

COVID-19: Fighting a Fire Blindfolded

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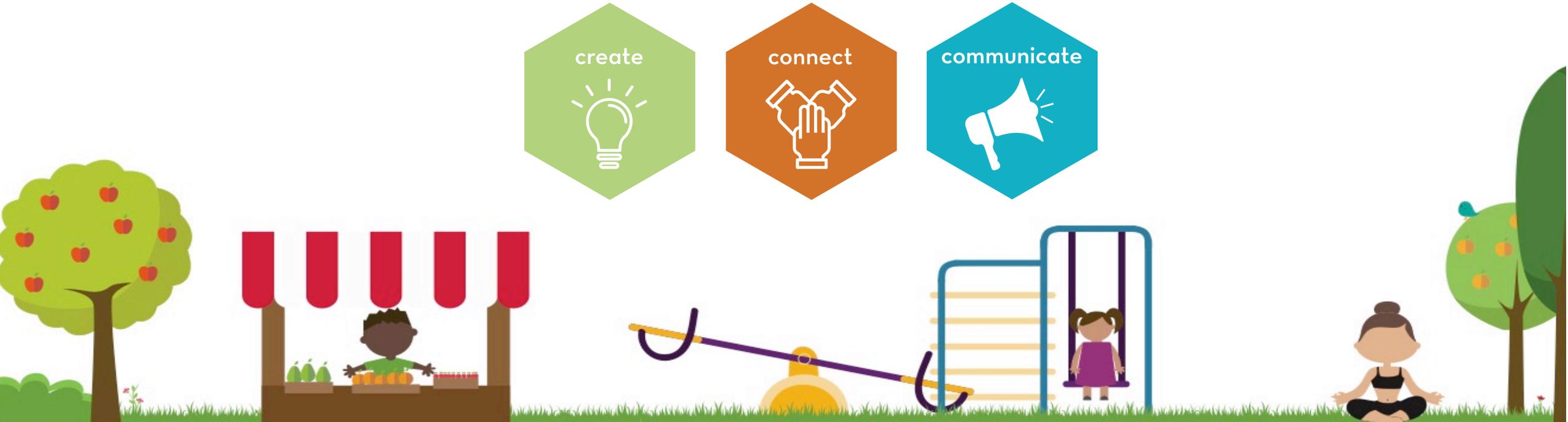


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STRATEGIC PLAN GOALS





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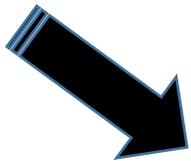
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WHAT IS A CORONAVIRUS?

**The virus is
named
SARS-CoV-2**



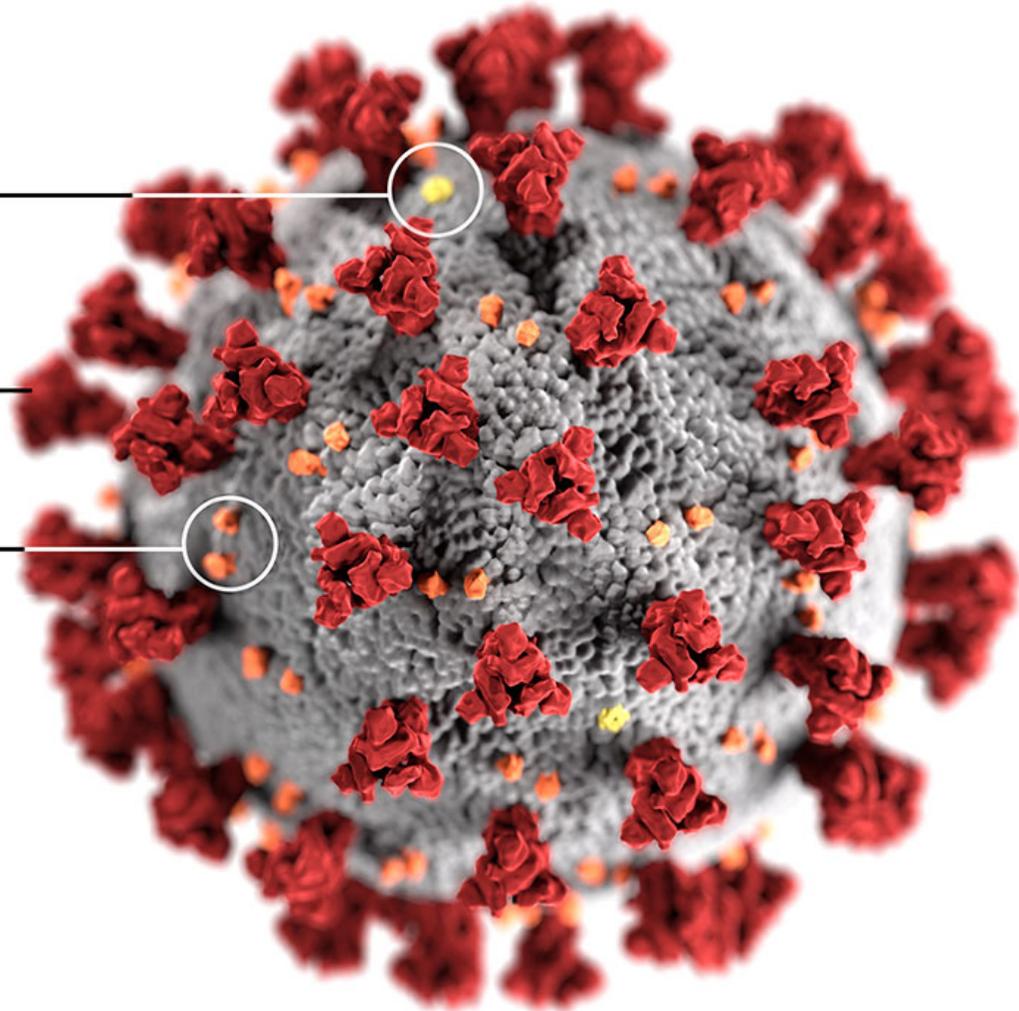
**The disease is
named
COVID-19**



E protein

S protein

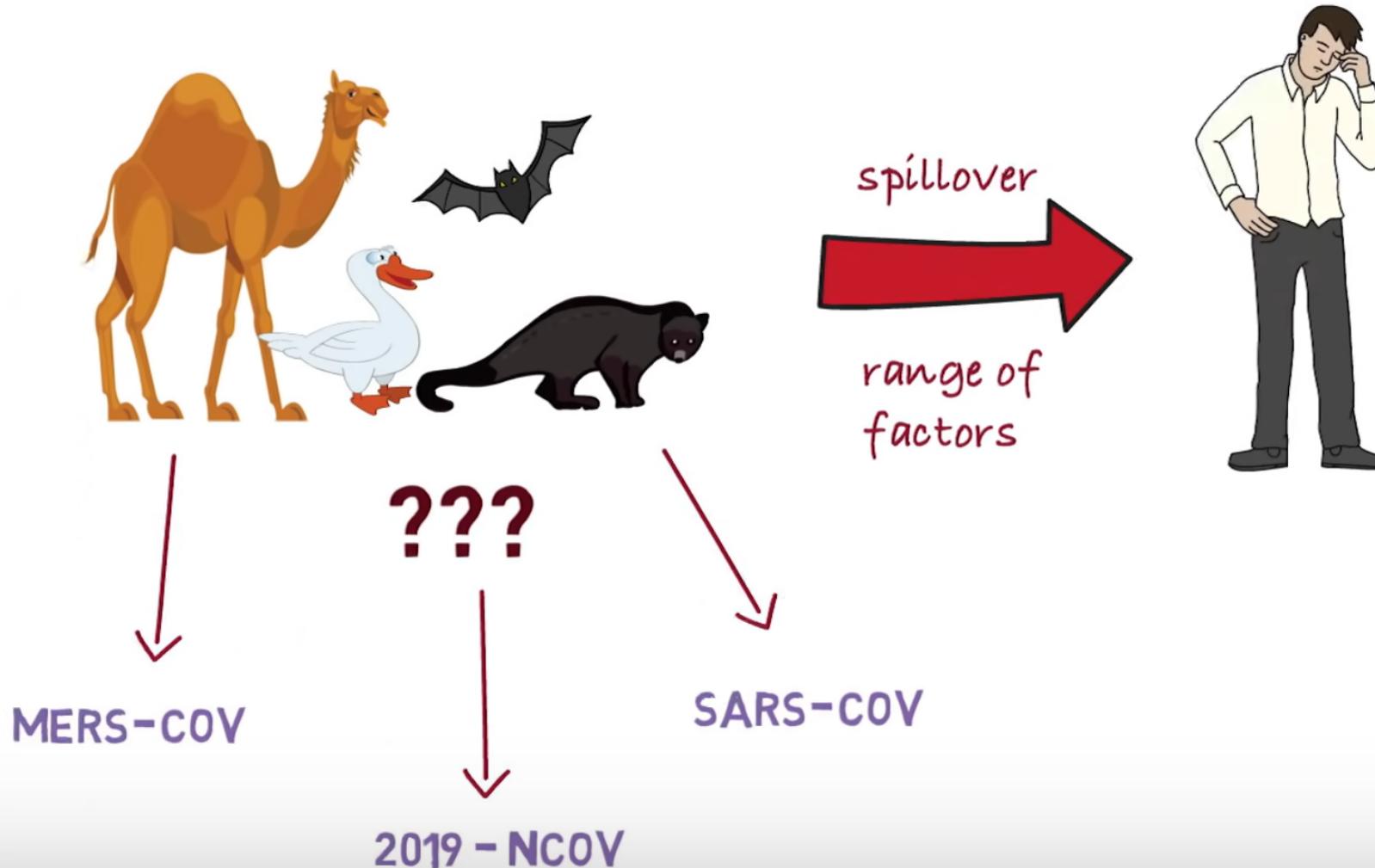
M protein



Coronaviruses can 'species jump'

When they do the results can be unexpected

The original host may have no disease, the new host very sick.



There are millions, billions or more likely trillions of viruses everywhere in nature including many unknown coronaviruses

KNOWN CORONAVIRUS FACTS

- **There are at least 36 known animal coronaviruses**
- **There are four human coronaviruses**
 - **They cause 1/3 of all common colds,**
 - **They are winter viruses**
 - **Immunity lasts less than a year**
- **SARS-CoV-2 infects both upper and lower airways.**
- **Its spikes attach to the ACE-2 receptor, common receptors found throughout the body and in the lung**
- **The spike is then cleaved by furin which allows it so enter the cell. Furin is ubiquitous in cells.**

CLINICAL SIGNS AND SYMPTOMS

SYMPTOMS

What is known so far

mild -----> severe



fever



cough

shortness of breath

Pneumonia

Kidney failure

Death

Play (k)

Mortality rate - not known yet

MILD DISEASE

- **Asymptomatic (50-80%)**
- **Body aches, headache**
- **Tightness of chest**
- **Dry cough**
- **Short of breath**

SEVERE DISEASE

- **Can be biphasic**
- **Widespread viral pneumonitis**
- **Acute Respiratory Distress Syndrome**
- **Cytokine storm**
- **Cardiac injury; heart failure**
- **Kidney failure**
- **Multi system failure**
- **Mortality 5-16% (Hospitalized)**

MMWR. March 31st,2020
Underlying conditions in 5143 COVID-19 patients with severe disease
Rates of hospital and ICU admission

Underlying health condition/Risk factor for severe outcomes from respiratory infection (no., % with condition)	No. (%)			
	Not hospitalized	Hospitalized, non-ICU	ICU admission	Hospitalization status unknown
Total with completed information (7,162)	5,143	1,037	457	525
One or more conditions (2,692, 37.6%)	1,388 (27)	732 (71)	358 (78)	214 (41)
Diabetes mellitus (784, 10.9%)	331 (6)	251 (24)	148 (32)	54 (10)
Chronic lung disease* (656, 9.2%)	363 (7)	152 (15)	94 (21)	47 (9)
Cardiovascular disease (647, 9.0%)	239 (5)	242 (23)	132 (29)	34 (6)
Immunocompromised condition (264, 3.7%)	141 (3)	63 (6)	41 (9)	19 (4)
Chronic renal disease (213, 3.0%)	51 (1)	95 (9)	56 (12)	11 (2)
Pregnancy (143, 2.0%)	72 (1)	31 (3)	4 (1)	36 (7)
Neurologic disorder, neurodevelopmental, intellectual disability (52, 0.7%) [†]	17 (0.3)	25 (2)	7 (2)	3 (1)
Chronic liver disease (41, 0.6%)	24 (1)	9 (1)	7 (2)	1 (0.2)
Other chronic disease (1,182, 16.5%) [§]	583 (11)	359 (35)	170 (37)	70 (13)
Former smoker (165, 2.3%)	80 (2)	45 (4)	33 (7)	7 (1)
Current smoker (96, 1.3%)	61 (1)	22 (2)	5 (1)	8 (2)
None of the above conditions [¶] (4,470, 62.4%)	3,755 (73)	305 (29)	99 (22)	311 (59)

DIAGNOSIS

- **Polymerase Chain Reaction detects viral RNA specific for SARS-CoV-2.**
- **Specimen is swab from nose or pharynx**
- **Only valid the day it is taken**
- **Result may be false negative**
- **Negative does not rule out COVID-10'**
- **Antibody tests for IgG and IgM under development**
- **Persistence of antibody unknown, but may be short (only a year or two)**

Some people require more than one test because of false-negative

The number of COVID-19 tests carried out will be similar to the number of people tested, but they won't be quite the same, because some people may need to be tested multiple times.

Several reasons why someone infected has a false-negative result:

- They may be in the early stage with a low viral load**
- They may have no major respiratory symptoms.**
- Problem with sample collection, so very little sample to test.**
- Poor handling and shipping of samples and test materials.**
- There may have been technical issues inherent in the test.**

The WHO suggests that these issues should be taken into account and that for some people, tests should be carried out several times

TREATMENT

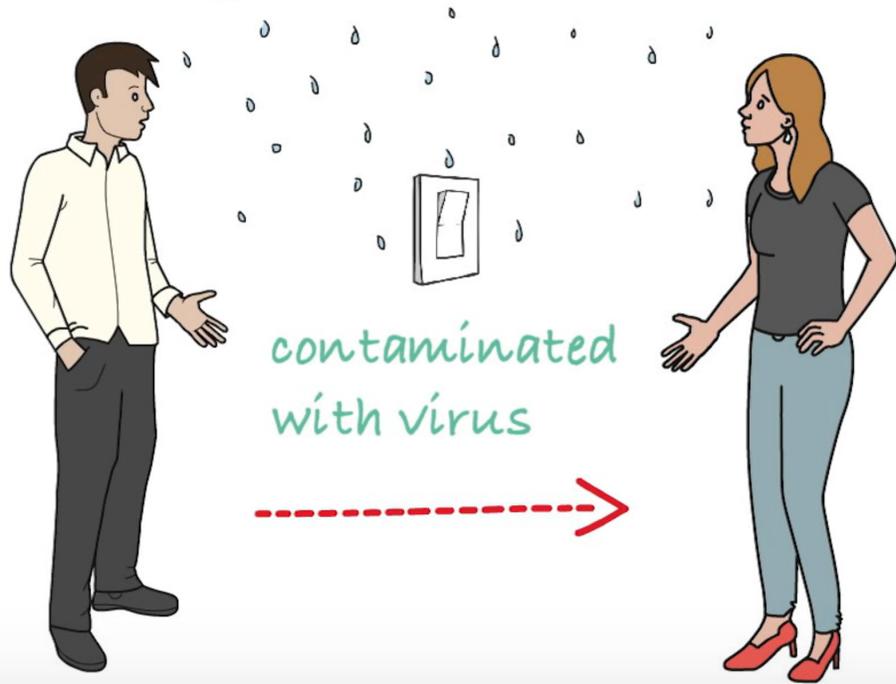
TREATMENT IS SUPPORTIVE CARE

- **There are no specific antivirals but antivirals in use for other diseases being tried**
- **Immune serum from recovered patients being tried.**
- **No results yet**

SPREAD OF THE VIRUS_c

TRANSMISSION

exact dynamics yet to be determined
generally



cough or sneeze

GROUPS MOST AT RISK

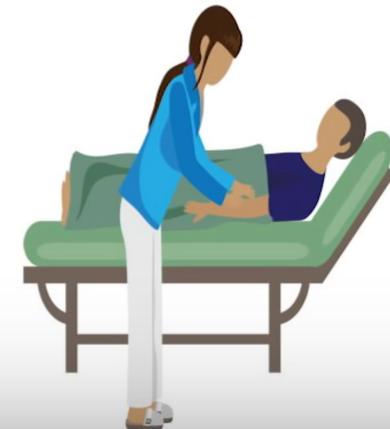
close contact with
animals

live animal
market workers



caring for those
with infection

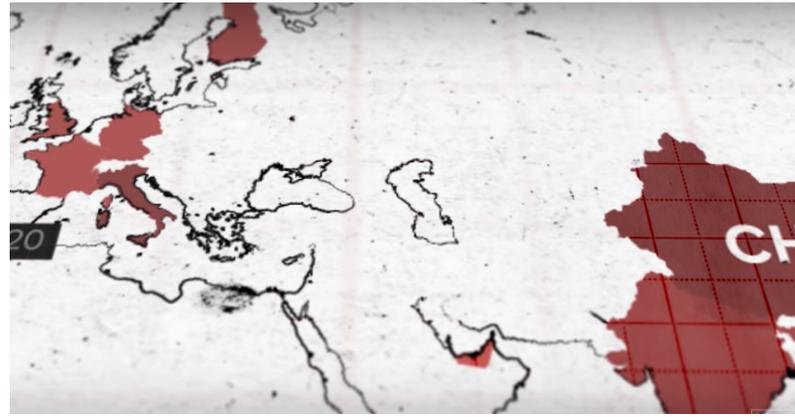
family members or
healthcare workers



SPREAD IN CHINA, ITALY, SPAIN USA AND THE ROLE OF TRAVEL

The seafood market in Wuhan China where the coronavirus apparently started
December 2019







**Chinese New Year Celebration
Millions traveled throughout
China**





终点站/ 经停站
To/Via
武汉 WUHAN

航班状态
Status

取消 CANCELLED

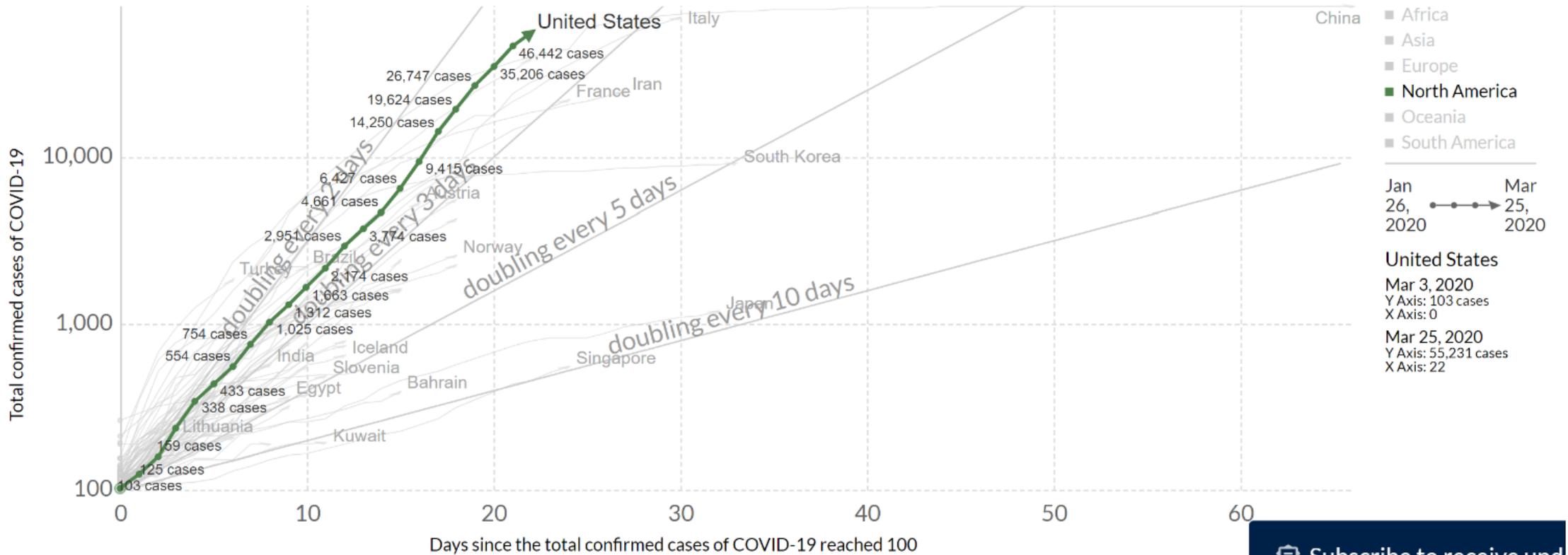
Total confirmed cases of COVID-19

The starting point for each country is the day that country had reached 100 confirmed cases

This allows us to compare the trajectory of confirmed cases between countries.

The number of confirmed cases is lower than the number of total cases. The main reason for this is limited testing.

LOG



Source: European CDC - Latest Situation Update Worldwide

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ITALY: Speed of Spread

February 20th, 2020

- **Patient 1, aged 30s admitted to Hospital with atypical pneumonia, positive for SARS-CoV-2**

February 21st, 2020

- **36 more cases admitted with no link to patient 1.**
- **Assumption the virus was circulating widely so decision made to cohort patients in 15 first responder hub hospitals**

ITALY

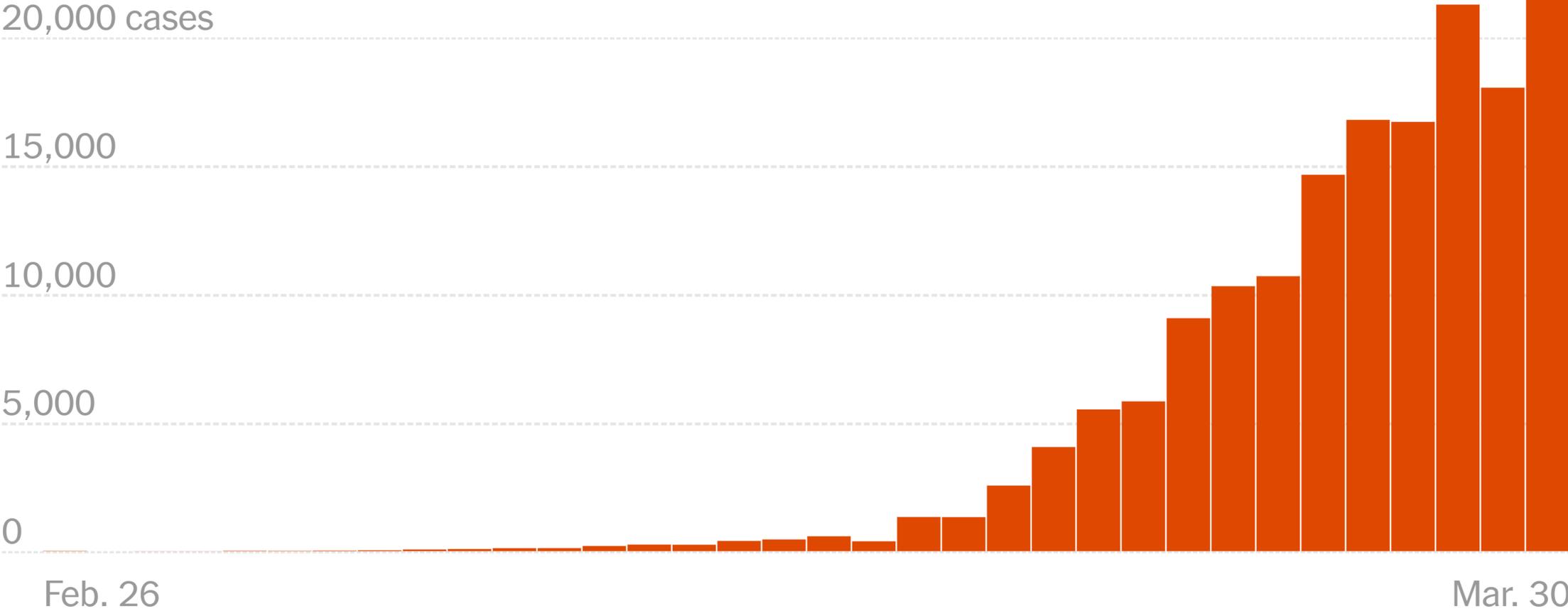
HOSPITALS

- **Surge in ICU admissions represents 12% of the total positive cases, and 16% of all hospitalized patients.**
- **This rate is higher than China, where only 5% of patients who tested positive for COVID-19 required ICU admission.**

SKI RESORTS

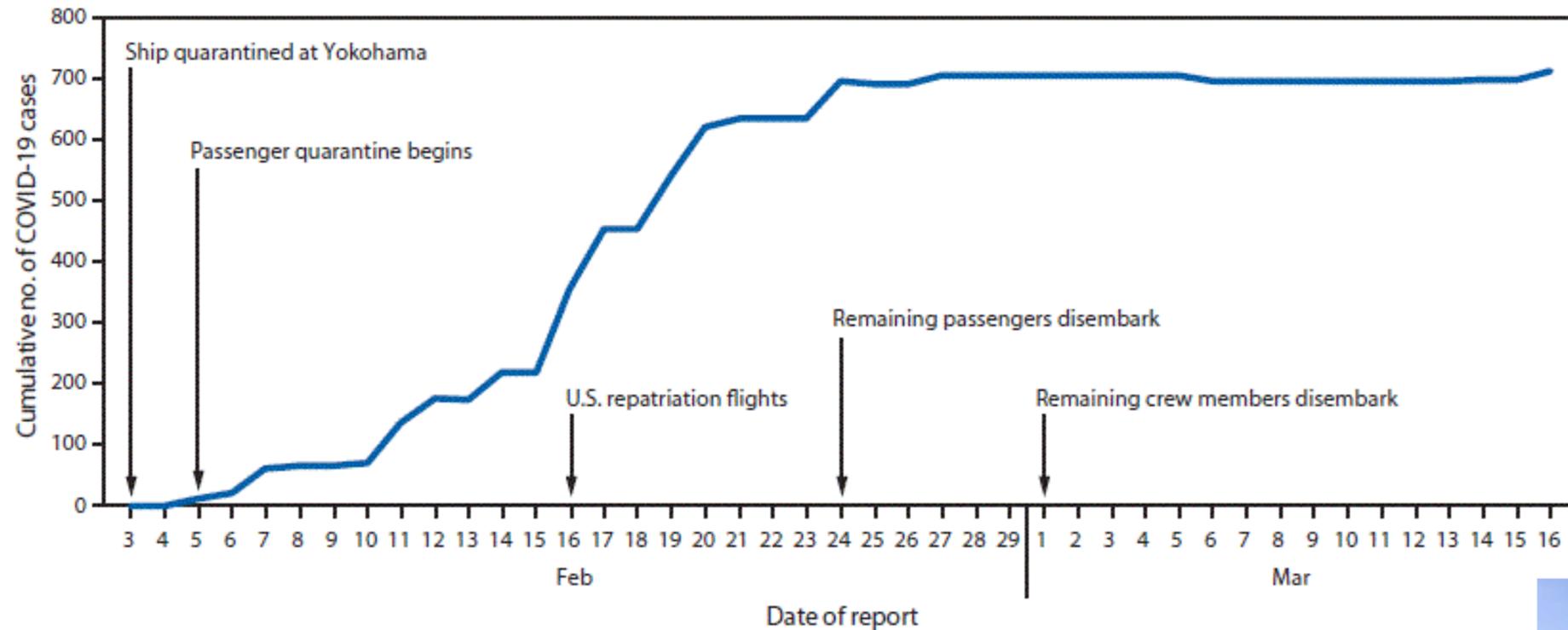
- **A worker fell ill at the Ischgl resort, in the province of Tyrol, in February.**
- **Despite this, the slopes and bars at the resort stayed open for weeks**
- **The resort has been linked to hundreds of cases in Austria, Germany and Scandinavian countries.**

New coronavirus cases announced in the U.S. each day



TRANSMISSION: UNITED STATES

FIGURE 1. Cumulative number of confirmed coronavirus disease 2019 (COVID-19) cases* by date of detection — Diamond Princess cruise ship, Yokohama, Japan, February 3 – March 16, 2020



Source: World Health Organization (WHO) coronavirus disease (COVID-2019) situation reports.
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/>



Super spreading event

- **About 50 people gathered for a birthday party in the upscale suburb of Westport, CT then scattered across the region and the world, taking the coronavirus with them.**
- **Westport, a town of 28,000 on the Long Island Sound, did not have a single known case of the coronavirus on the day of the party. It had 85 ten days later, up more than 40-fold in 11 days.**
- **The partygoers — more than half of whom are now infected — left that evening for Johannesburg, New York City and other parts of Connecticut and the United States, seeding infections on the way.**





MARDI GRAS: THE PERFECT STORM



The first case confirmed 13 days after Mardi Gras (Feb. 25) and happened in New Orleans. Mardi

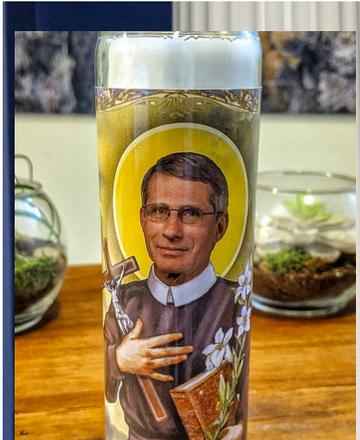
- Louisiana, experienced the fastest growth in new cases in the world. The current trajectory of case growth in Louisiana was similar to those in Spain and Italy.**
- Now the hospitals are overwhelmed and cases are seeded widely**

PREVENTION

**Where are the experts? We need them now;
We need the truth**



**Tedros Adhanom
Ghebreyesus**



Household name

PREVENTION

Limited geographic spread

Standard hygiene measures



covering mouth and nose



avoiding close contact with those who are sick



masks and PPE health care setting



handwashing



avoiding unnecessary contact with animals



thorough cooking



fever

cough

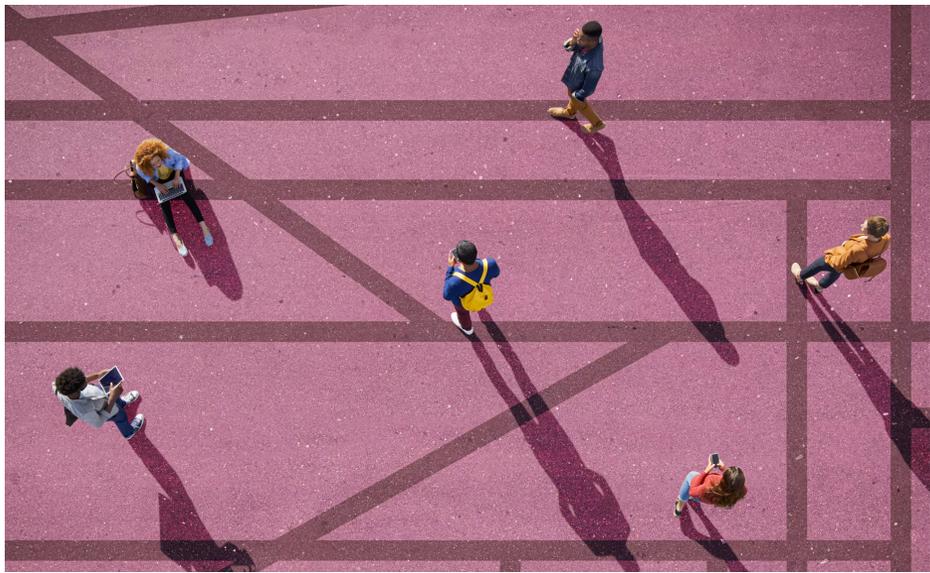
difficulty breathing

seek medical care early

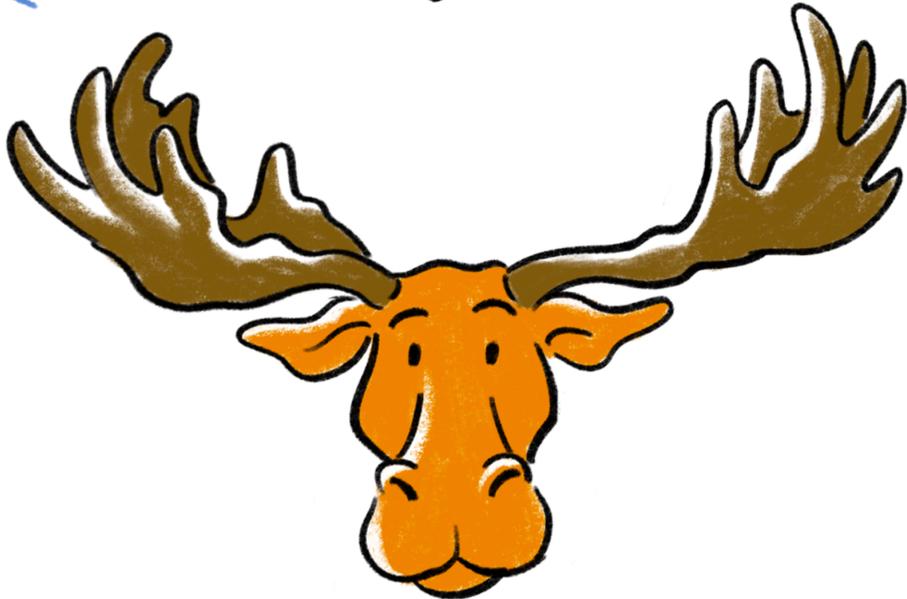
share travel history

HERD IMMUNITY

- **When people are infected by milder human coronaviruses that cause cold-like symptoms, they are immune for less than a year.**
- **By contrast, the those infected by the original SARS virus, which was far more severe, stayed immune for much longer.**
- **If SARS-CoV-2 lies somewhere in the middle, people who recover from their encounters might be protected for a couple of years.**
- **We need data to understand when immune citizens can return to work, care for the vulnerable, and anchor the economy during bouts of social distancing.**
- **We need to anticipate new waves of infection, or ongoing smaller epidemics, like the flu, which, like the poor is always with us.**

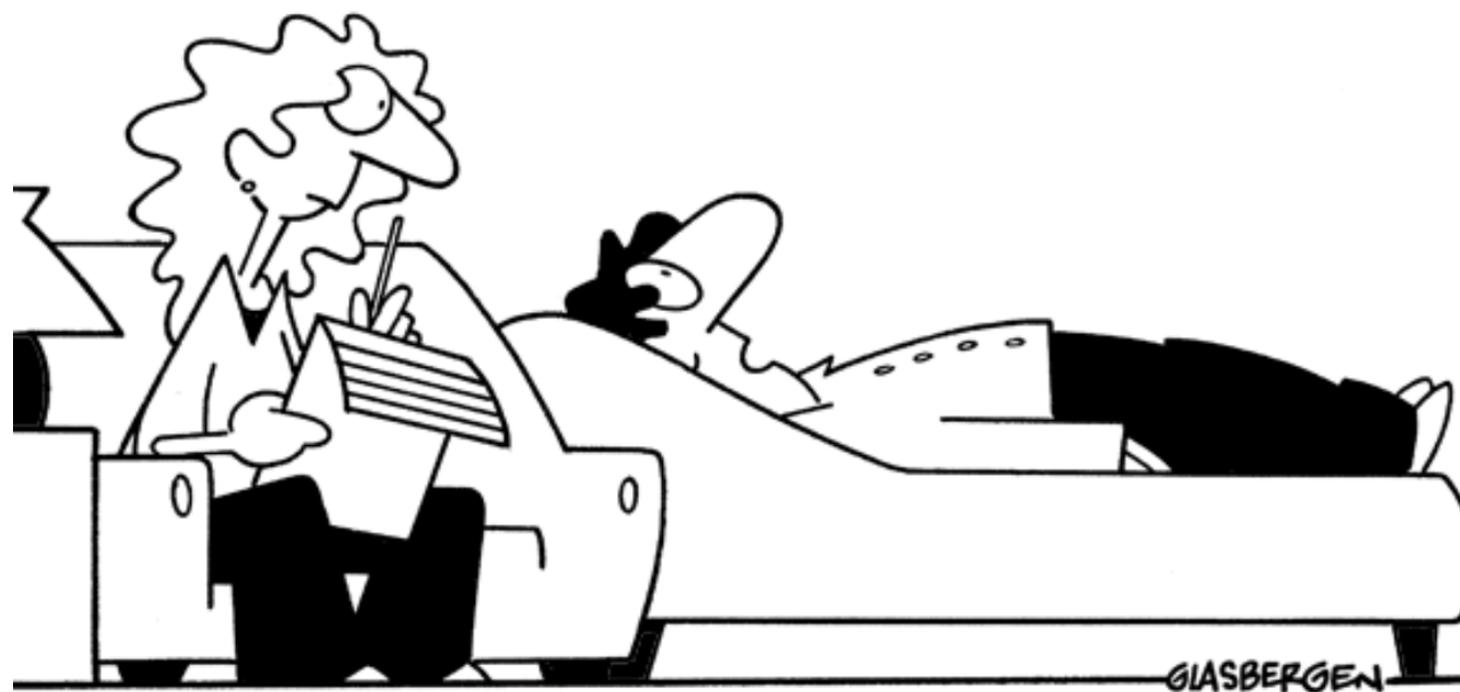


GUIDE TO SOCIAL DISTANCING





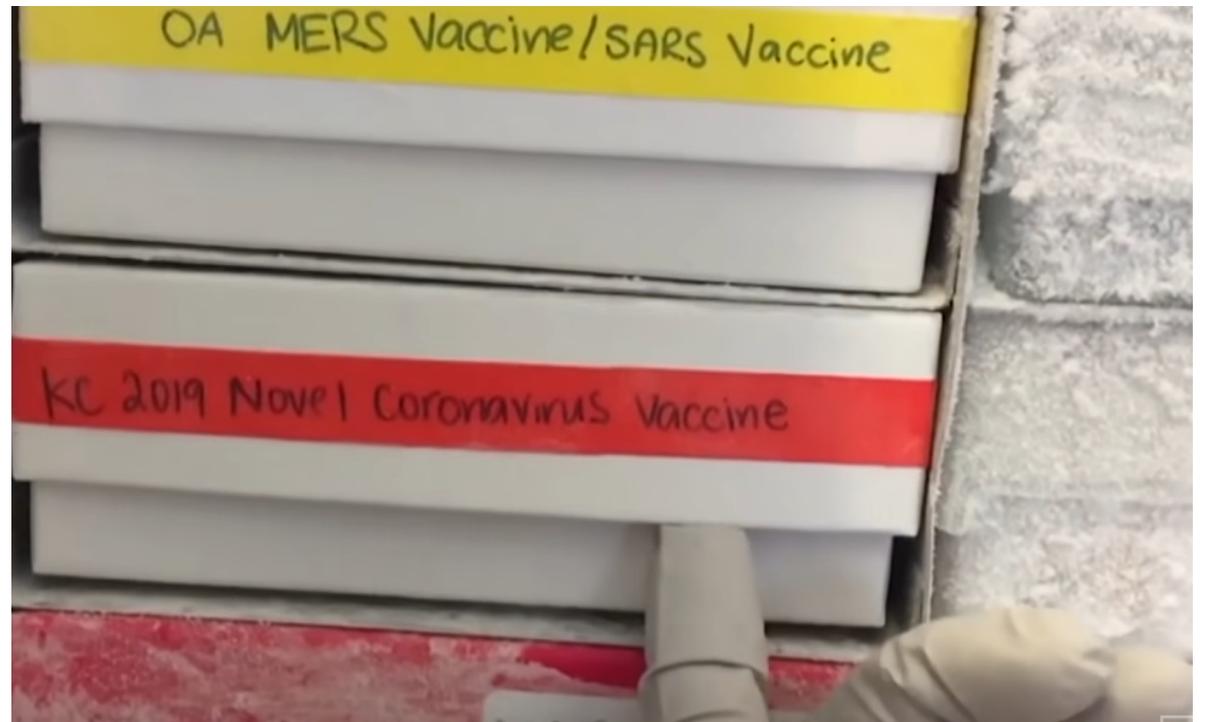
© 2010 by Randy Glasbergen.
www.glasbergen.com



“There are billions of germs, bacteria, and microbes living on my body...but I still get lonely sometimes.”

VACCINES

**Just as with Ebola, we have vaccines on the shelf. Never went to trials because of lack of funding
But first, we need to understand immunity to SARS-CoV-2.**



HOSPITALS: 'STAFF, STUFF, SPACE AND SYSTEMS'

STAFF

Physicians fled epidemics in ancient Greece, the Black Death in Europe, and the great influenza pandemic of 1918.

In Vietnam, when SARS cases occurred in one hospital, most of the staff left.

During the West African Ebola epidemic of 2014 and '15, at least 490/837 health-care workers died.

TORONTO 2003, SARS 44% of all infections were in health-care providers. Two nurses and a physician died

CHINA: about 3,000 health-care workers have been infected, and 22 have died providing care for COVID-19 patients. Transmission to family members is widely reported.

ITALY: at least 2,000 health-care workers have been infected and are not providing care. Among the 900 deaths in Italy on March 27, 51 were physicians.



STUFF



March 25th

New York hospitals have enough personal protection equipment for only the next two weeks, Gov. Cuomo said. The state also needs about 30,000 ventilators. The state has 4,000 ventilators in hospitals and another 4,000 on the way from the federal government. New York has also purchased 7,000 ventilators and is "still shopping,"

Hospital staff in New York improvising PPE using black trash bags.



SPACE

NEW YORK: Massive Emergency morgue in New York City



**Javitz Center in New York
Converted to Hospital for
Non Covid19 Patients**

**CHINA: Emergency hospital in
Wuhan built in just 10 days**



SYSTEMS

ITALY

start of epidemic

- 1. Cohort ICUs for COVID-19 patients (separated from other ICU beds).**
- 2. Organized a triage to send patients for mechanical ventilation if necessary.**
- 3. Established protocols for triage of patients with respiratory symptoms, test rapidly and allocate to appropriate cohort space.**
- 4. Ensured that adequate personal protective equipment (PPE) for health personnel is available but was not enough in the end.**
- 5. Reported every positive or suspected critically ill COVID-19 patient to the regional coordinating center.**

Non urgent cases cancelled, and 482 ICU beds created and staffed within 18 days

Our World in Data

Oxford University

Oxford Martin School of Global Development

<https://ourworldindata.org/>

Research and Media

Science nature PNAS  **BBC** The New York Times 
 theguardian THE WALL STREET JOURNAL.  The Washington Post **Vox**

Teaching

 HARVARD UNIVERSITY **Stanford** **Berkeley**  UNIVERSITY OF CAMBRIDGE  UNIVERSITY OF OXFORD 

STIGMA AND PERCEPTIONS

Most residents were exercising recommended vigilance, Mr. Haskell said, but one call that stuck out to him was from a woman awaiting test results whose entire family had been exposed to the virus. “She wanted to know whether or not to tell her friends and social network,” he said, because she was worried about “social stigma.”

“I don’t believe I’m the problem anymore,” the South African at the party in Westport told The Sunday Times. “It seems that the real problem is now the people who are too scared to say anything. The problem is the ignorance of the public.”

MYTHS Corrected

- **COVID-19 virus CAN** be transmitted in hot and humid climates.
- **Cold weather and snow CANNOT** kill the coronavirus.
- **A hot bath does NOT** prevent the new coronavirus disease.
- **The new coronavirus CANNOT** be transmitted through mosquito bites.
- **Hand dryers are NOT** effective in killing the 2019-nCoV.
- **UV lamps should NOT** be used on skin as UV radiation can cause skin damage.
- **Spraying alcohol or chlorine all over your body will NOT** kill viruses that have already entered your body.
- **Vaccines against pneumonia do NOT** provide protection against the new coronavirus.
- **NO** evidence that regularly rinsing the nose with saline protects people from infection
- **NO** evidence that eating garlic protects people from the new coronavirus.
- **Antibiotics do NOT** work against viruses, only bacteria.

URGENT

What needs to be done?

- **Widespread random community testing to identify silent hot spots**
- **Contact tracing to identify people needing testing**
- **Delivery of timely and accurate information and recommendations to people in hot spots**
- **Dissemination of timely, accurate local information to population**
- **Prioritize support of hospitals, medical staff, first responders, police etc for PPE and testing**
- **Reinforce to public importance to maintain shelter in place.**

Thank You!

