COVID-19 (2019 nCo-V)

David Jay Weber, M.D., M.P.H., FSHEA, FIDSA, FRSM (London)
Professor of Medicine, Pediatrics, Epidemiology
Associate Chief Medical Officer, UNC Hospitals
Medical Director, Hospital Epidemiology
University of North Carolina at Chapel Hill

Disclosures: Consultant to PDI, Germitec, Lumagenics, Pfizer; Past Consultant, Merck
CORONAVIRUSES

- Single-stranded, linear, positive-sense RNA, enveloped virus, 120-160 nm
- Reservoirs: Humans, multiple animal species, bats
- Epidemiology: Worldwide; winter and spring in temperate climate
- Syndromes
  - Common colds: Common cause of upper respiratory tract infections
  - Lower tract infections (pneumonia) in immunocompromised individuals and older adults
  - Gastroenteritis
  - Endemic coronaviruses: 229E, HKU1, NL63, OC43
  - Epidemic coronaviruses: SARS, MERS, COVID-19 (nCo-V-19)
UPDATE: COVID-19 INFECTION

- Transmission: Droplet/contact; also likely, indirect contact
- Incubation period: Median, 5 days; mean, 7 days; range, 2-14 days (possible outliers up to 27 days)
- Experience in China
  - Majority of cases arise from close contacts of symptomatic cases; 1-5% of 38,000 close contacts developed COVID-19
  - Transmission is driven by family-clusters (i.e. 75-85% of clusters)
- At diagnosis: ~80% are mild/moderate; ~15% severe; ~5% critical
- Progression: ~10-15% of mild/moderate cases become severe, and ~15-20% of severe become critical
- Mortality: 1%-3%; case fatality rate (if hospitalized, ~15%)
  - Risk of dying related to age: 0-39, 0.2%; 40-49, 0; 50-59, 1.3%; 60-69, 3.7%; 70-79, 8.3%; ≥80, 16.7%
  - Higher risk of dying in persons with underlying diseases
- Treatment: Supportive (no vaccine and no specific drug therapy available)
COVID-19: EPIDEMIOLOGY, COMMENTS

- Cases: Global: >215,500 (~9,000 deaths), >140 countries with cases
  - China has gone 24 hours without community transmission; Outside China: Italy, >35,000 (~3,000 deaths); Spain, >13,500 (~600), France, >9,000
  - US: >8,300 (~150 deaths); NC, 97 cases (0 deaths) - 23 counties reporting cases; doubling time every 2-3 days
- Comments
  - NC now has community transmission
  - Major limitations on our COVID-19 response: Critically shortages of PPE and limitations on COVID-19 test material

APPENDIX A

CORONAVIRUS TIMELINE IN NORTH CAROLINA

March 19
As of 2 p.m.

Total coronavirus cases in N.C.: 119

Source: NC DHHS, county health departments
SYMPTOMS of nCo-V

- Uncomplicated upper respiratory infection
  - Fever, cough, sore throat, nasal congestion
  - Malaise, headache, muscle aches
  - Shortness of breath
- Most patients have reportedly had mild to moderate respiratory illness
- Older and immunocompromised patients may present with atypical symptoms (e.g., no fever)
- Complications for infection
  - Mild to severe pneumonia
  - Acute Respiratory Distress Syndrome
  - Sepsis
  - Septic shock

Symptoms begin 4–5 days after exposure (range 2–14)

COVID-19, TIME LINE OF INFECTION COURSE

Based on analysis of 41 patients infected with 2019-nCoV in Wuhan, China

- Onset of symptoms (most common: fever, cough, fatigue)
- Admission to hospital: 41
- Shortness of breath: 21
- Acute respiratory distress syndrome: 11
- Admission to intensive care unit: 16

Number of days:
- 0
- 4
- 5
- 7
- 8
- 9
- 10
- 13
- 14
- 17

Median time

Understanding the epidemiology of COVID-19 allows one to safely manage patients and informs public health on necessary control measures.
KEYS TO COVID-19 MITIGATION:
SOCIAL DISTANCING AND DIAGNOSTIC TESTING

SOCIAL DISTANCING FLATTENS THE CURVE!!

MITIGATION STRATEGIES

- Public health interventions
  - Quarantine: Separates and restricts persons exposed to an infectious disease
  - Isolation: Separates and restricts persons who have an infectious disease
  - Case finding: Used by Public Health Departments to locate persons exposed to a known case
  - All of above are dependent on have availability of access to a rapid, sensitive and specific diagnosis test

- Social distancing
  - Must be maintained for 2-3 incubation periods after community acquisition has ceased

Effects of social distancing on 1918 flu deaths

As the first cases of the 1918 flu were reported in Philadelphia in September 1918, authorities played down the significance and allowed public gatherings to continue. Closures in Philadelphia were only enacted once the virus had spread. The first cases in St. Louis were reported in early October, with measures to contain the spread enacted two days later. This resulted in a slower spread and lower mortality rate.

Graphic from Washington Post: https://www.washingtonpost.com/health/2020/03/10/social-distancing-coronavirus/
Data from: Hatchett RJ, Mecher CE, Lipsitch M. Proc Natl Acad Sci U S A. 2007 May 1;104(18):7582-7
**APPENDIX A**

**PROJECTING THE FUTURE OF THE COVID PANDEMIC**

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**The 1918 Pandemic**

The influenza pandemic of 1918 spread across Europe, Asia and North America in three distinct but uneven waves, and was fatal for about 2 percent of those who caught it. Global data is incomplete, but death rates in Britain hint at the severity of the three waves.

**Weekly influenza and pneumonia deaths in Britain, 1918-19**

- **SECOND WAVE**
  - High rates of death.
  - Deaths per thousand:
    - July: 25
    - Aug.: 20
    - Sept.: 15
    - Oct.: 10
    - Nov.: 5

- **FIRST WAVE**
  - High rate of infection, but relatively few deaths.

**THIRD WAVE**

- Many nations experienced a third wave of flu in early 1919.

*Sources: Emerging Infectious Diseases; Jeffery K. Taubenberger and David M. Morens*

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**Probable cases of SARS by date of onset**

Canada, 1 February - 4 July 2003 (n=250*)

*As of 4 July 2003, 251 probable cases of SARS were reported from Canada. This graph does not include one additional case of SARS for whom no date of onset was available. Between 4 and 10 July 2003, 2 probable cases were discarded and one additional probable case was reported. As of 18 July 2003, a total of 250 probable cases of SARS were reported.

Source: Health Canada*
HOPE FOR THE BEST, BUT PREPARE FOR THE WORST (Benjamin Disraeli)

Wuhan, 1918

Social distancing, Italy

US, 1918

Alarming Photos of Coronavirus Patients in Italy Hooked Up to Life Support

Italian hospital