Key Takeaways

- Estimates of $R_0$, incubation period, and illness duration are still inconsistent as researchers rely on a range of case reporting sources. Even so, some patterns are beginning to emerge and may be worth noting, with caution. Current research suggests:
  - $R_0$ of up to around 4, with variation by community characteristics.
  - Incubation period of 1-11 days with an average of 4-6.
  - Roughly 14 days on average between illness onset and death among fatal cases.
- One study found that patients who died tended to align with the MuLBSTA score for predicting mortality in viral pneumonia and often died of multiple organ failure.
- Germany has reported what may be the first *known* case of asymptomatic person-to-person transmission of the virus.

Transmission

- Limited information is available about potential person-to-person transmission in Germany. A person who had not travelled to China was diagnosed with 2019-nCoV after attending a company training with a colleague from China. The Chinese colleague had recently been visited by family who came from Wuhan. It appears that transmission between the traveler and the German national occurred while the traveler was still asymptomatic.
  

Modelling and Prediction

- Using daily case reports from China CDC, researchers estimate the effective reproductive number ($R$, not $R_0$) for 2019-nCoV. $R$ is the number of secondary cases expected for each infectious case once an epidemic is already underway.
  - $R$ is estimated as 4.08, compared to SARS-CoV in Beijing (2.76) and Guangzhou (3.01).
- They also predict the future outbreak profile, and in doing so evidence suggests that human-to-human transmission likely began before 12/16/2020, contradicting current estimates.
- Case fatality is estimated to reach 6.5%, compared to SARS-CoV in Beijing (7.66%) and Guangzhou (3.61%).
  
  *Cao et al. (Jan 29, 2020).* This modeling study indicates that 2019-nCoV has a higher 2 effective reproduction number than SARS with a comparable fatality rate. Pre-Print. http://dx.doi.org/10.1101/2020.01.27.20018952

- Using publicly available case data in official reports from government institutes, researchers used modelling techniques to estimate:
  - Incubation period of 2-9 days with a median incubation period of 4-5 days.
  - Median time from illness onset to hospitalization = 3 days
  - Recommended length of isolation and quarantine should be at least 9 days.
  - Median time delay of 13.8 days from illness onset to death should be used for estimating case fatality risk.

- Researchers modeled confirmed cases of 2019-nCoV in mainland China from Jan 10-Jan 24. They estimated an R₀ of 2.24-3.35.


- Researchers provide demographic characteristics, exposure history, and epidemic for 425 laboratory-confirmed cases of 2019-nCoV reported prior to Jan 22, 2020 divided over three time periods: cases with illness onset prior to Jan 1, onset Jan 1-Jan 11, and onset Jan 12 or after.
  - Patients with earlier onset were more likely to report exposure to the Huanan Seafood Wholesale Market.
  - Mean incubation period estimated to be 5.2 days (95% CI: 4.1-7.0).
  - R₀ was estimated at 2.2 (95% CI: 1.4-3.9).
  - There was some variation in time between illness onset and first clinical visit and hospitalization across the three time periods.
- Findings support a 14-day observation period for exposed persons.

Li et al. (Jan 29, 2020). Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia. NEJM. DOI: 10.1056/NEJMoa2001316

- Based on travel history and symptom onset of 34 confirmed cases detected outside of Wuhan during Jan 20-23, researchers estimated a mean incubation period of 5.8 days (95% CI, 4.6-7.9) with a range of 1.3-11.3 days. These cases were likely infected in Wuhan.
- Details for modeling the incubation period are included as well as a table comparing mean incubation period estimates across studies of 2019-nCoV, SARS-CoV, and MERS-CoV.

Backer et al. (Jan 28, 2020). The incubation period of 2019-nCoV infections among travelers from Wuhan, China. Pre-Print. http://dx.doi.org/10.1101/2020.01.27.20018986

Origins, Reservoir, and Virus Background

- Samples from nine patients, eight with Wuhan travel history, were evaluated. Genome sequence identity between patients was 99.98%. 2019-nCoV had 88% sequence identity (similarity) with two SARS-like coronaviruses with bat origin but was less similar to SARS-CoV (79%) and MERS-CoV (50%). Receptor-binding domain structure was similar to SARS-CoV.
- In line with other studies, the virus appears to be within the subgenus Sarbecovirus of genus Betacoronavirus.
- While bats are identified as the likely origin, evidence points to a potential intermediary host sold at the Wuhan seafood market.


- Researchers in Greece aimed to characterize genetic relationships and to identify the presumed recombination within the sarbecovirus subgenus. Similar to other studies, they found around
96% similarity between 2019-nCoV and BatCoV RaTG13, associated with bats from Yunnan Province. Results indicate that this virus is not the result of a recent recombination event.

- Results still point to bats as the likely origin.


Clinical Characteristics

- All 99 cases identified from Jan 1 – Jan 20, 2020 at a single Wuhan hospital confirmed by RT-PCR are described. Patients who died aligned with the MuLBSTA score for predicting mortality in viral pneumonia.
  - 49% had exposure to the Huanan seafood market
  - 51% had chronic diseases
  - Clinical manifestations: fever (83%), cough (82%), shortness of breath (31%), muscle ache (11%) and confusion, headache, sore throat, rhinorrhea, chest pain, diarrhea, and nausea/vomiting all less than 10%.
  - 75% had bilateral pneumonia, 14% had multiple mottling and ground glass opacity, one patient had pneumothorax.
  - 17 patients (17%) developed acute respiratory distress syndrome.
    - 11 of these died of multiple organ failure.

International, Federal, and State Guidelines and Advice

1) 1/29/2020: Advice on the Use of Masks the Community, During Home Care and in Health Care Settings in the Context of the Novel Coronavirus (2019-nCoV) Outbreak – WHO


4) 1/26/2020: Outbreak of Acute Respiratory Syndrome Associated With a Novel Coronavirus, China: First Cases Imported in the EU/EEA; Second Update; Rapid Risk Assessment – ECDC


8) 1/25/2020: Hospital Preparedness Checklist for Suspected or Confirmed 2019-nCoV Patients – CDC


10) 1/23/2020: Novel Coronavirus Information Sheet for Emergency Departments – AUSTRALIA

11) 1/23/2020: Novel Coronavirus Information Sheet for Primary and Community Health Workers - AUSTRALIA

12) 1/22/2020: Outbreak of Acute Respiratory Syndrome Associated with a Novel Coronavirus, Wuhan, China: First Update; Rapid Risk Assessment - ECDC

13) 1/21/2020: 2019 Novel Coronavirus, Wuhan, China – CDC


15) 1/21/2015: Coronaviruses: SARS, MERS, and 2019-nCoV - JOHNS HOPKINS

16) 1/20/2020: Home Care for Patients with Suspected Novel Coronavirus (nCoV) Infection Presenting with Mild Symptoms and Management of Contacts: Interim Guidance - WHO


23) 1/17/2020: *Cluster of Pneumonia Cases Caused by a Novel Coronavirus, Wuhan, China: Rapid Risk Assessment* – ECDC


26) 1/2020: *Risk Assessment Guidelines for Infectious Diseases Transmitted on Aircraft (RAGIDA): Middle East Respiratory Syndrome Coronavirus (MERS-CoV); Technical Report* – ECDC