CoVID-19 – Assorted Observations about the New Viral King and the Portal to the New World

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Dean, College of Public Health
Science Café, Omaha 21 April 2020
Epidemiologic Transitions in Human History
The FIRST Transition – Era of the Great Plagues

• About 10-12,000 years ago
• Agriculture and new social order
  • Animal domestication
  • Sufficient population to sustain human-to-human transmission of infectious diseases
• Epidemics in non-immune populations of measles, smallpox, etc
BLACK DEATH AT TOURNAI, 1349 (SEE ALSO 33793), LE MUISIT, GILLES (1272–1352) /BIBLIOTHÈQUE ROYALE DE BELGIQUE, BRUSSELS/BRIDGEMAN
Help Bar Deadly Influenza From Seattle

By DR. J. D. TUTTLE,
State Health Commissioner

Don't get into crowds, don't cough or sneeze without using a handkerchief, get plenty of fresh air, and when the symptoms of a cold appear isolate yourself as far as possible from others.

By SURGEON GENERAL RUPERT BLUE,
U.S. Public Health Service

First there is a chill, then fever, headache, backache, reddening of the eyes, aches all over the body and general prostration. Persons so attacked should go to bed at once and call a physician.

NIGHT EXTRA
FOR INFORMATION
Or any purpose—has the highly
of news,immerse, do
Call Main 300

The Seattle Daily Times
12 Pages.
SEATTLE, WASHINGTON, SATURDAY EVENING, OCT. 5, 1918.

CHURCHES, SCHOOLS, SHOWS CLOSED
EPIDEMIC PUTS BAN ON ALL PUBLIC ASSEMBLIES

MR. LOWNERING'S COMMENT

SEATTLE TO MAKE FIGHT ON DISEASE

We can't draw on your imagination for expenses to Berlin! Put over that 40% Liberty Loan!

AMERICANS AND FRENCH SMASH FOE

Associated Press Summary.

FRANCE and American troops are driving out the German position in Champagne and the front.. From the town of St. Mihiel, near the French lines, they attacked to the 6th front under Gen. Dematte, many enemy'spositions were overrun by the Americans.

Four and some of the Americans and the 16th Division that they have encountered and that have reached the French lines, fighting, to the advantage of the French.

In the Paris, the 16th Division was.
FIGURE. MMWR report on *Pneumocystis* pneumonia in five previously healthy young men in Los Angeles — June 5, 1981

**Pneumocystis Pneumonia — Los Angeles**

In the period October 1980–May 1981, 5 young men, all active homosexuals treated for biopsy-confirmed *Pneumocystis carinii* pneumonia at 3 different hospitals in Los Angeles, California. Two of the patients died. All 5 patients had lab confirmed previous or current cytomegalovirus (CMV) infection and candidal infection. Case reports of these patients follow.

**Patient 1**: A previously healthy 33-year-old man developed *P. carinii* pneumonial mucosal candidiasis in March 1981 after a 2-month history of fever associated with elevated liver enzymes, leukopenia, and CMV viruria. The serum complement CMV titer in October 1980 was 256; in May 1981 it was 32. The patient's symptoms deteriorated despite courses of treatment with trimethoprim-sulfamethoxazole, zidovudine, and acyclovir. He died May 3, and postmortem examination revealed pneumonia, but no evidence of neoplasia.

**Patient 2**: A 29-year-old man developed *P. carinii* pneumonia, but no evidence of neoplasia. He died on July 28.
Zoonotic Diseases

- **Zoonoses:**
  - Zoon – animal
  - Noson – disease

  - First used and coined by Rudolph Virchow (1880-1902)
  - Diseases that are naturally transmitted between vertebrate animal and humans – WHO 1959

- **60% of microbial pathogens** infecting humans are from animals
- **75% of all emerging infections** are from animals
SARS 2003

Total cases and deaths: 8439 cases, 812 deaths
Number of countries reported cases: 30 countries (hit 6 countries most)
Affected health care workers: 20%—21% of all cases (>1,700)

SARS 2003 clusters in Singapore

Total 238 cases
33 deaths (14% CFR)
41% of cases were health workers
Duration from first case to last case ~ 70 days

Patient Zero in Singapore

TTS hospital cluster=109 cases

SGH hospital cluster~60 cases

NUH hospital cluster ~8 cases

MERS clusters in South Korea

- Total = 186 cases
- 38 deaths (19.4% CFR)
- Duration from first case to last case ~69 days
- Large number of cases were healthcare workers

Factors in microbe emergence

- Ecological Change
  - Climate change, deforestation, rabid urbanization
- Increase in global travel
- Vector and microbial resistance
- Human susceptibility to infection
- Political choices
BIRD FLU
Is Asia hatching the next human pandemic?
Burden of Large Epidemics

**Economic Impacts**
- Loses person-productivity (Absenteism, business closure)
- Travel and tourism
- Import and export restrictions
- Cost of response and recovery

**Health Impacts**
- Sickness
- Deaths
- Long-term disability

**Social Impacts**
- Disruption of social life
- Equality and access
- Mental Health
- Political Impacts
## 2019 National Health Security Preparedness Index

<table>
<thead>
<tr>
<th>Topic</th>
<th>2019 National Average</th>
<th>Improvement Since 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall score</td>
<td>6.7</td>
<td>11.7%</td>
</tr>
<tr>
<td><strong>Health security surveillance:</strong> The ability to monitor and detect health threats, and to identify where hazards start and spread so that they can be contained rapidly.</td>
<td>8.3</td>
<td>10.7%</td>
</tr>
<tr>
<td><strong>Community planning and engagement:</strong> The ability to develop and maintain supportive relationships among government agencies, community organizations, and individual households.</td>
<td>5.2</td>
<td>15.6%</td>
</tr>
<tr>
<td><strong>Incident and information management:</strong> The ability to deploy people, supplies, money and information to the locations where they are most effective in protecting health.</td>
<td>8.7</td>
<td>10.1%</td>
</tr>
<tr>
<td><strong>Healthcare delivery:</strong> The ability to ensure access to high-quality medical services across the continuum of care during and after disasters and emergencies.</td>
<td>4.9</td>
<td>8.9%</td>
</tr>
<tr>
<td><strong>Countermeasure management:</strong> The ability to store and deploy health-related products and supplies that protect people from diseases and injuries.</td>
<td>6.5</td>
<td>16.1%</td>
</tr>
<tr>
<td><strong>Environmental and occupational health:</strong> The ability to maintain the security and safety of water and food supplies, to test for hazards and contaminants in the environment, and to protect workers and emergency responders.</td>
<td>5.9</td>
<td>7.3%</td>
</tr>
</tbody>
</table>

Source: 2019 National Health Security Preparedness Index
The average overall Index score is **40.2/100**, while high-income countries report an average score of **51.9**.
The great Empty 2020
Wuhan pneumonia cluster, 2019-20
A timeline, dates based on local reports

31 Dec (Hong Kong [HK]; 30th United States [US])
   Wuhan Municipal Health Commission (WMHC)
   • Medical experts arrived to examine "SARS" outbreak
   • 27 viral pneumonia cases isolated, 7 critically ill
   • No human-to-human (h2h) transmission
   • All believed to have visited Huanan Seafood Wholesale Market
   • Market also sells non-aquatic animals including birds, snakes, rabbits

03 Jan
   • HK Govt to provide daily updates
   • WMHC update
     • 44 cases, 11 critical
     • non h2h

1 Jan
   • Wuhan University researcher (sina.com.cn) quoted
     • likely not SARS coronavirus (CoV)
     • testing found <4% homology to SARS-CoV
     • Seafood market closed

PNEUMONIA CASES PRESENTING TO HOSPITALS

DECEMBER 2019

JANUARY

Prepared by Ian M. Mackay, PhD
virologydownunder.com
Dates and information based on WMHC and media reports; not always verified by official sources
My thanks to FluTrackers.com for their excellent tracking of reports
Version 2
Last updated 03JAN2020 AEST
What is the new coronavirus?

- A large family of viruses that cause illness ranging from the common cold to more severe diseases
- Zoonotic, meaning they are transmitted between animals and people
  - SARS-CoV (civet cats ➔ humans)
  - MERS-CoV (dromedary camels ➔ humans)
  - SARS-CoV-2 ( Likely pangolin ➔ humans)

It shares 82% of the SARS-CoV structure that caused SARS outbreak of 2003
COVID-19 Signs and symptoms

➢ Some may experience severe illness:
  • Elderly adults
  • Persons with underlying health conditions

What are the symptoms?

- Fever
- Difficulty in breathing
- Coughing
- Tightness of the chest
  (Some patient chest scans have also shown inflamed and fluid-filled lungs)

Source: World Health Organization

NOT: Runny nose, sneezing, sore throat
Super spreading events

A Washington state choir rehearsal was deemed a 'super spreader event' after 45 people were infected with the coronavirus and 2 died

Patient #31 might be responsible of over 100 cases – large gathering in a church in Daegu city


Healthcare workers infected with COVID-19 in U.S.

- CDC latest report: from February 12–April 9, 2020
  - More than 9,282 health care workers have been infected
- 90% were not hospitalized
- 184 admitted to intensive care units
- 27 died

➢ Out of 1423 cases have known exposure source:
  ➢ health care exposure (55%)
  ➢ household exposure (27%)
  ➢ community exposure (13%)
  ➢ Multiple exposure (5%)

Source: https://www.cdc.gov/mmwr/volumes/69/wr/mm6915e6.htm?s_cid=mm6915e6_w
Tracking Infectiousness

RO (basic reproduction number) of diseases
A measure of how many people each sick person will infect on average

- **Infectiousness**
  - MERS: 0.8
  - Influenza: 1.5
  - Ebola: 2.0
  - COVID-19: 2.5* (note: this number may change)
  - SARS: 3.5
  - Mumps: 4.5
  - Rubella: 6.0
  - Smallpox: 6.0
  - Measles: 16.0

*This number may change as we learn more about this new disease.
$R_0 = 2.0$:

- $R_p = 0.9$ from pre-symptomatic
- $R_s = 0.8$ from symptomatic
- $R_e = 0.2$ from environmental
- $R_a = 0.1$ from asymptomatic
COVID-19 in the United States

COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Total Confirmed: 766,664

Total Deaths: 40,931

Total Test Conducted in U.S.: 3,893,815

Confirmed cases by country:
- United States
- Spain
- Italy
- France
- Germany
- United Kingdom
- Turkey
- China
- Iran
- Russia
- Belgium
- Brazil
- Canada
- Netherlands
- Switzerland

Last Updated: 4/20/2020, 1:38:36 PM

Data sources: WHO, CDC, ECDC, NHIS, DWY, Johns Hopkins University, and various media reports.
Daily confirmed new cases in U.S

January 22nd (first case identified)

March 11th = 322 cases
March 25th = 12,042 cases
April 1st = 25,200 cases
April 10th (35,098 cases)
April 17th (29,000 cases)
April 18th (29,916 cases)

Source: https://coronavirus.jhu.edu/data/new-cases
## Characteristics of COVID-19 cases in the United States

### Race Specified

<table>
<thead>
<tr>
<th>Race</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian or Alaska Native</td>
<td>765</td>
<td>1%</td>
</tr>
<tr>
<td>Asian</td>
<td>5,307</td>
<td>4.4%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>36,498</td>
<td>30%</td>
</tr>
<tr>
<td>Native Hawaiian or other Pacific Islander</td>
<td>383</td>
<td>0.3%</td>
</tr>
<tr>
<td>White</td>
<td>77,235</td>
<td>64%</td>
</tr>
</tbody>
</table>

### Race Unspecified

<table>
<thead>
<tr>
<th>Race</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race Unspecified</td>
<td>376,629</td>
<td>76%</td>
</tr>
</tbody>
</table>

### Race Specified

- **18-44**: 120,532 (24%)
- **45-64**: 120,532 (24%)
- **65-74**: 120,532 (24%)
- **75+**: 120,532 (24%)
- **<18**: 120,532 (24%)
- **unknown**: 120,532 (24%)

**Data as of April 16, 2020**

CoVID-19 Mortality in the most affected countries, 20 April 2020

Global CFR 6.88%
C.D.C. Labs Were Contaminated, Delaying Coronavirus Testing, Officials Say

 Fallout from the agency’s failed rollout of national coronavirus kits two months ago continues to haunt U.S. efforts to combat the spread of the highly infectious virus.

By Sheila Kaplan

April 19, 2020
As of April 17th there were over 3.7 million tests performed across the U.S
Coronavirus COVID-19 Nebraska Cases by the Nebraska Department of Health and Human Services (DHHS)

Total Positive Cases

1,648

Total Tested 16,478
Tested: Not Detected 14,724
Deaths 33

New positive cases by date results were received

Contact Nebraska Department of Health and Human Services (DHHS)
http://dhhs.ne.gov/coronavirus
Information Line: (402) 552-6645
Data are representative of Nebraska residents, are provisional and data reported by the local health department should be considered the most up to date.
Updated 12:00 AM CDT, 4/21/2020
Daily cases in Nebraska

- April 20th: 181
- April 19th: 197
- April 18th: 155
- April 17th: 68
- April 16th: 94
- April 1st: 38
COVID-19 cases in Nebraska by county

Douglas County’s population is more than nine times greater than Hall County. But Hall has 130 more cases.

Source: Central District Health Department, Douglas County Health Departments produced by KMTV News at https://www.3newsnow.com/news/coronavirus/grand-island-is-nebraskas-hot-spot
Nebraska is in the frontline against COVID

NIH Clinical Trial of Remdesivir to Treat COVID-19 Begins

Study Enrolling Hospitalized Adults with COVID-19 in Nebraska

February 25, 2020

A randomized, controlled clinical trial to evaluate the safety and efficacy of the investigational antiviral remdesivir in hospitalized adults diagnosed with coronavirus disease 2019 (COVID-19) has begun at the University of Nebraska Medical Center (UNMC) in Omaha. The trial regulatory sponsor is the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health. This is the first clinical trial in the United States to evaluate an experimental treatment for COVID-19, the respiratory disease first detected in December 2019 in Wuhan, Hubei Province, China.

The first trial participant is an American who was repatriated after being quarantined on the Diamond Princess cruise ship that docked in Yokohama, Japan and volunteered to participate in the study. The study can be adapted to evaluate additional investigative treatments and to enroll
Mitigation or Suppression or Containment

WHO 6 steps

1. Disease under control
2. Able to detect, test, isolate & trace
3. Hot spot risks minimized
4. Prevention at schools & other essential places
5. Manage imported cases
6. Educated, engaged communities

President 3-phases

Phase 1
• ALL VULNERABLE INDIVIDUALS should continue to shelter in place.
• MINIMIZE NON-ESSENTIAL TRAVEL
• ENCOURAGE TELEWORK

Phase 2
• ALL VULNERABLE INDIVIDUALS should continue to shelter in place.
• NON-ESSENTIAL TRAVEL can resume.
• ENCOURAGE TELEWORK

Phase 3
• VULNERABLE INDIVIDUALS can resume public interaction
• Resume UNRESTRICTED STAFFING of worksites.
Aren't you going to do something to fight the coronavirus?! I'm doing it.