

An outbreak of COVID-19 caused by a new coronavirus: what we know so far

Information on COVID-19 and its impact is being updated constantly and Australia must continue to be prepared at all levels of the health care system

An outbreak of a novel coronavirus, formally named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and causing coronavirus disease 2019 (COVID-19), emerged in the city of Wuhan in Hubei province in central China in December 2019. The first cases were noted as a cluster of patients with pneumonia who were all linked to a live animal market, and testing found the presence of a previously unknown coronavirus. Coronaviruses are a group of viruses that affect both animals and humans, and several (OC43, 229E, HKU1 and NL63) are a cause of the common cold.^{1,2} However, two coronaviruses previously caused significant outbreaks associated with more severe disease: the SARS coronavirus in 2002–2003 and the Middle East respiratory syndrome coronavirus that emerged in 2012.^{1,2} In contrast to previous outbreaks, the rapid sharing of viral sequences enabled laboratories worldwide to develop diagnostic tests within weeks of discovery of the pathogen.³ An Australian laboratory subsequently isolated the virus from a clinical sample (the first to do so outside of China), and rapidly shared this virus with relevant global agencies, further aiding diagnostic, therapeutic and vaccine development efforts.



outbreaks in Asia, the hardest hit countries currently are the United States and in Europe. There is great concern about low and middle income countries with limited diagnostic and public health capacity. The public health, political and societal ramifications have been considerable, with disruptive interventions that would have been unthinkable even a few months ago. Ultimately, a vaccine will be required; at the time of writing, 60 vaccine candidates have been developed, including three entering human trials (https://vac-lshtm.shinyapps.io/ncov_vaccine_landscape/).

For clinicians, the main considerations are the clinical management of patients with suspected COVID-19 but also systems to facilitate the identification of potential cases and to permit safe assessment and referral as appropriate. The experience with SARS and Middle East respiratory syndrome also reinforces the need for health services (both internationally and within Australia) to promptly identify patients with suspected infection and implement effective infection control measures, including adequate protection of health care workers. Based on clinical features, it can be difficult to distinguish patients with COVID-19 from those with other respiratory viral infections, including influenza. Although the original case series described fever in almost all patients,⁷ further experience has noted cases with only respiratory symptoms, and even a small proportion with gastrointestinal symptoms.⁶ This has resulted in constant changes to case definitions, initially limited to febrile respiratory infections in travellers, but now including the full spectrum of illness in patients with broader epidemiological risk factors. Clinicians should refer to current information to guide testing and management (Box 1).

Nucleic acid assays for SARS-CoV-2 are available at all Australian reference laboratories and commercial tests are now available in diagnostic laboratories. Compared with other countries, Australia has now performed a proportionately large amount of testing per capita.¹⁸ However, the sheer scale of testing has placed extraordinary pressure on supply chains for essential components required for laboratory testing,

Information on the new virus and its impact is being updated constantly. While ascertainment of the milder end of the disease spectrum varies between countries,⁴ the age-specific severity profile appears to be relatively consistent.⁵ Age is clearly an important risk factor — there have been few severe cases reported in children, and a high case fatality risk in the elderly. However, it is not clear whether comorbidities reflect the age group affected or whether they are risk factors for severe disease.^{6,7}

Early studies using data before the institution of public health interventions in China suggest that SARS-CoV-2 is as transmissible as SARS coronavirus and probably more transmissible than influenza viruses.^{8,9} Emerging data suggest that viral load is highest around the onset of illness in milder cases, and transmission may occur during this pre-symptomatic period.^{10–12} Careful analysis of early data suggests that the mean incubation period is 6 days, with a range of up to 14 days.¹³ There have been a considerable number of large clusters associated with large events, including religious communities, weddings, business meetings, closed communities, dormitories and cruise ships.^{14–17} The importance of infection control is also reinforced by a report that 41% of cases in Wuhan were acquired nosocomially (including 40 health care workers and 17 patients).⁶

Since the World Health Organization was first notified of this new pathogen, more than 2 million cases and over 130 000 deaths have been reported globally. On 16 April 2020, there were 6462 confirmed cases of COVID-19 in Australia, including 63 deaths. After early

Allen C
Cheng^{1,2} 

Deborah A
Williamson^{3,4} 

¹ Infection Prevention and Healthcare Epidemiology Unit, Alfred Health, Melbourne, VIC.

² Monash University, Melbourne, VIC.

³ Microbiological Diagnostic Unit Public Health Laboratory, University of Melbourne, Melbourne, VIC.

⁴ Peter Doherty Institute for Infection and Immunity, Melbourne, VIC.

allen.cheng@monash.edu

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[Corrections added on 16 April 2020 after first online publication: throughout the article, changes have been made to update for recent developments. The original version of this article with mark-up changes can be found in the [Supporting Information](#).]

Updated podcast
with Allen Cheng and
Deborah Williamson
available at mja.com.au/podcasts

1 Useful sources of official information*

Australian information

- Australian Government Department of Health: <https://www.health.gov.au/health-topics/novel-coronavirus>
- Smart Traveller: <https://www.smarttraveller.gov.au/>
- Jurisdictional health department sites: New South Wales: <https://www.health.nsw.gov.au/Infectious/diseases/Pages/coronavirus.aspx>; Victoria: <https://www.dhhs.vic.gov.au/coronavirus>; Australian Capital Territory: <https://www.health.act.gov.au/health-professionals/chief-health-officer-alerts>; Tasmania: <https://www.coronavirus.tas.gov.au/>; South Australia: <https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/clinical+resources/clinical+topics/infectious+disease+control/novel+coronavirus+%282019-ncov%29+infection+for+health+professionals/novel+coronavirus+%282019-ncov%29+infection+information+for+health+professionals>; Western Australia: https://ww2.health.wa.gov.au/Articles/A_E/Coronavirus; Northern Territory: <https://coronavirus.nt.gov.au/>; Queensland: <https://www.qld.gov.au/health/conditions/health-alerts/coronavirus-covid-19>

International situation reports and resources

- World Health Organization: <https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/>
- United States Centers for Disease Control and Prevention: <https://www.cdc.gov/coronavirus/2019-ncov/index.html>
- European Centre for Disease Prevention and Control: <https://www.ecdc.europa.eu/en/coronavirus>

* Websites viewed April 2020.

both in Australia and globally. Current World Health Organization advice is to test patients who meet the case definition for COVID-19, regardless of whether another respiratory virus is detected, as co-infections may occur.¹⁹ In recent weeks, surveillance for COVID-19 has expanded to include a much broader range of risk factors to ensure capture of community transmissions. The role of serological assays (particularly point-of-care testing) in the overall public health response to COVID-19 has yet to be defined, although peak bodies such as the Royal College of Pathologists note that there is no role for point-of-care assays in the diagnosis of acute COVID-19.²⁰

Lessons of the past are instructive for Australia, particularly the experience in Canada with its similar federated government and comparable health care system. In 2003, an outbreak of SARS coronavirus in Toronto infected 438 people and caused 44 deaths, including many health care workers. Following this public health disaster, two important reviews were conducted: the National Advisory Committee on SARS and Public Health,²¹ and Ontario's SARS Commission.²² The former reinforced the need for a strong and adequately funded nationally coordinated public health and laboratory system and led to the establishment of the Public Health Agency of Canada.

The SARS Commission made detailed recommendations, including endorsing the "importance of the precautionary principle that reasonable efforts to reduce risk need not await scientific proof [which] was demonstrated over and over during SARS".²² It made recommendations regarding clear governance, preparing for the need for unexpected interventions (including the closure of three hospitals to control the outbreak), effective distribution

2 Major unresolved clinical and public health issues

Clinical

- Optimal samples for diagnostic testing (upper versus lower respiratory tract samples)
- Utility of existing and investigational antiviral agents and other treatments
- Host risk factors associated with poor clinical outcomes

Public health and control

- The long term public health strategy for control to minimise morbidity and mortality, but taking into account broader impacts of health, the economy and society
- The optimal mix of case finding and isolation, contact tracing and quarantine, social distancing and personal hygiene
- Optimal, yet pragmatic, infection control measures to prevent infections in health care facilities and residential aged care facilities

of outbreak alerts and directives, the need for effective crisis communication, and the value of robust and timely surveillance. With the involvement of health care workers as cases, the Commission highlighted the need to listen to frontline workers and unions and ensure a robust safety culture and effective infection control.

We have many more information (and misinformation) sharing tools than were available in 2003. It has been breathtaking to watch the scientific process unfold in almost real time. Rapid genomic sequencing and online databases are being used to generate and analyse primary data. Preprint servers and rapid review in traditional journals are quickly publishing research findings. Research centres and platforms are responding to rapidly collect data and evaluate interventions. Social media and traditional media platforms are disseminating public health messages and findings.

However, the fundamental structure of our public health care system remains unchanged, with the same channels of formal communication and direction through jurisdictions and national networks. A future review should consider whether surveillance and response for all infectious disease threats could be better coordinated by a centralised national agency. There are still many major unresolved clinical and public health issues (Box 2). Clear communication to the public and to clinicians has been difficult, particularly with constantly changing epidemiology and evidence. Australia was not significantly challenged by the two previous zoonotic coronavirus outbreaks, but this global crisis has now significantly disrupted the lives of all Australians. With thousands of cases reported in Australia, public health authorities, governments at all levels, researchers and clinicians, laboratories and the community need to continue to work together in a timely and transparent manner to ensure an effective response.

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Supporting Information

Additional Supporting Information is included with the online version of this article.

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