History of Zoonotic Epidemics
Rats, Fleas & Plague
While Zoonotic Epidemics Require A Host It All Comes Down To...
Recent History of Epidemics & Zoonotic Infections
Zoonotic Epidemics

Plague, Influenza, AIDS, Ebola, SARS, MERS, COVID-19

1. Host (reservoir) Species
2. How the reservoir species comes into contact with humans
3. What happens to humans after the exposure to infection
4. Generalist bacteria or virus that often has intermediate host
5. While many zoonotic infections can be serious like rabies or salmonella few become epidemics: dependent upon spread rate
6. The other factor is severity. What is the mortality & morbidity?
Comparison of Various Pathogens

Graph showing the comparison of various pathogens based on their contagiousness and fatality rate. The new coronavirus is estimated to be in the range of 0.1 to 1 people infected by each sick person, which is more contagious than other diseases like bird flu, Ebola, and SARS.
Comparison of COVID-19 with Other Viruses

The average number of people that one person with a virus infects, based on the R0 scale:

- **COVID-19**: 2–2.5*
- **H1N1**: 1.2–1.6
- **Ebola**: 1.6–2
- **SARS**: 2–4
- **MERS**: 2.5–7.2**

*At February 28, 2020

**R0 calculated solely during the 2015 outbreak in South Korea

Sources: ScienceMag, WHO, Journal of the ISIRV
COVID-19 Severity

Mild: 81% (36,160 cases)

Severe: 14% (6,168)

Critical: 5% (2,087)
Progression of Disease COVID-19

Onset of symptoms --- Hospital admission --- Shortness of breath --- ARDS --- ICU admission

Number of days

0 1 2 3 4 5 6 7 8 9 10 11
Symptoms of COVID-19

The symptoms of coronavirus disease [COVID-19] reported from China in the period up to February 22, 2020:

- Fever: 87.9%
- Dry cough: 67.7%
- Fatigue: 38.1%
- Sputum production: 33.4%
- Shortness of breath: 18.6%
- Muscle pain or joint pain: 14.8%
- Sore throat: 13.9%
- Headache: 13.6%
- Chills: 11.4%
- Nausea or vomiting: 5%
- Nasal congestion: 4.8%
- Diarrhoea: 3.7%

Many of the most common symptoms are shared with those of the flu or cold. So it is also good to know which common symptoms of the flu or the common cold are not symptoms of COVID-19: COVID-19 infection seems to rarely cause a runny nose.

Symptoms of COVID-19

<table>
<thead>
<tr>
<th>DAY</th>
<th>Symptom Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fever, fatigue, muscle pain and a dry cough</td>
</tr>
<tr>
<td>2</td>
<td>Difficulty breathing</td>
</tr>
<tr>
<td>7</td>
<td>Those still with breathing troubles admitted to hospital</td>
</tr>
<tr>
<td>8</td>
<td>Acute respiratory distress</td>
</tr>
<tr>
<td>10</td>
<td>Intensive care unit</td>
</tr>
<tr>
<td>12</td>
<td>Fever ends</td>
</tr>
<tr>
<td>13</td>
<td>Shortness of breath stops</td>
</tr>
<tr>
<td>18.5</td>
<td>Death for those worst affected</td>
</tr>
<tr>
<td>22</td>
<td>Illness finishes</td>
</tr>
</tbody>
</table>
Treatment

- Hydration
- Acetaminophen for fever & achiness
- Antivirals?
- Chloroquine?
  - Anecdotal reports
  - No evidence yet
- Oxygen if hospitalized
- Antibiotics for bacterial infection?
- ACE inhibitors?
What We Don’t Yet Know

• Antibodies & resistance after infection
• Why some people progress to severe disease (inflammatory cascade)
• Sensitivity & specificity of tests
• Effects of public health measures on spread of disease
• Costs of public health measures
• Will this go away or will it be with us in the future?
Questions?