Editorial

The Novel Coronavirus (SARS-CoV-2) Epidemic

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Introduction

The SARS-CoV-2 epidemic began in early December in Wuhan, China's 7th most populous city, and was reported to the World Health Organization (WHO) on 31 December 2019.[1] An outbreak of unknown etiology was suspected because many of the initial cases were linked to a large live animal market rather misleadingly named Huanan Seafood Market, and the causative agent was identified as a novel coronavirus on 7 January 2020.[1,2] On 11 February 2020, official names for the virus (SARS-CoV-2) and the disease (COVID-19) were announced by the International Committee on Taxonomy of Viruses and WHO respectively.[3]

On 23 January 2020, in view of the exponential rise of cases in Wuhan and the export of the virus to almost every province in China as a result of the annual Spring Festival Migration, a quarantine of greater Wuhan was initiated,[4] which extended to the rest of Hubei and other cities in China over the next couple of weeks—successive public health interventions of unprecedented scale.[5,6] Although these measures considerably reduced the further spread of SARS-CoV-2 to the rest of the world, it was clear that significant exportation had already occurred by then.

The first confirmed case of COVID-19 outside China was a Wuhan resident who was diagnosed on 13 January 2020 in Bangkok, Thailand.[1] Other Asian countries reported cases in short order over the next two weeks.[1] As of 2 March 2020, 67 territories outside mainland China had reported 8,565 confirmed cases of COVID-19 with 132 deaths, as well as significant community transmission occurring in several Asian countries including Iran and Italy.[7]

The Virus

A novel coronavirus was identified from the initial patients in China. Its genetic sequence is closely related to bat betacoronaviruses (96% homology), while among the coronaviruses capable of infecting humans, the 2003 SARS-CoV came closest (approximately 79% homology).[2] Using published viral genomes (currently 119), scientists at the open source project Nextstrain have estimated that SARS-CoV-2 probably jumped into humans as a single introduction (or less likely a small number of introductions) between November and early December 2019.[8] The secondary animal host that resulted in the outbreak in China has not been identified to date.

SARS-CoV-2 is substantively different from SARS-CoV and MERS-CoV in terms of human infections. Unlike the other two, SARS-CoV-2 is well capable of sustained community transmission, with each case estimated to infect another 2 to 3 uninfected persons on average.[9] Its infection fatality rate (IFR)—used in place of case fatality ratio because it is believed that a significant proportion of infected persons are not diagnosed—is also much lower (SARS had a case fatality rate of 9.6%), and is currently estimated at between 0.3% to 1.0%.[10]

The clinical presentation in confirmed cases is virtually indistinguishable from that of an upper respiratory tract infection (URTI) within the first few days, progressing to severe and critical disease in just under 20% and 5% respectively of all diagnosed cases in a huge Chinese cohort.[6] No effective definitive treatment has been identified to date, although a large number of clinical trials on multiple antiviral drugs and traditional Chinese medications have been launched, mostly in China.

In brief, SARS-CoV-2 has the transmissibility and lethality of a particularly virulent pandemic influenza virus, matched only by the 1918 virus, which had an estimated case fatality rate that exceeded 1%.[11] Unlike influenza however, SARS-CoV-2 has to date caused relatively mild disease in infants and young children.[6]

SARS-CoV-2 in Singapore

The first case of COVID-19 in Singapore was a Wuhan tourist, diagnosed on 23 January. Singapore instituted a series of public health measures rapidly, including

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aggressive contact tracing, quarantine of contacts, travel restrictions and advisories, compulsory leave of absence for workers returning from China, as well as ramping up case detection and infection prevention measures at its clinics and hospitals.[12] All clinics and hospitals have had to re-configure quickly for temperature and visitor screening, as well as requisition adequate supplies of masks and other personal protective equipment (PPE). This had affected the primary health sector the most, as the majority of general practitioner clinics were not designed for such functions.

These measures collectively contained but have to date been insufficient for eliminating sustained community transmission of SARS-CoV-2. Since 7 February, the country has been in Disease Outbreak Response System Condition (DORSCON – a colour-coded national framework mapped to the disease situation in Singapore) Orange, the second highest alert level signifying that SARS-CoV-2 has not spread widely in Singapore and is still being contained.[13]

As of 2 March, there were 106 confirmed cases including a handful that still cannot be linked to others.[14] These were largely isolated as inpatients at the purpose built National Centre for Infectious Diseases (NCID), although all public sector acute hospitals have had to manage at least one confirmed and many suspected COVID-19 cases to date.

In fact, given the difficulty in distinguishing suspect COVID-19 cases from routine URTIs and pneumonias, particularly as local transmission occurred and global epidemiology changed, NCID and the public hospitals became at risk of being overwhelmed by the number of patients with URTI or pneumonia sent for screening by primary care physicians who did not wish to miss a case of COVID-19 and employers who had many employees from SARS-CoV-2-affected countries. This was mitigated by MOH activating its Public Health Preparedness Clinic (PHPC) scheme—first established during the 2009 influenza pandemic—on 14 February that helped to divert community patients with URTI to any of the 878 clinics that could provide subsidized treatment as well as up to 5 days of medical leave. This last in particular reduced the case load to the hospitals and NCID, as its implicit message to primary care physicians was that it was alright to miss a mild case of COVID-19.

Future Scenarios

Although WHO had deliberately not labelled SARS-CoV-2 as a pandemic on 28 February and stressed that containment was still possible,[15] this view is not universally shared. In any case, it will become increasingly difficult for Singapore—a global travel hub—to block cross-border transmissions as SARS-CoV spreads in more countries which in turn serve as a foci for spread. Singapore's current local containment efforts also come at considerable cost not just to healthcare system, but also to the economy.[16] If the SARS-CoV-2 epidemic does get contained globally, it will be a process that will take several months rather than weeks. If not, then the primary hope is that an effective vaccine will be developed and launched, which will take more than 1.5 years even if the first batch of candidate vaccines are successful.

One of the key points of both containment and mitigation is to prevent the healthcare system from being overwhelmed, as happened in Wuhan, which will lead to increased mortality and morbidity not just from COVID-19, but also from all other diseases. The current projected IFR is too high to contemplate letting the virus spread freely through the population like other respiratory viruses and past influenza pandemics.[17] Public health interventions directed towards social distancing, improving hygienic practices, and countering "misinfodemics" will continue to be a priority, potentially also reducing the spread of influenza and other respiratory viruses. These interventions will need to be balanced with carrying on with life as normally as possible for the broader society. One possible "new normal" for society could be more telecommuting and online learning, recognising though this will not be possible for everyone. We must ensure here that vulnerable groups in our workforce and schools are not disadvantaged in these new ways of interacting through measures such as subsidising the technologies needed. Singapore is also a major global professional services hub and MICE (Meetings, Incentives, Conferences and Exhibitions) destination and we will need to create novel ways of convening meetings large and small to sustain our economy.

In the meantime, it is difficult to contemplate standing down from existing measures in the clinics and hospitals. SARS-CoV-2 is capable of causing severe disease in the young and healthy, with critical illness and deaths reported among healthcare workers in China as a consequence of nosocomial transmission.[6,9] Two difficult interventions may be key in easing the strain on healthcare workers and facilities if this becomes a full-blown pandemic. The easier intervention lies in expanding capacity for rapid diagnostic testing in primary care—be it in the form of easy to use point-of-care tests for clinics or centralized laboratory testing. This is important for the identifying cases early, empowering primary care physicians and limiting onward transmission.

The more difficult of the two—but given especial impetus by this epidemic—is to re-think and re-structure how healthcare should be delivered for non-communicable diseases with minimal contact with healthcare facilities, perhaps even beyond an expansion of telemedicine and homecare services. This may require a fundamental rework of healthcare financing, and is philosophically a

de-centralization and reversal of current models where staffing, expertise and equipment are concentrated for efficiency. This will likely be beyond the span of the SARS-CoV-2 epidemic, but will nonetheless stand us in good stead for the future.

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