

# Novel Coronavirus disease 2019 (COVID-19): The importance of recognising possible early ocular manifestation and using protective eyewear

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On 31 December 2019, China notified WHO of a pneumonia outbreak of then unknown aetiology in Wuhan,<sup>1</sup> a city of 11 million people in Hubei province. The seafood market which was thought to be the source was closed on 1 January 2020.<sup>2</sup> The causative organism was identified on 7 January 2020 as a novel coronavirus (nCoV). The genetic sequence of at least 19 strains found in infected patients has been published so far.<sup>3,4</sup> To date, COVID-19 has already confirmed to have affected almost >68,000 with >1600 deaths in China, and over 680 cases outside of China spanning 25 countries over South East Asia, Europe, North America, Australia and the Middle East, etc. This number is expected to rise over the next few months worldwide. So far, 41 million from China and at least 14 cities in the Hubei province have travel restrictions, some with suspension of outbound flights and trains as well as other public transport, and many countries are taking measures to quarantine travellers from China.

Comparisons are being made with severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), also both caused by coronaviruses. SARS emerged in 2003 and caused the first pandemic of the 21st century, affecting more than 8000 people, killing 774 in 26 countries.<sup>5</sup> MERS coronavirus

(MERS-CoV) was isolated in 2012<sup>6</sup> and has seen over 2400 cases reported to WHO to date, and over 850 deaths.<sup>7</sup> Of the 2223 laboratory-confirmed MERS-CoV cases reported to WHO, 415 were healthcare workers, representing over one-third of all secondary transmission.<sup>8</sup> SARS and MERS spread principally by direct transmission and respiratory droplets.<sup>9,10</sup> However, SARS-CoV, and perhaps also MERS-CoV, may shed and be transferred to environmental surfaces, and thence contaminate hands and mucous membranes subsequently.<sup>10</sup>

Ocular involvement has not been described with either MERS-CoV or SARS-CoV<sup>11–13</sup> although polymerase chain reaction on tears from patients with SARS-CoV infection demonstrated presence of the virus.<sup>14</sup> There is also evidence that some coronavirus can occasionally cause conjunctivitis in humans. In fact, human coronavirus NL 63 (HCoV-NL63) was first identified in a baby with bronchiolitis and conjunctivitis.<sup>15</sup> Subsequent in 28 cases of children with confirmed HCoV-NL63 infections, 17% had conjunctivitis.<sup>16</sup>

There is now growing evidence that human-to-human transmission is occurring among close contacts, and reports that >1,700 healthcare professionals having been infected with 6 deaths including one ophthalmologist.<sup>17–19</sup> Of the affected healthcare workers, one was part of the expert task force who visited Wuhan, and he has reflected on his experience of the disease. Despite being fully gowned with protective suit and N95 respirator, he was still infected by the virus with the first symptom being unilateral conjunctivitis, followed by development of fever a few hours later.<sup>13</sup> Since his report, healthcare professionals in China have been urged to use eye protection when they are in close contact with patients.

The route of transmission of COVID-19 is not yet fully elucidated but is thought to be mainly respiratory,<sup>20</sup> and evidence thus far suggests human transmission, with the potential for efficient human transmission.<sup>2</sup> WHO provides guidance on personal protection equipment in infection prevention and control when COVID-19 is suspected. Eye protection (goggles) or facial protection (face mask) should be worn, and healthcare workers are advised against touching any mucosal membranes (eyes, nose or mouth).<sup>20,21</sup> Infected patients should be isolated in a timely manner, with avoidance of any unnecessary direct contact.

Although in the initial clinical reports of almost 150 patients<sup>2,18,22</sup> conjunctivitis has not been reported as a clinical feature, it cannot be excluded, in particular as we know that another coronavirus is infrequently recognised to cause conjunctivitis.<sup>15</sup> Given that these patients may present to the hospital with viral conjunctivitis, it is important for the emergency physicians and eyecare professionals to inquire about travel history, systemic flu-like symptoms and family history. The usual measures that apply to prevention of infection transmission, in particular thorough handwashing, should apply.

Until we learn more, it is prudent to avoid touching the eyes where possible in at risk locations, in particular for healthcare workers in the hospital environment. This may be particularly applicable in China and much of East and South East Asia where myopia is so prevalent.<sup>23</sup> Many of the frontline healthcare workers will wear glasses or contact lenses and touching the eyes or near the eyes will frequently be habitual. It is encouraging to note that all healthcare workers who worked in a room with patients infected with MERS, or with the patients' bodily fluids in one small study, who were fully compliant with all protective wear including eye protection, showed no serum evidence of MERS-CoV antibodies.<sup>24</sup>

At this time of limited information, we will need to stay highly vigilant to recognise early manifestation of COVID-19 including consideration of viral conjunctivitis as a possible presentation. Healthcare professionals should take the full recommended measures including strict hand hygiene and protecting the exposed mucous membranes, including wearing goggles or face masks.<sup>25</sup> It would be prudent to question patients directly if they had any symptoms and signs of conjunctivitis prior respiratory and other systemic symptoms to help further our understanding of the natural history of

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the disease. Ophthalmologists should take particular care when examining patients, because of both the proximity to patients' nose and mouth, and the potential exposure to tears which may contain the virus. Research into if COVID-19 can be found in tears and conjunctival scrapings would be valuable and inform ongoing disease-prevention strategies.

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**REFERENCES**

- 1 World Health Organization. *Pneumonia of unknown cause – China*. 2020.
- 2 Huang C, Wang Y, Li X, *et al.* Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020. doi:10.1016/S0140-6736(20)30183-5. [Epub ahead of print: 24 Jan 2020].
- 3 Callaway E, Cyranoski D. New China virus: five questions scientists are asking. *Nature News*. 2020. 2020.
- 4 WHO. Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases – interim guidance. 2020; 2020.
- 5 Peiris JSM, Yuen KY, Osterhaus ADME, *et al.* The severe acute respiratory syndrome. *N Engl J Med* 2003;**349**:2431–41.
- 6 Zaki AM, van Boheemen S, Bestebroer TM, *et al.* Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. *N Engl J Med* 2012;**367**:1814–20.
- 7 Killerby ME, Biggs HM, Midgley CM, *et al.* Middle East respiratory syndrome coronavirus transmission. *Emerg Infect Dis* 2020;**26**:191–8.
- 8 Elkholy AA, Grant R, Assiri A, *et al.* MERS-CoV infection among healthcare workers and risk factors for death: retrospective analysis of all laboratory-confirmed cases reported to WHO from 2012 to 2 June 2018. *J Infect Public Health* 2019. doi:10.1016/j.jiph.2019.04.011. [Epub ahead of print: 2 May 2019].
- 9 Holmes KV. SARS-associated coronavirus. *N Engl J Med* 2003;**348**:1948–51.
- 10 Otter JA, Donskey C, Yezli S, *et al.* Transmission of SARS and MERS coronaviruses and influenza virus in healthcare settings: the possible role of dry surface contamination. *J Hosp Infect* 2016;**92**:235–50.
- 11 Belser JA, Rota PA, Tumpey TM. Ocular tropism of respiratory viruses. *Microbiol Mol Biol Rev* 2013;**77**:144–56.
- 12 Arabi YM, Balkhy HH, Hayden FG, *et al.* Middle East respiratory syndrome. *N Engl J Med* 2017;**376**:584–94.
- 13 Yuen KSC, Chan W-M, Fan DSP, *et al.* Ocular screening in severe acute respiratory syndrome. *Am J Ophthalmol* 2004;**137**:773–4.
- 14 Loon S-C, Teoh SCB, Oon LLE, *et al.* The severe acute respiratory syndrome coronavirus in tears. *Br J Ophthalmol* 2004;**88**:861–3.
- 15 van der Hoek L, Pyrc K, Jebbink MF, *et al.* Identification of a new human coronavirus. *Nat Med* 2004;**10**:368–73.
- 16 Vabret A, Mourez T, Dina J, *et al.* Human coronavirus NL63, France. *Emerg Infect Dis* 2005;**11**:1225–9.
- 17 Imai N, Dorigatti I, Cori A, *et al.* Report 2: estimating the potential total number of novel coronavirus cases in Wuhan City, China. Imperial College London, 2020.
- 18 Chan JF-W, Yuan S, Kok K-H, *et al.* A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet* 2020. doi:10.1016/S0140-6736(20)30154-9. [Epub ahead of print: 24 Jan 2020].
- 19 Li Q, Guan X, Wu P, *et al.* Early transmission dynamics in Wuhan, China, of novel Coronavirus-Infected pneumonia. *N Engl J Med* 2020.
- 20 World Health Organization. *Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases - Interim guidance*, 2020.
- 21 World Health Organization. *Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected. Interim guidance*, 2020.
- 22 Chen N, Zhou M, Dong X, *et al.* Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The Lancet* 2020.
- 23 Morgan IG, French AN, Ashby RS, *et al.* The epidemics of myopia: aetiology and prevention. *Prog Retin Eye Res* 2018;**62**:134–49.
- 24 Wiboonchutikul S, Manosuthi W, Likanonsakul S, *et al.* Lack of transmission among healthcare workers in contact with a case of Middle East respiratory syndrome coronavirus infection in Thailand. *Antimicrob Resist Infect Control* 2016;**5**:21.
- 25 Chan W-M, Liu DTL, Chan PKS, *et al.* Precautions in ophthalmic practice in a hospital with a major acute SARS outbreak: an experience from Hong Kong. *Eye* 2006;**20**:283–9.