

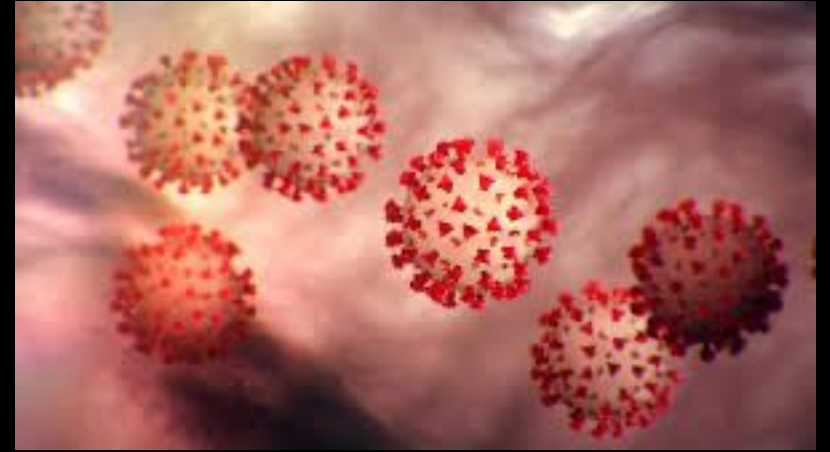
# COVID-19 Coronavirus:

Peter Katona, MD



# Coronaviruses

- Single stranded RNA viruses
- 7 species infect humans, 4 cause 15-30% URIs
- Similar to SARS (disappeared) and MERS (geography, high mortality)
- Originated from bats → intermediate hosts in wet markets
- 41% nosocomial
- 2-day to 2-week incubation



# What we know today

- Spreading rapidly
- Uncertainty and fear and constant news coverage
- 80-85% infected have very mild symptoms
- HCWs disproportionately affected
- Know almost nothing about # asymptomatic  
→ impossible to calculate the true CFR



# Transmissibility ( $R_0$ ) and Virulence (CFR):

<u>Agent</u>	<u>Years</u>	<u><math>R_0</math></u>	<u>CFR (%)</u>	<u>Global cases</u>	<u>Global Deaths</u>
COVID-19	2019-2020	1.5-3.0	<1-2	>120K	>4,200
Seasonal flu	2018-2019	1.3	0.14	3-5M	250-500K
Spanish flu	1918-1919	2.3	2.5	720M	50-100M

# Perspective: US Leading Causes of Death

- Heart disease: 650,000
- Cancer: 600,000
- Accidents (unintentional injuries): 170,000
- Chronic lower respiratory diseases: 160,000
- Stroke (cerebrovascular diseases): 150,000
- Alzheimer's disease: 120,000
- Diabetes: 84,000
- Influenza and Pneumonia: 55,000

# Handling an Outbreak: Basic Epidemiology

- Case definition (clinical + epi + time)
- Identify presumptive cases
- Confirm with testing
- Contact tracing → quarantine
- Education (public, HCW, politicians, businesses...)
- Data inflow → case definition revision

# Misunderstood Terminology

- Isolation
- Quarantine – mandated or voluntary for 14 days post exposure
- Cordon sanitaire
  - Lockdown
- Social mitigation / social distancing
  - School, meeting and other closings
  - Cancel “large” gatherings
  - Work from home if possible
- Transmission
  - In respiratory (droplet) transmission the viruses are carried in the mouth, nose, throat & respiratory tree
  - Reproduction number ( $R_0$ )



# Initial Reports

- Dr Li Wenliang, an ophthalmologist, warned a circle of medical school classmates on Dec. 30, 2019 about an outbreak that appeared similar to SARS
- The police compelled him to sign a statement denouncing his warning as an unfounded and illegal rumor
- He eventually died from the virus





# Early chronology of events

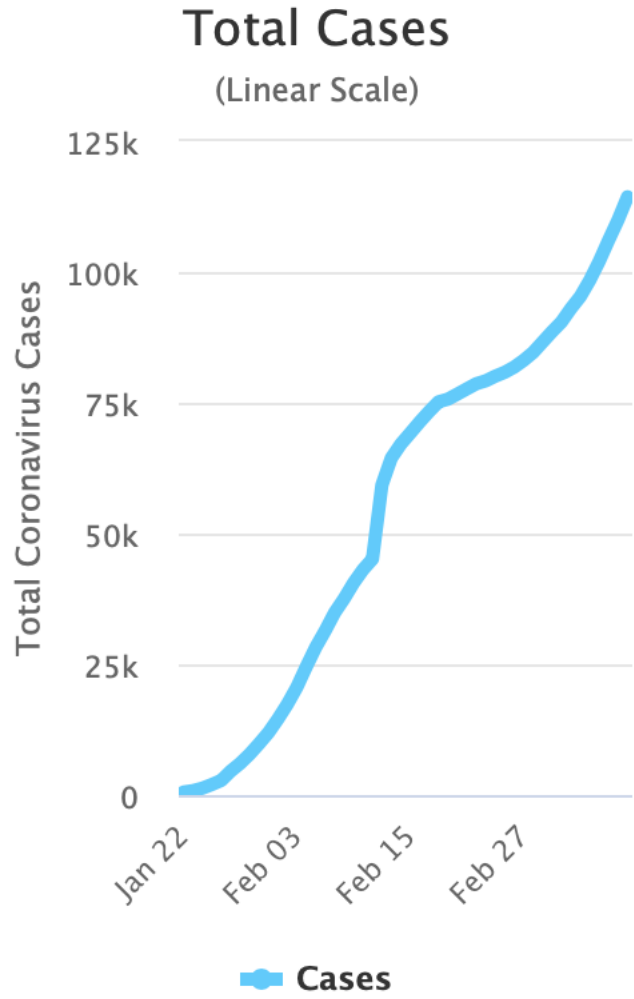
- 12/1 – 1<sup>st</sup> case recognized
- 12/8 – more cases recognized in the wet market
- 12/31 – 1<sup>st</sup> cases reported
- 1/1 – Wuhan market closed
- 1/6 – CDC issues Level 1 Travel Notice
- 1/8 – China declares an epidemic
- 1/12 – genetic sequence published
- 1/13 – 1<sup>st</sup> case outside China in Thailand
- 1/20 – person-to-person transmission recognized
- 1/22 – WHO declines declaration of PHEIC
- 1/23 – 60M people in 11 Cities enforced quarantine

# Early chronology of events (continued)

- 1/24 – Chinese Lunar New Year celebrations canceled
- 1/18 – Trump briefed by Azar
- 1/26 – Reported cases doubling in 2 days, spread before symptoms?
- 1/29 – CDC issues Level 3 Travel Alert
- 2/26 – 1<sup>st</sup> Trump news conference
- 1/30 – WHO issues 6<sup>th</sup> PHEIC, DoS warns of travel to China, 1<sup>st</sup> US case
- 1/31 – 1<sup>st</sup> US travel ban issued
- 2/5 – Cruise ship crisis (3,700 passengers, 706 infected)
- 3/2 – Test kits made more available
- 3/5 – Ca and LA declare state of emergency

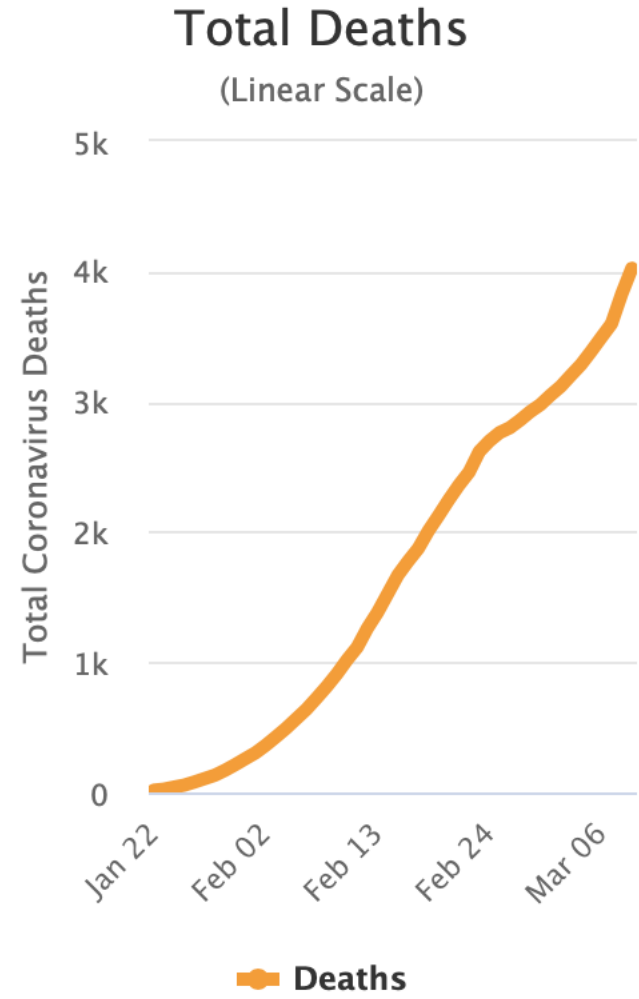
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logarithmic

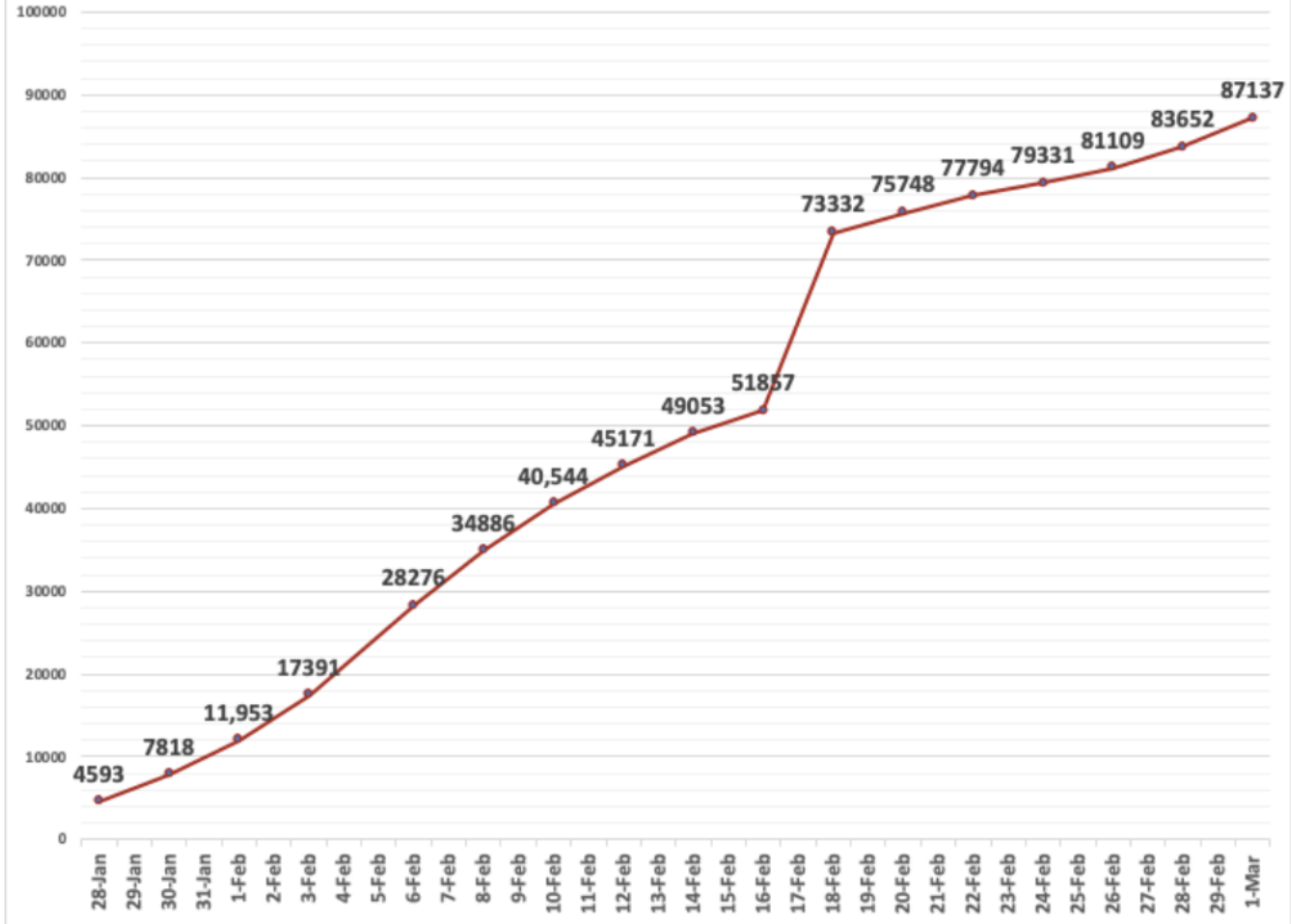


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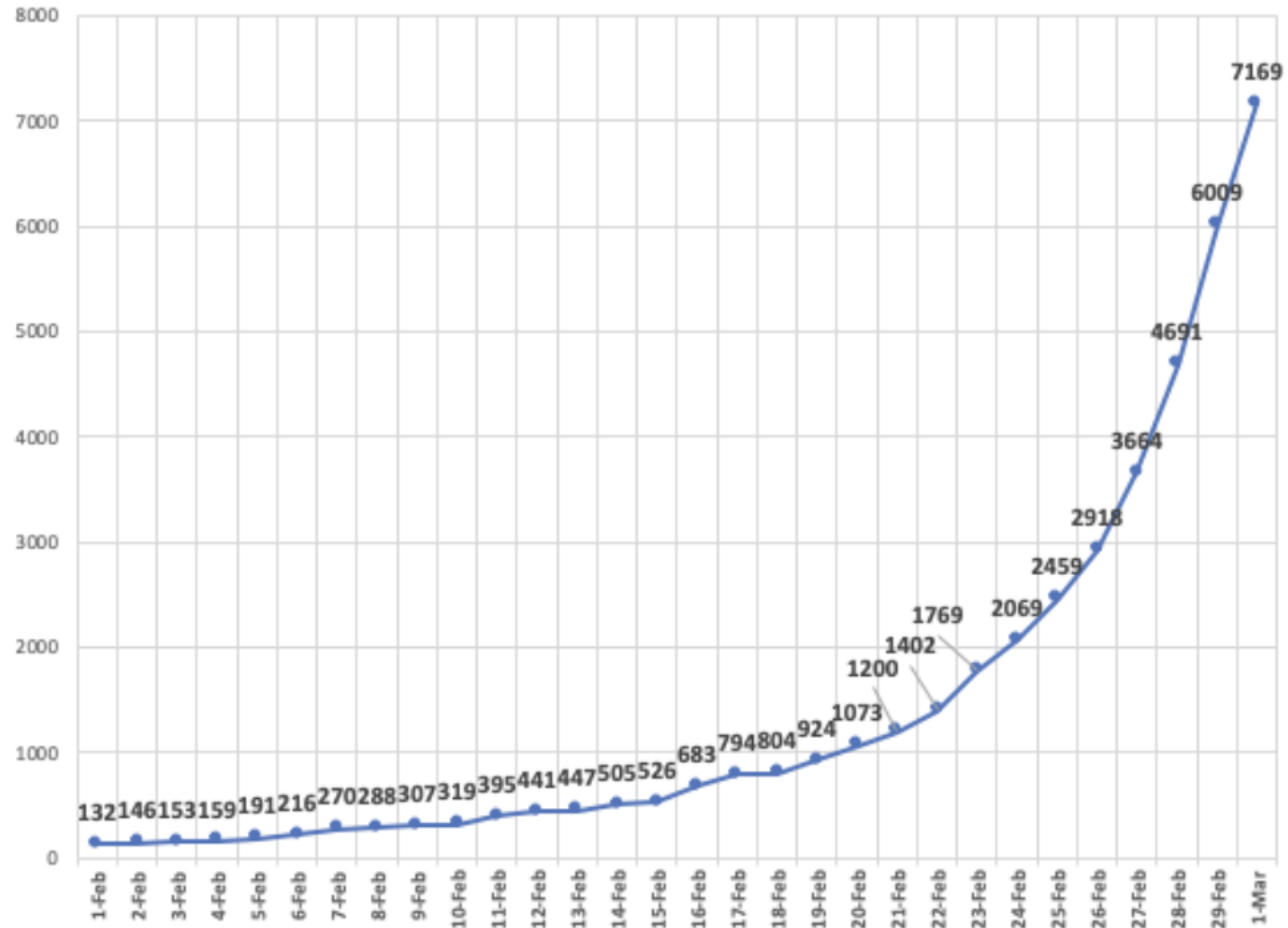
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Tracking Reported Global Novel Coronavirus **TOTAL** Infections  
(WHO Statistics)



### WHO Reported Cases **Outside China**

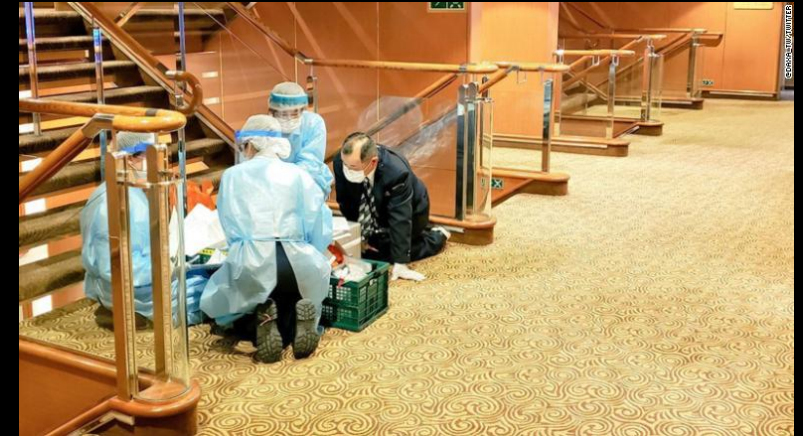


# United States Lacks Excess Surge Capacity?

- **Beds**
  - 2.8 beds/1,000 people
  - US Pop = 330M → 1M beds
  - 65% normally occupied = 330,000 available
  - 10% cases will require hospitalization
  - We have 3,503 cases now - need to have 330,00 cases for saturation
- **Masks**
- **HCWs**
  - 18M total, 6M working any one time; 800K MD, 500K CC nurses
  - Disproportionately affected
- **Ventilators**
  - 62,000 available, many in use, plus 10,000 in SNS, 10,000 can be repurposed
- **What about continuing care for others? Gowns? Effective protocols?**

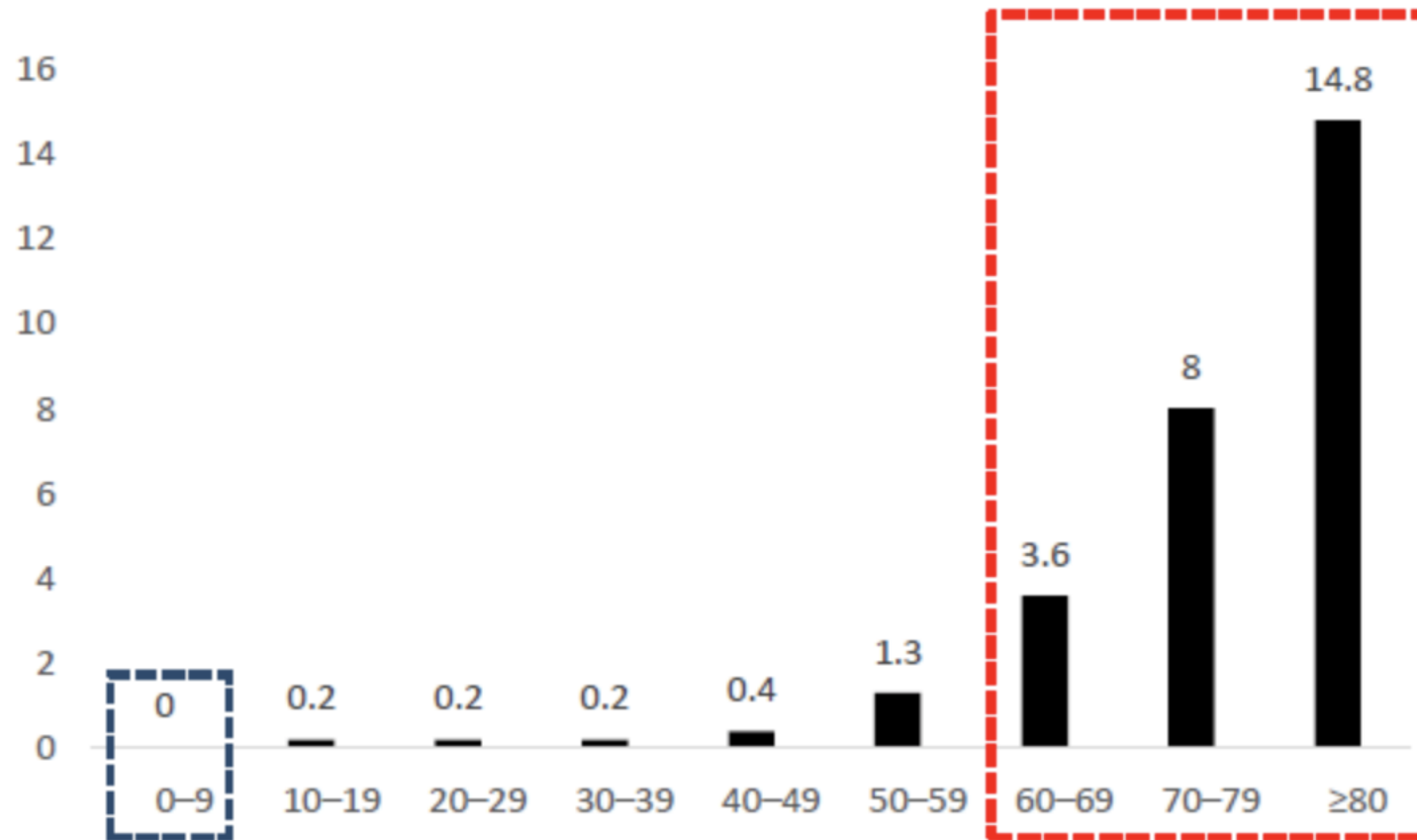
# Diamond Princess: a Test Bed

- 705 of 3,711 (19%) infected
- Half asymptomatic
- 6 deaths (.85%) all over >70 y/o
- Exposed repeatedly to concentrated viral loads
- Treatments delayed
- Relatively benign disease for most young people, a potentially devastating one for the old and chronically ill, but not nearly as risky as reported





## 2. Case Fatality Rate by Age Group<sup>1</sup>



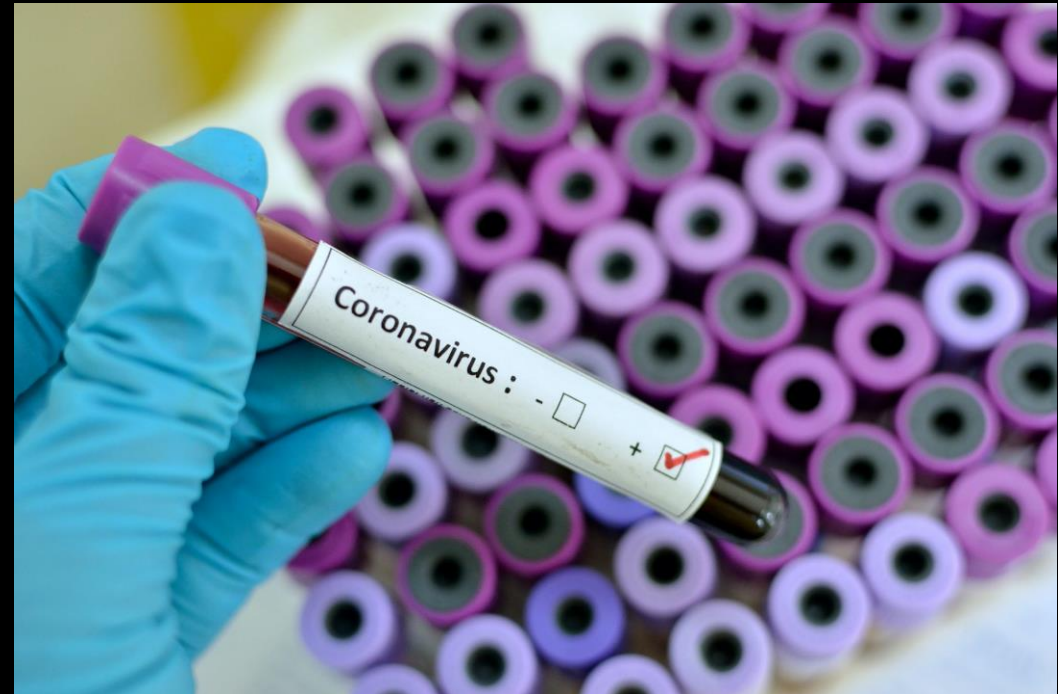
Source: Goldman Sachs, WHO, China's CDC, ISG

# Transmission – it has to reach the lung

- Person-to-person contact by droplet aerosol
  - May be spread simply through breathing, even without coughing
- Surface contact (degree?) – less important
- Asymptomatic, mildly symptomatic
- Community acquisition (unknown origin)

# Testing

- The earlier the better
- Needed for surveillance
- Fewer tests → fewer cases
- For 1<sup>st</sup> 2 months a few hundred at CDC; thousands/day in Korea; China running out → fewer cases
- Initially flawed
- Accuracy unknown, each country different (no gold standard)
- Balancing quality with speed of introduction



# Face Masks

- N95 v. surgical
- Misinformation
- Stockpile 12M N95, 30M surgical
- Severe shortages
- Hoarding
- Leave to HCWs, infected
- Different in China and US
- Last 2 days
- Most made in China
- Effectiveness?



# What do you tell specific groups with limited data?

- Individuals
- Institutions, businesses, colleges, hotels, prisons
- Hospitals, clinics, MD offices, SNF, LTCF
- Cruise ships
- Sports arenas and other gathering places (indoors vs. outdoors)
- Politicians & public health departments: local, state, nat'l, global
- Travelers
- Elderly, chronic health issues

# Effectiveness of China's efforts

- Too little too late? Merely delay or effective containment?
- **Lockdown**
  - Enforcers
  - Incomplete
  - Magnitude unprecedented for both establishment and maintenance
- **Lunar New Year** celebrations coincided
- **Chinese medical system normally overburdened** without primary care
- **Transparency** questioned - economic, saving face, inadq testing
- **Surveillance**
- **They have pollution, smoking, COPD**

# Comparing National Responses

## Done Well

- Taiwan
- South Korea\*
- Germany

## Done Poorly

- China?
- Iran
- Italy
- United States
- Japan

## Lucky?

- Ukraine
- Sri Lanka
- Jordan
- Paraguay



# United States

- Calming influence from the top important but.....
- Inconsistent and erroneous messaging
  - Incorrect early messaging from Whitehouse
  - “contained” “warmer climate” “anyone can get tested”
  - Political sanitizing messages
- Testing
  - Wrong messages
  - Very late
  - Politically keeping the numbers down?

# United States

- Challenges of information sharing with China
- Dismantling of federal public health infrastructure prior to outbreak
  - CDC budget and personnel
  - Shut down the Directorate for Global Health Security and Biodefense at the NSC IN 2016
- Washington State nursing home – feds not there early
- Political rallies to continue? Politicians in quarantine

# Taiwan

- Small island very 81 miles from Mainland China
- Population 23M
- 850,000 of their citizens reside in the mainland
- Another 400,000 work there
- 2.71M visitors from China in 2019



# Taiwan Did Crisis Management Right

- Rapidly implemented robust pandemic prevention plan with 124 action items
  - border control from the air and sea
  - case identification using new data and technology
  - early quarantine of suspicious cases
- Toll free hotline
- Educating the public while fighting misinformation
- Negotiating with other countries
- Formulated policies for schools and businesses
- Activated Central Epidemic Command Center in early January, integrated policies for schools, businesses

# Taiwan Did Everything Right

- Integrated national health insurance database with immigration and customs database to
  - Begin the creation of big data for analytics
  - Allowed case identification by generating real-time alerts during a clinical visit based on travel history and clinical symptoms
- Quick Response (QR) code scanning and online reporting of travel history and health symptoms
  - Classify travelers' infectious risks based on flight origin and travel history in the last 14 days
- Acted right after WHO was notified Dec. 31, 2019, of cases of pneumonia of unknown cause in Wuhan
  - Officials began to board planes and assess passengers on direct flights from Wuhan for fever and pneumonia symptoms before passengers could deplane

# Summary of a Proactive Approach post-SARS

- Travel bans
- Quarantines
- Surveillance
- Social distancing
- Panic prevention with good messaging
- Case tracking
- Collaboration
- Education
- Alert system
- Compliant population
- Technology

# Iran: What not to do with no means, equipment, money, or public trust

- Sent 300,000 militia door to door to sanitize
- Hoarding face masks... → death penalty
- Disclosure of patient info to public a “threat to nat’l security”, “public fear mongering”
- Senior officials sickened – VP, deputy health minister, 23 members of Parliament, 1 admitted death
- Death numbers don’t make sense → under-reporting
- Crackdown > saving face
- Mismanagement, ignorance
- Held mass worship services esp for visiting pilgrims
- Security agents told docs to fill out false death certificates





# Factors in Evaluating COVID-19 Risk

1. Look at current numbers and trajectory
2. All the unknowns
3. Psych component, worry about getting it wrong
4. Risk tolerance
5. Specific vulnerability – age, type of exposure
6. Personal and societal decisions ( travel, mass gatherings, close schools, play sports without spectators, switch to teleworking, a cruise, staying in a hotel, taking public transport
7. Expert opinion confusion
8. Actual risk currently very small compared to chronic disease, flu
9. Getting care if become sick
10. Background of past pandemic preparations in general

# Economics: Hysteria rules >>> infection

- Canceling business meetings
- Canceling trips
- Just-in-time supply chain disruption
- Many things made in China
- Stock market dive
- Petroleum industry in downward spiral
- Little the Fed can do
- Stimulus package, sick leave relief
- Good for Chlorox, hand sanitizers, survival kits, gold
- Casinos?

# Do's and Don'ts for Individuals

## Do

- Use hand sanitizer judiciously
- Wash hands often
- Elbow rubs
- Stay home if sick
- Get flu shot
- Keep supply of essential meds
- Avoid mass gatherings
- Call hospital before going in

## Don't

- Use a face mask
- Disregard public health announcements
- Avoid all travel (be selective)
- Sanitize everything you touch
- Mingle with sick people
- Go to “mass” gatherings
- Forget that this will pass

# A Model for all Businesses

- Establish a good leadership team
- Unlimited sick leave
- Work from home if possible; close office if necessary or directed
- Mandatory home protocol 14 days from last symptom, no self diagnosis, conservative choice when in doubt
- Help desk or phone number
- Limit personal & business travel esp. to a hazardous zone
- Flexible planning (not plans) for both short and long-term continuity

# A Model for all Businesses

- Deep cleaning as appropriate
- Hand sanitizer protocols
- No hug or handshake or mask
- Limit your visits and screen visitors (same standard)
- Emergency supplies on hand
- Alert system

# A Model for all Businesses

- Do everything to avoid panic in employees
- Comply with all community mitigation efforts
- Listen to health authorities
- Don't hoard
- If in doubt take the conservative choice
- Employee free flu shots and rapid testing if sick

# Travel Considerations

- Age (>60) and chronic state of health
- Contacts? Babies? Elderly? Sick? Crowded places?
- Quarantined or even frowned upon after returning
- What if outbreak trajectory worsens while away?
- Where going? Low to high risk or visa versa
- Cancellation fees will loosen
- Supplies harder to get while away
- Purpose of trip

# Conclusion: where we are today

- Comparisons to flu, chronic disease under-emphasized
- Infodemic, hysteria, conspiracy theories, fear mongering
- China fading and Southern Hemisphere not affected
- Lockdown effective or delay?
- Need more on testing, transmission, surfaces
- Superspreaders
- Xenophobia
- Surveillance innovations – cell phones, airline schedules, AI
- Travel restrictions, bans – effective or delay?



## Conclusion: where we are today

- Drive through testing 300+/day in Korea
- Universal healthcare
- Balancing needed news and fear mongering
- Building new hospitals and quarantine centers
- Treatment and vaccines
- Mistakes
- Effect on the election, Olympics...

# Focus

- Nursing homes, indoor large gatherings, not schools
- Hospitals, not planes
- Up the hygiene and isolation ante
- Void misdirected anxieties like hoarding food, masks, and hand sanitizer

# The Future

- Optimistic Scenario

- Cases decreasing in China and S Korea
- Run out of susceptible, genetic mutation, environment slow down to warm moist from cold dry
- Vaccine and therapeutics will save us

- Pessimistic Existential Threat

- Like 2009 or 1918: billions infected
- Point of no return?

