



Australian  
National  
University

## COVID-19 RESPONSES AMONG COUNTRIES WITH HIGH TRANSMISSION

Tatum Street  
Eden Barrett  
Sydney Jantos

ANU College of Health and Medicine COVID-19 Evidence Team

Suggested Citation: Street, T, Barrett, E, and Jantos, S., (13 March 2020). *COVID-19 responses among countries with high transmission*. ANU College of Health and Medicine COVID-19 Evidence Team, Canberra, Australia.

Correspondence to:  
Tatum Street  
Tatum.Street@anu.edu.au

*Aim: to identify the responses of countries that have had significant transmission of COVID-19 and to find data on the following:*

- *Number of cases, population, cases tracked over XX time period*
- *What they did (response and containment)*
- *What happened to the case numbers following response measures*
- *Testing: how did they test, who did they test?*
- *Quarantining/isolation: how did they determine who needed to be quarantined/isolated, how did they do it?*
- *Social distancing measures: what measures were implemented?*
- *Demographic information – specifically age*

## **Sources**

**Sohrabi et al 2020.** World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19)

- Methods of containment in China: the epicentre in Wuhan is comprised of an urban area spanning 1,528 km<sup>2</sup> and exceeds 11 million residents. This area was quarantined on 23rd January 2020. Subsequent viral spread led to the imposition of a cordon sanitaire, restricting movement across Hubei Province in 16 cities, affecting 50 million people [42]. All forms of public transportation including long-distance bus routes, metros, express railways, and aviation were sealed off. To halt further viral spread, a ¥1 billion fund from China's Finance Ministry was used to facilitate the construction of two new hospitals in under two weeks in Wuhan.

**Lin et al 2020.** A conceptual model for the coronavirus disease 2019 (COVID-19) outbreak in Wuhan, China with individual reaction and governmental action

- Propose conceptual models for the COVID-19 outbreak in Wuhan with the consideration of individual behavioural reaction and governmental actions, e.g., holiday extension, travel restriction, hospitalisation and quarantine.
- Provides a timeline of COVID-19 and control measures implemented in Wuhan from Dec 2019 to Feb 2020 (events and control measures)
- Captures the course of the COVID-19 outbreak and sheds light on understanding the trends of the outbreak

**Sibylle et al 2020.** First cases of coronavirus disease 2019 (COVID-19) in France: surveillance, investigations and control measures, January 2020.

- Strengthened surveillance was implemented in France on 10 January 2020 in order to identify imported cases early and prevent secondary transmission. Three categories of risk exposure and follow-up procedure were defined for contacts.

- Includes Table of Definitions of a contact and follow-up procedure by level of risk of infection, COVID-19, France, January 2020
- Describes the surveillance method and implementation in detail:
  - Physicians suspecting a COVID-19 case have to contact immediately either the emergency hotline (SAMU-Centre 15), if the patient is seeking medical attention from a general practitioner, or a referring infectious diseases specialist at hospital level. Together, they evaluate whether the patient matches the case definition criteria for a possible case (see below). If they do, the case has to be reported immediately through a 24/7 available phone line to the Regional Health, which informs without delay the hospital infection control teams involved in the management of the patient, the French Public Health Agency and the Ministry of Health.
  - A standardised investigation form collecting socio-demographical information, clinical details and history of exposure (history of travel to or residence in Wuhan, China or contact with a confirmed case) is completed for each possible case at regional level, in collaboration between the clinicians, the ARS and SpFrance. Data are entered into the secure web-based application Voozanoo (Epiconcept, Paris).
  - Possible cases have to be hospitalised, isolated and cared for in one of the 38 French referral hospitals designated by the Ministry of Health, according to the guidelines for the management of patients with Middle East respiratory syndrome (MERS)
  - For each possible case, respiratory samples from the upper respiratory tract (nasopharyngeal swabs or aspirates) and when possible from the lower respiratory tract (bronchoalveolar lavage fluid, when indicated, or induced sputum) are collected and sent to one of the laboratories accredited to perform SARS- CoV-2-specific real-time RT-PCR.
- Provides a Timeline of travel, onset of illness and close contacts of confirmed cases of COVID-19, France, January 2020
- Details France's contact tracing methods
- Findings: Rapid and effective collaboration between the clinicians (general practitioners attending the cases, emergency hotline clinicians (SAMU-centre 15) and infectious diseases specialists), the National Reference Centre and the regional and national health authorities has played a crucial role in the system's capacity to quickly detect, isolate and investigate those cases in order to implement adequate control measures.

**Cheng et al 2020.** Escalating infection control response to the rapidly evolving epidemiology of the Coronavirus disease 2019 (COVID-19) due to SARS-CoV-2 in Hong Kong.

- Up to 10 February 2020 (day 42 after official announcement of a cluster of pneumonia of unknown etiology in Wuhan, Hubei Province), a total of 1275 patients fulfilled the clinical and epidemiological criteria for active and enhanced surveillance upon presentation to our public hospitals, of which 42 (3.3%) of 1275 patients confirmed to be a case of SARS-CoV-2 in Hong Kong. The first patient was confirmed on 21 January 2020 (day 22). From day 22 to day 32, only 1 (7.7%) of 13 confirmed cases was locally acquired. The number of locally acquired case significantly increased to 27 (93.1%) of 29 confirmed case from day 33 to day 42 ( $p < 0.001$ , Fisher's Exact test). There were 8 family cluster involving 28 patients. One (2.4%) patient died and 4 (9.5%) patients remained in critical condition requiring mechanical ventilation as at day 42.

- Upon epidemiological investigation of 42 confirmed cases, 36 patients were directly admitted to AIIR, while 6 patients were initially cared in the non-AIIR facilities. 413 HCWs caring these patients before confirmation of SARS-CoV-2, eleven (2.7%) HCWs were found to be close contact with unprotected exposure requiring quarantine for 14 days. None of them was infected with SARS-CoV-2 by the end of the quarantine. Nosocomial transmission was not observed in the hospitalized patients.
- With reference to experience in the outbreak of SARS-CoV, almost 60% of nosocomial acquisition of SARS-CoV was HCWs
- In Hong Kong, as a cosmopolitan city of 1,104 square-kilometers with a population of 7.45 million in Southern China, we are at a high risk of importation of infected case from mainland China. Therefore, we had progressively stepped up our infection control measures by widening the clinical and epidemiological criteria of surveillance for early recognition and isolation of index case according to the evolving of epidemic.
- Also enhanced the infection control measures by implementation of standard, contact, droplets, and airborne precautions for suspected or confirmed cases. Stepped up the use of PPE among HCWs in performing aerosol generating procedures (AGPs) even though for caring patients without clinical features and epidemiological exposure risk in the general wards.
- Surgical mask to all HCWs, patients, and visitors in clinical areas was implemented since day 5.
- zero nosocomial transmission of SARS-CoV-2 since the importation of first confirmed case since day 22 in Hong Kong.
- Transmission within family remained a concern as 66% of confirmed cases diagnosed in Hong Kong were spread within their family members.

**Hellewell et al (Lancet) 2020.** Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts

- Authors employ a mathematical model to assess if isolation and contact tracing are able to control onwards transmission from imported cases of COVID-19.
- Findings: In most scenarios, highly effective contact tracing and case isolation is enough to control a new outbreak of COVID-19 within 3 months. The probability of control decreases with long delays from symptom onset to isolation, fewer cases ascertained by contact tracing, and increasing transmission before symptoms
- Using the current best understanding, around 80% of symptomatic contacts must be traced and isolated to control over 80% of outbreaks in the model.
- Effective contact tracing and isolation could contribute to reducing the overall size of an outbreak or bringing it under control over a longer time period.

**C.-C. Lai, T.-P. Shih and W.-C. Ko et al. 2020.**

- Overview of trends

**A. Wilder-Smith and D.O. Freedman 2020.** Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak

- China's response: Within weeks China implemented all the tools ranging from case detection with immediate isolation, and contact tracing with quarantining and medical observation of all contacts. By 2 February 2020, 14600 cases had been confirmed, and >20 000 cases were classified as suspect cases waiting for laboratory results, 113 579 close contacts were been tracked and 4201 people were released from medical observation. A total of 102 427 people were receiving medical observation.
- Community containment with social distancing, community-use of facemasks at all times and the city of Wuhan with 11 million residents was locked-in with the shutdown of the city's public transportation, including buses, trains, ferries and the airport.
- Prior to the lock-down in Wuhan, about 5 million (many of whom were already infected) left Wuhan thus contributing to further spread. As the community-based outbreak spread, lock-down was extended to >60 million residents in >20 cities by 30 January 2020. China has issued the largest quarantine in history.

**Lionel Tim-Ee Cheng et al. Déjà Vu or Jamais Vu? How the Severe Acute Respiratory Syndrome Experience Influenced a Singapore Radiology Department's Response to the Coronavirus Disease (COVID-19) Epidemic. American Journal of Roentgenology 0 0:0, 1-5**

- Actions of a radiology dep at a tertiary hospital in Singapore
- Response included rapid dissemination of information
- Use of off-site imaging facilities

**Dalton CB et al. Pre-emptive low cost social distancing and enhanced hygiene implemented before local COVID-19 transmission could decrease the number and severity of cases.**

- China has constrained transmission through containment and mitigation strategies
- Use of social distancing and hygiene enhancement
- Early measures that lower number of contacts could have a multiplier effect leading to less cases
- social distancing and hygiene enhancement are low cost

**COVID-19 National Emergency Response Center, Epidemiology & Case Management Team, Korea Centers for Disease Control & Prevention. Early Epidemiological and Clinical Characteristics of 28 Cases of Coronavirus Disease in South Korea. In Osong Public Health and Research Perspectives.**

- To date all cases in S Korea are second-generation cases
- S Korea quickly implemented a screening program at airports
- Believe dissemination of epidemiological and clinical data is key to prevent further transmission

**COVID-19 National Emergency Response Center, Epidemiology & Case Management Team, Korea Centers for Disease Control & Prevention. Contact Transmission of COVID-19 in South Korea: Novel Investigation Techniques for Tracing Contacts. In Osong Public Health and Research Perspectives.**

- South Korea focussing on improving methods of contact tracing
- Is using methods of verifying patient’s contact history (GPS, CCTV, credit card history)
- Improving privacy protocol for contact tracing as well

**Sources on Testing**

Reference	Author, journal	Key points
Technical guidance for laboratory testing of 2019-nCoV infection (third addition)	Bureau of Disease Prevention and Control, National Health Commission of Peoples Republic of China Biosafety and Health	<p><a href="https://www.sciencedirect.com/science/article/pii/S259005362030015X?via%3Dihub">https://www.sciencedirect.com/science/article/pii/S259005362030015X?via%3Dihub</a></p> <p><b>WHO?</b></p> <ul style="list-style-type: none"> <li>• Technicians engaged in specimen collection shall be trained and qualified in biosafety and possess experience in the collection and detection of pathogens</li> <li>• PPE shall include: N95 mask/respiratory protection, goggles, double latex gloves, protective suit, waterproof boots</li> <li>• Specimens collected from hospital inpatients shall be collected with qualified hospital medical staff</li> <li>• Specimens from close-contact persons shall be collected from the local disease control centre or medical institutions</li> </ul> <p><b>TYPES?</b></p> <ul style="list-style-type: none"> <li>• Upper and lower respiratory tract specimens should be collected simultaneously, however priority given to lower RT specimens including bronchial fluid and alveolar lavage fluid</li> <li>• Upper: pharyngeal swabs, nasal swabs, nasopharyngeal extracts.</li> <li>• Lower: sputum from deep coughs, respiratory tract extracts, bronchial lavage fluid, pulmonary alveolus lavage fluid, and pulmonary tissue biopsy specimens.</li> <li>• Depending on research requirements, blood, serum and conjunctival specimens may be required too</li> <li>• Guidelines also detail <b>METHODS</b> for pharyngeal swab, nasal swab, nasopharyngeal or respiratory tract extract, deep cough sputum, bronchial lavage fluid, pulmonary alveolus lavage fluid, blood, serum, stool and conjunctival specimens.</li> <li>• Specimen preservation, submission, and transport provided</li> </ul> <p><b>TESTING</b></p> <ul style="list-style-type: none"> <li>• Standardisation of RT-PCR methods</li> <li>• No Ct or Ct=40: Negative, Ct &lt; 37: Positive, Ct 37-40 repeat test.</li> <li>• A Ct value between 37 and 40 is indeterminate. It is recommended that the experiment be repeated. If, when repeated, the Ct value is &lt;37, the specimen is positive, otherwise, it is negative.</li> <li>• Negative results do not rule out infection. False negatives can be caused by the poor quality of specimens, such as respiratory tract specimens collected from the oropharynx; collection that is too early or late in the progression of the disease; specimens that have not been properly stored, transported, or processed; technical factors, including virus mutation and PCR inhibition.</li> </ul>

<p>Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Persons Under Investigation (PUIs) for Coronavirus Disease 2019 (COVID-19)</p>	<p>CDC</p>	<p><a href="https://www.cdc.gov/coronavirus/2019-ncov/lab/guidelines-clinical-specimens.html">https://www.cdc.gov/coronavirus/2019-ncov/lab/guidelines-clinical-specimens.html</a></p> <ul style="list-style-type: none"> <li>• For initial diagnostic testing for COVID-19, CDC recommends collecting and testing upper respiratory (nasopharyngeal AND oropharyngeal swabs), and lower respiratory (sputum, if possible) for those patients with productive coughs. Induction of sputum is not recommended.</li> <li>• Specimens should be collected as soon as possible once a PUI is identified, regardless of the time of symptom onset.</li> <li>• When collecting diagnostic respiratory specimens (e.g., nasopharyngeal swab) from a possible COVID-19 patient, the following should occur: HCP in the room should wear an N-95 or higher-level respirator (or facemask if a respirator is not available), eye protection, gloves, and a gown. The number of HCP present during the procedure should be limited to only those essential for patient care and procedure support. Visitors should not be present for specimen collection. Specimen collection should be performed in a normal examination room with the door closed. Clean and disinfect procedure room surfaces promptly as described in the section on environmental infection control below.</li> <li>• If aerosol generating procedures are performed: HCP in the room should wear an N95 or higher-level respirator, eye protection, gloves, and a gown. The number of HCP present during the procedure should be limited to only those essential for patient care and procedure support. Visitors should not be present for the procedure. AGPs should ideally take place in an AIIR. Clean and disinfect procedure room surfaces promptly as described in the section on environmental infection control below.</li> <li>•</li> </ul>
--	------------	--

**Other resources:**

The BMJ has released a Coronavirus disease 2019 (covid-19): a guide for UK GPs:

<https://www-bmj-com.virtual.anu.edu.au/content/368/bmj.m800>

- Covers all aspects of clinical care
- Also provides more general information that could be used for general public
- Some good visuals

Table summary of articles

Country/region	Source	Article summary	Population/case data	Response measures	Quarantine/Isolation measures	Social distancing measures	Testing
China (Hubei Province)	Sohrabi, C., et al. (2020). "World Health Organization declares global emergency: A review of the 2019 coronavirus (COVID-19) outbreak." <u>International Journal of Surgery</u> <b>76</b> : 71-76.	Overall review of global responses, more focus on China	Wuhan epicentre: an urban area spanning 1,528 km <sup>2</sup> and exceeding 11 million residents.	Wide quarantine measures Restricting public transport ¥1 billion fund to facilitate the construction of two new hospitals in under two weeks in Wuhan.	This area was quarantined on 23rd January 2020. Subsequent viral spread led to the imposition of a cordon sanitaire, restricting movement across Hubei Province in 16 cities, affecting 50 million people [42].	All forms of public transportation including long-distance bus routes, metros, express railways, and aviation were sealed off.	
Global/China	Lin, Q., et al. (2020). "Conceptual model for the COVID-19 outbreak in Wuhan, China with individual reaction and governmental action." <u>International Journal of Infectious Diseases</u> <b>95</b> : 216.	Propose conceptual models for the COVID-19 outbreak in Wuhan considering individual behavioural reaction and governmental actions, e.g., holiday extension, travel restriction, hospitalisation and quarantine.	Captures the course of the COVID-19 outbreak and sheds light on understanding the trends of the outbreak	Provide a timeline of COVID-19 and control measures implemented in Wuhan from Dec 2019 to Feb 2020 (events and control measures)			
France	Bernard Stoecklin, S. (2020). "First cases of coronavirus disease 2019 (COVID-19) in France: surveillance, investigation and control measures." <u>Euro</u>	Describes France's surveillance and contact tracing methods and implementation in detail	Provides a Timeline of travel, onset of illness and close contacts of confirmed cases of COVID-19, France, January 2020	Strengthened surveillance was implemented in France on 10 January 2020 in order to identify imported cases			

	surveillance : bulletin Europeen sur les mal transmissibles = Euro communicable diseas bulletin 25(6): 20000			early and prevent secondary transmission.  Includes Table of Definitions of a contact and follow- up procedure by level of risk of infection, COVID- 19, France, January 2020			
Cheng, V. C. C., et al . Escalating infection control response to the rapidly evolving epidemiology of the Coronavirus disease 2019 (COVID-19) due to SARS-CoV-2 in Hong Kong.	Hong Kong		zero nosocomial transmission of SARS-CoV-2 since the importation of first confirmed case since day 22 in Hong Kong. Transmission within family remained a concern as 66% of confirmed cases diagnosed in Hong Kong were spread within their family members.	Stepped up infection control measures by widening the clinical and epidemiological criteria of surveillance for early recognition and isolation of index case according to the evolving of epidemic.  enhanced the infection control measures by implementation of standard, contact, droplets, and airborne precautions for			

				<p>suspected or confirmed cases.</p> <p>Stepped up the use of PPE among HCWs in performing aerosol generating procedures (AGPs) even though for caring patients without clinical features and epidemiological exposure risk in the general wards.</p>			
<p><b>A. Wilder-Smith and D.O. Freedman 2020.</b> Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak</p>	China		<p>By 2 February 2020, 14600 cases had been confirmed, and &gt;20 000 cases were classified as suspect cases waiting for laboratory results, 113 579 close contacts were been tracked and 4201 people were released from medical observation. A total of 102 427 people were receiving medical observation.</p>	<p>Within weeks China implemented all the tools ranging from case detection with immediate isolation, and contact tracing with quarantining and medical observation of all contacts.</p>	<p>As the community-based outbreak spread, lock-down was extended to &gt;60 million residents in &gt;20 cities by 30 January 2020. China has issued the largest quarantine in history.</p>	<p>Community containment with social distancing, community-use of facemasks at all times and the city of Wuhan with 11 million residents was locked-in with the shutdown of the city's public transportation, including buses, trains, ferries and the airport.</p>	