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Letter to the Editor

Preparedness and proactive infection control measures against the emerging novel coronavirus in China



Sir,

In response to the official announcement of a cluster of pneumonia of unknown aetiology with an epidemiological link to a wet market in Wuhan, China on 31 December 2019 [1], we present our proactive infection control measures for immediate prevention against hospital outbreaks due to such imported cases into Hong Kong. Hong Kong is a cosmopolitan city in south China with a unique history of confirming the first case of human infection due to avian influenza A H5N1 in 1997 [2] and severe acute respiratory syndrome (SARS)-associated coronavirus (CoV) in 2003 [3]. Patients with H5N1 and SARS-CoV initially presented with either community- or hospital-acquired pneumonia of unknown aetiology, and did not respond to broad-spectrum antimicrobial therapy with typical and atypical coverage. Epidemiological exposure to wet markets with contact with poultry and civet, respectively, was subsequently recognized as a risk factor for acquisition of novel pathogens [3]. Based on our previous experiences with novel respiratory infections, we recognize the utmost importance of infection control preparedness in our healthcare system. Our preparedness levels includes alert, serious level 1, serious level 2 and emergency; the level of activation is determined according to a risk assessment. Infection control measures and administrative support are enhanced with reference to the different levels of preparedness. With this infrastructure, we overcame the challenge of pandemic influenza A in 2009 [4,5] and the emergence of avian influenza A H7N9 in 2013 [6,7].

To prepare for this emerging infectious disease, fever screening has been set up at the airport and high-speed rail station, focusing particularly on flights and trains from Wuhan. Travellers with fever $\geq 38^{\circ}\text{C}$ are referred to public hospitals for assessment. In the public hospital system, the key measures include a surveillance system to identify suspected cases for early isolation in an airborne infection isolation room (AIIR). Standard, contact, droplet and airborne precautions are implemented during patient care practices for the suspected cases, before the mode of transmission is known. The surveillance definition comprises clinical criteria (any patient with fever and acute respiratory illness, or pneumonia) plus a travel

history to Wuhan in the 14 days before onset of symptoms, irrespective of any wet market exposure. For the purpose of surveillance, triage stations have been set up in the accident and emergency departments (AEDs) and outpatient clinics, where personal protective equipment (PPE) includes surgical mask, face shield or equivalent, and gown as minimum. Patients fulfilling the clinical and epidemiological criteria are isolated immediately in an AIIR for further assessment. Face-to-face right-on-time education has been provided for front-line healthcare workers in the AEDs, acute medical wards, isolation wards, intensive care units, general wards, ambulatory day centres, physiotherapy, occupational therapy and pharmacy. In addition, open staff forums were provided during the first week of preparedness in the hospitals. During the training sessions, staff were reminded to be alert to the identification of suspected cases, and to use infection control measures by wearing an N95 respirator, face shield or equivalent, gloves and gown when performing aerosol-generating procedures on all patients in both AIIRs and general wards, in case suspected patients had been missed by the surveillance system. In addition, the opportunity was taken to remind staff of the administrative support of the hospital preparedness plan for emerging infectious diseases, including waste and linen management, environmental cleaning and supply of PPE.

Before identification of the aetiological agent, the diagnostic strategy includes a two-tier approach. The first tier is to screen the upper respiratory specimen (nasopharyngeal aspirates or nasopharyngeal flocked swab) by Biofire (FilmArray Respiratory Panel 2), which is a molecular diagnostic test to detect 17 respiratory viruses and four bacteria in 1 h. The second tier is to investigate the FilmArray RP2-negative specimen for pan-CoV polymerase chain reaction (PCR) [8] with modification in order to detect 23 CoVs known to be present in humans, animals and bats within 24 h. Pan-CoV PCR-negative specimens would be further investigated by performing Nanopore sequencing to identify the novel agent. Within the first 10 days of surveillance and this testing strategy, 55 patients fulfilling the surveillance criteria were admitted to hospitals in Hong Kong; none have tested positive for the novel agent to date.

A novel CoV was identified in patients with pneumonia in Wuhan within 1 month of outbreak. This was faster than the time required to identify SARS-CoV (Table 1) [3]. The viral genome (GenBank Accession No. MN908947) has the highest similarity (89%) to a SARS-related member of the Sarbecoviruses (MG772933), a subgenus within the Betacoronavirus genus. However, the transmissibility, morbidity and mortality of this novel CoV remain unresolved. Without the availability of effective antiviral therapy and vaccine, we have to be vigilant

Table I

Comparison of public health response and discovery of aetiological agent between severe acute respiratory syndrome (SARS)-associated coronavirus (CoV) and a novel CoV in China

	SARS-CoV	Novel CoV
Date of first reported case (retrospective analysis)	16 November 2002 [3]	8 December 2019 ^a
Location of first reported case	Foshan, Guangdong Province, China [3]	Wuhan, Hubei Province, China ^a
Date of first report on social media	End of December 2002	30 December 2019 ^b
Date of first release by health official in China	11 February 2003 ^c	31 December 2019 ^{d,e}
Date of first official response from Department of Health, HKSAR	11 February 2003 ^f	31 December 2019 ^g
Date of discovery of novel agent	21 March 2003 [3]	9 January 2020 ^h
Location of discovery of novel agent	Hong Kong [3]	China ^{h,i}
Time from first reported case to official report of outbreak (days)	87	23
Time from first reported case to discovery of novel agent (days)	125	32

HKSAR, Hong Kong Special Administrative Region, China.

^a <https://www.ecdc.europa.eu/en/news-events/update-cluster-pneumonia-cases-associated-novel-coronavirus-wuhan-china-2019> [last accessed January 2020].

^b <https://www.japantimes.co.jp/news/2019/12/31/asia-pacific/science-health-asia-pacific/outbreak-sars-like-pneumonia-investigated-china/> [last accessed January 2020].

^c World Health Organization receives reports from the Chinese Ministry of Health of an outbreak of acute respiratory syndrome with 300 cases and five deaths in Guangdong Province. Available at: https://www.who.int/csr/don/2003_07_04/en/ [last accessed January 2020].

^d <https://www.who.int/csr/don/05-january-2020-pneumonia-of-unknown-cause-china/en/> [last accessed January 2020].

^e <http://wjw.wuhan.gov.cn/front/web/showDetail/2019123108989> [last accessed January 2020].

^f https://www.dh.gov.hk/english/press/2003/03_02_11.html [last accessed January 2020].

^g <https://www.info.gov.hk/gia/general/201912/31/P2019123100667.htm> [last accessed January 2020].

^h <https://www.sciencemag.org/news/2020/01/mystery-virus-found-wuhan-resembles-bat-viruses-not-sars-chinese-scientist-says> [last accessed January 2020].

ⁱ <https://www.sciencemag.org/news/2020/01/chinese-researchers-reveal-draft-genome-virus-implicated-wuhan-pneumonia-outbreak> [last accessed January 2020].

in enforcing infection control preparedness and measures to prevent importation of index patients and minimize the risk of nosocomial transmission.

Conflict of interest statement

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V.C.C. Cheng^{a,b}

S.-C. Wong^b

K.K.W. To^c

P.L. Ho^c

K.-Y. Yuen^{c,*}

^aDepartment of Microbiology, Queen Mary Hospital, Hong Kong Special Administrative Region, China

^bInfection Control Team, Queen Mary Hospital, Hong Kong West Cluster, Hong Kong Special Administrative Region, China

^cDepartment of Microbiology, The University of Hong Kong, Hong Kong Special Administrative Region, China

* Corresponding author. Address: Department of Microbiology, The University of Hong Kong, Hong Kong Special Administrative Region, China. Tel.: +852 22553214; fax: +852 28724555. E-mail address: kyyuen@hku.hk (K.-Y. Yuen)

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