human-to-human contamination via respiratory droplets.
• Visit the elderly more rarely. Do not kiss them and stay within 3 m of them.
Of note

- Opening packages and envelopes presents no risk; the virus does not persist in an infectious form beyond 3 h on inert surfaces.
- No food (garlic, fennel), or hygiene product (spray, mouthwash) can protect against SARS-CoV-2.
- SARS-CoV-2 does not correspond to a recombinant virus which escaped from a laboratory in Wuhan.
- The clinical efficacy of chloroquine (an antimalarial) has not been proven at all.