COVID-19 Infection Control Brookline Panel 4

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Agenda

Overview

Transmission

Infection Control

Overview

2019 ~
COVID-19 (SARS-CoV-2) Coronavirus

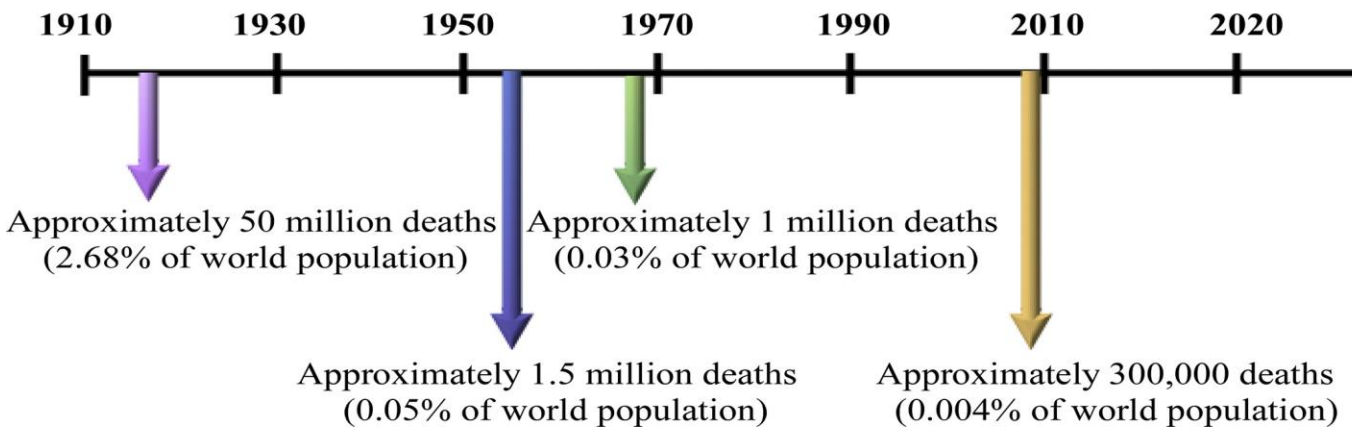
At least 772,296 deaths as of August 18, 2020

1918 - Spanish Flu (H1N1) Influenza A virus

2009 - Pandemic Flu (H1N1) Influenza A virus

1957 - Asian Flu (H2N2) Influenza A virus

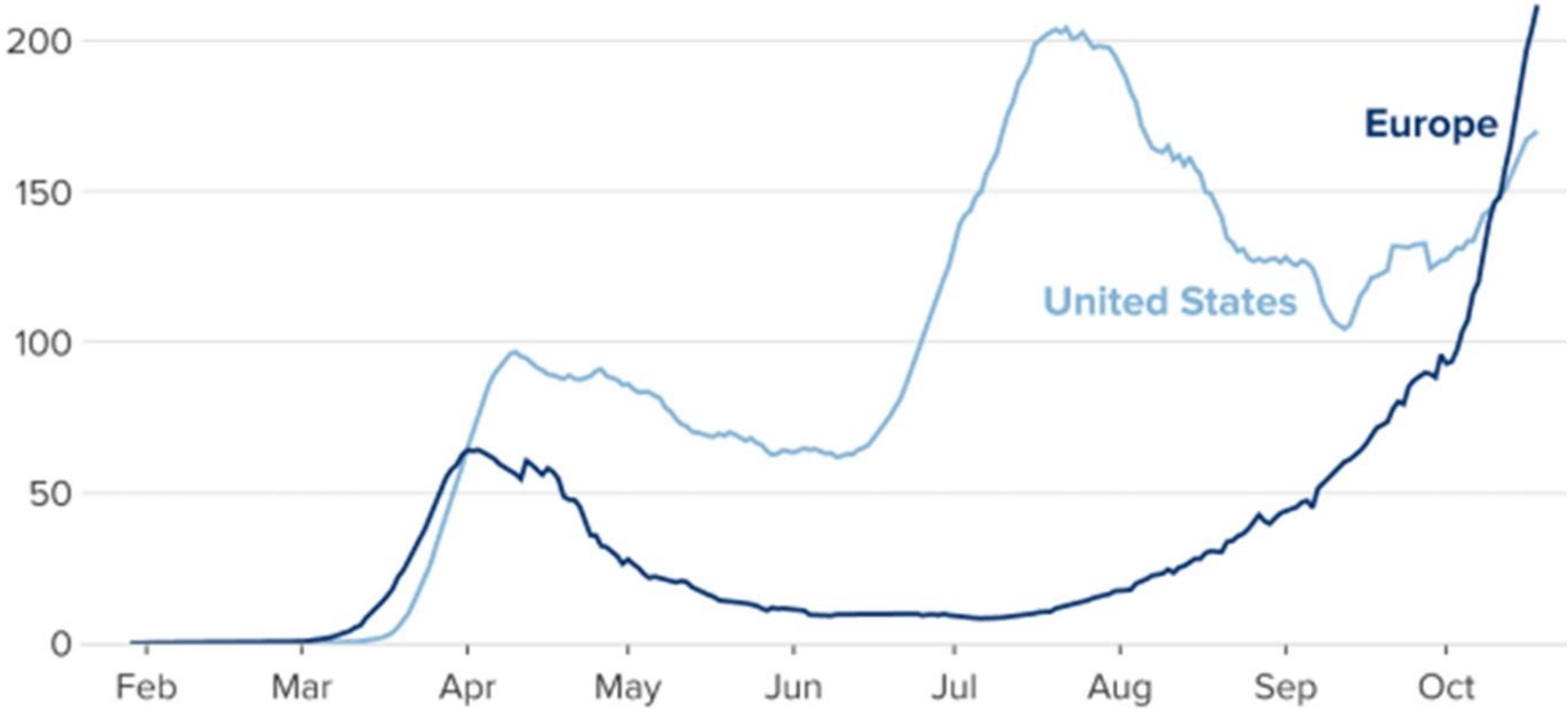
1968 - Hong Kong Flu (H3N2) Influenza A virus



Liu Y-C et al., https://doi.org/10.1016/j.bj.2020.04.007
https://www.the-scientist.com/news-opinion/how-face-masks-can-help-prevent-the-spread-of-covid-19-67646

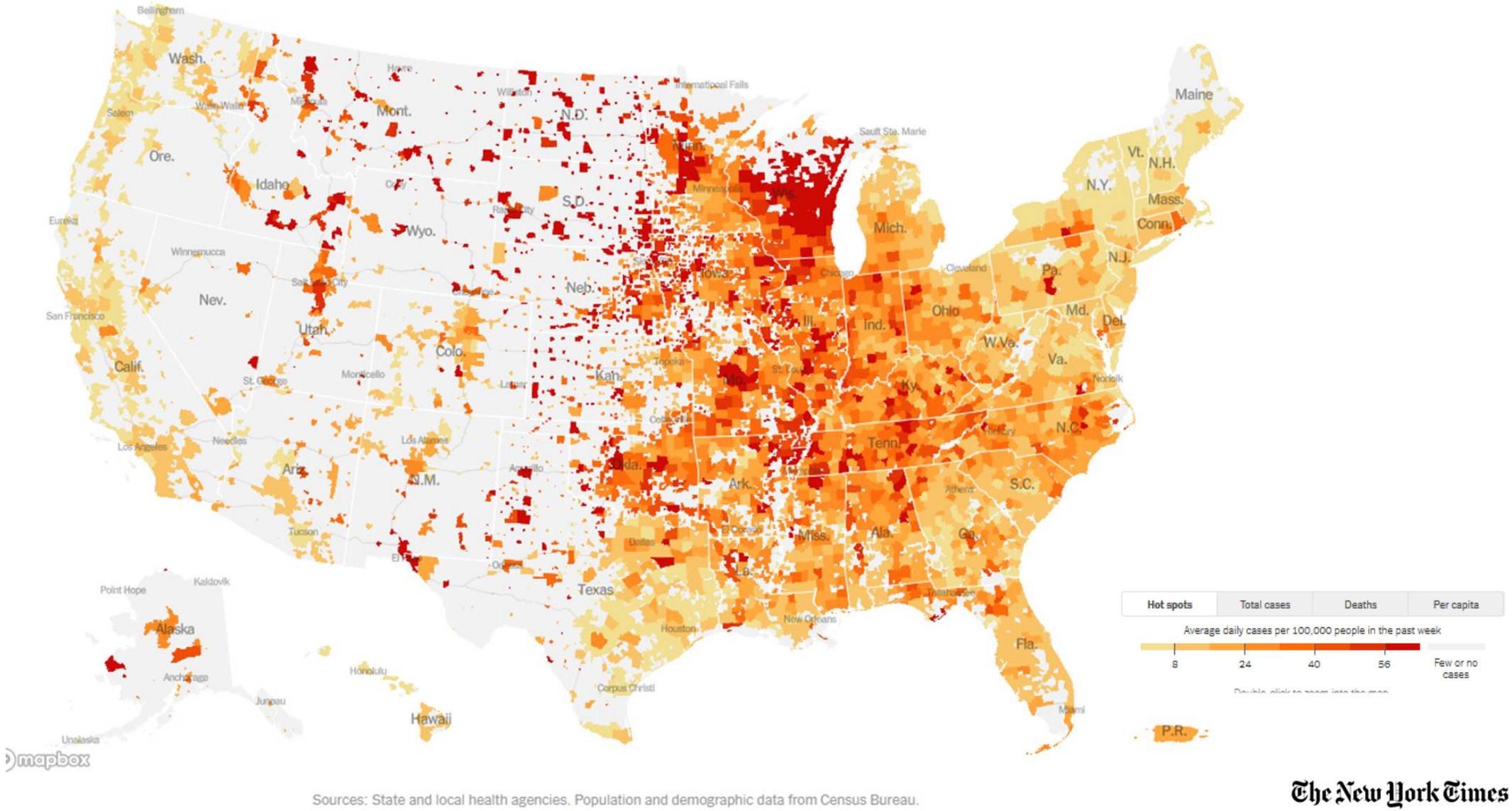
Daily new coronavirus cases per million people

Seven-day average. Europe data includes EU countries plus the United Kingdom.

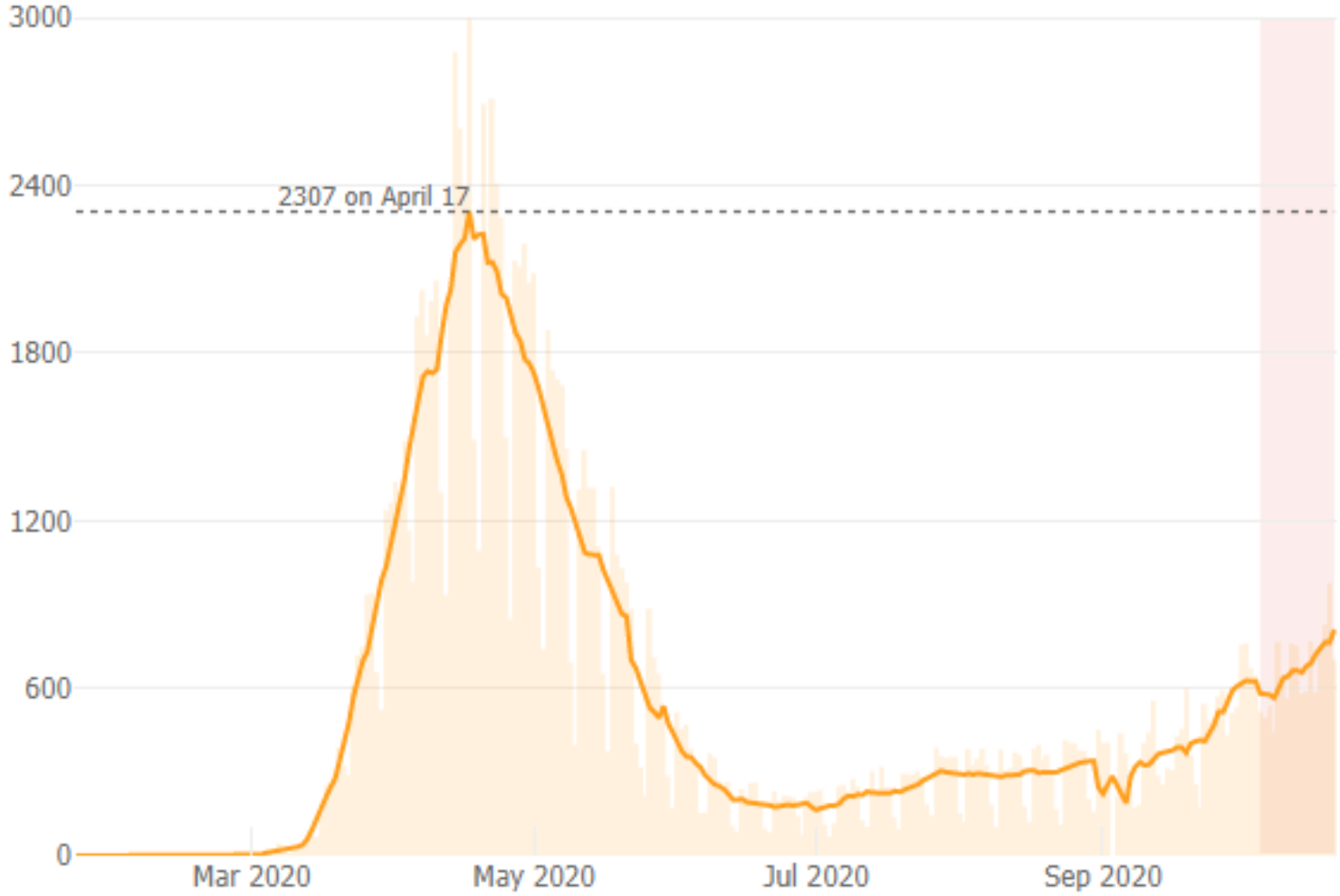


SOURCE: Johns Hopkins University, CNBC analysis. Data as of October 18, 2020.

>8.4 million cases and 223,000 deaths



Massachusetts New Cases per Day



The New York Times

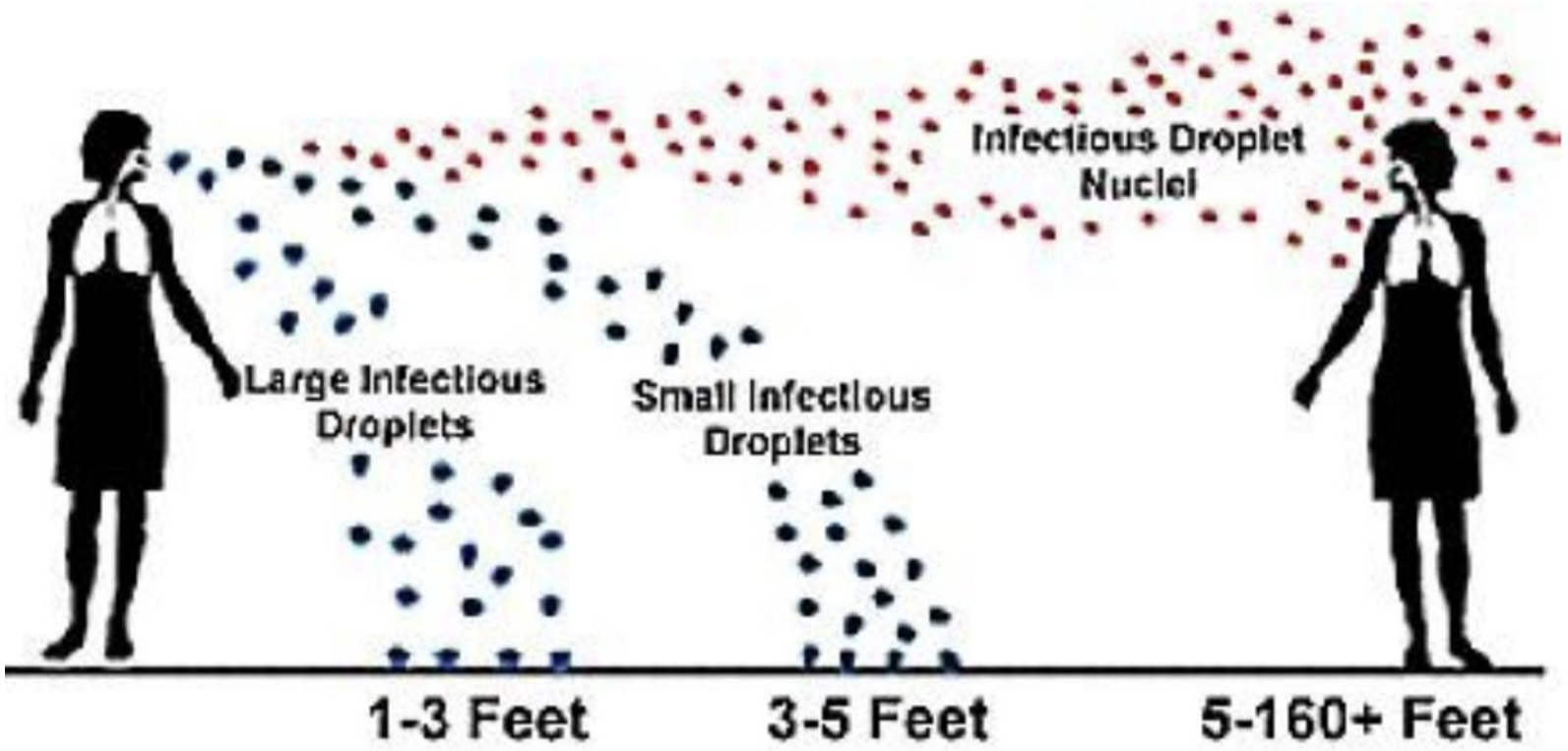
Transmission

James Gathany/CDC Public Health Image library/Wikimedia

How is SARS-CoV-2 spread?

- Person to person, mainly respiratory droplets, airborne also possible
  - Respiratory droplets when an infected person coughs, sneezes, talks landing on mucosal surfaces
  - Spread mostly when people are in close contact <6 feet
- Less commonly spread by touching a surface with virus on it and touching mouth, nose, eyes

Droplet vs Airborne Transmission



https://alamoashrae.org/

VIEWPOINT

Airborne Transmission of SARS-CoV-2
Theoretical Considerations and Available Evidence

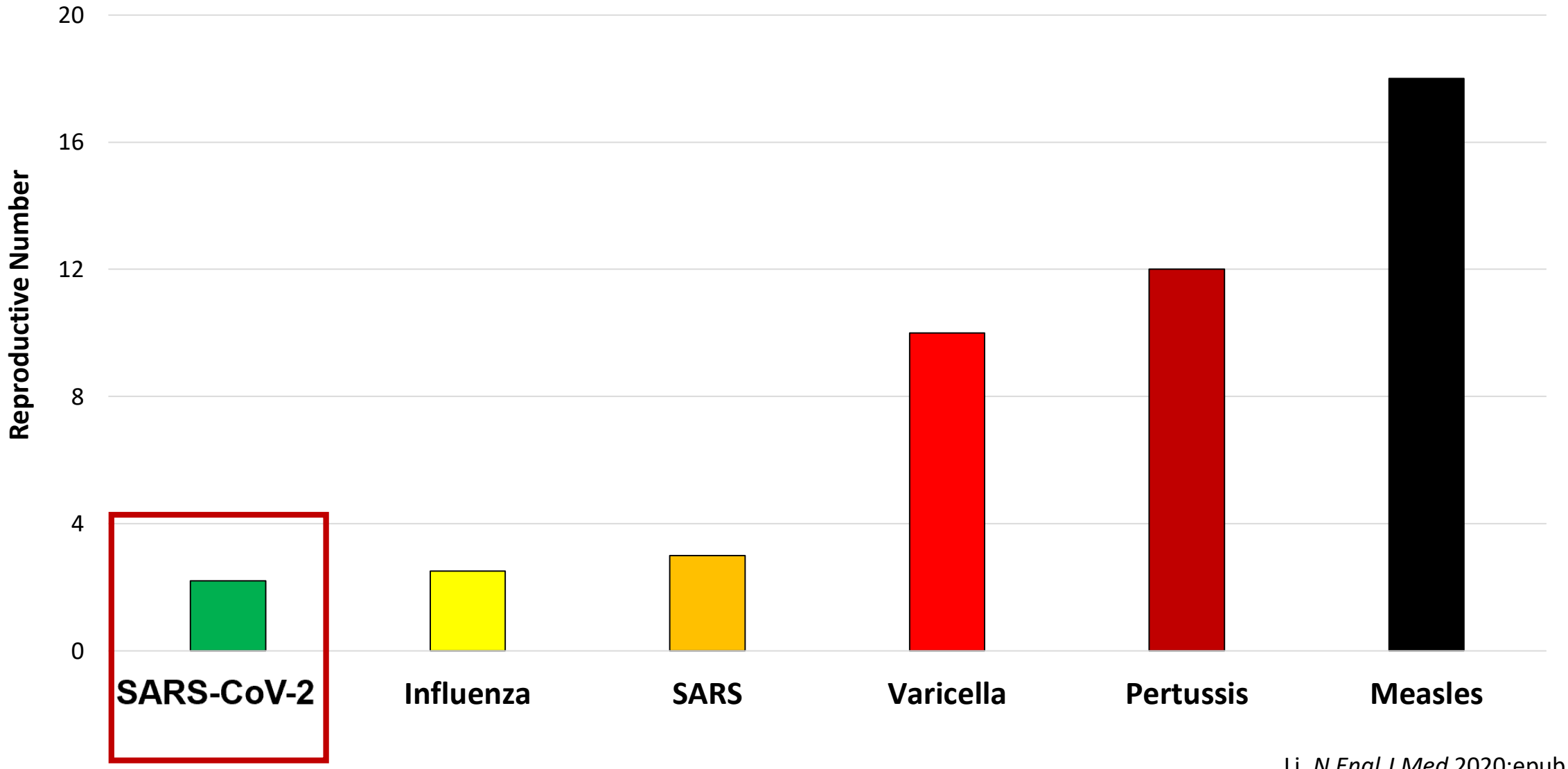
Demonstrating that speaking and coughing can generate aerosols or that it is possible to recover viral RNA from air does not prove aerosol-based transmission...

- **Experimental data *support* the possibility of airborne transmission**
  - Speaking and coughing produce mixture of droplets and aerosols
  - Some of these secretions can travel for up to 27 feet
  - Viral RNA and replication-competent virus isolated from air samples of rooms of COVID-19 patients

- **Epidemiological data indicate that aerosols are not the primary mode of transmission**
  - And little evidence of long-range airborne transmission

Klompas, JAMA 2020; 324:441-442

Contagiousness (R_0)



Li, *N Engl J Med* 2020;epub

How contagious is SARS-CoV-2?

- **CDC analysis of the first U.S. case of locally acquired COVID-19 (Solano, CA)**

- **Patient with unsuspected COVID-19**
  - 121 providers had contact with the patient, no precautions
  - 3 developed COVID-19 (2.5%)
  - Risk factors:
    - Aerosol generating procedures (2 HCWs)
    - Prolonged contact (>2 hours, 1 HCW)

Heinzerling et al. Morb Mortal Wkly Rep 2020;69:472–476.

How contagious is SARS-CoV-2?

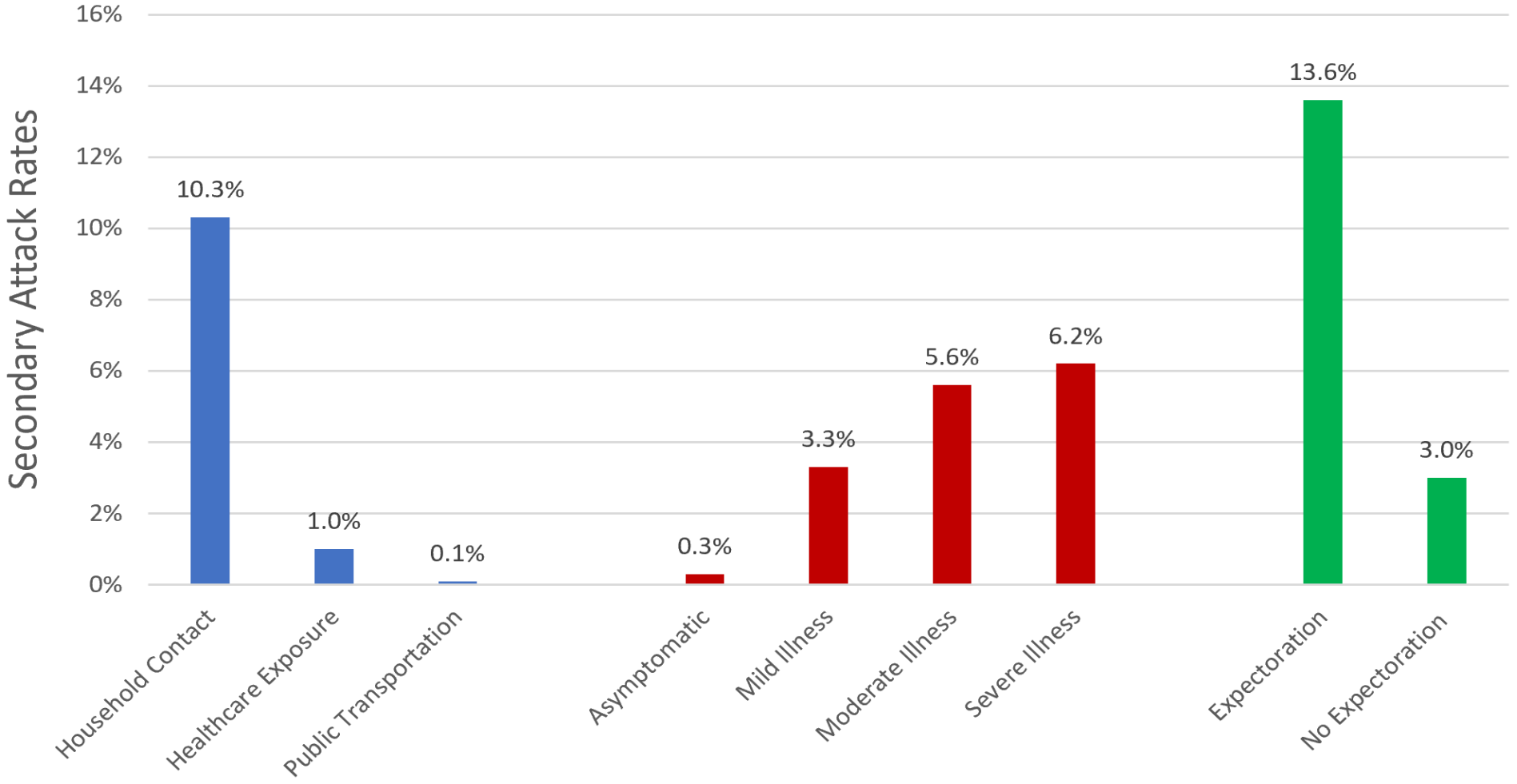
- **China conducted intensive contact tracing of all COVID+ cases**
  - Amongst 2,147 close contacts of 187 cases in Ningbo City, China
  - 6.2% became infected

- **Risk factors**
  - Household members – 18% developed infection
  - Eating together – 12% developed infection
  - Relatives – 5% developed infection
  - Supermarket – 0.6% developed infection

Chen et al. Chin J Epid, 2020

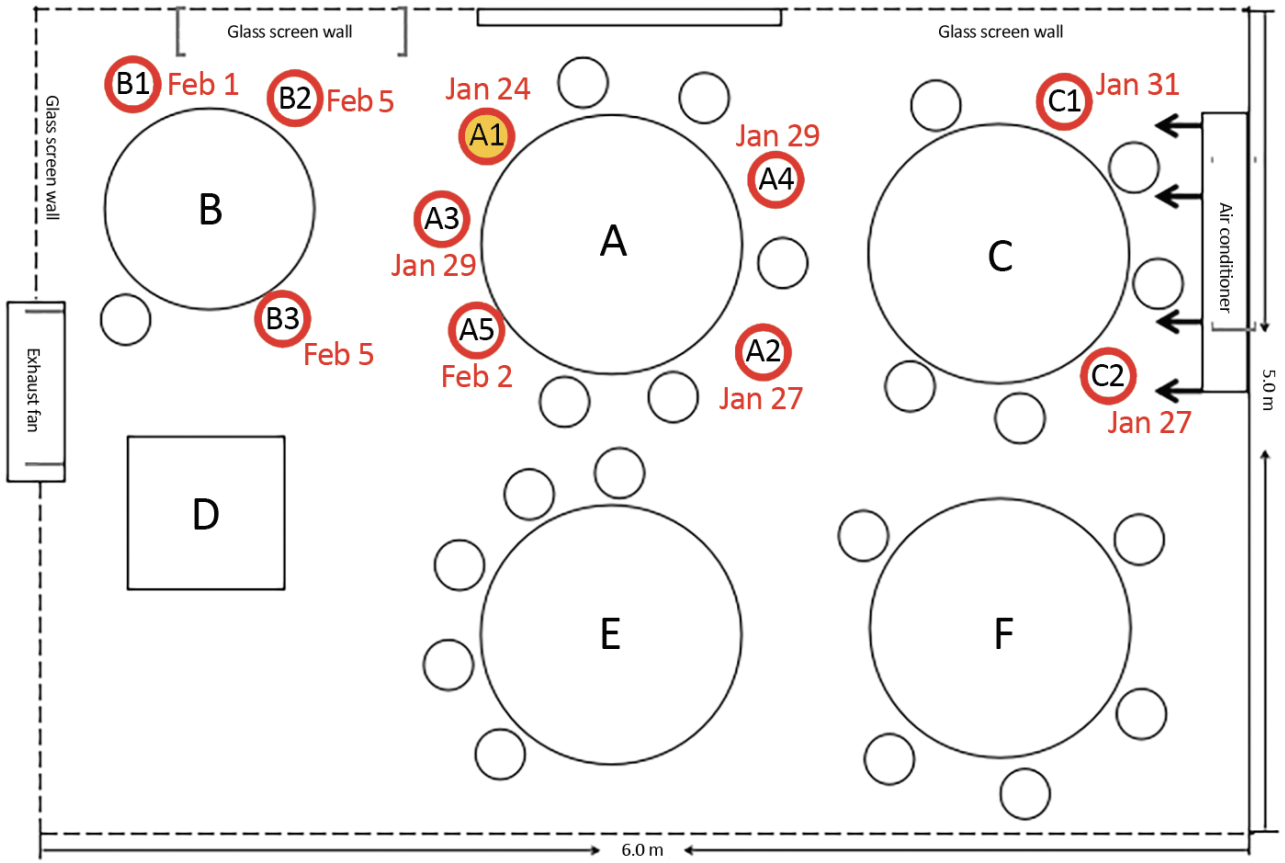
Risk for transmission by setting and illness severity

Contact tracing of 391 index cases in China → 3410 close contacts quarantined for 14 days and tested by PCR daily



Luo, Annals of Int Med 2020

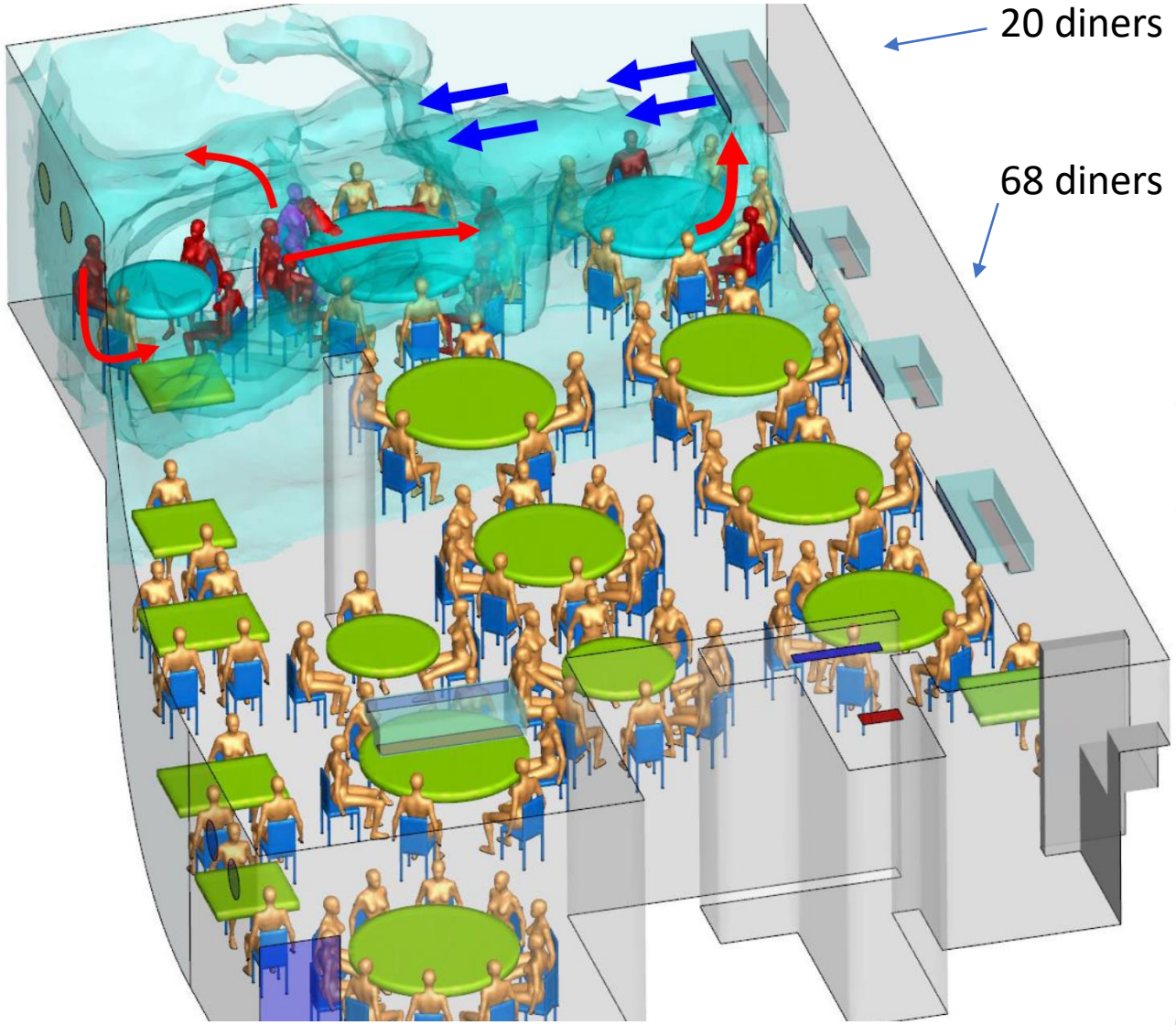
Covid Cluster Associated with Air Conditioning, Guangzhou, China



- Cluster of 10 cases, A1 pre-symptomatic
- Some of the infected diners up to 4 meters away from the index case
- Air conditioning and lack of ventilation potentially contributory

Lu, *Emerging Infectious Dis* 2020;26:1628-31

Air flow modeling



20 diners (attack rate 9/20)

68 diners (attack rate 0/68)

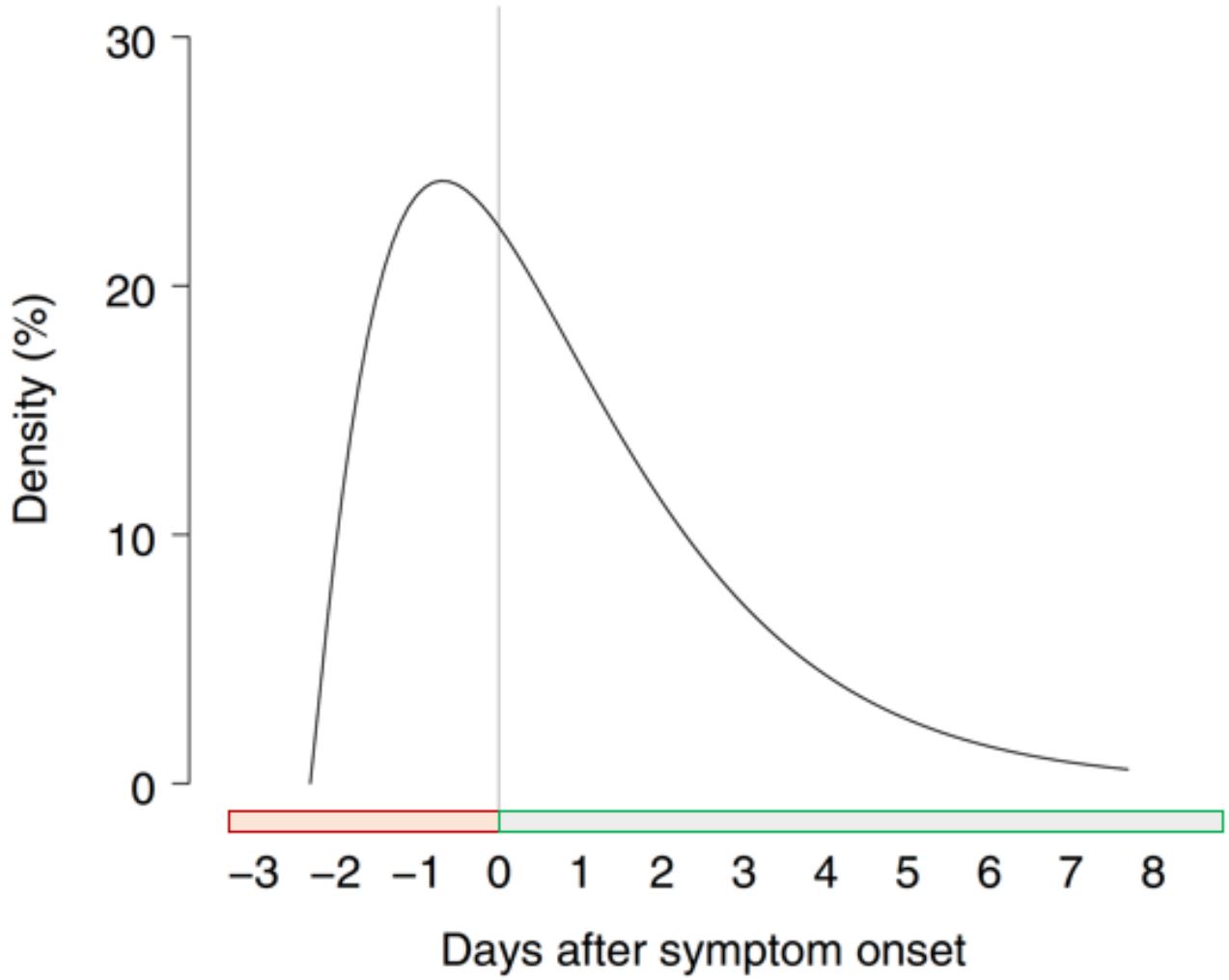
None of the 8 waiters infected

Air conditioner was recirculating “old” air rather than fresh

Affected area of the restaurant 0.7 air changes/hour
(hospital standard ≥6 air changes/hour)

Li 2020, medRxiv preprint, doi: 10.1101/2020.04.16.20067728

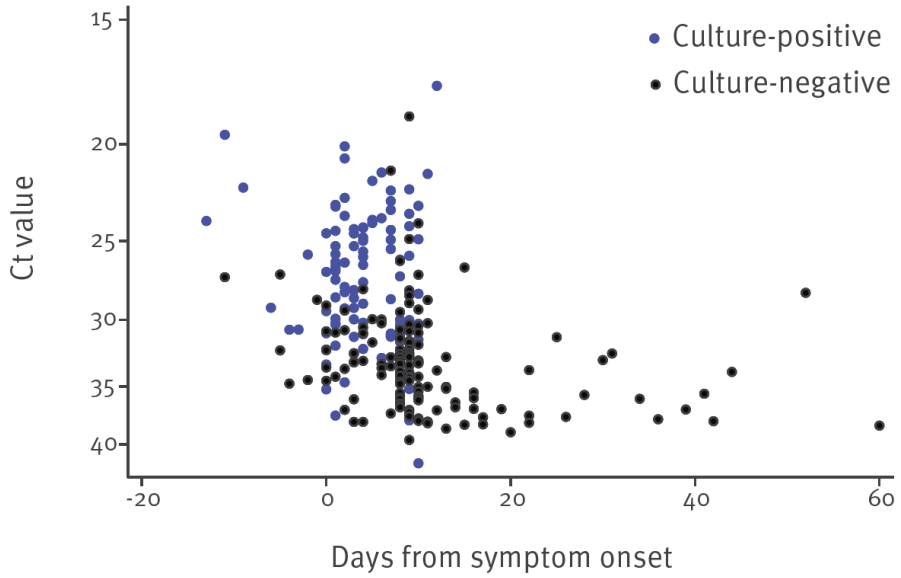
Distribution of infectivity

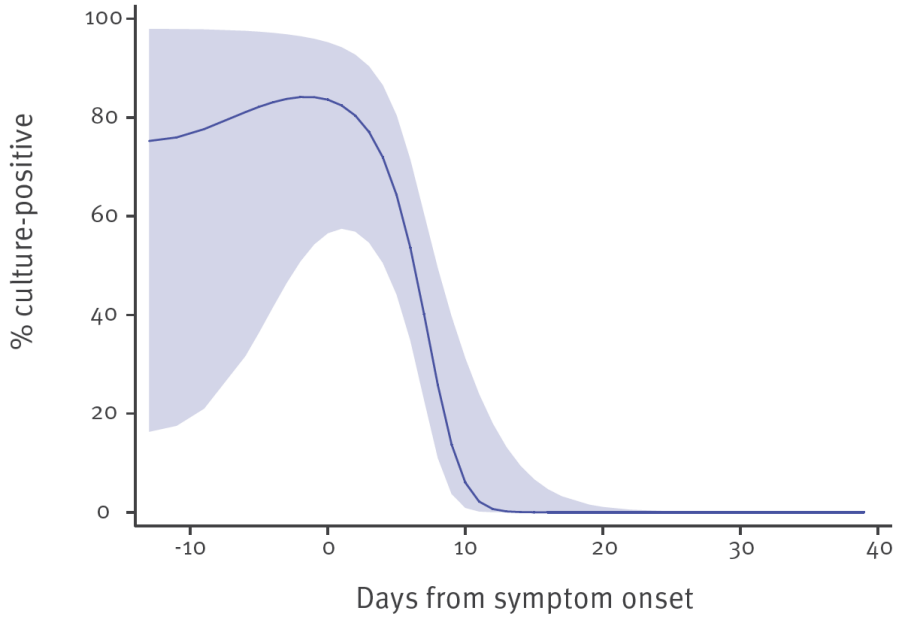


He et al. 2020, *Nature Medicine*, doi.org/10.1038/s41591-020-0869-5

Patients with mild-moderate COVID-19

246 upper respiratory samples from 176 patients with mild-moderate disease

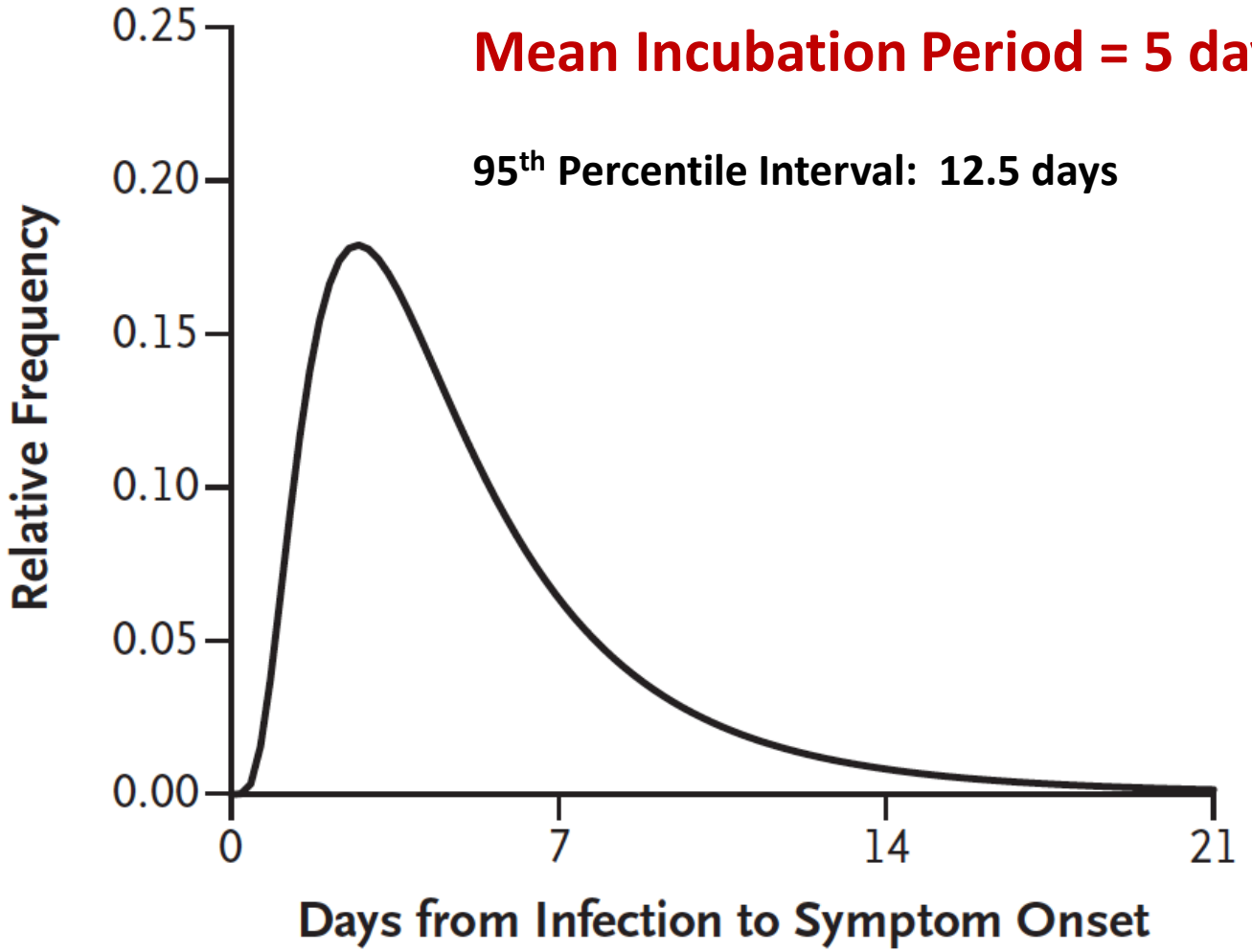




Probability of culturing virus <6% after 10 days from symptom onset

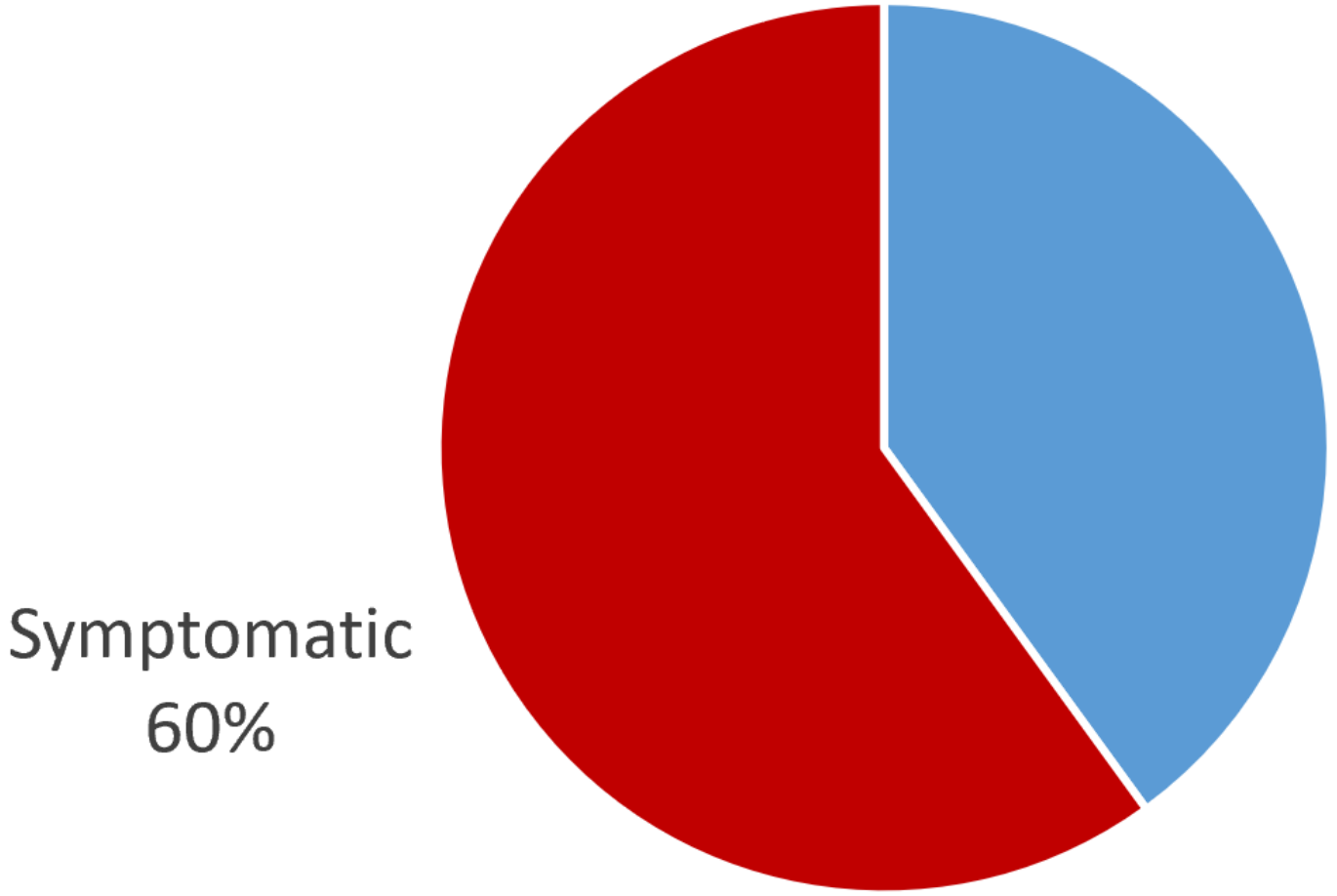
Singanayagam, Euro Surveill 2020; 25(32) Aug 13
Courtesy of Dr. Chanu Rhee

Incubation Period



Li, NEJM 2020; 382:1199-1207

Symptomatic vs Asymptomatic



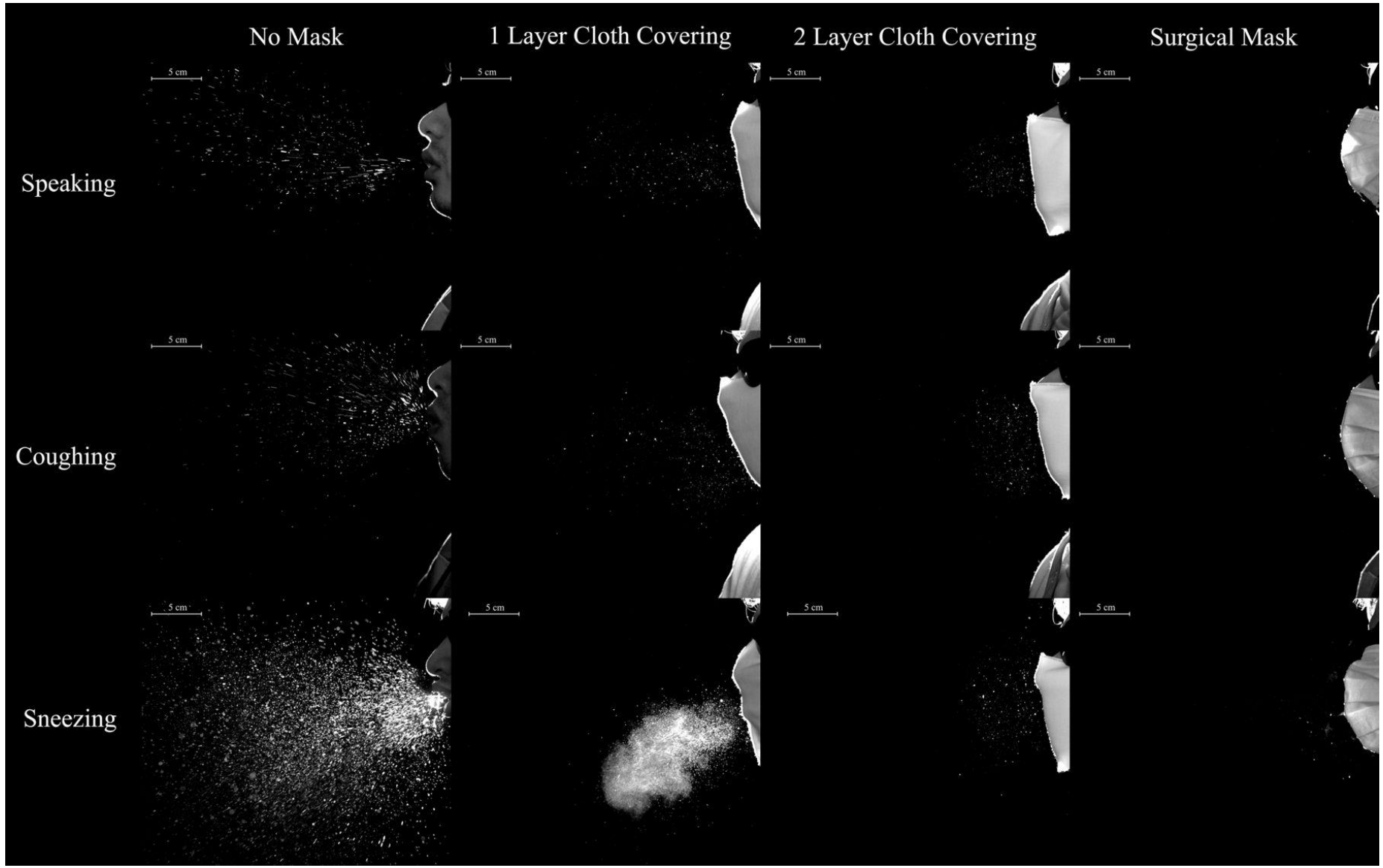
Asymptomatic patients may be *pre-symptomatic* or have subclinical findings on chest radiograph

Oran, Ann Intern Med 2020; Jun 3

Infection control principles

- Assume anyone could be infected with SARS-CoV-2
  - Masks
  - Physical distancing
  - Ventilation/air turnover
  - Hand hygiene
  - Symptom screening

Face coverings and face mask to minimize droplet dispersion and aerosolization in three different scenarios



Prateek Bahl et al. Thorax
doi:10.1136/thoraxjnl-2020-215748

Questions