2019-nCoV Literature Situation Report (Lit Rep)
January 29, 2020

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 <u>up to</u> 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*.

    Available from:

    https://www.dw.com/en/germany-confirms-human-transmission-of-coronavirus/a-52169007

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.

Linton et al. (Jan 29, 2020). Epidemiological characteristics of novel coronavirus infection: A statistical analysis of publicly available case data. Pre-Print. http://dx.doi.org/10.1101/2020.01.26.20018754

- Researchers modeled confirmed cases of 2019-nCoV in mainland China from Jan 10-Jan 24. They estimated an R_0 of 2.24-3.35.

  Zhao et al. (Jan 29, 2020). Preliminary estimation of the basic reproduction number of novel coronavirus (2019-nCoV) in China, from 2019 to 2020: A data-driven analysis in the early phase of the outbreak. Pre-Print. https://doi.org/10.1101/2020.01.23.916395

- 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).
  - R_0 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 https://www.nejm.org/doi/full/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.

  Lu et al. (Jan 29, 2020). Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. The Lancet. https://doi.org/10.1016/S0140-6736(20)30251-8

- 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.

    Paraskevis et al (Jan 27, 2020). Full-genome evolutionary analysis of the novel corona virus (2019-nCoV) rejects the hypothesis of emergence as a result of a recent recombination event. Pre-Print. https://doi.org/10.1101/2020.01.26.920249

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.
    o 49% had exposure to the Huanan seafood market
    o 51% had chronic diseases
    o 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%.
    o 75% had bilateral pneumonia, 14% had multiple mottling and ground glass opacity, one patient had pneumothorax.
    o 17 patients (17%) developed acute respiratory distress syndrome.

        ▪ 11 of these died of multiple organ failure.

    Chen et al. (Jan 29, 2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. The Lancet. https://marlin-prod.literatumonline.com/pb-assets/Lancet/pdfs/S0140673620302117.pdf

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

2) 1/28/2020: [CDNA (Communicable Diseases Network Australia) National Guidelines for Public Health Units: Novel Coronavirus (*2019-nCoV*)](#) – AUSTRALIA

3) 1/26/2020: [Risk Communication and Community Engagement (RCCE) Readiness and Response to the *2019* Novel Coronavirus (*2019-nCoV*): Interim Guidance V2](#) – 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

5) 1/26/2020: [PHLN (Public Health Laboratory Network) Guidance on Laboratory Testing for *2019-nCoV*](#) - AUSTRALIA

6) 1/25/2020: [Household Transmission Investigation Protocol for *2019*-Novel Coronavirus (*2019-nCoV*) Infection](#) - WHO

7) 1/25/2020: [Healthcare Professional Preparedness Checklist For Transport and Arrival of Patients Potentially Infected with *2019-nCoV*](#) – CDC

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

9) 1/23/2020: [Statement on the Meeting of the International Health Regulations (2005) Emergency Committee Regarding the Outbreak of Novel Coronavirus (*2019-nCoV*)](#) – WHO

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

14) 1/21/2020: [Global Surveillance for Human Infection with Novel Coronavirus (*2019-nCoV*): Interim Guidance](#) - WHO

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

17) 1/18/2020: *2019* Novel Coronavirus, Wuhan, China: Interim Healthcare Infection Prevention and Control Recommendations for Patients Under Investigation for *2019* Novel Coronavirus - CDC

18) 1/18/2020: *2019* Novel Coronavirus, Wuhan, China: Interim Guidance for Implementing Home Care of People Not Requiring Hospitalization for *2019* Novel Coronavirus (*2019-nCoV*) – CDC

19) 1/17/2020: Laboratory Testing for *2019* Novel Coronavirus (*2019-nCoV*) in Suspected Human Cases – WHO

20) 1/17/2020: *2019* Novel Coronavirus, Wuhan, China: Interim Guidance for Healthcare Professionals – CDC

21) 1/17/2020: *2019* Novel Coronavirus, Wuhan, China: Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Patients Under Investigation (PUIs) for *2019* Novel Coronavirus (*2019-nCoV*) – CDC

22) 1/17/2020: *2019* Novel Coronavirus, Wuhan, China: Interim Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with *2019* Novel Coronavirus (*2019-nCoV*) - CDC

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

24) 1/15/2020: Surveillance Case Definitions for Human Infection with Novel Coronavirus (*nCoV*): Interim Guidance V2 – WHO

25) 1/2020: WHO (World Health Organization) Recommendations to Reduce Risk of Transmission of Emerging Pathogens from Animals to Humans in Live Animal Markets – WHO

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

27) 1/2020: Emerging Respiratory Viruses, Including *nCoV*: Methods for Detection, Prevention, Response and Control – WHO