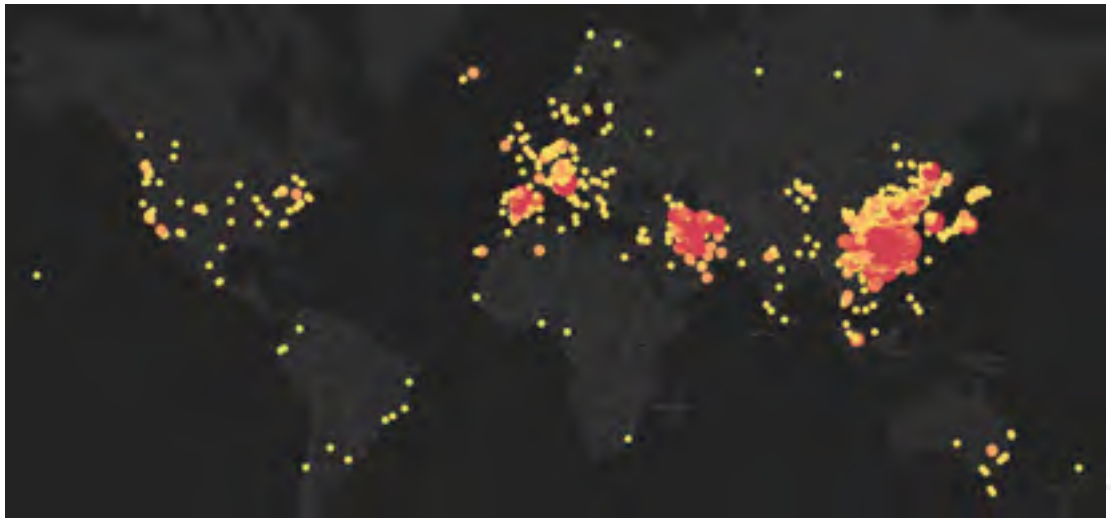
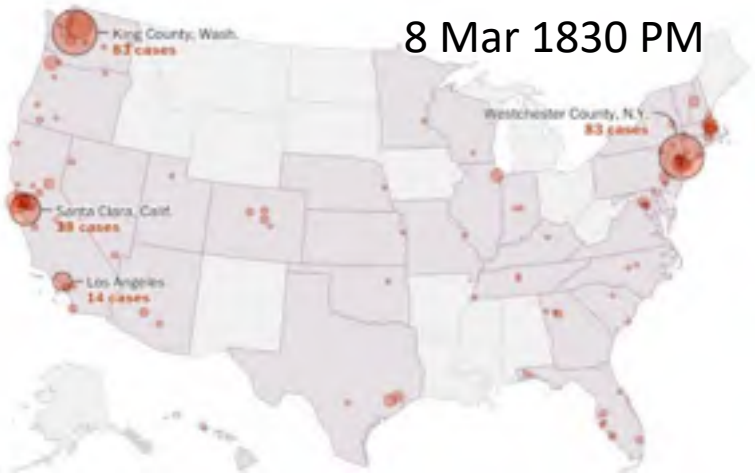
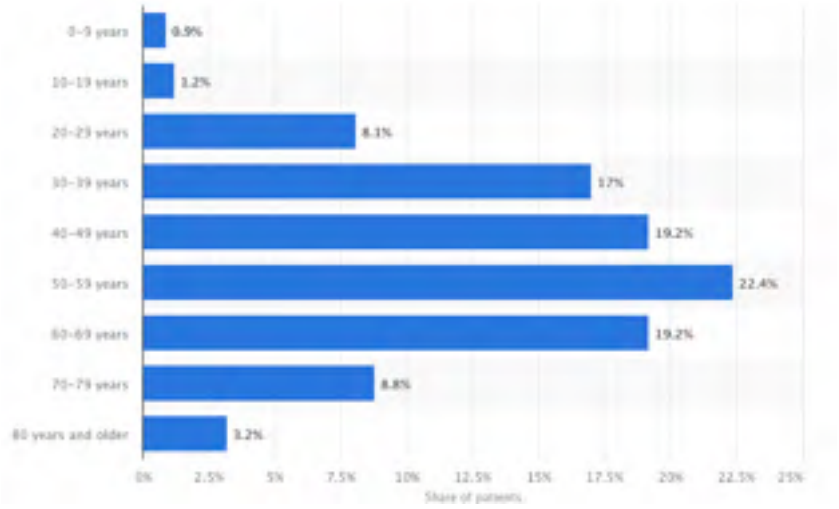
Corona Virus Briefing (9 Mar. 2020)





8 Mar 1830 PM

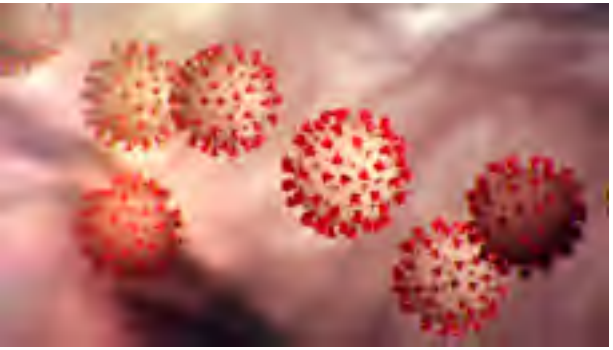


AGE	DEATH RATE*
80+ years old	14.8%
70-79 years old	8.0%
60-69 years old	3.6%
50-59 years old	1.3%
40-49 years old	0.4%
30-39 years old	0.2%
20-29 years old	0.2%
10-19 years old	0.2%
0-9 years old	no fatalities

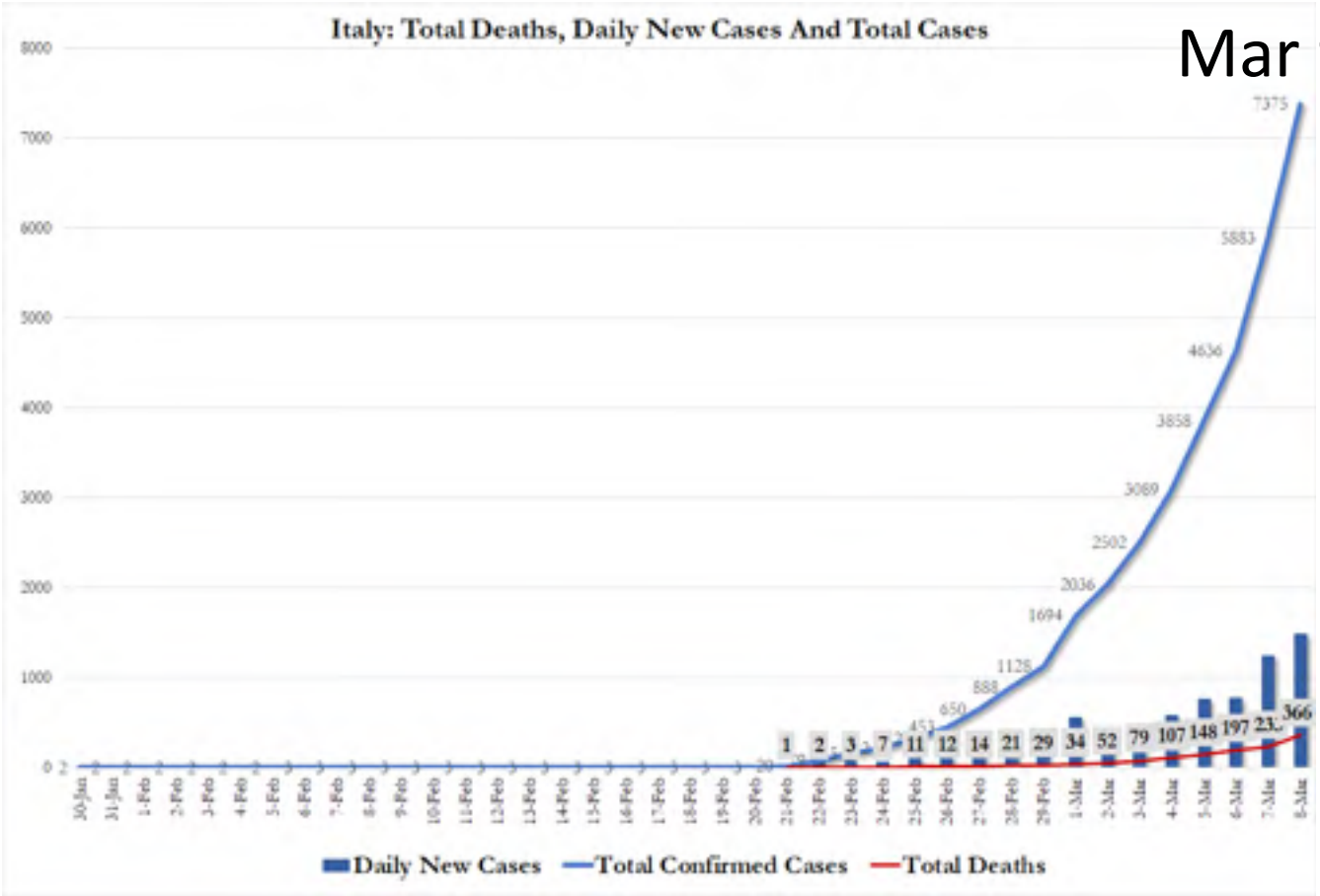
*Death Rate = (number of deaths / number of cases) = probability of dying if infected by the virus (%)

102084 cases globally

Corona Virus Briefing (9 Mar. 2020)



- Human experience – linear not exponential
- Exponential growth is natural for a virus



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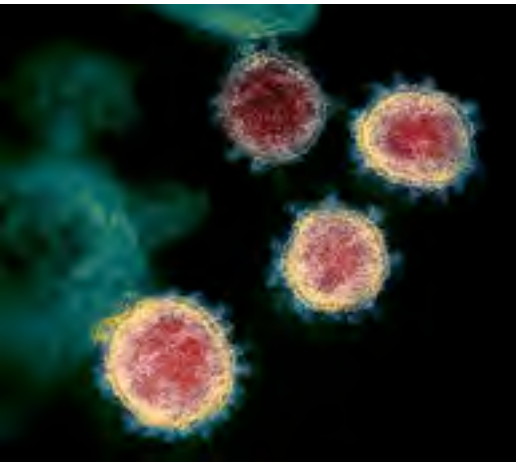
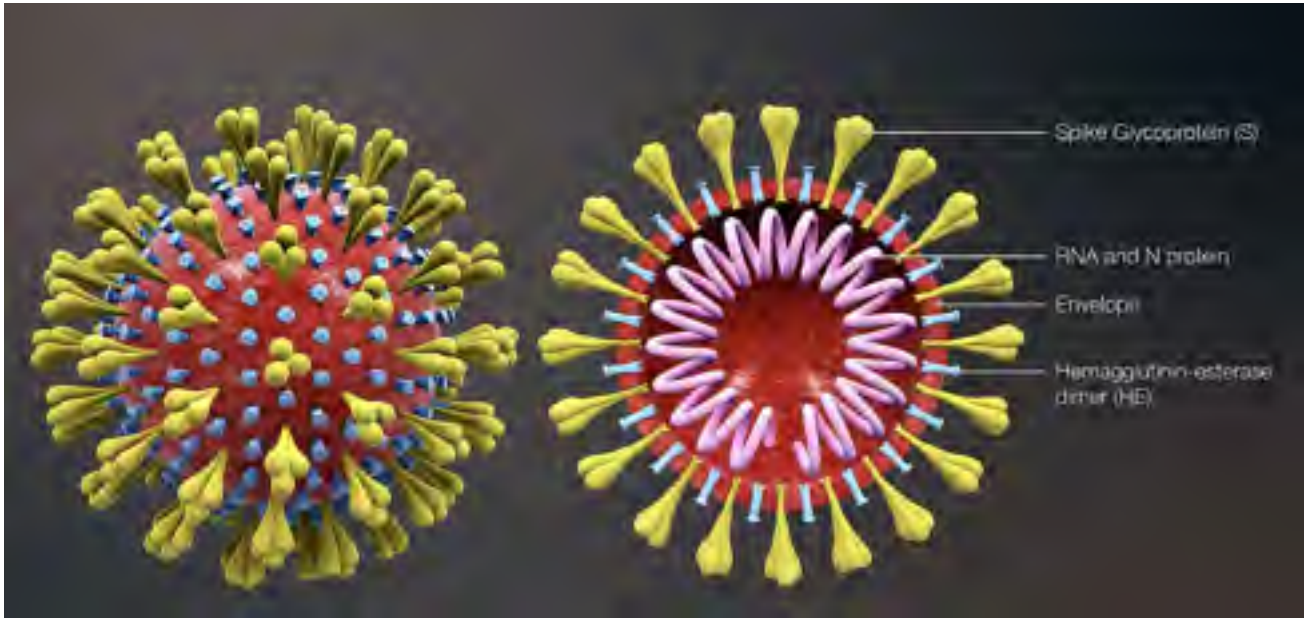
Corona Virus Briefing (9 Mar. 2020)

What is a virus?

The most abundant “life” on earth
DNA (or RNA) in a protein coat with a viral wrapper



n-Cov19 from NIH

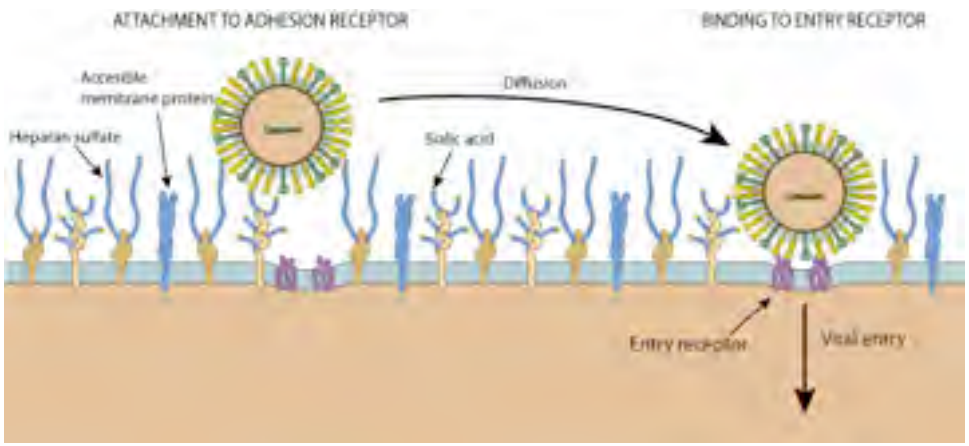


Corona Virus Briefing (9 Mar. 2020)

What is a virus?

Proteins on virus trick cell to allowing entry

Zika virus in cell



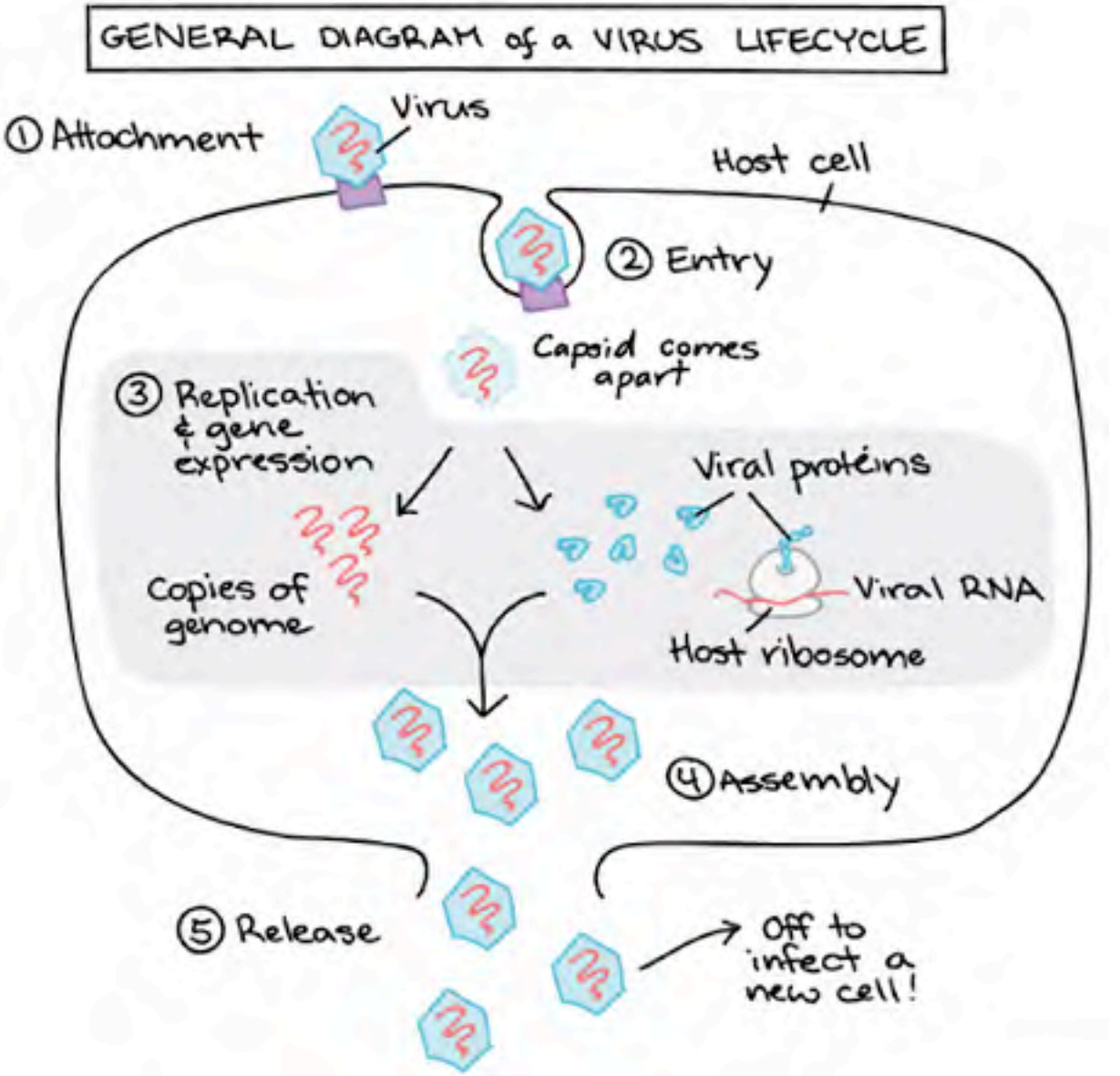
Virus's depend on a host cell for reproduction

"Hijack the cellular machinery"

Corona Virus Briefing (9 Mar. 2020)

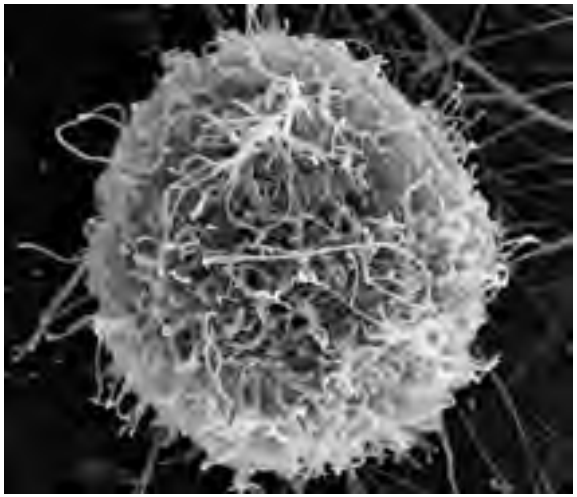
What is a virus?

H1N1 budding from lung cell



Corona Virus Briefing (9 Mar. 2020)

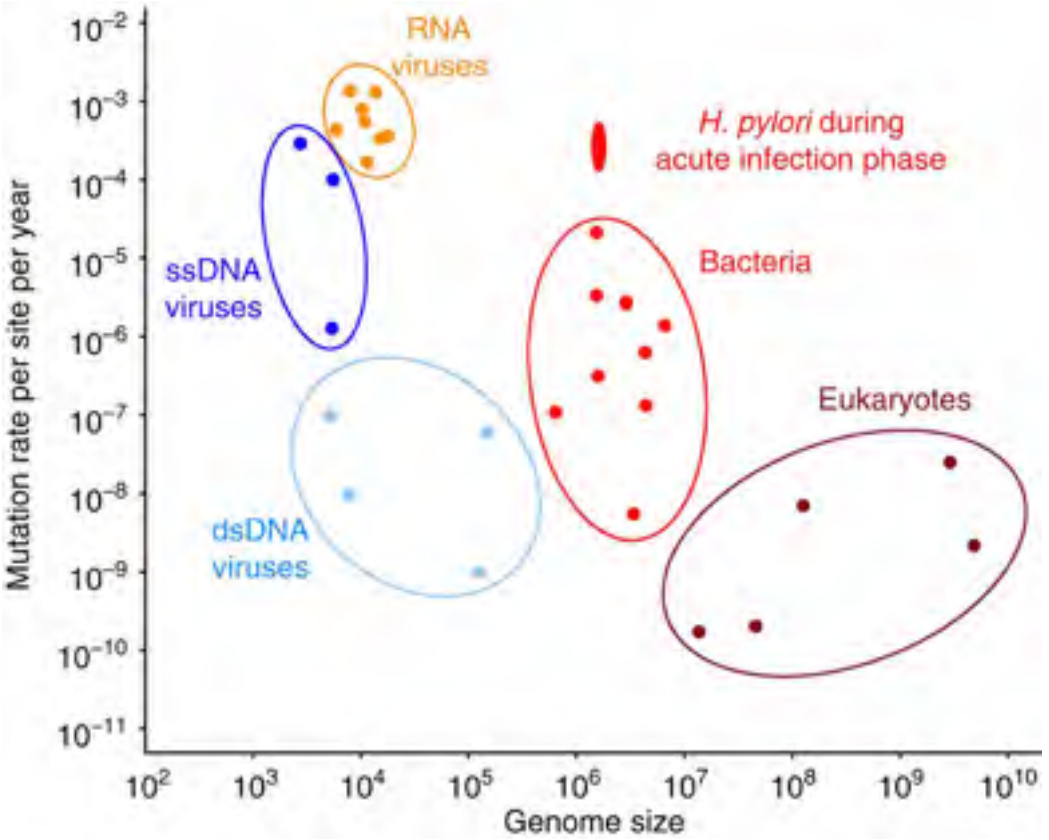
What is a virus?



Ebola virus

Virus's mutate

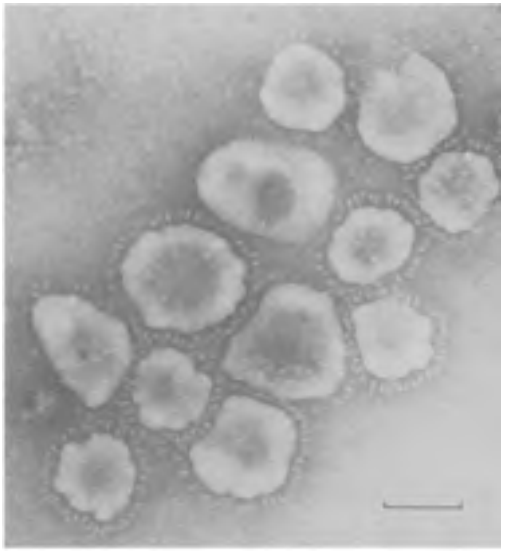
- why you can get the common cold every year



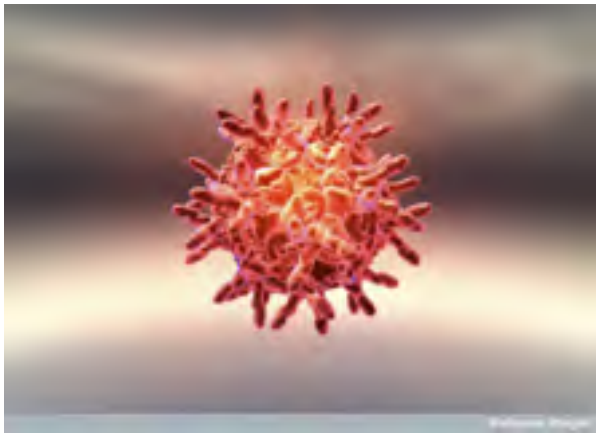
Bronchitis virus, from Linz et al. 2014

Corona Virus Briefing (9 Mar. 2020)

What is a virus?



Bronchitis virus, -Siddell et al., 1983



Human rhinovirus – common cold

Corona Virus's are not new

nCoVid19 is a corona virus, a family discovered in the 1960s.

Corona virus's are zoonotic – animal to human and vice-versa transmission.

Prior to 2002 (SARS*) associated with the common cold in humans.

Typical coronavirus affects a small section of the lung.

Typically, a local IgA immune response is sufficient to the development of humoral immunity.

*SARS - Severe Acute Respiratory Syndrome

Corona Virus Briefing (9 Mar. 2020)

Presentation

Symptoms — no. (%)	All	Non-Severe	Severe
Conjunctival congestion	9 (0.8)	5 (0.5)	4 (2.3)
Nasal congestion	53 (4.8)	47 (5.1)	6 (3.5)
Headache	150 (13.6)	124 (13.4)	26 (15.0)
Cough	745 (67.8)	623 (67.3)	122 (70.5)
Sore throat	153 (13.9)	130 (14.0)	23 (13.3)
Sputum production	370 (33.7)	309 (33.4)	61 (35.3)
Fatigue	419 (38.1)	350 (37.8)	69 (39.9)
Hemoptysis	10 (0.9)	6 (0.6)	4 (2.3)
Shortness of breath	205 (18.7)	140 (15.1)	65 (37.6)
Nausea or vomiting	55 (5.0)	43 (4.6)	12 (6.9)
Diarrhea	42 (3.8)	32 (3.5)	10 (5.8)
Myalgia or arthralgia	164 (14.9)	134 (14.5)	30 (17.3)
Chills	126 (11.5)	100 (10.8)	26 (15.0)

Coughing blood

Muscle Pain, Joint Pain

https://www.hopkinsguides.com/hopkins/view/Johns_Hopkins_ABX_Guide/540143/all/Coronavirus

Corona Virus Briefing (9 Mar. 2020)

Presentation

SITES OF INFECTION

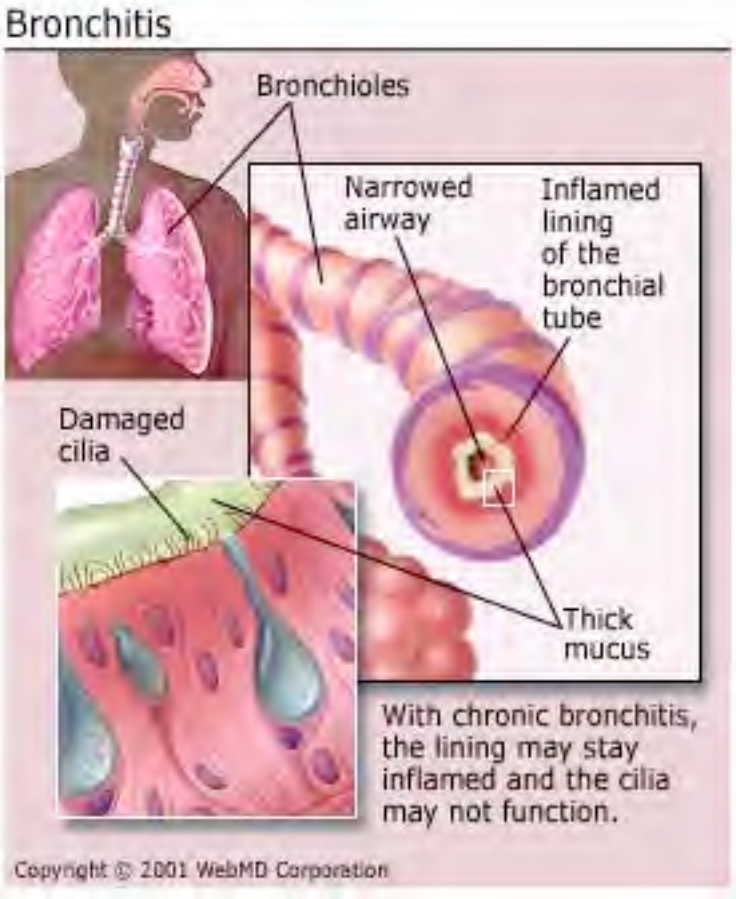
Upper respiratory tract: common cold, acute exacerbation of chronic bronchitis or COPD flare, asthma flare, acute bronchitis, sinusitis

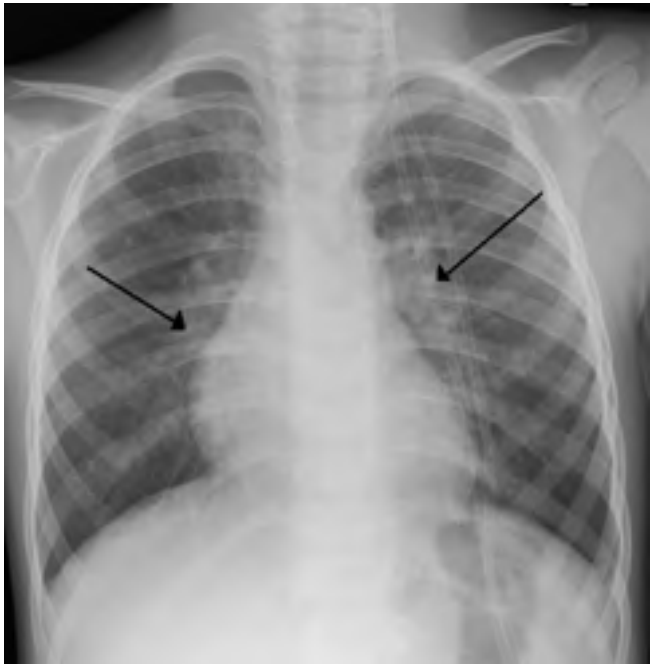
HCoV infections thought to account for 5-10% of URTIs.

Lung: an uncommon cause of pneumonia

Gastrointestinal tract: gastroenteritis mainly described in infants

CNS: encephalitis (rare)





Corona Virus Briefing (9 Mar. 2020)

How Covid19 Kills

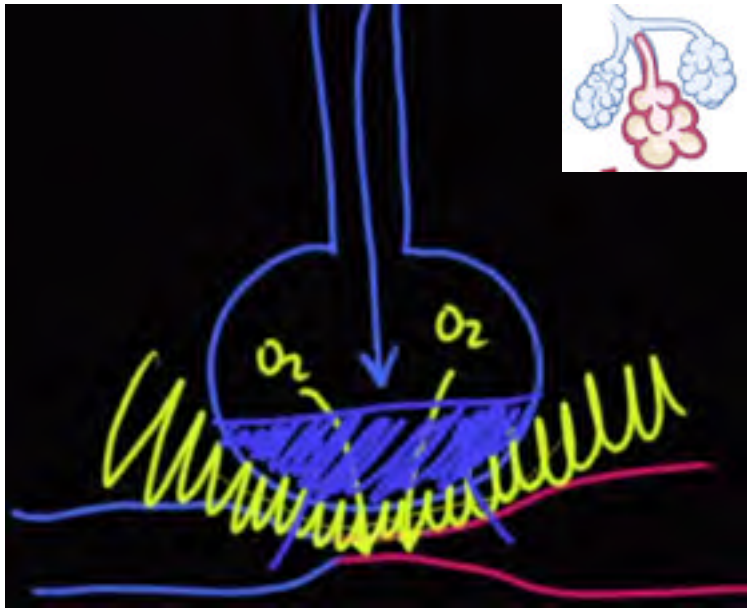
We breath through 600 million alveoli in our lungs that exchange oxygen and CO2 with blood.

Inflammation causes leakage of fluid between alveoli and capillaries and membrane thickening.

Cytokine storm triggers lung-wide inflammation leading to blood cell leakage and alveoli filling with fluid (distress).

Normal Alveoli

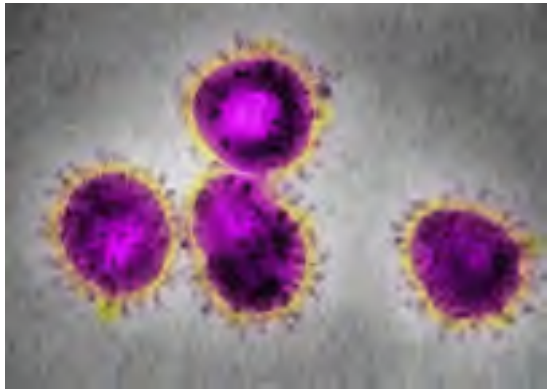
Inflamed Alveoli



Severe Acute Respiratory Syndrome
Acute Respiratory Distress Syndrome

Corona Virus Briefing (9 Mar. 2020)

How Covid19 Kills



The most common symptoms include fever, fatigue and dry cough, shortness of breath.

Leukopenia* in ~70% of hospitalized patients. LDH may be modestly elevated.

For those with COVID-19 pneumonia

Chest CT may include ground-glass opacities that may evolve into consolidation or ARDS, findings appear to peak at 10d of illness, resolution begins > d14.

Among hospitalized patients, about one-third need to be in the ICU/intubated with an ARDS picture.

*Low white blood cell count

https://www.hopkinsguides.com/hopkins/view/Johns_Hopkins_ABX_Guide/540143/all/Coronavirus

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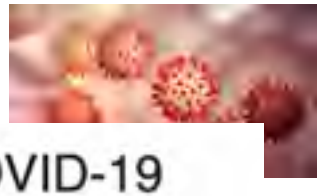
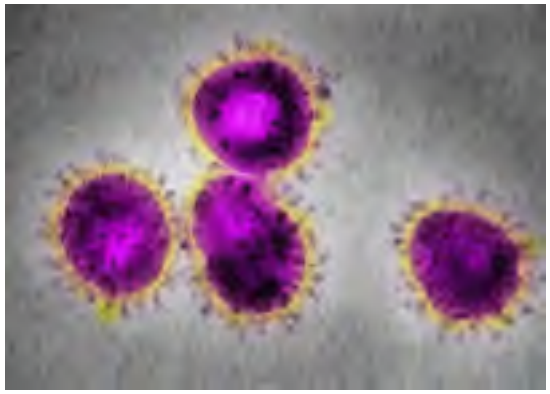


Who CoVid-19 kills



Age, Sex, Existing Conditions of COVID-19 Cases and Deaths

Last updated: February 23, 22:35 GMT

Age of Coronavirus Deaths

Based on all 72,314 cases of COVID-19 confirmed, suspected, and asymptomatic cases in China as of February 11, a paper by the Chinese CCDC released on February 17 and published in the Chinese Journal of Epidemiology [1] has found that the risk of death increases the older you are, as follows:

COVID-19 Fatality Rate by AGE:

***Death Rate** = (number of deaths / number of cases) = **probability of dying if infected by the virus** (%). This probability differs depending on the age group. The percentage shown below does **NOT represent in any way the share of deaths by age group**. Rather, it represents, for a person in a given age group, the **risk of dying** if infected with COVID-19.

AGE	DEATH RATE*
80+ years old	**14.8%**
70-79 years old	**8.0%**
60-69 years old	**3.6%**
50-59 years old	**1.3%**
40-49 years old	**0.4%**
30-39 years old	**0.2%**
20-29 years old	**0.2%**
10-19 years old	**0.2%**
0-9 years old	**no fatalities**

***Death Rate** = (number of deaths / number of cases) = **probability of dying if infected by the virus** (%).

In general, relatively few cases are seen among children.

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Mitigation

Pandemic Basics

Stop the Pandemic

1:

Need to get R0 below 1.0
NPIs or tight containment & isolation actions

Keep Economy Going

2:

Need to keep economy going (or as bad an outcome)

3:

Need to keep Infection level below that which swamps the hospitals

Corona Virus Briefing (9 Mar. 2020)

CDC 2006 Pandemic Guidance

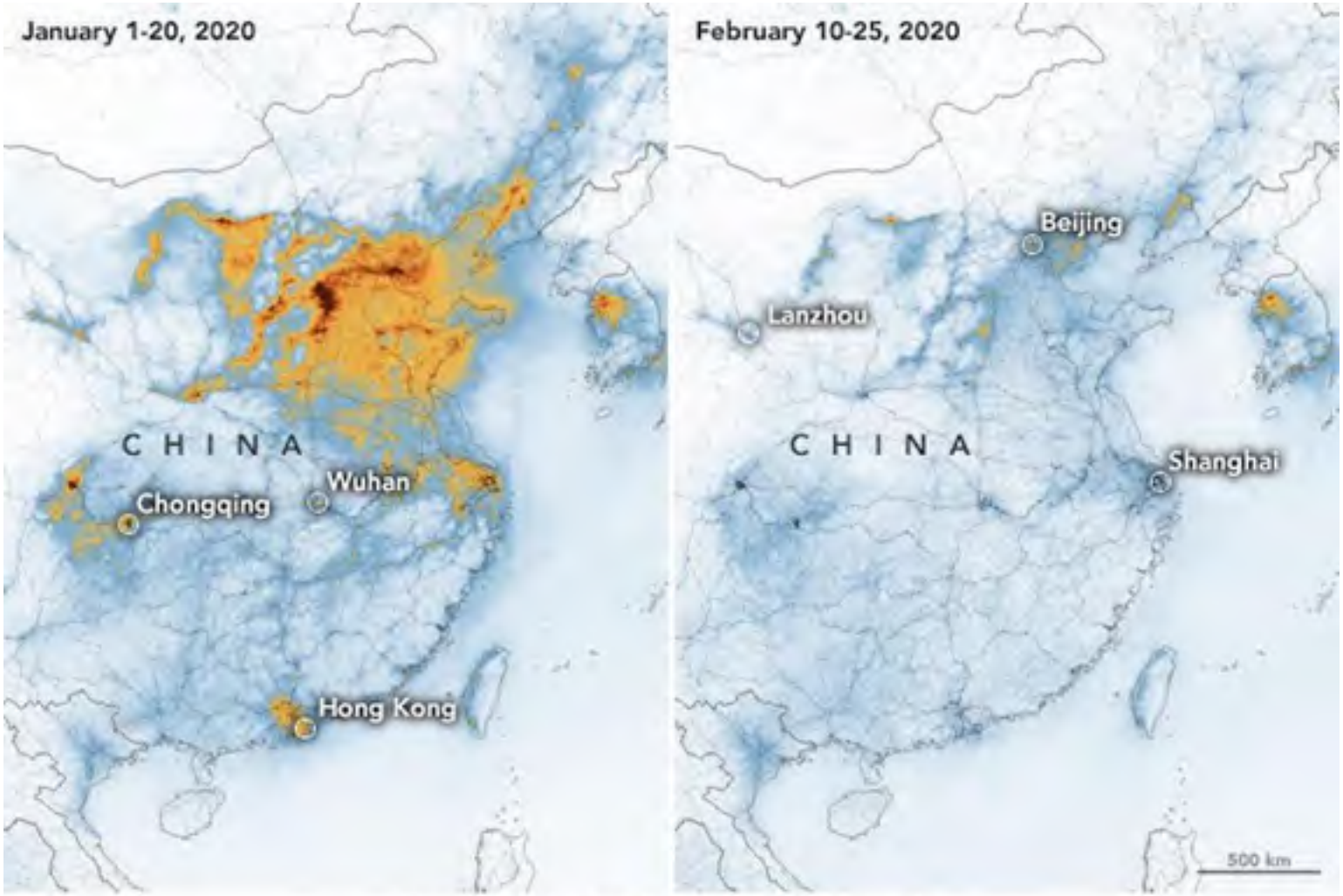
For the most severe pandemics (Categories 4 and 5), Alert is implemented during WHO Phase 5/U.S. Government Stage 2 (confirmed human outbreak overseas), and Standby is initiated during WHO Phase 6/ U.S. Government Stage 3 (widespread human outbreaks in multiple locations overseas). Standby is maintained through Stage 4 (first human case in North America), with the exception of the State or region in which a cluster of laboratory-confirmed human pandemic influenza cases with evidence of community transmission is identified. The recommendation for that State or region is to **Activate the appropriate NPIs when identification of a cluster with community transmission is made**. Other States or regions Activate appropriate interventions when they identify laboratory-confirmed human pandemic influenza case clusters with evidence of community transmission in their jurisdictions.

For Category 1, 2, and 3 pandemics, Alert is declared during U.S. Government Stage 3, with step-wise progression by States and regions to Standby based on U.S. Government declaration of Stage 4 and the identification of the first human pandemic influenza case(s) in the United States. Progression to Activate by a given State or region occurs when that State or region identifies a cluster of laboratory-confirmed human pandemic influenza cases, with evidence of community transmission in their jurisdiction.

https://www.hopkinsguides.com/hopkins/view/Johns_Hopkins_ABX_Guide/540143/all/Coronavirus

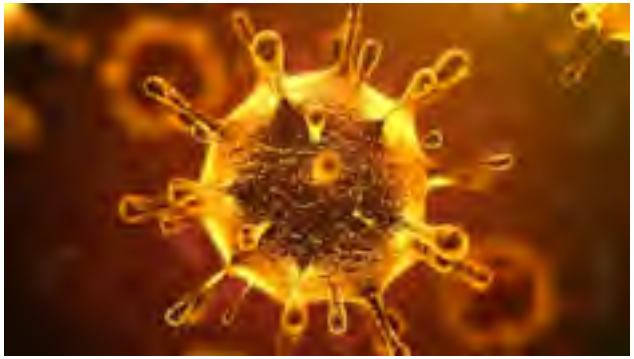
Corona Virus Briefing (9 Mar. 2020)

Pandemic Response



Corona Virus Briefing (9 Mar. 2020)

Pandemic Basics



Consider the following Susceptible-Infectious-Recovered (SIR) model:

$$\frac{dS}{dt} = -\beta SI\,, \tag{1a}$$

$$\frac{dI}{dt} = \beta SI - \gamma I\,, \tag{1b}$$

$$\frac{dR}{dt} = \gamma I \tag{1c}$$

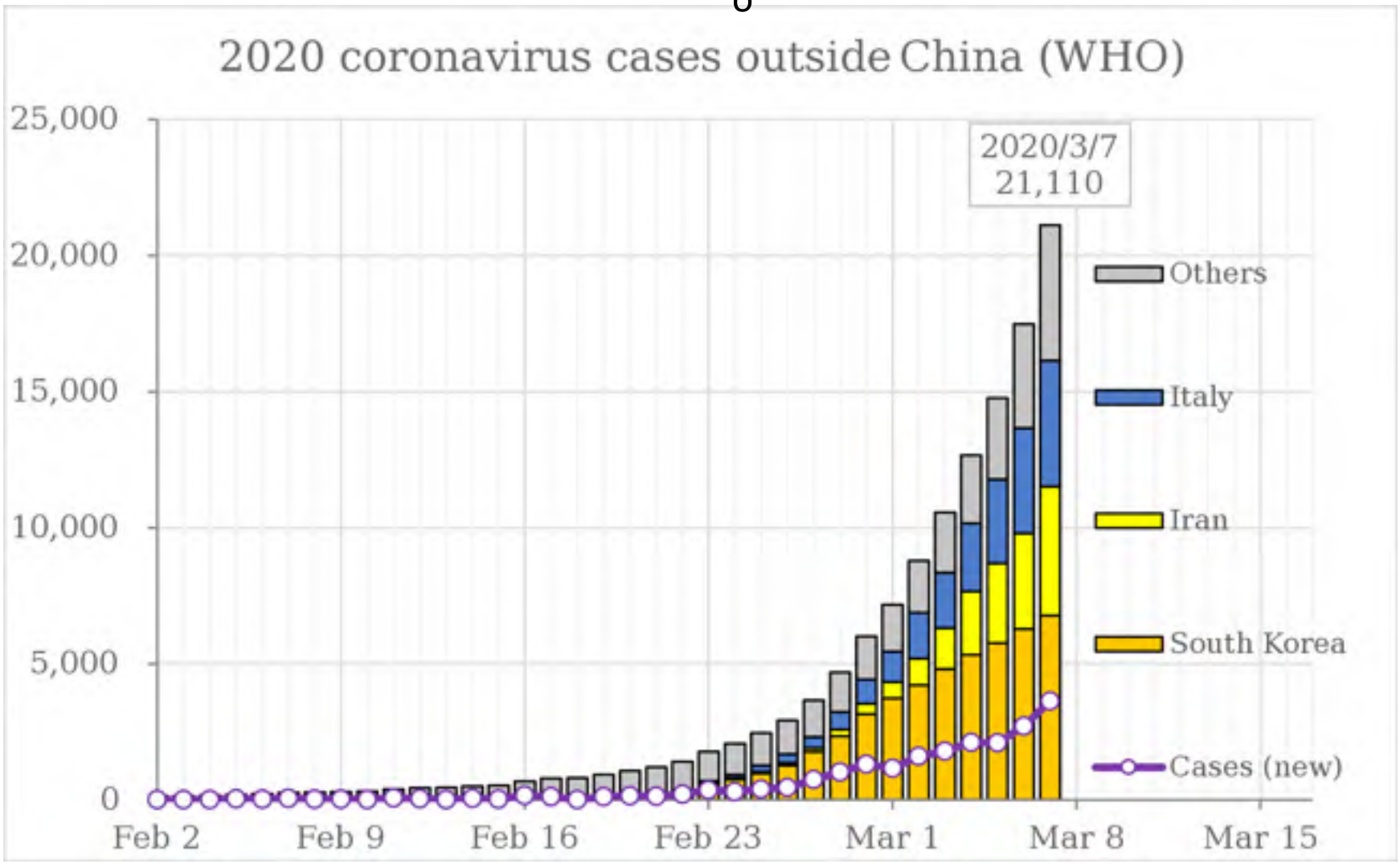
where S is the fraction of susceptible individuals, I is the fraction of infectious individuals, and R is the fraction of recovered individuals; β is the transmission rate per infectious individual, and γ is the recovery rate, i.e., the infectious period is exponentially distributed with a mean $1/\gamma$. Linearize about the disease-free equilibrium (DFE) (1,0,0),

Corona Virus Briefing (9 Mar. 2020)

Pandemic Basics

Exponential growth

$C=C_o\, e^{rt}$

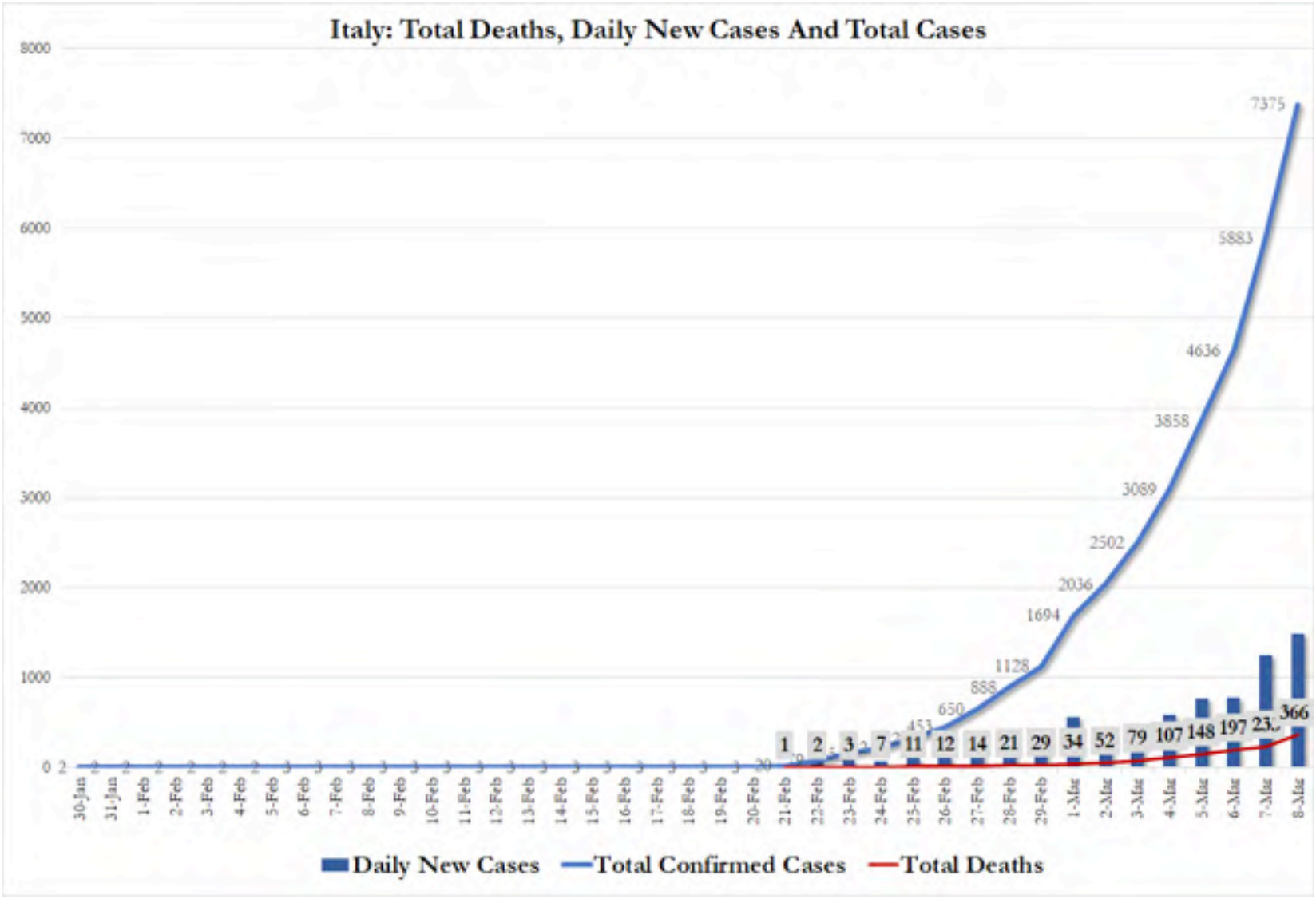


Corona Virus Briefing (9 Mar. 2020)

Pandemic Basics

Exponential growth

$C=C_o\, e^{rt}$



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Italy is failing on 1, now pushing on 2 to avoid losing 3

Stop the Pandemic

1:

Need to get R0 below 1.0
NPIs or tight containment
& isolation actions

Keep Economy Going

2:

Need to keep
economy going (or
as bad an outcome)

3:

Need to keep Infection
level below that which
swamps the hospitals

Corona Virus Briefing (9 Mar. 2020)

Why Test? To enable containment and reduce R_0.

China tests 1.2 million per week

Most test kits from CDC produce 90% false negative.

China tests patients five times when negative to clear. US tests once (if at all).

COVID-19 testing volume

Country	Total tests	As of	Tests per day	As of	Tests per million
South Korea[121][124]	196,618	March 8	10,329	March 7	3,600
Italy[125]	42,062	March 7			700
United Kingdom[126]	23,513	March 8			320
Japan[127]	8,111	March 4			65
The Netherlands[128]	6,000	March 7			340
Austria[123][129]	4,509	March 8			250
India[130]	4,058	March 6	25	March 8	
United States[131]	1,895	March 6			6
Switzerland[132]	1,850	March 2			220
Vietnam[133]	1,737	March 2			18
France[132]	1,170	March 3			18
Poland[133]	1,154	March 8			30
Turkey[123]	940	March 2			11
Czech Republic[134]	787	March 8			75
Philippines[132]	640	March 8			
Slovakia[136]	496	March 8			90
Iceland[137]	484	March 7			1,329

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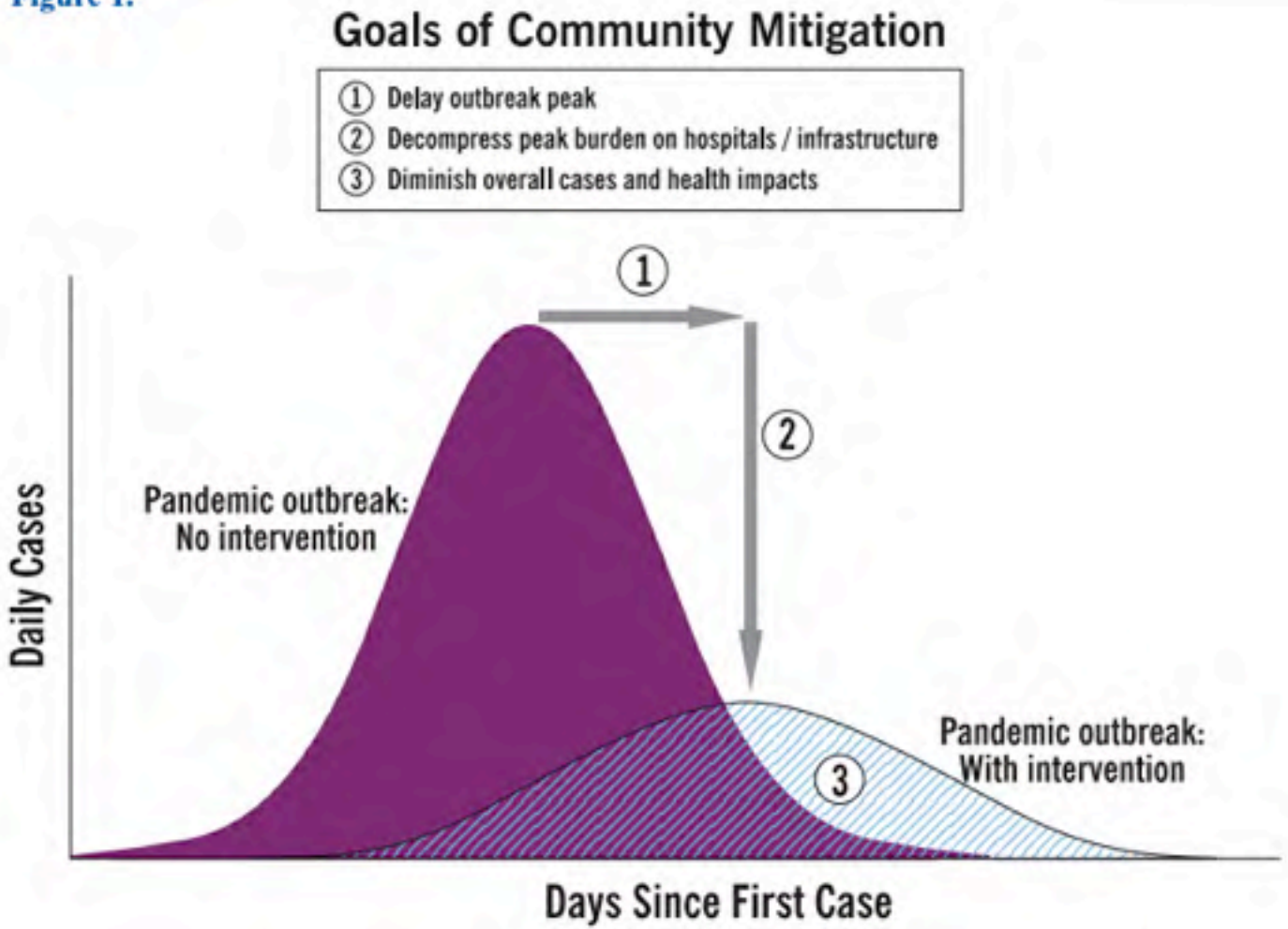
Why Test? To enable containment and reduce R_0.

Figure 1.

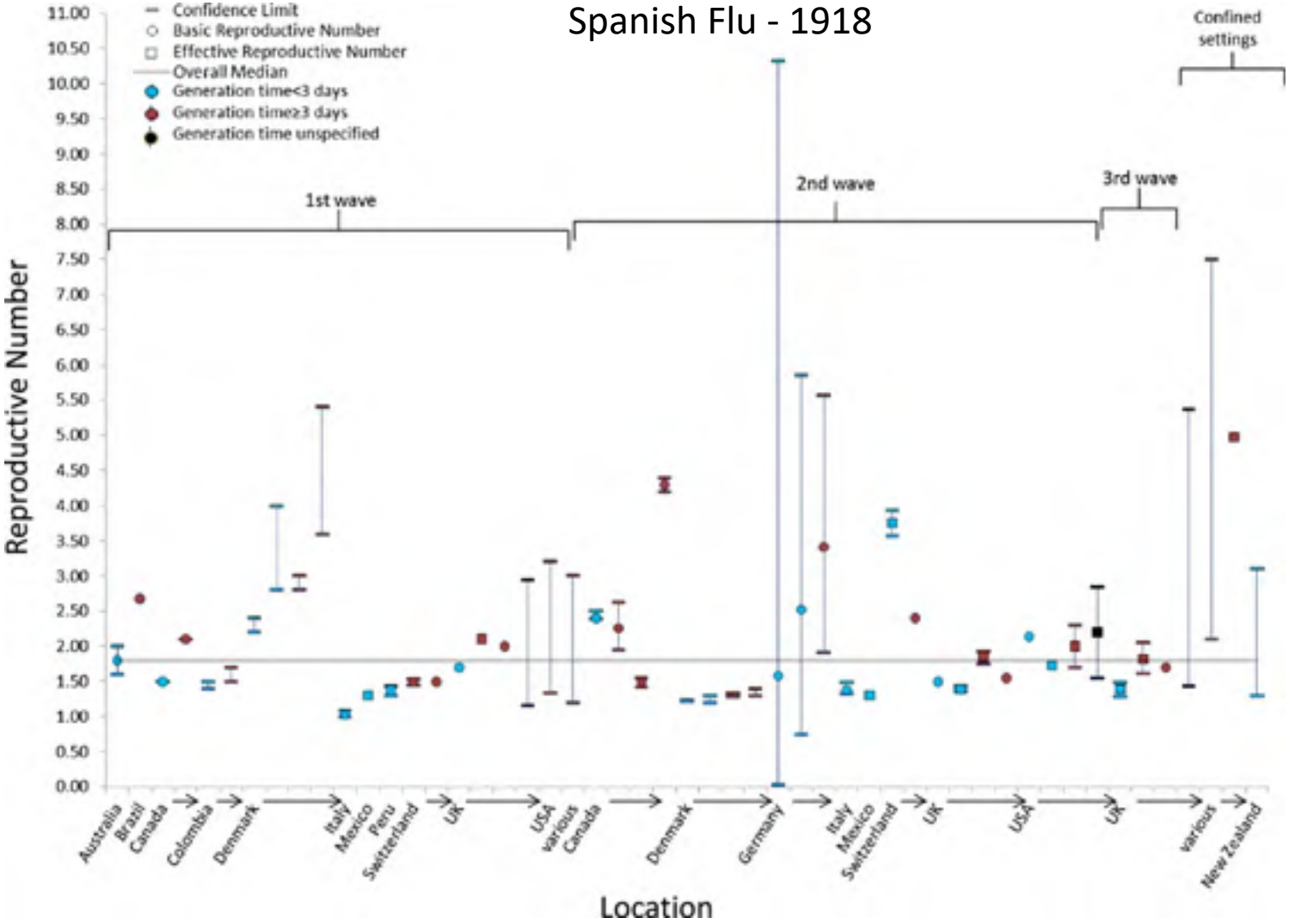


Corona Virus Briefing (9 Mar. 2020)

Corona Virus vs. Spanish Flu

Coronavirus: R_0=2.5
Interval time: 4-5 days
Case Fatality Rate: 3.5%

Spanish Flu - 1918

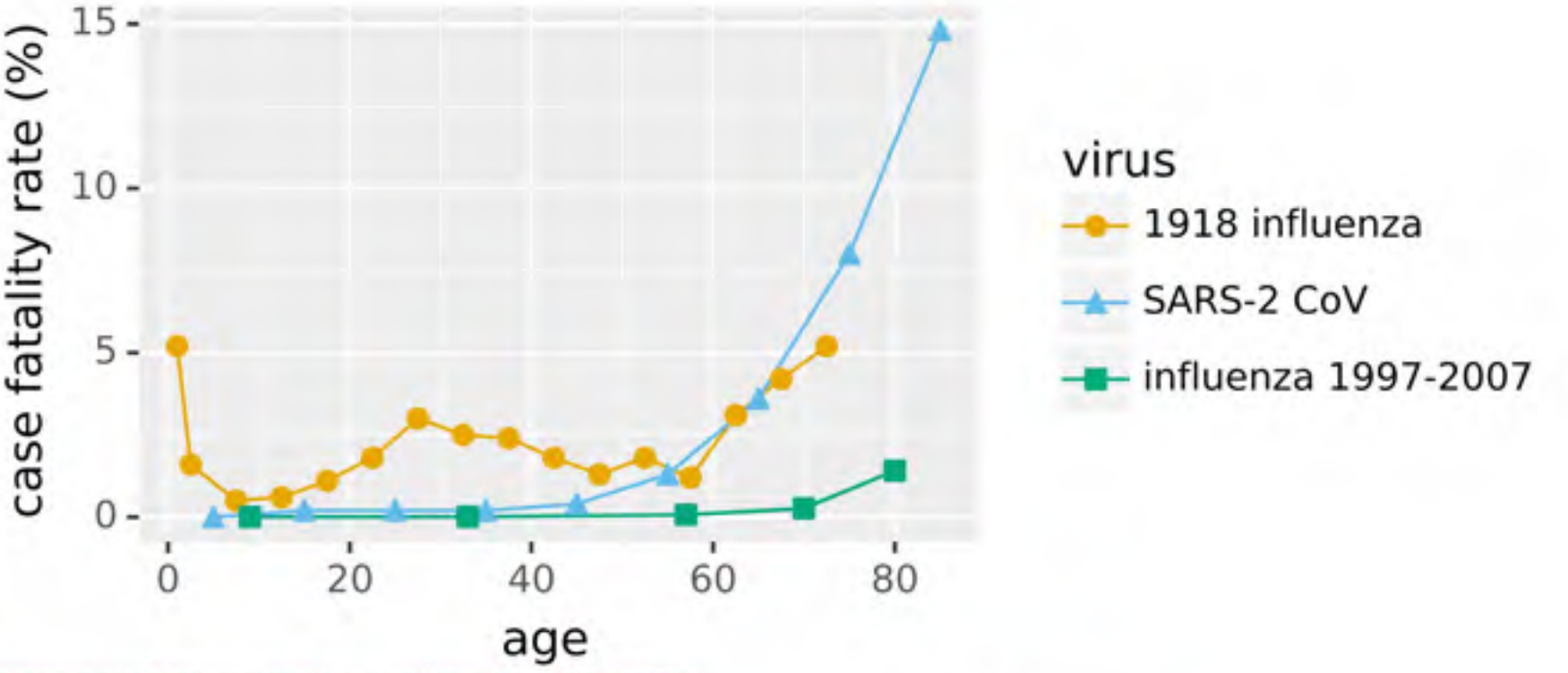


Corona Virus Briefing (9 Mar. 2020)

Corona Virus vs. Spanish Flu

Coronavirus: R_0=2.5
Interval time: 4-5 days
Case Fatality Rate: 3.5%

Spanish Flu – CFR = 2.5%, Interval time = 3 days



Statistics for 1918 influenza from *Emerging Infectious Diseases*, 12:1 (2006)
Statistics from *China CDC Weekly*, 2 (2020): available at https://github.com/cmrivers/ncov/blob/master/COVID-19.pdf
Statistics for 1997-2007 influenza from *Am J Epidemiol*, 179:156-167 (2014) assuming 10% incidence in all age groups.

Notes: Statistics for 1918 influenza are from era prior to treatments for secondary bacterial pneumonia like antibiotics and pneumonia vaccination.
Statistics for SARS-2-CoV are from China up to Feb-11, and may be biased by two main factors: (1) epidemic is still growing exponential, so some cases that may eventually die have not yet, and (2) there may be substantial under-detection of lightly symptomatic cases.

Corona Virus Briefing (9 Mar. 2020)

Corona Virus vs. Spanish Flu

Coronavirus: R_0=2.5
Interval time: 4-5 days
Case Fatality Rate: 3.5%

Spanish Flu Interval time = 6 days

Table 1: Reported estimates of the basic reproduction number of pandemic influenza during the fall wave (2nd wave) from 1918–19

Location	Serial interval (days)	R_0
San Francisco, USA	6	3.5
	6	2.4
45 cities in the USA	6†	2.7
UK (entire England and Wales)‡	**6**	**1.6**
Geneva, Switzerland	5.7	3.8
Sao Paulo, Brazil	4.6§	2.7
83 cities in the UK	3.2 and 2.6	1.7–2.0
45 cities in the USA	2.9	1.7

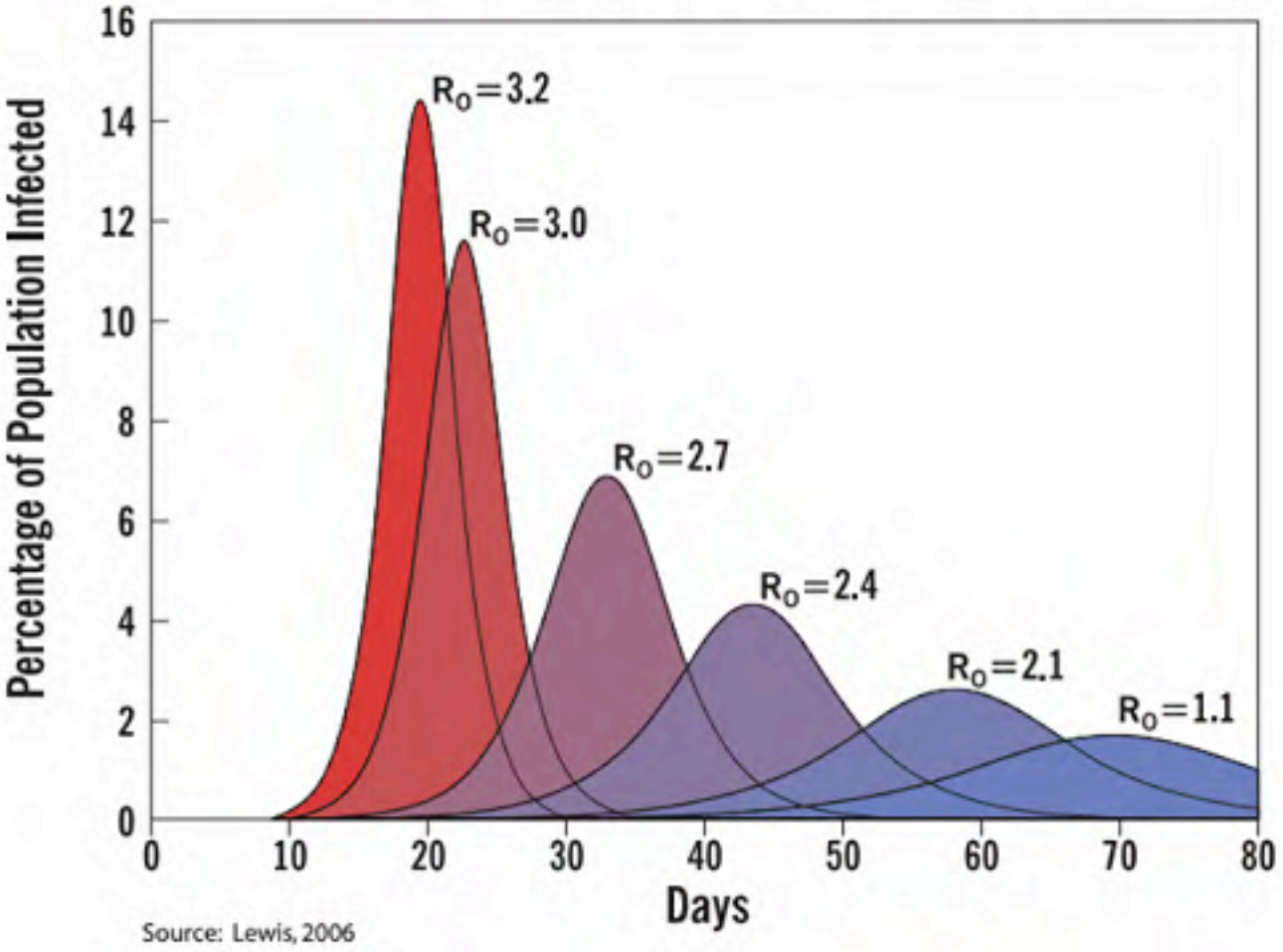
Nishiura2007

Corona Virus Briefing (9 Mar. 2020)

Corona Virus vs. Spanish Flu

Coronavirus: R_0=2.5; Spanish Flu 1.8

Figure 2. Effect of R_0 on Epidemic Curves



Corona Virus Briefing (9 Mar. 2020)

Pandemic Natural Growth

Fighting a Pandemic – Push R_0 down

Stop the Pandemic

1:

Need to get R0 below 1.0
NPIs or tight containment & isolation actions

Keep Economy Going

2:

Need to keep economy going (or as bad an outcome)

3:

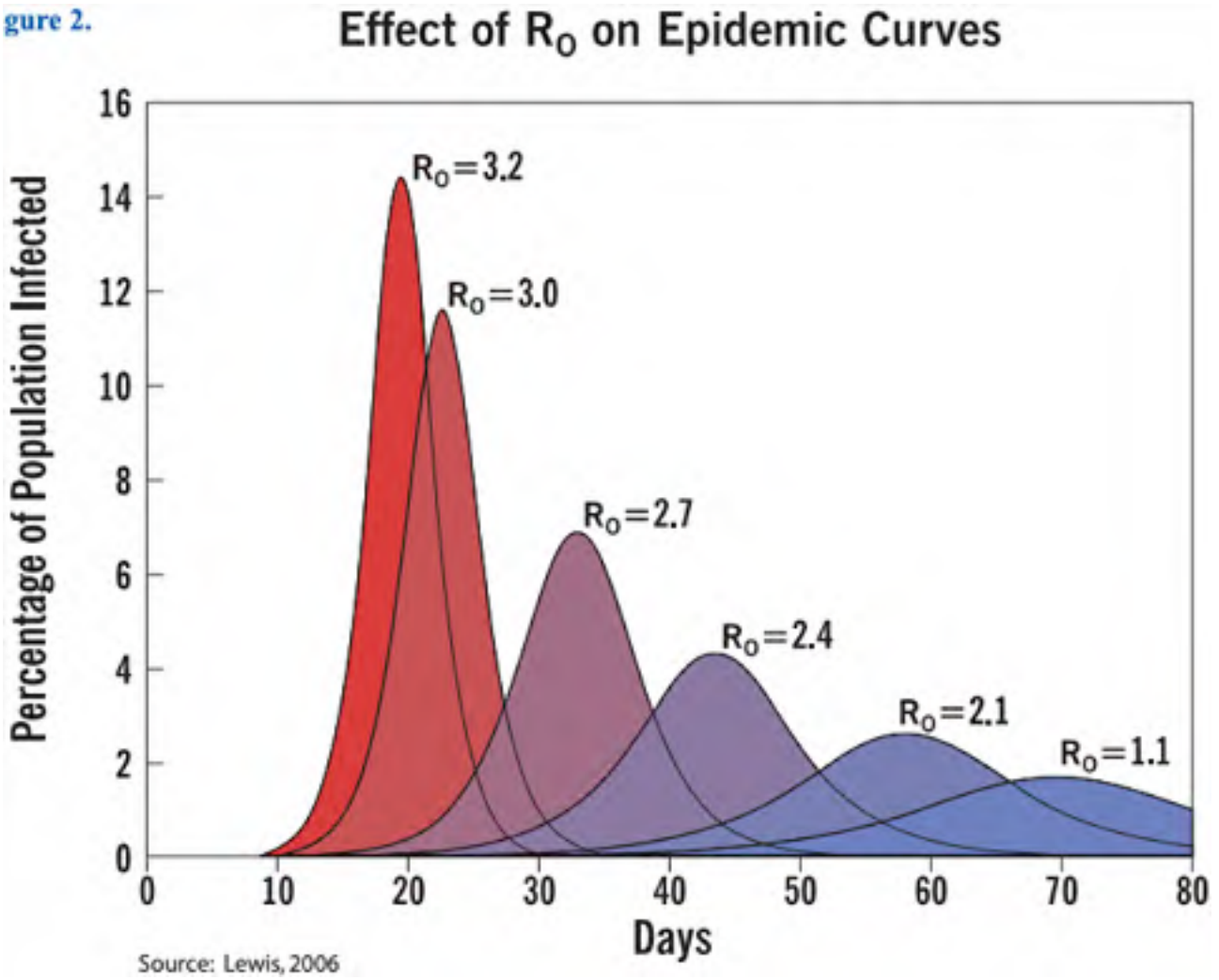
Need to keep Infection level below that which swamps the hospitals

Corona Virus Briefing (9 Mar. 2020)

Pandemic Natural Growth

Coronavirus: R_0=2.5; Covid in Wuhan = 3.86!!

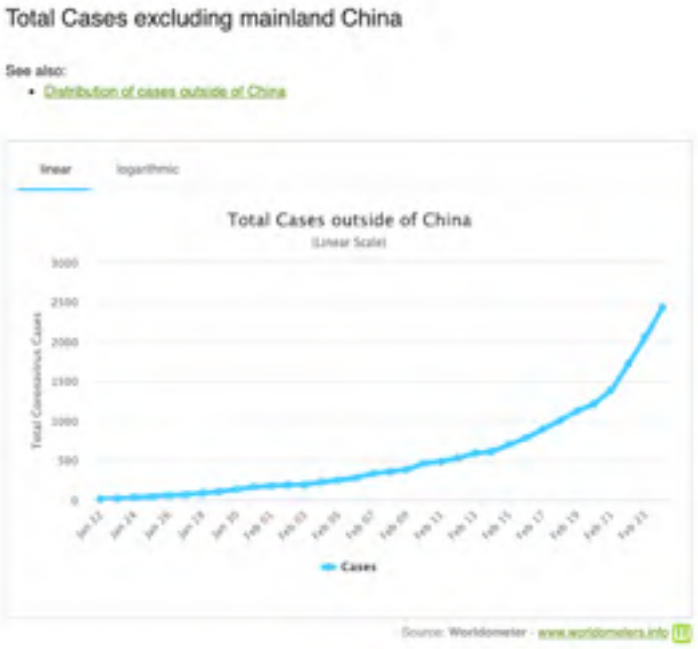
gure 2.

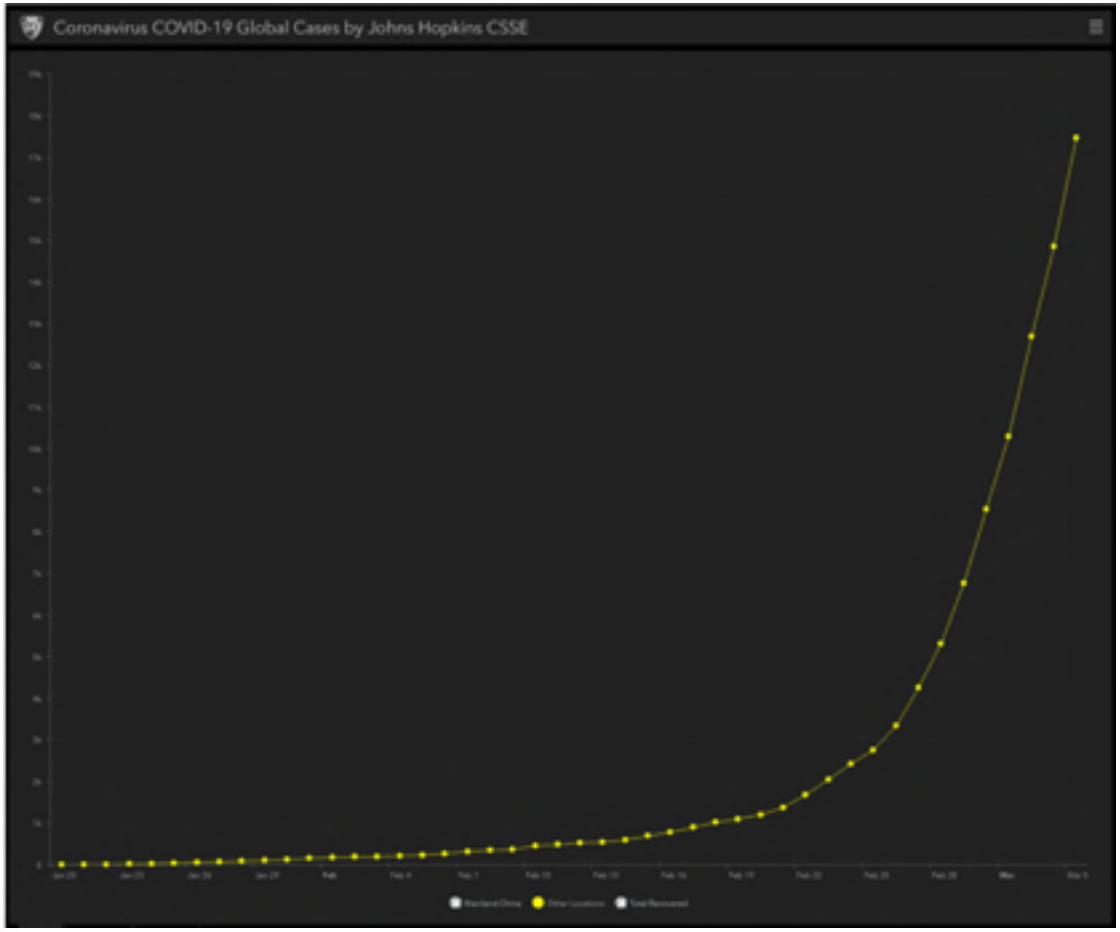


Corona Virus Briefing (9 Mar. 2020)

Pandemic Natural Growth

Cases Outside China
Following Classic Exponential Growth

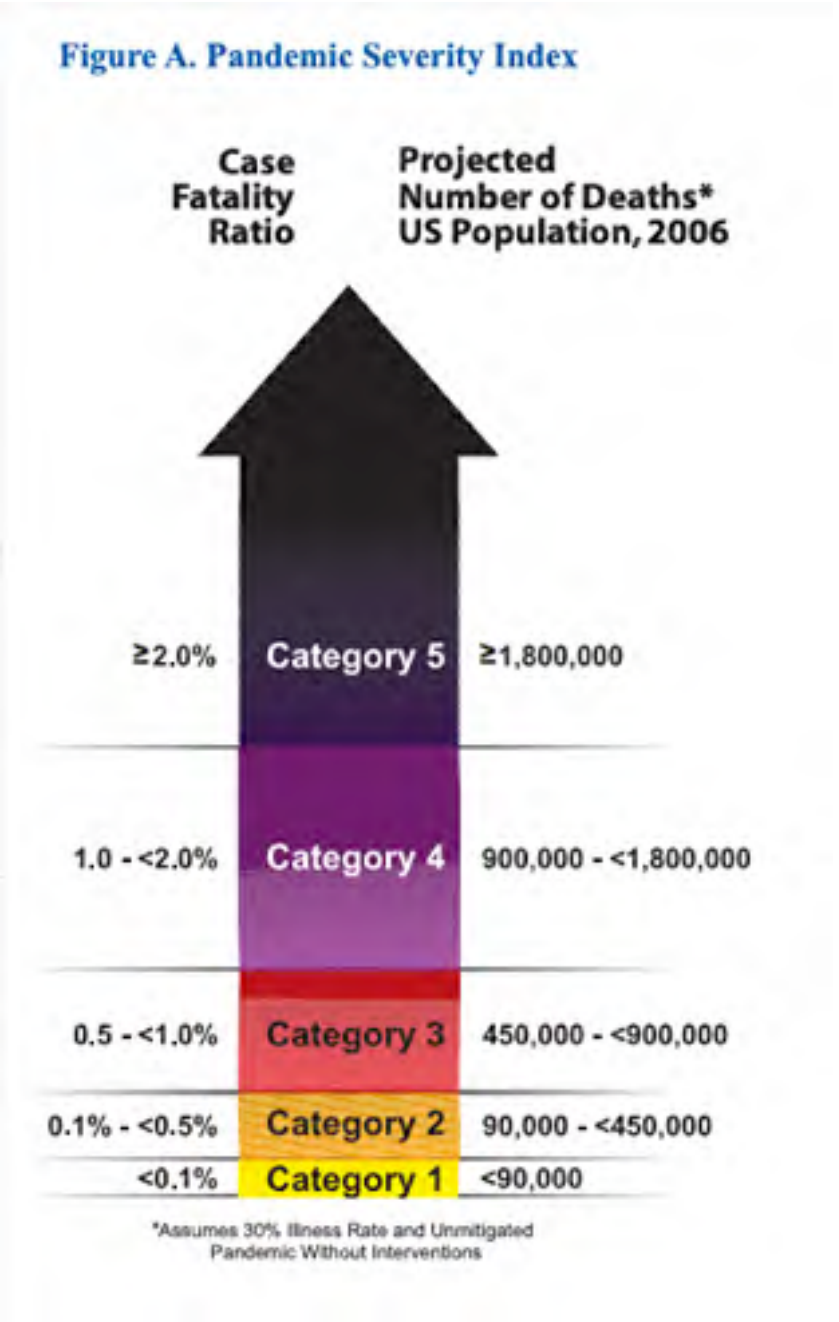




Corona Virus Briefing (9 Mar. 2020)

Pandemic Natural Growth

CDC Guidelines
nCoVID19
Most severe!
Category 5



Corona Virus Briefing (9 Mar. 2020)

Pandemic Advantages

Song Tie, vice director of the local disease control center in southern China's Guangdong province, told a media briefing on Wednesday that as many as 14% of discharged patients in the province have tested positive again and had returned to hospitals for observation.

17% require hospitalization and significant care

Corona Virus Briefing (9 Mar. 2020)

US Disadvantages

US has 300,000 beds available out of 980,000*

*Includes psychiatric beds, prison beds, military beds, etc.

17% require hospitalization and significant care

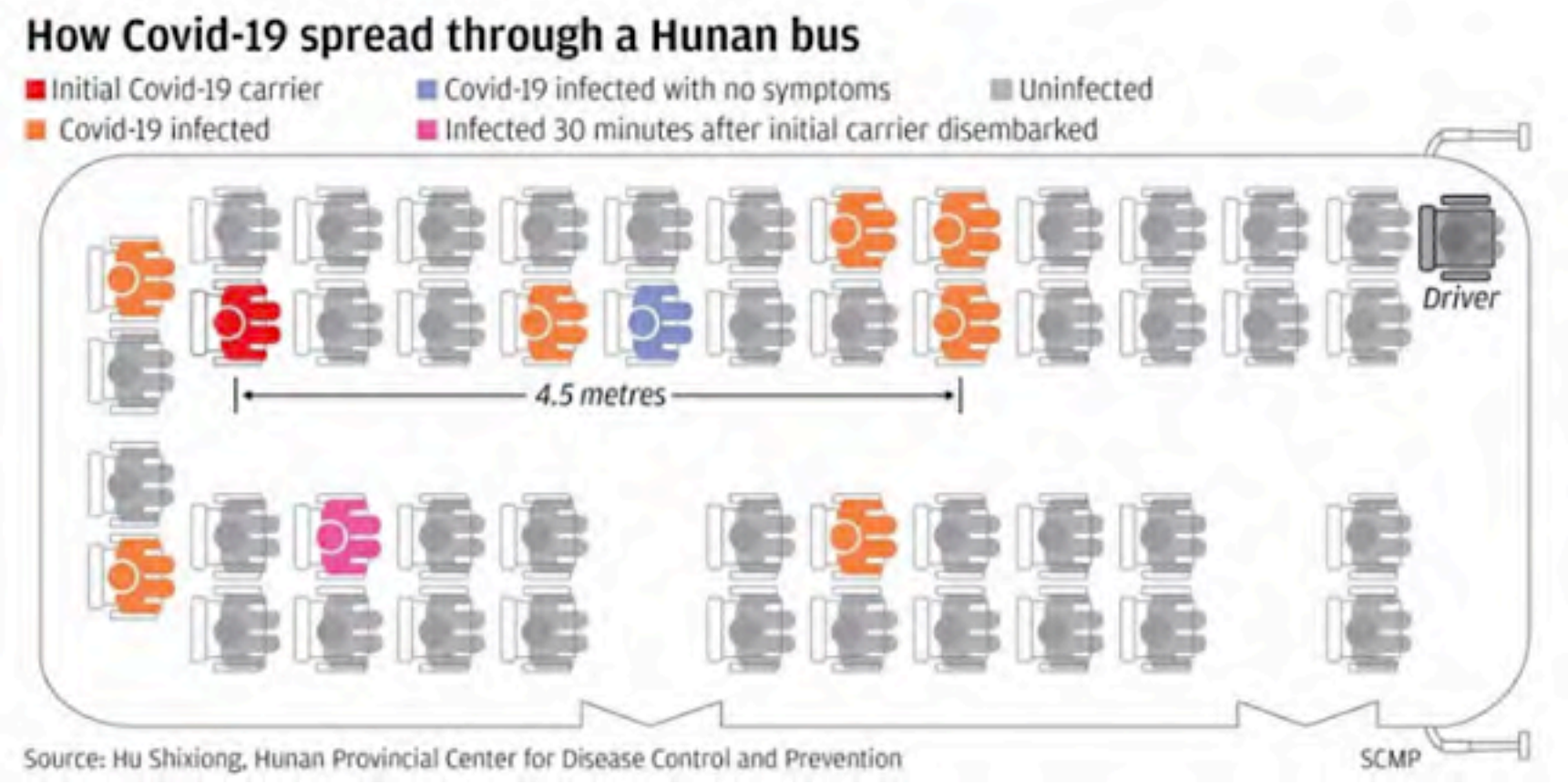
Masks – US has 50,000,000
18,000,000 health care workers
2-day supply
90%+ were imported from China
Mask making machines costs millions and are made in China

Absent reducing R_0 significantly, US health care critical (insufficient beds) early May

10% Italy Health Care workers Quarantined. Italy running out of masks after 1 month

US hospital infrastructure uses minimum wage orderlies, janitors, etc.

Late breaking



Lead author Hu Shixiong said that the camera footage revealed patient "A" did not interact with anyone throughout the four-hour ride, **yet the virus infected seven other passengers** by the time the bus stopped at the next city. **Infected passengers included not only those sitting relatively close to "patient zero," but people six rows away - or 4.5 meters (14.76 feet**).

All seven tested positive, **including one passenger who displayed no symptoms**. Then, 30 minutes later, another group of passengers got on the bus - one of whom was sitting in the front seat when they also became infected. Patient "A" meanwhile, got on another minibus and infected **two other passengers**

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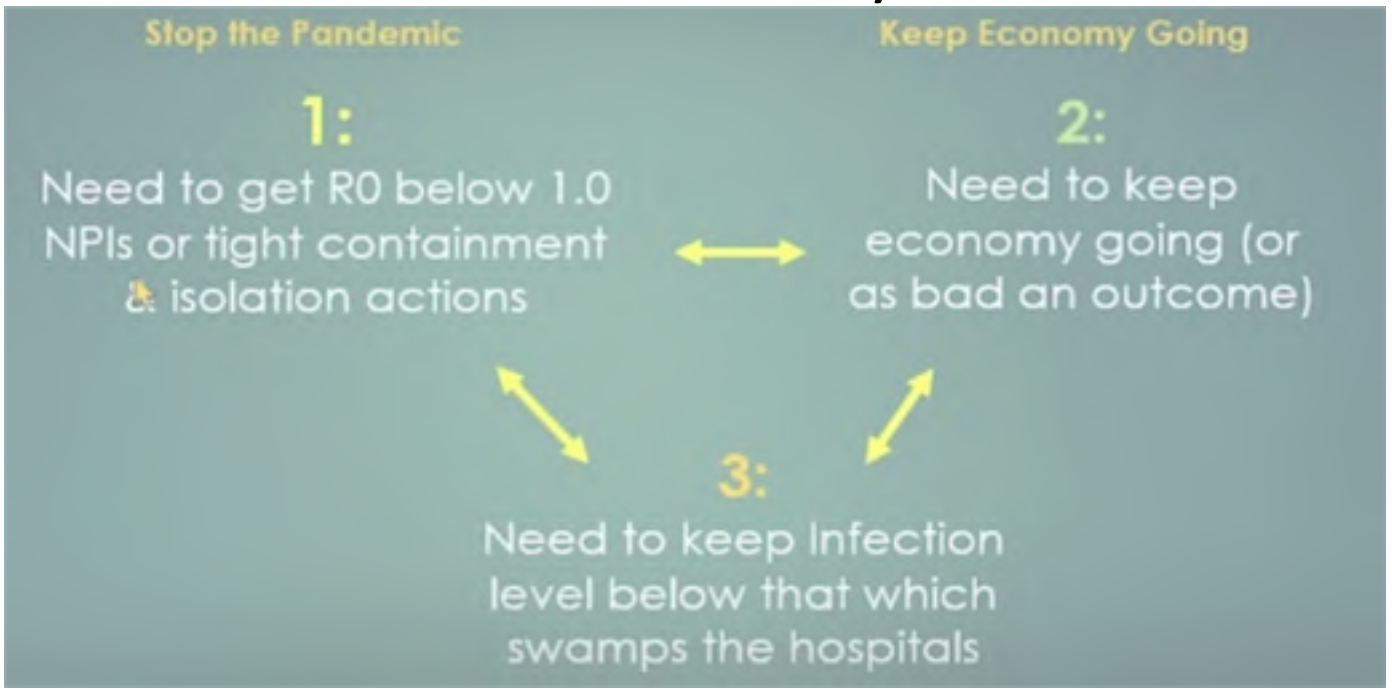
Best Practices

Bottom Line : Your on your own



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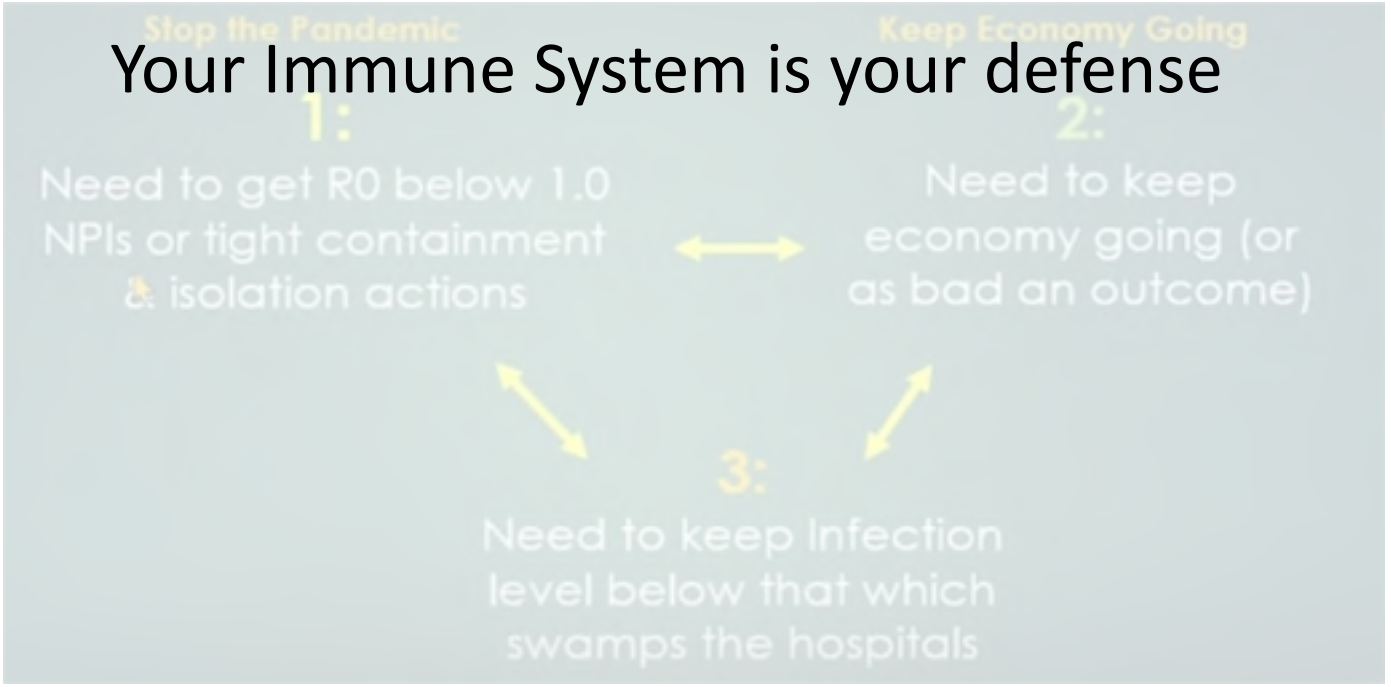
Best Practices

Bottom Line : Your on your own

Your Immune System is your defense



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Bottom Line : Your on your own

Your Immune System is your defense

Best Practices prevents overwhelming your Immune System

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There is currently no vaccine to prevent coronavirus disease 2019 (COVID-19). The best way to prevent illness is to avoid being exposed to this virus. However, as a reminder, CDC always recommends everyday preventive actions to help prevent the spread of respiratory diseases, including:

- Avoid close contact with people who are sick.
- Avoid touching your eyes, nose, and mouth.
- Stay home when you are sick.
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
- Clean and disinfect frequently touched objects and surfaces using a cleaning spray or wipe.

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Best Practices

How does COVID-19 Spread?

Although the ongoing outbreak likely resulted originally from people who were exposed to infected animals, COVID-19, like other coronaviruses, can spread between people. Infected people can spread COVID-19 through their respiratory secretions, especially when they cough or sneeze.

According to the CDC, spread from person-to-person is most likely among close contacts (***about 6 feet***). Person-to-person spread is thought to occur mainly via respiratory droplets produced when an infected person coughs or sneezes, similar to how influenza and other respiratory pathogens spread. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

New data suggests 4.5 m is a safe distance (particularly in a closed environment.)

It's currently unclear if a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes. But it is very feasible. **New data suggests it occurs**

Corona virus can live up to 9 days on surfaces.

Given what has occurred previously with respiratory diseases such as MERS and SARS that are caused by other corona viruses, it is likely that person-to-person infection will continue to increase.

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BEST PLAN – KEEP YOUR IMMUNE SYSTEM STRONG

The reason you catch a cold or flu is because your immune system is not functioning. It's not an inevitable event based on exposure alone.

Lifestyle factors that depress your immune system, alone or in combination, are more important than exposure to determine if you will get sick. These include eating too much sugar, vitamin D deficiency, insufficient sleep and lack of exercise, and unaddressed stress.

Research has shown that people who took garlic daily for three months had fewer colds than those who took a placebo, and, when they did come down with a cold, the duration of illness was shorter—an average of 4.5 days compared to 5.5 days for the placebo group.

A review of the research on zinc found that when taken within one day of the first symptoms, zinc can cut down the time you have a cold by about 24 hours. Zinc was also found to greatly reduce the severity of symptoms.

Supplements that can help combat cold and flu include vitamin C, propolis, oregano oil, medicinal mushrooms, olive leaf extract, and tea made from a combination of elderflower, yarrow, boneset, linden, peppermint and ginger.

From mercola.com

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Best Practices

BEST PLAN – KEEP YOUR IMMUNE SYSTEM STRONG

Autophagy is an evolutionally conserved, highly regulated catabolic process that combines cellular functions required for the regulation of metabolic balance under conditions of stress with those needed for the degradation of damaged cell organelles via the lysosomal machinery. The importance of autophagy for cell homeostasis and survival has long been appreciated. Recent data suggest that autophagy is also involved in non-metabolic functions that impact the immune system. Here, we reflect in two review articles the recent literature pointing to an important role for autophagy in innate immune cells. In this article, we focus on neutrophils, eosinophils, mast cells, and natural killer cells. We mainly discuss the influence of autophagy on functional cellular responses and its importance for overall host defense. In the companion review, we present the role of autophagy in the functions performed by monocytes/macrophages and dendritic cells.

From mercola.com

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Best Practices

ARE YOU PROPERLY APPLYING HAND SANITIZER? PROBABLY NOT.

Apply to hand sanitizer to hands, rub quickly on hands, 99.9 percent of germs gone, right?

The key word for hand sanitizer to be effective is to apply it thoroughly. Friction is the force that loosens and rises away microbes. One common error most of us make when using hand sanitizer is not applying enough. According to Berkeley Wellness, the proper amount of hand sanitizer to apply is a dime-size amount. Applying hand sanitizer properly is simple but requires attention to detail.

The proper way to apply hand sanitizer:

1. Make sure all organic matter like dirt and grease are removed from your hands.
2. Apply a dime-size amount to the palm of one hand.
3. Rub your hands together, covering all surfaces of both hands, including between your fingers and up around your fingertips and nails. **Rub hands together for 30 seconds to allow your hands to completely absorb the product and the hand sanitizer to completely dry.** Don't touch food or anything until your hands are dry.

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Best Practices

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Best Practices

Protect others from getting sick

When coughing and sneezing **cover mouth and nose** with flexed elbow or tissue

Throw tissue into closed bin immediately after use

Clean hands with alcohol-based hand rub or soap and water after coughing or sneezing and when caring for the sick

World Health Organization

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Best Practices

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Best Practices

Wear it Right

Wearing Your Filtering Facepiece Respirator

1

Place the respirator over your nose and mouth. Be sure the metal nose clip is on top. With models 8210 or 07048, pre-stretch the straps before wearing.

2

Pull the top strap over your head until it rests on the crown of your head above your ears.

3

Pull the bottom strap over your head until it rests just below your ears.

4

Using both hands starting at the top, mold the metal nose clip around your nose to achieve a secure seal.

Check the Seal of Your Filtering Facepiece Respirator Each Time You Don the Respirator.

Positive Pressure User Seal Check

For Non-Valved Respirators

Place both hands completely over the respirator and *exhale*. The respirator should bulge slightly. If air leaks between the face and faceseal of the respirator, reposition it and readjust the nose clip for a more secure seal. If you cannot achieve a proper seal, **do not** enter the contaminated area. See your supervisor.

Negative Pressure User Seal Check

For Valved Respirators

Place both hands over the respirator and *inhale* sharply. The respirator should collapse slightly. If air leaks between the face and faceseal of the respirator, reposition it and readjust the nose clip for a more secure seal. If you cannot achieve a proper seal, **do not** enter the contaminated area. See your supervisor.

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Best Practices

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Best Practices

1. CLOSE THE TOILET

2. *Flush!!!*

3. wash hands properly.

4.Sanitize.

Coronavirus is transmitted in fecal material.