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Short Communication

The SARS-CoV-2 epidemic, a school case for public health

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The covid-19 epidemic has evolved differently depending on the responses to it. This heterogeneity and changes in recommendations have blurred the messages facilitating the emergence of fake news and conspiracy theories.

Public health and the liberal state: The american paradox

The biomedical model explains the predominance of the pharmaceutical industry and the low resources allocated to public health research almost exclusively financed by the States. In a 2013 general review of non-pharmacological means of influenza prevention, Killingley and Nguyen-Van-Tam noted that a series of surveys to date have « failed to provide definitive answers and key questions remain. Reasons for this include the fact that many studies have not sought to investigate routes of transmission as a primary objective (instead, they have evaluated specific interventions) and that fieldwork in natural settings, specifically assessing the dynamics and determinants of transmission between humans, has been limited » [1]. During a debriefing of the 2009 influenza epidemic, Professor Delfraissy acknowledged the lack of solid data to understand the course and control of epidemics and the need to develop research in this field [2]. He insisted on the limited budgets of European governments, which probably do not amount to a tenth of that of the USA (France: €12.5M, Germany: €20M, United Kingdom: €15M, USA: $700M). This difference would be even greater if one considered the shares allocated to "basic" research. For influenza, almost all animal models and in vitro models are funded by US federal agencies. They also fund epidemiological research conducted outside the territory of the United States. While the USA is regarded as the model of an ultraliberal society, the funding of research explains this paradoxical situation. Numerous agencies with large budgets of their own and very competent department set priorities, finance laboratories and organise partnerships with industry instead of leaving these choices to industry through tax breaks [3]. This organisation explains the dynamism of the major American universities that benefit also from tax exemptions linked to philanthropy [4]. Although the economic returns on investment are difficult to assess, they are part of American soft power with its international stranglehold on public health which has proved to be dissociated from internal political decisions [5].

The role of previous pandemics

The course of previous viral pandemics has led us to believe that a control would always be possible, leaving sufficient time to get organised: Responses to the last two influenza epidemics of 1976 and 2009 had been disproportionate, leading to severe criticism of political decisions [2,6]. The first had caused few cases and the second few deaths (18,156 deaths in 156 countries). On the other hand, both coronavirus epidemics were quickly brought under control by coercive measures implemented outside Western countries [7,8]. They may explain the differences in initial responses between East and West.

A gap in health surveillance

In France as in Italy, the first cases of Chinese origin did not cause the epidemics. The introduction of the virus was undoubtedly earlier and was only sought after at a time when the virus was already widely present in the population [9,10], explaining the differences observed in April between the west and east of the European continent.

Inappropriate and contradictory messages become incomprehensible

Communication: Key concepts were debated, which delayed the making of "good" decisions. They concerned the

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presence of asymptomatic and presymptomatic forms, aerial transmission, social distancing, and the interest of masks involving the communication of international agencies : « Seriously people-STOP BUYING MASKS! began a 29 February tweet from U.S. Surgeon General Jerome Adams. The World Health Organization and U.S. Centers for Disease Control and Prevention (CDC) have both said that only people with COVID-19 symptoms and those caring for them should wear mask while the director of the Chinese Center for Disease Control and Prevention, disagreed and Health authorities in parts of Asia have encouraged all citizens to wear masks in public to prevent the spread of the virus, regardless of whether they have symptoms » [11]. « Leading health agencies including the World Health Organization and the European Center for Disease Prevention and Control provided contradictory and sometimes misleading advice. A crucial public health discussion devolved into a semantic debate over what to call infected people without clear symptoms. The two-month delay was a product of faulty scientific assumptions, academic rivalries and, perhaps most important, a reluctance to accept that containing the virus would take drastic measures »[12].

What was known?

Pre- and asymptomatic forms were well known. For influenza, the actual number of cases was 20 to 50 times higher than that of clinical surveillance [13]. The difficulty of changing one's beliefs is illustrated by the original 35.5% in-hospital mortality [14] attributed to MARS-CoV, whereas many asymptomatic cases had been discovered [15,16].

The aerial transmission admitted for decades for tuberculosis had been indisputably demonstrated for influenza by the presence of viruses in aerosols produced by patients [17,18] and by animal models [19,20]. Aerial transmission of SARS-CoV-1 was considered probable in 3 clinical studies [21].

Social distancing which was promoted from the beginning of the epidemic had never been evaluated [22]. Evidence of the value of handwashing and mask use was better documented without accurate measurement of their effectiveness due to the insufficient quality of the studies, which never eliminated all confounding variables [1,22]. Wearing a mask reduces the production of viruses. (18) Wearing masks by infected persons provided much greater protection than masks worn by recipients [23]. It limits, without making them disappear, the risks of contamination provided it is worn continuously [23].

What we have learned since ?

A few examples confirm the validity of maximalist measures and of the utility of masks the actual incidence is much higher than tthe symptomatic cases [24], aerosolized fomites are contagious [25,26], Quarantine and stay at home order are effective [27-29], mask could reduce the inoculum and sympoms [30], mask continuous wearing is the most effective prevention [31] even if their are cloth mask [32,33].

Conclusion

Returning to the course of the SARS-CoV-2 epidemic, it is clear that the only truly effective responses were rapid, imposing all possible measures, without questioning their respective effectiveness, at a time when the spread of the virus was still limited. Delays in diagnosing the epidemic, discordant positions of the experts, lack of masks and belief that radical measures could not be accepted have led to a preference for prevention measures whose effectiveness was least proven (hand washing, social distance). Mistaken messages, the content of which it is difficult to know if they were linked to insufficient knowledge of the experts or to their belief in the population's inability to understand and/or apply them, have undermined confidence and favoured fake news, preparing the way for the curent resumption of the epidemic.

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