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# Health Policy and Technology

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## A new pandemic out of China: the Wuhan 2019-nCoV coronavirus syndrome



Each of the first two decades of the new millennium has seen international concerns about viral pandemic zoonoses. Major examples originating as diseases of animal origin include with bats as the primary host, SARS (Severe Acute Respiratory Syndrome) in the early 2000s [1], MERS (Middle East Respiratory Syndrome) and Ebola in the early to mid-2010s [3], and the Zika virus in the mid-2000s and the mid-2010s with mosquitoes as vectors [4]. Now the start of the 2020s has been marked by a new viral respiratory pandemic out of China: Wuhan novel coronavirus (2019-nCoV) disease, a respiratory illness not previously reported in humans [5].

The respiratory coronavirus (CoV) causing SARS originated in China and ran from November 2001 to July 2003, with civet cats living in bat caves not identified as an intermediate host until 2017 [1]. The reported international incidence of SARS was 8422 cases with a mortality rate of 11%, higher in patients aged 65 years or older [1]. Since 2004, no known cases of SARS have been reported.

The coronavirus causing MERS (Middle East Respiratory Syndrome) was first reported in Saudi Arabia in 2012, with camels as an intermediate host [2]. Mass migration of pilgrims to and from Mecca contributed to the spread of the infection. There have been at least 2260 reported cases of confirmed MERS-CoV infection and at least 803 related deaths [2]. Most patients with clinical features of MERS-CoV infection have had chronic co-morbidities [2]. Unlike SARS, MERS remains a serious infectious disease, with cases in at least 27 countries – i.e., it has progressed from an epidemic to an endemic disease [2].

The outbreak of the Ebola hemorrhagic fever epidemic in West Africa lasted over 2 years from 2014 to 2016, ending with over 28,600 cases and 11,325 deaths [3]. Primates and the dik-dik antelope were the intermediate hosts, entering the human food chain as bush meat. Ebola is highly contagious and needs effective isolation of patients, barrier protection for medical staff and access to sophisticated medical facilities. A new outbreak in 2018 of Ebola in the Democratic Republic of Congo is continuing, its control much more difficult as cases are occurring in a war zone [6].

The Zika RNA flavivirus (ZIKV) is a member of the same arbovirus family as dengue (DENV), West Nile, yellow fever, and Japanese encephalitis viruses and is transmitted by the mosquito [4]. The Zika virus story illustrates the potential for evolving risks from other viral pathogens. Initial strains of the virus affecting non-human primates were detected in Uganda in 1947 and the first human case was reported in 1962. The Zika virus then evolved by 1966 as a strain that had spread to Asia and was transmissible by human-adapted *Aedes* mosquitoes, with however few human

cases recognized until 2007 [4]. The epidemiology of the virus then changed, with outbreaks of infection in the Pacific in 2007 and in 2013–2014, followed by epidemic spread in 2015–2016 in the Americas, the Caribbean and Africa. Clinical effects of the Zika virus can be insidious [4]. Acute infections may have minimal symptoms however the Zika virus has been implicated in causing auto-immune disease, including the serious neurological disorder Guillain-Barré Syndrome, and in pregnancy Zika can cause the serious birth defect microcephaly [4]. Up to January 2018, over 3700 cases of ZIKV infection-associated congenital birth defects had been reported in the Americas [4]. The Zika epidemic shows the ability of a virus to evolve, to spread through human travel and vector mobility, and be efficiently transmitted within new regions among susceptible populations that have not been previously exposed [4]. No outbreaks of Zika infection are currently flagged by the US Centers for Disease Control and Prevention [7].

What do we know about the new 2019-nCoV coronavirus syndrome [5]? At the end of December 2019, the Chinese authorities reported a new respiratory flu-like syndrome originating in Wuhan, a city in Central China with around 11 million inhabitants. Complications in the initial 41 patients reported from Wuhan up to 2nd January 2020 included acute respiratory distress syndrome, acute cardiac injury and secondary infection [5]. A third of these patients were admitted to an Intensive Care Unit (ICU); these patients had higher levels of inflammatory cytokines than those not admitted to ICU [5]. Following a serious delay by Chinese authorities in reporting and action in the first two weeks of the month, by the 28th January there had been over 4500 cases reported of Wuhan 2019-nCoV disease and 100 deaths [8]. By then, cases of 2019-nCoV infection had been reported in a further 15 countries, including elsewhere in Southeast Asia, Australia, Europe and North America. Cases of person-to-person transmission have been reported, including in Germany, in a UK citizen visiting Singapore, possible materno-foetal transmission, and in 61 of 3700 passengers in a cruise ship quarantined off Yokohama, Japan. The initial doubling interval appears around 5 days, with on 7th February the European Centre for Disease Prevention and Control (ECDC) reporting an increase to 31,503 laboratory-confirmed cases (31,217 in China) and 638 deaths, all but one in China. Up to the time of this editorial there have now been reports of 286 cases in 25 further countries and territories [9]. Mortality is reportedly highest in frail patients, however there have already been reports of 2019-nCoV attributed deaths in health professionals in China [5], including Dr Li

Wenliang, the 34 year old Chinese ophthalmologist who was the first to alert his medical colleagues to the outbreak of this new coronavirus syndrome [10].

Appropriate health policy requires bold, timely and effective actions. These would be expected to include preparedness of equipment, staff and facilities based on learning from previous epidemics, clear public health information, relevant containment, surveillance, and reporting, and international cooperation among governments, health authorities, travel organisations and border control forces. This includes the need for the WHO and the international community to provide financial and health professional resources to middle and low income countries for detecting, treating and controlling spread of the disease. There were two particular initial and ongoing concerns for public health authorities about Wuhan 2019-nCoV. Firstly, the epidemic began at a time of major international migration of more than one billion Chinese to mark celebrations of the Lunar New Year. Secondly, affected individuals are infective before symptoms appear [5].

Diagnostic tests for 2019-nCoV are already available internationally. As a marker of global forward planning, the International Severe Acute Respiratory and Emerging Infection Consortium has prepared standard forms and these were used to record data in the Lancet report on initially affected patients [5]. The ECDC and the WHO Regional Office for Europe are coordinating the rapid reporting of data [9]. Public health measures in place in China since late January include bans on travel from the city of Wuhan, with overall 15 cities – a population of 57 million – under full or partial travel lockdown [11], major sporting events cancelled and gatherings banned, including for weddings and birthdays, and limits on how many family members can leave home each day. On 28th January 2020, Hong Kong announced closure of many border crossings with mainland China [8]. USA, Japan, Russia and Australia and many other countries have now closed their borders to arrivals from China. Checks are now in place at many international airports for symptoms and fever in travelers from China, with international 14 day quarantine for travellers at risk. With remarkable speed, new 1000 bed containment hospital for suspected coronavirus cases was built and opened in Wuhan on 3rd February and a further new 1500 bed hospital is under construction.

Whether these and other measures are sufficient responses to the Wuhan coronavirus will soon be apparent. In particular, we have yet to see whether international lessons on pandemic preparedness have been learned from the experience of earlier coronavirus and other viral epidemics. Containment and good medical care, including access to high dependency and intensive care support, are the only measures currently available against Wuhan 2019-nCoV. There are already concerns about shortages of high dependency medical beds, medical equipment and the barrier clothing needed to treat patients safely and effectively. Controlling the animal hosts is not yet an option: animal origins for the Wuhan coronavirus are yet to be established and it took 15 years to do so for the SARS CoV [1]. It is worth noting that 18 and 6 years respectively since their reported emergence, no specific drug treatment or vaccines are yet available for the SARS and MERS coronaviruses. A further important concern is the major downturn

in the Chinese and global economy resulting from measures being taken in China and around the world to try to contain the spread of Wuhan 2019-nCoV.

Future issues of the journal will include expert reports and commentaries from health policy and health technology perspectives on evolution of the 2019-nCoV pandemic. The journal would also welcome submissions of commentaries and other papers on the implications for health policy and health technology of the Wuhan 2019-nCoV and other epidemics.

### Author Statements

The author has no conflict of interest to declare. He is President of the Fellowship of Postgraduate Medicine for which Health Policy and Technology is an official journal.

### Acknowledgments

During 2014 the author was a physician and pharmacologist in Rwanda within the US AID and US CDC Human Resources for Health Program.

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