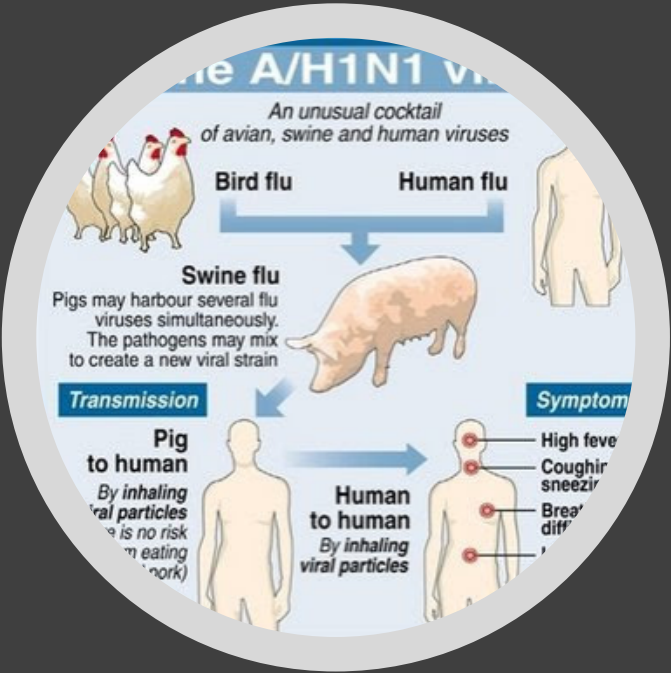# CoVID-19

Luis Ostrosky, MD, FACP, FIDSA, FSHEA, CMQ

Professor of Medicine and Epidemiology
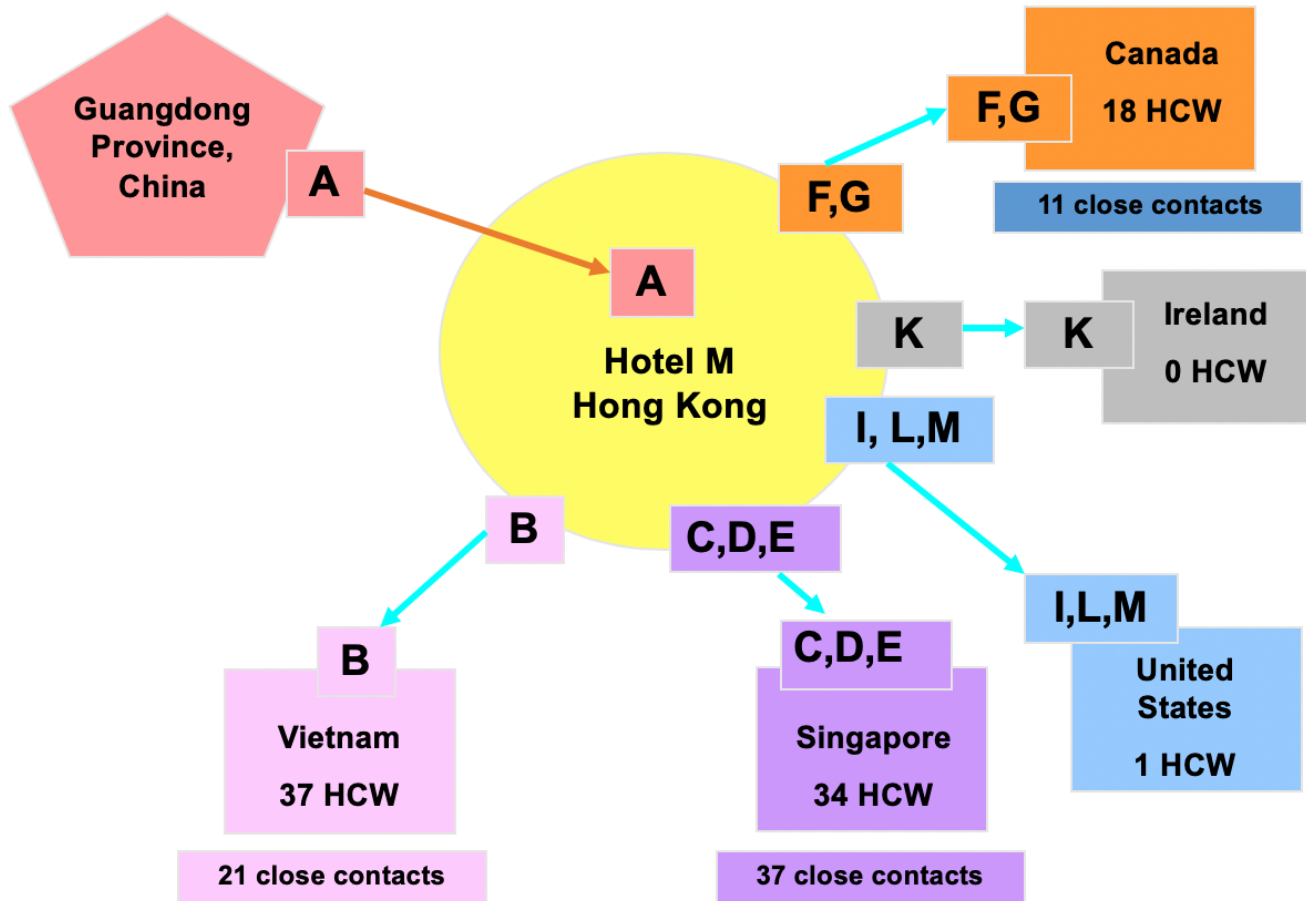
Vice Chair for Healthcare Quality

Division of Infectious Diseases
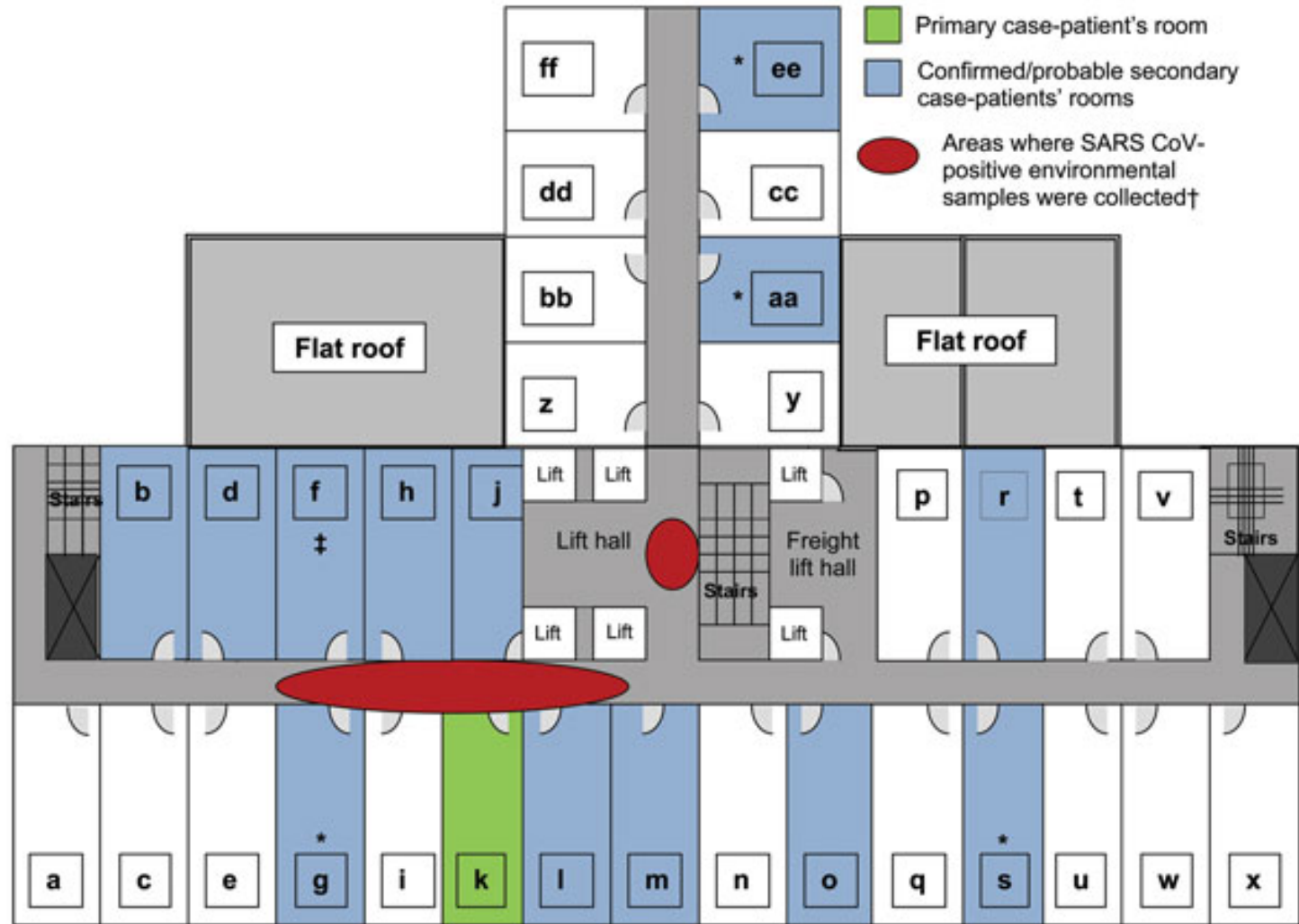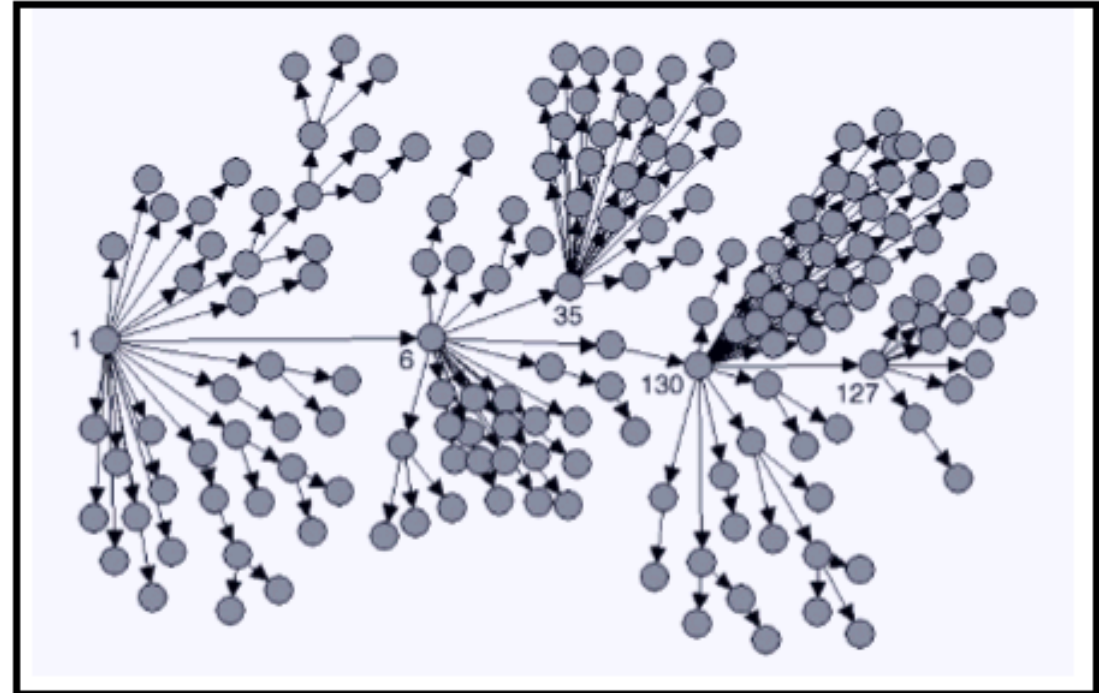
McGovern Medical School

Not our first time at the rodeo…

Early spread

Inside the Metropole hotel

The spread in Singapore

FIGURE 2. Probable cases of severe acute respiratory syndrome, by reported source of infection* — Singapore, February 25–April 30, 2003

* Patient 1 represents Case 1; Patient 6, Case 2; Patient 35, Case 3; Patient 130, Case 4; and Patient 127, Case 5. Excludes 22 cases with either no or poorly defined direct contacts or who were cases translocated to Singapore and the seven contacts of one of these cases.
Reference: Bogatti SP. Netdraw 1.0 Network Visualization Software. Harvard, Massachusetts: Analytic Technologies, 2002.

The Toronto Outbreak

Two phases of the Toronto SARS outbreak
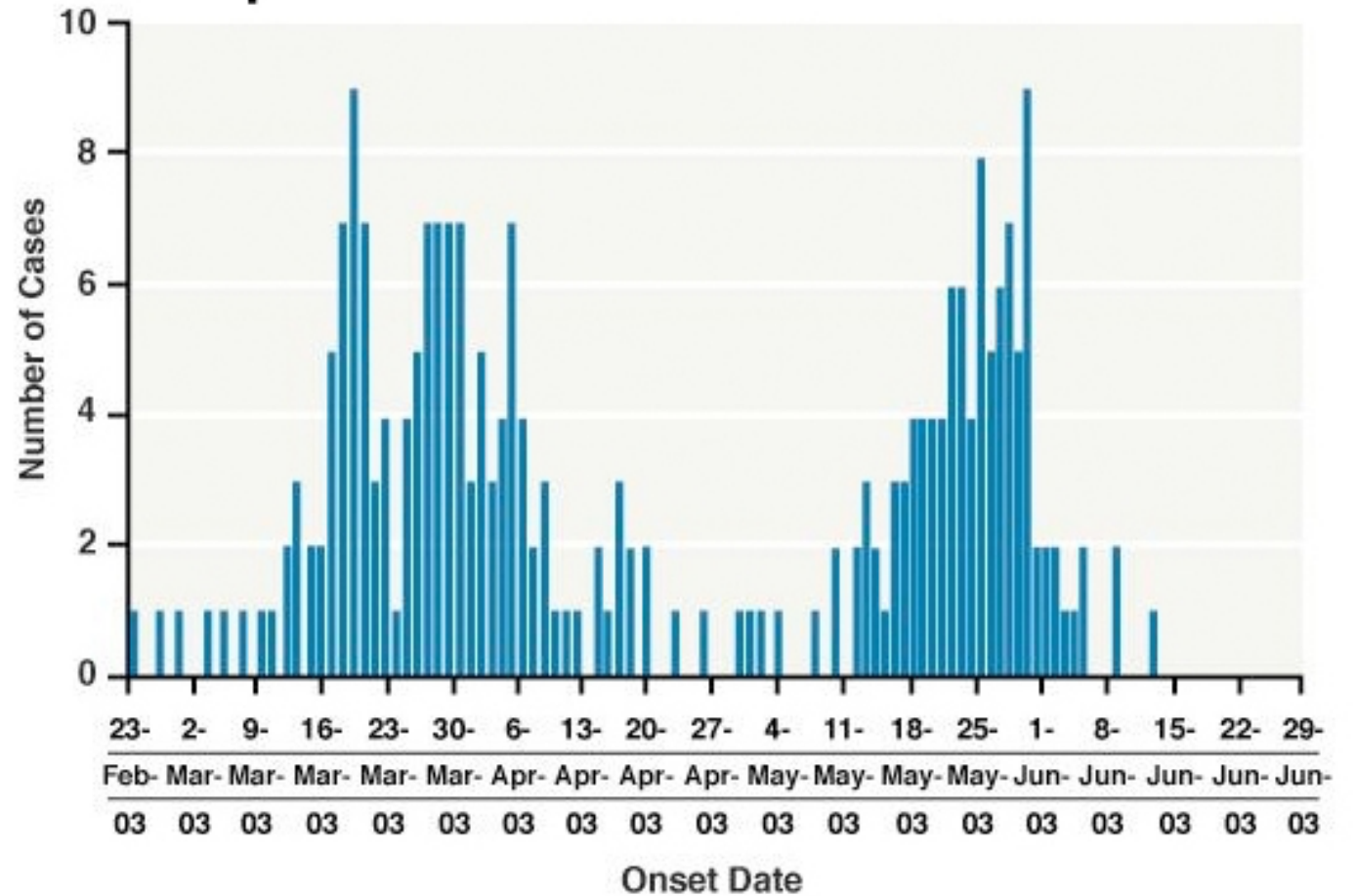
Toronto

- Severe HCW transmission
- Hospital shutdowns
- SARS wards
- Emergency assistance from US
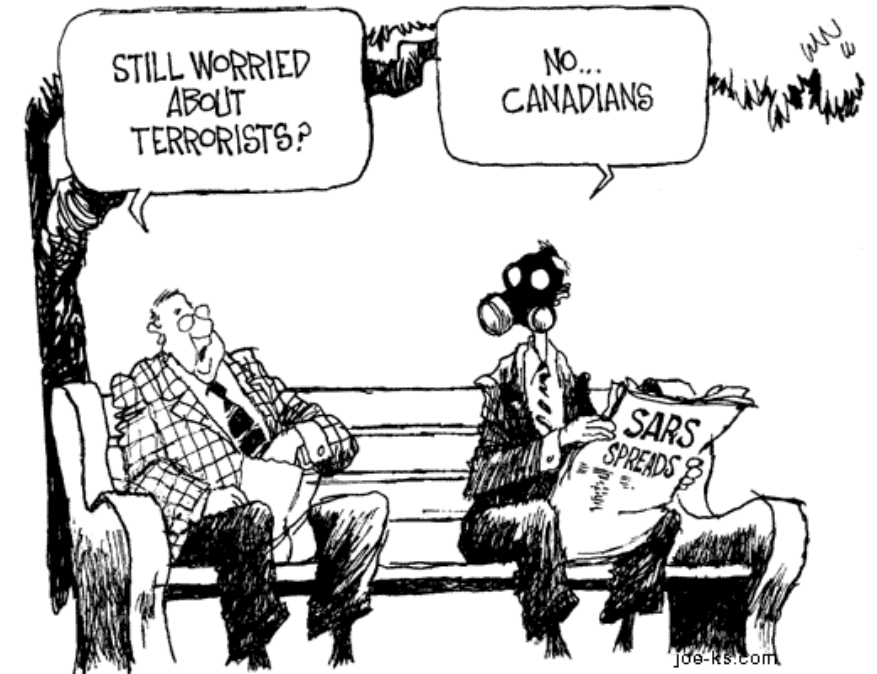
The clue was in the visitors!

Avian Influenza- 2005

H1N1 (Swine) Influenza

MERS: The new SARS

- Two early cases in the US
  - HCW Indiana
  - HCW Florida

- PUI every month or so
- Never really transmitted outside the middle east

Neighboring countries where precautions are recommended

Countries in or near the Arabian Peninsula

Lessons learned

Pandemic response plan drafted in 2003

Active monitoring and updates

ORP model

Screening algorithm

- EC, transfer ctr, International office, L&D, admissions, day surgery, other entry points
- Physician and house staff emails
- Electronic screening, order sets, and alerts

System approach

Contigency plan in-house

PPE packs placed in strategic locations

PPE sequence training/competency for high risk HCW

Guidelines for infection control in ancillary services

- EVS, F&N, laboratory, imaging, security, OR

Communications

Drills

- Suspected cases and system exercise

Where we are

WHO PANDEMIC PHASE DESCRIPTIONS AND MAIN ACTIONS BY PHASE

| PHASE	DESCRIPTION	MAIN ACTIONS				
		PLANNING AND COORDINATION	SITUATION MONITORING AND ASSESMENT	COMMUNICATIONS	REDUCING THE SPREAD OF DISEASE	CONTINUITY OF HEALTH CARE PROVISION
PHASE 1	No animal influenza virus circulating among animals have been reported to cause infection in humans.	Develop, exercise, and periodically revise national influenza pandemic preparedness and response plans.	Develop robust national surveillance systems in collaboration with national animal health authorities, and other relevant sectors.	Complete communications planning and initiate communications activities to communicate real and potential risks.	Promote beneficial behaviours in individuals for self protection. Plan for use of pharmaceuticals and vaccines.	Prepare the health system to scale up.
PHASE 2	An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a specific potential pandemic threat.					
PHASE 3	An animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.					
PHASE 4	Human to human transmission of an animal or human-animal influenza reassortant virus able to sustain community-level outbreaks has been verified.	Direct and coordinate rapid pandemic containment activities in collaboration with WHO to limit or delay the spread of infection.	Increase surveillance. Monitor containment operations. Share findings with WHO and the international community.	Promote and communicate recommended interventions to prevent and reduce population and individual risk.	Implement rapid pandemic containment operations and other activities; collaborate with WHO and the international community as necessary.	Activate contingency plans.
PHASE 5	The same identified virus has caused sustained community level outbreaks in two or more countries in one WHO region.	Provide leadership and coordination to multisectoral resources to mitigate the societal and economic impacts.	Actively monitor and assess the evolving pandemic and its impacts and mitigation measures.	Continue providing updates to general public and all stakeholders on the state of pandemic and measures to mitigate risk.	Implement individual, societal, and pharmaceutical measures.	Implement contingency plans for health systems at all levels.
PHASE 6	In addition to the criteria defined in Phase 5, the same virus has caused sustained community level outbreaks in at least one other country in another WHO region.					
POST PEAK PERIOD	Levels of pandemic influenza in most countries with adequate surveillance have dropped below peak levels.	Plan and coordinate for additional resources and capacities during possible future waves.	Continue surveillance to detect subsequent waves.	Regularly update the public and other stakeholders on any changes to the status of the pandemic.	Evaluate the effectiveness of the measures used to update guidelines, protocols, and algorithms.	Rest, restock resources, revise plans, and rebuild essential services.
POST PANDEMIC PERIOD	Levels of influenza activity have returned to the levels seen for seasonal influenza in most countries with adequate surveillance.	Review lessons learned and share experiences with the international community. Replenish resources.	Evaluate the pandemic characteristics and situation monitoring and assessment tools for the next pandemic and other public health emergencies.	Publicly acknowledge contributions of all communities and sectors and communicate the lessons learned; incorporate lessons learned into communications activities and planning for the next major public health crisis.	Conduct a thorough evaluation of all interventions implemented.	Evaluate the response of the health system to the pandemic and share the lessons learned.

World Health Organization

Outbreak Response and Incident Management: SHEA Guidance and Resources for Healthcare Epidemiologists in United States Acute-Care Hospitals

David B. Banach, MD, MPH, MS;[1,a] B. Lynn Johnston, MD, MS, FRCPC;[2,a] Duha Al-Zubeidi, MD;[3] Allison H. Bartlett, MD, MS;[4] Susan Casey Bleasdale, MD;[5] Valerie M. Deloney, MBA;[6] Kyle B. Enfield, MD, MS;[7] Judith A. Guzman-Cottrill, DO;[8] Christopher Lowe, MD, MSc;[9] Luis Ostrosky-Zeichner, MD;[10] Kyle J. Popovich, MD, MS;[11] Payal K. Patel, MD;[12] Karen Ravin, MD, MS;[13] Theresa Rowe, DO, MS;[14] Erica S. Shenoy, MD, PhD;[15] Roger Stienecker, MD;[16] Pritish K. Tosh, MD;[17] Kavita K. Trivedi, MD;[18] and the Outbreak Response Training Program (ORTP) Advisory Panel[b]

Incident command model
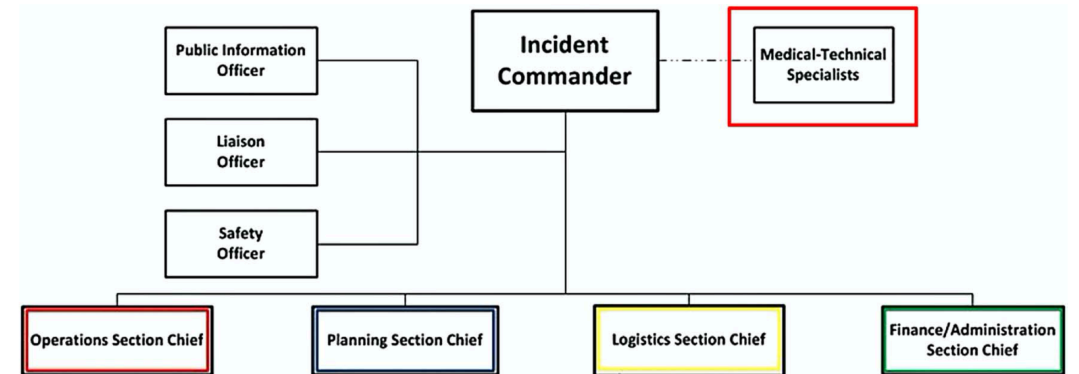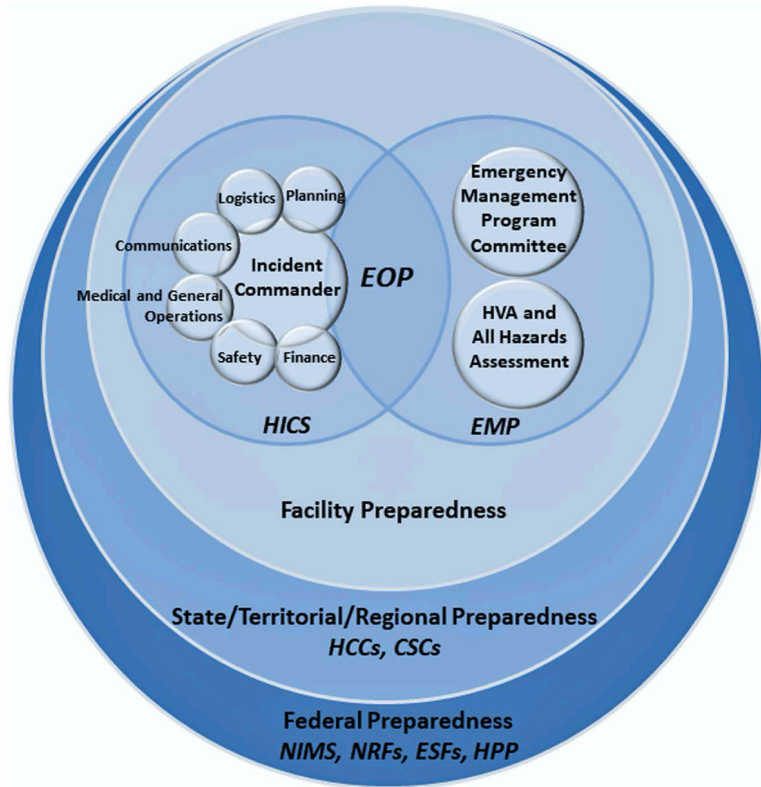
Hermann plan

COVID-19 INCIDENT RESPONSE

Memorial Hermann Health System
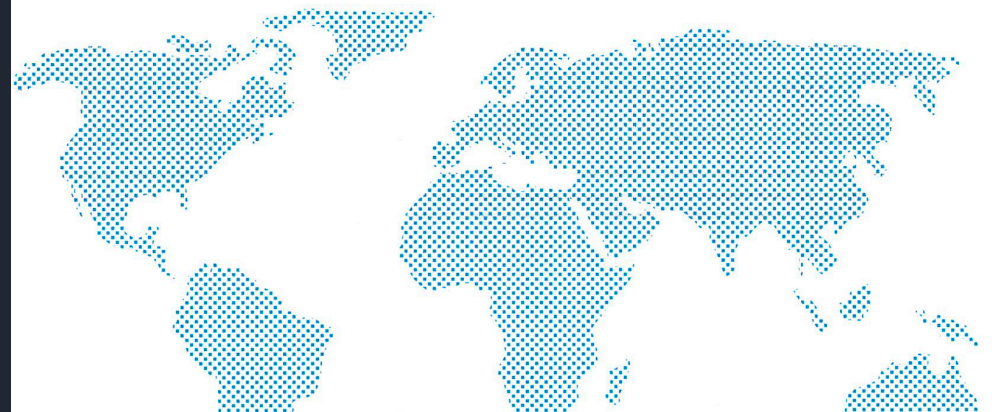
SARS-CoV-2
& CoVID-19

2019 Novel coronavirus

- Coronaviruses are a large family of viruses that are common in many different species of animals

- One of the most common causes of the "common cold" in humans

- Rarely, animal coronaviruses can infect people and then spread between people such as with MERS and SARS

- First detected in Wuhan, China in December

- Initial cases had a link to a large "wet market" suggesting animal-to-person spread

- Subsequent cases indicated person-to-person spread

- Cases are now being reported in 6 continents, with community transmission.

Confirmed CoVID-19 Cases Globally

As of 12:00 p.m. ET March 10, 2020
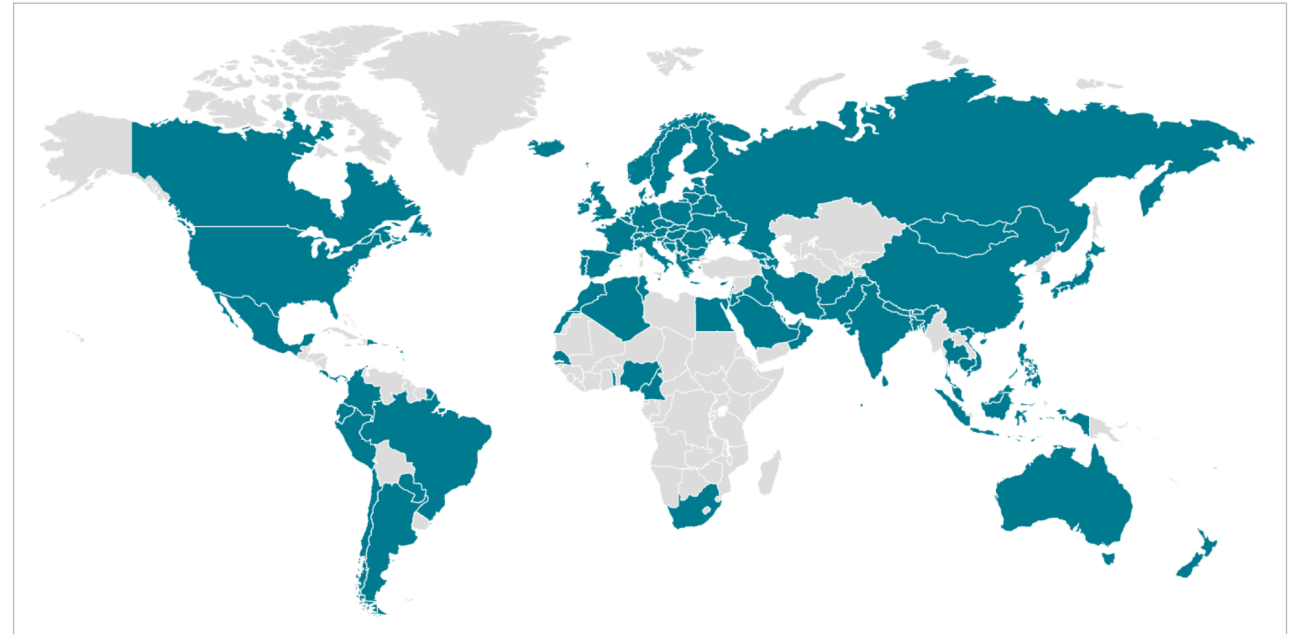
CoVID-19 in the US 3/4/20 from 3/11/20
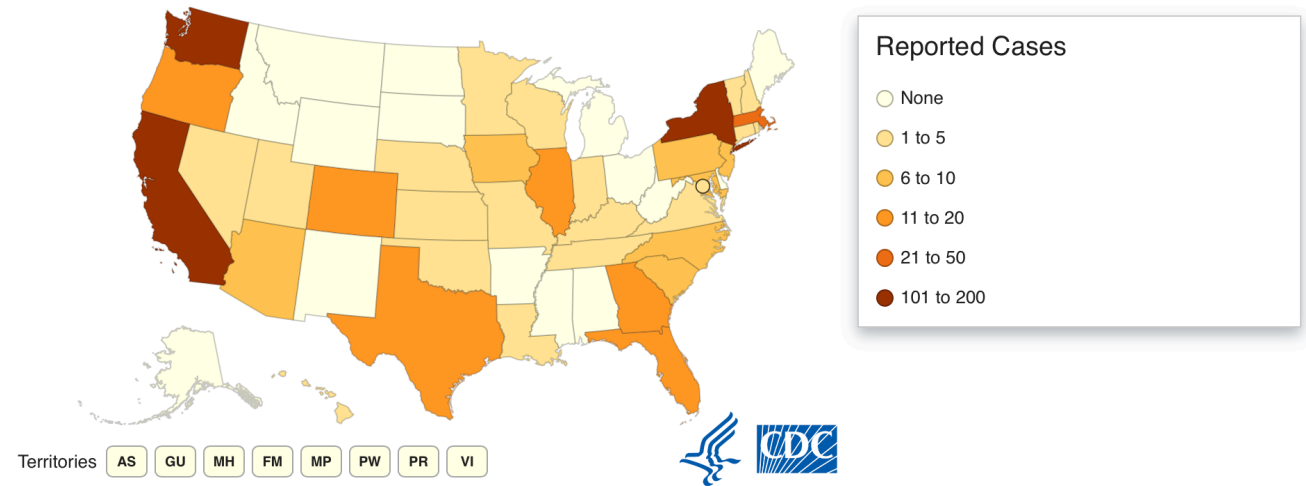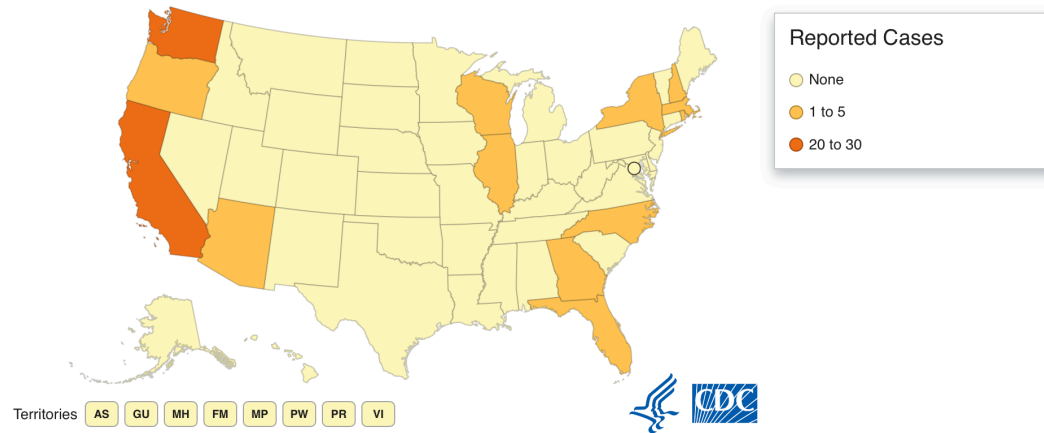
Coronavirus Testing: Criteria and Numbers by Country

As of March 2, 2020

We were undertesting

Country	Tests Performed	Tests per Million People	Population	Source
South Korea	109,591	2,138	51,269,185	source
Italy	23,345	386	60,461,826	source
Austria	2,120	235	9,006,398	source
Switzerland	1,850	214	8,654,622	source
UK	13,525	199	67,886,011	source
Finland	130	23	5,540,720	source
Turkey	940	11	84,339,067	source
United States	472*	1	331,001,651	source

https://www.worldometers.info/coronavirus/covid-19-testing/

Where does SARS-CoV-2 rank?

Fatality rate (log scale)

- MERS
- Bird flu
- Ebola
- Smallpox
- Spanish flu
- Polio
- SARS
- **Wuhan coronavirus** — Most estimates put the fatality rate below 3%, and the number of transmissions between 1.5 and 3.5.
- Swine flu
- Measles
- Seasonal flu
- Common cold
- Chickenpox

More deadly ↑

Spreads faster →

Average number of people infected by each sick person
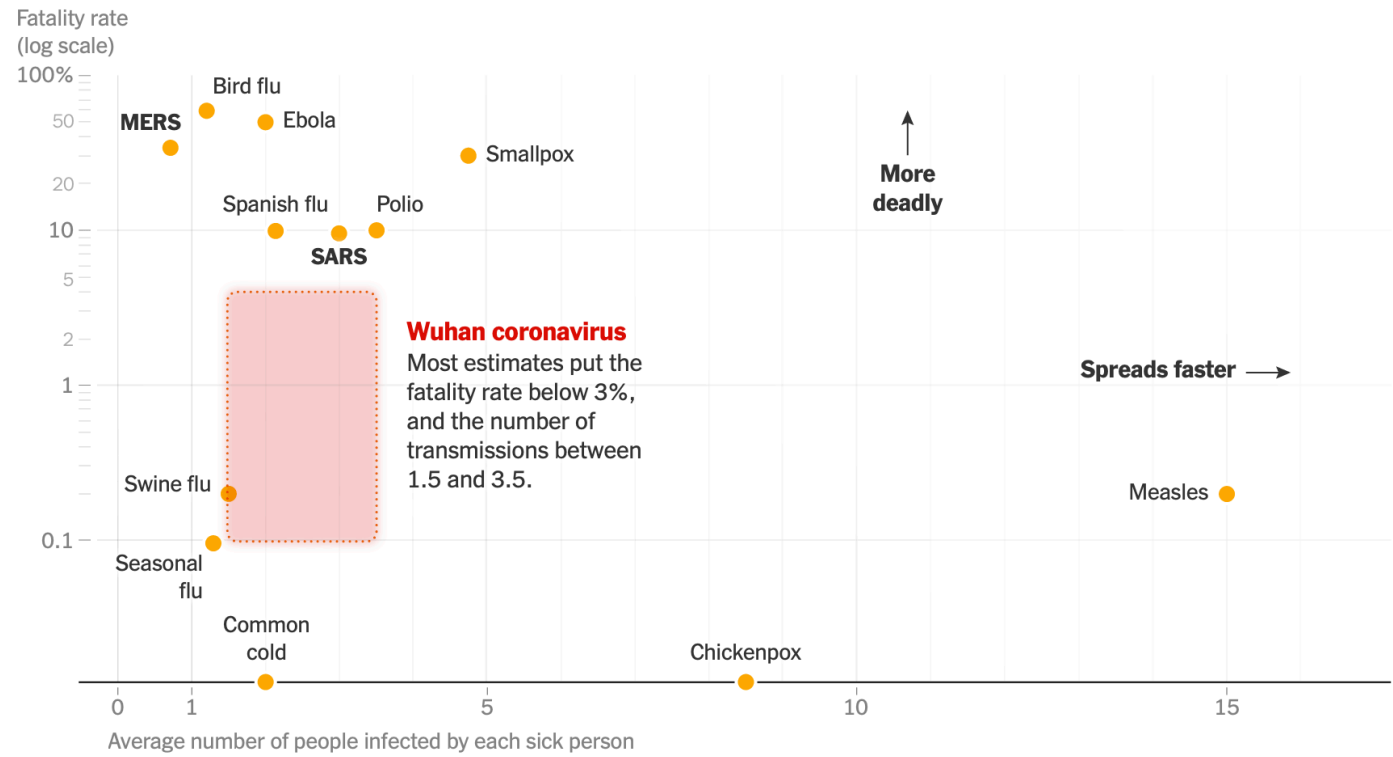
Note: Average case-fatality rates and transmission numbers are shown. Estimates of case-fatality rates can vary, and numbers for the Wuhan coronavirus are preliminary estimates.

NY Times

Contrasting SARS vs CoVID-19

10,000 reported cases

Wuhan coronavirus

8,000

6,000

SARS

4,000

2,000

Numbers rose after SARS cases from mainland China were reported.

0

Day 20   40   60   80   100   120   140
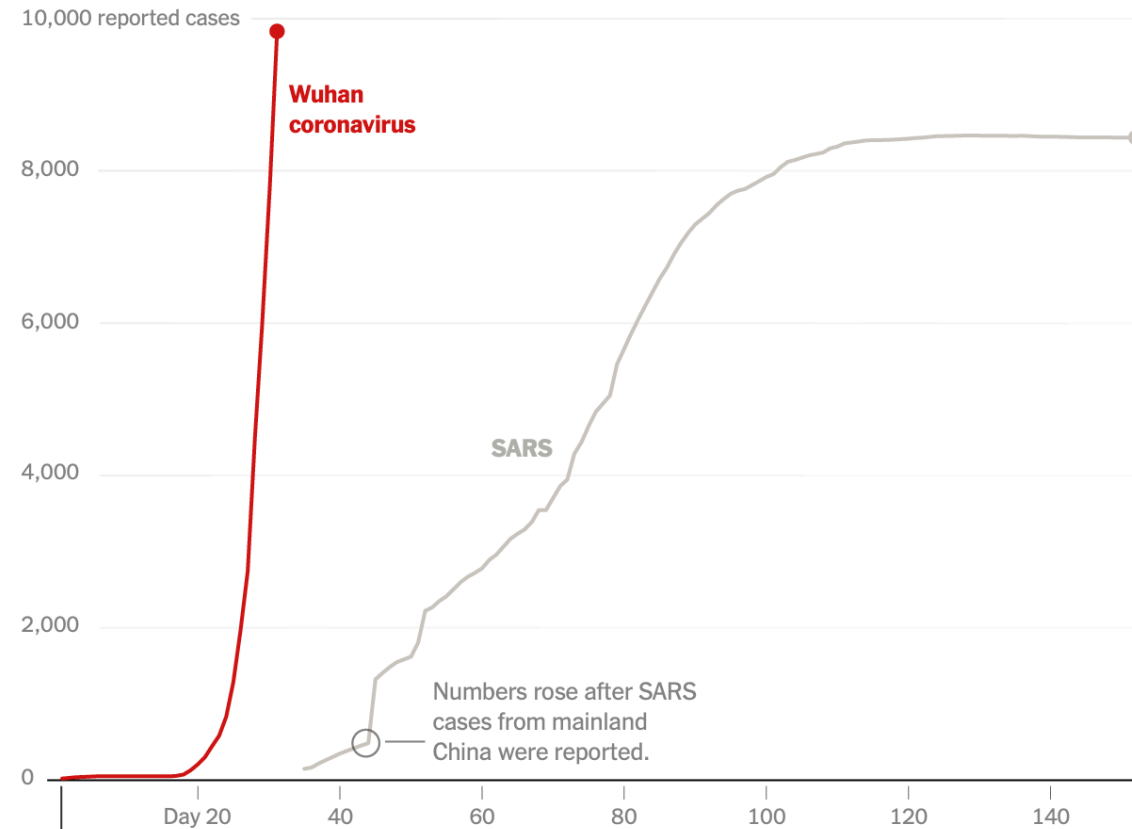
The first day that W.H.O. received reports of the outbreaks

Notes: The official World Health Organization case count for SARS was delayed at the beginning of the outbreak. Some cases were suspected but not confirmed; SARS is a diagnosis of exclusion, so previously reported cases may have been discarded after further investigation. Wuhan coronavirus data as of 11:30 p.m. E.T., Jan. 30.

NY Times

How does COVID-19 compare to FLU?

PRELIMINARY U.S. FLU BURDEN ESTIMATES

So far this season, CDC estimates there have been at least:

32 million Illnesses

14 million Medical visits

310,000 Hospitalizations

18,000 Deaths

Based on data from Oct. 1, 2019, through Feb. 22, 2020

* Because influenza surveillance does not capture all cases of flu that occur in the U.S., CDC provides these estimated ranges to better reflect the larger burden of influenza. These estimates are calculated based on CDC's weekly influenza surveillance data and are preliminary.

CDC

The worst epidemiological situation.. Stop the cruises!

Current person under investigation (PUI) criteria

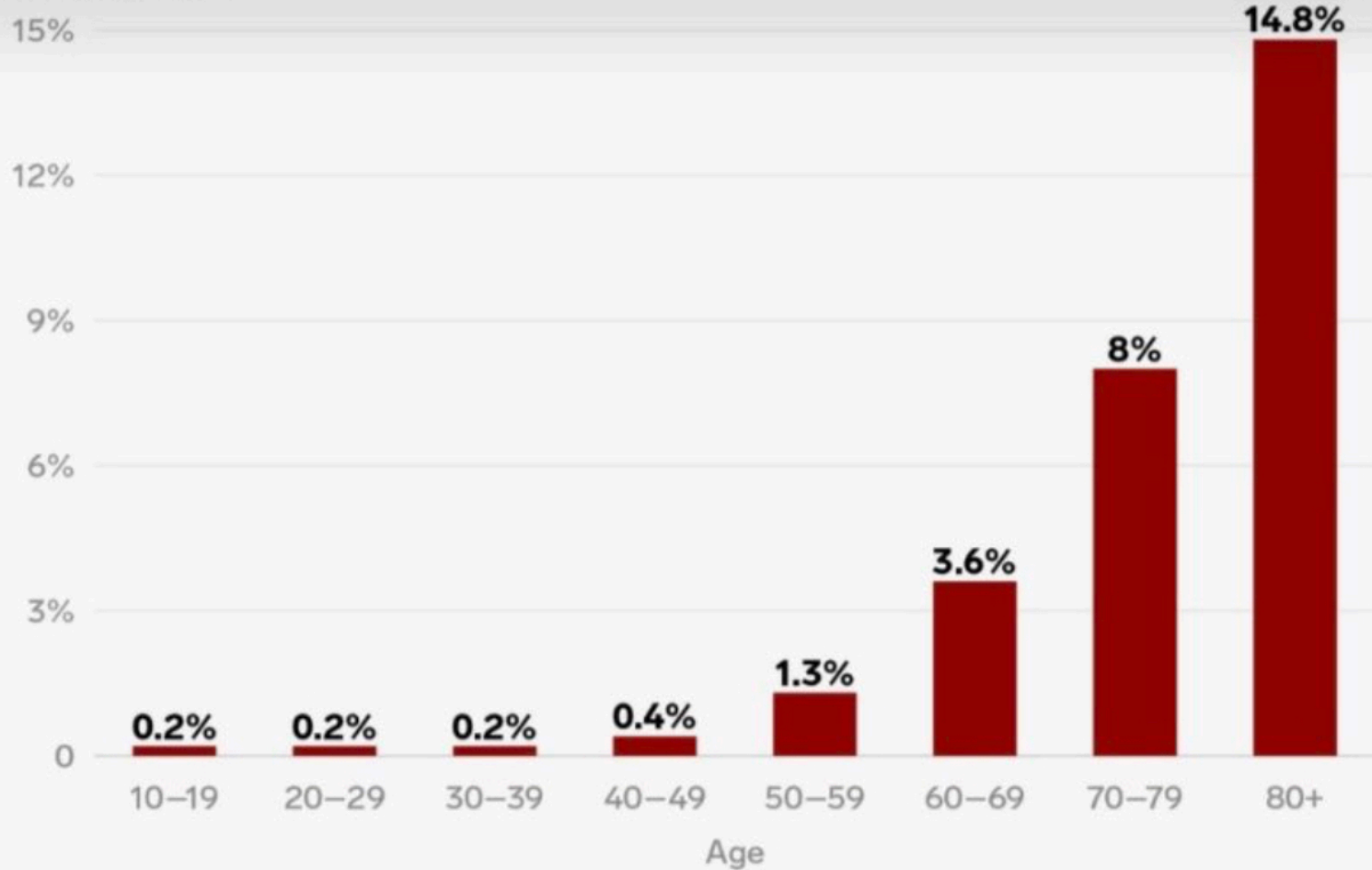| Clinical Features	&	Epidemiologic Risk
Fever[1] **or** signs/symptoms of lower respiratory illness (e.g. cough or shortness of breath)	**AND**	Any person, including healthcare workers[2], who has had close contact[3] with a laboratory-confirmed[4] COVID-19 patient within 14 days of symptom onset
Fever[1] **and** signs/symptoms of a lower respiratory illness (e.g., cough or shortness of breath) requiring hospitalization	**AND**	A history of travel from affected geographic areas[5] (see below) within 14 days of symptom onset
Fever[1] with severe acute lower respiratory illness (e.g., pneumonia, ARDS) requiring hospitalization and without alternative explanatory diagnosis (e.g., influenza)[6]	**AND**	No source of exposure has been identified

Clinical pearls

- Incubation period: 4-7 days (95%CI), but max range is 2-14 days
- Symptoms:
  - Fever (83-98%)
  - Dry cough (46-82%)
  - Myalgia/fatigue (11-44%)
  - SOB (31%)
  - Less common: Sore throat, headache, productive cough, hemoptysis, **diarrhea**
- Biphasic course, deterioration during the 2nd week of illness
- Lab and Imaging:
  - Leukopenia, lymphopenia, transaminases, normal procalcitonin
  - Bilateral consolidation and ground glass opacities
- Complications:
  - ARDS
  - Secondary infection (bacterial, fungal)
  - **Cardiac events**
  - Shock/sepsis/MOF
- Risk factors for mortality:
  - Age >60
  - Male gender
  - Comorbidities

CDC.gov

Age is an important predictor for mortality

COVID-19 mortality rate by age

Mortality rate

- 15%
- 12%
- 9%
- 6%
- 3%
- 0

Age	Mortality rate
10–19	0.2%
20–29	0.2%
30–39	0.2%
40–49	0.4%
50–59	1.3%
60–69	3.6%
70–79	8%
80+	14.8%

Age

Source: Chinese Center for Disease Control and Prevention

BUSINESS INSIDER

Knowns and unknowns

- Knowns
  - Person to person spread through droplets
  - **Not airborne**
  - 2-14d (5-7d 95%CI) incubation period
  - 90% present with fever
  - Mortality associated with age and underlying comorbidities.
  - 2-9 days environmental survival
  - Susceptible to common disinfectants

- Unknowns
  - True number of cases
  - Ease of transmission compared to other viruses
  - Specific treatment
  - Vertical transmission
  - *How* contagious before symptoms

Treatment

- Supportive care
  - ECMO?
- Complication management
  - Avoid steroids!
- Antivirals?
  - Ribavirin
  - Protease inhibitors
  - Interferon
  - Oseltamivir
- Cloroquine?
- Hyperimmune serum

Common myths and urban legends

- Packages from China can transmit the virus
- Pets can be reservoirs
- Things that prevent the virus:
  - Mouthwash
  - Alcohol and bleach sprays
  - Garlic
  - Sesame oil
  - Face masks
- A vaccine is already available
- The virus was patented
- The virus is a rogue HIV vaccine/bioweapon that escaped from a BSL-4 lab

Tom Cotton @SenTomCotton

When I said we couldn't rule out any explanation yet for the Wuhan coronavirus' origin, @washingtonpost claimed I was repeating "conspiracy theories" that experts had "debunked."

Wrong. washingtonpost.com/politics/2020/...

Tom Cotton keeps repeating a coronavirus conspiracy theory ...
Experts say there's no evidence the virus is man-made and it's "highly unlikely" it is the result of an accident at a lab.
washingtonpost.com

CNN @CNN

38% of Americans wouldn't buy Corona beer "under any circumstances" because of the coronavirus, according to a recent survey.

Just to be abundantly clear: There is no link between the virus and the beer.
cnn.it/398M5A9

Corona beer sounds like coronavirus, but...
Corona beer isn't making any changes to its ...
cnn.com

What are we doing as a country?

Travel alerts to China, Italy, Iran, Japan, Hong Kong, and South Korea. TRAVEL BANS.

Repatriation/quarantine of US citizens

Airport screening US

Infection Prevention and Control Recommendations

What to expect

- Increased number of cases, including more cases in the US
- Community/person-to-person spread in the US
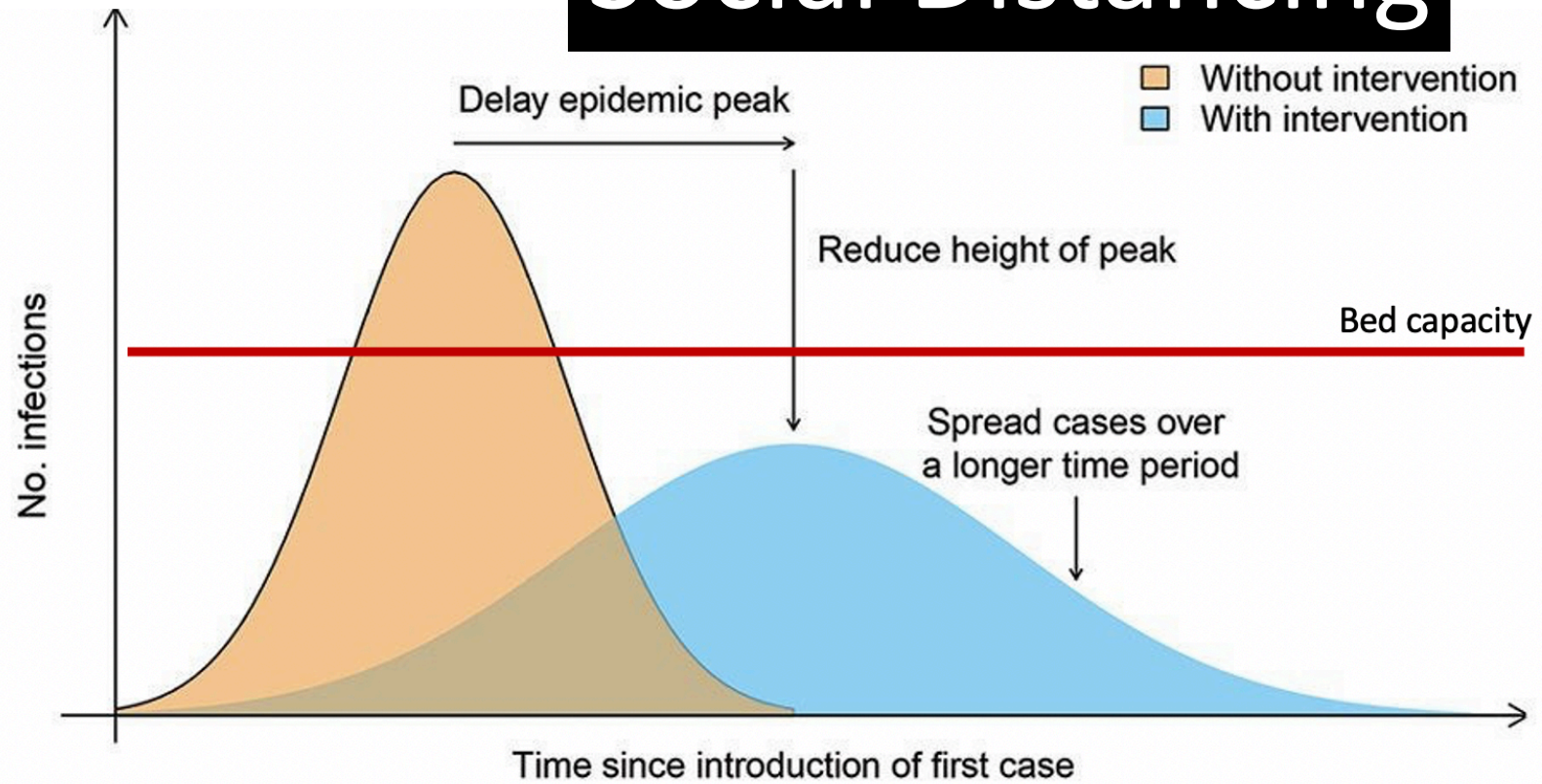- Overall, risk remains low for general public. Need to protect high risk groups to avoid a healthcare surge
- Better understanding of transmission and disease
- If SARS/MERS model, outbreak will last a few months, but potential for endemicity or seasonality

Social Distancing

MH Infection prevention team:
Kelley Boston
Sonia Basset
Yvana Rivera
Valerie Ausborn
Olayinka Oremade
Sarah Milligan
Julia Thomas
Elizabeth Reed
John Butler
Tawanna McInnis-Cole
Jocelyn Williams

UTP Infection prevention team:
Kristofer Harris
Fozia Steinkuller

ID EPI team:
Misti Ellsworth
Karen Vigil
Michael Chang
Susan Wootton
Masayuki Nigo
Charles Ericsson

Leadership:
Barbara Murray
David McPherson
Barbara Stoll
Giuseppe Colasurdo
Michael Blackburn
Robert Emery
Andrew Casas
Meredith Raine
Bela Patel
Jeffrey Katz
Robert Yetman
Greg Haralson
Susie Distefano
Toni Vonwenckstern
Lance Ferguson
Justin Kendrick
Bryan Williams

THANK YOU

Luis.Ostrosky-Zeichner@uth.tmc.edu

@DrLuisO