

COVID-19/SARS-CoV-2 Pandemic: Dress Rehearsal for “Disease X”? FOR “DISEASE X”
Prof. Steven Morse, Columbia University Mailman School of Public Health
A Webber Training Teleclass



Columbia University
**MAILMAN SCHOOL
OF PUBLIC HEALTH**

**COVID-19/SARS-CoV-2 PANDEMIC:
DRESS REHEARSAL FOR “DISEASE X”?**

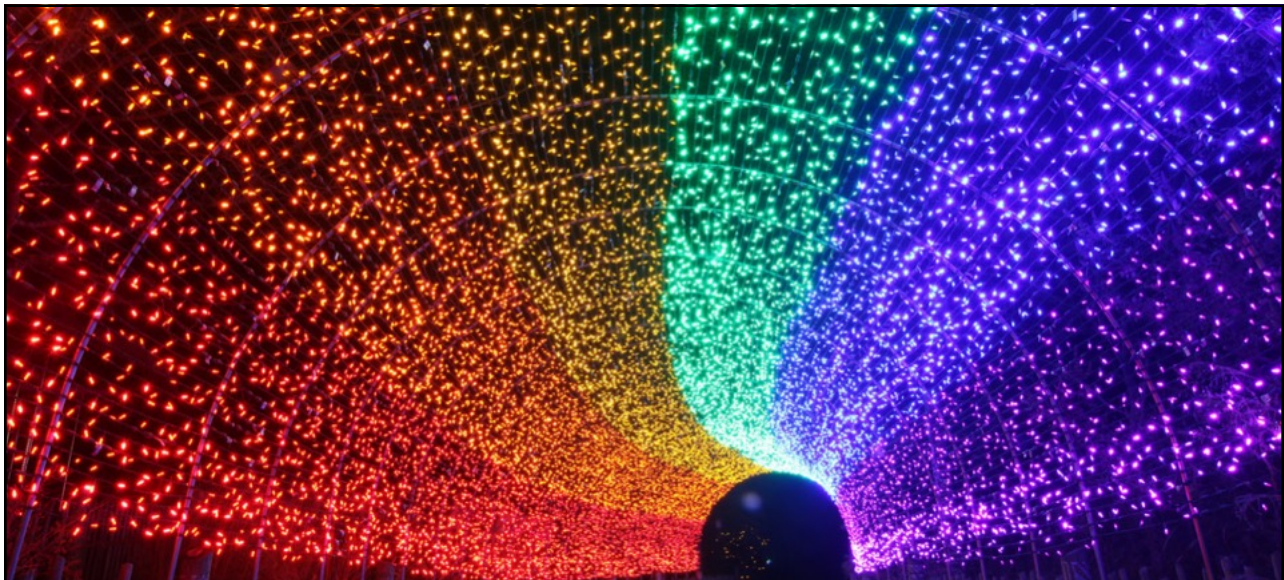
Stephen S. Morse
Professor, Epidemiology
ssm20@cumc.columbia.edu



Hosted by Paul Webber
paul@webbertraining.com

www.webbertraining.com

December 16, 2021



**CONGRATULATIONS ON TELECLASS’ 20th
ANNIVERSARY!**

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WHO 2018 Annual review of diseases prioritized under the R&D Blueprint

The second annual review occurred 6-7 February, 2018. Experts consider that given their potential to cause a public health emergency and the absence of efficacious drugs and/or vaccines, there is an urgent need for accelerated research and development for:

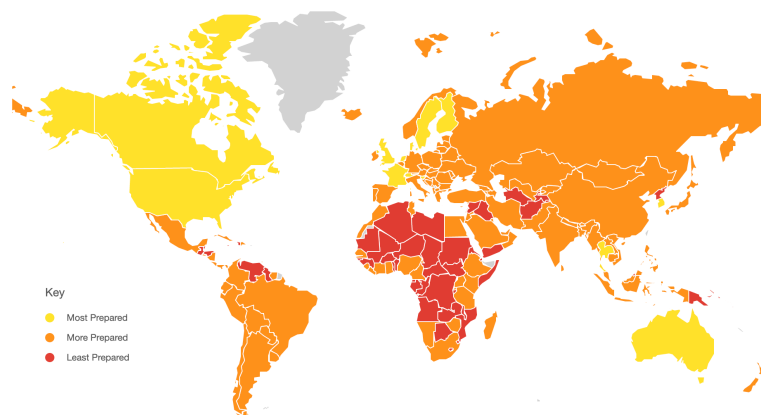
- Crimean-Congo haemorrhagic fever (CCHF)
- Ebola virus disease and Marburg virus disease
- Lassa fever
- Middle East respiratory syndrome coronavirus (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS)
- Nipah and henipaviral diseases
- Rift Valley fever (RVF)
- Zika
- Disease X

Disease X represents the knowledge that a serious international epidemic could be caused by a pathogen currently unknown to cause human disease, and so the R&D Blueprint explicitly seeks to enable cross-cutting R&D preparedness that is also relevant for an unknown “Disease X” as far as possible

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Global Health Security: Overall

NTI:bio



Courtesy of Dr. Wilmot James

Source: <https://www.ghsindex.org/>

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We had dress rehearsals for “Disease X”

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‘Crimson Contagion 2019’ Simulation Warned of Pandemic Implications in US

Crimson Contagion was a joint exercise conducted from January to August 2019, in which numerous national, state and local, private and public organizations in the US participated, in order to test the capacity of the federal government and twelve states to respond to a severe pandemic of **influenza** originating in **China**.

The **simulation**, which was conducted by the Trump administration’s Department of Health and Human Services in a series of exercises that ran from January to August 2019, involved a scenario in which a group of about 30 tourists returning from China spread a novel influenza A respiratory **virus** in the United States, beginning in **Chicago**. In less than two months the virus had spread from a single index case (a 52 year-old man returning to Chicago) to infect 110 million Americans; 7.7 million patients would require hospitalization, and 586,000 people would die from the novel virus. The 70-page report issued at the conclusion of the exercise outlined the government’s limited capacity to respond to a pandemic. States experienced “multiple challenges” requesting resources from the federal government “due to a lack of standardized, well-understood, and properly executed resource request processes,” the report said. Federal agencies lacked the funds, coordination, and capacities to implement an effective response to the virus.^{[1][2][3]}



Wikipedia, https://en.wikipedia.org/wiki/Crimson_Contagion;

NY Times, March 19, 2020 (by David E. Sanger, Eric Lipton, Eileen Sullivan and Michael Crowley)

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Event 201 (October, 2019) Johns Hopkins Center for Health Security

- The Johns Hopkins Center for Health Security in partnership with the World Economic Forum and the Bill and Melinda Gates Foundation hosted Event 201, a high-level pandemic exercise on October 18, 2019, in New York, NY. The exercise illustrated areas where public/private partnerships will be necessary during the response to a severe pandemic in order to diminish large-scale economic and societal consequences.
- The scenario ends at the 18-month point, with 65 million deaths. The pandemic is beginning to slow due to the decreasing number of susceptible people. The pandemic will continue at some rate until there is an effective vaccine or until 80-90 % of the global population has been exposed. From that point on, it is likely to be an endemic childhood disease.

<https://www.centerforhealthsecurity.org/event201/>

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An interesting time to be an Epidemiologist!

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“People ask me to predict the future, when all I want to do is prevent it.”

—Ray Bradbury

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Emerging Infections

- Those rapidly increasing in incidence (number of new cases) or geographic range
- Often novel (a previously unrecognized disease)
- Most are zoonotic (from other species)
- Anthropogenic causes (such as land use change, agriculture, live animal markets) often important in emergence

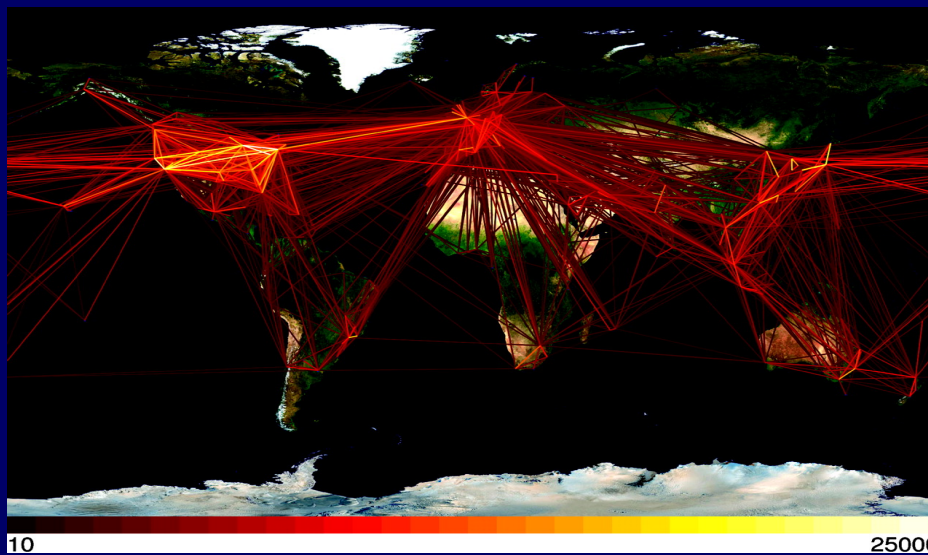
10

Common Pathways for Emerging Infections

- Wildlife contact
- Hunting
- Live animal markets and food handling
- Healthcare settings (infection control)

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Global aviation network



Hufnagel, L. et al. (2004) Proc. Natl. Acad. Sci. USA 101, 15124-15129

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PNAS

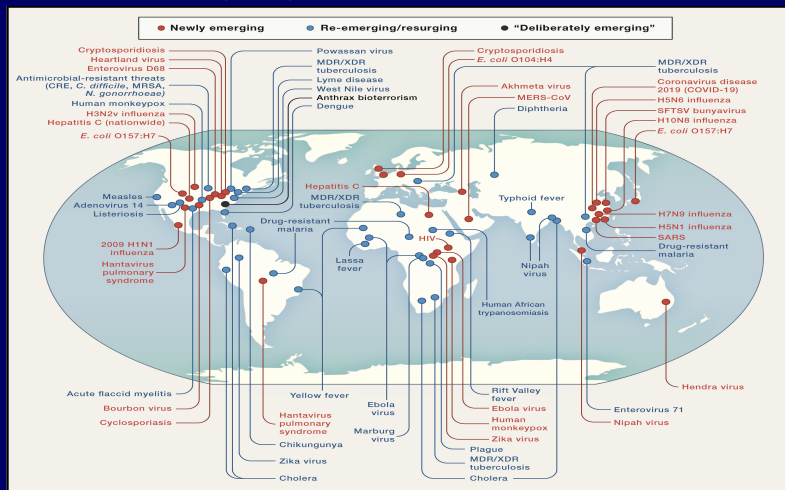
12

Zoonoses in disease emergence

- 1407 human pathogens
- 58% are zoonotic
- 130 of the 177 recently emerged pathogens zoonotic (RR=2.0)

Woolhouse ME, Gowtage-Sequeria S. Host range and emerging and reemerging pathogens. *Emerg Infect Dis* 2005; 11(12): 1842-7.

Global Examples of Emerging and Re-Emerging Infectious Diseases









Cell 2020 1821077-1092DOI: (10.1016/j.cell.2020.08.021)

David Morens and Anthony Fauci, NIAID

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PANDEMICS IN HISTORY

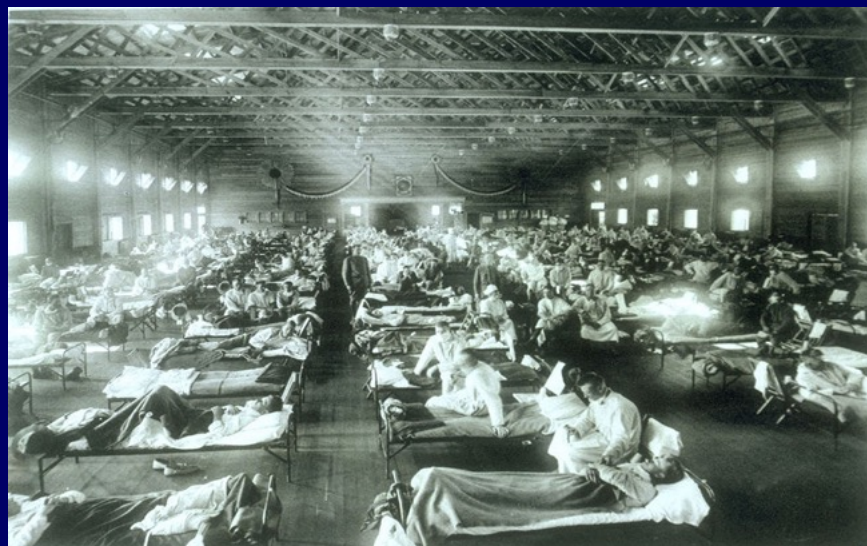
PANDEMIC	DATES	DEATH TOLL
 Smallpox	~3,000 years–1979 ^a	>300,000,000 ^b
 Black Death	1347–1351	~225,000,000 ^c
 Spanish Flu (H1N1)	1918–1919	50,000,000
 HIV/AIDS	1981–Present	23,600,000–43,800,000
 Cholera	1899–1923 ^d	>1,500,000
 Asian Flu (H2N2)	1957–1958	1,100,000
 Russian Flu (likely H2N2)	1889–1890	1,000,000
 Hong Kong Flu (H3N2)	1968–1970	1,000,000
 Swine Flu (H1N1)	2009–2010	151,700–575,400
 COVID-19	2019–Present	333,489 ^e
 Ebola	2014–2016	11,300
 MERS	2012–Present	866
 SARS	2002–2003	774

Shyanne Gal/Business Insider, May 22, 2020

^e: COVID-19 deaths as of May, 2020; >5 M globally as of Dec. 12, 2021

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Influenza Pandemic 1918 at Camp Funston (Kansas)



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Influenza Pandemic, 1918



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**No pandemic or emerging
infection has ever been
predicted**

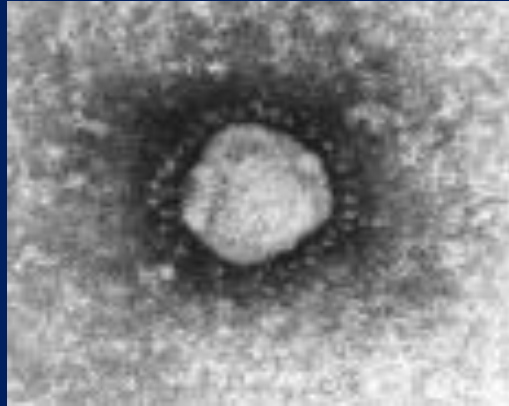
--- Morse *et al.*, *Lancet* 380: 1956–1965 (2012)

... and we can probably now say that
none has ever been stopped yet

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CORONAVIRUS



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SARS
(Severe Acute Respiratory Syndrome)
2003

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PNEUMONIA - CHINA (GUANGDONG): RFI

A ProMED-mail post

<<http://www.promedmail.org>>

ProMED-mail is a program of the International Society for Infectious Diseases <<http://www.isid.org>>

[1]

Date: 10 Feb 2003

From: Stephen O. Cunnion, MD, PhD, MPH
<cunnion@erols.com>

This morning I received this e-mail and then searched your archives and found nothing that pertained to it. Does anyone know anything about this problem?

"Have you heard of an epidemic in Guangzhou? An acquaintance of mine from a teacher's chat room lives there and reports that the hospitals there have been closed and people are dying."

--

Stephen O. Cunnion, MD, PhD, MPH
International Consultants in Health, Inc
Member ASTM&H, ISTM
<cunnion@erols.com>

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ProMED-mail: A Prototype Outbreak Reporting System

ProMED-mail: www.promedmail.org

- Moderated listserv**
- Free to all**
- Started 1994**
- Approximately 70,000 subscribers in ≥185 countries**

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A Compliment?

"The popular ProMED-mail e-list offers a daily update on all the known disease outbreaks flaring up around the world, which surely makes it the most terrifying news source known to man."

**– Steven Johnson
"The Ghost Map", p. 219
Riverhead Books/Penguin, 2006**

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Rhinolophus (“Horseshoe Bat”)

- Natural host of SARS Coronavirus – and a number of other related coronaviruses
- Sold in live animal markets in South China



EcoHealth Alliance



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September 20, 2012

- A ProMED Mail report details a novel human Coronavirus isolated from a 60 year old male patient in Jeddah, Saudi Arabia

Published Date: 2012-09-20 15:51:26
 Subject: PRO/EDR> Novel coronavirus - Saudi Arabia: human isolate
 Archive Number: 20120920.1302733

NOVEL CORONAVIRUS - SAUDI ARABIA: HUMAN ISOLATE

 A ProMED-mail post
<http://www.promedmail.org>
 ProMED-mail is a program of the
 International Society for Infectious Diseases
<http://www.isid.org>

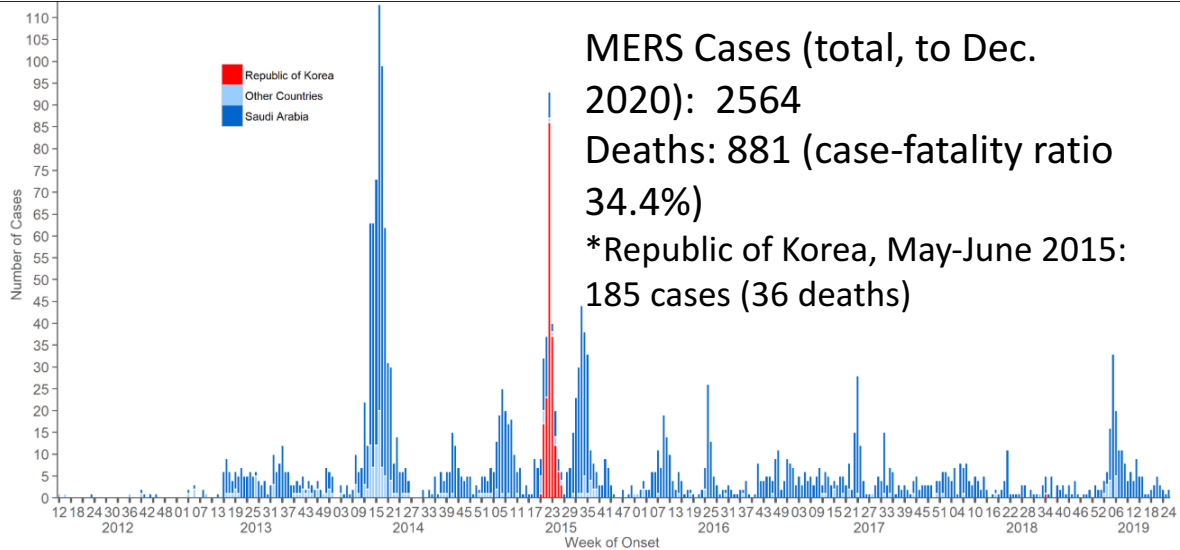
Date: Sat 15 Sep 2012
 From: Ali Mohamed Zaki <azaki53@hotmail.com> [edited]

[A new human coronavirus was isolated from a patient with pneumonia by Dr Ali Mohamed Zaki at the Virology Laboratory of Dr Soliman Fakeeh Hospital Jeddah Saudi Arabia.](#)

The virus was isolated from sputum of a male patient aged 60 years old presenting with pneumonia associated with acute renal failure. The virus grows readily on Vero cells and LLC-MK2 cells producing CPE in the form of rounding and syncytia formation.

[The clinical isolate] was initially tested for influenza virus A, influenza virus B, parainfluenza virus, enterovirus and adenovirus, with negative results. Testing with a pan-coronavirus RT-PCR yielded a band at a molecular weight appropriate for a coronavirus. The virus RNA was tested also in Dr. Ron Fouchier's laboratory in the Netherlands and was confirmed to be a new member of the beta group of coronaviruses, closely related to bat coronaviruses. Further analysis is being carried out in the Netherlands.

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Other countries: Algeria, Austria, Bahrain, China, Egypt, France, Germany, Greece, Iran, Italy, Jordan, Kuwait, Lebanon, Malaysia, Netherlands, Oman, Philippines, Qatar, Thailand, Tunisia, Turkey, United Arab Emirates, United Kingdom, United States of America, Yemen
 Please note that the underlying data is subject to change as the investigations around cases are ongoing. Onset date estimated if not available.



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... And now ...
SARS-CoV-2
(COVID-19)

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The screenshot shows a WHO webpage with a navigation menu on the left containing links for Home, Alert and response operations, Diseases, Biosafety reduction, and Disease outbreak news. The main content area is titled "Pneumonia of unknown cause – China" and is categorized as "Disease outbreak news" dated 5 January 2020. The text reports that on 31 December 2019, the WHO China Country Office was informed of cases of pneumonia of unknown etiology (unknown cause) detected in Wuhan City, Hubei Province of China. As of 3 January 2020, a total of 44 patients with pneumonia of unknown etiology have been reported to WHO by the national authorities in China. Of the 44 cases reported, 11 are severely ill, while the remaining 33 patients are in stable condition. According to media reports, the concerned market in Wuhan was closed on 1 January 2020 for environmental sanitation and disinfection. The causal agent has not yet been identified or confirmed. On 1 January 2020, WHO requested further information from national authorities to assess the risk. National authorities report that all patients are isolated and receiving treatment in Wuhan medical institutions. The clinical signs and symptoms are mainly fever, with a few patients having difficulty in breathing, and chest radiographs showing invasive lesions of both lungs. According to the authorities, some patients were operating dealers or vendors in the Huanan Seafood market. Based on the preliminary information from the Chinese investigation team, no evidence of significant human-to-human transmission and no health care worker infections have been reported. A "Public Health Response" section states that national authorities have reported the following response measures:

- One hundred and twenty-one close contacts have been identified and are under medical observation;
- The follow-up of close contacts is ongoing;
- Pathogen identification and the tracing of the cause are underway;
- Wuhan Municipal Health Commission carried out active case finding, and retrospective investigations have been completed;


WHO

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ProMED
INTERNATIONAL SOCIETY
FOR INFECTIOUS DISEASES

Published Date: 2019-12-30 23:59:00
 Subject: PRO/AH/EDR> Undiagnosed pneumonia - China (HU); RFI
 Archive Number: 20191230.6864153

UNDIAGNOSED PNEUMONIA - CHINA (HUBEI); REQUEST FOR INFORMATION

 A ProMED-mail post
<http://www.promedmail.org>
 ProMED-mail is a program of the
 International Society for Infectious Diseases
<http://www.isid.org>

[1]
 Date: 30 Dec 2019
 Source: Finance Sina [machine translation]
<https://finance.sina.cn/2019-12-31/detail-ihnzahk1074832.d.html?from=wap>

Wuhan unexplained pneumonia has been isolated test results will be announced [as soon as available]

 On the evening of [30 Dec 2019], an "urgent notice on the treatment of pneumonia of unknown cause" was issued, which was widely distributed on the Internet by the red-headed document of the Medical Administration and Medical Administration of Wuhan Municipal Health Committee.

On the morning of [31 Dec 2019], China Business News reporter called the official hotline of Wuhan Municipal Health and Health Committee 12320 and learned that the content of the document is true.

12320 hotline staff said that what type of pneumonia of unknown cause appeared in Wuhan this time remains to be determined.

According to the above documents, according to the urgent notice from the superior, some medical institutions in Wuhan have successively appeared patients with pneumonia of unknown cause. All medical institutions should strengthen the management of outpatient and emergency departments, strictly implement the first-in-patient responsibility system, and find that patients with unknown cause of pneumonia actively adjust the power to treat them on the spot, and there should be no refusal to be pushed or pushed.

The document emphasizes that medical institutions need to strengthen multidisciplinary professional forces such as respiratory, infectious diseases, and intensive medicine in a targeted manner, open green channels, make effective connections between outpatient and emergency departments, and improve emergency plans for medical treatment.


Another piece of emergency notification, entitled "City Health and Health Commission's Report on Reporting the Treatment of Unknown Cause of Pneumonia" is also true. According to this document, according to the urgent notice from the superior, the South China Seafood Market in our city has seen patients with pneumonia of unknown cause one after another.

The so-called unexplained pneumonia cases refer to the following 4 cases of pneumonia that cannot be diagnosed at the same time: fever (greater than or equal to 38C); imaging characteristics of pneumonia or acute respiratory distress syndrome; reduced or normal white blood cells in the early stages of onset The number of lymphocytes was reduced. After treatment with antibiotics for 3 to 5 days, the condition did not improve significantly.

It is understood that the 1st patient with unexplained pneumonia that appeared in Wuhan this time came from Wuhan South China Seafood Market.

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Timeline

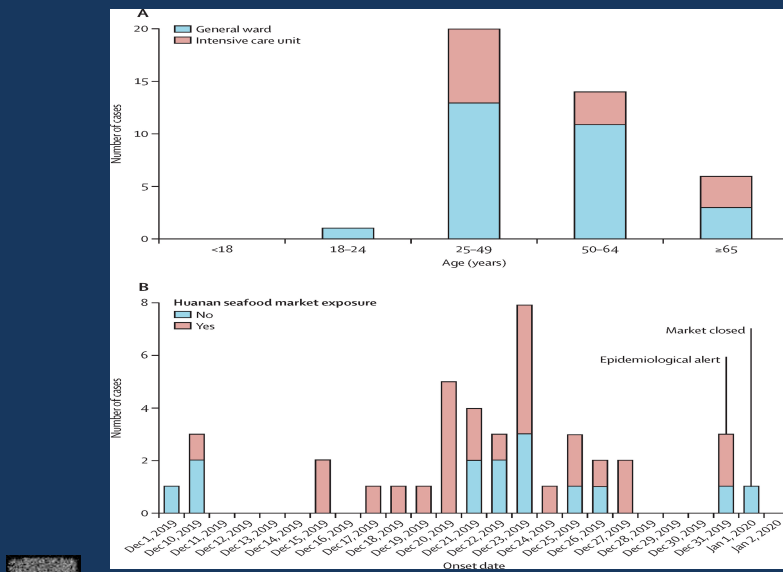


ProMED posting:
Dec. 30/31

Business Insider
30

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Figure 1
 Date of illness onset and age distribution of patients with laboratory-confirmed 2019-nCoV infection



Huang C et al. Lancet Volume 395 Issue 10223 Pages 497-506 (February 2020)
 DOI: 10.1016/S0140-6736(20)30183-5



Mission summary: WHO Field Visit to Wuhan, China 20-21 January 2020

22 January 2020 | Statement

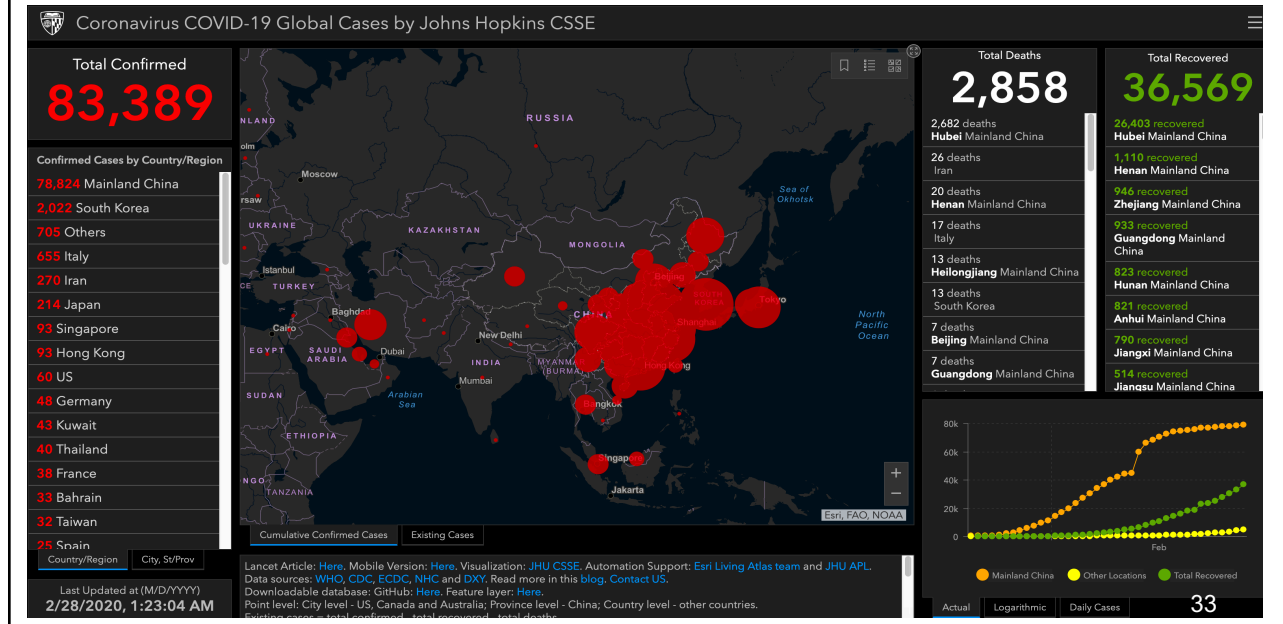
On 20-21 January 2020, a World Health Organization (WHO) delegation conducted a field visit to Wuhan to learn about the response to 2019 novel coronavirus (2019-nCoV). The mission was part of the on-going close collaboration between WHO and Chinese national, provincial, and Wuhan health authorities in responding to 2019-nCoV.

The delegation visited the Wuhan Tianhe Airport, Zhongnan hospital, Hubei provincial CDC, including the BSL3 laboratory in China's Center for Disease Control (CDC). The delegation observed and discussed active surveillance processes, temperature screening at the airport, laboratory facilities, infection prevention and control measures at the hospital and its associated fever clinics, and the deployment of the rRT-PCR test kit to detect the virus.

Data collected through detailed epidemiological investigation and through the deployment of the new test kit nationally suggests that human-to-human transmission is taking place in Wuhan. More analysis of the epidemiological data is needed to understand the full extent of human-to-human transmission. WHO stands ready to provide support to China to conduct further detailed analysis.

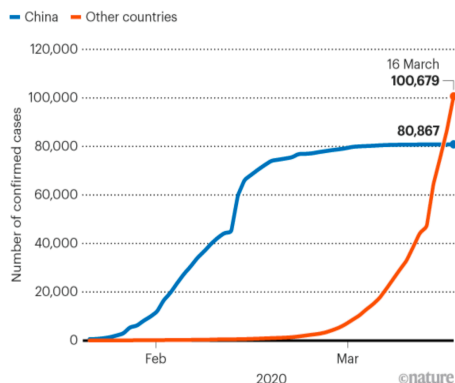
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The situation as of Feb. 28, 2020



BY MARCH 2020

The new coronavirus has infected more than 180,000 people globally. The number of cases outside China continues to escalate.



U.S. Begins Airport Screening from Wuhan Jan. 17



(For illustrative purposes; this is actually Kolkata Airport)

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International Arrivals at DFW Airport, Mar. 14, 2020



New York Times, Mar. 15, 2020

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THEN AND NOW ...

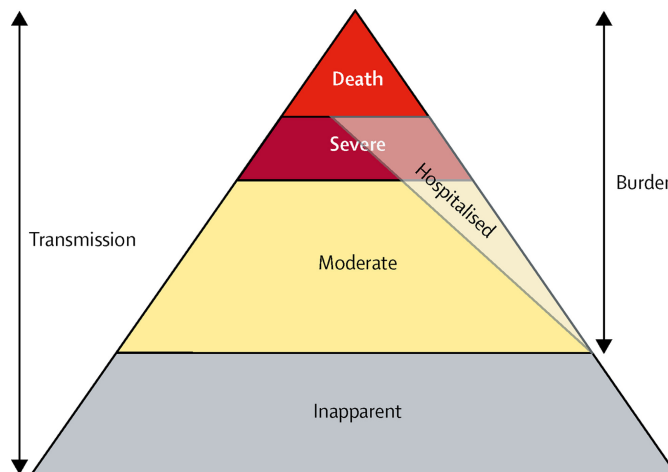
Influenza Pandemic, 1918



SARS-CoV-2
Pandemic, 2020



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[Terms and Conditions](#)

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THE WALL STREET JOURNAL

What Derailed America’s Covid Testing: Three Lost Weeks

The coronavirus spread unchecked for 21 critical February days while problems plagued the federal test for the pathogen; ‘We quickly got behind’

By [Stephanie Armour](#), [Brianna Abbott](#), [Thomas M. Burton](#) and [Betsy McKay](#)

Aug. 18, 2020 12:20 pm ET

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LOST TIME

Federal health agencies failed to fix a flawed Covid-19 test for three critical weeks while the pathogen spread.

U.S. cases of Covid-19 since the SARS-CoV-2 genome sequence is shared globally



Feb. 4

The CDC is granted an Emergency Use Authorization on Feb. 4 and says it will start shipping its coronavirus test kits, initially to 33 states 70 labs in 66 countries, by Feb. 6.

Feb. 9-10

CDC learns that some public-health labs had negative controls producing positive results.

Feb. 11

CDC puts most labs on pause while it worked on a solution, but some labs without the issues could start testing.

Feb. 24

Association of Public Health Laboratories urges the FDA in a letter to allow public-health labs to create and run their own in-house tests and not wait for new CDC kits.

Feb. 25

Top CDC official Nancy Messonnier warns of Covid-19 spread in the U.S. and severe disruptions to daily life.

Feb. 26

State and local public-health labs are notified they can proceed with the CDC test kits, removing the faulty component.

Feb. 29

FDA says specific labs can start testing for Covid-19 while they are waiting for FDA approval—speeding up the process for hundreds of hospital labs that previously couldn't test without getting an approval.

Wall Street Journal, Aug. 19, 2020

Note: Confirmed cases as of Aug. 6
 Sources: Johns Hopkins Center for Systems Science and Engineering; public records

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WHY WOULD A PANDEMIC BECOME A POLITICAL ISSUE?



Anti-Mask Demonstrations, Michigan State House, May 1, 2020

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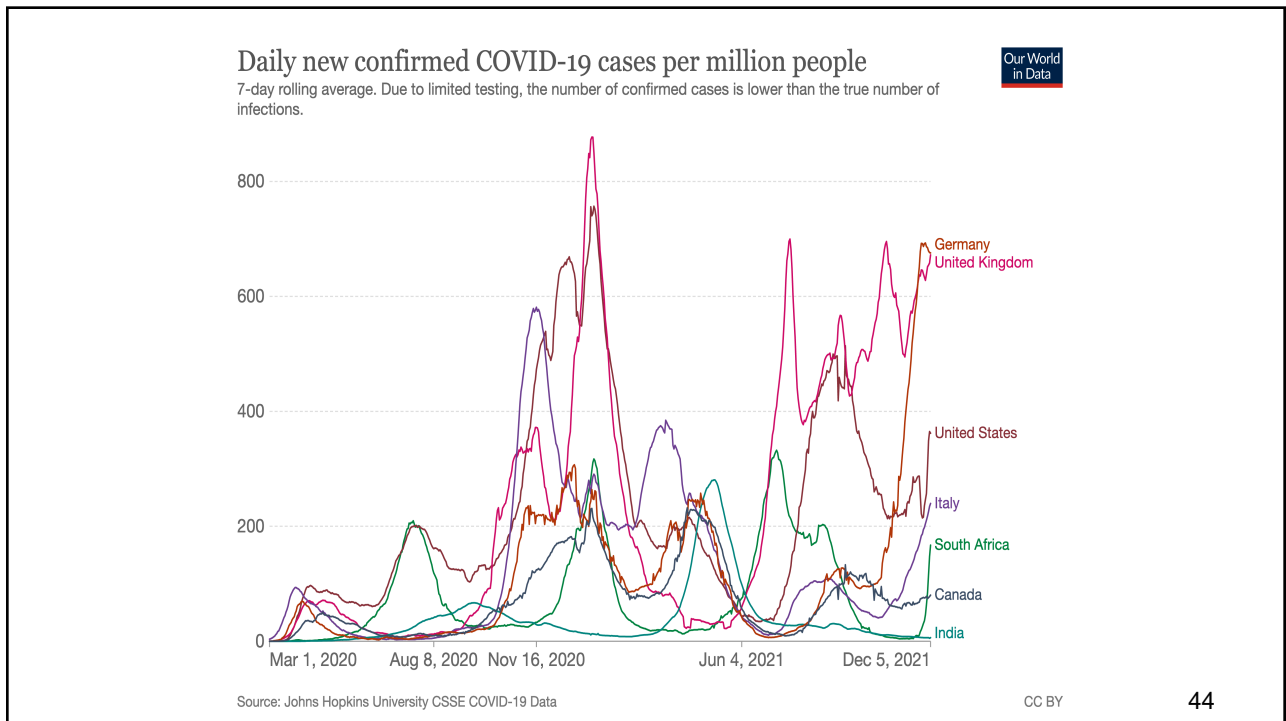
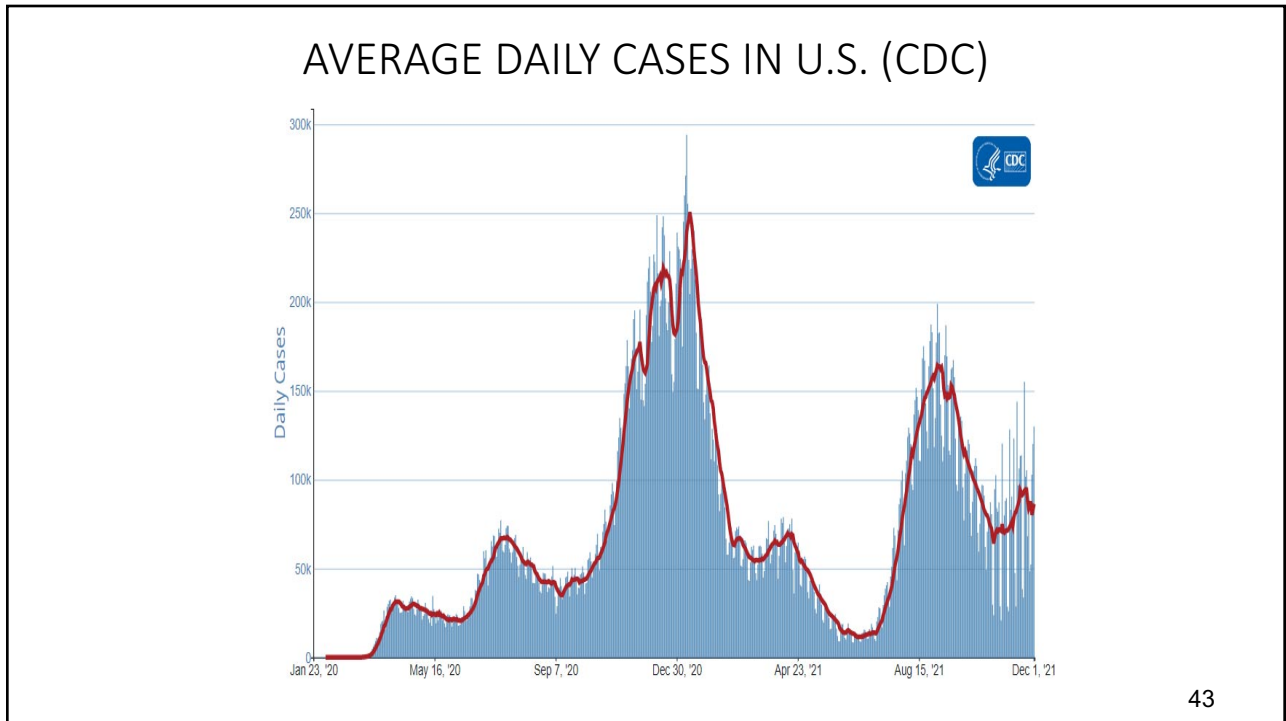
WHO-convened Global Study of Origins of SARS-CoV-2: China Part

Joint WHO-China Study
14 January-10 February 2021

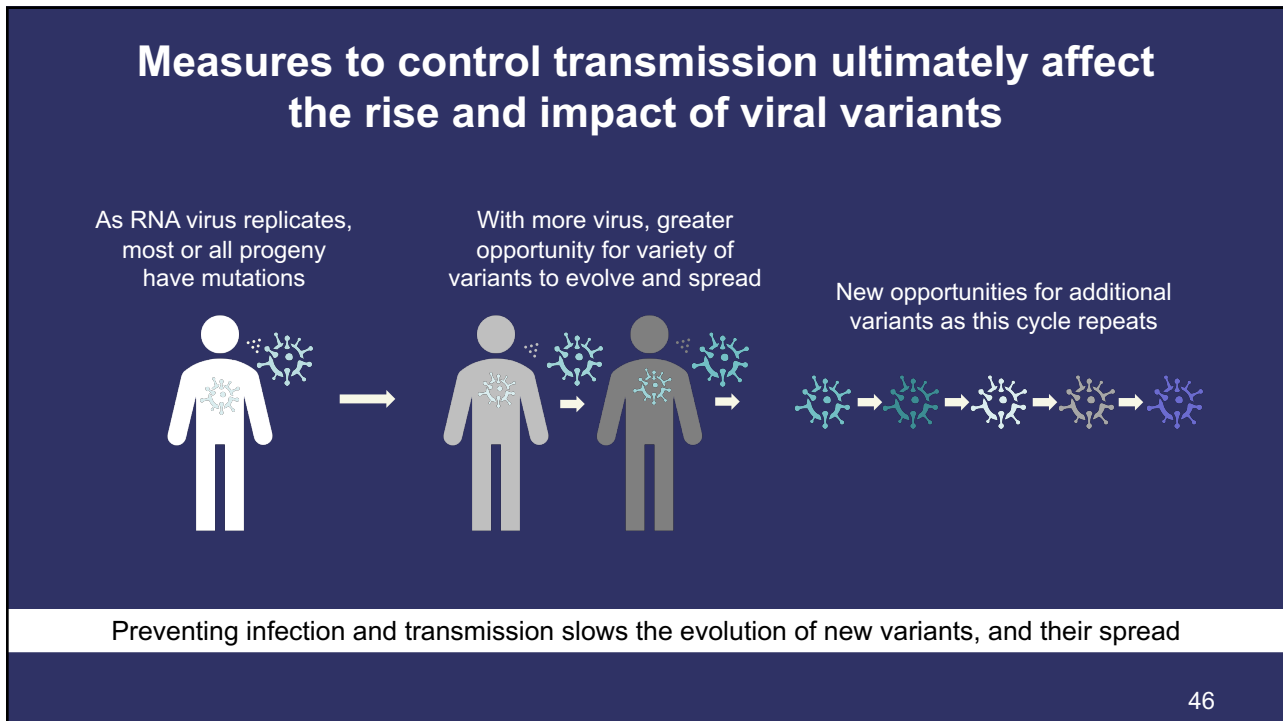
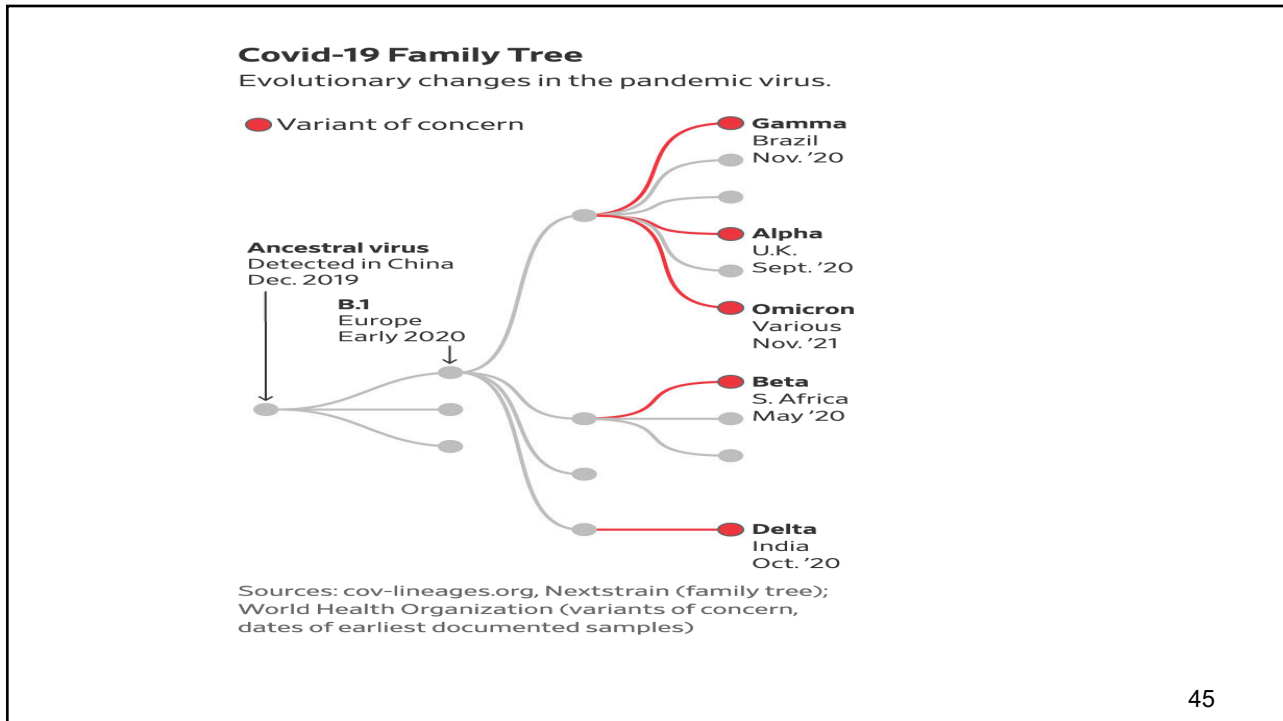
Joint Report

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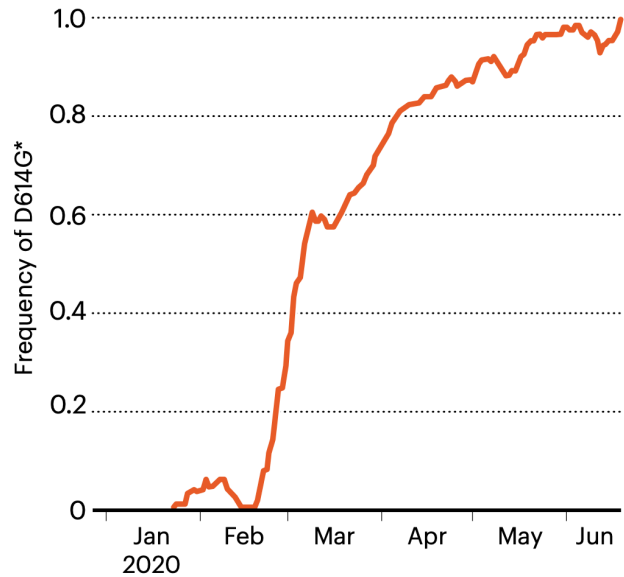
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Global spread

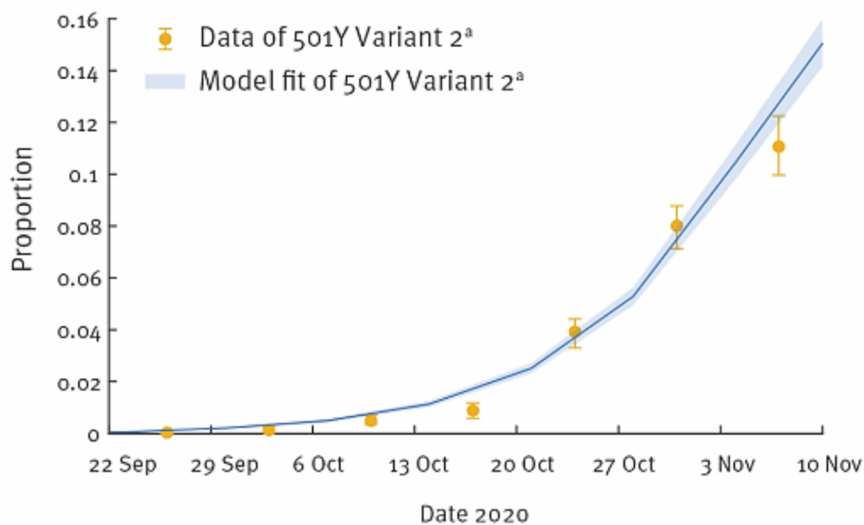
By the end of June, the D614G mutation was found in almost all SARS-CoV-2 samples worldwide



*Number of samples = 52,292

Callaway E. Making Sense Of Coronavirus Mutations. Nature, Vol 585, 10 Sept 2020. <https://media.nature.com/original/magazine-assets/d41586-020-02544-6/d41586-020-02544-6.pdf>. Accessed 9 Mar 2021. Data: Korber, B. et al. Cell 182, 812–827 (2020). 47

SARS-CoV-2 501Y variant 2 (B.1.1.7; Alpha) in U.K.

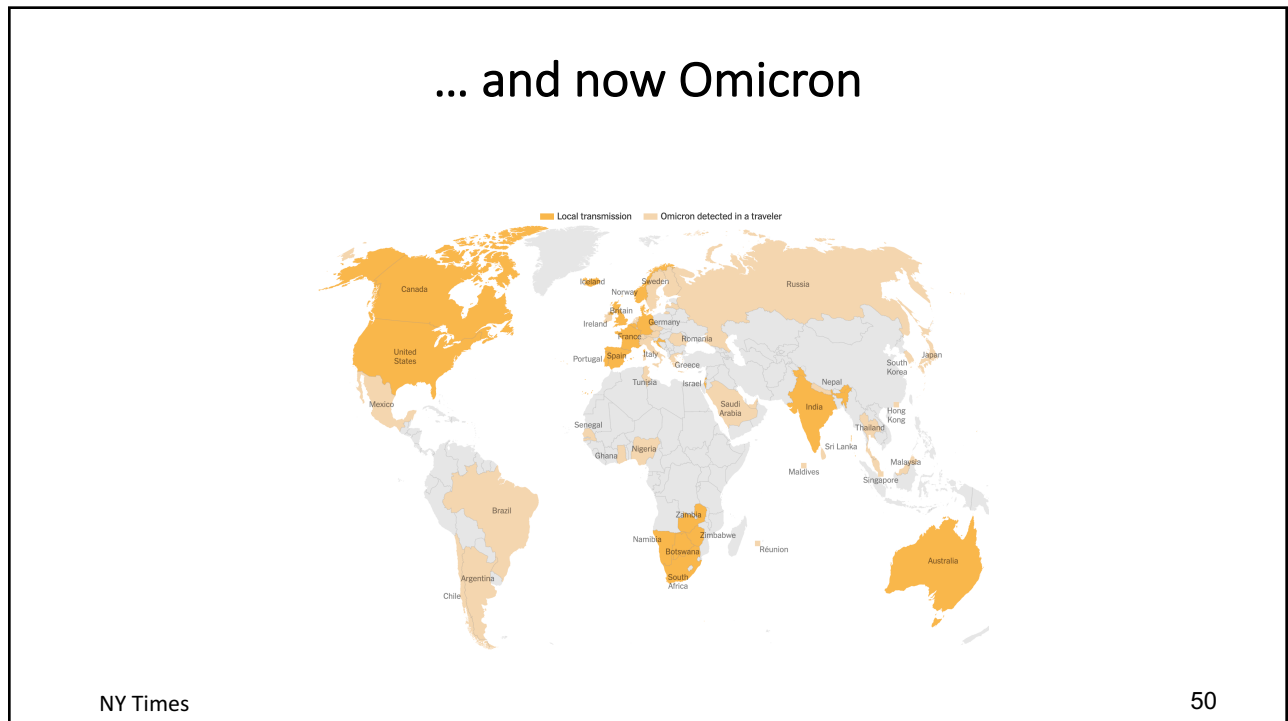
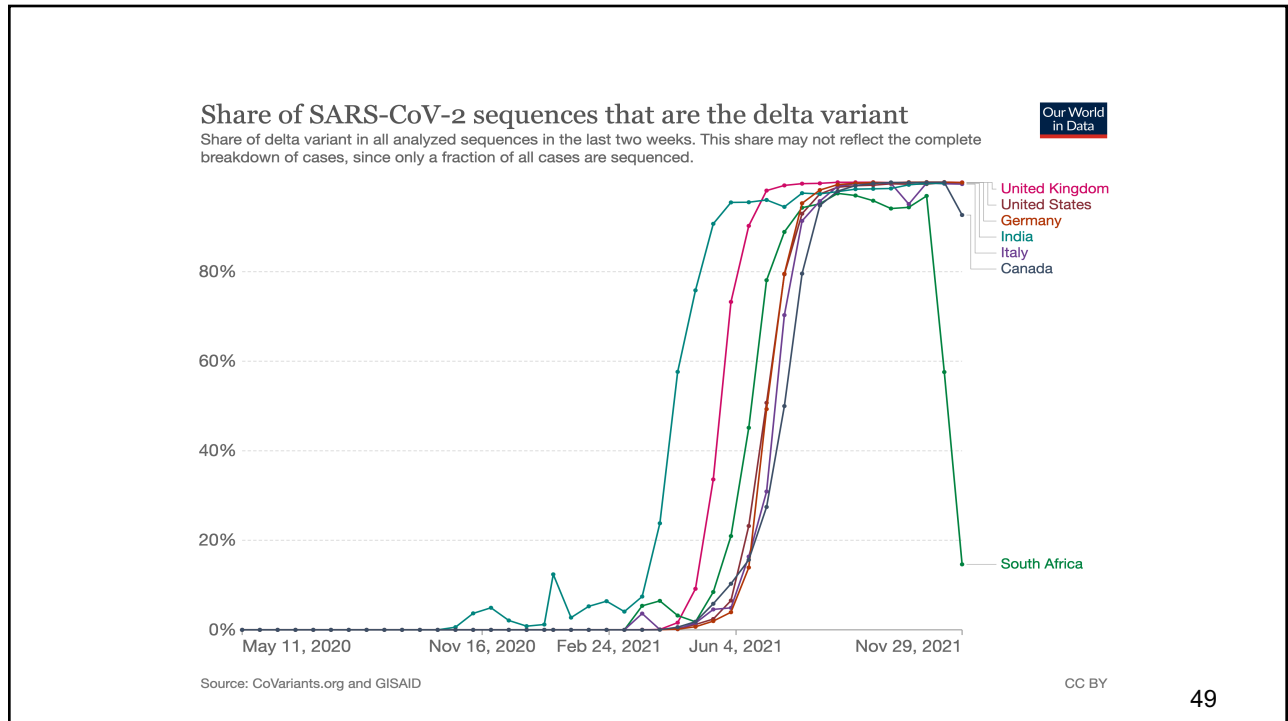


CDC, COVID-19 Science Update, Transmission. 22 Jan 2021, Ed. 73. https://www.cdc.gov/library/covid19/01222021_covidupdate.html Accessed 9 Mar 2021.

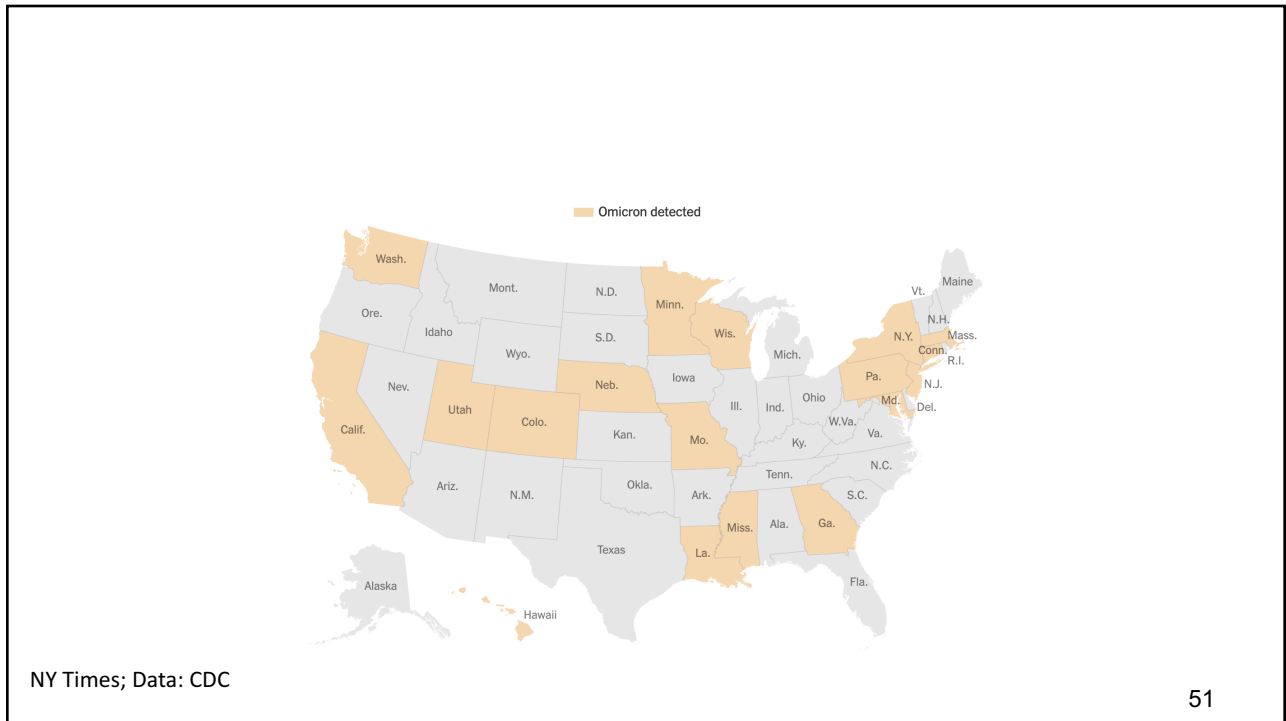
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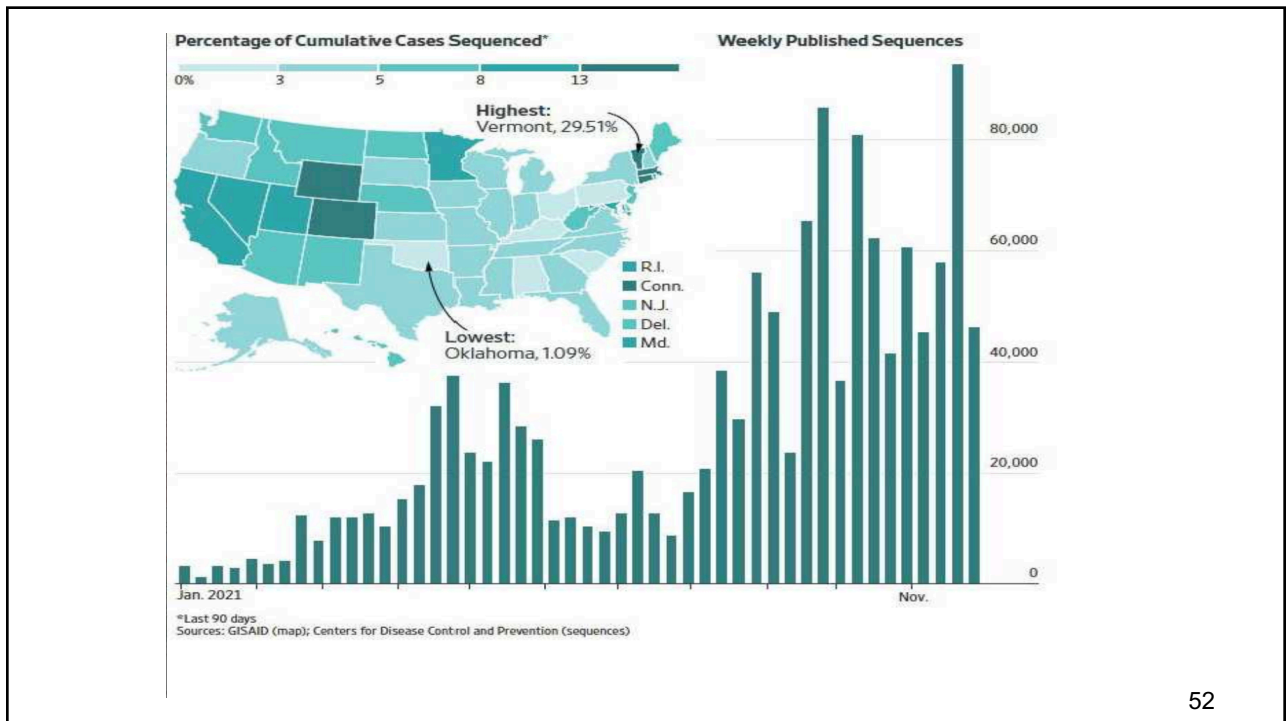
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Some Lessons from this Pandemic:
We Were Not Prepared!

- Failed to recognize spread by asymptomatic individuals (unlike SARS but like many other coronaviruses)
- Lack of global or regional coordination or strategic planning (WHO was mostly left out)
- The “diagnostic gap”
- Failure to implement systematic epidemiologic surveillance
- Public health mostly sidelined
- Shortages of essential supplies (like PPE)
- Misinformation (“infodemic”)

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READY FOR THE NEXT DISEASE X?

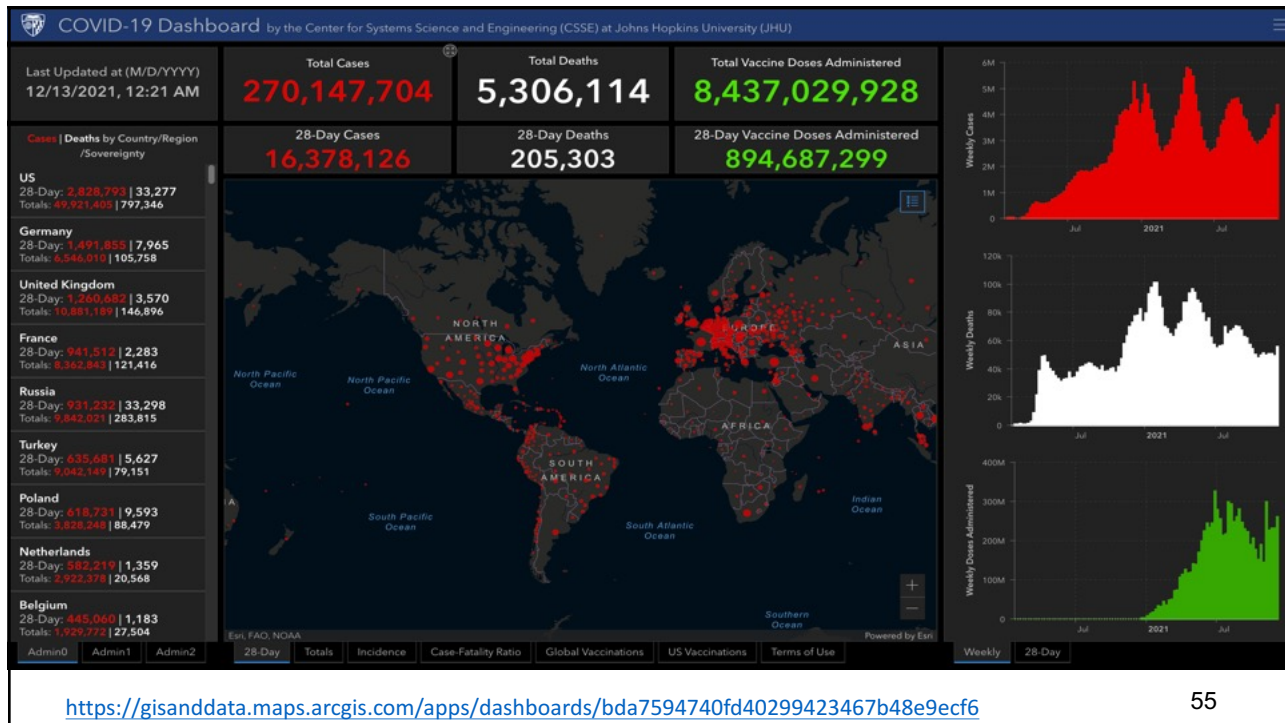
WHO 2020 Annual review of diseases prioritized under the R&D Blueprint

- **COVID-19**
- Crimean-Congo haemorrhagic fever
- Ebola virus disease and Marburg virus disease
- Lassa fever
- Middle East respiratory syndrome coronavirus (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS)
- Nipah and henipaviral diseases
- Rift Valley fever
- Zika
- “Disease X” *

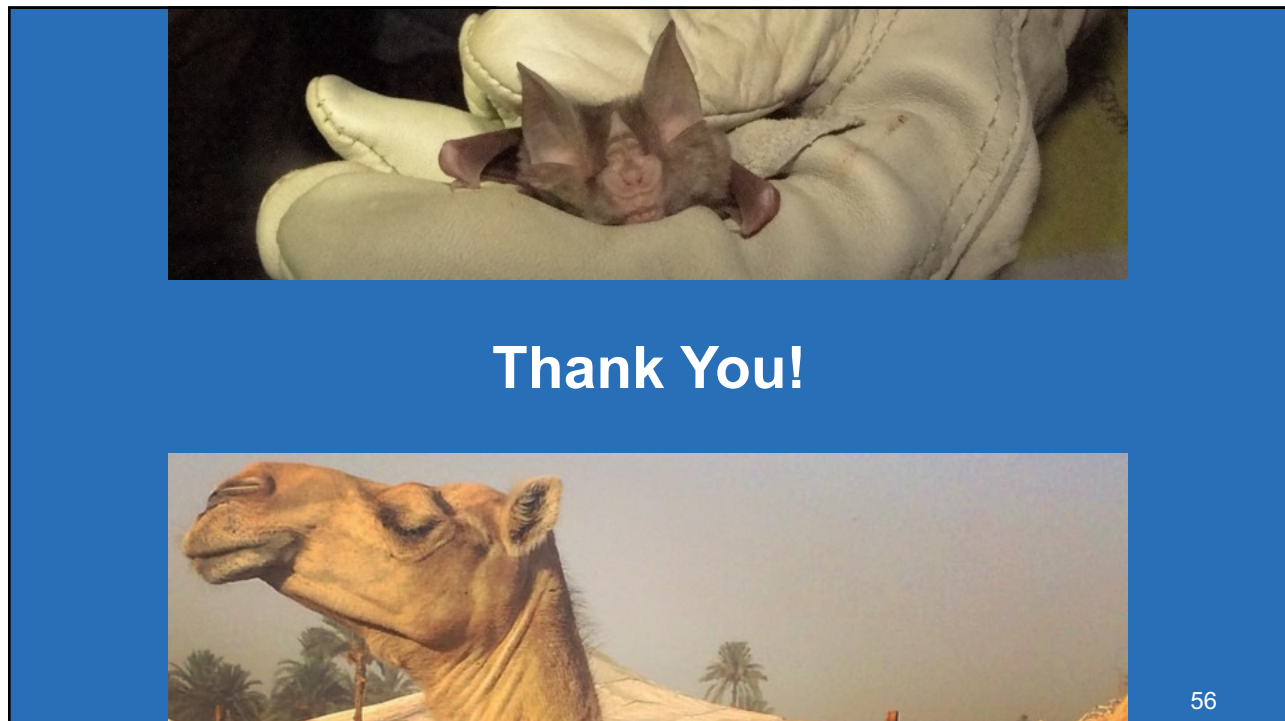
** Disease X represents the knowledge that a serious international epidemic could be caused by a pathogen currently unknown to cause human disease. The R&D Blueprint explicitly seeks to enable early cross-cutting R&D preparedness that is also relevant for an unknown “Disease X”.*

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COVID-19/SARS-CoV-2 Pandemic: Dress Rehearsal for “Disease X”? FOR “DISEASE X”
Prof. Steven Morse, Columbia University Mailman School of Public Health
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COVID-19/SARS-CoV-2 Pandemic: Dress Rehearsal for “Disease X”? FOR “DISEASE X”
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January 13, 2022	<p><i>(FREE Teleclass)</i></p> <p><u>ONE HEALTH FOR HUMAN HEALTH CLINICIANS – IN LIGHT OF COVID-19, ARE WE APPROACHING A ‘TIPPING POINT’?</u></p> <p>Speaker: Dr. Cheryl Stroud, One Health Commission</p>
January 19, 2022	<p><i>(South Pacific Teleclass)</i></p> <p><u>THE MENTAL HEALTH OF HEALTHCARE WORKERS IN THE COVID-19 PANDEMIC</u></p> <p>Speaker: Prof. Salut Muhidin, Macquarie University, Australia</p>
January 27, 2022	<p><u>CLINICAL SYNDROMES AND CONDITIONS WARRANTING EMPIRIC TRANSMISSION BASED PRECAUTIONS</u></p> <p>Speaker: Dr. Jennifer Cole, Avanti Hospitals, California</p>
February 8, 2022	<p><i>(FREE European Teleclass)</i></p> <p><u>THREE EARLY PIONEERS – WHO CAN STILL TEACH US A THING OR TWO</u></p> <p>Speaker: Dr. Evonne Curran, Glasgow Caledonian University, Scotland</p>

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